

QST FM

volume 2, number 5

IN THIS ISSUE

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FCC
ANTENNAS
SOLID-STATE COR

NEW ENGLAND
ARRL
CONVENTION

JUNE 1 & 2

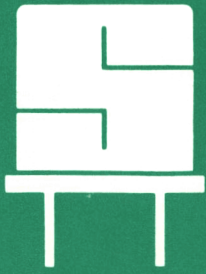
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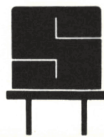
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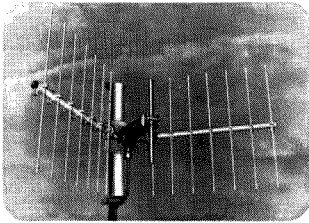
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FM is a monthly publication devoted to the gathering and dissemination of information concerning amateur radio FM and material that is of particular interest to amateur FM operators; the promotion of FM as a recognized segment of amateur radio; and the exchange of information on a national scale between amateur FM operators and organizations.

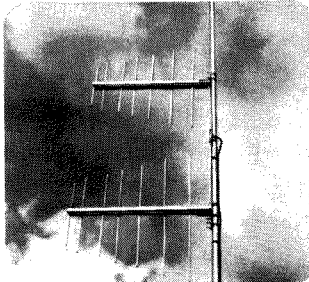
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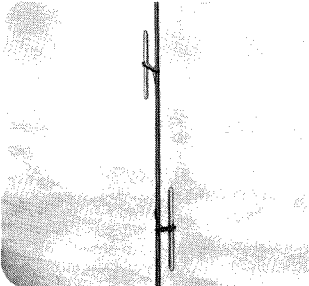
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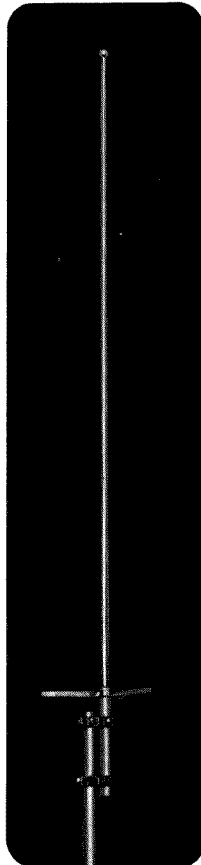
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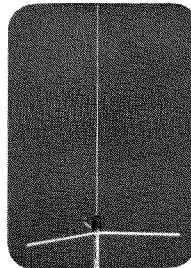
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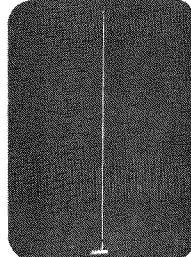
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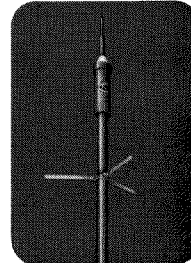
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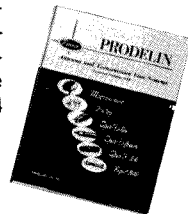
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the national scene: Paramus EXPO Report

New inroads

The past few weeks have been pregnant with promise for amateur FM radio. The now-famous Buffalo Petition has been assigned an FCC docket number, and top FM men from all over the country have had the opportunity to review the proposal and proffer suggestions and comments of their own.

The
ARRL
sits
up ...

Even the League has raised its official, conservative, and traditionally unchanging eyebrows to consider the impressive interest in FM by amateurs across the continent. At the recent VHF Conference and Exposition in Paramus, New Jersey, League representative Ed Tilton -- long-rumored enemy of FM and its "channel" concepts -- declared publicly that the League would support the Buffalo petition, and would encourage FM operators to take a more active interest in improving the legislation concerning repeaters and remote control.

... and
takes
notice!

ARRL director Harry Dannals and Bill Dunkerley (assistant secretary) caused a general FM chin-dropping when they announced that the 1969 ARRL Radio Amateur's Handbook would contain a complete chapter on FM repeaters and repeater control techniques. They went a step further by calling upon key FM repeater men to provide the input data for the chapter.

Unprecedented
turnout
jars
observers

No previous FM event has aroused the League's interest quite so much as the May FM Forum at the Expo in Paramus. ARRL vice president Soupy Groves was "surprised" at the FM'ers' response. The Expo, planned primarily as a VHF conference, was expected to be dominated by VHF DX'ers and moonbounce men. The special moonbounce symposium, held during the three-day exposition, drew a crowd of some twenty-five, and hopes began to dwindle for the success of the FM forum (scheduled to follow the moonbounce talks).

... as FM'ers
arrive
early...

But the FM'ers confounded the guessers by turning out 300 strong. Additional chairs had to be trotted out to accommodate the growing throng. What shocked the non-FM'ers even more was the fact that after a five-minute break which followed two hours of technically involved speeches and talks, the crowd returned. The only noticeable vacant chairs after the first half were those of the League's representatives. The FM'ers stayed on. And on.

...and stay late



EXPO '68 HIGHLIGHTS

Above (cover): EDITOR MEETS PUBLISHER! Ken Sessions and Mike Van Den Branden shake hands for the first time when they meet at Expo. The little-known fact is that Mike and Ken have been jointly publishing FM entirely by correspondence and telephone calls. Both later admitted they were almost afraid to meet each other for fear their personalities might conflict. Their fears proved unfounded and the two spent the whole night of their first meeting formulating plans for the future.

The impressive assembly at right represents some of the top FM men in the country: organization spokesmen and local leaders from many active FM areas.

The photo at the upper right shows the FM booth at Expo. On the walls around the rear of the booth are shown block diagrams and coverage charts of several noted repeater installations. The cut-in at the bottom of this photo shows a suitcase repeater (left) and a two-meter rack repeater. The suitcase repeater operated on 450 MHz and the cabinet was a standard .34-to-.94 type. The two were interconnected so that signals coming in on either repeater keyed the outputs of both. The two tabletop GE units were simplex base stations for 146.94 and 52.525 MHz. Sentry Manufacturing Co. provided the crystals for the displays, as indicated by the sign in the lower right. Naturally, all units were right on channel.

Left to right in the standing group of the lower left photo are Ken Sessions (K6MVBH), Gordon Pugh (W1JTB), Robert Pederson (K2IEZ), Pat Devlin (WA5BPS), and Mike Van Den Branden (WA8UTB). Seated at right is Gary Hendricks (W3DTN), who recorded the minutes of the FM conference.

The cut-in at the bottom is a photo of the audience taken during the final hour. Note that most chairs are still occupied.

The small photo (lower right, central) shows the site of the Paramus Expo. The building teemed with hams, listeners, and curious onlookers.

Mike shows FM to a group of non-FM hams in the lower right photo, as Glen Pohl, FM circulation manager, looks on.



FRONT ROW (Left to right): Barry Mitchell (W3WKV), Maryland Emergency Net; Robert Raper (W4DXC); Ken Adams (K4MOC), Carolina Repeater Society; Gary Hendricks (W3DTN), Maryland FM Assn; Hugh Aikenhead (WA2ZZZ), Buffalo Repeater Assn; Gil Boelke (W2EUP), Buffalo Repeater Assn; Fran Stengel (K2GUG), Buffalo Repeater Assn; Bob England (W3JCN); Tom McKee (K4ZAD); John Harris (W4TYS), Carolina Repeater Society; Warren Middleton (W4DYE), GE-Lynchburg; Bob Pederson (K2IEZ), Northeast FM Repeater Assn; Pat Devlin (WA5BPS), Tulsa Repeater Organization; John Longley (W2ANB), Northeast FM Repeater Assn; Harry Preston (W1VSI), Northeast FM Repeater Assn; Earl Baldwin (K3LLI), Northeast FM Repeater Assn; Al Gaughnour (K3PQZ), Pennsylvania FM Assn; Warren Severence (K1BKK), Northeast FM Repeater Assn; Gordon Pugh (W1JTB), Northeast FM Repeater Assn; Hugh Wilson (K2ISO), Buffalo Repeater Assn.



PHOTOS BY CARROLL WZAKR



About those 10-codes ...



Do you consider the operating habits of FM'ers to be merely stereotypes of CB channel procedures? Is an FM'er any lower a grade of amateur because he may use a 10-code occasionally or refer to operating frequencies as channels? Following up with a few additional questions will help to answer these: Can the average VHF'er, SSB'er, AM'er, or CB'er build and maintain radio-controlled remote base stations or repeaters? Would they know what these devices are? Can AM and CB nets handle emergency and public-service traffic with the efficiency and speed of the police departments?

Here's the point: FM operation is not really comparable to any other mode of amateur radio. But FM still holds a place for every type of communications interest!

Technical- For the builder, experimenter, and systems technician, FM unfolds new fields with repeaters, remote control, mobile telephone, and many other complex aspects of modern radio.

Nets- For those who like to handle traffic and participate in public-service programs, FM is rich with activities involving various police, civil defense, RACES, MARS, AREC, and other service organizations.

Mobile- With FM repeaters, low-band (6 meters) and high-band (2 meters) mobile units can enjoy extended coverage in nearly every metropolitan area of the United States. Ranges from 50 to 75 miles, mobile-to-mobile, are not at all uncommon using today's advanced FM communications through amateur repeater networks.

DX- For the VHF'er who looks continually over the horizon for new contacts, the remote base stations and repeaters make ordinary ground-wave contacts seem like a band-opening.

Yes, there is more to FM operation than just yakking and passing along signal reports. FM operation is alive with creativity, originality, and professionalism. The resemblance between FM and CB is purely coincidental!

Mike Van Den Branden
Publisher

Bill Strack
11052 Wickford Drive
Santa Ana, California

touchtone as a STANDARDIZED control approach

by Bill Strack WA6ZTJ

Bell's dialing system provides the means by which a flexible yet standard set of conventions for amateur remote control can be established.

Many FM'ers, in examining the various methods of tone control currently in use, have come across a new name. No doubt most of us have heard of the Touchtone telephone signaling system developed by the Bell Telephone Laboratory, already in use in many areas of the United States.

The Touchtone article by K3DSM in the April issue of FM cited a few of the key characteristics as well as some original applications. This article is intended to augment K3DSM's material by providing more detailed data on the Touchtone system and describing additional control applications.

Touchtone consists of eight discrete tone frequencies arranged in two groups of four tones each (a high group and a low group). Sixteen digits can then be represented by the combination of one tone from the high group with one tone from the low group. The individual frequencies and various combinations are illustrated graphically in the K3DSM article.

In standard telephone use, only ten of the possible sixteen digits are used. The remaining six are used for special-purpose applications. In order for the FM'er to decode the ten standard digits, seven individual tones will have to be processed.

With only slight modification to the digit-formation logic in the decoder, the two other functions will also be picked up. That is, the four low tones and three of the high tones will allow for the selection of twelve separate functions, a sufficient number for most remote control applications.

By this time, it has probably become pretty clear that Touchtone is a relatively complicated approach in comparison to other techniques in vogue. For example, the signals require more circuitry for decoding than do those of the AFSK dial pulse or the single-tone pulse-train systems enjoying current popularity in amateur remote control applications.

So why go to a complex method when so many simpler systems are available that will provide the same results? Completely ignoring the advanced technology of Touchtone, the system is highly versatile and is unique in that it has the lone potential of becoming a truly universal control scheme.

Of prime importance is the Touchtone encoder (or "pad"). The Automatic Electric pad that a W2 in New York buys and puts into service with his facility will be the exact equivalent of the Western Electric pad in use by the W6 in Los Angeles. The tones will be within a few hertz of each other even over a very wide temperature range. These two FM'ers could drive from state to state using any system setup for these tones, as long as they had the capability of operating on the correct radio frequency in each case.

Let's look at the functional requirements of your system. If you need less than seven functions, you have no need to bother decoding the dual frequencies. If two adjacent buttons on the pad are pressed simultaneously, only a single tone will be produced. Making a slight modification to the pad so that the 941 Hz tone can be sent independently, you will have seven individual tones that can be decoded in standard fashion.

With a little bit of help from our national FM journal, certain frequency/function standards can be established and used consistently across the country. For those of you who like the compatibility angle but don't want every Tom, Dick, and Harry to have the same control tones you use on a restricted control frequency, the solution to your dilemma rests in use of a small vibrating reed and associated parts: compatibility without universal accessibility.

The superiority of Touchtone in marginal-strength areas over any sort of dial pulse approach is clear. It is safe to say that regardless of the type of tone system you are now using (or contemplate using), going to Touchtone or standardized single tones will provide you with a versatile and technologically up-to-date control system that has the potential of being used in a multiple-user, statewide, or perhaps -- eventually -- nationwide repeater or remote base system. Even if you have no desire to become part of a large complex of remote systems, the inherent advantages of Touchtone over the other control techniques tends to justify its use.

What are the problems involved in sending and decoding Touchtone signals? The first basic premise is one that pertains to both sending and decoding: Whenever the two-tone combination needs to be limited, watch out! If hard limiting -- as in the clipper of the transmitter -- occurs, exit Touchtone! One of the characteristics of extreme instantaneous limiters or clippers is to accentuate any differences in level that were already a part of the tone combination. Make certain that the transmitted tone amplitude is such that

no clipping occurs when the transmitter is set for correct deviation on voice.

Due to the fact that amplitude differences are naturally quite low as a result of encoder design, and all the tone components are within the flat frequency response area of most FM equipment, there will be no difficulty if limiting does not occur.

The process of decoding the Touchtone signal after it arrives at the receiver is an area where there are a number of successful methods in current use. The most sophisticated -- and probably the most complicated -- is that which was originally proposed by Bell and is used in Bell equipment. It consists of separating the two-tone combination (via band elimination filters) into groups consisting of all applied frequencies except the high-group or low-group sequence that is to be eliminated. This is done so each tone component can be regulated separately, hard limiting successfully applied, and each group treated discretely after this point in decoding.

After group limiting, selective filters separate the individual tones. Each filter has a corresponding detector and output circuit as well as an output timer and checking circuitry. The active elements are solid-state components of standard design.

As might be expected, this decoder represents an "optimum" design approach. The time required for the decoder to recognize a valid digit combination is a quick 40 milliseconds. The number of false indications due to voice energy or noise tripping is next to none.

For those of us who refuse to look at anything less than the absolute ultimate, this is THE decoder, already neatly designed and optimized. The only hangup is the fact that Bell is somewhat reticent about making available various critical parts used in the design. Fortunately, there are ways by which the amateur can circumvent this problem.

HOW TO GET THE

MOST

FROM YOUR MOBILE

by Bill Harris K9FOV



an FM sermonette

Bill Harris
414 Bomberding Ave.
Lafayette, Indiana

There are two pertinent factors upon which the successful operation of a land-mobile radio station hinges; they are: (1) quality of installation and maintenance, and (2) operator technique. This article will endeavor to help you with the first.

You probably already have at least one mobile unit in the family ornithopter, but perhaps you're contemplating the addition of another. Or possibly a change of cars is in the offing. Perhaps you're a new FM'er with a fresh unit and you're preparing to install your first unit. In any case, some of the hints here might be good to keep in mind at installation or maintenance time.

The first item of note has little to do with actual installation, but it will have a great deal of bearing on the operation and performance of your unit; that item is the crystals you intend to use for transmitting and receiving. **DON'T TRY TO SAVE A BUCK OR TWO ON CRYSTALS!** What you may have saved in dollars will not buy back what you will have lost in performance through the use of substandard crystals. Twelve or fourteen dollars for a set of Sentry crystals may seem high, but bear in mind that it will be a one-time investment; they'll last the lifetime of the rig, and the frequency will be the same the day your radio dies of old age as it was on the day of its birth. The rule is: Get the crystals made for the unit and you will never have frequency stability and drift and "bad rock" problems that might otherwise cripple the rig. And **NEVER** try to "fake" the crystal with one you just happen to have lying around the shop. With conventional ham radio, such tactics are clever; with FM, they're crude. Quite understandably, it's the most common mistake FM newcomers

make. If you're a newcomer and you've committed this sin, rectify it now by ordering your trouble-free crystal and slipping it quietly into place when it arrives. Do it without fanfare and no one will ever know.

It goes without saying that the mobile rig should be checked completely before installation, and all noticeable defects corrected at that time. In this way, you can spot such problems as broken cables, loose connections, and the like while you can still get at them. This can prove to be a pretty handy tip if there's no one within 80 miles of you who has the necessary jig and cables to fire up your unit on the bench. Troubleshooting in the trunk of a car tends to be a time- and gas-consuming headache, especially when the difficulty is serious and the light is poor.

You can help to overcome the potential problem of inadequate lighting by taking the time to install a simple light on the inside of the deck lid. Most auto parts stores sell mercury-switch lights that can be installed in minutes; such lights go on when the lid goes up and go off when the lid is shut. (At least the instructions say the light goes out when the lid goes down; it would be an interesting object of research to check the validity of the statement. Maybe I'll do some study along these lines, but it will have to wait until I'm finished with my current "refrigerator-light" effort.)

Look at your car as a rolling QTH -- not necessarily as an "unspoiled thing of beauty and a joy forever" when installing the radio. Unless you use it only to drive back and forth to church once a week, it's going to show the inevitable signs of wear soon enough anyway. So at least give some consideration to mounting the antenna in the roof if at all possible.

Contrary to popular opinion, the small hole in the roof does not depreciate the value of the car these days. And if you don't believe that statement, ask any car dealer. If it's the effects of the hole that bother you, take heart: A good make of antenna properly installed will not leak.

Unless you use a car-top carrier a good part of the time, the space up there is going to waste. So why not use it -- you won't regret it.

Even if you're a six-meter FM'er, a roof mounting antenna will be less directional than a rear-mounted ball and spring.

Never use a bumper mount on six meters. Inherent band noise is worse on six than it is on any other amateur band; A bumper-mounted whip compounds the problem in two ways: it puts the antenna close to the ground (which is a noise source in itself) where signals find it difficult to compete with road garbage; and it hides the antenna behind the mass of the car. On any other rear-mounted type of installation, the car mass reinforces the signal by lending it gain and directivity off the front (at the sacrifice of side coverage, of course); but this is not so with the bumper mount.

Other types of antenna installations to stay away from if you're making it a permanent hookup are gutter clamps, jiffy mounts, trunk-groove and magnet-base mounts and their ilk. For the most part, they give misleading vswr indications and result in high radiation angles due to their self-resonance and inherent inductance in the ground return. Also, they tend to leave the transmission line and coaxial termination out in the open where eventual deterioration is inevitable. To top it all off, the kink in the cable where the door, window or trunk lid closes will ruin it in short order.

And while we are discussing the cable aspect: Upon installation and periodically thereafter, carefully check the transmission line; replace it if it shows signs of degradation, crushing, or right-angle bends. It may not show up on a vswr meter, but weather contamination or center-conductor migration will wipe out a lot of performance.

When installing the unit, fasten it firmly to the floor. In the case of a front mount, get some heavy trunnion brackets made and use them to bolt the case to the dashboard (and to the floor or fire-wall, if possible). There are several

sound reasons for mounting the rig securely: For one, the same amount of rf current that goes to the antenna must flow through the car body, and it does not generally prefer the dynamotor ground lead or the coax braid for its path to ground. The battery current WILL, however, tend to return through the coax braid for its ground path, particularly if the negative cable connection happens to loosen a bit. This will tend to affect the receiver sensitivity due to increased vibrator hash pickup along the lead.

The last reason I wish to expound in favor of fastening the rig securely is one that has probably never entered your mind: Say you are involved in a wreck and you hit something head-on or roll the car a time or two. What will you have accomplished if you are kept intact by the seat belts only to be decapitated by your faithful old 80D (which weighs something like 1400 pounds at 60 miles per)?

Inside the cockpit, mount the speaker where you can look directly into it when you're sitting in the driver's seat. It's usually better not to give the preferential location to the control head, and stash the speaker way up under the dash panel where it can talk to all the defroster ducts and wiper cables. Since the control head is a set-and-forget device, it should be the item mounted in the more remote spot. In any case, intelligibility of signals will be greatly improved by judicious situation of the speaker; and likewise, intelligibility will be seriously degraded if the speaker is not mounted reasonably close to the listener, and positioned toward the listener's ear.

If the speaker has a warped or torn cone, replace it. It's an inexpensive item to buy, but it is still one of the weakest links in your radio system. In addition to affecting the readability of signals, a speaker with a rubbing voice coil will actually increase the apparent noise in the audio. (Standing waves here, too.)

The mike cord deserves some consideration, too. What could be more hazardous than snagging the mike cord in the wheel as you tool around a tight corner?

A little thought goes a long way in terms of safety, comfort, and convenience.

Sit in the driver's seat and close your eyes; angle your right arm straight out and lay your palm on the dash. That's the spot where the mike bracket should be mounted. Unfortunately, in 98% of the newer cars, this spot is infeasible, so try to find one that is not. In any event locate it where the operator can grasp it without taking his eyes off the road.

Here's a helpful hint on cables: Remove the cables from the battery and carefully clean the connectors and the battery posts with soapy steel wool and warm water. At the same time, it's a good idea to clean off all foreign matter from the top of the battery. Rinse the area well, then dry it off and reconnect the cables to the battery. When the reconnection is completed, spread a thin coat of silicone grease over the connection; chances are you'll never have to wade through the oxidation again (and neither will the current to the battery from the generator or from the battery to the radio or starter, I might add).


Don't forget an ignition tuneup or any other noise suppression that may be necessary. (There are many articles and books available on this subject.) Of course, FM is not as susceptible to noise as some of the other modes, but it is by no means immune; it's just that you don't notice noise presence so much because of the squelched receiver.

After the unit is installed and peaked to the antenna, check with someone to make sure you are transmitting on frequency; if warranted, make any necessary adjustments. The closer you get to frequency, the stronger your transmitted signal will seem. At this time, zero the receiver oscillator onto channel by monitoring a known signal with a discriminator meter. Get a few modulation reports, and adjust the transmitter deviation as necessary.

This should find you all set to go FM mobile. Just remember, you'll only get out of your unit what you have put into it!

... K9FOV

lowering the frequency on commercial omni gain antennas



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AT
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WAVELENGTH
MULTIPLES
OVER
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If you've ever passed up the chance for a bargain on a good Prodelin Omin-6 or Com-Prod Stationmaster simply because it was cut for some frequency in the commercial band, you can start kicking yourself. There is a little trick you can play with capacitance to bring the frequency down to two meters without sacrificing any significant amount of gain.

The cost? Probably about a quarter! All you need is some aluminum foil plus a modest amount of electrical tape. After a half-hour with the antenna and a Bird Thru-Line wattmeter, you should have it tuned and ready for use on the frequency of your choice.

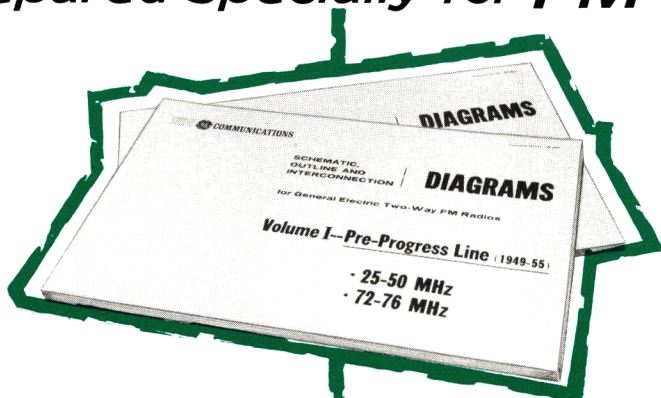
How to Do It

Cut the foil into a half-dozen or so inch-wide strips of about ten inches length. Support the antenna horizontally on two non-conducting pillars so it rests as far off the ground as possible. Connect the transmitter to the antenna through the wattmeter, and adjust the plug to read reflected power (so that arrow on wattmeter plug points to transmitter). With transmitter keyed, wrap one of the strips around the antenna at its base, and gradually shift its position for minimum reflected power. Once the position has been ascertained, secure the strip well with electrical tape.

When the first strip has been taped down, repeat the process a half-wavelength from the first. The exact half-wavelength distance can be readily determined by the sudden drop in reflected power. Secure the second strip with tape, and repeat the process all the way up the antenna.

If a 1:1 match is obtained before reaching the last half-wavelength portion of the antenna, remove all strips and start over using thinner pieces. The resonant frequency is properly lowered when all half-wavelength spots have been encircled and the wattmeter shows no power reflected.

Prepared specially for **FM'ers**



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FM Reviews GE's Newly Released Pre-Prog Schematic Collection

by Don Milbury W6YAN
STAFF TECHNICAL CONSULTANT

The increasing number of requests at GE from amateurs seeking to buy schematics on older GE FM equipment has prompted the manufacturer to publish two volumes of detailed schematics and circuit data on the complete series of Pre-Progress Line units. Volume I covers low-band units (25 to 50 MHz and 72 to 76 MHz); Volume II covers high-band (150 to 174 MHz) and UHF (405 to 475 MHz).

When the editor handed me a copy of Volume I to evaluate for FM, he instructed me to be especially critical; to look hard for shortcomings and weak points. Cite the merits, he said, but don't gloss. I didn't realize at that time how difficult the task would become, because the deeper I delved into Volume I, the more impressed I was with its content. I found some bad points, all right, but it took a lot of looking.

I could easily summarize the whole review with the statement that GE has turned out a collection of schematics that is as complete and thorough and professional in appearance as the original equipment it represents.

The most important "plus" is the fact that the Volume I collection is not merely a compilation of schematics pulled from GE manuals. It's obvious -- from the very first page -- that the book was prepared as a complete work in its own right. It is NOT a montage of pullouts and pastes-ups. It is apparent that all entries, notes, hints, suggestions, and individual circuits were originated or tailored expressly for this publication. Each diagram is sized for the book's page dimensions (11 x 17 inches); and many of the

sheets contain special notes and data not found on the schematic page of the original manual.

A particularly good feature is that for each model, the latest version of the model series is shown. This allows amateurs to add components and circuit elements or make minor modifications to update their early models of a series.

Volume I (and presumably Volume II) had to be prepared or planned by a service technician. It contains a lot of extras that could only be appreciated by those of us who have to really dig in to troubleshoot: The book contains not only circuit diagrams (which would be useful enough, admittedly), but complete tube pin voltage-reading data and listings of normal test-point voltages.

Simplified tuning procedures -- applicable to all GE receiver and transmitter units -- are other extras that warrant mention. GE should be particularly lauded for including special cautions in the receiver alignment procedure to deter the tweak-happy. The cautions reinforce the emphasis on restraint spelled out in "The Fine Art of Receiver Alignment," FM, March 1968.

To keep the low-band volume universally appealing, GE has thrown in (there's probably a better choice of words, considering the exceptionally well-planned layout) diagrams and notes of particular interest to repeater builders. Typical examples of these are application notes, schematic diagram, and parts list for a carrier-operated relay, diagrams for remote control units, ac power supplies, and cathode-follower audio circuits.

Review (continued from page 15) .

Probably the most glaring discrepancy is in the crystal-ordering data. GE has very obviously expended a great deal of effort to include comprehensive and precise crystal-correlation information. But there was no mention of Sentry or International. While it is understandable that GE would not want to commercially endorse a specific company, it does seem that GE must be aware of the problems so often caused by using inferior crystals. Thus, in this case, it would seem that the advantages of a Sentry endorsement would far outweigh the disadvantages. It pains me to think of all the drifting, off-frequency signals we'll be hearing as the hordes of newcomers carefully correlate the oscillator data from the GE book and innocently order crystals from Cheapie Rock Chippers, Inc. It's doubly shameful because GE has been in the two-way business a long time and should know better.

There were very few minor errors, and those I found were for the most part insignificant (such as a 6AQ7 tube being marked 6AQ5 in an outline diagram). I would like to have seen part numbers included for major components, too -- but not at the expense of anything that is included in the volume. But the lack of part numbers is compensated for at least partially by the thorough listing of component values and ratings.

If I had manuals for all the Pre-Prog items in Volume I, I would commit them to attic storage and use nothing more than the single volume. In my opinion, it is a terrific buy, even if purchased for but a single piece of equipment. For serious FM'ers, the GE collection is a must, and should make GE as popular in our ranks as Motorola.

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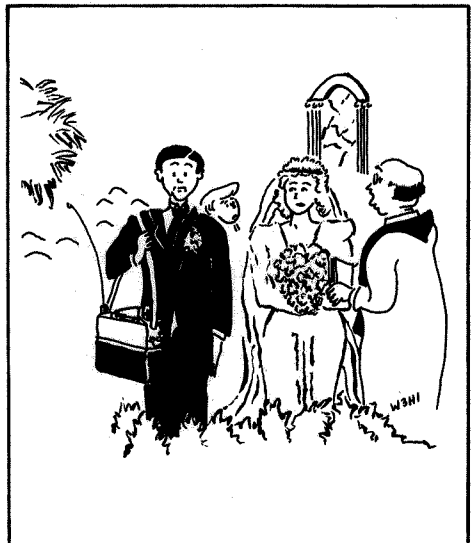
FM SERVICE CENTER

by DON CHASE WØDKU

Are you having trouble with spurious emissions from the transmitter of a GE Progress Line unit "locking up" your GE repeater? Two sources of trouble are the 6678/6U8A tube (modulator) and the 6677/6CL7 tubes. The 6678/6U8 can be replaced by a 6GH8, which usually seems to cure this problem.

Here's a hint if you're having trouble neutralizing a high-power two-meter power amplifier: Try hooking the output of the driver to the output of the power amplifier; then remove the B+ from the power amplifier and watch the grid current of the power amplifier as you adjust the neutralizing capacitor.

In severe cases of ignition noise in your mobile unit, check the polarity of the ignition coil. Cases have been found that required nothing more than swapping the primary leads to bring the noise down to a listenable level.





by Bob Lyon

WA6DTG

The low prices and ready availability of Motorola tube-type Handie-Talkies make them ideal units for ham use. The 150 MHz quarter-watt unit (FHTRU-1 etc) is particularly desirable for two-meter use because it is small and lightweight, and it can be converted with a minimum of modification.

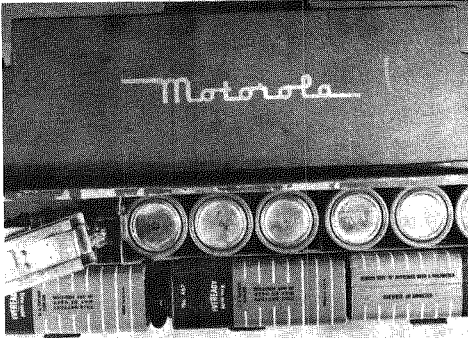
For serious AREC work, the Handie-Talkie is almost indispensable, because it allows the operator to get right in and move to where the action is. Emergencies know no limitations, and can happen where there is no power avail-

able. Or they can happen TO the power. So, it pays to have the capability of maximum transportability in preparation for any type of unforeseen situation.

The major nuisance with Handie-Talkies is the battery pack aspect: Batteries are expensive and cannot last long under the drain of heavy or repeated use. One way to preserve the batteries and squeeze additional performance from the hand-carried radio is to build up an ac supply capable of adequately powering the unit when it is not in use in the field. This ac supply can also be used to provide a

limited charge for the B batteries during periods of nonuse.

The radio portion of the Motorola Handie-Talkie is built on a long subchassis that mounts on the larger battery box, serving as the base. The battery container portion of the unit makes an ideal chassis for an ac supply. If an extra one of these can be obtained, by all means use it for this purpose.



The bottom section makes an ideal chassis for an ac supply.

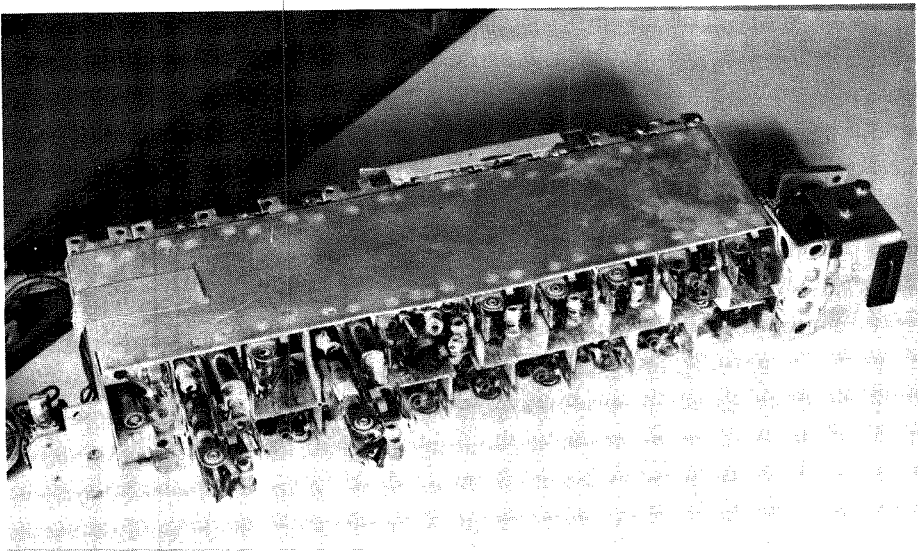
The following modifications will bring about satisfactory operation; however, it must be noted that great care must be taken to precisely follow directions because this unit is very responsive to any frequency deviation throughout. An electronic voltmeter is a must (VTVM or equivalent)!

Use a 1 megohm resistor on the tip of the voltmeter probe. Allow no more than a quarter-inch of lead to be exposed on the probe end of the resistor.

A communications receiver can be used to check peaking on the oscillator adjustment of the receiver and for the oscillator and multiplier adjustments of the transmitter up to 30 MHz. The S-meter will serve as a relative scale for this tuneup. A conventional two-meter FM base station receiver set to monitor first limiter current will aid in peaking the rest of the transmitter. Be sure to remove the antenna from the base station receiver and use a 4- to 6-inch piece of wire in the coaxial receptacle to attenuate the signal (otherwise the tuning will be too broad).

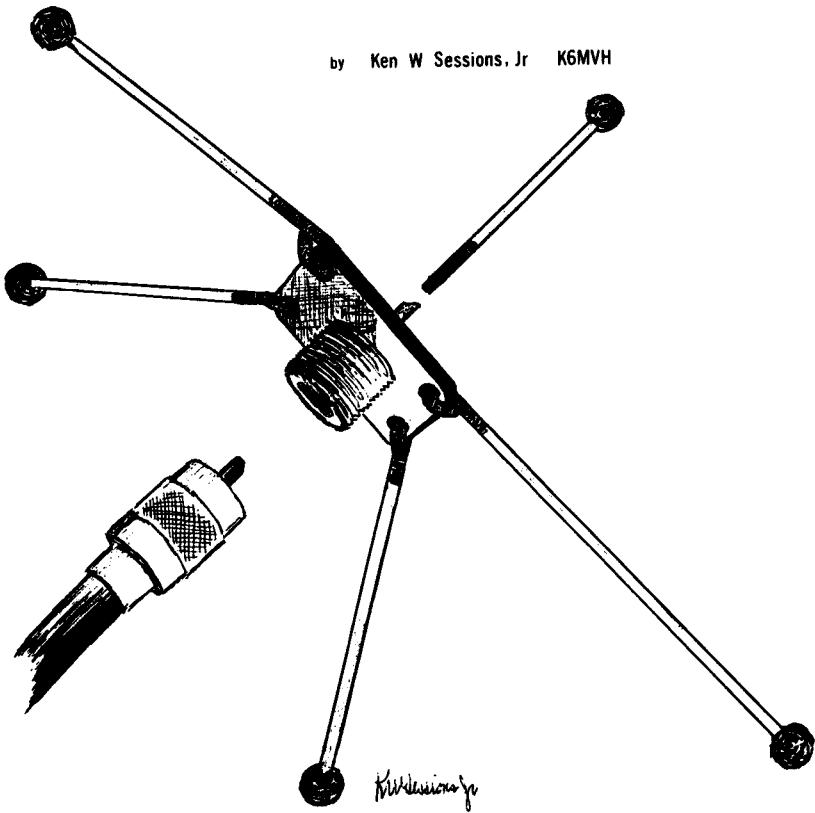
For receiver peaking, use the electronic voltmeter at the connecting terminals between 7U and 8U for all stages ahead of this. Then use the terminals between 9U and 10U to peak 9U. Use terminals connecting 9U and 10U to peak 9U. Then check 10U and 7U for best quieting and noise on frequency. The transmitter is straightforward and should give no trouble at all in tuning. (Continued on P. 32)

Belows Photo shows complete strip with modules. The transmit and receive oscillator modules have been slid forward for easy identification.



the COAt HAnGer groundplane

by Ken W Sessions, Jr K6MVH



For UHF and VHF applications in particular, the groundplane is perhaps the most utilitarian of all antenna types. It is simple to build and offers effective performance for both receiving and transmitting. The most economical of the groundplanes is the "coathanger" type, where the elements are cut from wire coathangers or some other stiff conductor (such as 10 AWG type TW copper wire). With a little imagination on the part of the builder, the coathanger groundplane can be made into a very professional-looking antenna.

To build up a quickie two-meter groundplane, you'll need five coathangers, five toy plastic beads, a chassis-mounting UHF connector, and some silicone grease.

The first step is cutting. Refer to the cutting chart to determine the lengths of the radials and the radiator, then straighten the wires and cut accordingly.

When the elements have all been cut to length, sand the protective coating from the coathanger wires for 3/4 inch at one

end of each piece. Most coathangers are coated with a heavy varnish-like compound to retard rust and corrosion. The sanding operation removes this coating and prepares the wire to accept solder.

The beads will be affixed to the unsanded ends of the elements. The beads offer an added measure of safety and give a professional appearance to the antenna. To attach the beads, heat the unsanded end of a wire on the kitchen stove for a few seconds; then, while the conductor is still very hot, press the bead down firmly over the wire end. The heat melts the plastic of the bead so that the stiff wire bores its own hole. Now, as the wire and bead cool, the plastic bead hardens and becomes securely attached to the end of the element.

The four screw holes in the chassis UHF connector will be the "solder lugs" for the radials. Using a pair of long-nose pliers, bend a "U" in the sanded end of each of the four longer pieces. (The shorter piece is the upright radiator, and requires no bend.) Allow no more than one-half inch for each bend, and be sure to keep each piece the same length.

Hook each bend into the UHF connector as shown in the sketch on the preceding page, then compress the joints with pliers. Try to keep each radial positioned so that it maintains a 90-degree interval from adjacent elements.

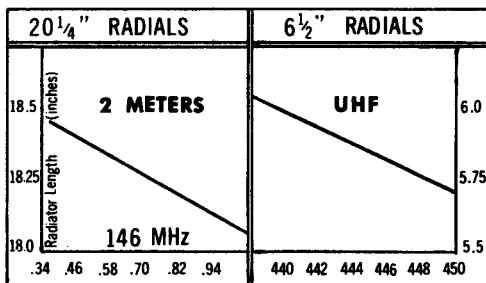
Before soldering, adjust the positions of the radials precisely so that a symmetrical cross is formed by looking directly down onto the antenna from the top. Then solder all connections with a heavy iron or gun. The chassis connector requires a considerable amount of heat to keep the solder flowing, and insufficient heat will mean cold solder joints.

When the radials have been soldered, insert the shorter upright piece into the "center conductor" soldering point of the chassis connector. Twirl the radiator in the tube as you solder to make sure it is tinned completely, but don't allow excess solder to build up to

the point where it exudes onto the dielectric. The characteristic impedance of the connector is determined by the dielectric material as well as the radial distance from the center conductor to the shield. If this distance is shortened in any way -- as from a blob of solder -- the characteristic impedance will be lowered and a mismatch will result.

When the joints have cooled, carefully bend the radials downward about 30 degrees from the horizontal. This will lower the radiation angle of the antenna and will result in a better match for a 50-ohm input impedance. Spread a generous amount of silicone grease over all connections to prevent corrosion and minimize the chance for water entry.

That's all there is to it; the antenna is ready to use. And in appearance, it's "just like downtown."



If you're thinking of building up this antenna to use in conjunction with a repeater or remote installation, there's one other trick of interest: Mount the thing upside down! Of course, this type of an installation would not be beneficial at all in run-of-the-mill applications, but it could mean the difference between "hearing" and "hearing nothing" on a mountaintop.

The groundplane characteristically has a very high angle of radiation. This problem is not too evident when the antenna is put into service in the lowlands; but when it is part of a mountaintop station, a high angle of radiation gets less and less tolerable. By mounting the groundplane so that the vertical radiator is suspended, the angle of radiation can be put to work FOR you. Try it! It really works!



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CHESS BY HAM RADIO

by

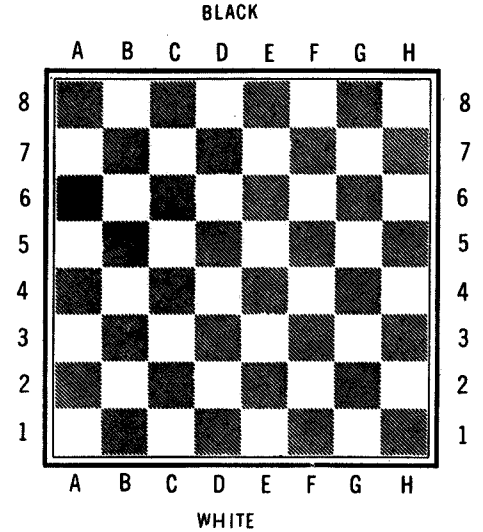
Kayla Bloom W1EMV

One of the enchantments of radio -- FM radio in particular -- is its flexibility of application. Radio usage need not be restricted to traffic handling, ragchewing, and DX-chasing. An increasing number of amateurs are discovering the potential of amateur radio for the play of various strategic games, such as chess, checkers, and -- with some adaptation -- even Scrabble.

Chess is perhaps the most popular entry in the radio games category because chess by radio involves no modification to the basic rules of play and there is practically no possibility for cheating.

Radio chess is played almost exactly the same as the game in which both participants sit opposite each other at a board. The only difference is that each player has a board, and each moves his opponent's piece as directed by the opponent himself.

If you're a chessplayer, you know already that each chess piece has its own identifying name, and no other piece on that "team" bears the same nomenclature. Likewise, each square of a chessboard bears a name. Thus, a player can move his piece to the square of his choice, and



then announce the move on the radio to his opponent. The opponent, in turn, makes the move as directed on his own board, then responds by making his own move and announcing it.

Chess by radio is an ideal pastime. It doesn't tie up spectrum or airtime because the only time necessary per transmission is the time it takes to call out a specific move and get a verification from the opponent. While an amateur radio chess game may go on for several hours, there may be less than 10 minutes of accumulated transmitting time.

Most serious chessplayers are already familiar with "descriptive notation," the means by which chess moves in tournament play are recorded for later analysis and replay. Descriptive notation is the system by which each square of the board is identified according to the original piece commanding that square. While this system is easily adaptable to radio play, it is often confusing to those who are unfamiliar with chess terminology.

It also suffers the disadvantage that the squares are numbered differently for White than they are for Black; thus, when Black announces his move, White must

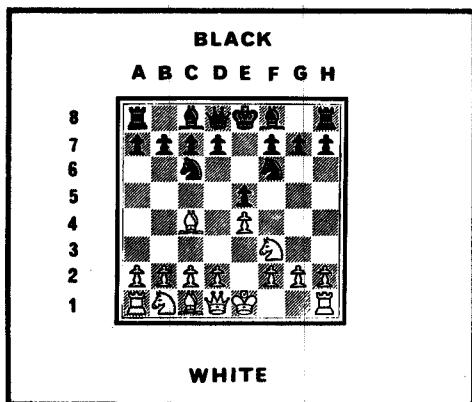
remember not to put Black's man on his own square of the same name.

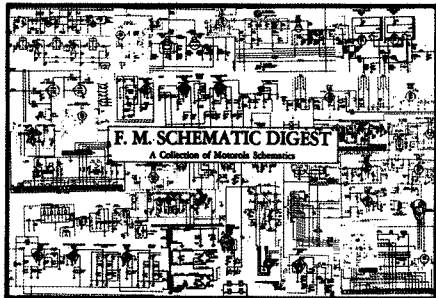
For these reasons, the matrix system (algebraic notation) is in more common general use by amateurs. With algebraic notation, the board is identified by ranks (horizontal rows) and files (vertical rows). The ranks are numbered 1 to 8 from bottom to top (from White's side); the files are identified by the letters A through H from left to right (White's side). This arrangement yields a matrix that pinpoints each square with a letter/number sequence.

Here's how the moves would sound in a typical opening of an amateur radio game:

1. White: "Pawn to E4."
Black: "Pawn to E4, Roger; and Pawn to E5."
2. White: "Pawn to E5, Roger; and Knight to F3."
Black: "Knight to F3, Roger; and Knight to C6."
3. White: "Knight to C6, Roger; and Bishop to C4."
Black: "Bishop to C4, Roger; and Knight to F6."
4. White: "Knight to F6, Roger; and ..."

The diagram below shows the positions of the pieces after these three initial moves. (The opening, incidentally, is called "Two Knight's Defense.")





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EDITORIAL

civil strife: LONG ISLAND versus POUGHKEEPSIE

A Long Island amateur group of 40 has filed a petition with the FCC against the Poughkeepsie Radio Club. Pat Veraldo, as acting secretary for the plaintiffs, mailed copies of the petition to FM and the three major ham magazines, the ARRL, and the Poughkeepsie Radio Club.

Here is that petition:

To the Poughkeepsie Radio Club:

As you know, the Poughkeepsie Radio Club station, W2CVT, located at the Mt. Beacon (Fish-kill), New York, transmitter site of broadcast station WKIP, is being operated as an unattended FM repeater, retransmitting 146.34 to 146.94 MHz; therefore, we, the undersigned radio amateurs of Long Island, 50 miles to the south, are directing this appeal to you:

We are appealing to you to operate this repeater station in accord with the "Amateur's Code (one)" as published in the front of every ARRL Radio Handbook; specifically, we are appealing to you to operate W2CVT in such a way as not to "...lessen the pleasures of others."

We are appealing to you to limit the radiation of this repeater to essentially your own operating sphere, as stated in the Radio Act of 1934, as amended, which says: "...all radio stations... shall use the minimum amount of power necessary to carry out the communication desired."

(Forty signatures follow)

We have no way of knowing whether the Long Island group are AM'ers or FM'ers and whether or not they use 146.94 MHz for simplex communications or for a repeater of their own. For the sake of

this editorial, then, certain assumptions will have to be made. One thing is certain: A .34-to-.94 repeater is in use in or around Poughkeepsie, and the output can be heard in Long Island, some 50 miles away. Since there aren't enough details given in the petition to arm everyone with all facets of the controversy, it would be impracticable to offer suggested solutions other than those most obvious, such as: Let the petitioners crystal up and use the repeater if the coverage is as good as it seems to be.

Cutting the power output of a repeater is GENERALLY not a good solution. By its very nature and intent, a repeater should whack out the strongest possible signal. There's no point in having a repeater if its use must be restricted to a local community; "direct" operation would be as effective and far simpler. The whole idea of a repeater is to extend coverage to the greatest extent possible so that local mobiles can travel great distances and maintain good communications capability.

If the repeater in this case puts out a signal that wipes out stations 50 miles away, however, when it can't hear stations at the same range, the input-to-output coverage ratio is bad and should be changed. Such a circumstance, it would seem, would be willful interference with other stations operating on the output channel -- not necessarily malicious, of course, but nonetheless willful. It's up to the repeater owner to make sure his output power is no more potent than his input capability.

Here's what appears to be the general picture: On the one hand, a .34-to-.94 repeater is operating and in use by a specific amateur group. On the other, an established .94 simplex group in an outlying area is encountering .94 interference. Neither group could economically move, considering the cost of crystals and the effort involved in rechanneling. So the repeater group continues to oper-

ate and the simplex group notifies the FCC because of the impasse.

And the entire amateur community looks just a bit smaller today than it did yesterday in the eyes of the FCC.

There ARE solutions to problems like this. Probably every metropolis faces struggles of this type from time to time. But crying and fighting won't solve it; the only result from these tactics will be the engendering and nurturing of animosity.

The answer lies in cooperation and mutual effort. Isn't this what the amateur spirit is all about? Let's examine a few of the possibilities:

1. The complaining individuals could take advantage of the existing repeater, thereby increasing their own coverage in the direction of Poughkeepsie. The added advantage would justify the expenditures for crystals to establish a secondary channel for simplex communications.
2. The repeater owner could install a tone encoder on the output; in this way, all operators who do not want to hear the repeater can install decoders on their receivers to mute the speaker when the tone comes on. This is common practice in many areas of the U. S. where problems of this nature have occurred in the past.
3. The complaining amateurs could collectively install a repeater in their own area operating on the same frequencies. With this approach, all mobiles would have a tremendous degree of flexibility, with the capability of operating through either repeater.
4. The Poughkeepsie group could -- and should -- conduct tests to determine input and output characteristics of the existing repeater. If the repeater can be heard in areas where an operator can't "get in," the receiver capability should be improved or the transmitter radiation pattern modified.

An important point to remember is the fact that FM is growing. The frequencies

The Amateur's Code

ONE

The Amateur is Gentlemanly . . . He never knowingly uses the air for his own amusement in such a way as to lessen the pleasure of others. He abides by the pledges given by the ARRL in his behalf to the public and the Government.

TWO

The Amateur is Loyal . . . He owes his amateur radio to the American Radio Relay League, and he offers it his unwavering loyalty.

THREE

The Amateur is Progressive . . . He keeps his station abreast of science. It is built well and efficiently. His operating practice is clean and regular.

FOUR

The Amateur is Friendly . . . Slow and patient sending when requested, friendly advice and counsel to the beginner, kindly assistance and cooperation for the broadcast listener; these are marks of the amateur spirit.

FIVE

The Amateur is Balanced . . . Radio is his hobby. He never allows it to interfere with any of the duties he owes to his home, his job, his school, or his community.

SIX

The Amateur is Patriotic . . . His knowledge and his station are always ready for the service of his country and his community.

—PAUL M. SEGAL

of 146.34 and 146.94 MHz have been adopted nationally as repeater channels. Like it or not, sooner or later there will be repeater outputs on 146.94 all the way across the country. And eventually, that channel will be useless as a straight-through simplex channel. Until that time comes, however, there will be friction between simplex operators and the repeater users. Likewise, unless we want the FCC to be in the middle of our squabbles, we'll have to learn to settle our differences peaceably among ourselves.

Let's leave the petitions to the CB'ers and our televieing neighbors and make an attempt to approach our own problems without outside intervention. How else can we let the FCC know that we can effectively and with maturity cope with our own internal conflicts; that we do not need nor do we desire policing and supervision from any official body.

AUTO-CALL AFTERMATH by K6MVH

Radio clubs all over the nation have picked up the ball on the Anderson smearing of FM and repeaters in the now-famous Auto-Call editorial (reprinted in FM Bulletin, February 1968). The word counts on both sides of the argument are up so high that publishing even a brief résumé would be impracticable. There have been a few significant happenings since the article was published, however.

First Andy Anderson, writer of the anti-FM Auto-Call masterpiece, wrote a very lengthy letter to the editor of FM. He says, in essence, that my original rebuttal was that of a city slicker, and that my responses to his honest and serious questions were evasive and vague. And he defended his second-grade grammar by saying it was what the Auto-Call readers expect. (It really doesn't speak too well for them, does it?)

He also wrote a lengthy letter to Bob (KØIFJ, last name unknown), who is apparently the current editor of Tech-Ni-Chat Chit-Chat, a monthly club paper out of Wichita, Kansas. In that letter (published in March), Andy said that his original Auto-Call editorial was not anti-FM, and that he merely had put forth a few serious questions; he wanted simple and honest answers.

Bob's answer was something of a classic, and I wish we could print the entire piece intact. Bob seems to have some insight into Andy's character that most of us have not. The following is a paragraphical excerpt from Bob's answer to Andy, the Auto-Call hatemaker.

"Most of all I cannot understand how you could write such an article in your position with the ARRL. You said you did not run down FM but may I quote a few of your statements? 'REAL HOT STUFF, EH? ... REAL HOT BUSINESS!! ... AND WHAT DAMN GOOD IS ANY COMMUNICATIONS SYSTEM IF YOU CAN'T USE IT? ... OR TRY TO!! ... and so on. I know that you are on good terms with the FCC boys, Andy, but I certainly hope you have not taken advantage of this to put a stop to repeater operations. You asked in your letter to me that I re-read your

article. Now I ask the same of you; read as a ham -- not as the editor that wrote it. Then ask yourself, did you run down FM?"

Bob also said that he received a second letter from Andy a few days after he'd received the first. This second letter is in itself a capsule summary of Anderson's psychological makeup. But before I get into it, let me mention one fact: From all I can gather, this fellow Anderson has recently been appointed as an ARRL field officer of some kind. Many of the club papers have made references to this and, in general, lamented the fact that such an ill-spoken and heavily prejudiced person should be placed in a key ARRL position.

Now, I am not an ARRL member, so I'm not familiar with the duties and responsibilities of its field appointees. I do, however, find it difficult to see how such an individual as Anderson could qualify for any official post. My principal reason for saying this is because in Anderson's last letter to Bob, he boasted of his personal and close association with the FCC, apparently to back up his earlier statement that "... the FCC is being approached" in regard to FM repeater operation.

But lest he write a spirited denial, here are his exact words:

"It is true that I do know the FCC boys quite well. The two in the amateur section now -- I have had lunch with them many times. In fact, one of them I got acquainted with through my wife, surprising as it may seem, she and his wife were friends before I ever met him. One of these fellows often comes in on our regular Washington schedule. Two others on our regular sked are retired FCC boys, one of them has been here to see me, and was the speaker at the Kansas City QCWA dinner. One of the ex-Commissioners also comes in on our sked now and then. In addition, I know a great many of the other FCC boys through their amateur affiliations in D.C."

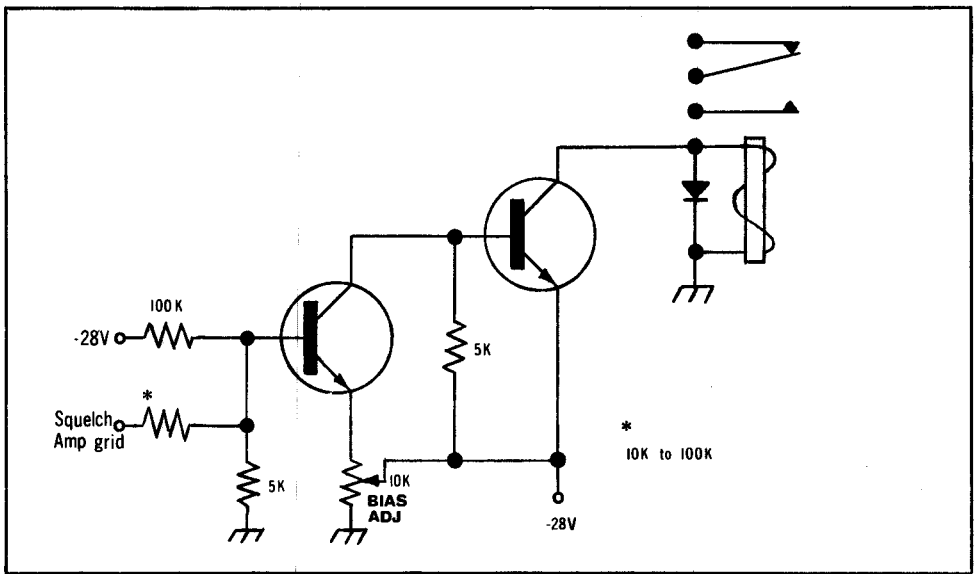
Well, that's it. My hope is that the FCC policymakers haven't grown so accustomed to taking orders from a hayseed that Andy has begun to sound like The Boss.

K6MVH

The SOLID-STATE Carrier-Operated Relay

Jerry Schneider
1901 S. Livonia
Los Angeles, Cal

by
Jerry Schneider



Probably the most important single cause of failure in remotely operated equipment is heat. Most of us who maintain repeaters and other remotely controlled devices go to great lengths to minimize the amount of heat generated at the remote site. We replace tube-type rectifiers with silicon diodes and install carrier-operated squirrel cages to blow air over the tubes. Some of us use solid-state decoders for control of functions. But most of us still use the same old vacuum-tube carrier-operated relay to key the transmitter with each incoming signal.

Of course, it is true that replacement of a single tube with a transistor circuit

won't have any great effect on the overall heat-generation characteristic of a repeater, but with each such replacement the overall "reliability figure" is improved. And replacement of a vacuum-tube carrier-operated relay (COR) with a transistor version will certainly prevent that otherwise inevitable service call for a defective COR tube.

The advantages of transistors over tubes is sufficient in terms of reliability alone to justify their incorporation for remote applications.

Another good application for a solid-state COR is in a "walkie-talkie" repeater, a ubiquitous device which can be carried

anywhere and mounted on such unlikely stanchions as tree trunks or telephone poles.

A pole-mounted transistorized repeater may sound a trifle far-fetched, but the idea does have merit. Such an approach allows installation of a low-power repeater at locations where no commercial power is available. At least one California amateur (Paul Signorelli, K6CHR) has reportedly been using a portable two-meter transistor repeater for years to successfully provide coverage in the San Fernando Valley and throughout the Los Angeles Basin. His site is high enough to provide excellent coverage, but far enough away from commercial ac lines to preclude their use as a power source.

A low-power repeater of all-transistor construction can be successfully deployed using an automobile battery as a dc source. The unit can then be kept operational by the simple expedient of exchanging batteries once a month.

Although the basic operating principles are the same for both vacuum-tube and transistor receivers, the COR shown in this circuit was designed for compatibility with a tube-type squelch amplifier, such as Motorola's conventional 12AX7 or 12AT7 variety. It can be used "as is" for most GE and Motorola receivers, but some modifications would be required to adapt it to a solid-state squelch amplifier.

The 24 - 28 volts required for power should prove no problem at all. A standard transmitter bias supply is an excellent source. If you have a control system, you're probably using a 28-volt dc source to drive a stepper or operate transistor circuits, anyway. If not, a small external battery will do the job nicely.

There are no critical components in the solid-state COR. The transistors can be any NPN types capable of switching at a collector current of greater than 50 mA. The mechanical relay can be any low-current device that will pull in with less than 24 volts applied.

FCC DOES ABOUT-FACE

The letters shown below tell the story without words. Fortunately for repeater users, the letter at the bottom is the last official word. Note that dates are five years apart.

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON 25, D. C.

May 5, 1960

7600

Mr. Tim Bentley
Deputy Chief of Communications
Los Angeles Office of Civil Defense
6501 Fountain Avenue
Hollywood 28, California

Dear Sir:

The Los Angeles field office referred your letter of March 8, 1960, regarding the operation of amateur (repeater) station EDGX, to this office for reply.

The operation described in your letter appears to be in substantial compliance with the Amateur Rules except that the log of EDGX should also show the call signs of all amateur stations using the repeater facilities.

Very truly yours,
Sam F. Maple
Sam F. Maple
Acting Secretary

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 2054

January 11, 1965

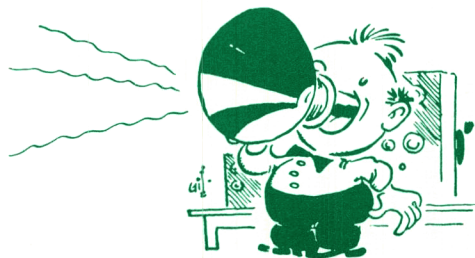
7523

Mr. Barney L. Dewey
411 Pullerton Avenue
Newport Beach, California 92660

Dear Mr. Dewey:

This is in reply to your recent letter regarding Section 97.103(b) of the Amateur rules when your station is repeating the transmissions of another amateur station. To satisfy this section of the rules, it is only necessary that you include a statement in your log to the effect that your station is operating as a repeater and transmit your call sign at the required intervals.

Very truly yours,
Sam F. Maple
Sam F. Maple
Secretary



ATTENTION FM'ERS....
YOUR 'FM' MAGAZINE WILL
HAVE A BOOTH HERE IN
SWAMPSCOTT, MASS.

TWO BIG
DAYS PACKED
WITH ACTION
FOR EVERYONE!



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england
A. R. R. L.
convention**

Bring the family!

SATURDAY, JUNE 1st

SUNDAY, JUNE 2nd

- **DISPLAYS and DEMONSTRATIONS** by leading manufacturers and distributors of amateur gear of the very latest equipment. Convention Hall opens Saturday at 10 A.M.
- **ANTIQUE WIRELESS EXHIBIT**
- **F.C.C. EXAMS** (Sunday only, general, advanced and extra, 10 A.M. to Noon). Send application and \$4 fee to F.C.C. Boston, Mass. at least 14 days in advance. Due to the great demand exams will be given on a first come basis only. Space is limited. Reserve early with F.C.C. office.
- **NET MEETINGS**
- **DX MEETINGS**
- **MARS MEETINGS** Army-Navy-Air Force
- **A.R.R.L. BOOTH** — Both days the Headquarters Staff will be here to help you.
- **Y.L. ACTIVITIES** Including YL Luncheon Sunday noon.
- **QSL CONTEST**
- **A.R.R.L. FORUM**
- **W-1/K-1 QSL BUREAU**

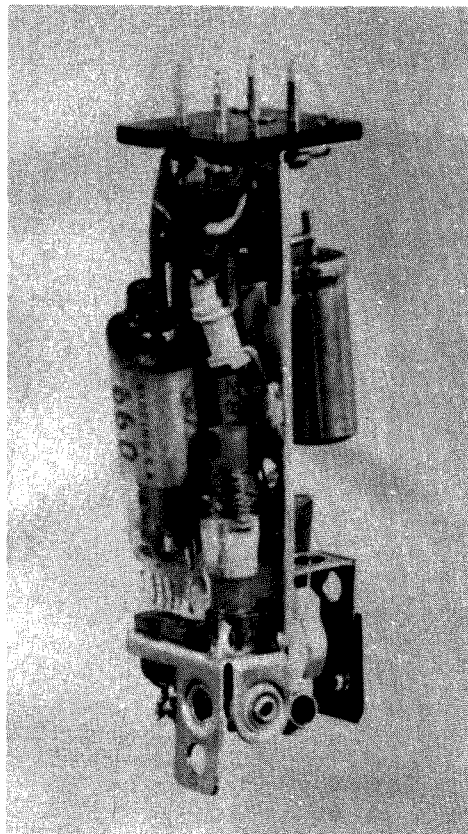
Sponsored by The Federation of Eastern Massachusetts Amateur Radio Associations

HANDIE-TALKIE (Cont. from P.19)

TRANSMITTER SECTION

Oscillator, 14U (Print 316)

1. Connect 10 pF across crystal socket terminals.
2. Connect 20 pF across the inductance.



Transmitter oscillator module.

Driver, 20U (Print 319)

Connect 1 pF across the inductance.

Final, 1UL (Print 305)

Connect 1 pF across the transmitter inductance (7 turns). Do not confuse the inductance with the slug-tuned neutralizing coil on top of assembly. Also, be sure to find proper inductance; there are two: one for transmitter, one for receiver. Check print to be safe.

Modulator, 1UL (Print 317)

Modulator will not peak out very well; the peak is low, but should be acceptable if tuning is anywhere in the general range.

RECEIVER

Antenna Stage, 1UL (Print 305)

1. Add a gimmick (2 inches of hookup wire) to high-frequency coil at button connector at top of assembly (connecting 1U and 2U).
2. Dress down into module through spare hole in top of assembly.

RF Stage, 2UL (Print 300)

1. Add a gimmick to pin 1 of tube socket.
2. Dress down into corner of assembly behind primary coil connected to pin 1.

Oscillator

Peak oscillator by watching signal on S-meter of communications receiver, then back off slightly on oscillator's most stable slope.

First Mixer, 3UL (Print 301)

1. Add a 1.5-inch gimmick to coil going to pins 1 and 2 of tube.
2. Dress leads down inside module behind coil affected.

NOTE: The antenna input coil for the receiver is in the same module (1UL) as the transmitter output tank coil.

**Don't miss
FM JAMFEST '68
Legg Lake - Aug 31
FUN!
PRIZES! IT'S FREE**

FM across the



**Up-to-the-minute reports on
FM action throught the U.S.**

CALIFORNIA

by Doug Stuard W6GUS

There are about ten stations active on the two-meter repeater operated by the Central Coast Amateur Relay Society (WB6TSO). The repeater location is Cuesta Peak. The site is near KSBY's TV transmitter at an elevation of about 2,650 feet. The Cuesta repeater provides coverage over much of the Central California area; planned upgrading will broaden this coverage even further.

Point-to-point links with the San Francisco area to the north and the Los Angeles area to the south are currently being seriously investigated.

The Cuesta input is 146.2 MHz; the output is 146.8 MHz.

The greater Los Angeles area, covering the area from the coast to Palm Springs and from the San Fernando Valley to Laguna, is now being serviced by no less than three two-meter repeaters:

146.28 to 146.70

146.82 to 146.70

146.34 to 146.94

The .82-to-.70 group plans to change its system to an on-channel type, repeating 146.82 to 146.82. If successful, the participants believe it will be the first of its kind in the country to operate on a continuous basis.

COLORADO

by Vic Beaver W0KVK

The Pueblo Amateur Radio Club has installed a radio repeater operating from 146.34 to 146.94 MHz. This currently operational repeater serves both Colorado Springs and Pueblo areas. The repeater on Cheyenne Mountain (reported in the May repeater directory of FM Magazine) has not been installed, and will not be because of interference with the Denver repeater, which also functions as a .34-to-.93 system.

SOUTH CAROLINA

by Frank Davis WA4MWA

Since its beginning in the spring of 1966, FM in the Columbia area has grown from none to a current total of 33, including base and mobile (six and two meters), with the bulk of activity on six meters.

Also included as part of the 33 is the club-supported in-band six-meter repeater operating through two 160-foot towers spaced approximately three miles apart. The two facilities use a link on 449 MHz.

Not quite operational yet is a two-meter repeater capable of crossband operation with the six-meter facility. The equipment is all GE Progress Line.

HAWAII

by John Rice KH6GHC

VHF is off to a good start in Hawaii with about 25 mobiles on six meters and 10 or so on two. Diamond Head is the site of three repeaters which provide coverage over most of Oahu, Maui, and Kauai (pronounced "coweye"). The six-meter machine repeats 52.525 to 53.25 MHz. The two-meter repeater receives 146.2 FM and 147.0 MHz AM and transmits via FM on 146.8 MHz. For the time being, the six- and two-meter repeaters are interconnected, or cross patched, to enhance the overall usefulness and add interest to the operation.

The third repeater is an Army MARS system repeating 148.01 to 143.98 MHz. This MARS system is AM.

All the islands will be covered when the planned new repeater is installed atop 10,000-foot Halleakala on Maui. This will be a cooperative effort and is just part of the long-range plans of Hawaiian FM'ers to provide "total communication" over the state.

NEVADA

by Larry Oakley W7DNX

The Nevada Amateur Radio Society was reactivated in July 1967 and is going great guns now. We call ourselves the most progressive VHF club in the west.

At present, we have approximately 30 members on simplex (146.94 MHz) and have a .34-to-.94 repeater built and almost ready to be put on the air. Rigs consist mostly of Motorola 41V's, a few Link 6000's, and some GE gear.

With a little over 700 amateurs in the state of Nevada, we undertook the job of bringing more of them into the Reno area. On 15 January, a free code and theory course began at the University of Nevada, instructed by Frank Cherne (WA7DUL), F. William Rett (WA7FBU), and Larry Oakley (W7DNX). The course lasted 11 weeks and brought into being 2 Conditionals, 25 Novices, and 19 Tech-



nicians. Of the 46 students taking the exams, only 3 failures were reported. We feel this is a tremendous success.

At all entrances to the city of Reno, we have posted signs giving publicity to our society. The photo here shows the sign and members (from left to right) Tom (WA7HUF), Larry (WA7EGW), Gary (K7VYT), and Larry (W7DNX). This picture was taken near Steamboat Hot Springs on Highway 395.

Canada*

*PAUL HUDSON VE3CWA REPORTS

OTTAWA

VE2CRA, the Ottawa repeater, located in Gateneau Park at the 1300-foot Camp Fortune ski area near Hull, Quebec, is operated by the Ottawa Amateur Radio Club. A Marconi (Kaar) DT-45 3-watt mobile unit with a converted power supply and homebrew cavities provides a compact repeater facility. The transmitting antenna, a homebrew collinear, is 20 feet above ground and the receiving antenna, a commercial 3-dB-gain ground-plane, is located on a commercial tower at the 150-foot level.

Activity in the Ottawa area has mushroomed in the last few months as it has in so many other areas. Some 50 or so stations are active in Ottawa now and, because of growing interest, a separate

FM club similar to the Toronto group is being formed.

Although most of the activity is on the repeater (146.46 in, 146.94 out), there are a number of base stations equipped for .94 direct operation. The gang in Ottawa has recently selected .76 as its basic frequency; six or seven locals are currently using this channel.

QUEBEC

For some time, Montreal has had a complex repeater operation. Credit for the VHF FM accomplishments is largely due Murray (VE2AUU). As a result of Murray's organizational activities, the number of active FM'ers in Quebec has grown considerably.

Interest in FM has spread quickly in Quebec and there are now repeaters in Quebec City, Sherbrook (VE2FZ), Three Rivers (VE2CTR), Granby, Rimouski, Chicoutimi, and Montreal. The main repeater in each of these areas operates on 146.46 MHz in and 146.94 out. In Montreal, this is the Mount Royal repeater (VE2MT).

The provincial repeater (VE2TA) is Murray's newest brainchild. This repeater is used to link the various local repeaters. At 1915 (local time) each day, a provincial net is held on the system. A secondary repeater in each area is used to tie in with VE2TA. Secondary repeat functions at VE2MT and VE2ZO in Montreal with directional antennas allow VE2TA to be used from the Ottawa area on 146.34 / 147.06 .

VE2TA (146.52 in, 147.5 out) is located at a commercial site on 3,000-foot Mount Orford, 80 miles from Montreal in the eastern townships. A range of 100 miles mobile and 200 miles for base stations is also claimed. Four stacked J-poles are used for receiving; two are pointed toward Montreal and the other two toward Quebec City. The transmitting antenna is a Gam 3-dB-gain collinear, but this antenna has not performed well under the icing conditions which are prevalent in that area, and will be replaced shortly by J-poles.

VE2MT is Montreal's most active repeater. In addition to the .34-to-.94 function, it also has the capability for linking with W1KOO, the .34-to-.94 repeater on Mount Mansfield in Vermont.

VE2RM, a secondary repeater on Regault Mountain in West Montreal, repeats .40 to 147.18 MHz. VE2RM also repeats AM from 144.40 to 147.60.

All this may sound complicated and involved, but it does provide a province-wide system that can be used almost anywhere in Quebec and with the same two crystals (.46 transmit and .94 receive). These same frequencies are recommended as standard Canadian repeater channels. The input frequency was chosen to avoid conflict with the stations in the U.S. operating on 146.34 MHz.

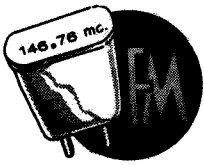
BRITISH COLUMBIA

Doug (VE7APU), secretary of the Vancouver Amateur Radio Club, reports several hundred active stations in his area. The most common equipment is GE and Motorola. Most activity seems to be on 147.33 simplex, although the frequency of 146.76 is getting a lot of use as a secondary channel.

There is no formal organization in BC, although the University of BC Ham Society, led by WB6MAY/VE7 and VE7MQ, has managed to put up a repeater only 8 miles away from Vancouver. Separate transmitting and receiving sites at Seymour and Grosse Mountains are interconnected with Kaar 450 MHz equipment.

The repeater (.34-to-.58) is located at a height of about 4000 feet above the city. Although this repeater hasn't been operating for any great length of time, it looks as though coverage will extend as far as Seattle, which is located about 160 miles to the south.

Doug reports that there is some FM activity in Trail, Prince Rupert, and the Okanogan Valley, but there seems to be little communication among the different areas or with the amateurs on the south side of the Canadian border.



CHRONICLES OF SEVEN-SIX

By Ken Sessions

VII. TAKE TO THE HILLS

There's a universal truth which I call Sessions' Law: "The degree to which one is hated on a given band is in direct proportion to the power he uses on that band." The prevalence of jamout skirmishes and capture contests on 2 meters FM led to an all-out war that encompassed the entire band.

We were going through a pretty rough era. Not just on FM, either. Even the AM stations took up jamming. The two popular Los Angeles open repeaters on 2 meters, WA6TDD and K6MYK, were being subjected to interference such as never before seen on an amateur band.

At the height -- or depth -- the Los Angeles Council of Amateur Radio Clubs called a special meeting, and invited all the private and public repeater owners. Seven-Six was well represented. All the big boys were there: Good Guys and Bad Guys.

I wonder if the Council was aware of the fact that many of the very people sitting in that large room represented just the element they had pledged themselves to eliminate. K6TOX and W6ZJU (who own some 40% of the 220 mc band) nodded in agreement to every suggestion as to how the band might be cleaned up. But they took notes regarding secret frequencies and control codes -- later to fall prey to their chief hobby of "systembusting."

WA6VHC offered suggestions of his own, and outlined a 5-point program to better the band. (He is notorious for his successful experiments with "confidential" interference. Even I was there. (My name is attributable to superstitious discretion, whereby all operators within a 5-mile radius of my frequency hear all my transmissions.)

They talked of forming vigilante committees, pseudo-police informer groups. But a spokesman for seven-six apprised these methods had already been tried on the Preferred Frequency. While the results were effective, what with rig confiscation, operator blackmailing, and open threats, the FCC viewed the goings-on with more than a mere hint of disdain.

The meeting lasted several hours, but the only concrete outcome was that it was late and nothing had been decided. With one exception. A small committee had been appointed to monitor the band and take notes on pinpointing the sources of trouble. Rout out the Bad Guys.

I guess they're still listening. They're up against a clever, well organized group of operators who have dedicated themselves to the proposition that signals were created to be heterodyned.

And the war raged on. Antennas improved. Transmission lines were modified to peak efficiency. Towers were raised. And finals were tweaked and pressed into "maximum performance" service. My dusty old Thunderbolt, originally a linear for 6-meter DX, became a kilowatt class C amplifier for 2 meters FM. Like everyone else on the channel, I was determined to be heard through the "garbage." And I was hated the prescribed measure in accordance with Sessions' Law. (People with sensitive feelings shouldn't use a kilowatt into a 20-element beam on a 100-foot tower. But I'm not too sensitive.) Seven-sixers aren't easily beaten. The more spunky operators planned elaborate remote control systems. Everyone wanted to be a part of the magic kingdom of The Unjamable, and each wanted to be heard above the rest. On a tunable band, when the going gets rough, an operator just shifts frequency a few kc's and continues uninterrupted. On single-channel FM, where one can't move horizontally one must be flexible enough to move vertically if necessary.

K6TOX and W6ZJU had been using a remote base station on Mt. Wilson for years with success. This inspired WA6DOW, WA6VHC, K6CHR, WA6ESC, K6CJE, K6TAZ, WA6COT, and a few others to look for good high ground. Remote transmitter projects are expensive. Most of the fellows sought partners to share the work, money, and dubious glory. As the supersignals appeared, my own system became dwarfed, and I no longer could communicate at will. I teamed up with Fred Daniel, W6NQS, and joined the "repeater" crowd. My choice of partners later proved very wise indeed.

Fred is technically competent, single, not too talkative, and very industrious. He is manager of a radio service center, and has access to even the most sophisticated of test equipment. Almost immediately, he landed a deal whereby we could buy 450 mc radios for less than \$50 apiece. And we did.

Our repeater/remote base station would be pretty much the same as the others: On a hill somewhere you place a transceiver (2 meters FM) and install a good, high-gain omnidirectional antenna. You install another transmitter and receiver (preferably capable of simultaneous operation) on another band, say 450 mc. This will be the control frequency. In your car and at home you install gear operating on your control frequency. When you send the proper control signal, a carrier-operated relay in the 2 meter system keys the 450 transmitter each time a carrier appears. A similar relay in the control receiver keys the 2-meter transmitter when you talk. In this way you can talk and hear on 450, but what you say is re-transmitted onto 2 meters and what you hear is re-transmitted from 2 meters.

The first step in establishing a remote facility is getting a suitable site. The second step is licensing. The Federal Communications Commission doesn't sanction remote operation unless it is sure the operator knows what he's doing. The requirements for obtaining a remote license are: to secure the average operator away. Uncle Sam wants a description of facilities, circuit diagrams of control functions, listing of operating frequencies, estimates of power levels, and certification of compliance with special rules and regulations governing remote operation.

It took nearly 5 months to get my license even after I submitted a 15-page handwritten proposal covering virtually every phase of the anticipated operation. Getting the site was no easy task, either. The place most suitable were either Government-owned or privately leased by individuals or firms who treasured the seclusion and placed a high value on the land. As it happened, we finally managed to lease a small hilltop site from the U.S. Department of Agriculture Forest Service. This hadn't been done before, and necessitated processing of papers, permits, and special letters of approval. But eventually, the lease was OK'd, and we could start building -- after our blueprints were approved, of course.

Our plans were initially very modest. We would install a simple controllable transceiver inside a weatherproof housing on a mast in the Angelus National Forest. Power, if not available, could be supplied from ordinary storage batteries because our consumption would be minimal. That's what we planned.

The truth is that our plans had to accommodate a system that was already expanding in our minds. And what started out to be a small weatherproof enclosure ended up as a 10 x 15-foot brick building. We had to level a suitable hilltop area and clear the surrounding terrain of brush and debris. We had to have a road carved into the rocky ground. The power company happily installed a separate "pole pig" transformer for us, and routed power from their nearby lines.

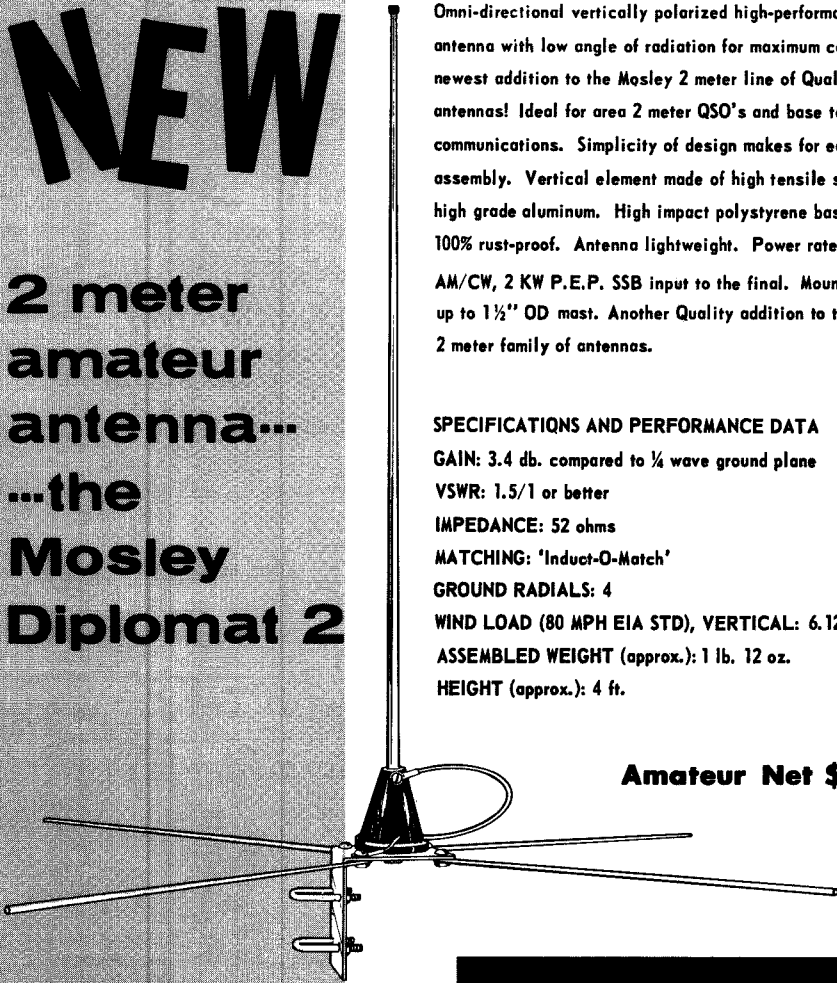
Within a few months it became obvious that Fred and I were creating a monster which had grown already to the point where we couldn't abandon it because of the financial resources. We brought in two additional partners. The newcomers, Clyde Anderson (WA6EBD) and Elwood Cousins (K6EMF), would contribute to the support of our enterprise in exchange for permission to operate through the completed system.

The rest was easy. Dig trenches; pour foundation; bury the conduit; mix concrete; lay brick; hire electricians; pull weeds; build a roof and ceiling; build and erect the tower. It was work, work! Evenings and weekends -- month in, month out.

But it would all be worth it, we kept telling ourselves. We would really be able to make a big noise on the band.

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2 meter amateur antenna... ...the Mosley Diplomat 2



Omni-directional vertically polarized high-performance 2 meter antenna with low angle of radiation for maximum coverage. The newest addition to the Mosley 2 meter line of Quality antennas! Ideal for area 2 meter QSO's and base to mobile communications. Simplicity of design makes for ease in assembly. Vertical element made of high tensile strength, high grade aluminum. High impact polystyrene base. All parts 100% rust-proof. Antenna lightweight. Power rated 1 KW AM/CW, 2 KW P.E.P. SSB input to the final. Mounting fits up to 1½" OD mast. Another Quality addition to the Mosley 2 meter family of antennas.

SPECIFICATIONS AND PERFORMANCE DATA

GAIN: 3.4 db. compared to ¼ wave ground plane

VSWR: 1.5/1 or better

IMPEDANCE: 52 ohms

MATCHING: 'Induct-O-Match'

GROUND RADIALS: 4

WIND LOAD (80 MPH EIA STD), VERTICAL: 6.12 lbs. ●

ASSEMBLED WEIGHT (approx.): 1 lb. 12 oz.

HEIGHT (approx.): 4 ft.

Amateur Net \$8.10*

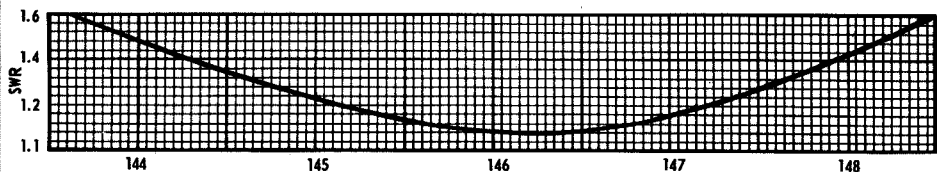
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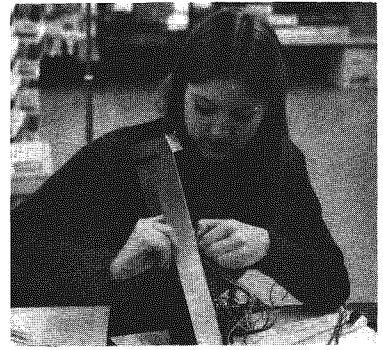
DETROIT, MICHIGAN 48214

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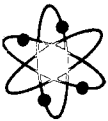
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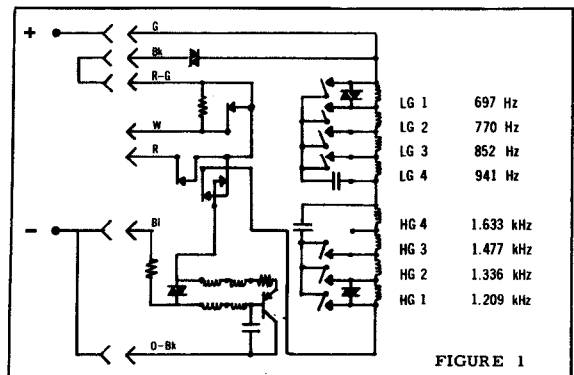
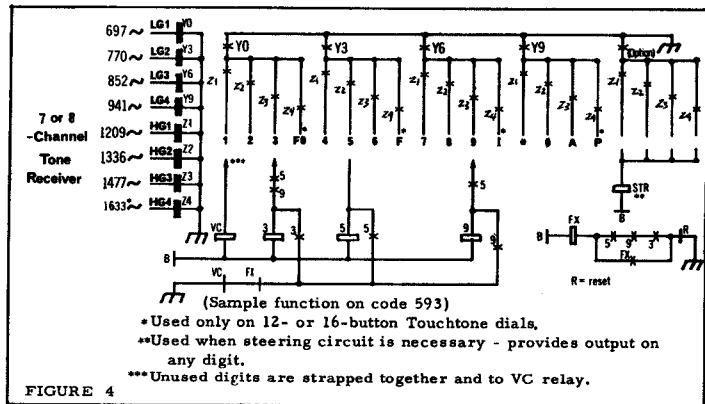
**TOUCHTONE
BOO-BOOS**

From K3DSM comes the report that FM screwed up in the last issue. There were a few errors in the Touchtone schematics (pages 15 and 16).

The author was kind enough to show us our mistakes.

The two schematics shown here are the corrected and revised copies. The capacitor was incorrectly attached to HG4 in figure 1. In figure 4, the contacts of relays Z1 - Z4 were not shown. Also, the hold path for the 5-9-3 counting relays should show a break contact instead of a make.

We're sorry. Hope no one was caused any problems because of the errors.



LETTERS FROM FM READERS

Organizing

Recent articles seem to indicate that the ARRL is sure wondering how they can get control of FM'ers. I wonder how many FM'ers are actually members or have retreated to the FM nook to avoid the big ARRL noses. Hope they don't butt into FM; we can get a national organization of our own.

Joe W9HCI

Our group is very much behind the forming of a nationwide FM organization. If there is anything we (the Nevada Amateur Radio Society) can do, please let us know.

Larry Oakley, W7DNX
Trustee, NARS
Box 7808, Reno, Nevada 89502

Repeaters

It's that time again; my subscription is due for renewal. I would like to renew for three years so I can avoid missing a single issue.

The articles on repeaters were very good. As a matter of fact, I am involved in establishing an elaborate system here in South Bend. We plan to use .46-to-.88 along with a set of frequencies on six meters FM. It would be a combined crossband and in-band repeater. Later we plan to link up with a repeater in Chicago (WA9EAE) by a 450 link; this would tie in with a repeater north of Chicago. All would use 146.46 in and 146.88 out. We're still on paper but getting closer to being operational. While I'm on the subject of repeaters, I have heard of a repeater being installed in Kalamazoo. This is fine, with one exception: They plan to use .34/.94, and .94 is a very active channel here in South Bend and points west beyond Chicago. The CFMC repeater in Chicago originally came out on .94 but it was faced with many petitions from those on .94 already. It finally changed over to 146.64. I mention this so those who know

this group can help them avoid problems that are bound to occur if they tie up a national calling channel that is in active use in the area. I am totally in favor of the opinions expressed by Bob England in the September issue of FMB.

Melven Dzialak, WA9GOP
South Bend, Indiana

THE REPEATER PROBLEM THAT YOU HAVE CITED IS PERHAPS THE MOST IMPORTANT ONE FACING FM'ERS TODAY, BUT IT CAN BE RESOLVED. A SIMILAR PROBLEM OCCURRED IN CALIFORNIA NOT TOO LONG AGO, WITH THE RESULT THAT THE ACTIVE CHANNELS WERE DIVIDED INTO TWO FACTIONS. THE REPEATER BOYS FELT THAT SINCE .94 WAS A NATIONAL REPEATER OUTPUT CHANNEL, THE AREA SHOULD HAVE A .34-TO-.94 REPEATER. THE .94 BUNCH SAID THAT SINCE .94 WAS A CALLING CHANNEL, NO REPEATER OUTPUT SHOULD BE DUMPED OUT ON IT.

SINCE THE ARRL LISTS .94 AS A NATIONAL CALLING FREQUENCY, AND MANY STATES HAVE ADOPTED IT AS A REPEATER OUTPUT, CONFLICTS WILL CONTINUE TO EXIST UNTIL SOMEONE COMES UP WITH A WORKABLE PLAN THAT WILL SATISFY EVERYONE.

THE PROBLEM WAS SOLVED WHEN ALL PARTIES STOPPED TO CONSIDER THE REAL PURPOSE OF A REPEATER

TO AID IN COMMUNICATIONS IN A GIVEN AREA. SINCE THE REPEATER DID NOT ENHANCE THE OVERALL COMMUNICATIONS IN THE AREA, THE CONCEPT WAS CHANGED, AND THE REPEATER WAS TURNED INTO WHAT THE INHABITANTS LIKE TO CALL A "TALKBACK," A REPEATER THAT RETRANSMITS A VERY ACTIVE CHANNEL ONTO AN INACTIVE ONE. IN THIS WAY, THE REPEATER BENEFITS EVEN THOSE WHO WOULD OTHERWISE BE OPPOSED TO IT.

The local amateur radio club is interested in operating a repeater. We are particularly interested in sources for used FM mobile and repeater equipment. Any assistance that you can render to our project would be greatly appreciated.

Robert Nelson, K2QPN
West Jersey Radio Amateurs
Florence, New Jersey 08518

For several years most of the amateurs here in and around Grand Junction, Colorado, have operated a two-meter wide-band FM net using a locally controlled repeater. I will be glad to furnish you with any additional information about our two-meter FM operation (including photographs) for your information and/or for publication in FM Magazine.

Nathan Bale, W0PXZ
Box 1494
Grand Junction, Colorado 81501

I have just been introduced to your journal by W4RKH (Frank). I am very impressed with the March issue (the only one I have seen). Please enter my subscription and send one copy each of all back issues available. You can expect many more subscriptions after I show this journal at the next club meeting. I am communications officer for the North Florida Civil Defense Area and have a .34-to-.94 repeater operating here in Starke, Florida. So far we have one aeronautical mobile, five land mobiles, and nine base stations using the facility. They are in Jacksonville, Starke, Hampton, Waldo, Fairbanks, Ocala, and Lake City. The repeater uses a Motorola Sensicon receiver and an 80 D transmitter strip. We receive on a 176-foot groundplane and transmit on a 140-foot groundplane mounted on the same tower. Our maximum range to land mobiles is about 25 miles at present. We have not been able to build a suitable cavity ourselves, but we borrowed a Motorola cavity for a short time. It really increased our range. We are planning to move the repeater to Gainesville, Florida very soon so that

transients on Highway I-75 will be able to use it.

I must mention one thing to those of you trying to use one tower for both receiving and transmitting with a .34-to-.94 repeater: Push-pull output transmitters such as the Motorola 80D variety produce less "noise" than some of the others. DO critically tune T1 for minimum transmitter noise output on the listening frequency. We lost about six weeks before finding out how critical the T1 tuning actually is.

Cecil Ellington, K4RZO
NFCDA Comm. Officer
830 Edwards Rd.
Starke, Florida 32091

Onions

Typographical shame!! Repeater directory for California all screwed up despite our carefully published directory. Sending April 1968 version with mild upbraiding. Input/output all reversed without exception. Show 'em all -- we are proud of our leadership in the field, dammit! First repeaters were in California. First and only known UHF repeaters exist in California. First relay council originated from creative California minds. Chronicles of 76 born here (shame on us!).

First 440 to 2400 MHz TV relay soon will be on the air -- in California! First San Francisco-to-Los Angeles long-haul system to be on the air! First Teletype relay will be on this year. Try THAT on for size, other forty-nine!

Robert Kelty WB6DJT
Chairman, Calif. Amateur Relay Cncl.
2661 Carol Drive
San Jose, California

IF YOU CALIFORNIA PIONEERS WOULD LIST YOUR FREQUENCIES IN THE SAME IN/OUT SEQUENCE AS THE OTHER STATES, THE DIRECTORY WOULD HAVE BEEN RIGHT IN THE FIRST PLACE. AND IF YOU THINK CALIFORNIA IS THE ONLY STATE WITH COMPLEX LONG-HAUL SYSTEMS, YOU'D BETTER START RE-

READING BACK ISSUES OF FMB, SUGGEST YOU LISTEN TO HORNS OTHER THAN YOUR OWN, AND PERHAPS VISIT THE KILLINGTON THING ON YOUR NEXT TRIP TO THE EAST COAST. CHANCES ARE YOU'LL SEE SOPHISTICATION THAT HASN'T YET ENTERED YOUR CREATIVE MIND. LIKE MULTIPLEX LINKS, SINGLE-CHANNEL REPEATER PLANS, MULTI-OPERATOR LICENSES FOR CONTROL, AND OTHER NEAT STUFF.

Orchids

Today I received my first issue of FM. I was highly pleased; it's just what we need for FM operators. Saw lots of goodies in the ads, nice articles on alignment (by Don Milbury W6YAN), etc. Keep it up!!

Kermit Crowell, W3AJO

Controversy

Felicitations to Ken Sessions for his Auto-Call rebuttal. I feel that Anderson (Auto-Call author) does not understand FM and didn't give it a fighting chance against his 75 meters.

... I was indoctrinated on the frequency of 146.76 where the K6MVH Newsbeat originated, and I came on the hard way just like everyone else did at the time. As a consequence, I learned a deep appreciation for FM as a communications mode and I feel that I really "belong."

The shenanigans of the Chronicles were really true enough, but they were a sort of breaking-in for the newcomer -- an initiation, as it were, similar to the initiations of modern colleges. The result was that FM'ers became an especially close group with commonly shared feelings about the trite old ways of false sincerity and phony friendships, so prevalent on some of the other bands and modes.

Upon discharge from the Army, I will be starting on a repeater for my own area. (Repeater-hater Anderson should take note of this.) There's a place for AM,

I'll agree. I was at one time an avid AM operator and I still use it occasionally to say hello to a few people who haven't made -- or won't make -- the switch. As I said, there's a place for AM. My advice is this: Keep AM where there's lots of AM activity on the spectrum, but keep it away from the 31 active FM channels. And for those who can't see FM as a better way, c'est la vie!

Barry Flint, SP/5 (WA6RTV)
U. S. Army, APO San Francisco
California

Here is my renewal for another year of the best mag going. Like the new format. Take the comments (WA8UIT letter, FM Magazine, May 1968) with a chaser; there are always those who can tell you how to succeed and fail. K6MVH is good and his articles are ALL informative; so to me that is enough!

W9HCI

Articles

First of all, may I compliment you on your new format. It really is a fine effort, although the pioneering aspect and your old personal touch seem to be lacking. Ken Sessions, of course, does a fine job as editor.

The article I sent you on VE3RPT was lost in the mail. I shall do another, and this time I will register it if you will tell me the exact size and type (finish, etc.) of photos you require for your printing process.

Barry VE3FBH
178 Upper Canada Drive
Willowdale, Ontario

TYPE ALL COPY ON 8-1/2 x 11 BOND PAPER, LEAVING TWO INCHES MARGIN SPACE ON THE RIGHT AND NO LESS THAN ONE INCH ON THE LEFT. DOUBLE-SPACE ALL TEXT AND LEAVE ROOM FOR EDITOR'S COMMENTS. PHOTOS SHOULD PREFERABLY BE 8 x 10 CLOSSIES, ALTHOUGH THIS IS NOT ABSOLUTELY ESSENTIAL. PROCESS IS LITHOGRAPHY.

CLASSIFIED ADS

The Quad City Amateur Radio Club has scheduled its annual MISSISSIPPI VALLEY HAMFEST for August 18 at the Rock Island Arsenal in Rock Island, Ill. The site is an all-weather type with excellent display facilities. Lunch will be served in the cafeteria. Send \$1.50 per ticket to John Greve (W9DGV), 2210 30th St., Rock Island, Ill. Talk-in frequencies will be 3.9, 50.4, and 146.94.

WILL TRADE the following (all or part) for 2M FM base or mobile (6V) working and tuned up on or near 146.94 MHz: Hammarlund HX 50, Heath HW32A 20M SSB transceiver (with ac supply), Minolta model ER SLR camera, Parks 432 MHz converter. Local deal preferred; all correspondence answered. Steve Fried (K2PTS), 2125 60th St, NY 11204

FOR SALE: Motorola 250W rf amplifier; has 4-125's and 2 new Eimac spares. Motorola power supply incl. Also has meters and manual. Requires 20W drive. Unit is on rack panels; no cabinet. Needs hooking up. FOB Winnipeg. Offers? Gordon McKone 138 Hill Street, Norwood, Manitoba

WANTED: 2M Motorola or GE base and 12V mobile units. Also need 19-in. enclosed relay rack. (State cond. & price first letter.) Stephen Dible (K8JNP), Main OR, USN Hosp 13, Grt Lakes, Ill.

WANTED FOR REPEATER: Motorola high-band G receiver with PL (complete and working). Will consider buying mobile unit to get receiver. Also need xstr 12V PL encoders and 1 miniature PL encoder suitable for Handie-Talkie (H23AAM). FOR SALE: 2805 Hz single-function Secode decoders (6/12V); offers invited. Alfred Defigio, Box 524, Republic, Penna 15475 (412) 785-6320.

MOTOROLA STUFF FOR SALE: 30D-type base station, \$50. T-1200 Remote Control with desk mike, \$75. 450 MHz repeater (complete) in tabletop cabinet (BY), \$100. Gary Hoffsommer (W0QJC), 3501 Croco Road, Topeka, Kansas 66605 (913) 266-8771.

SWAP- Model 28 ASR Teletype. New Bird 43 ThruLine wattmeter. Want audio logging recorder (as used by FAA & others to monitor traffic on their common frequencies). Prefer Soundscribe, Stencil-Hoffman, Schaffer, Dictaphone, or Ampex, but will consider any comparable unit. Will answer all inquiries. J. Thomsen (W9YVP) 8280 S. Tennessee, Claredon Hills, Ill. Telephone (312) 323-3821

WANT schematic for GE 4ES1B5, type ES-1B high-band 2-way. Also need schematic for Link 15VR transceiver. Contact Bob Shuman (K8SPE) 20125 Wakenden, Redford, Michigan 48240 Phone 531-4312.

FOR SALE: GE Progress Line DT03, 6 frequencies, 30W (T-power), all accessories, handset, cables, relay, and 6 ovens. Mint condition. Ed Rasmussen, East Chatham, NY 12060 (518) 305-5303

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C & A Electronic Enterprises, 2529 E. Carson St., Long Beach

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