

73

magazine
for radio amateurs

\$1.00
MAY 1974



**Catching
the 2m Streaker**

See feature article
on page 67

FEATURES

- 2 Never Say Die W2NSD/1
- 4 SSTV Scene
- 6 Social Events
- 8 New Products
- 10 Repeater Update
- 10 50 MHz
- 12 Contests
- 12 Looking West
- 13 Letters
- 14 Caveat Emptor
- 15 Burglar
- 16 DX Footnotes
- 33 Circuits — Circuits
- 54 Toothpaste in the Ham Shack
- 58 Jazz Up Your 24-Hour Clock
- 74 Amsat
- 76 Ham Help

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CONTENTS

- 17 ICs Upgrade the CD Ignition System W1KNI
A B+ article.
- 21 Adding dBs to the Audio Compressor W2EEY
Expanding upon new ideas.
- 27 Finding a New Home for the Mobile Rig WA8QNR
Some hams will go to any lengths. . .
- 31 Interference Suppression for Amateur Boat Owners DL5KS
Let us not forget our Maritime Mobile friends.
- 37 Heath HW-202 W3WTO
Review of a very popular rig.
- 39 Simple Mobile Alarm System K6SUB
There's beauty in simplicity.
- 41 Reducing Mobile Noise VE3FGS
Stop turn signal noise — drive in a straight line.
- 43 Newtronics CGT-144 Antenna K4TWJ
Try one of these and gain a good antenna.
- 45 Another Burglar Alarm WA2OJT
Add this one to your car, too — be safe in case your
other one is stolen.
- 47 Two High Grain rf Stages in One IC for 2m FM K1CLL
Two for the price of one!
- 53 OSCAR Special Converter W2EEY
Build it quick — last chance to hear OSCAR 6.
- 59 Toward Mobile Security WA1JOS
You pays your penny — you takes your choice.
- 61 Improving the Pearce-Simpson Gladding-25 Bimini-VHF WA4DXI
It's not what you do — it's the way how you do it.
- 65 Putting Yourself on TV WB8HEE
Overnight stardom can be yours.
- 67 Catching the 2m Streaker WB0FKZ
Another route to stardom.

COVER: In keeping with the times and the theme of this issue, 73 went out in search of a mobile stalker. And while peaking through some bushes we happened across Flash Walker frolicking in the sun. Flash proves that ham radio can be entertaining as well as fun.

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NEVER SAY DIE

...de W2NSD/I

EDITORIAL BY WAYNE GREEN

MORE IRS?

The letters keep pouring in from readers with horror stories of the IRS and newspaper clippings of further IRS sponsored disasters. There are occasional stories where there has been some sign of there being nice people working in the IRS, but the instances of callous disregard for the rights of taxpayers are overwhelming.

One reader referenced a new book which documents the blundering which apparently has resulted in the State of Ohio not actually being made an official state of the U.S. This happened back in 1803, I gather, and there was a frantic and relatively secret attempt to cover this up with a retroactive joining of the Union in 1953. The author gleefully points out that the 16th amendment to the constitution (the income tax) was passed by only the bare minimum of states...and one of these was Ohio...so if Ohio was not legally a state at the time, then the 16th amendment was not passed and there is no legal income tax. If it turns out that Ohio is not really part of the Union. The IRS has a lot of tax money to give back.

PROBLEMS

There are some other problems with that 16th amendment too; the main ones being that a good many of the parts of the IRS code appear to be clearly unconstitutional. The only way the courts have been able to cope with this is for the judges to instruct the juries that they are to totally ignore the constitution and bring in their verdicts solely upon the law as it is presented to them by the judge. Last December Jim Scott finally managed to get a hearing before a jury on his blank IRS tax forms in order to try and test the constitutionality of the IRS rules. Judge Crocker in Fresno instructed the jury, "The court (the judge) in this case rules that the IRS codes and laws used in this case are constitutional. The 16th amendment is constitutional and is the law. It does not violate either the 4th or 5th amendment. The jury is not to be concerned with the law itself nor the wisdom of the court in determining the law." It's things like this that make a lot of people boiling mad. Is it possible that any question of law

based upon the constitution does not have to go all the way to the Supreme Court for a decision?

LETTERS

Fear pervades all of the correspondence I get about the IRS. Many readers give no name or call...and all the others ask not to be revealed. In view of the record of vindictiveness of the IRS this fear is well founded. Governor Lee of Utah testified at the Scott trial about a man who committed suicide, stating in a note that he could not continue to put up with the IRS harassment. And before the man was buried his daughter received a note from the IRS demanding all of his records. His 17-year old son, who had worked his first year and had a \$400 tax refund coming, received a notice that this money had been applied to his father's account, even though the IRS had as yet no records from which to determine if the father did owe any taxes. Governor Lee turned this information over to the Justice Department and was told by them that only the IRS can investigate the IRS!

In 1955 Governor Lee withheld \$100 from his taxes and informed the Secretary of the Treasury Humphrey that he was doing this so he could use it as a way to appeal all the way to the Supreme Court the use of his taxes for foreign aid, which he considered unconstitutional. The IRS attached all of his property. Then they seized the \$100 from the separate account where Lee had deposited it...seized it without a court order...and later released his property...all without any court action of any kind.

Lee claimed that he had been shaken down by the IRS every single year since 1934, complete with yearly audits and even though he didn't owe them anything it was cheaper to pay up than try to fight it out.

TAXES - AGAIN

Since we see only the tip of the tax iceberg, it is easy for us not to think much about the enormity of the situation. The fact is that we are paying an incredible amount of taxes, but the withdrawal from our pockets is so slick that, though we are uncomfortable about it, we don't see it happening, and our resistance is kept below the revolt level.

Since we realize, on some level, that the situation may not be acceptable, I suspect that many of us react by avoiding the subject. It's like death, we just don't even want to think about it. Death and taxes, the saying goes, are unavoidable. And, like rape, when something is unavoidable, why not try and enjoy it?

Well, death can be put off by good medical help...and taxes can be, similarly, cut to a minimum, even though they can't be eliminated. We don't hasten death just because we know it is inevitable...neither should we pay a lot more taxes than we really have to just because some must be paid.

Okay - we can make do with a minimum of taxes - but how do we go about achieving this goal? Could we ever get taxes down to that biblical tythe - the ten percent level? Perhaps, if we worked on all aspects of taxes, we could do just that - or even better.

So what do we mean by taxes and what ways can we cut them down? There are two obvious approaches to this situation - one is to cut down the need for tax money by cutting back on government expenses - and the other is to apportion the tax bite more evenly on the people so that some groups are not taxed heavily while others have little or no tax to pay.

Over 50% of your income is going out for taxes in one way or another - federal and state income taxes - social security taxes - unemployment taxes - gasoline taxes - liquor taxes - tobacco taxes - travel taxes - airport taxes - sales taxes - rooms and meals taxes - occupancy taxes - property taxes - business taxes - telephone taxes - import duty taxes on all imports - sewer tax - road improvement taxes - ICC truck taxes - water tax - car registration tax - drivers license tax - ham license tax - school tax - transfer taxes - stock taxes - ad nauseum. Add the extra cost on every product you buy of the corporation taxes - gross receipts taxes - state and federal corporation income taxes - money spent on employee employment taxes - on federally required insurance (tax) - plus virtually all of the above listed taxes. And don't forget estate taxes, inheritance taxes, gift taxes, probate taxes, and things like that. The government won't.

If the tax bite were equalled a bit, even without trying to save any money that is being wasted on our bureaucracy, with the corporations and businesses made to carry a more significant part of the burden - and with the rich at least equally taxed - we would have a lot more to show for the amount of time we devote to

bringing home that paychecklette. Unfortunately our great government — our democracy — has somehow worked out to represent the wealthy people and corporations rather than the common people. Well, that's not surprising, since it is the wealthy people and corporations that enable our law makers to get elected. They pay the money it takes to con us into voting for their proteges.

Can something be done? Of course it can! But it won't be done if you and I sit there and try not to think about the problem — if we try to ignore it. That treatment does not get rid of problems, it just aggravates them. A couple of hundred years ago our forefathers got pretty upset over the tax situation and they did something about it. They complained about taxation without representation — and we don't have much different today. Sure, when it comes down to it, you appear to have representation. But your representative has been put in his job by money — and it wasn't your money — so when you ask him to buck the buck that keeps him working, what chance do you have? And how real is that representation you think you have?

The Watergate affair brought out the importance of some legislation being put through to try and bring political campaign contributions out into the light and see that they come from the voters and not just wealthy people and corporations who need to have political clout to keep down their taxes or get government favors. If we keep silent about this, we deserve every taxed dollar the government bleeds from us.

ARE WE HELPLESS?

Ralph Nader has shown that the average citizen *can* fight back against the might of U.S. industry — against the conspiracy of the wealthy elite — and even against the government itself. They have the power of money — but we have the power of votes, if only we can organize ourselves to resist having our vote bought via radio, television and newspapers by those who can afford to pay for promotion in these media.

Amateurs demonstrated very clearly that they were not helpless against the FCC, even when the FCC tried hard to ignore the damage they were doing to amateur radio. Amateurs, through their congressmen, put on the pressure and it was felt. We were able to not only get a hearing before the Commission — a historic event in itself — we were able to get immediate changes and the promise of even more changes!

We are not helpless.

It is true that it is difficult for any one person to make a dent in the IRS or in any government behemoth like this — and it is just as true that working together and cooperating we can make the changes we believe are needed. One person can help a group to form and act together — in that way one person can move the mountain.

SHOULD WE FIGHT THE IRS

Though the IRS is by no means the entire problem, it is the crux of it, for if taxpayers go on a tax revolt as our predecessors did two hundred years ago, there is no question but that Congress will notice this and respond to the mandate. In this we have a lot going in our favor. The mail I have received regarding my battle against the IRS has been almost totally in support — give the bastards hell, is the gist of most letters. I don't think many people in America like the way the IRS is doing their job and they don't like the way dollars are being taken from their pockets for ridiculous government programs, foreign aid, wars, arming other countries, etc.

Most of the dealings with the IRS are relatively trouble-free. The IRS is able to collect 97% of the revenue without difficulty and this function costs us about \$250 million and the services of about 23,000 IRS employees, who work in the IRS offices and computer centers. Then we come to that other 3% of the collections. . . and here we find that the IRS spends nearly \$1 billion and uses nearly 50,000 employees. Would you run a business like that? The Audit-Compliance section of the IRS is almost totally wrapped in secrecy, with little information even available to Congress. In fact, the Senate Appropriations Committee has a Subcommittee for the Treasury which has only one member who is responsible for reviewing this billion dollar budget! It is obviously impossible for one man to cope with a budget of that magnitude.

In order to collect the taxes involved the IRS has constantly demanded more and more power — and been granted it. Many people now feel, in view of the wide range of excesses of IRS agents, that too much power has been given or permitted, that it is high time to review the whole collection enforcement process.

WHERE TO START

One of the worst aspects of IRS power is its use of the Federal Grand Jury for its own purposes, with virtually no restraint. Any unrestrained power will most surely be abused, and this one certainly is.

The way the system works right now an IRS special agent can go before a Grand Jury and testify against a taxpayer, saying whatever he wants, with absolutely no fear of any consequences, no matter how barefaced the lies. No record is kept of the hearing — none whatever — so there is no evidence against the agent and his perjury. On the basis of this one-sided testimony the Grand Jury hands down an indictment of the taxpayer. And, on the basis of that indictment, from then on the taxpayer is in deep trouble.

An indictment immediately cuts off all credit for the taxpayer. In fact, his creditors may use this as an excuse for demanding quick payment of debts. You can imagine what this does to his life and, if he has one, his business. It even makes it extremely difficult to get the legal and accounting help he is going to need to fight the case. In many, if not most, cases it is impossible. And without expert help — really expert — he is sunk. This is why the IRS has such an impressive record of winning these cases.

Is there any simple solution to this ghastly situation? Well, for starters, it would help the Grand Jury if they had some way of getting some information which would make it possible for them to hand down a more unbiased decision. If they could have an opportunity to ask a representative of the taxpayer some questions, they might be able to get some light on the situation, and be less in the dark. If such a thing had happened in my own case I am certain that no indictment could have been handed down and 73 would have been saved tens of thousands of dollars. Such a procedure could save many, many small businesses, and even lives. There is no known argument against it, except by the IRS.

This one simple safeguard would take a lot of the power out of the hands of the IRS special agents. If they knew that they might get in trouble if they lied, it could help to keep them more honest and stop the railroading of victims through the courts. It is a fact that the IRS has been used for political reasons to screw enemies of the government — that the IRS is exceedingly vindictive and persecutes critics and others on its "list."

Another safeguard would be to force the IRS to make their secret manuals for agents available to the public as Congress has decreed with the Freedom of Information Act. The IRS has been and remains one of the leading offenders in this regard. A recent test by Freedom Magazine showed that the IRS still has no

Cont. on page 75

SSTV SCENE

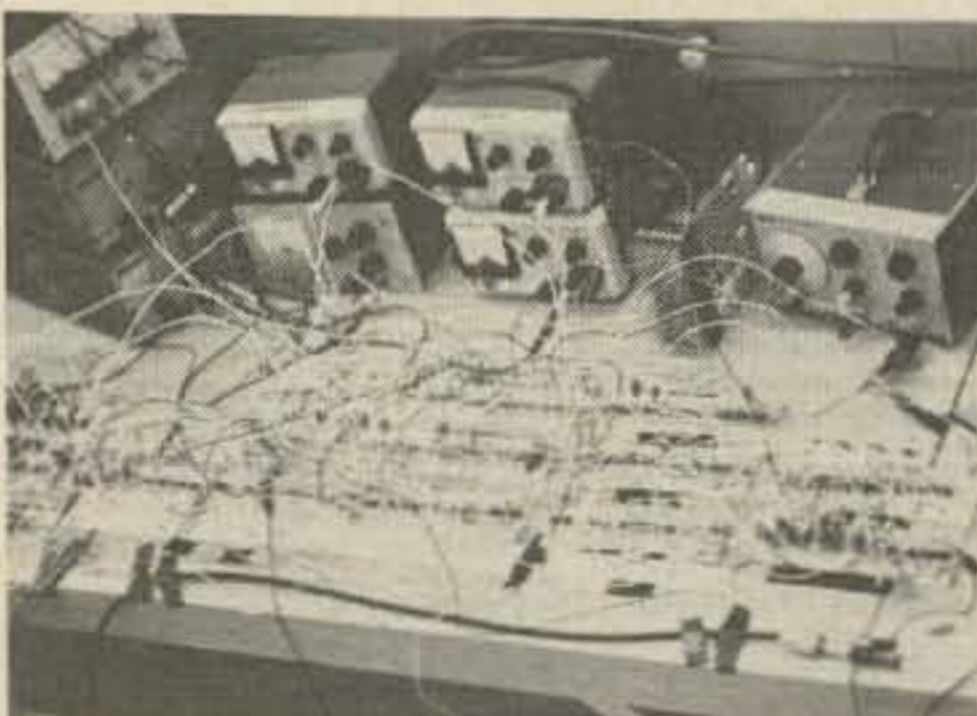
Dave Ingram K4TWJ
Rte. 11, Box 499, Eastwood Vil. 50N
Birmingham AL 35210

Slow to Fast Scan conversion is coming of age, and rather fast. This month's pictures are compliments of Dr. George Steber WB9LVI, and show his converter unit which has been in operation about 9 months(!). The converter includes an MOS shift register memory that can store an entire frame of video. Resolution is 128 bits horizontal by 128 lines vertical with 16 levels of brightness and requires a total of 65,536 bits of storage. Also included is buffer circuitry that allows



Here's the fast scan monitor at WB9LVI, displaying a slow scan picture through the aid of the slow to fast scan converter.

incoming SSTV video to be continuously added to memory and displayed simultaneously. This gives the effect of painting newly received pictures over older ones. Viewing the pictures on an ordinary TV produces large, flicker free, bright pictures and when transmission stops the last frame is retained in memory and displayed continuously. George's scan converter uses a total of 64 - 1024 bit MOS shift register ICs, and considering it takes about 6 transistors to store a single "bit," this gives the equivalent of over 400,000 discrete transistors.



Breadboard of the SSTV slow to fast scan converter.

Recently, while chatting with John WB2AZT, on 20m, he demonstrated the new Venus C-1 micro focus camera which was rather impressive. The camera will focus down to 1/4" through a special vidicon movement assembly thus giving full screen reproductions of small items like ICs and postage stamps, with sharp definition.

Also included is a built-in video inverter and bar generator. (Flip a switch and either function is initiated immediately.) The camera outputs with either Fast or Slow Scan TV, which is quite handy during camera setups. Incidentally, Venus also now has a vertical retrace modification for their SS-2 monitor, which yields better syncing under noise, so you might check with John if you haven't received any info from Venus.

I received some hard-copy SSTV pictures from Leo K1GRT, recently which were fairly good copy. He had accomplished this "paper readout" by using an acoustical coupler and feeding a SSTV signal into a 3M model 850 FAX machine. (This late model machine responds to audio frequency variations, whereas older models like DESKFAX units respond to amplitude variations.) Leo mentions this is an inexpensive hard copy procedure provided one has access to the 3M machines. Also, red, green and blue tracing paper is said to be available for this 3M machine (although Leo has not found any as of this time) and if run through 3 times, should produce fairly good color SSTV hard copies. If any of you know where K1GRT can acquire (or would like to donate) a few sheets of this tracing paper he will attempt the above procedure and return a copy to the donator(s).

Some months back, I mentioned Ben K5IRO, was trying to acquire a batch of 3FP7 and 5FP7 crts, plus some yokes and shields. Walter W7LLP/5, of 3448 N.W. 18 St., Oklahoma City OK 73107, now has that stock. So, if you need one for a Slow Scan monitor you might check with him as he is passing them along for his cost only, which is quite low. Walter also mentions the 75m Slow Scanners are dropping down to 3830 kHz to avoid DX and teletype QRM on 3845 kHz, so you might keep this in mind when operating 75m.

Judging from activity on the air during this year's SSTV contest, participation was tremendous. (20m was alive with pictures that weekend!). Franco I1LCF, also reports heavy European activity but, similar to our situation, propagation was poor. As of this writing I have received very few logs, although the ones received have very good scores. Again, I would like to stress the point that involvement in contests helps promote our mode of communication. Send in those scores, no matter how low! If sponsors see only a small group of entries, they soon lose faith and say a mode "hasn't caught on yet." We know Slow Scan is "now," but we, as pioneers, must also attempt to convince others of our fraternity. Stand up and be counted!



Close up of picture on 10" monitor.

SSTV Terms

Newcomers to SSTV are often confused by some of the terminology used, so this month I have a brief listing of the more commonly used technical terms.

Anode or accelerator - Refers to plate equivalent on crt.

Aperature - Size of "dot" on crt screen.

Aspect Ratio - Ratio of picture width to height. For Slow Scan this is 1:1, indicating a square picture format.

Barrel Distortion - Picture defect where sides appear to bulge outward.

Composite Video Signal - Entire video signal containing video, blanking, and sync.

Definition or resolution - The amount of fine detail a unit can reproduce. (This is usually dependent on scanning frequencies, number of lines, and size of crt "dot.")

Electromagnetic Deflection/Focus - Function produced by magnetic field created by current flowing in yoke on crt.

Electrostatic Deflection/Focus - Function produced by voltage applied to plates or anode in crt.

Florescence - Brightness of P7s initial trace.

Frame - A complete Slow Scan picture, which takes 8 seconds to produce.

Jiggle or Jitter (in sync) - This is usually a partial loss of sync, causing minute misplacement of various lines of a picture.

Luminescence - Brightness of P7s persistence.

Persistence - Length of time of "afterglow" of P7.

Pincushion Distortion - Picture defect where sides appear to bulge inward. (Pincushioning and barreling are usually caused by improper alignment of yoke to crt).

Raster - The 120 lines (either all white, or modulated with picture information) painted on the crt face.

X-Ray Radiation - IN CRT's caused by applying accelerator high voltage in excess to manufacturers specified maximums.

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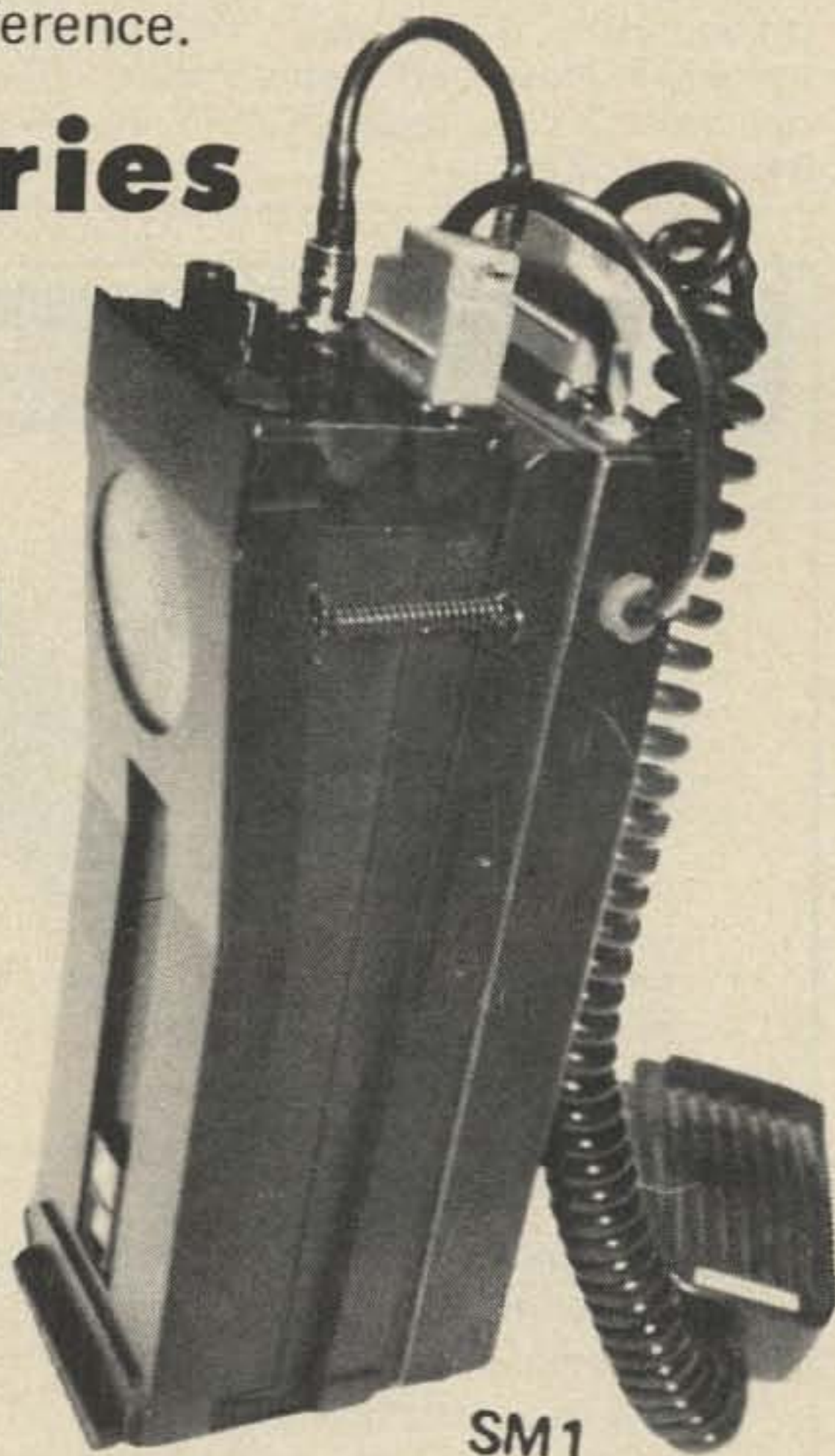
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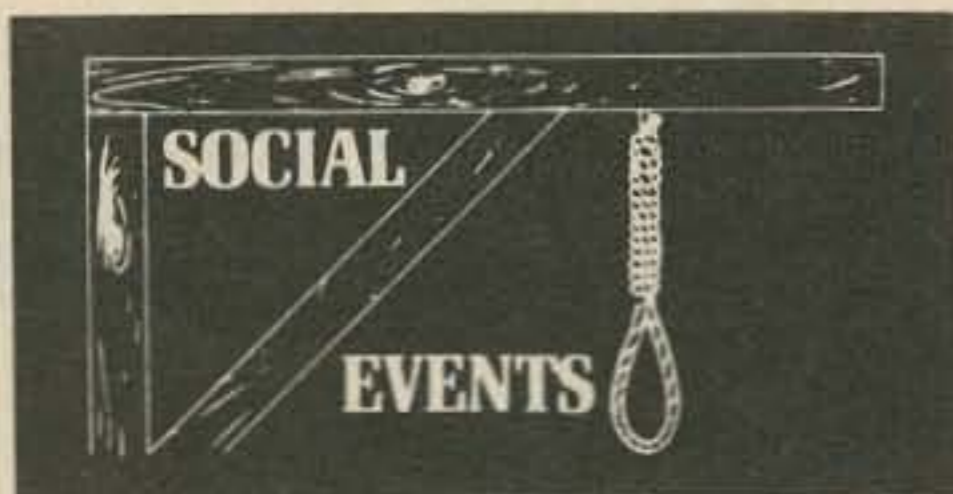
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SPARC GATHERING

The St. Petersburg Amateur Radio Club will hold its annual Hamfest on Sunday, May 5, 1974, from 9:00AM to 3:00PM at Lake Maggiore, 9th St., So., at 38th Ave., St. Petersburg. Registration will be \$1 per family. This entitles you to one chance on the prize drawing, and use of the swap tables. There will be plenty of nice prizes, and extra tickets for these will be 50¢ each. We will also have prizes for the ladies, and separate tickets for them will be 25¢ each. An extra for the ladies will be a swap table of their own. So gather the family, bring your lunch and come along to meet your friends and have fun.

ERIE HAMFEST

The Erie Amateur Radio Society will hold their semi-annual Amateur Equipment Auction on Sunday Afternoon May 5, at 1PM, at Laborers' Union Hall, 1205 West Perkins Avenue, Sandusky OH. Refreshments, cash prizes, door prizes. Talk-in on 94/94 and 52/52.

MISSOURI SINGLES

The Missouri Single Side Band Net will have their annual picnic at Memorial Park in Jefferson City MO, Sunday June 9. A covered dish dinner will be served at 12:30. Coffee, ice tea and soft drinks will be provided by the net. Door prizes given. All amateurs, their families and friends are invited.

"INDY" 14

(Another Bastille Day Bash)

The Greater Indianapolis Hamfest will be held Sunday, July 14, 1974, rain or shine, at the Marion County Fairgrounds. All activities under roof. \$2 covers gate fee and prize drawing. For information write: William J. Evans, 8104 Crest Hill Dr., Indianapolis IN 46256.

MOBILEERS BASH

The Maryland Mobileers ARC Hamfest is June 16, Father's Day, at Anne Arundel Community College, Arnold MD, at 10:00AM - rain or shine. Talk-in on 10/70 and 146.94. Games, refreshments, contests and an auction are planned. Top awards: 2m transceiver and an electronic calculator. Registration \$2, tailgating \$2. Free parking, but plan car pools to save precious petrol. For further information contact: Ted Redick K3UPU, 2 Acton Place, Annapolis MD 21401. Telephone: 301-269-5577.

KENTUCKY HAM-O-RAMA

The Northern Kentucky ARC Ham-O-Rama will be held Sunday May 26, 1974 at Boone County Fairgrounds, Burlington KY, from 8AM to 5PM, 10 minutes south of Cincinnati OH on I-75. Features prizes, indoor exhibits, forums, flea market, food. Tickets \$1.50 advance, \$2 at the door. For tickets and details write: W4PII, 601 Rosemont Ave., Covington KY 41011.

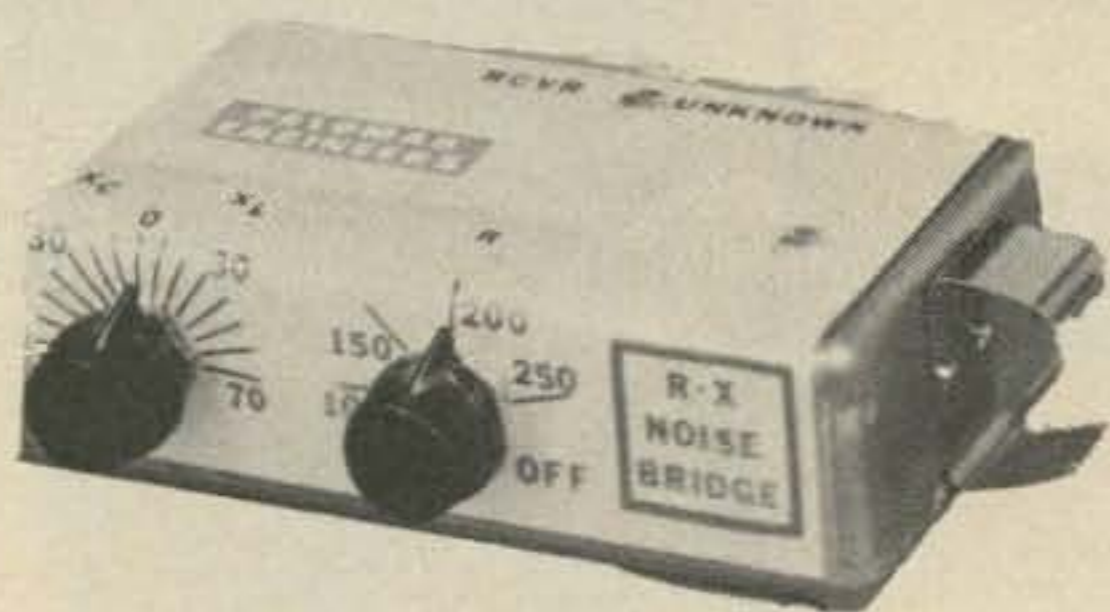
DEKALB COUNTY

The DeKalb County amateurs are sponsoring a Hamfest on May 5, from 7AM to 4PM at Notre Dame High School, 3 miles south of DeKalb off Route 23. Signs will be posted. Registration is \$1.50 in advance, \$2 at the door. For more information contact: Crawford Electronics, 301 Main St., Genoa IL 60135.

IRVINGTON HAMFEST

The Irvington Radio Amateur Club will hold its annual hamfest on Sunday May 19, 1974, 1-6 PM, at the Irvington PAL Building, 285 Union Ave., Irvington NJ. Admission - 50¢ in advance, \$1 at the door. Table rental - \$2.50. Refreshments will be available. Door prize!! For more information and advance tickets contact WA2PWZ, 9 Barbara St., Newark NJ 07105.

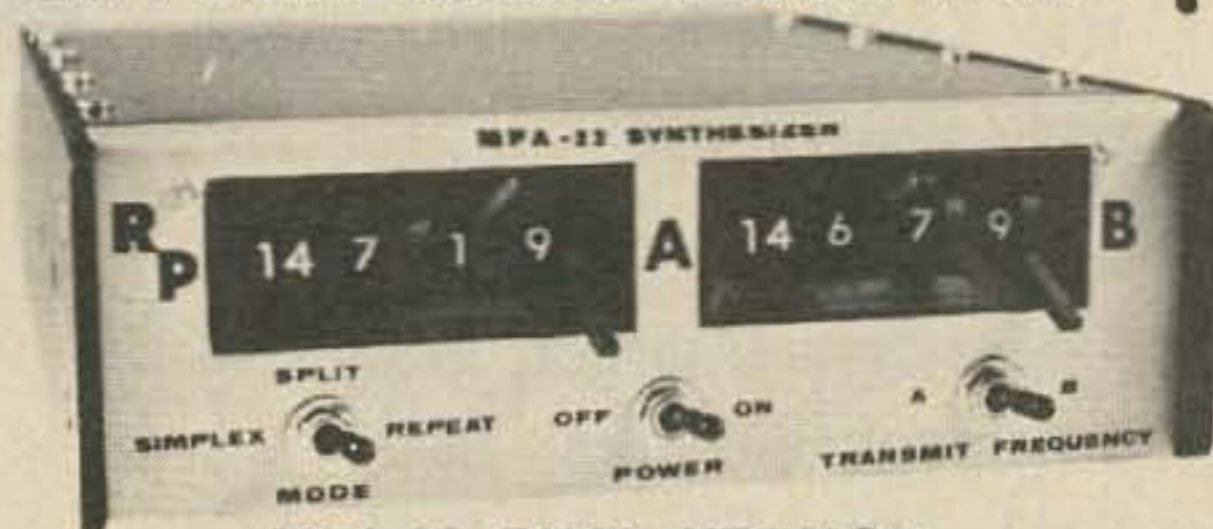
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SEND FOR FREE DETAILS

ROCKY ARRL FEST

The 1974 ARRL Rocky Mountain Regional Convention will be held June 7, 8, and 9, at the Ramada Inn in Pueblo CO. Pre-registration fee is \$6, at the door \$7. Meals, accommodations and camper/trailer hook-ups will be available for the three days of the convention at special reduced rates. Sunday afternoon banquet with speakers from Industry and the Amateur Radio Field. For additional information write: Convention Committee, P. O. Box 92, Pueblo CO 81002.

BIRMINGHAM HAMFEST

The Birmingham Amateur Radio Club proudly announces the 1974 Birminghamfest Convention at the Alabama Fairgrounds Exhibition Hall, Saturday and Sunday, May 4-5, 1974. PRIZES. Talk-in: 3.695 and 34/94.

FLUSHING FESTIVITIES

The Hall of Science Radio Club will hold its annual Fleamarket/Auction/Picnic at the Hall of Science, 111th St. and 48th Ave., Flushing Meadow Park, Queens, on Saturday, June 8, from 10:00AM to 4:00PM. Fleamarket setup 9:00-10:00AM. Admission \$1. Sellers \$2. No commission. Free parking. An auction service available with 10% fee. Rain date is Saturday, June 15. Zoo, Childrens' Farm, Golf, Boating, Art Museum, Science Museum, etc., adjacent. For more information call/write: 212-699-9400 or Box 1032, Flushing NY 11352.

P.H.D.

The P.H.D. Amateur Radio Association invites you to attend its Fifth Annual North West Missouri Hamfest in Kansas City MO on Sunday May 5, from 9AM to 4:30PM. The location will be in the Kansas City North Community Center, one mile south of the Antioch Road, Highway I and I-35 Interchange. Address is 3930 No. Antioch Road.

ANGOLA FEST

The Original FM Hamfest, Sunday, August 4, 1974, near Angola IN. Free fleamarket, entertainment for ladies and kids. Picnic grounds, campsites, boating, food, soft drinks, available — rain or shine. For information contact: Fort Wayne Repeater Association, Box 6022, Fort Wayne IN 46806.

TRI-STATE ARS FEST

The Tri-State ARS will hold their annual Hamfest on May 18, 1974, at the 4-H Fairgrounds, U.S. 41, 3 miles north of town. Overnight camping, auction, flea market, door prizes and ladies bingo. For information or advance registration contact: Steve WB9MDB, 5805 Berry Lane, Evansville IN 47710.

YELLOW THUNDER (WHITE LIGHTNING!)

The 4th Annual Yellow Thunder Hamfest will be held at the Dellview Hotel in Lake Delton WI, on May 18, 1974. Events will include a swapshop, meetings of MARS, ARPSC and VHF repeaters with a cocktail hour and banquet in the evening. Registration will begin at noon. For further information contact: Kenneth A. Ebnetter K9GSC, 822 Wauona Trail, Portage WI 53901.

WEXAUKEE — YEA!

The Wexaukee Radio Club will be holding its 14th Annual "Swap Shop," on Saturday, May 4, 1974, from 9:00AM 'til 3:00PM, at the Cadillac National Guard Armory in Cadillac MI. Talk-in on 146.94 MHz. Everyone welcome — many good prizes — lunch counter — buy & sell — FREE PARKING.

SEE YA IN MARYLAND

The Potomac Area Hamfest will be held at Westminster MD, on Sunday, May 5, 9:00-5:00. \$2 registration covers Flea Market and tailgate sales. Professional food and beverage catering on grounds. Parking for 400 cars. Usual hamfest activities. Talkin on 146.94. Details from K3DUA or W3EVF per Callbook addresses.

MONTREAL '74

The 1974 Montreal Hamfest will be held August 4, at the MacDonald College Farm, Ste Anne de Bellevue. Prizes, giant fleamarket, technical sessions, family fun — \$2.50/Adult. For more information contact: VE2RM, Box 201, Pointe Claire-Dorval, Quebec H9R 4N9.

FRIENDLY FESTS

Hamfest! Indiana's friendliest and largest Spring Hamfest. Wabash County ARC's 6th Annual Hamfest, May 19, 1974, 4-H Fairgrounds, rain or shine. Admission still only \$1 for advanced tickets (\$1.50 at gate). Large flea market, technical sessions, bingo for XYL's, free overnight camping, plenty of parking. Bonus for car-pools (4 or more adults per car). For more information or advanced tickets write: Jerry Clevenger WA9ZHU, Route 4, Wabash IN 46992.

SEE YOU IN DES MOINES

The Des Moines Radio Amateur Association invites you to participate in the Des Moines Hawkeye Hamfest at the Iowa State Fairgrounds in Des Moines, Sunday, June 16, 1974, 8:00 AM to 6:00 PM CDT. Booths available for rental. For further information contact: Alan V. Harris, K0OOD, P.O. Box 88, Des Moines IA 50301.

SRRRC HMFST

The SRRRC Hamfest will take place June 2, at a new sight — the Bureau County Fairgrounds, Princeton IL (It has formerly been held in Ottawa IL). Easy access Rtes. 80 — 6 — 29 — 34. Advance registration \$1.50 before May 20, \$2 at the gate. For more information write: G. E. Keith W9QLZ/W9MKS, RFD #1, Box 171, Oglesby IL 61348.

JUST BREEZIN' ALONG

The 20th Annual Breeze Shooter's Hamfest, Western Pennsylvania's largest, will be held on Sunday, May 19, 1974, at White Swan Park (Parkway West, 4 miles East of the Greater Pittsburgh International Airport). No fees and parking is free. Tables are available, as is a large flea market. An amusement park is on the premises for the family's enjoyment. Check-ins will be taken on 29 and 146.94 MHz. Further information is available from George Proudfoot WA3QER, 3472 Ivy Hill Lane, Finleyville PA 15332.

MILWAUKEE FEST

(Bastille Day Celebration)

The South Milwaukee Amateur Radio Club's 4th Annual Southeastern Wisconsin Swapfest will be held Saturday, July 14, 1974 from 7:00AM to 5:00PM, at Shepard Park (American Legion Post 434), 9327 South Shepard Avenue, Oak Creek WI. Parking, picnic area, hot and cold sandwiches and liquid refreshments will be available on the grounds. Admission \$1, and includes a "Happy Hour" with free beverages. Prizes will be awarded. Talkin on 146.94. More details available from: So. Milwaukee Amateur Radio Club, S. F. Schreiter W9AKF, 104 Brookdale Dr., South Milwaukee WI 53172.

HUMBOLDT HUMBOLDT

The annual Humboldt ARC Hamfest is Sunday May 19, at Shady Acres City Park, Trenton TN. Flea market, ladies activities and a playground for the children. For information contact Hugh Wardlaw WB4SLI, 2678 Cole Drive, Humboldt TN 38343.

BLUE RIDGE

The Blue Ridge Radio Society of Greenville SC will hold its annual Hamfest on May 5, at the Recreation Building in Cleveland Park, Greenville SC. Flea market, prizes, fun from 9AM til 3PM. For information contact Don Rose W4ZKH, 11 Ivanhoe Circle, Greenville SC 29607.

FUN IN KANSAS

The Central Kansas ARC sponsored Hamfest will be held June 2. For more information contact: Charles R. Svoboda W0LQK, 225 West 9th, Chapman KS 67431.

NEW PRODUCTS

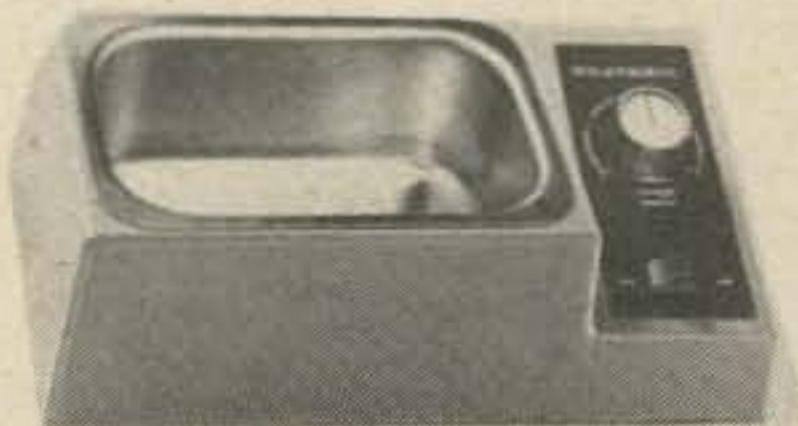
NEW FROM HEATH



More new products from Heath. The Heath Company, Benton Harbor Michigan is now offering in kit form a professional type weather station for home use. Barometer, lighted wind direction indicator, wind speed gauge and indoor/outdoor thermometer. The new ID-1290 weather station features a solid state thermometer displaying either indoor or outdoor temperatures at the flip of a switch. Sensing devices are mounted on a single horizontal mast that easily attaches to a TV antenna mast or tower. The entire package can be built with conventional hand tools.



Another model for temperature only, indoor and outdoor, is the ID-1390. With 1.27cm numerals, they can be readily seen across a room.



Also new from Heath is the "Ultrasonic Cleaner" in kit form. Excellent for cleaning paint brushes, most jewelry, watches, glasses, dentures, etc. With an automatic timer from 1 to 5 minutes, the unit automatically shuts off. Deep cleans the most intricate items.



A new kit form 4 channel amplifier, loaded with top performance is now available as the model AA-2005, 25 watts, 1HF and 15 watts rms per channel, plus built in SQ circuit to reproduce the matrixed 4 channel discs currently available. The AA-

2005 is kept simple and uncomplicated through use of modular design.

All these items and more are found in the new Heath Company catalog. . . just check Heath on the reader service form in the back pages of 73.

SCHOTTKY DIODE SPEC SHEET

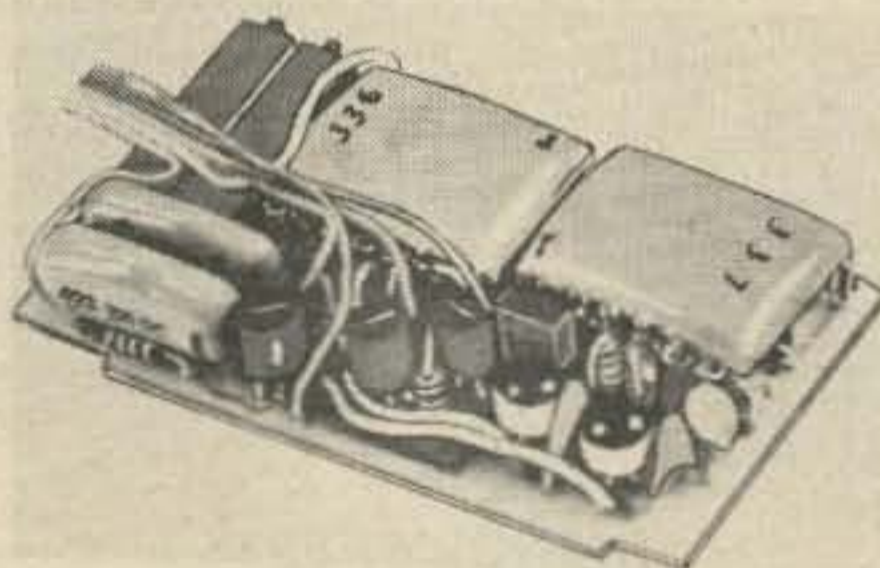
A power Schottky diode, believed to be the first such device rated for a junction temperature of 125°C and available in production quantities, is described in a spec sheet available from TRW Semiconductors.

The device, designated SD-51, is rated at 60A average forward current with a forward voltage of 0.6V at a junction temperature of 125°C. The unit features a blocking voltage of 200 milliamperes at a case temperature of 125°C at 35V. Reverse recovery time in inverter circuits is less than 10 nanoseconds. Packaging is a nickel-plated JEDEC DO-5 case.

SD-51 is ideally suited for computer power supplies and for any application where a diode is used to rectify at 5V.

Further information and a copy of the Spec sheet are available from Sales Manager, TRW Semiconductors, 14520 Aviation Blvd., Lawndale CA 90260. Telephone: 213-679-4561.

SOLID STATE TUNEABLE



The new ALPHA TT-88 Two Tone Sequential Decoder will respond to any two standard tone codes such as are used in Motorola, General Electric or Bramco type two-tone sequential selective calling decoders and is fully compatible with these systems.

The TT-88 has several exceptional advantages over all other selective calling decoders. It does not use mechanical reeds and is, therefore, far more reliable. It is fully tuneable over the standard frequency range (250 Hz. to 1600 Hz.) It is miniature in size, and has low current drain (9 mA standby) and can, therefore, be utilized in handheld and walkie talkie radio units where space and current drain are critical problems.

With the ease of installation, lack of maintenance, and low cost of the Alpha TT-88 Two-Tone Sequential Decoders, selective calling is now more practical than ever.

For additional information call or write Alpha Electronic Services Inc., 8431 Monroe Avenue, Stanton CA 90680. Telephone: 714-821-4400.

FR-101S 160-2M Receiver



Yaesu Musen innovation and advanced communications technology, now brings you a total coverage, solid-state communications receiver.

The FR-101S has the flexibility that even the most demanding amateur desires-with provision for all mode reception on 21 500 KHz amateur and shortwave bands from 160 thru 2m. This versatile receiver is capable of transceive or external VFO control with the matching FL-101 transmitter-to be introduced soon. New, solid-state technology, with features such as a double-balanced mixer, offer unparalleled performance and rejection of cross-modulation and inter-modulation interference. Build your "total performance" base station with the addition of the FR-101S communications receiver. List \$499.00. For more information contact: Yaesu Musen USA Inc., 7625 E. Rosecrans Ave, Unit 29, Paramount CA 90723. Telephone: 213-633-4007.

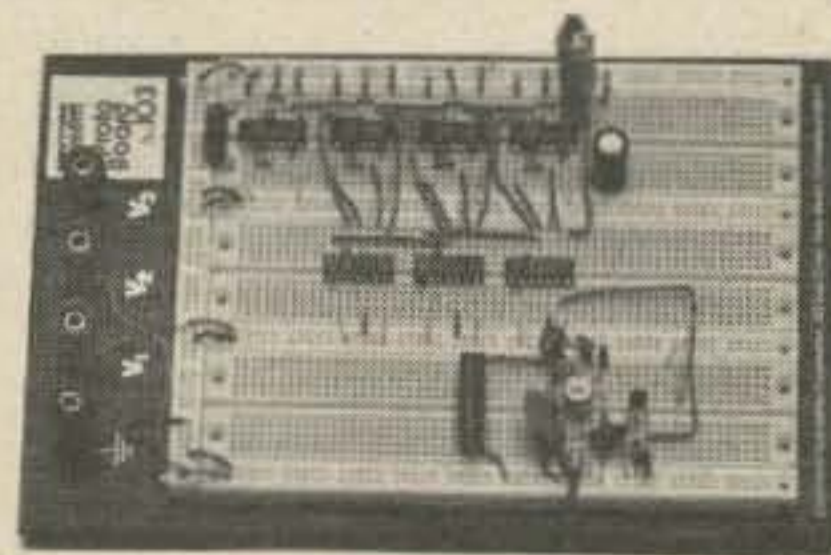
RF TUNING DIODES

A new six-page brochure issued by Amperex Electronic Corporation, contains specifications and application data for variable capacitance tuning, band switching and AFC diodes.

In addition to device specifications, the brochure contains charts of Diode Capacitance vs Reverse Voltage for all 12 types, outline drawings of the five different package configurations available, and a sample schematic diagram of the front end of an FM auto radio showing the use of three of the diode types.

Copies of the brochure may be obtained by writing: Amperex Electronic Corporation, Solid State and Active Devices Division, Slatersville RI 02876. Telephone: 401-762-9000.

SOCKETS AND BUS STRIPS



Continental Specialties Corporation, New Haven CN has developed and is now marketing an expanded line of breadboarding sockets and bus strips with a modular snap-lock capability allowing the user to expand or contract additional sockets or strips as the project requires.

Called Continental Specialties QT Sockets and Bus Strips, these flexible circuit testers accept all discrete multi-pin components without soldering or patch cords. This enables the user to breadboard a circuit almost as fast as he can draw it.

Contacts are encased in a tough, heat resistant valox housing, withstanding temperatures in excess of 100°C. Mounting holes in the housing permit top mounting to any flat surface with 4-40 flat head screws or 6-32F self-tapping screws for behind-the-panel mounting. An insulated backing prevents shorting when mounted on a conducting surface.

Complete technical literature, specifications, drawings and prices are available by contacting Continental Specialties Corporation, 325 East Street, P.O. Box 1942, New Haven CN 06509, 203-624-1811.

NEW FET MULTIMETER



Sencore has introduced a new unit to its All-American made line of multimeters, the FE27 Big Henry FET Multimeter. Big Henry was designed to include protection against the mechanical and electrical hazards of everyday service. The rugged molded acrylic case, backed up by vinyl-clad steel, is virtually indestructible. A spring loaded jewel meter movement has been specially designed to withstand the shock of a ten-foot drop. Internal protection of the sensitive circuitry is provided on all functions by diodes and a fuse. Big Henry will withstand 1000 volts DC across the input on any range.

Big Henry features 1.5% dc accuracy with 15 megohm input impedance, designed to reduce circuit loading and eliminate measurement errors in high impedance circuits. A special ac rms circuit was designed into the unit to read true rms voltage within 3% for either sine waves or square waves produced by regulated power supply transformers in some new TV sets. This circuit provides more accurate rms measurements on other non-sinusoidal waveforms as well. A separate function is provided for ac peak-to-peak measurements for direct comparison readings against peak-to-peak test point voltages labelled on schematics. Price \$1.50. For additional information contact: Robert Bowden, Sencore, Inc., 3200 Sencore Drive, Sioux Falls SD 57107.

TUCKER CATALOG

Tucker Electronics Company has announced the availability of a new 160 page instrument catalog. Over 5000 test instruments are listed by nearly 600 manufacturer names including many reconditioned, new and used units. Of particular interest is the availability of an interesting variety of rental and purchase-finance plans. An excellent selection of hand-held and desk top calculators are also listed in one of the 18 distinct sections divided by product category.

Tucker's incoming toll-free WATS telephone system combined with an inventory of over 15,000 instruments provide many excellent bargains. For more information contact: David G. Fletcher, P.O. Box 1050, Garland TX 75040.

RF POWER TRANSISTORS

MRF5174, MRF5175 and MRF5176 are three new RF transistors designed for 28VDC transmitter use. The MRF5174 has 2 watts output and 12 dB gain at 400 MHz, while the MRF 5175 yields 5 watts of output and 11 dB gain at the same frequency. The MRF5176, highest powered of the three devices has 15 watts output at a gain of 10 dB. (All outputs and gains are at 50% efficiency.)

These devices are in Stripline Opposed Emitter (SOE) ceramic stud packages with low inductance dual emitter bonding for high gain high frequency performance in military and industrial applications.

All are characterized from 200 through 600 MHz and for Series Equivalent Impedances to facilitate broadband amplifier design. They are well suited for use as predrivers, and drivers for both transistor and microwave varactor multiplier stages.

For more information contact: Technical Information Center, Motorola Semiconductor Products Inc., P.O. Box 20924, Phoenix AZ 85036.

4-CHANNEL SCAN MODULE

RK Products, 4295 Kentridge, S.E., Grand Rapids MI announces a new RK-4 plug-in, 4 channel scan module, with memorized return from instant priority searchback for the full Regency line, MT-15, MT-120 and Aquaphone Transceivers. Catch all the area action automatically. It will instantly search back to the priority channel every 1-2 seconds, and stays there as long as there is a signal. Otherwise, it instantly returns to the channel it was originally on. A mini-switch can be installed for disabling the searchback feature. Ideal for hams who also want to be sure of getting all

the traffic on a particular channel, firemen, policemen, repeater controllers, or to monitor your own private channel. An excellently detailed instruction book and schematic comes with the unit, or may be purchased separate for \$1. The RK-4 sells for \$24.95, plus 50¢ postage, from RK Products, Grand Rapids, MI 49508.

DUAL GATE MOSFETS FOR 500 MHz APPLICATIONS



Motorola's 3N209 and 3N210 are dual gate, diode protected N channel MOSFETs Silicon nitride passivated for long term stability, these devices are fully characterized in both S and Y parameters.

Developed for use up through the 500 MHz band, they feature designed-in A.G.C. capability, low feedback capacitance, very low intermodulation distortion. Common source power gain at 500 MHz is 13 dB, with a low 4.5 dB noise figure.

For further information contact the Technical Information Center, Motorola, Inc., P.O. Box 20924, Phoenix AZ 85036.

VOICE BAND TELEVISION HARD COPY RECORDER

Alden Electronics & Impulse Recording Equipment Co., Inc., announces the introduction of the ALDEN 400 "Push to Print" Recorder. The 400 "Push to Print" Recorder converts audio VBT (voice band television) signals into sharply, detailed hard copy facsimile pictures with a frame size of 2.3 diagonal inches.

The recorder records at a frame rate of 8 seconds at 15 sweeps per second on Alfax electrosensitive paper. It receives VBT transmissions via radio or standard telephone voice grade communications link with no delay in receipt of picture or data. The recorder is complete with synchronous sweep drive, chart drive, internal writing amplifier, power supply and manual framing. A contrast control is incorporated into the recorder to provide the operator with a convenient means of optimizing the recording to provide clarity and contrast to suit his needs. Price for the ALDEN 400 "Push to Print" Recorder is \$795.00. Delivery is 60-90 days. Write: Alden Electronics and Impulse Recording Equipment Co., Inc., Alden Research Center, Westboro MA.

73 REPEATER ATLAS REGISTRATION

REPEATER CALL (WR only)		FORMER CALL		LOCATION (City)		STATE	
INPUTS	OUTPUTS	TT Wh TB PL	FM AM RTTY	AUTO PATCH	ERP	USEFUL RANGE (RADIUS)	
		Hz					
		Hz					
		Hz					
		Hz					
REPEATER GROUP/SPONSOR						TRUSTEE	ID-TYPE OR MFR.
<input type="checkbox"/> I certify that I have received no outside assistance while completing this form.							
DATE	SOURCE (NAME/CALL)		SPECIAL OR EMERGENCY FUNCTIONS				



AR	WR7ACT	Eagle River	6.16-6.76
CA	WR6ADR	Burlingame	7.90-7.30
CA	WR6ADR/6	San Bruno Mt.	7.90-7.30
CA	WR6ACM	Vacaville	6.55-7.57
			52.760-52.525
			449.850-444.850
CT	WR1ABC	Torrington	223.06-224.66
FL	WR4AFL	Jacksonville	6.28-6.88
FL	WR4ABZ	Ft. Walton Beach	T1.8 6.19-6.79
IA	WR8ADC	Ottumwa	6.04-6.64
IN	WR8ACI	Anderson	6.22-6.82
			6.34-6.76
IN	WR9ACF	Evansville	6.19-6.79
IN	WA9EAU	Ft. Wayne	6.31-6.91
IN	WR9ABN	Ft. Wayne	6.28-6.88
			7.60-7.00
IN	WR9ACJ	Ft. Wayne	CLOSED
IN	WR9ABJ	Gary	7.60-7.00
IN	W9CSF	Michigan City	T1.8 6.37-6.97
IN		Terre Haute	6.34-6.94
KY	WR4AFK	Glasgow	6.34-6.94
LA	WR5ADB	Rayville	6.16-6.76
MD	WR3ALP	Lexington	6.04-6.64
MI	WR8ACP	Jackson	6.28-6.88
MI	WR8ACS	Rochester	6.22-6.82
MI	WR8ACY	Whitmore Lake	6.07-6.67
			449.00-444.00
MN	WR8ABT	Mankato	6.25-6.85
MO	WR8ADH	Independence	6.13-6.73
NV	WR7ABN	Virginia City	6.16-6.76
NV	WR7ABI	Reno	6.34-6.94
			6.34-7.48
			6.94-7.48
NB	WR8ADF	Clarkson	6.28-6.88

NH	WR1ABQ	Derry	6.25-6.85
			53.580-52.980
			444.25-449.25
NH	WR1ACQ	Saddleback Mt.	6.40-7.00
NJ	WR2ADK	Pleasantville	7.81-7.21
NM	WR5ACX	Albuquerque	6.10-6.70
NY	WR2ADL	Plattsburgh	6.22-6.82
OH	WR8ABC	Cleveland	6.16-6.76
			6.355-6.76
OH	WR8ACR	Cleveland	6.13-6.73
OK	K5CFM	Oklahoma City	6.22-6.82
			7.21-7.81
			52.680-52.525
			449.1-444.1
PA	WR3ACO	Harrisburg	6.22-6.82
TN	WR4AFA	Nashville	6.19-6.79
TX	WR5ACJ	El Paso	6.28-6.88
TX	WR5ABB	Sequin	6.16-6.76
WA	WR7ABO	Olympia	52.525-53.030
WI	WR9ACR	Plymouth	7.84-7.24
		Mexico	
	XE1UHF	Mexico City	16-76
		Puerto Rico	
	WR4AEC	Adjuntas	6.16-1.76

50 MHz BAND

Bill Turner WA0ABI
Five Chestnut Court
St. Peters MO 63376

Jim WA3RSP dropped me a QSL to say that he will be on 6m in force from Pittsburgh this summer running a Lafayette transceiver on AM and a Clegg Venus on AM and SSB. Jim is looking forward to lots of Es and scatter contacts.

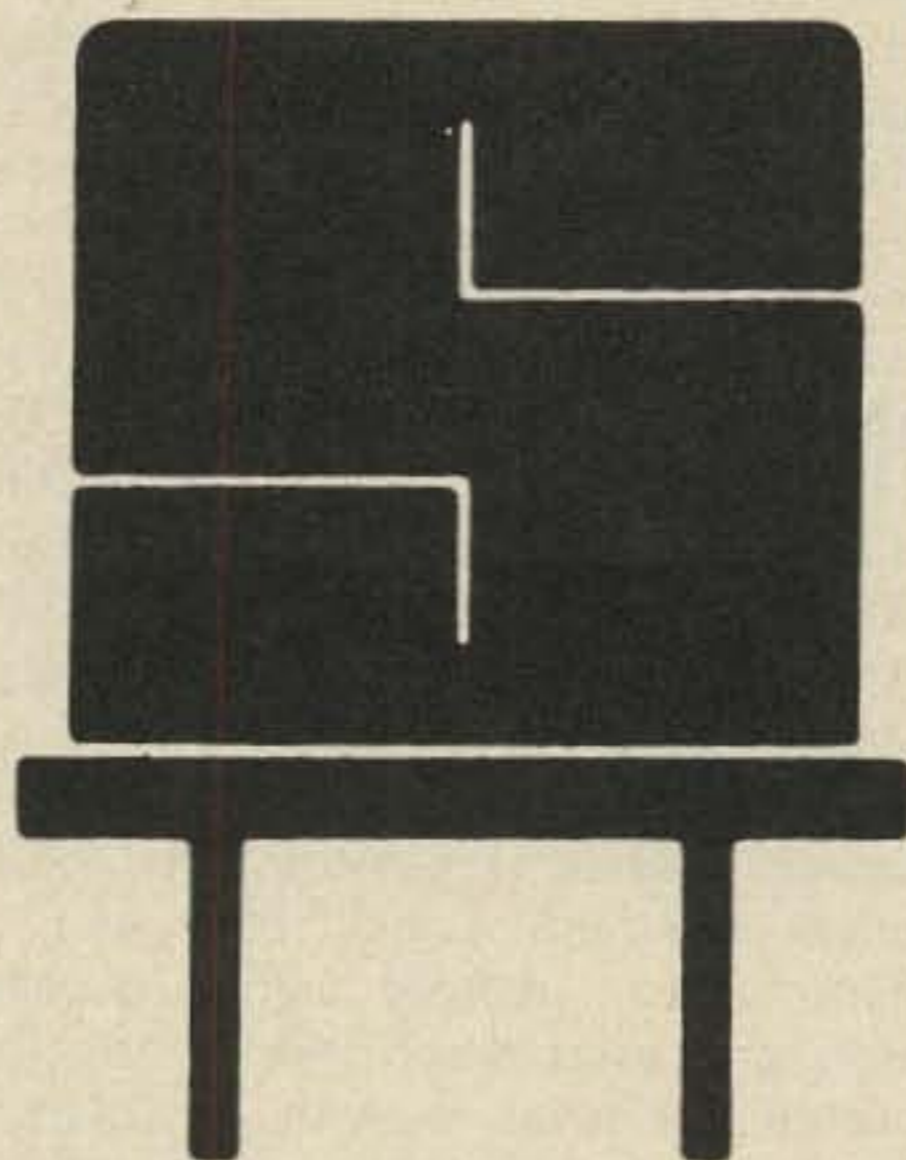
Larry W3MSN, is active on 6m SSB and CW from Oxon Hill MD with a Swan 250C and four elements. Larry is also active on 2m SSB and CW plus FM on 223.5 and 446.0 and would be happy to contact any and all from the Maryland/Washington D.C. area.

Art WA1EXN, says he has heard from Andy ex-VE1ASJ who is now VO2AB from Goosebay, Labrador. He will be signing VX2AB during 1974, Canada's Centennial year. Andy is looking for an SB-110A and a modified SB-200 linear for 6m operation from the new location. Art has not been personally very active this winter but does mention working WB4NDT on February 17th with 5X9 signals both ways.

Thanks to W3DID for sending a copy of 'The Milliwatt,' the publication of the Baltimore Radio Amateur Television Society. This is a rather short but informative club bulletin.

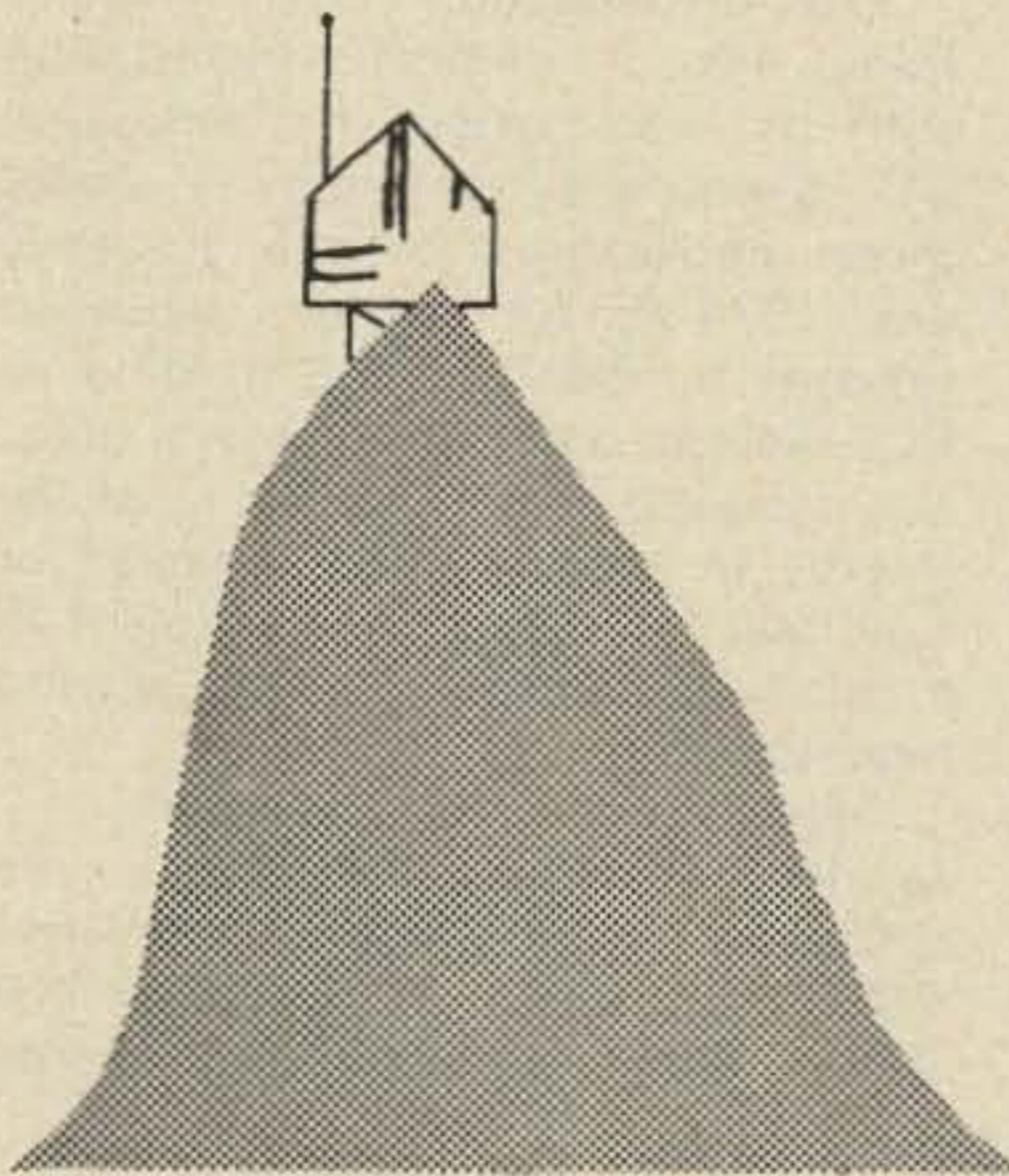
K5ZMS/5 says San Antonio had an opening to six land on February 1st. Ray worked WB6ECD/6, thereby qualifying another new member for SMIRK, of which Ray is Secretary/Treasurer. Also heard or worked were Lyle K9DKW/7, and WA7UDV, both SMIRK members from Arizona. The evening of the 14th the band opened to the Dallas area during which WA5YCC picked up the con-

Cont. on page 12.



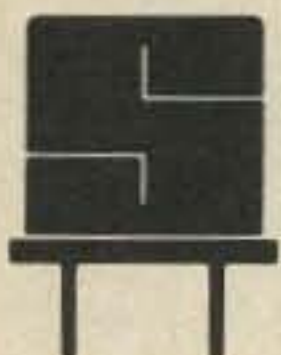
REPEATER OWNERS

Don't Take Chances. SENTRY offers custom made crystals made exactly to your specifications. When it comes to crystals for your repeater, BUY THE BEST - SENTRY.



REPEATER USERS

If you want reliable access to the repeaters in your area, you want and need SENTRY CRYSTALS. SENTRY CRYSTALS are custom made for your rig. We don't stock a large quantity of crystals for a certain frequency and hope you can tweak them to frequency in your rig. We do offer FAST service on crystals made especially for you and your rig. If you want reliable, on-frequency operation, INSIST ON SENTRY.



SENTRY MANUFACTURING COMPANY
Crystal Park, Chickasha, Oklahoma 73018

PHONE: (405) 224-6780

TWX-910-830-6425

tacts needed for membership. The 23rd the band was open to Virginia, North and South Carolina and Florida. Ray also said that Smirk has 75 members in 15 states with numerous applications being processed and many more expected when the band starts opening again.

The Yaesu FTV-650 transverter available on the American market. This unit, when supplied with power and a little 10m drive will yield 100 watts PEP input on any frequency from 50.0 to 54.0 MHz. While intended for use with the Yaesu line of equipment other types may be used if desired. The manual includes a schematic for a power supply suitable for this purpose. When used with Yaesu equipment power is supplied from the driving unit through cables provided.

This is an all tube design with the triode of a 6AW8 supplying the mixing frequency of 22 or 24 MHz for both receiving and transmitting mixers. The receiving converter consists of a pair of 6CB6s used as rf amplifier and mixer. The pentode half of the 6AW8 is used as the transmitting mixer, the output of which is amplified by a 12BY7 driver and fed to a single 6146 which is pi-net coupled to the antenna. Metering is provided for final cathode current plus input and output relative power. An ALC output is provided. All rf and dc switching is internal. Input and output are 50 to 75Ω, sensitivity is .5uV for 10db S/N (depending upon the receiver with which it is used), image rejection is greater than 50dB. 3V RMS is the required rf drive. The i-f is of course 28-30 MHz. Physical specs are 20.32cmW x 15.88cmH x 29.21cmD (8"W x 6 1/4"H x 11 1/2"D) with a weight of 14 pounds. The price is currently \$159.95, and it sounds good too.

WA0ABI



*Tom DiBiase WB8KZD
708 6th Avenue
Steubenville OH 43952*

Contest Calendar

May 11-13	Georgia QSO Party
May 18-20	Connecticut QSO Party
June 1-2	IARS CHC/FHC/HTH QSO Party
July 27-29	CW County Hunter's Contest

This Month

Georgia QSO Party

From 2000Z May 11 to 0200Z May 13. Stations may be worked once per band/mode. Exchange QSO number,

RS/T, and QTH (Georgia county or state, province or country). Georgia to Georgia QSOs permitted. Score 2 points per QSO. Georgia stations multiply total QSO points by total states and provinces worked. DX stations don't count for a multiplier. Non-Georgia use total Georgia counties worked as multiplier. Frequencies are: CW-1810, 3590, 7060, 14060, 21060, 28060; SSB-3900, 3975, 7260, 14290, 21360, 28600; NOVICES-3718, 7125, 21110, 28110. Appropriate awards. Logs should show Date/time in GMT (UTC), stations worked, exchanges sent and received, bands, emission, and multipliers claimed. Check lists will be appreciated. Include signed declaration and brief description of rig and antenna. Entries must be postmarked by June 10, 1974 and sent to CARC, c/o John T. Laney III K4BAI, P.O. Box 421, Columbus, GA 31902. Enclose large SASE for results.

Connecticut QSO Party

From 2100Z May 18 to 0200Z May 20. See March 1974 "73," page 4 for complete details.

WB8KZD

SCHOLARSHIP AVAILABLE

The Foundation for Amateur Radio, Inc., a non-profit organization with its headquarters in Washington DC, announces its intent to award three scholarships for the academic year 1974-75. All amateurs, wherever resident in the U.S. and holding an FCC license of at least general class, can compete for one or more of the awards if they are now enrolled or have been accepted for enrollment in a full time course of studies beyond high school.

Application forms and further information can be requested from the Chairman, Scholarship Committee, 8101 Hampden Lane, Bethesda MD 20014. Requests must be postmarked prior to June 1, 1974.

ARMED FORCES DAY

This year, as in the past, the U.S. Naval Academy Amateur Radio Club will be operating special stations to commemorate the Armed Forces Day Communications Test. In the past this operation has been very successful, resulting in a great number of hams receiving the colorful QSLs commemorating the occasion.

The test will be on May 18, 1974. Operation will be on 4045, 7385 and 13975.5 kHz on LSB and USB on 20m, using the call N0NNN. In addition, the call WU3SNA will also be used on 3930, 7260 and 14280 SSB, depending on band conditions, of course.

All QSLs should be sent with an SASE to the club in care of W3ADO.

MASSACHUSETTS AMATEUR RADIO WEEK

The amateur radio operators of Massachusetts invite all radio operators to participate in the 6th Annual Massachusetts Amateur Radio Week. A certificate of recognition will be issued to amateurs who take part in the operations award program for the week.

Operating hours are from 0001GMT on June 9, to 2400GMT on June 15. Rules: Massachusetts amateurs must work 16 other Massachusetts amateurs. The rest of the New England State's amateurs must work 8 Massachusetts amateurs. All other amateurs in the U.S. must work 5 Massachusetts amateurs. Any band and mode may be used. All stations participating will exchange signal report, county and state. Logs must show date, time and frequency of contact. The certificates will be endorsed for band and mode only if requested. Applications must be received no later than July 31, and accompanied by a #10 business size SASE. DX enclose one IRC. Submit applications to Bill Holliday WA1EZA, 22 Trudy Terrace, Canton MA 02021.

WB8KZD



*Bill Pasternak WA2HVK/6
14732 Blythe Street #17
Panorama City CA 91402*

It was in May of '67 that I first visited Los Angeles. I was on a business trip and as always my trusty Twoer was in my luggage. Along about 10PM, after a day of meetings and a good dinner I dug the "lunch-box" out, plugged in the 1/4 λ whip and fired up /6 from my hotel room in Santa Monica. Now, that was a strange sounding round-table; every-time one guy stopped talking there was a beep and another station would take the place of the first. More fascinating, everyone seemed to have the same signal strength. I listened for awhile, then skooted down band and made contact with WB6NCF. I asked Bob about that "odd" QSO up band and was told it was the K6MYK repeater. I also learned that a quick

Con t. on page 15.

ou goons don't ever proofr
lasy man scripps from bab
bunch of trocks are ng on
LETTERS
you ignored my comments in
I insist that you print ev

CHALLENGE THE IRS

Just a note to inform you of some ways to challenge the IRS; I'm not a tax expert by a long shot, but it looks to me like a way to at least pay only the taxes you are required by law(?) to pay. The article was in the March 11, 1974 issue of U.S. News and World Report, pages 70-72. It deals with challenging the IRS on owed taxes up to \$1500 in a "small claims" court. The decisions are made by a judge — quite often in favor of the individuals rather than the IRS. The decision is final — it cannot be reversed by any court — not even the Supreme Court.

Name Withheld
South Bend IN 46628

AT LAST — A CALL!

I have finally obtained an Amateur Radio License with the call WN2UUAU. Now any Novice who reads this letter will say, "That's wonderful. Congratulations!" the Techs will smile and shake your hand, the Generals will smile, the Advancers will just nod their heads and the Extras will just yawn and say, "So what?" Well, that document has taken me, believe it or not, eighteen years to get.

My interest in Amateur Radio started in 1955. The first ham magazine I bought was CQ, December, 1955. I remember that it showed a tower with a 20m beam with Christmas lights strung up the guy wires and I also recall Wayne Green (you know him?) was editor of CQ.

The eighteen year long wait was because of a disasterous disease called laziness. But I finally "mastered" the code and now I have the coveted Novice License. Now I belong to the wonderful fraternity of Amateur Radio. Wheee!

B.F. Alabastro, Esq. WN2UUAU
Frankfort NY 13340

Our QSL Contest Winner this month is Jene H. Melton WAØDEM, of Deadwood SD. His winning entry is a representation of the Dakota Territory in 1876. At the far right of the card is Ms Martha Jane Canary. And two over from her is one of the last known renderings of James Butler Hickok, done shortly before his death.

You are cordially invited to participate in our QSL Contest and, perhaps, win a 1-year subscription to 73 (and the envy and admiration of all of your friends). Send us your card TODAY. Send your card to 73 Magazine, Peterborough NH 03458.

XE1VHF

We would like to advise you and your readers of our new 2m repeater now in operation in the Mexico City area. The repeater has been in operation since last August and is the first fully automatic amateur repeater in Mexico.

The repeater is sponsored by our club, "Association VHF de la Ciudad de Mexico" (Mexico City VHF Association) and is maintained by dues of our members. Call is XE1VHF and frequency is 16/76. Although the repeater is for use by club members, all visitors are welcome.

There is no formal reciprocity agreement between the U.S. and Mexico, however, visiting hams can contact me at my home address below and perhaps a temporary permit can be arranged. In any event, bring a small rig or a Walkie Talkie as a way can undoubtedly be found for a visitor to use the repeater. Most of the fellows speak English and there is activity on the repeater at all times.

We are planning a second 2m repeater as well as a 450 MHz UHF repeater using the call XE1UHF.

R.N.Green XE1WS/W2GFO
President-VHF Association
Palmas 1460
Mexico City 10, Mexico
Phone: 520-79-93

de WN6DHM

I want to thank you, and 73 Magazine for the role you played in helping me get some help so that I could get my license. I also want to thank Richard H. Klotsche for his help after reading your column "Ham Help." Thank you all.

Gary L. Weseman WN6DHM
San Diego CA 92105

NOVEMBER COVER EXPLAINS IT ALL

In reference to your November '73 cover. I find that it states the amateurs' opinion very well. This may not be to the liking of some amateurs, but you can't please all of the people all of the time. It also seems that the FCC doesn't please anyone at any time. Keep up the good work against the FCC and the IRS.

I have, in recent days, been studying for my General class license. In a part of the regulations — the part about the five principles that express the fundamental purpose of the amateur radio service — it seems there is some conflict between what Mr. Walker has done and what is supposed to be done. One of the five principles is: Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art. Obviously, there has been a misinterpretation of the rules by Mr. Walker. Maybe he did it on purpose?

John W. Zelz Jr., WN1SRQ
Stafford Springs CT 06076

CASSETTE A SUCCESS

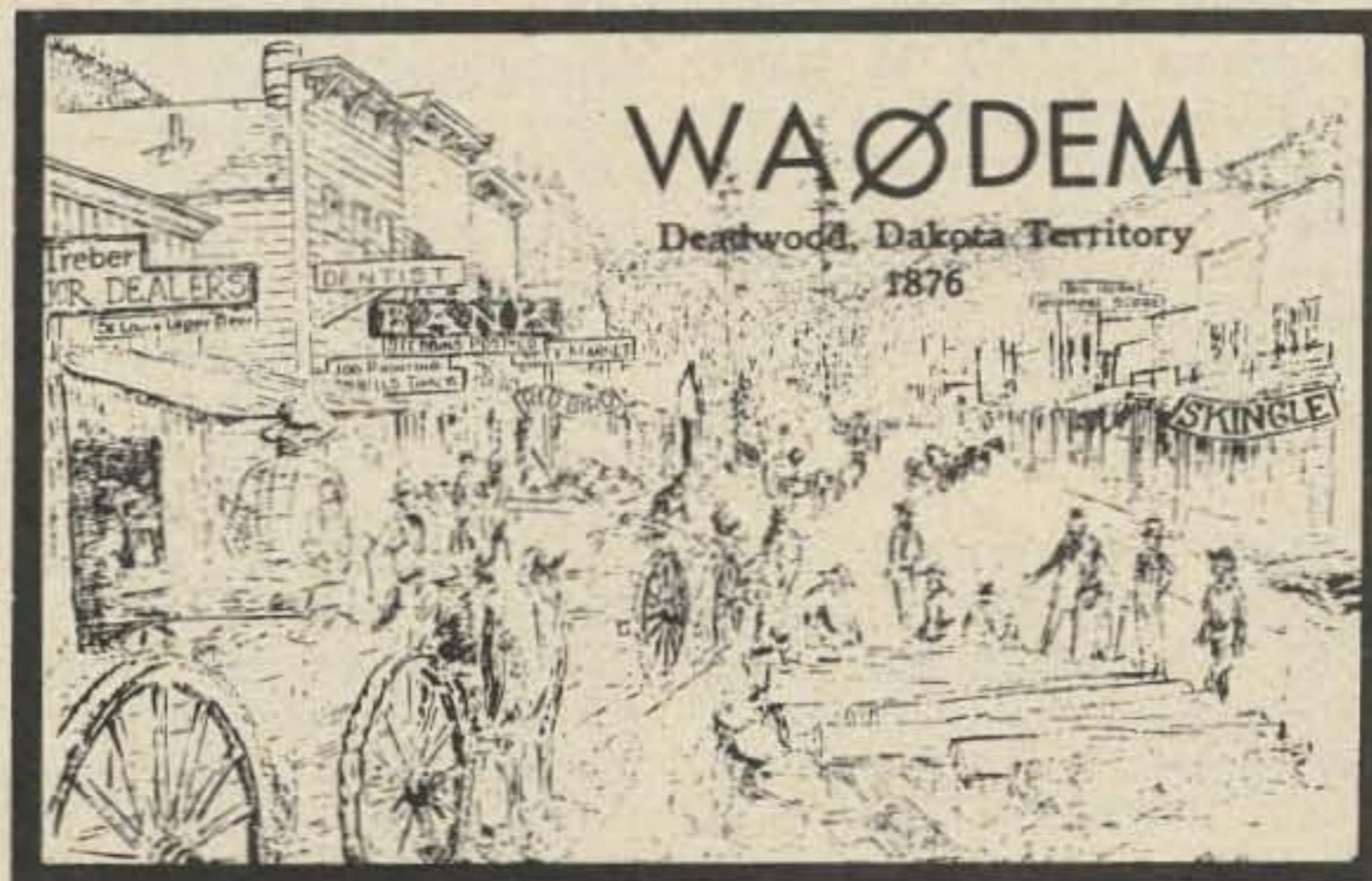
After seeing your advertisement and reading your editorial regarding the use of your cassette and tape in learning the Morse Code; and trying to study the code via other means, thought that your cassette and tape would be an easier way of learning.

So, I ordered the cassette and tape and very readily learned the code and passed the test at 5 wpm and then went on to obtain my Technician's license. As a result, I now hold the call of WB9OAJ.

If it had not been for the use of the cassette and tape, I do not believe I would have passed the test the first time around. I highly recommend the cassette and tape for anyone wanting to learn the code rapidly. I also have the tape for 13 wpm which I am now studying and in the near future hope to go for my General Class License.

Ruth Finch
Wauwatosa WI 53226

QSL CONTEST



Caveat Emptor?

Price - \$2 per 25 words for non-commercial ads, \$10 per 25 words for business ventures. No display ads or agency discount. Include your check with order.

Deadline for ads is the 1st of the month two months prior to publication. For example: January 1st is the deadline for the March issue which will be mailed on the 10th of February.

Type copy. Phrase and punctuate exactly as you wish it to appear. No all-capital ads.

We will be the judge of suitability of ads. Our responsibility for errors extends only to printing a correct ad in a later issue.

For \$1 extra we can maintain a reply box for you.

We cannot check into each advertiser, so Caveat Emptor.

FREE CRYSTALS with the purchase of any 2 meter FM radio. Write for our deal on the rig of your choice. Factory-authorized dealers for Regency, Drake, Kenwood, Tempo, Genave, Swan, Clegg, Ten-Tec, Standard, Midland, Hallicrafters, Galaxy, Sony, Hy-Gain, CushCraft, Mosley, and Hustler. For the best deal around on HF or VHF gear, see us first or see us last, but see us before you buy. Write or call us today for our low quote and become one of the many happy and satisfied customers of Hoosier Electronics, R.R. 25, Box 403, Terre Haute, IN 47802. (812)-894-2397.

MONTREAL HAMFEST 74, August 4, MacDonald College Farm, Ste Anne de Bellevue. Prizes, Giant fleamarket, Technical sessions, Family fun, \$2.50/adult. Info contact VE2RM, Box 201, Pointe Claire-Dorval, Quebec H9R 4N9.

MOTOROLA PORTABLES - Expert repairs, reasonable prices, fast turn-around time. More details and flat rate catalog FREE. Ideal Services, 6663 Industrial Loop, Greendale WI 53129.

HAMFEST! Indiana's friendliest and largest Spring Hamfest. Wabash County ARC's 6th Annual Hamfest, May 19, 1974, 4-H Fairgrounds, rain or shine. Admission still only \$1 for advanced tickets (\$1.50 at gate). Large flea market, technical sessions, bingo for XYL's, free overnight camping, plenty of parking. Bonus for car-pools (4 or more adults per car). For more information or advanced tickets write: Jerry Clevenger WA9ZHU, Route 4, Wabash IN 46992.

NOW PAYING \$1750.00 and up for 618T/ARC-102 - \$1200.00 and up for ARC-51 - \$1500.00 and up for GRC-106, also parts for these sets. D & R Electronics, R.D. 1 Box 56, Milton PA 17847 After 6:00 1-717-742-4604.

EQUIPMENT FROM 73

The following list of gear, unless otherwise noted, consists of brand new equipment purchased for testing purposes only. Some have been tested, some remain unopened in original cartons. We are offering this gear at a considerable discount on a first-come-first-served basis. Please send Money Orders or Certified Checks only to 73 Magazine, Peterborough NH 03458.

MITS 908M Calculator w/p.s./case (S143) new	\$ 110
Logiclocks (S120 new) 3/4" numbers - 6 figs	\$ 75
Heath IB 101 counter (S170) - 5 figs	\$ 140
Vanguard Scaler by 10 to 200 MHz (S120)	\$ 75
Midland 220 MHz xcvr - brand new - (S220)	\$ 180
Clegg 21 220 MHz xcvr - new - (S300)	\$ 235
Regency 16ch scanner TME H LMU (S300) - new	\$ 245
Waller 60A p.s. brand new (S125)	\$ 99
SBE Scanvision, complete, like new (S900)	\$ 600
Robot Monitor - new - (S296)	\$ 240
Robot camera - with micro-focus gear (S330)	\$ 250
Pickering CW keyboard KB-1 (S265) - tested	\$ 175
Heath HW-202 - brand new - (S180)	\$ 165
Heath HA-2022 amplifier new (S70) - built	\$ 65
Gladding 8ch scanner - Cheyenne brand new - (S150)	\$ 99
Gladding Hi-Scan - 8ch scanner - tested (S180)	\$ 99
Genave GTX-2 - used - (S250)	\$ 180
Motorola KW 2m amplifier - used	\$ 350
Heath IC-2009 calculator - brand new (S92)	\$ 88
SBE-450 xcvr - new - (S450)	\$ 299
Standard 1400 2m 22ch xcvr 10w (S550) - used	\$ 250
Heath HWA-202-1 power supply - new - built (S30)	\$ 25
Signal One CX7-A - tested - perfect - like new - fantastic	\$1990
Kenwood Twins - Tested - like new (S900)	\$ 750
Standard 146 2m HT - used (S289)	\$ 190
Fannon intercom - exec - 6 ch master (S60) tested	\$ 35
Genave GTX-200 - used (S270)	\$ 180
Icom IC-30 6m xcvr - brand new (S400)	\$ 299
Icom IC-60 450 MHz xcvr - brand new (S375)	\$ 275
Concord TV camera MTC-15 ch-5 output tested (S500)	\$ 250
Concord video monitor VM-12 tested (S400)	\$ 250
Concord all channel TV tuner Dem-911 (S600)	\$ 250
Concord VTR - like new - fantastic (S400)	\$ 300
Bell & Howell 2966 VTR - like new - excellent (S995)	\$ 350
Bell & Howell 2965 portable VTR - new (S1595)	\$ 475
Batteries for B&H 2965 - like new (S36)	\$ 25
Clegg 6.5A power supply (S80) - brand new	\$ 60
Vanguard 2m preamplifier - used - (S25)	\$ 15
Vanguard com 223.34 MHz - brand new - 407 (S55)	\$ 45
Tempo CL-220 xcvr - new - (S329)	\$ 220
Tempo FMH charger - ACH - brand new - (S30)	\$ 20
Caringella Rx - WWV - 5-10-15 MHz - tested (S75)	\$ 45
Regency 450 MHz scanner - (S200) like new	\$ 140
Varronics PA-50 2m amp (S110) - brand new - 10w in 50 vout	\$ 75
RP tone burst gen - 5 freq - TB-5 - exc (S37.50)	\$ 25
Electro-Voice 717 noise cancelling ceramic mike - new (S13)	\$ 10
Hitachi cassette recorder - excellent - (S60)	\$ 35
Hitachi stereo cassette recorder - exc - (S120)	\$ 75
Hitachi AM-FM-cassette recorder - exc - (S90)	\$ 145
Regency HR-2 xcvr - used	\$ 50
Turner mike - noise can NC350DM - brand new	\$ 18
Vanguard preamp 201 - 52.525 MHz (S25) - new	\$ 23
Vanguard preamp 202 - 450 MHz (S29) - new	\$ 23
Vanguard com 144-146/14.15 MHz -407 - new - (S50)	\$ 40
Vanguard com 144-146/28-30 MHz -407 (S50) new	\$ 40
Vanguard com -407 146.94/10.7 MHz new (S50)	\$ 40
Antenna Spec rubber ducky antennas HM-4 2m	\$ 4
KLM 2m amp PA-2708 - brand new (S150)	\$ 125
SWR meter - exc (S25) KW	\$ 12
Test Labs - 10 in 1 - SE-400 (S25) as is	\$ 10
Control Signal ID unit - brand new (S50)	\$ 35
Concord stereo recorder-changer - 12 cassettes (S240) brand new	\$ 135
VTR Monitor - exc - Hitachi (S225)	\$ 125
Video tape - new - per roll 1/2"	\$ 10
Radio Shack Code cassette - new (S6)	\$ 4

All prices FOB: UPS collect.

2ND ANNUAL DES MOINES HAWKEYE HAMFEST will be held on Sunday, June 16, 1974, at the Iowa State Fairgrounds. Plenty of free parking. Flea Market, covered display booths available, small charge; open arena, no charge. Dealer displays, prizes, and expanded XYL activities. Saturday night auto races and camping-extra. Registration \$1.50 advance /\$2.00 at gate. Write Des Moines Radio Amateur Association, Box 88, Des Moines IA 50301.

KLM AND MADISON Electronics present the finest in VHF antennas. 144-148 MHz, 7-element to 16-element; 9-element \$31.95; 14-element \$45.95; 16-element \$49.95; 220 MHz; 420-450 MHz, 14-element \$19.95; 27-element \$41.95. Write literature. All prices FOB Houston. Free flyer. Madison Electronics, 1508 McKinney, Houston TX 77002. 713/224-2668; Nite 713/497-5683.

GREATEST of them all! That's the ARRL 1974 National Convention, sponsored by Hudson Amateur Radio Council. Remember the dates - July 19, 20, 21 at the Waldorf-Astoria, New York City. Three days of exciting events!! Wide array of demonstrations, exhibits and forums featuring latest in FM, SSTV, ATV, RTTY, FAX, Satellites, Antenna design, Transistors, Integrated Circuits, DX, MARS, ARPSC and much more. Something to do every exciting minute for YLs & XYLs - Tours, New York sightseeing, visits to popular TV shows, Parties, Fashion Shows. Meet the ARRL President, Vice-presidents, and all 16 Directors! Famous-name Speakers at Saturday Night Banquet! Everything for the Non-Ham, New Ham and Old Timer. For Info, Contact: ARRL Convention, 303 Tenafly Road, Englewood, N.J. 07631.

FLEA MARKET/AUCTION/PICNIC! Hall of Science Radio Club annual event Saturday June 8 10AM - 4PM Flushing Meadow Park Queens 111th St. 48th Ave. Rain date June 15. Admission \$1.00 sellers \$2.00 no commissions. Auction service at 10% fee. Free parking. Zoo, Children's Farm, Golf, Boating, Museums adjacent. Info 212-699-9400 or write Box 1032, Flushing, NY 11352.

CALCULATOR OWNERS: Use your +x÷ calculator to compute square roots, cube roots, sin(x), cos(x), tan(x), arcsin(x), arccos(x), arctan(x), logarithms, exponentials and more! Quickly, accurately, easily! Send today for the **IMPROVED AND EXPANDED EDITION** of the First and Best Calculator Manual - now in use throughout the world...only \$2.00. Unconditional moneyback guarantee - and FAST service! Mallmann Optics and Electronics, Dept. - E5, 836 South 113, West Allis WI 53214.

HELP WANTED There is a position open at 73 Magazine for an administrative assistant. This is an excellent opportunity to learn publishing, advertising, etc., while living in fantastic New Hampshire, away from the rat race. Some ham background, typing and writing ability would be helpful. Send resume. 73, Peterborough NH 03458.

JUNE 2 - SRRRC Hamfest - new site - Bureau County Fairgrounds, Princeton IL. Formerly held at Ottawa IL. Easy access Rtes. 80 - 180 - 6 - 29 - 34. Advance registration \$150 before May 20, \$2.00 at the gate. See QST Hamfest calendar or write G.E. Keith W9QLZ/W9MKS, RFD 1 Box 171, Oglesby, IL 61348.

THE ORIGINAL FM Hamfest Sunday August 4, 1974, near Angola, Indiana. Free flea market, entertainment for ladies and kids. Picnic grounds, campsites, boating, food, soft drinks, available, rain or shine. For information contact: Fort Wayne Repeater Assoc. Box 6022, Fort Wayne IN 46806.

BUY-SELL-TRADE. Write for monthly mailer. Give name, address, call letters. Complete stock of major brands, new and reconditioned equipment. Call us for best deals. We buy Collins, Drake, Swan, etc., SSB & FM. Associated Radio, 8012 Conser, Overland Park, Kansas 66204. 913-381-5901

WANTED: Heath HW-18-1 C.A.P. SSB transceiver with ac supply, also Westrex 900B. Patrick Butler, 1833 N. Indiana, Peoria IL 61603.

SELL/TRADE 1973 Bell & Howell Electronics Home Study Course, 162 lessons, lab, answers. Heath I-103, HW101, HP23, SB-600. Want SSB. Robert A. Pohorence, 2334 Regal Court, Lawrenceville, GA 30245.

MOBILE IGNITION shielding gives more range, no noise. Everything from economical suppression kits to custom shielding. Literature. Estes Engineering, 543-A West 184th St., Gardena CA 90248.

WANTED HT200, 2 meters, any condition. State price and condition. Ron Dierkens WA6QVE, 3367 Ellington Dr., Altadena CA 91001.

TOUCH-TONE INTERFACE. One connection pad to rig. 1/2 sec. delay. Even fits TR-22. \$6.95 NY add 7%. VW Electronics, Box 11, North Tonawanda NY 14120.

WANTED: 73 and Ham Radio from first issue through 1972. Also QST from 1960-1972. Send quote to William Senior, Picklebrook Road, Bernardsville NJ 07924.

SELL/TRADE Clegg 22er AM \$290. Lampkin 105B clean \$130. Write for mailer. Send address to: Dale Hutchinson WA9KQD, 824 Read Street, Lockport IL 60441.

HALLICRAFTERS FPM-300. Within factory warranty. Will include extra 11m crystal. Must dispose of. Cashiers check \$395 for UPS delivery. Billy Parker, Rt. 1, Big Rock TN 37023.

PRINTED CIRCUIT TECHNIQUES FOR THE HOBBYIST. Ferric chloride "suspension etching," cutting epoxy glass, screen printing, etc. . . . **BOOKLET \$2.** TRUMBULL' 833 Balra Dr., El Cerrito CA 94530.

FAX PAPER: For Desk-Fax, new (not surplus), precut (not rolls), \$15 per thousand sheets, postpaid worldwide. Bill Johnston, 1808 Pomona, Las Cruces, New Mexico 88001.

WANT WESTERN UNION DESK-FASK already converted according to the 1973 CQ series of articles on conversion. Your price, condition, shipping? Darcy Brownrigg, Chelsea, Quebec, JOX 1NO, Canada.

GREATER INDIANAPOLIS Hamfest, Sunday July 14, 1974, rain or shine, Marion County Fairgrounds, all activities under roof. \$2.00 covers gate fee and prize drawing. For information write: Wm. J. Evans, 8104 Crest Hill Dr., Indianapolis IN 46256.

Looking West

... Cont. from page 12.



The Hamburglar STRIKES AGAIN!

List from Past Issues:
Mfr., Model, Ser. No.

Mfr., Model, Ser. No.	Owner	Issue
Genave GTX-200 No. 12-38 (name engraved on cover and inside of chassis)	W4LRR	5/74
Kenwood TS-520 No. 840092 CW-520/511S filter	W7JFR	5/74
HR-2 No. 04-C2879	W6GSR	6/73
SB-34 No. 21 1828	WA2FSD	6/73
STD 826 No. 011268	State Univ. of NY (Albany)	6/73
HT220 No. GJ7327	W4GF	7/73
Yaesu FT-101 No. 82G 12279/CW		
HR-2 No. 0302030		
Clegg 27B No. 72013-1068	W3BXL	7/73
STD. 826 MA No. 208078	WB2DEW	7/73
Drake ML-2 No. 10582	W3MSN	8/73
Sonar FR-2528 No. 21-4250	Doherty	12/73
STD SRC-851-SH No. 9725		
STD SRC-707C No. 2833		
TPL PA-6-IDE No. 1092		
RP MEA-22 No. 212		
Two Larsen antennas		
Swan 270 No. M-252616	W4NTB	12/73
STD SRC-146A No. 208070	W7DKB	12/73
Marker Luxury No. 2296	W7BVP/6	2/74
Regency HR-2A 2m FM No. 04-05632	WB8NSU	3/74
Collins Model KWM-2 No. 13551	W9JS	3/74

trip to Henry Radio would get me the necessary crystal to make use of this new aspect of amateur radio that I had discovered. Since the next day was to be a free one, I made the voyage to Olympic Blvd., and procured the aforementioned rock. An hour later, back at the hotel I was ready to give this repeater thing a try. I won't bore you with the details, but this was the day that I discovered the fun world of repeaters thanks to a man named Art Gentry W6MEP, and his machine K6MYK.

From what I have come to learn, K6MYK now WR6ABN, is possibly the oldest continual operation repeater in the country. However there have been a number of significant changes since the first time I used it. ABN is now FM, operates on a standard channel of 7.84/7.24 and has just installed a duplexer that really improved coverage. In similar fashion to the Mt. Wilson Repeater Assoc., the Mt. Lee Repeater Assoc., was formed to provide financial support to the repeater while leaving all technical and administrative decisions to the repeater's owner. It seems that the trend toward user support groups is catching on here in Southern California. This is the fourth area group to go this route since the formation of MWRA last year. I like the concept in that it lets a given group of hams who like a particular machine to support it without the formality of a club and without interfering with any policies set forth by the owners of a given machine.

ABN is one of those friendly type machines that I personally like to operate. It's also one of the easiest to get your rig on channel for. Art has installed a two-tone system that gives you both tones if you are on channel, or just the respective low or high one in relation to where your transmit rock sits. Just tweak for the dual-tone, but do so only when the machine is not in use. It's a neat system and avoids all those "am I on frequency" breaks.

Both Art and his repeater are still going strong and a lot of us hope they will be around for a long time to come. I have operated many repeaters in all parts of the country, but K6MYK was the first. Needless to say it holds many fond memories for me. Then again, any machine that's been around as long as ABN has to be good. Try it yourself when you are in Los Angeles.

My buddy Dave WB6IRL, called from Stockton the other evening and I got the word of a fairly new 28/88 machine on Mt. Oso. Its coverage is the northern end of the Central Valley primarily into the Stockton area, its call is WR6ACB. Also, Bill WA6NTW, informed me that he and Warren WA6JMM, have their 220 machine (the 34/94 220 machine I spoke of last month) installed at its permanent home some 1800' above the Los Angeles basin. Bill says that not only is its usership growing quite rapidly, but coverage is even better than anticipated.

WA2HVK/6



By: Gus M. Browning, W4BPD
Drawer "DX"
Cordova, SC 29039

During the past winter I have been building up and monkeying around with these FB little ICs. And let me tell you "Ole Geezers," if you have not yet tried out these little jewels, you are about to get thrown out of the ball park! It costs you so little to learn so much and don't ever think you are too old to learn (like I had been for a number of years). In my case I try to "forget" what's inside the IC package, I try to learn "what they will do!", and let me tell you, they can do almost anything except handle real high power. I built up myself a little printed board with two of the 16 pin DIP sockets (the 14 pin DIP will also fit into the 16 pin sockets), and one of the TO-99 (round) IC sockets. Each pin from each socket comes out to a small banana jack & next I built up a good voltage regulated 5V. supply and a zener controlled 9v., 12v., & 15v. supply (all from the same small transf. and rectifiers. The supply also uses banana jacks. Made up a whole batch of short jumper leads with banana plugs on each end. I can connect "anything" to anything. When I have a few spare moments or hours I have a "ball" just "monkeying around" with all kind of IC's and circuits. I am learning a lot about what they will do. I am not interested in "what's inside" them! You will be "amazed" ole buddy! With the low cost of these units, wouldn't it be great if "everyone" used them in a synthesizer circuit to control their frequency? Maybe on cw have the frequencies spaced, lets say, every 200 cycles, and on phone, maybe every 4000 cycles. This is entirely possible right now at a very reasonable price. We could call the various frequencies "channels" and then we could make skeds, have nets, have DX channels listed, etc. All we would have to do is turn a few switches and listen if the DX station is on his "channel", no turning of dials or knobs "hunting" for the DX! You would soon forget about tuning and just turn switches or tumblers. I don't know about YOU, but, I am having a "ball", learning more then ever, and not spending much loot.

Sure would be nice for those sunspots to get more numerous, and the way it looks right now to me is, it won't be too much longer before this may be coming to pass. It takes those spots

you know for those "long openings". Considering all this, there is still plenty of good DX coming through, provided you do a little digging, and be on the air at the right time for the DX.

160 METERS: Best times is for it to be either sunrise or sunset on both ends, or at least on ONE end. This means that IT IS POSSIBLE for DX to be there almost anytime, because the sun is either rising or setting somewhere in the world ALL THE TIME!, Of course it cannot be to far into the daylight hours on either end, otherwise (if you can take the QRN and Ioran QRM, etc.), you may find DX in there almost anytime during the night, but watch closely plus and minus sunset and sunrise.

75/80 METERS: Plenty of very good DX still on this band and it's rather hard to believe, it can and IS being worked with rather low pwr. It even seems that almost anything works well for your antenna too! Maybe all this is because the competition is not there like on the higher frequency bands. Such DX as YU, VP1, 6Y5, 8P6, F, YN, 6W8, CO, KG4, M1, YO, HC8, YS, HB9, OZ, HK, HC1, HH2, ZS, G8, ON, CT1, YV, ZL, 9L1, CT2, DL/DK/DM, VP8, LZ, I, TI, CE, VP7, XE, KX5, KV4, HI, FG7, HA, VK, SM, GW, PA, PJ9, GM, UK, UC2, UP2, CR6, OX3, EI, KH6, UW3, CX, and a few more was all heard, most of them worked in about one week of operation, all on 75 or 80 meters, cw and SSB. This is not bad DX for what is considered as a low frequency band!

40 METERS: We are now beginning to get into what is called, by many, "the DX bands", but to me, working DX on 40 has most always been a rather hard task, especially with all the BC QRM, and other forms of QRM you have to battle. When you consider that all the DX is usually crowded up in just a small handfull of frequencies. I suppose working DX on 40 meters would come a lot easier if there was more space, frequency-wise in which you can really operate. Plenty of good stuff is there if you can take all the various QRM you have.

20 METERS: Now here is what's considered as the DX'ers bread and butter band. (with 15 meters a close second at times). This is where it's all to be found, most of the time. I guess if your DXing time is limited, and if you want to work DX in as short time as possible, this is the band for you. As a rule I have found that at my QTH this band folds up flat about 2 AM and opens up again just a little before sunrise. Then the DX fades

out, or at least gets very weak about 9 to 9:30 AM. Opens back up fairly good about 2 PM for Africa, and Europe starts coming through a little later. Of course these hours change a little with the seasons and sunspots. This even seemed to hold true when I was at various spots while I was at many DX spots on DXpeditions a few years ago, EXCEPT when operating near the equator, where the various bands seemed to stay open practically around the clock. So I say 20 meters is the DXers Band, but I warn you this is where the "big-boys" hang out, and if you can stay on the 2nd. layer, you are doing OK!

15 METERS: This is a GOOD DX BAND when it's open, it is a wide band (that's how it seemed to me). The QRM don't seem to be as bad up there, lot less QRN than 20, takes less power to work DX. This band seems to be either open or closed (like 10 in that respect), the DX is there or is not there, none of the half-way stuff like 20. DX at times are spotty, but, just wait until those sunspots get plentiful and this band will crawl with DX. I worked W2QHH when I was at AC3PT on 15, he was only using a 1/2 wave dipole and about 60 watts! You do have to be on when the time is right. Those signals get loud when the band is wide open. Don't take a gallon of power and a big antenna to do the trick either. Sometimes when things are "right" this band have been open all night. It's a good band.

10 METERS: This is the "spotty" DX band a good bit of the time, but when it is open to a certain area of the world the signals really "bang" thru, but, you better grab them when they peak, because they can QSB completely to S-0 in just a few minutes. Propagation north and south is the last to go out, and seems to get very good right after the band goes out to the rest of the world. Best times for north-south path here is late in the afternoon, the Pacific a bit later, sometimes along with the JA's. Power don't seem to make a big difference on this band, and QRN is not a problem like some of the lower frequency bands.

One of my friends from Bhutan (A51) came by and visited me. We had a FB "eye-ball" QSO and, maybe one of these days I may be back over there and give out some more QSO's from this last "Shangra-La", just about the most beautiful place I have ever seen. And, the people are the best and most kindest of any I have ever met. Sure would be nice to visit this country again and to be on the other end of real DX, once more!

That's it for this month,

Gus

CD

IGNITION SYSTEM

Kenneth W. Robbins W1KNI
835 Woburn St.
Wilmington MA 01887

There seems to be unlimited possibilities in the application of integrated circuits to various problems throughout applied electronics with further inherent benefits of reliability, miniscule power consumption, easy procurement and low cost. This paper is a case in point where their use yields improvement, simplification and cost reduction of a CD ignition system described previously.¹

A major design problem in capacitor discharge ignition is the dc/dc converter which supplies HV B+. It must have the greatest possible efficiency, low internal impedance and yet be able to sustain a periodically shorted output without distress. The common self-oscillating type is generally

employed; it does a good job but requires considerable care in transformer design optimization of feedback and biasing to ensure good transistor switching performance and perhaps some empirical adjustments to obtain a desired frequency. Taking a cue from the old days of radio where simple CW keyed oscillators delivering power to an antenna were much improved by going to M.O.P.A. (Master Oscillator Power Amplifier), we also find a number of advantages to this method of power generation when applied to the converter problem. Circuitry evolved which consists of a 50% duty cycle multivibrator that determines frequency independent of transformer characteristics and loading, power transistors are switched op-

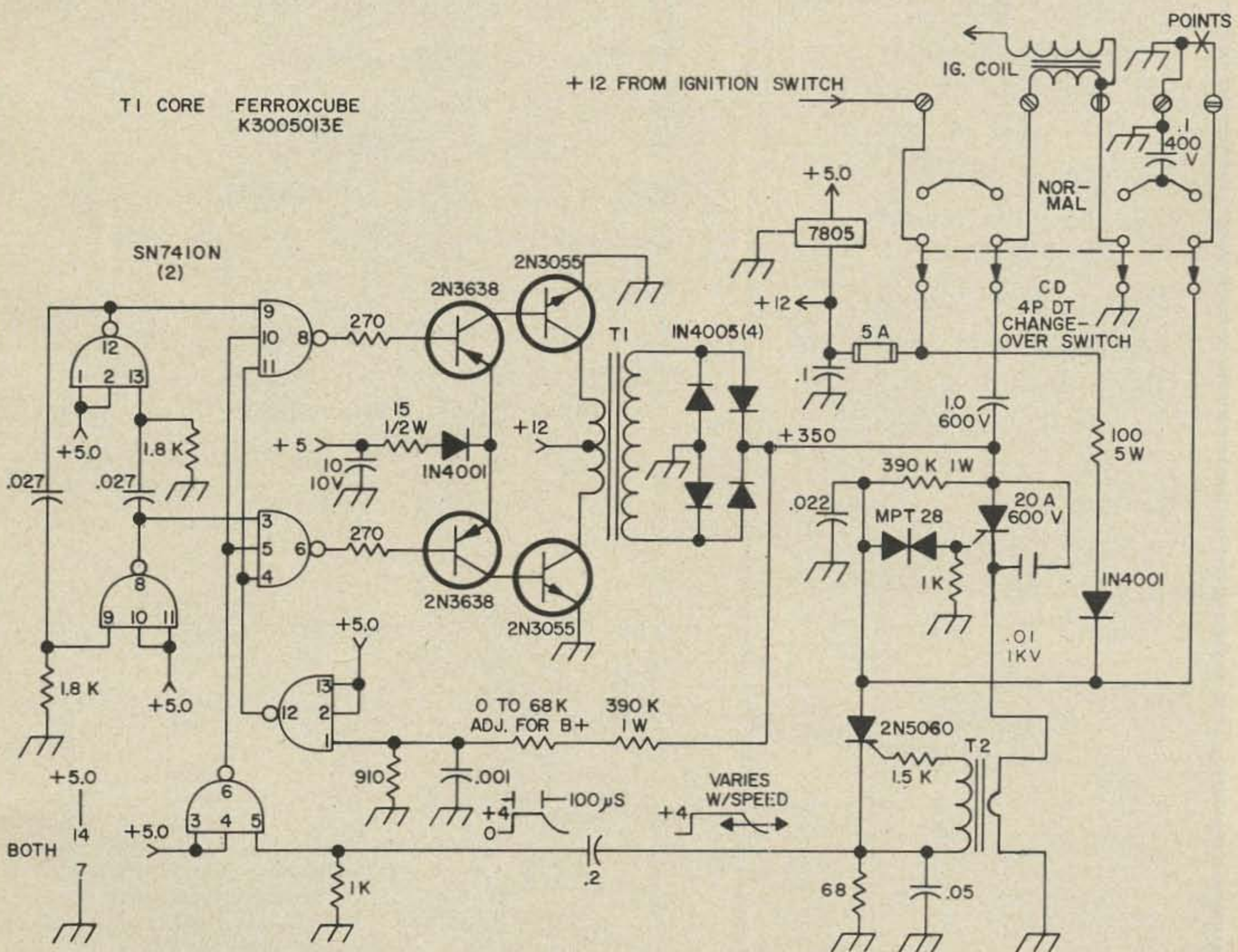


Fig. 1. The IC CD Ignition system. See text for details of T1 and T2.

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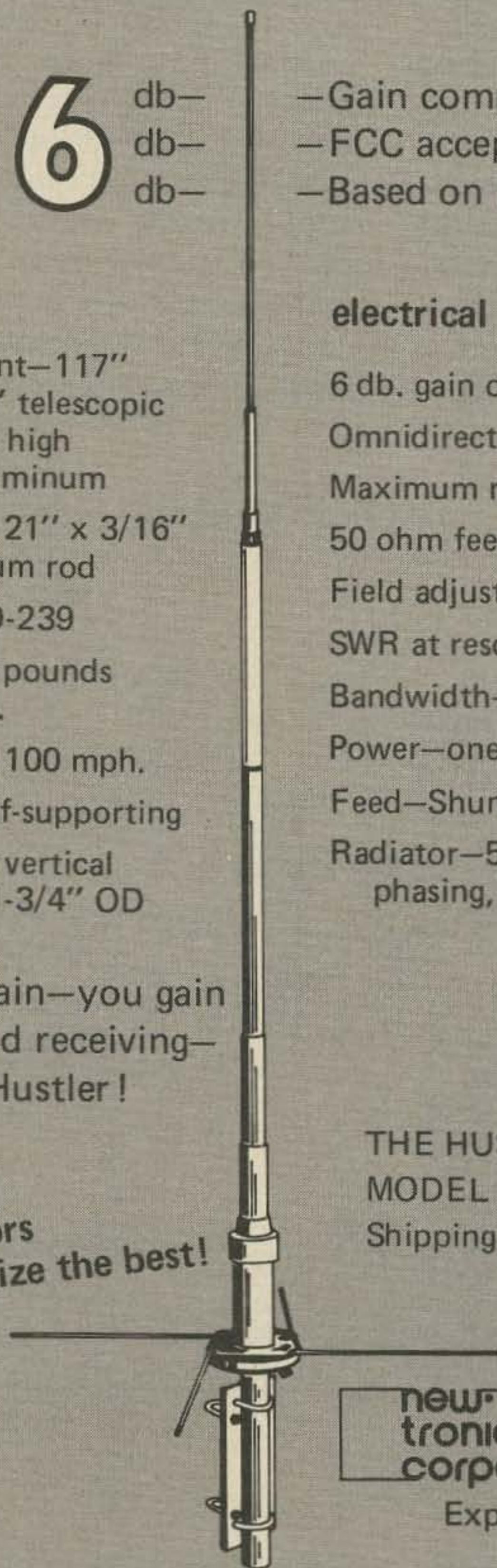
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timally for high efficiency, oscillator drive to the power amplifier is easily gated off in response to a shorted output condition and HV B+ can be regulated at a chosen value by selection of a resistor. TTL logic devices are the magical "Black Boxes" that make the task so easy.

Two sections of a triple 3 input NAND gate make up a multivibrator that free-runs at about 10 kHz, this being determined by capacitor values. Another pair of 3 input gates function as a low level push pull driver working into a class B PNP/NPN power amplifier. It is these gates that control the flow of square wave oscillator drive to the power stage, normally permitting signal passage but inhibiting it when either maximum B+ is reached or SCR firing reflects a momentary shorted output. The remaining two gates are used as inverters to obtain proper logic sense for circuit operation. Although this design calls for two 7410 ICs, other types may be used (a 7420 and 7404 for example). Recent appearance of so-called 'Three lead' IC voltage regulators² greatly simplified the selection of a low output impedance device capable of providing both 5V logic B+ and 220 mA current pulses required by the PNP drivers. A 15Ω emitter resistor sets this limit current as a compromise between unnecessary power drain and storage capacitor recharge time which is about 1.8 milliseconds at a B+ of 350V. Full spark energy up to 500 Hz is available while good converter efficiency is indicated by low 12V current drain at various spark repetition rates and chassis-mounted heat sinking of the 2N3055 transistors being sufficient for cooling.

The transformers will have to be fabricated but they are quite easy to build. T1 secondary has 15.24 meters of No.26 Formvar insulated wire put on in 6 bank winding sections, insulated with plastic tape. Then, 20 turns of No.14 insulated wire evenly spaced around the core are added and centertapped. T2 was made up using a yellow dot tuning core from a CTC coil form (slug is 5 mm in diameter by 10 mm long) and has a 30 turn secondary of No.36 wire and a 1 turn hookup wire primary. This item can also be made up from an unshielded iron core rf choke of 30 to 100 microhenrys with a

couple of turns wound over it. When the main SCR fires, T2 has only to develop an oscillation burst sufficiently energetic for firing of the sensitive gate latching SCR; pulse shape or duration are unimportant.

Storage capacitor energy is "dumped" rapidly into the ignition coil primary by a power SCR but triggering and reset of this hard-working device is not too easy judging by component count required to obtain positive results as shown schematically and discussed in a previous article.³ This aspect of CDI was also dealt with at some length in the author's first effort. Preliminary tests using an RS flip-flop made up of TTL gates to control SCR firing and reset worked fairly well but not 100% due to spurious pulses upsetting toggling. A small SCR latch is immune to this difficulty once fired and to insure positive reset in the present circuit, anode voltage becomes negative with respect to its cathode for several microseconds at point closure time. Tests in two cars whose sum total of mileage is about three times around the world with this trigger and latch circuit installed has proven its worth. Even though electronic ignition can tolerate a considerable increase in point contact resistance, this is a fallacy because if resistance *has* gone up, the regular Kettering system will be inoperative if switch back from "CD" to "Normal" becomes necessary. Current bleed of fractional ampere through the points appears to be a satisfactory solution.

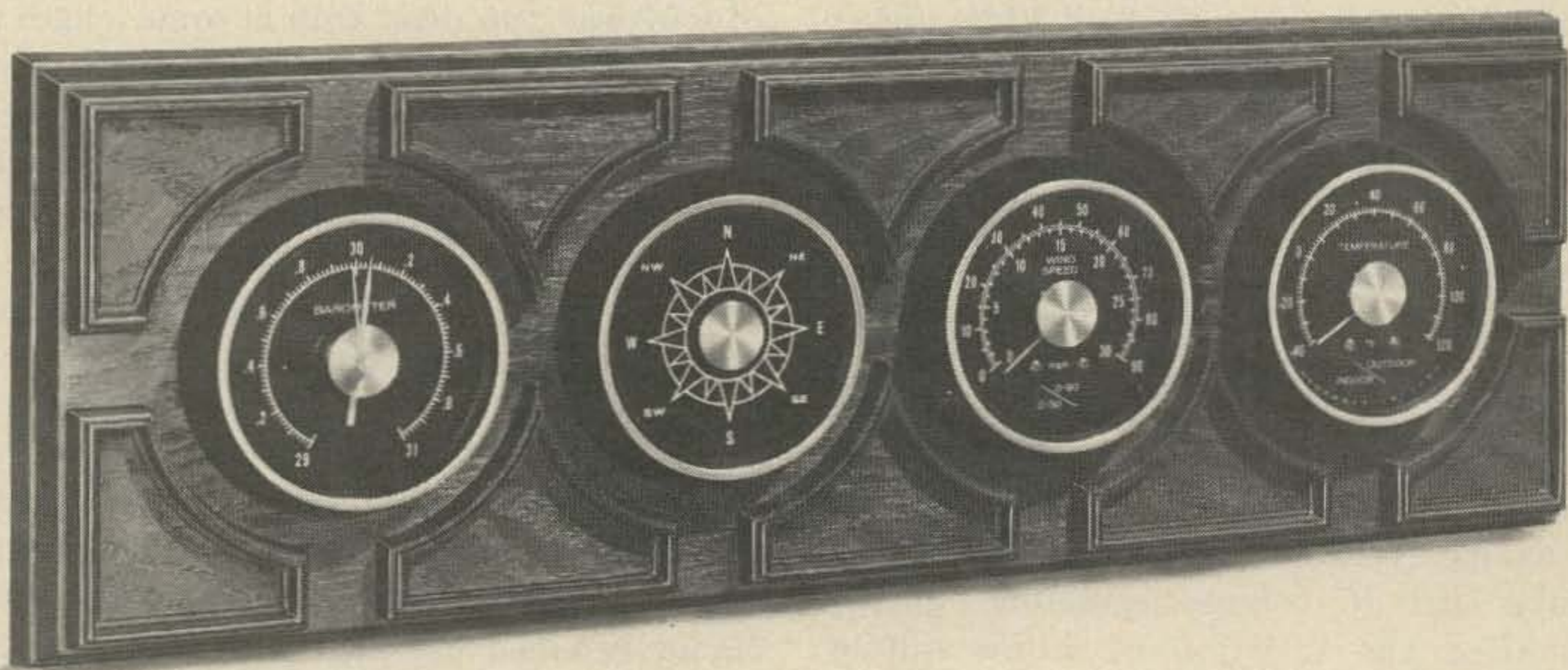
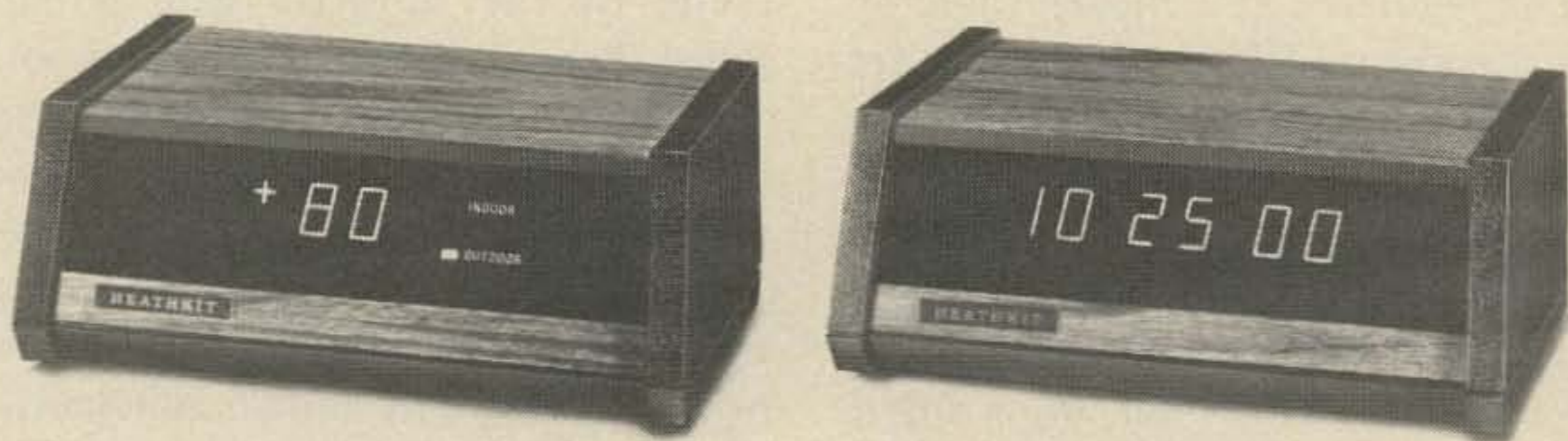
If you've been thinking about constructing a CD ignition but have hesitated due to cost, this one figures out to about \$15 for parts and low cost surplus semi-conductors. It can easily pay for itself in fewer tuneups, improved wintertime starting and a little better gas mileage. If that won't do it, how about being one of the first with a homebrew "CDI with ICs!"

...WIKNI

¹ "Improved Low Cost CD Ignition", K.W. Robbins, 73 Magazine, June 1972.

² "A New Dimension to Monolithic Voltage Regulators", Chu & Oswald, IEEE Transactions on BC & TV Receivers, May 1972

³ "Add-on Electronics for Your Car", F. W. Holder, Radio-Electronics, April 1972



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Top left is the Heathkit ID-1390 Digital Thermometer. A solid-state device that monitors indoor and outdoor temperatures. Switches set thermometer for alternate display of indoor/outdoor temperature at 4-second intervals, for constant display, and for readout in either degrees Fahrenheit or degrees Centigrade. Includes 85' cable and 2 sensors. \$59.95*. Mailing weight, 5 lbs.

Top right is the Heathkit GC-1005 Electronic Alarm Clock. A six-digit timepiece that displays hours, minutes and seconds on highly visible cold-cathode readout tubes. Gentle "beeper" alarm can be set for 24-hour cycle, features snooze switch for seven more minutes of sleep. Displays time in 12-hour, or 24-

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Below is the Heathkit ID-1290 Weather Station. It has Uni/Mag® barometer for 2½ times greater pointer deflection; 8 wind-direction compass points that light-up in combination to give you 16-point resolution; wind speed indicator with 2 switch selectable ranges, 0-30 and 0-90 mph; dual-sensor thermometer with switch selection of indoor and outdoor temperatures. Includes weather cup and wind vane assembly, simulated walnut housing. \$89.95*. Weight, 9 lbs., 50' cable, 5.95*, 2 lbs.; 100', 9.95*, 4 lbs.; 150', 14.95*, 6 lbs.

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ADDING dBs TO THE AUDIO COMPRESSOR

Simple audio compression units can easily improve the apparent effective signal strength of any SSB transmitter by several dB under difficult weak signal conditions. Simple audio compression is not as effective as rf speech clippers as many tests have demonstrated. However, with frequency response shaping and "soft" clipping added to an audio compressor, the latter can be made almost as effective as much more elaborate speech processing methods. This article describes how various simple accessory circuits can be added to any existing audio compressor which will considerably improve its effectiveness. The circuits which are added all operate at audio frequencies so no complicated construction is required. The cost is minimal when one considers that they can produce several dB more effective signal strength under poor signal conditions. This is especially true when one considers what the cost would be to increase one's signal strength by 3 dB by conventional means. That means doubling transmitter power, a directive antenna array, etc.

Frequency Response Shaping

If one uses any type of compressor/preamp, it operates on the basis that audio levels beyond a certain threshold activate a gain reduction circuit which reduces the gain of some circuit early within the compressor/preamp unit. Input signals below the threshold are amplified fuller and those exceeding the threshold activate the gain reduction circuitry so that the wide variations in input signal levels are compressed into a much smaller range of output signal levels. Although many compressors have a stated frequency response which includes

only the 300 to 3,000 Hz range, this restricted frequency response is not shaped sharply before the gain reduction circuitry is reached. The result is that if one uses a wide response microphone, the gain reduction circuitry is often activated by low frequency audio/signals which are not passed anyway by the SSB generation circuits in the transmitter. The result is that the audio compressor's action is partially wasted on responding to audio signals in a range which are later rejected and are not useful for voice intelligibility. The result is at least a partial waste of the compressor's effectiveness.

The rather simple solution to this situation is to frequency shape the audio signal input to the compressor before any audio compression action is started. One often hears about some type of microphone which seems to have a particularly effective response or audio "punch." Using such a microphone before a good compressor often makes several dB difference in signal effectiveness. However, this type of effect can be duplicated using almost any simple type of microphone if a frequency shaping preamplifier is used before any existing audio compressor! A suitable circuit is shown in Fig. 1. A low noise FET preamplifier is used to provide initial gain for a high impedance microphone input (low impedance via a matching transformer). This stage is followed by a low and high rolloff circuit which can provide about a 15 dB boost or rolloff to frequencies centered on approximately 1 kHz and extending both higher and lower than this center frequency. By the adjustment of both potentiometers, one can just about duplicate the sound of any commercially available communications

microphone as it is heard after the audio compressor. It cannot, of course, compensate for the directional pickup characteristic of a microphone which may be of consideration when a location with high background noise is in question. But it can compensate to a very great degree for individual voice characteristics when used with a given microphone and this is the main advantage of using the circuit in conjunction with a given audio compressor. This initial frequency response shaping is useful by itself but particularly worthwhile when combined

with "soft" clipping and further frequency response shaping as described next.

Soft Clipping

Soft clipping refers to the type of limiting action that takes place when a sine wave signal is fed into a clipping circuit, such as a diode pair, but where the sine wave is not cut off along a flat line on its positive and negative excursions. Rather, the sine wave is rounded off abruptly and a far less harmonic rich output is produced. "Soft" clipping is not well defined and where a diode provides

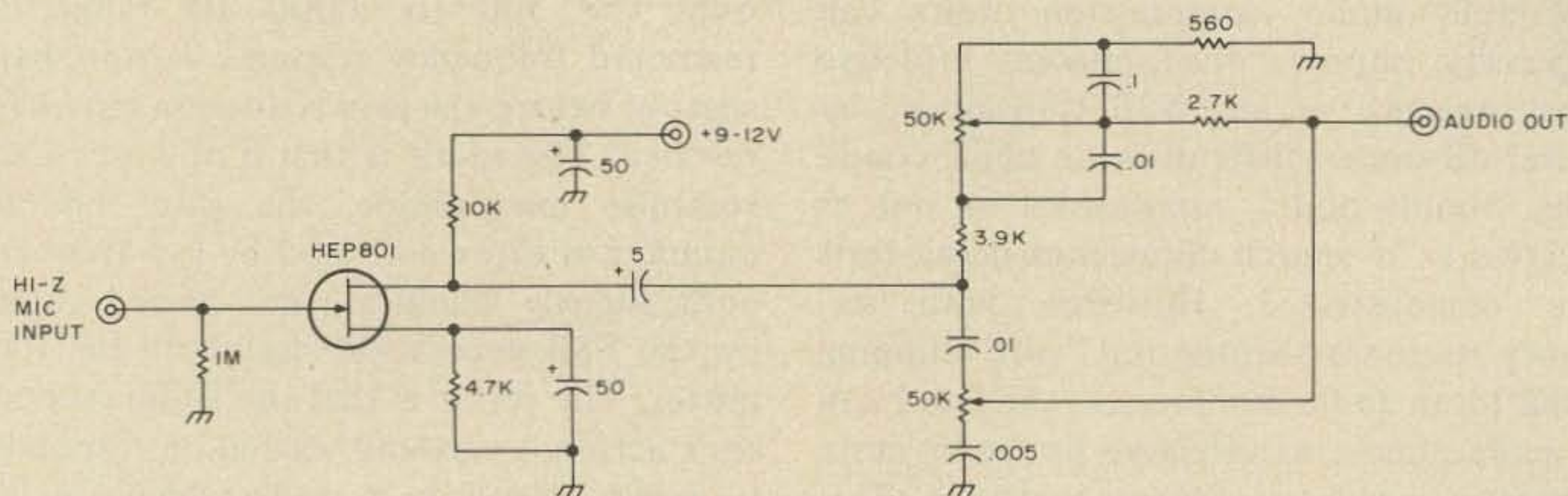


Fig. 1. Shaping circuitry to be added ahead of existing compressor.

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soft clipping by its basic characteristics, it may be regarded as a poor diode for clipping purposes where a very sharp, hard clipping characteristic is desired. Also, one can produce soft clipping by driving a diode pair through some resistance so the diode operates over that portion of its characteristic where it has a rapid current/voltage change characteristic. The diodes operate as a form of a variable resistor element, one diode in the pair responding to positive going voltages and the other to negative excursions.

The latter type of soft clipping is used in the circuit of Fig. 2, which is meant to be placed at the output of an existing compressor. Most compressors provide more than enough output voltage, usually several volts, to drive the clipper circuit. If the compressor has an output level control, it should be set to provide full output for initial adjustment. The clipping can be adjusted by means of the variable resistor in series with the diodes. The clipping itself is not meant to be in action constantly but only as a further adjunct to the basic compressor action. Peaks which the compressor doesn't handle are acted upon by the clipper and the overall average to peak ratio of the processed audio signal is increased *without* significantly more distortion.

The output level of the clipper is very low and it should be followed immediately by a good low noise amplifier. This action, in

the FET stage and still have the final output level more than sufficient to drive the audio input for any transmitter.

The filter following the FET stage is a carefully designed double unit which provides extremely sharp attenuation of frequencies higher than about 3,000 Hz and continues to provide excellent harmonic attenuation up to 30 kHz or more. If one can obtain the inductors (commercial types are available in the correct values), this type of filter is highly recommended because of its excellent harmonic filtering capabilities. Unfortunately, miniature audio chokes of good quality are not very inexpensive, unless obtained from surplus sources. Therefore, Fig. 3, shows an alternate type filter using only one choke which is only slightly less effective. Audio chokes which provide a Q of 60 at least at a few thousand cycles should be used. One side of the audio transformer winding cannot normally substitute for a choke even though it may have the correct inductance. The increased resistance of such windings and other characteristics deliberately engineered to provide a broad frequency response in the transformer result in a very low Q for the windings. A few transistor transformer windings the author measured had Qs of 1 - 2!

Construction and Adjustment

The auxiliary circuitry described is best constructed on perforated board stock and

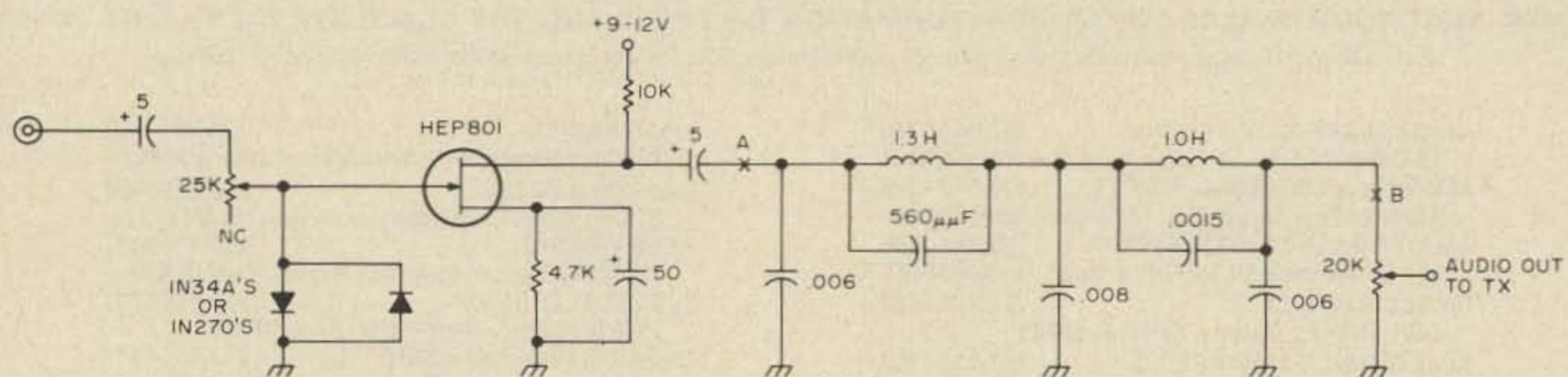


Fig. 2. Clipper and filter for use at output of existing audio compressor.

fact, is one of the most important considerations in making the circuit effective. As shown in Fig. 2, the clipper is followed by a low noise FET voltage amplifier stage which has a broadband, flat frequency response. The voltage gain is sufficient to provide for the loss in the filter in the drain output of

placed in the same enclosure as the audio compressor with which it is used. The photo shows the construction used by the author, although there is no need to follow any particular circuit layout. Two commercial type audio chokes are shown being used.

The adjustment process may seem a bit

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confusing especially since so many potentiometers are present, including those present in the basic compressor. However, approached step by step the adjustment process is basically simple. Set up the compressor first as it is used normally for best results. Then, connect only the circuitry of Fig. 1 to the input of the compressor. Adjust the rolloff potentiometers in different combinations for the most effective audio sound. This can be done running the compressor output through any good audio amplifier and listening to it over some headphones. However, one can become confused by this method when listening to one's own voice. A far better procedure is to use an over the air check with a local station. The other station should, however, constantly reduce the rf and not the af gain on the station receiver to simulate a barely readable DX signal. One is interested in intelligibility under poor conditions and not fidelity at this point. The audio input level to the compressor (part of the compressor) may also have to be adjusted to prevent over driving the compressor. If problems with rf feedback are encoun-

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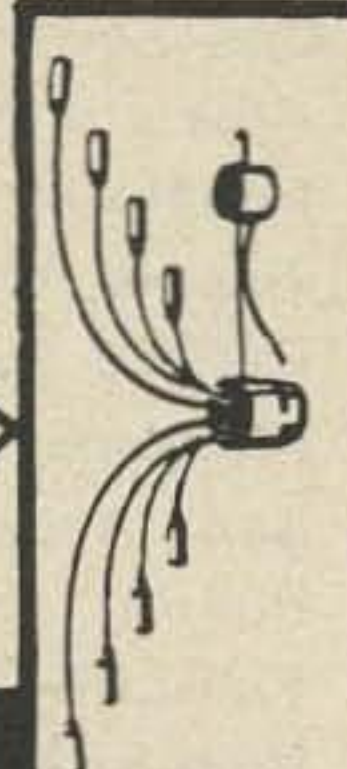
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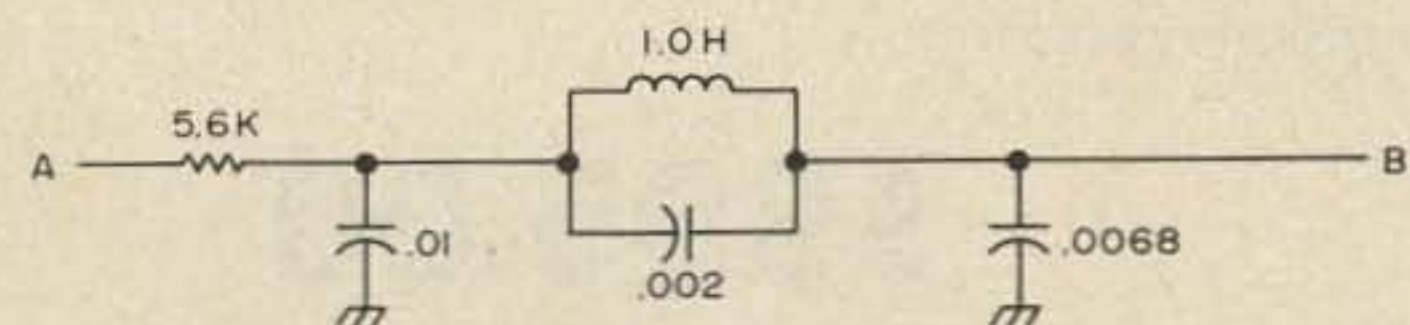


Fig. 3. Alternate filter design to be connected between points A and B in Fig. 2 instead of filter requiring two inductors.

tered, use a rfc of 1 to 2 mH in the input lead from the microphone to the circuitry of Fig. 1.

Then, the circuitry of Fig. 2 with either filter, is connected after the compressor being used. A similar type of adjustment process is gone through by adjusting both the output level control on the compressor, if it has one, and the variable resistor in series with the clipping diodes. The correct adjustment point is a compromise between distortion generated and improvement in audio effectiveness. If the compressor is only intended to be used for DX contacts, adjustment should be made under simulated weak signal reception conditions. A final adjustment can be made then by going back to the rolloff potentiometers in the input circuitry

The author tried the auxiliary circuitry described with three different types of conventional solid-state audio compressors. Each unit was meant to be originally complete in itself and have a communications voice frequency response. In each case, greater punch could be obtained under poor reception conditions by adding the auxiliary circuits. The effective gain was estimated at least as several dB. Under strong local conditions, no improvement may be noted, the same as with most audio compressors. In fact, some stations will report the audio distortion as being undesirable but not severe.

When one considers the expense involved in building the accessory circuits described to obtain more effectiveness on DX contacts as opposed to increasing power or antenna gain the circuitry described represents very good value. If the type of equipment you are using works better when a conventional audio compressor is added it will work somewhat better when these accessory circuits are used.

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Our 1954 clunker had seen better days and the XYL and I decided to put it to rest in favor of a more modern machine. She had visions of a super car with a nice bench type front seat, plenty of leg room, and a trunk large enough to put half of Sears & Roebuck into it. I agreed with the latter two, but the bench type front seat would have to be replaced with bucket seats — and no console. I didn't want anything in the way that might cause the rig to be cramped. So off we went down to Honest Johns's Chevrolet place to get our dream car.

We spent about an hour just looking at price tags. This is a very important step in buying a new home. The price must be low enough so you can still afford to put gas in it after the monthly payment has been met, but it must also be high enough so your wife can tell all of her friends that we just bought a new "X number of dollars" car. So after checking out the prices and playing hide and seek with the salesmen, we decided to start looking at the features that each one in our range had. The first one had enough room under the dash for a good size transceiver, but not enough room for more than one rig. I was planning on running at least the hf bands and two meter FM, so I needed a lot of room. The next one had all the room that I could ever use up front, but you couldn't

get a good size watermelon into the trunk. The third one, and last on our list of eligibles, was a perfect compromise between operating room up front and Sears space in the rear. In fact, the trunk was so big I got the idea of putting an amplifier in it.

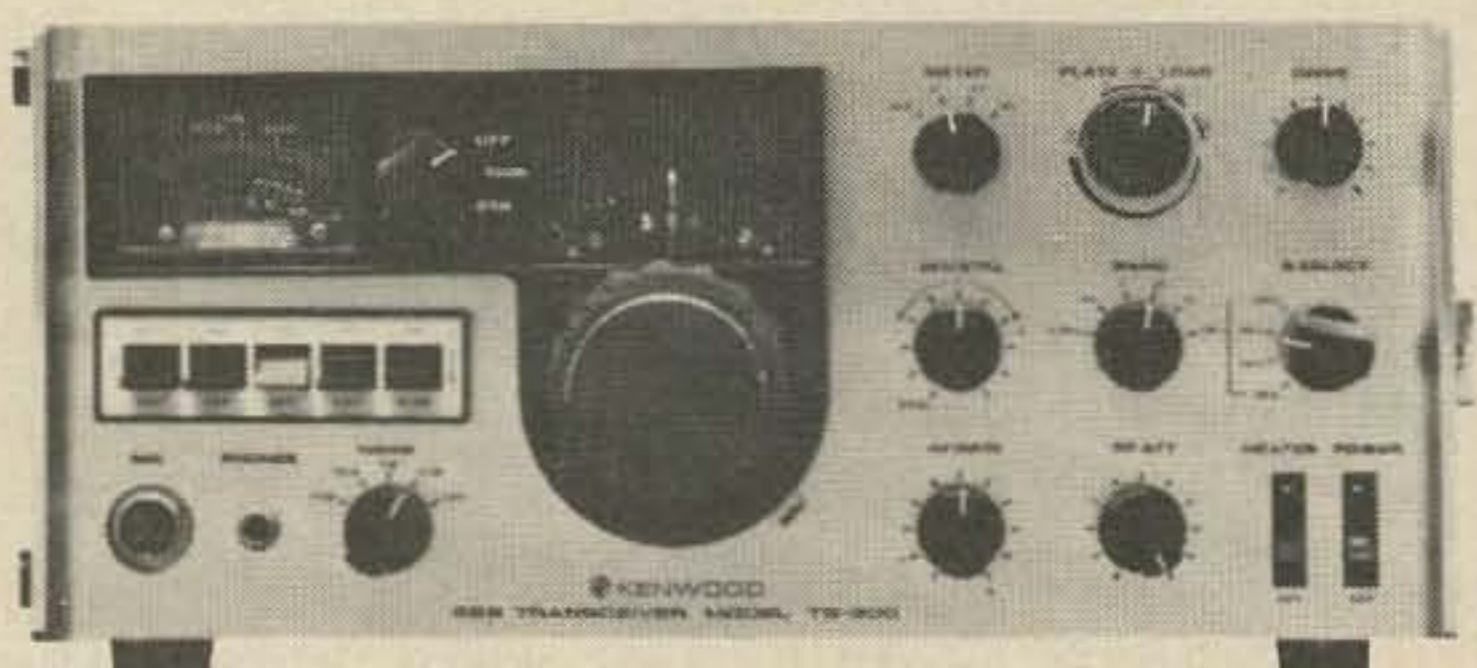
My wife wasn't too crazy about the bucket seats and the salesman kinda frowned when I asked if I could order it without the console, but they both gave in and we ordered the car. I let my wife choose the color to get her to forget that there would be no console for her to clutter up with her trading stamps and emergency bottles of make-up. When I cleaned out the glove compartment in our '54 trade-in, I found enough stamps to get a new 25-inch color TV console with record player and radio (I didn't tell her that, though, she thinks I bought it for her birthday—actually I spent the money on a new (used) FM rig).

We got the car three weeks ago and my wife is crazy about it. I found that I had miscalculated though — there is enough room under the dash for three rigs, so I am now operating mobile on 80 through 2 meters. That heavy-duty rear bumper that I ordered sure comes in handy for mounting all of those antennas (she didn't know about the bumper and I told her that the factory must have made a mistake). I took the car down yesterday to see about a noise under the hood and had them install factory air conditioning in the trunk to keep the amplifier cool. Don't know what I'll tell the wife when she discovers it, maybe I can tell her that it's an anti-pollution device!

...WA8QNR

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. . . the ultimate transceiver. The promise of the transistor has been fulfilled. Here is the transceiver you will want to own . . . whatever you have now, get ready to trade up. Its important features are far too numerous to list. Its specifications are superb. The TS-900 is unquestionably the best transceiver of its kind ever offered. The price \$795.00
PS-900 (AC Supply) \$120.00, the DS-900 \$140.00



TS-520 Kenwood's go every place . . . do everything transceiver

The new TS-520 is the transceiver you have wanted, but could not buy until now. It is a non-compromise, do everything, go everywhere 5 band transceiver for SSB or CW that performs equally well at home, in an automobile, airplane, boat or trailer. The TS-520 features built-in AC power supply, built-in 12 volt DC power supply, built-in VOX with adjustable gain delay and anti-VOX. The price \$629.00

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The R-599A is the most complete receiver ever offered. It is solid state, superbly reliable, small and lightweight, covers the full amateur band . . . 10 thru 160 meters, CW, LSB, USB, AM, AM.N and FM.

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INTERFERENCE SUPPRESSION FOR AMATEUR BOAT OWNERS

Many articles have been written about interference suppression for mobile radio amateurs, but little if anything has been written about using these same principles on marine engines for our many maritime mobile friends. For one thing, there is very little difference in the engine used in a car and the one used in a boat. The main difference is in the method of cooling and shielding for protection against water. It is the aim of this article to provide a few hints and shortcuts to interference suppression for boat owners.

One of the first requirements is patience in locating the trouble area. Next is having or taking the time to correct the problems found. A very useful aid in finding faulty areas is a simple tool made by taking a .5 μF bypass capacitor and attaching a large alligator clip to the metal case and a small alligator clip to the wire lead. Prior to using this aid, one should first perform a few preliminary checks of the ground system used on the boat. Check to ensure the radio, engine, and all attached accessories are making a good, clean electrical ground connection. At the same time, one should also check and clean, if necessary, the battery terminals.

Next, we need to know what can, and often does, cause interference to the radio system. To name a few: the coil, generator or alternator, voltage regulator, tachometer, bilge pump, spark plugs, points, rotor and other electrical instruments.

To begin our corrective measures, start by

placing the large alligator clip on the capacitor aid to ground and placing the small alligator clip on the hot terminals of the voltage regulator and generator or alternator. If the interference noise decreases or disappears, you are on the right track.

Next, permanently attach a .5 μF bypass capacitor between the hot terminals of the voltage regulator and generator or alternator. Caution: DO NOT attach a capacitor to the field terminals of the generator or alternator. Attach a .1 μF coaxial capacitor between the positive terminal of the coil and the ignition switch lead. Attach a .005 μF 1000V disc capacitor between the negative terminal of the coil and ground. Illustrations on the proper way to make the above capacitor installations may be found in many mobile handbooks. It would also be helpful to install resistive type spark plugs and spark plug cables if the boat engine does not already have them installed.

If the boat is a used or second hand boat which already has the resistive spark plugs and cables installed, it may be a good idea to replace them with new ones, as the resistive type cables tend to deteriorate from vibration, age and high temperature.

A final step toward a noise-free ignition system would be to ensure that the distributor points and spark plug points are properly gapped, clean and still in good condition. An improperly tuned ignition system can also cause noise.

If this does not completely cure the

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RG-174/U

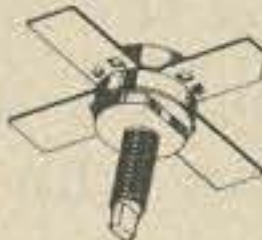
WE WENT THROUGH 20 MILES OF IT LAST TIME!

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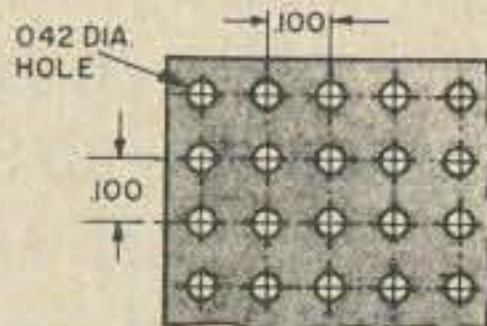


2N5589	3 Watts Out	\$ 3.50	2N6080	4 Watts Out	5.00
2N5590	10 Watts Out	6.00	2N6082	25 Watts Out	10.00
2N5591	25 Watts Out	12.00	2N6084	40 Watts Out	15.00

All are Silicon NPN and power output ratings are good to 175 MHZ. Hurry! Some quantities are limited.

KEYSTONE PERF BOARD

G-10 Glass Epoxy
Perf Board 3/64" Thick.



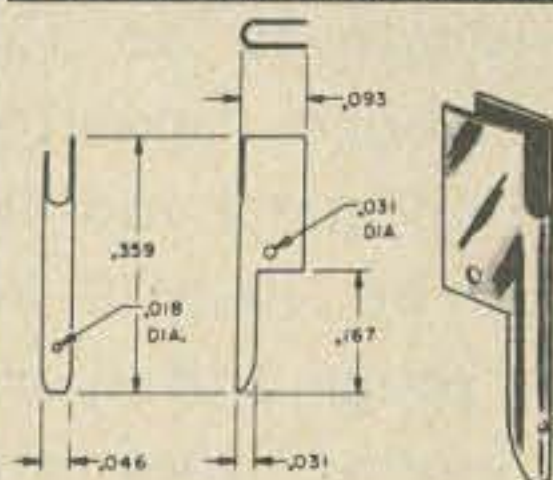
--UNCLAD--

No.	Size (in.)	Price
4229	2 x 4 1/2	\$.85
4230	2 x 6	1.09
4231	4 1/2 x 6	1.55
4232	17 x 6	5.75

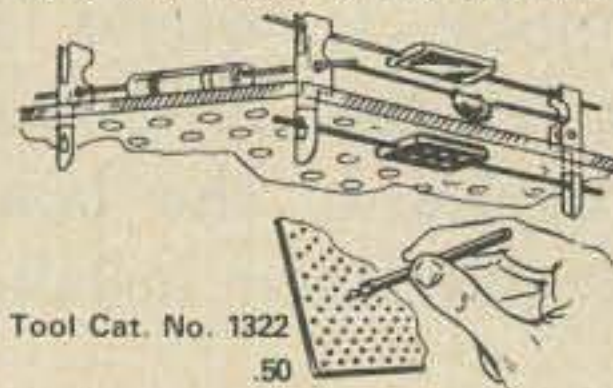
--COPPER CLAD ONE SIDE--

No.	Size (in.)	Price
4238	2 x 4 1/2	\$1.35
4239	2 x 6	1.85
4240	4 1/2 x 6	3.20
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MATERIAL: .008 thick Beryllium Copper.
FINISH: Fused Tin Plate

Insertion Tool Cat. No. 1322 \$50

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402 .55	422 .55	429 1.26	465 .89
403 .67	423 .64	460 .37	466 .97
404 .81	424 .80	461 .32	467 1.04
405 1.01	425 .85	462 .52	468 1.20
406 1.04	426 1.01	463 .64	469 1.22
420 .58	427 1.12		



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interference problem, it is necessary to check the accessory items which have brush type motors. These can normally be suppressed by installing a .25 μF pigtail capacitor across the brushes. Make sure the capacitors are capable of handling both the voltage and current present. The same capacitor as above may also be wired across the terminals of the instruments to eliminate any noise caused by the instrument itself (but not on tachometers).

If you have an engine that has the capacitor-discharge type ignition system which is used on most outboard type motors, the methods outlined here will help; however the problem of space may post a slight installation problem. Some of the outboard motor manufacturers offer suppression kits for their products, but there is no guarantee they will be 100% effective.

Some additional steps that may help are: check for good electrical connections, check to see if any of the non-ignition wires are routed alongside of ignition wires, use a shielded ignition system for the distributor-spark plug portion of the system and check the condition of the ignition switch and associated wiring. Dirty contacts in the ignition switch itself can also cause noise. Switch contacts can be cleaned by use of a good contact cleaner which is available at most electronic parts houses.

The following symptoms may help to isolate the interference problem. A popping type noise indicates ignition interference. A steady high-pitched whine which increases with engine speed is caused by the generator or alternator. A ragged, rasping type of noise which is usually found along with the high-pitched whine is indicative of voltage regulator noise. Instrument noise consists of irregular crackling or hissing noises and can be checked by jarring the instruments one at a time.

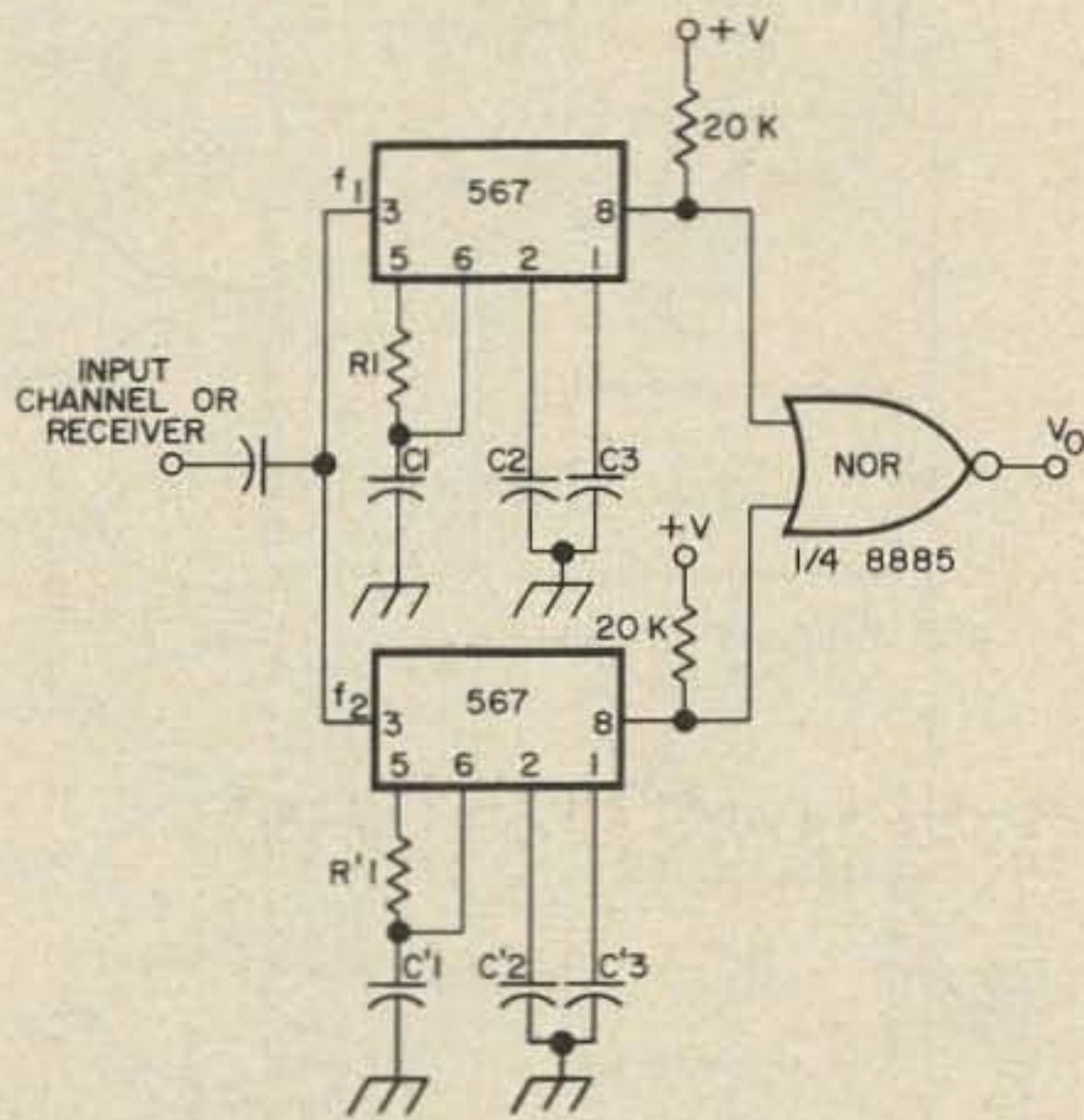
As a final extreme measure, it may be necessary to completely enclose the engine compartment in a copper screen cage. It sounds far out, but can be done if one has both the time and patience to have a completely noise-free system. Here's hoping no one will have to go that far... happy ham-boating to our /MM friends.

...DL5KS

CIRCUITS

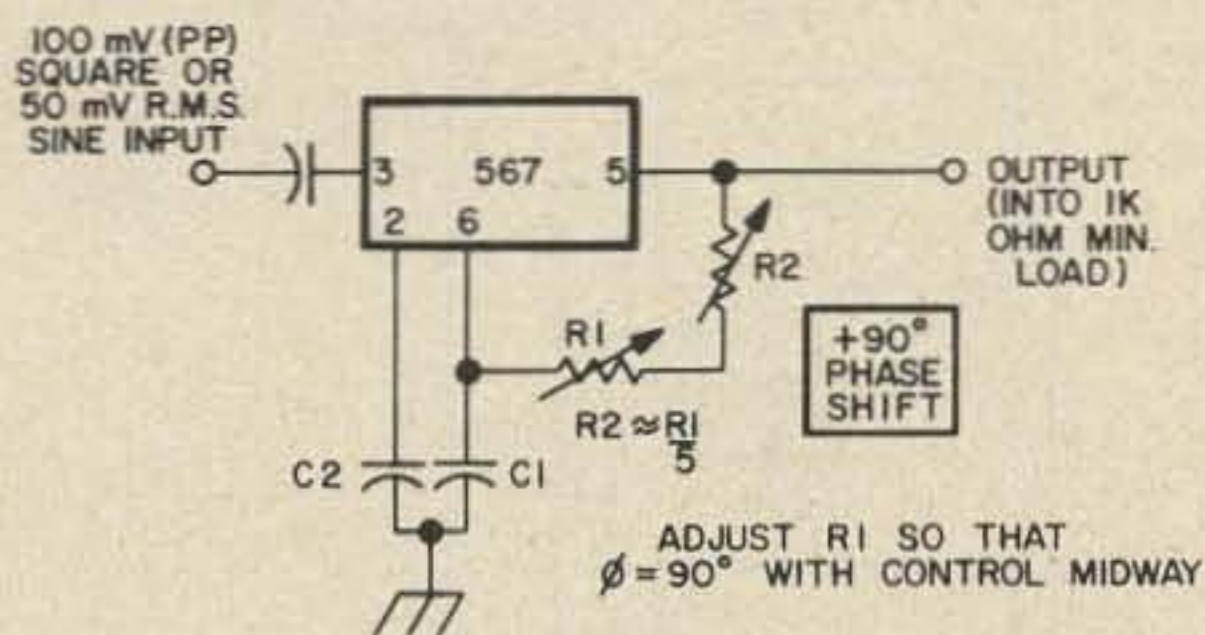
Courtesy of Signetics Catalogue.

DUAL-TONE DECODER

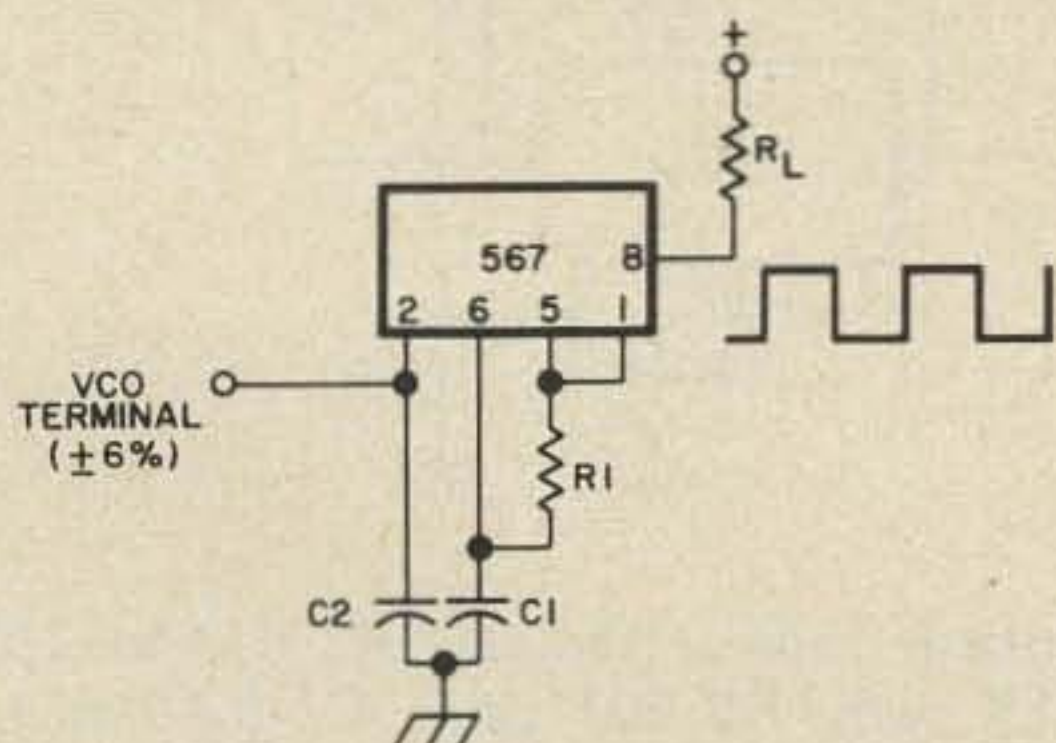


Resistor and capacitor values chosen for desired frequencies and bandwidth. If C_3 is made large so as to delay turn-on of the top 567, decoding of sequential (f_1 , f_2) tones is possible.

0° TO 180° PHASE SHIFTER



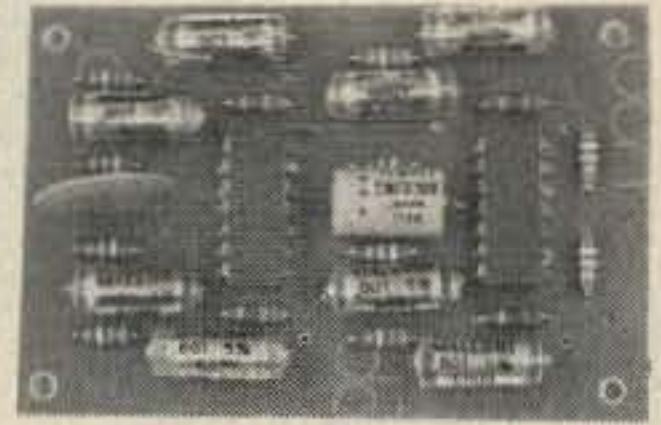
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We have what we think is the finest CW filter available anywhere. The 80 Hz selectivity with its steep sided skirts will allow you to pick out one signal and eliminate all other QRM and QRN. Simply plug it into the phone jack or connect it to the speaker terminals of any receiver or transceiver and use headphones, small speaker, or speaker amplifier. Better yet, connect it between any audio stages to take advantage of the built in receiver audio amplifier.

Build the 2"x3" CWF-2 PC card into your receiver or get the self contained and ready to use CWF-2BX and plug in!

SPECIFICATIONS

BANDWIDTH: 80 Hz, 110 Hz, 180 Hz (Switch selectable)
SKIRT REJECTION: At least 60 db down 1 octave from center frequency for 80 Hz bandwidth
CENTER FREQUENCY: 750 Hz
INSERTION LOSS: None. Typical gain 1.2 at 180 Hz BW, 1.5 at 110 Hz BW, 2.4 at 80 Hz BW
INDIVIDUAL STAGE Q: 4 (minimizes ringing)
IMPEDANCE LEVELS: No impedance matching required
POWER REQUIRED: CWF-2 . . . 6 volts (2 ma.) to 30 volts (8 ma.); CWF-2BX standard 9 volt transistor radio battery
DIMENSIONS: CWF-2 . . . 2"x3" PC board; CWF-2BX . . . 4"x3 1/4"x2 3/16" (black winkle steel top, white aluminum bottom, rubber feet)

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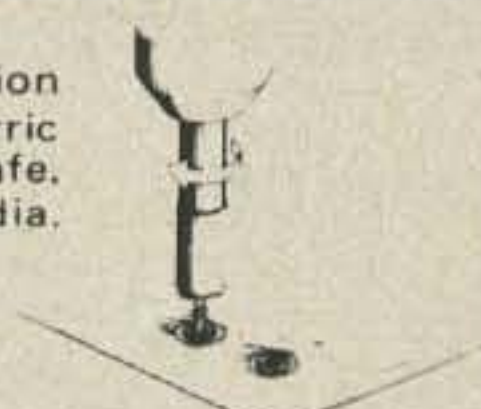
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HOT NEWS! for hams...



The premier issue of the 73 HOTLINE, which will be published every other Friday, is scheduled for April 5th. This newsletter will cover all the up-to-the-minute happenings in amateur radio... FCC news... new petitions filed... new actions... DXpeditions... new products... propagation flashes... Hotline Classified ads... job opportunities in the ham field... hamfest and convention news... contest news... all those things hams want right now and not the usual two months late magazine schedule. The 73 HOTLINE will be chock full of last minute news since it will be in the mail just a few hours after deadline closing.

HOTLINE will be mailed to all subscribers (at \$8 per year) by first class mail, marked Rush - Time Value. Our tests have shown that this class of mail seldom arrives later than airmail and often even sooner! HOTLINE will not be a simple typewritten sheet, as some newsletters are, but will be similar to the format of newspapers, with many times the information you might get elsewhere. Use the handy order form below and start getting the news you need to know while it's still news.

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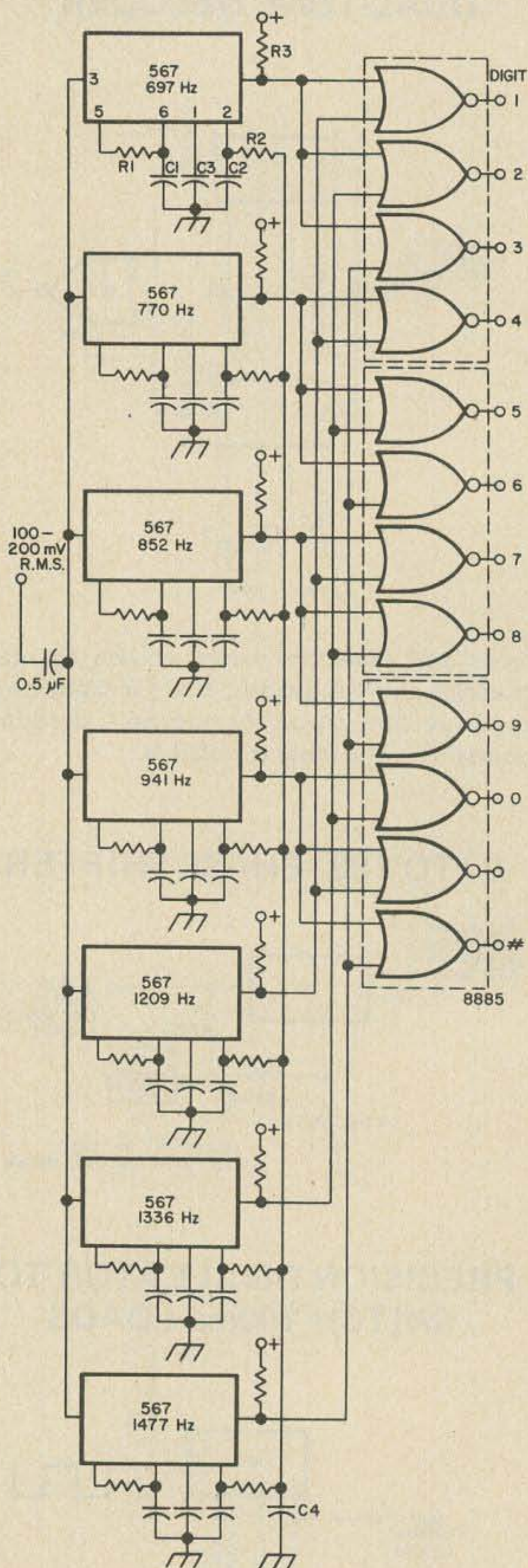
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Courtesy of Signetics Catalogue.

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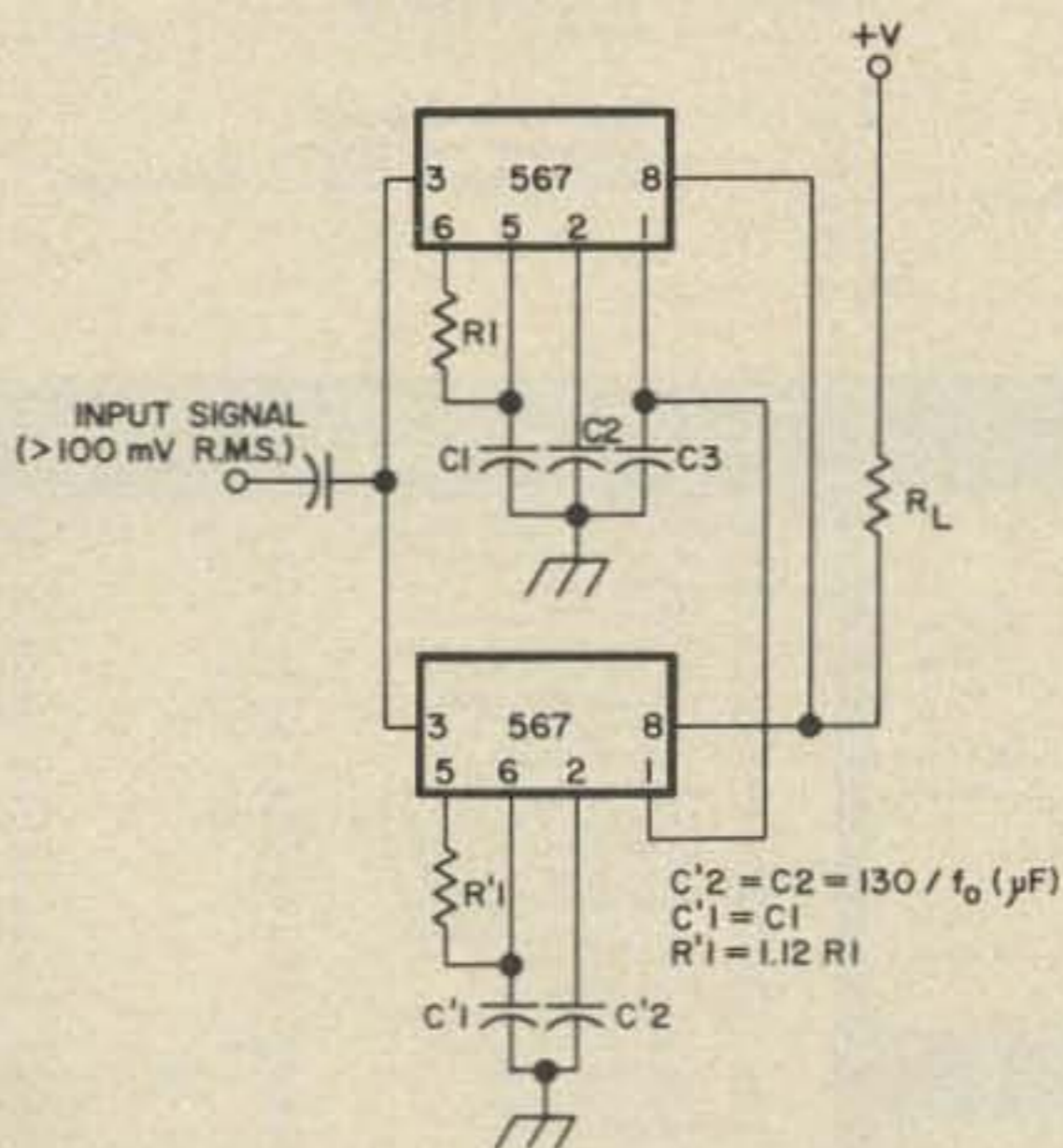


Component values (typical) R1 6.8 to 15K ohm, R2 4.7K ohm, R3 20K ohm, C1 0.10 mfd, C2 1.0 mfd 6V, C3 2.2mfd 6V, C4 250 6V.

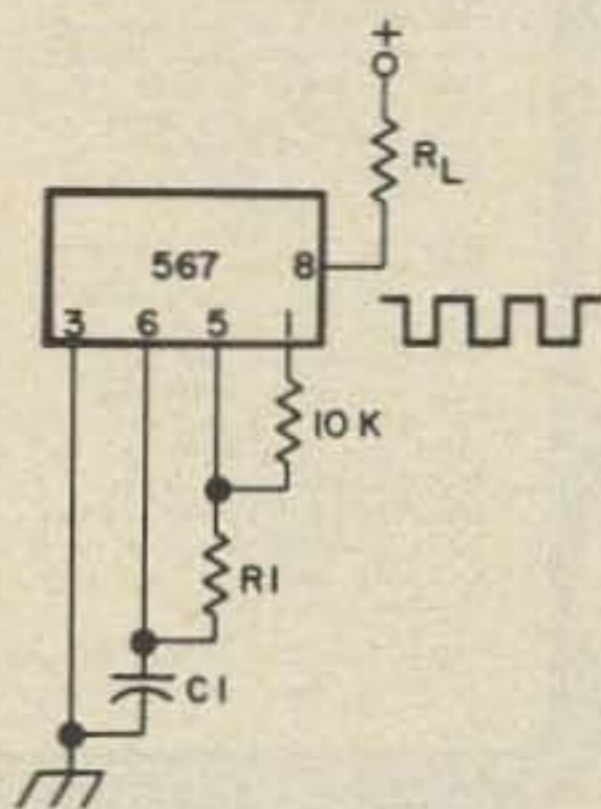
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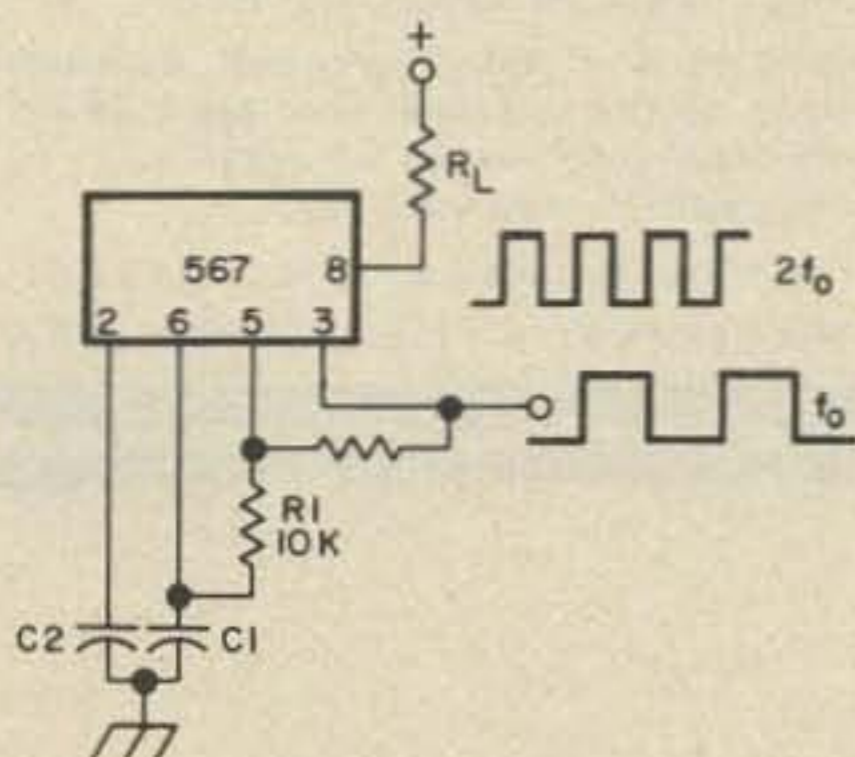
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7405	.27	7454	.45	74150	1.25
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7407	.53	7460	.30	74153	1.45
7408	.29	7461	.30	74154	1.75
7409	.29	7464	.45	74155	1.35
7410	.25	7465	.45	74156	1.50
7411	.35	7470	.50	74157	1.50
7412	.95	7472	.45	74161	1.65
7415	.50	7473	.55	74163	1.80
7416	.50	7474	.55	74164	2.95
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7425	.39	7486	.55	74177	.95
7426	.35	7489	3.25	74180	1.15
7427	.39	7490	1.25	74181	4.25
7430	.25	7491	1.40	74182	1.10
7432	.30	7492	1.05	74190	1.65
7437	.50	7493	1.05	74192	1.65
7438	.55	7494	1.10	74193	1.65
7440	.25	7495	1.05	74194	1.65
7441	1.25	7496	1.05	74195	1.15
7442	1.15	74100	1.65	74196	1.35
7443	1.25	74105	.55	74197	1.15
7444	1.20	74107	.55	74198	2.50
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74L03	.40	74L71	.60	74L93	1.75
74L04	.40	74L72	.60	74L95	1.75
74L06	.40	74L73	.80	74L164	2.95
74L10	.40	74L74	.80	74L165	2.95
74L20	.40	74L78	.80	85L52	2.95
74L30	.40	74L85	1.25	86L75	2.95
74L42	1.75	74L86	.95		

High Speed TTL					
74H00	\$.40	74H21	\$.47	74H60	\$.45
74H01	.40	74H22	.47	74H61	.45
74H02	.40	74H30	.40	74H62	.45
74H04	.45	74H40	.40	74H72	.60
74H08	.45	74H50	.45	74H74	.70
74H10	.40	74H53	.47	74H76	.70
74H20	.40	74H55	.47		

8000 Series TTL					
8504	\$.45	8200	\$2.95	8554	\$2.95
8060	.30	8210	3.95	8750	2.95
8091	.69	8214	1.95	8600	1.15
8092	.69	8219	1.95	8810	.95
8093	.69	8220	1.95	8812	1.25
8094	.69	8280	.95	8830	.69
8121	1.05	8288	1.75	8831	2.95
8122	1.05	8520	1.45	8832	2.95
8123	1.75	8551	1.95	8836	.69
8130	2.50	8552	2.95	8830	1.50
8182	1.75				

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74C00	\$.85	74C76	\$1.70	74C163	\$3.25
74C02	.85	74C107	1.50	74C164	3.50
74C04	.95	74C151	2.90	74C173	2.90
74C10	.85	74C154	3.50	74C192	3.25
74C20	.85	74C157	2.25	74C193	3.25
74C42	2.15	74C160	3.30	74C195	3.00
74C73	1.70	74C161	3.25	80C97	1.50
74C74	1.50	74C162	3.25		

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4000 Series - RCA Equivalent

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CD4002	.65	CD4013	1.50	CD4023	.65
CD4009	1.00	CD4016	1.50	CD4025	.65
CD4010	.65	CD4017	2.95	CD4027	1.35
CD4011	.65	CD4019	1.35	CD4030	.65
				CD4035	2.85

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1103	1024 bit RAM MOS	7.50 ea.
5260	1024 bit RAM 16 pin	
	Low power consumption	6.95 ea.
7489	64 bit RAM TTL	3.25 ea.
8223	Programmable ROM	6.50 ea.

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7445	BCD to decimal dec/drv	.99 ea.
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741	Comp Op amp mini-DIP	.29 ea.
9601	Retriggerable one shot DIP	.75 ea.
9602	Dual retrigger-reset monost-multivibrator DIP	.95 ea.
9312	8-in multiplexer DIP	.95 ea.
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5002 LSI Similar to 5001 except designed for battery power	
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Data only - Refundable w/purchase	1.00 ea.
5005 LSI (28 pin) Full four function memory, 12 digit display and calc. 7 segment multiplexed output	
Data supplied with chip	\$10.95
Data only - Refundable w/purchase	1.00 ea.

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MM 5313 (28 pin) Any readout 6 digit 1 pps BCD with spec. sheet	10.95 ea.
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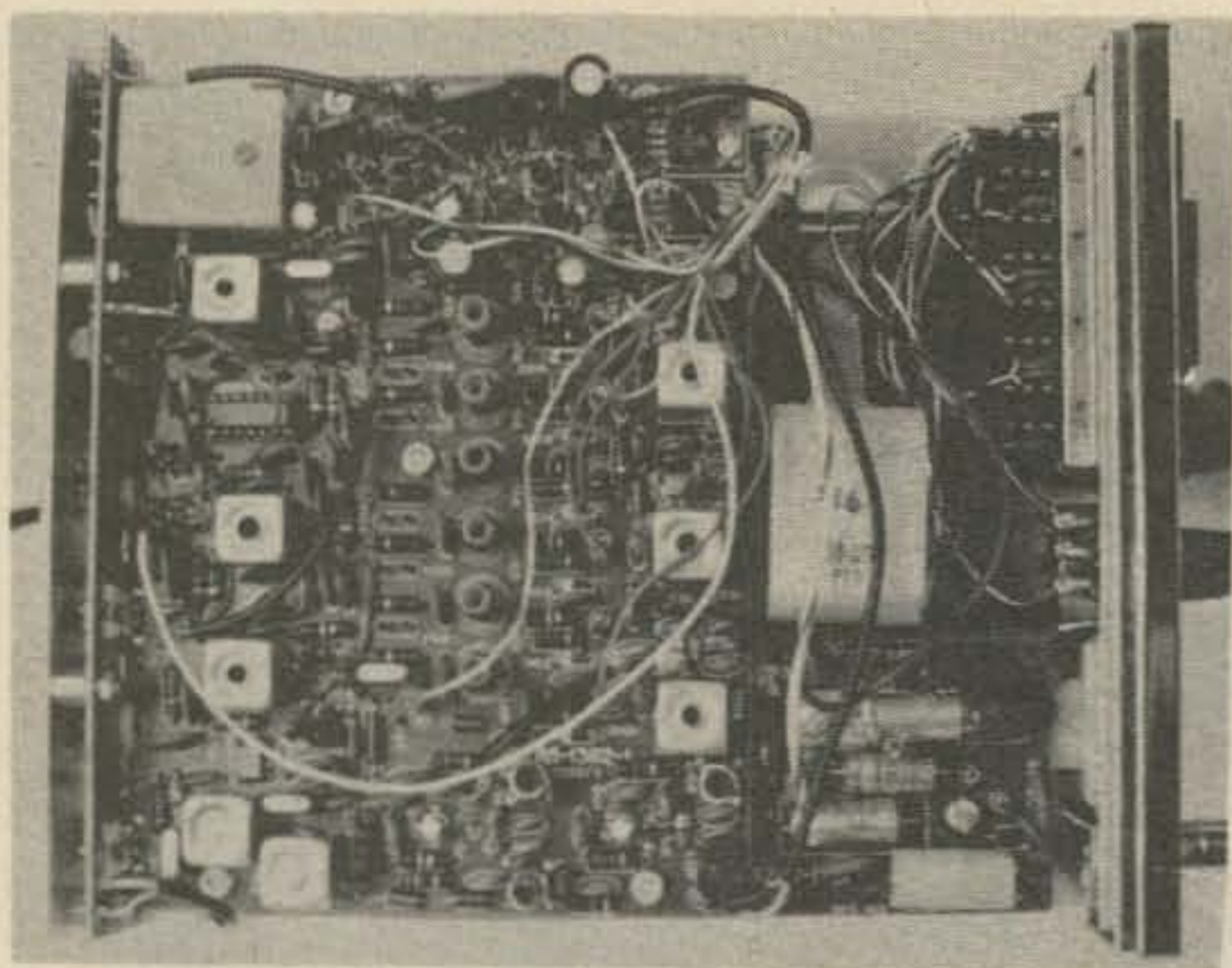
HEATH HW-202



If, for some eccentric reason, you have lately had an occasion to tear yourself away from the rig, you may have heard a song on the broadcast band called "Everybody's Got One" . . . which is also the punch line of a saying popular in some circles, in reference to a delicate part of the human anatomy. Well, now apparently this phrase is applicable to the Heath HW-202, if one listens to and counts the increasing number of these units bringing up the local repeaters. A couple of reasons for this could be Heath's reputation or that it is American made. However, I suspect that the main reason for its popularity is that after catalog shopping and comparing watts and number of channels versus price tag . . . Heath is the winner.

Providing a minimum of 10W out on your choice of 6 crystal frequencies and a sensitivity of $0.5 \mu\text{V}$ for 20 dB of quieting on 6 receive crystal frequencies, this all solid-state little unit is a box full, as can be seen in the photographs. However, other than for the number of components, all construction is straightforward with no difficult wiring or

Rube Goldberg mechanical surprises. In fact, I would say that it is one of the smoothest going-together kits I have yet assembled. Heath's instruction manual, clear and well illustrated as usual, certainly deserves a major portion of the credit for this, especially the pictorial format they have developed. Timewise, you may expect to spend approximately one hour soldering time on the regular-hash filter circuit board, 3.5 hours on the power amplifier, 8.5 on the receiver, 4 hours on the transmitter, and another 5 hours connecting the wiring harness and the circuit boards on the chassis. In case you don't have your pocket calculator handy, that adds up to 22 hours. The etched circuit boards are heavy duty glass-epoxy and no trouble should be experienced with lifting pads during soldering nor warping in mobile installations where high ambient temperature conditions may be encountered. Incidentally, the transceiver is designed to operate within a temperature range of -12 to +122 degrees F (-25 to +50 C) which is well below and above the operating range of most operators! For those who would attempt to

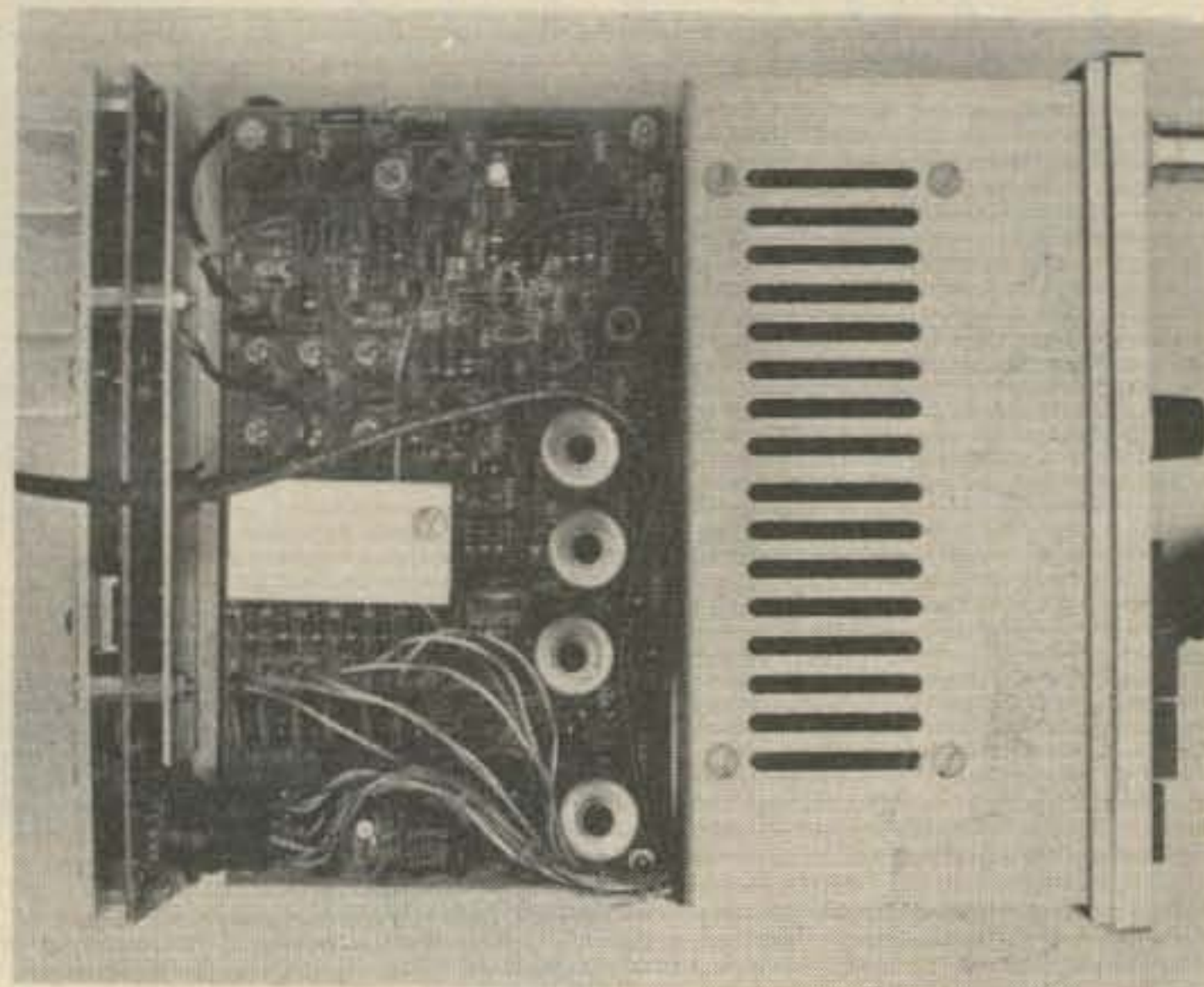


Top View.

construct such a kit as this without the proper solder . . . Heath includes a generous roll. Are there still creatures walking among us who have not gotten the word about the evils of acid core solder? In addition, a .64 x .80 cm open-end wrench is provided for a few moments use.

A look at the transceiver schematic reveals 33 transistors, 23 diodes and 2 ICs in a fairly standard arrangement. The receiver front end consists of an TCA 40673 dual

gate, metal oxide semiconductor field effect transistor (MOSFET) as the rf amplifier, whose output is fed to a second 40673 functioning as a mixer stage along with the output of the crystal controlled first (local) oscillator. The oscillator circuit crystal is selected by pushing the desired front panel buttons and tickled into activity by a 2N2369 and sent to the mixer. The mixer output, which is 10.7 MHz, is fed through a 22 kHz bandpass filter (two double-pole



Bottom View.

crystal filters) and amplified by a MC1350P integrated circuit. Then, the signal is mixed in a 40673 transistor stage with a 10.245 MHz signal from a second 2N2369 crystal

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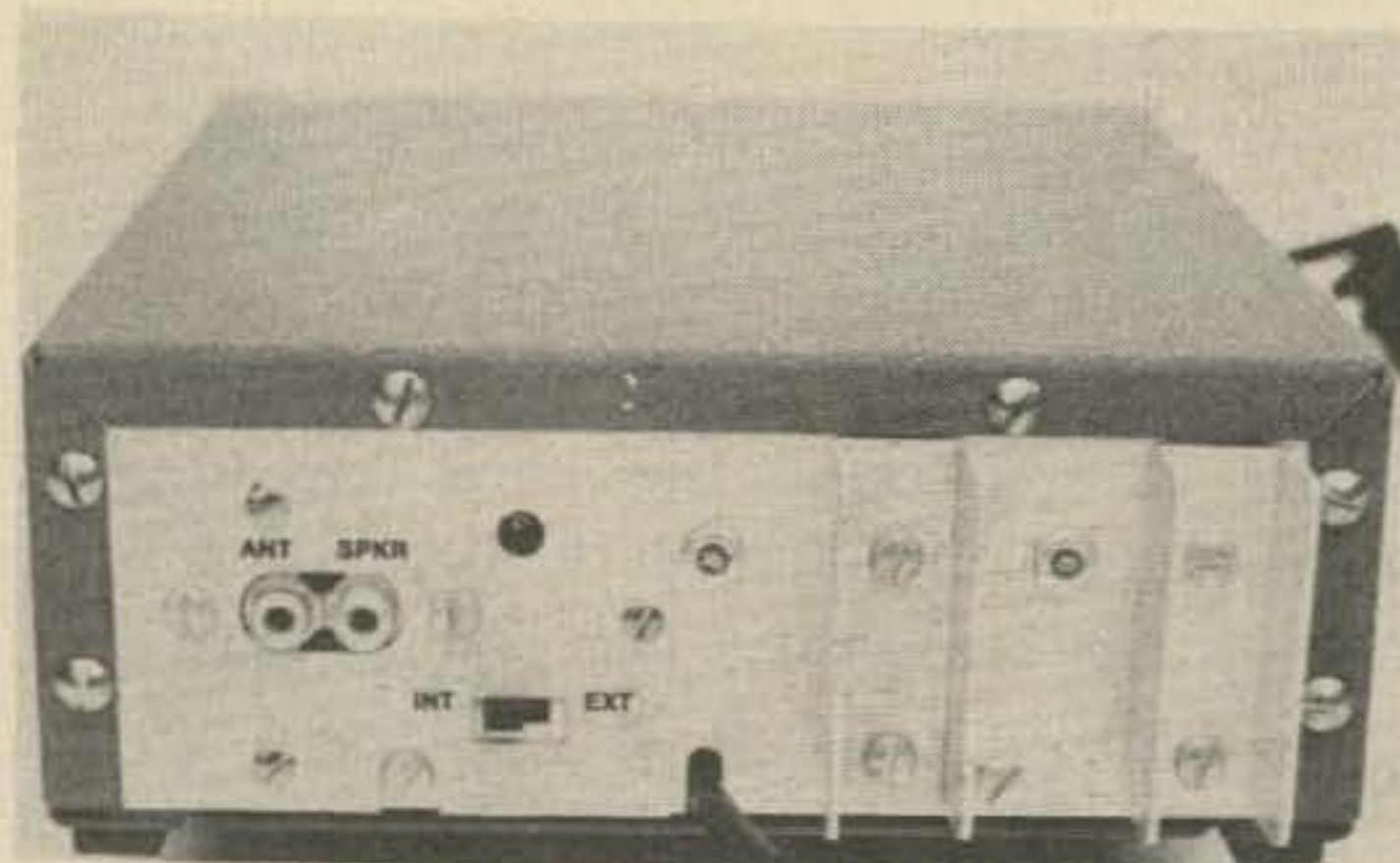
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Rear View.

controlled oscillator. The resultant 455 kHz output is coupled to a MC1357P integrated circuit operating as an additional stage of i-f amplification and as a quadrature detector. Now, as audio, the signal is processed by squelch gate, preamp and squelch amplifiers (all 2N5232As) and boosted by the audio amplifier circuits up to 3 watts to drive the built-in speaker.

W3WTO

Robert V. Grater K6SUB
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Santa Clara CA 95050

A SIMPLE MOBILE ALARM SYSTEM

Here's a blue light warning system that will help save your rig from a potential thief.

The alarm described here offers two deterrents to the potential thief. First, a small lamp is illuminated on the dash, which tells the thief that an alarm system is probably installed. For those who come in anyway to take the mobile rig, the horn lets go about the time they are ready to make their exit. If you aren't close enough to catch them, they will most likely (hopefully) drop the rig and make their exit posthaste.

The alarm consists of a pilot light (to show at all times on the dash) and an

inexpensive SCR. The pilot light is used to provide gate voltage to turn on the SCR, which in turn activates your horn. Pilot-Lamp #1455A draws about 20 mA at 12V. It is intended for 18V operation and the lower voltage extends the lamp life since it is left on all of the time. The 20 mA current drain on the battery is negligible, and the car may sit for two weeks without any appreciable drain on the battery. Any lamp may be used that provides enough gate current for the SCR. I would suggest a blue lens on the lamp socket – it gives a soft glow and you are still alert to the red auto warning lights.

The circuit consists of the SCR, either mounted somewhere on the car frame with the mica insulators, or mounted on a Bakelite block. Heat sinking is no problem. The SCR anode is connected to the horn relay, the small wire that goes to the horn ring on the steering wheel, one wire of the lamp is also connected to the anode, the other wire of the lamp is connected to the SCR gate. The SCR cathode is connected to vehicle ground. The SCR gate is also wired to a ground lug on the back of your transceiver. Once this extra ground wire is broken, the SCR gates on, and the horn sounds.

...K6SUB

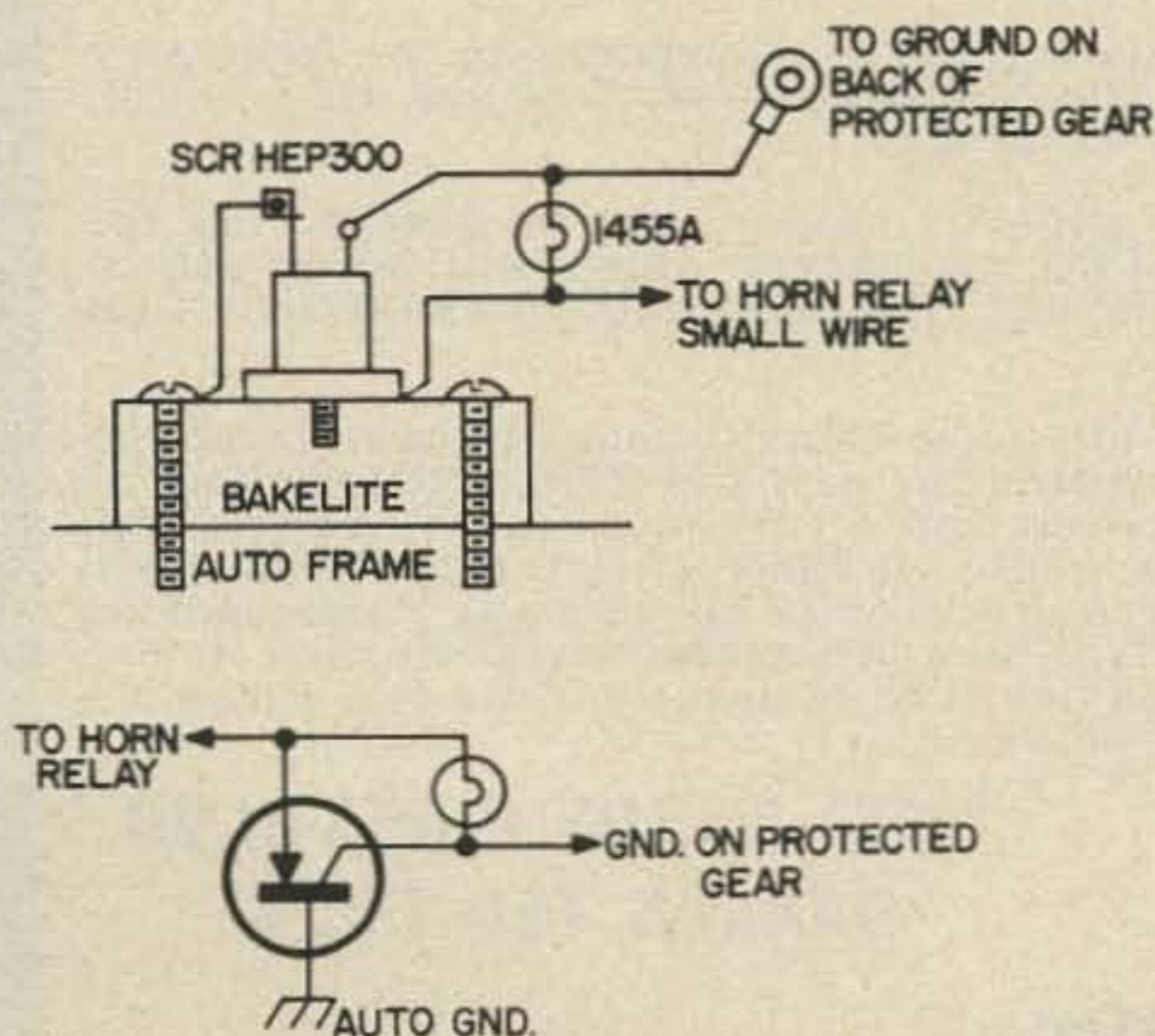


Fig. 1. Shown is the schematic and mounting method for the SCR.

JUDGE



Let's take a close look at the FM-27B. Skip over the technical specifications. . . you can find them in any of our competitor's ads or the factory's advertising. Let's talk about what the radio will do for you.

First of all, your experience will back up the fact that our Cushman CE-3 says the FM-27B is the most sensitive 2-meter rig it has checked. On the Cushman, it fully quiets at about $.25\mu v$ and the next best has been about $.4\mu v$, with the average radio we check running $.5$ to $.7\mu v$. The accuracy of the readings should be good, but the comparison is the important thing, because all of the radios tested were checked on the same equipment. As most of you know, many fellows operating on simplex frequencies are slightly off frequency. The FM-27B allows you to fine-tune all received signals, and its meter shows you when the signal is centered into the discriminator. This usually means the difference in a noisy or fully-quieting signal, and coupled with the extreme sensitivity many times means the difference in contact and no contact.

The FM-27B's frequency control system allows you to tune *continuously*, throughout the operating range of 146 to 148MHz, and doesn't restrict you to 30kHz steps or standard repeater spacing. The last digit you dial in is tuneable, not stepped, so you can dial up 146.525 if you wish, and there is no connection between transmitter and receiver frequencies, so you can listen to 146.94, and transmit on any frequency between 145 and 146MHz at the same time (or any other combination of frequencies). "Oddball" repeater spacings are as easy to get as "standard" frequencies.

For those of you who are naturally nosy like I am, you can tune in on any frequency you wish and see what is really going on in your area, and you may find as I have that there are repeaters operating that you didn't know were on the air.

The "B" model of this fine radio is exceptionally stable, and the markings on the frequency dials are almost never more than half the width of the pointer off actual center. (If you ask, we'll check this for you and be sure before we ship your unit.)

If your club has a "club frequency" in the 145 to 146MHz range, and you have no use for 147 to 148MHz, we'll deliver you a unit at no additional charge which will cover 145 to 147MHz, if you will allow us about 2 weeks for shipping. Standard units we can usually ship the day your order arrives.

Couple this with a 28 to 30 watt nominal output, and you're going to make mobile-to-mobile contacts which you had thought were impossible with your new FM-27B, and the price of \$479.95 (no crystals to buy) is a bargain. Think it over, and order yours today. Even at the \$479.95 price, the FM-27B is now the most popular radio we have with our local customers who have found out what we're telling you here. Not one customer has failed to come back to us and tell us that the FM-27B exceeded his expectations, and was the best performer he has ever seen. (Incidentally it is American made, and service turnaround time the few times it's needed, has averaged 24 hours both with us and the factory.)

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REDUCING MOBILE NOISE

*Induced voltages can be a real problem.
Here's one method to solve that problem.*

With the introduction of transistorized 2m FM transceivers and various amateur receivers for mobile use, there is a natural tendency to pick up the supply voltage from the ignition switch or the switched terminals on the fuse panel. Reduced current demands have rather obsoleted the old power relay . . . but not quite.

Because of the compactness of wiring harnesses, all kinds of voltages are induced into other wires in the same harness. It is quite possible for your receiver to get alternator, gage, and turn-signal noises induced on the supply line, and much of it will

pass the receivers filtering and appear at the speaker terminals.

The best way to eliminate this problem is to run the supply lead directly from the battery terminal, and route it away from other wiring while keeping it close to the metal chassis parts of the vehicle, which of course are at ground potential.

The battery itself is a big fat capacitor and a beautiful hash filter! But taking our A lead directly from it means we have to turn the rig on by hand for now it won't come on automatically with the turn of the ignition switch.

Here we come back to our old friend, the relay. Any relay with the current capacity for your rig and a 12V dc coil is okay. Your local two-way radio serviceman will undoubtedly have some old ones he would be glad to sell cheap or he may even give them away. If you want a new one, ask for Motorola part number 59K813674. It looks like a horn relay off a car but it isn't! The illustration shows both the physical and electrical layout of this particular relay.

Use of this type of voltage supply will do much to reduce "local QRN" generated by the vehicle. Give it a try.

. . . VE3FGS

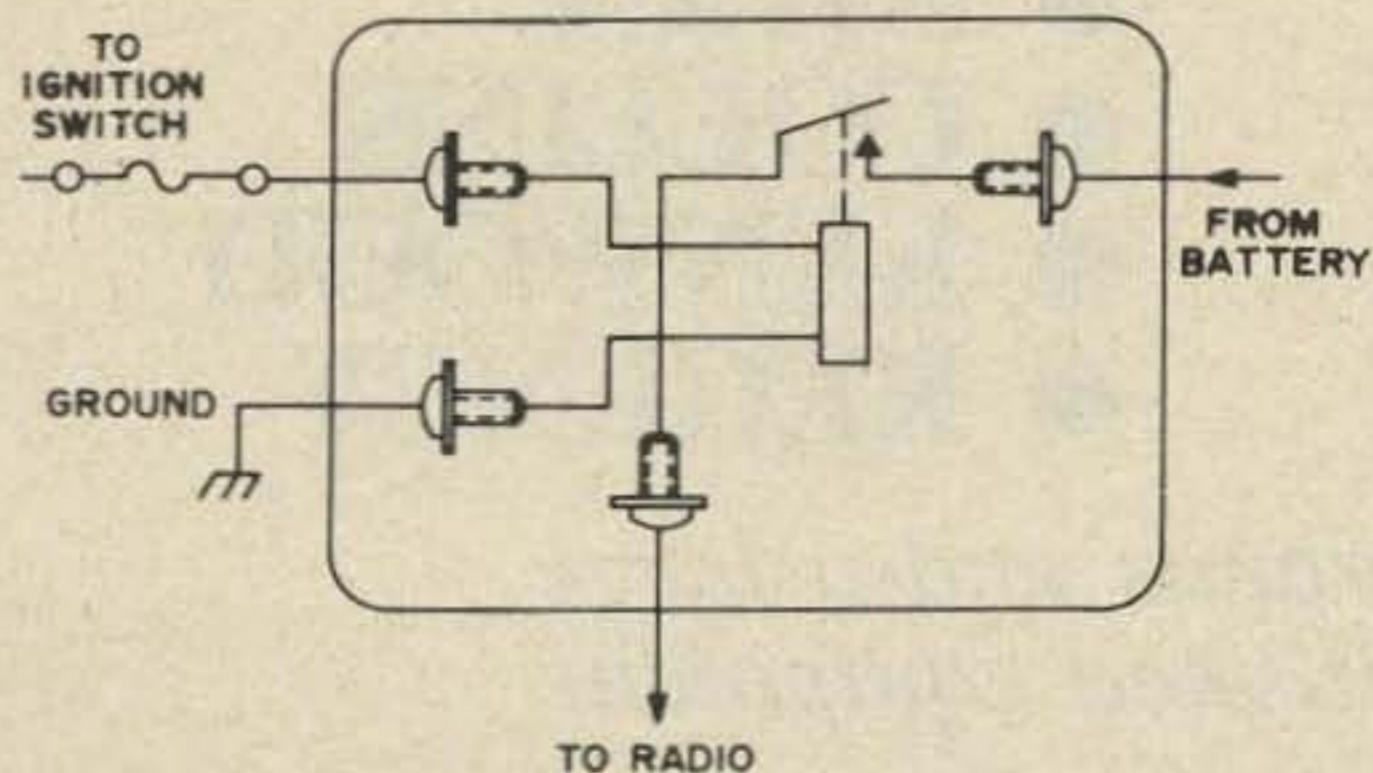


Fig. 1. Terminal layout and internal wiring of Motorola type A relay (bottom view).

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THE NEWTRONICS CGT - 144 ANTENNA

One of the latest additions to the Newtronics family of outstanding antennas is the CGT-144 mobile antenna for 2m which has a nice gain figure of 5.2 dB.

I recently acquired one of these high gain colinear antennas and was quite impressed with the results.

When the antenna arrived, our weather was cold and rainy, so I really appreciated the quick trunk lip mount, and the fact it was replacing my 5/8 wave Hustler. I just raised the trunk lid, unplugged one antenna from the transmission line jack, (boy that connector is handy!) plugged in the other, slipped the old mount off and the new one on.

Newtronics mentions the antenna needs to be mounted perfectly vertical for best results, and the trunk mount includes a special arrangement in the base so the antenna can be adjusted for perfect vertical alignment, regardless of the trunk's angle. This feature is particularly nice for late model autos.

The antenna worked beautifully right off, and the SWR was very low. In fact, a difference was quite apparent. Fringe repeaters came in solid and new DX repeaters could be heard from my favorite old "prime" locations.

I also noticed my autopatch capabilities were better, and I didn't necessarily need to be in a good location to use it. Indeed, I noticed my TR22, barefoot, now appeared to have the same transmitting capabilities as when I used the 1/4 wave whip and 12 watt amplifier. However, the 12 watt amplifier

didn't help on receiving, and the antenna did. This led me to thinking. . .if you have a rig and one of the big 90 watt amplifiers, this antenna would really make a difference; 5.2 dB gain is very close to quadrupling your power. A 90 watt signal would be the equivalent to 350 watts! Then during a band opening if you were atop a high mountain (like Lookout Mountain, Tennessee, where on a clear day you can see seven states) you could really shake up the troops. In fact, mountain tops are especially good for the CGT-144, because of its low angle of radiation.

After really having a ball with the CGT-144 for a while, I decided to run a series of comparisons and the results were quite interesting. I first found a 1/4 wave whip had a noticeable advantage when mounted on an auto roof compared to mounting on the trunk. (In fact, I wouldn't suggest trunk mounting of 1/4 wave whips for low power rigs.) Next I found the BBLT-144 3.4dB gain trunk mount had a noticeable advantage over a roof mounted 1/4 wave whip. Finally, I found the CGT-144 had a very noticeable gain over the BBLT-144, and the 1/4 wave roof mount just couldn't compare to the CGT-144. (I wonder how well the CGT-144 would do on the auto roof!) All the previous measurements were into local repeaters. The CGT-144 did better on "long hauls," (especially from high hills) and seemed to drop slightly when in "holes" between tall hills around town. This is no doubt due to that low angle of radiation the antenna

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utilizes. It is, however, superb on the open road compared to other antennas I have tried. The antenna doesn't fall short in the looks department either. It is quite impressive because of the heavy bottom section and tall slender white phasing section. The complete antenna is so tall it generates quite a bit of curiosity.

For those low overhead areas like garages, car washes, bank windows, etc. Newtronics offers an optional, stainless steel quick disconnect (Model QD1). This device installs between the antenna mount and the antenna proper. The bottom section of the whip is adjusted shorter to compensate for the QD1 length, and then you can just slip the whip section off, leaving only the mount. (Some churches use a device similar to this on pulpit mikes.)

Finally, for those interested in using this antenna on a standard 3/8 threaded body mount, the CG-144 is available. This is the complete antenna less trunk mount.

Whichever one you choose, I think you'll find it's a truly outstanding antenna.

...K4TWJ

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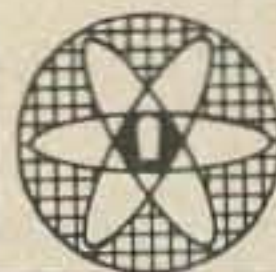
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One night I locked my doors but forgot to lock the key switch on. A thief put a coat hanger between the front and rear windows, opened the door, and started to disassemble my tape player. My tape player has a burglar alarm built into it. It is a simple switch that conducts when a mounting screw is unscrewed. The switch connects to the horn relay. Most experienced burglars know this and cut the wires. The thief who entered my car did not know I had elaborated on this circuit, so cutting the wires caused him to flee.

The heart of the circuit is a silicon controlled rectifier that acts as an open circuit normally. When a positive voltage is applied to the gate, a current will flow from

the cathode to the anode. The current will continue to flow until the battery voltage is removed even if the triggering voltage is removed or shorted to ground. There are two ways to make the gate positive in this circuit. In the first, the 100K resistor and the 500Ω resistor make up a voltage divider

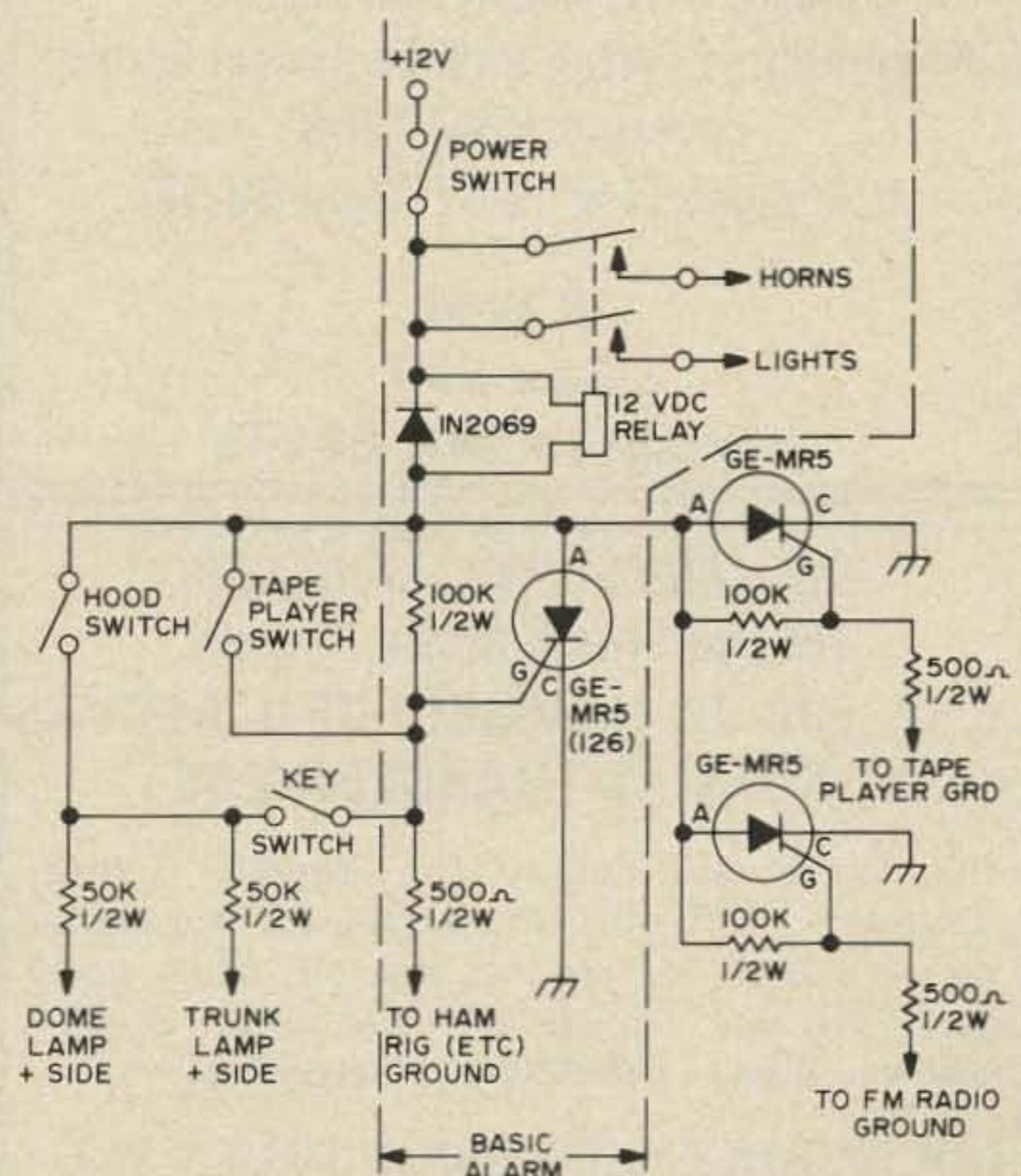


Fig. 1. Schematic

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network and the gate is connected to the center of it. As long as the 500Ω resistor is grounded, voltage at the gate will be very low. If the ground on the 500Ω resistor is removed, the gate will become more positive, the SCR will conduct, the relay will become energized, the horn will sound, and the headlights will shine brightly. Additional triggering SCR's may be added as shown in the right hand portion of the schematic or the ground return wire from the 500Ω resistor may be looped through all your equipment. The second triggering method is to take power from courtesy or dome lights and the trunk light positive side and apply it to the gate of the SCR through the 50K resistor. A switch is used in this line to turn this part of the circuit on and off. It should be a key switch and located near a headlight, grill, or some place where it can't be seen. When you leave the car just lock the key switch.

Don't apply too much heat to the SCR leads or it may not stay latched on or work at all. The anode tab may be cut off if relay current is less than 2 amps but don't short what's left of it to ground or the relay will stay on. If the ignition causes the alarm to trigger, place a 10 μF capacitor between the gate and cathode. If that doesn't cure it, run shielded microphone cable to everything connected to the gate and ground at both ends.

It's a good idea to paint the box black, mount the parts, and place it in a spot so that its whereabouts is known only to you and your spouse. A second horn will delay a burglar if he tries hunting under the hood. You should be able to get to the switch to turn the alarm off if it should go off, but to make it less convenient for a burglar use a key switch. To reset the alarm, shut off the power to it, find out why it went off (open ground of 500Ω resistor or you forgot to shut off the part triggered by the dome, trunk, or hood by shutting off the key switch), and turn the power back on. Most burglars would probably leave as soon as the horn goes off because the price of attempted burglary isn't as high as what could happen if he were caught by the police with your equipment and no receipt.

...WA2OJT

TWO HIGH GAIN RF STAGES IN ONE IC FOR TWO METER FM

This article describes a new integrated circuit that not only works well as an rf stage on two meters, but also as two of them! The result is a high gain double compound amplifier with low noise, excellent stability due to the low internal feedback, and only two tuned circuits. The RCA chip, CA3102E, four trimmers, and two hand wound coils at 5¢ each, and a handful of .01 discs are about all there is.

In my opinion (although I don't work for RCA) they are to be congratulated on this one. It is really putting ICs into the rf business on VHF-UHF.

Complete design philosophy, construction details, testing and results are given.

The RCA3102E chip. Integrated circuits are certainly "growing up," as far as rf is concerned. This 14 pin dual in line package has two differential amplifiers with associated constant-current transistors on a common monolithic substrate. The six transistors which comprise these amplifiers are general purpose devices which exhibit low noise and a value of Ft in excess of 1 GHz. These features make the CA3102E useful from DC to 500 MHz.

With a maximum voltage rating of 20 volts, no trouble is had with nominal 12 volt supplies or with charging car batteries.

Fig. 1, shows the internal schematic as RCA draws it, and Fig. 2, the way it actually looks and works. Why they insist on drawing it as in Fig.1, I'll never know, at least till my next visit to Somerville, N.J. It certainly is a lot easier to read as in Fig. 2.

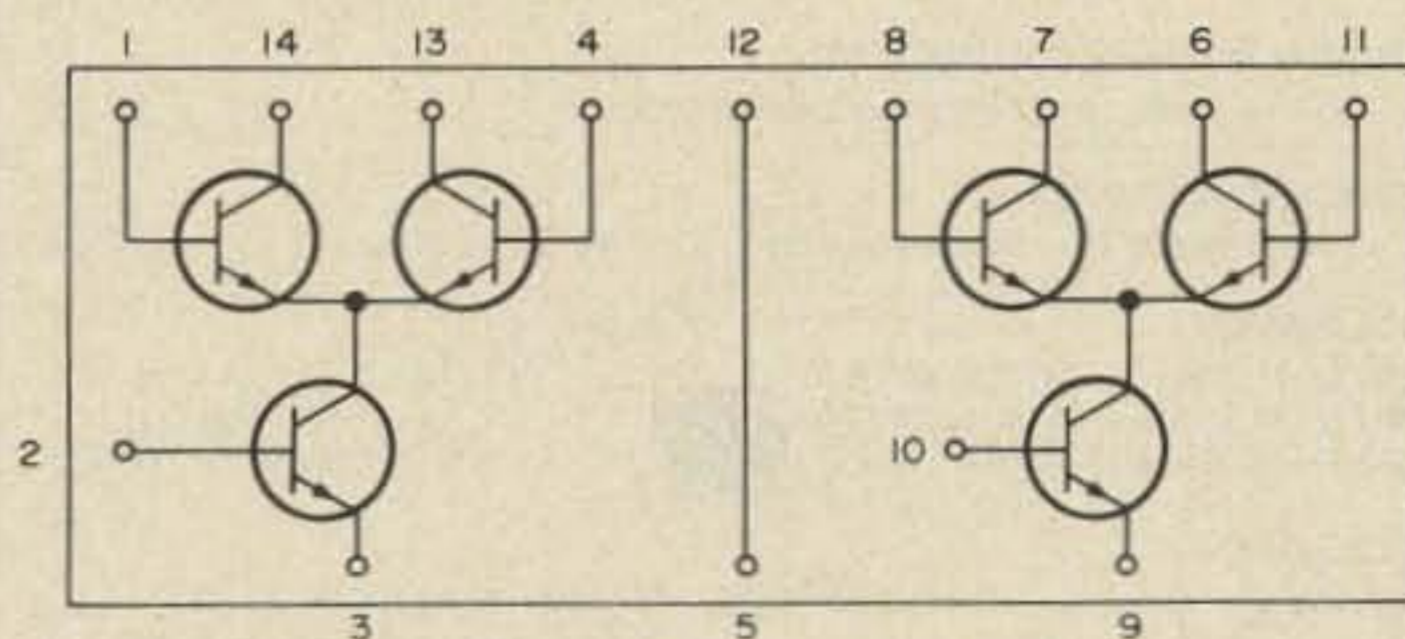


Fig. 1. Schematic CA3102E.

Either of these absolutely independent compound amplifiers may be connected as dif amps or as cascodes, and they may also be used in cascade, which I have done here. The noise figure of either is about the same, 4.5 dB at 200 MHz. I prefer the cascode connection as it has less reverse



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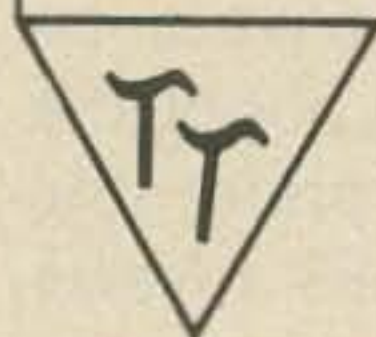
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transfer conductance (internal feedback), although the dif amp will handle stronger signals where needed, such as in a repeater receiver, or in crowded areas.

Fig. 3, shows the general differential amplifier connections, in which a common collector amplifier Q2 drives a common base stage Q3. Q1 acts as a constant current source. As mentioned, this is called a compound amplifier. While I have shown three separate dc base bias supplies, in some circuits two of these may sometimes be connected together. The internal feedback of the dif amp is low enough so that neutralization is not required. This dif amp connection handles stronger signals than the cascode.

Fig. 4, shows the general cascode connections for the RCA CA3102E chip, with Q1, a grounded emitter amplifier driving Q2, a grounded base stage. Q3 is not used in this case. This cascode connection has the highest gain and the least internal feedback. Shielding and layout are important if proper advantage is to be taken of the low internal feedback of these circuits. See later paragraphs and figures.

With both of these circuits, if you intend to play around with them, (and you can see there is not much cost involved — not the

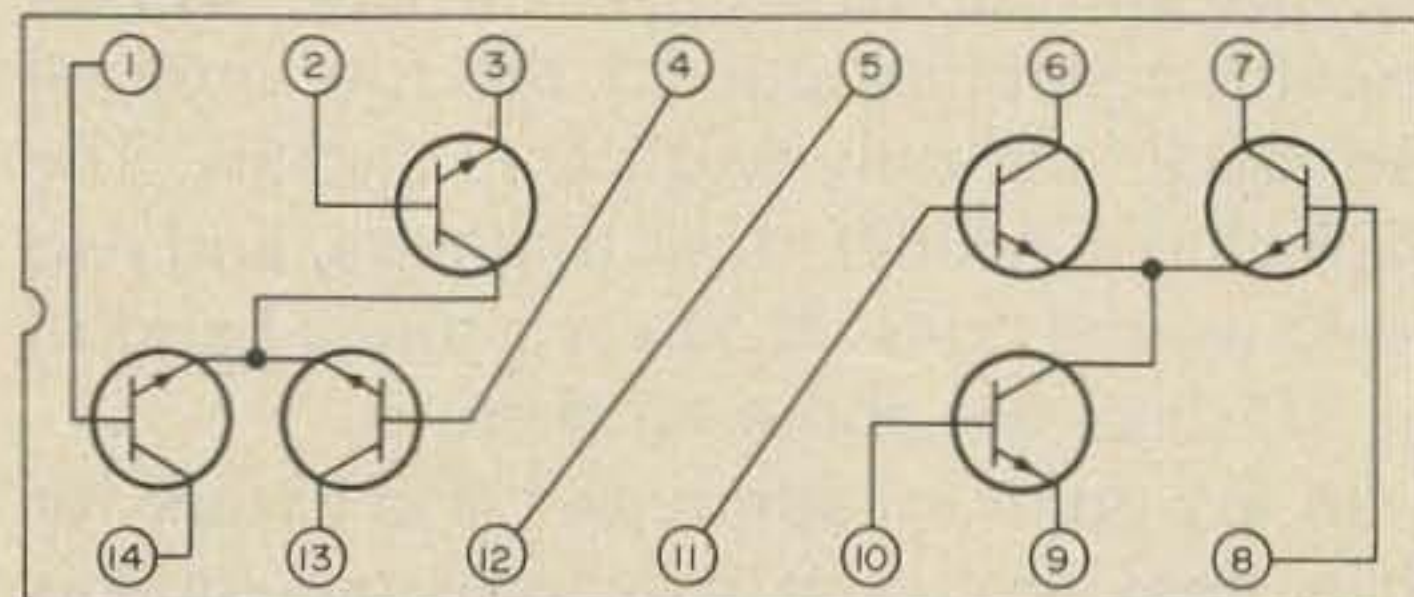


Fig. 2. CA3102E package pin view.

purpose of this article) you should definitely make provisions for varying the base and emitter bias voltages, while operating.

Note: Do not do this at first while using a high gain i-f strip. If you wish to know how IC rf stages behave, use the set-up of Fig. 5, which will really give you answers. Both the signal generator with infinite attenuator, and the tuned diode receivers have been written up several times in 73 Magazine.

Rf stages for two meter FM using the CA3102E. Fig. 6., shows the entire circuit as

it finally evolved here, after many days of "hard labor" and testing. Again, the test set-up of Fig. 5, was used, with a final check using a second CA3102E as the single conversion front end, a crystal filter for the 10.7 i-f strip for selectivity, followed by the RCA chip, CA3089E as i-f amplifier, meter driver, AGC, squelch driver and squelch, quadrature detector, and af, as detailed in Dec. 1972 magazine. Which one? 73 of course. In detail, the cascode connected compound amplifier formed by Q1 and Q2

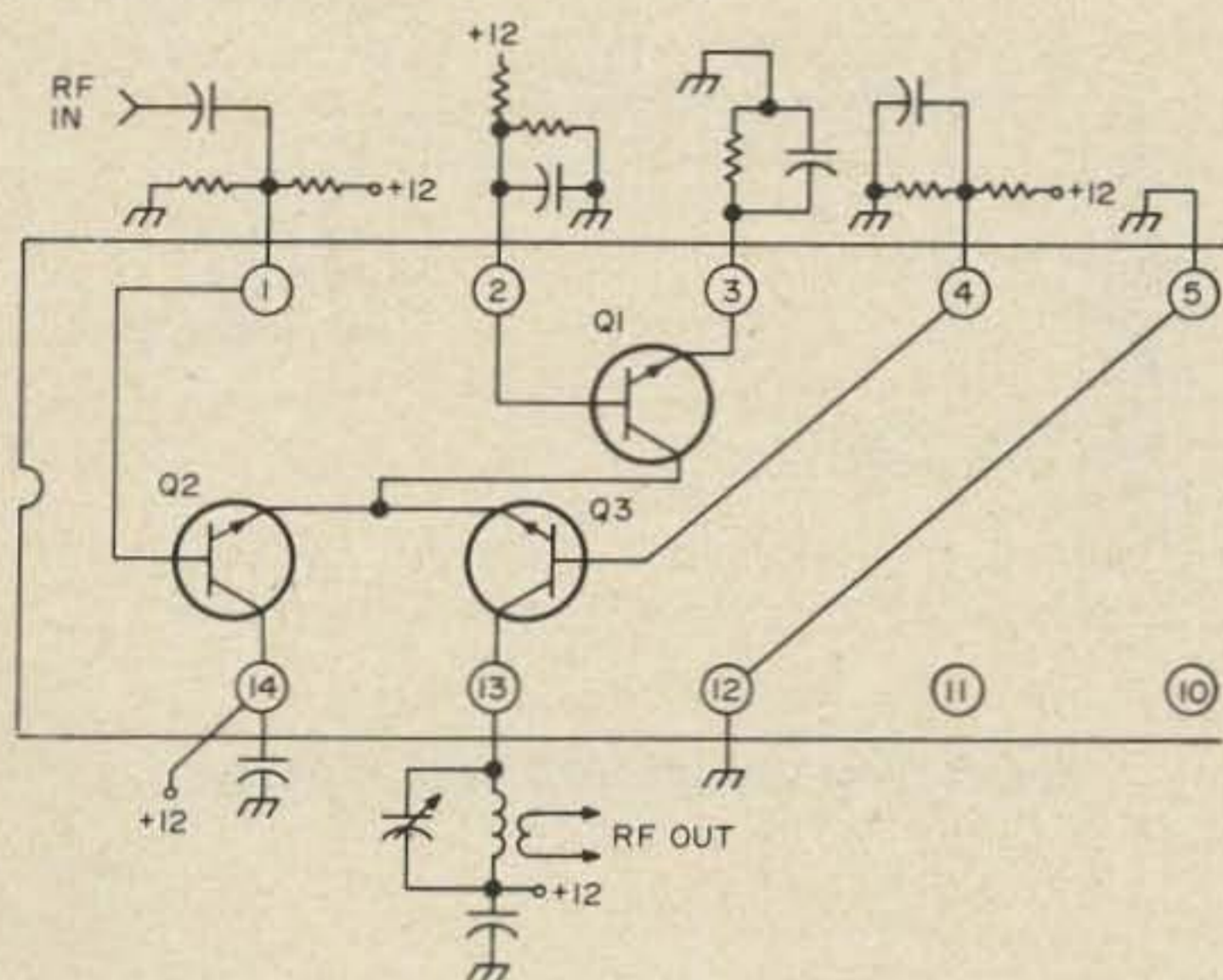


Fig. 3. Differential amplifier, general schematic.

has Q1's base input tapped down on L1 for low impedance matching. This base input is pin 2 of the CA3102, as can be seen on Fig.6. The antenna cable series matching capacitor C1 will match almost anything, with an assist by varying the tap on L1. Pin 2, the base of Q1, could also be varied for low noise purposes if you were scratching for the last possible fraction of a dB. R1 and R2, if you are going to change them for test purposes, should only be adjusted in relation to the other DC bias resistors R3, R4, and R5, as you will find they are naturally somewhat interrelated.

Capacity coupling between the two cascodes. After much work with coupling circuits using inductors, taps, double-tuned circuits, plus considerable study, the collector of Q2 was simply brought out to a resistor whose final value turned out to be 470 ohms, and a .01 coupling capacitor over to the input of the second cascode, Q4 and Q5.

Further notes on tuned circuit coupling between cascode #1 and cascode #2 (left

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and right half, respectively, on Fig. 6). I got quite a shock while testing various circuits here. The sensitivity, into a simple diode detector, at times was equal to that of a good superhet receiver using good FET's in the front end! Of course, when you consider that the combination of the cascode Q1 and Q2, in cascade (note that second A in cascade) with the second cascode Q4 and Q5, uses four active, lively, hot, transistors, all good for 500 MHz, this is perhaps not surprising. Nevertheless, I was surprised. I always figure that every day should bring at least one new piece of knowledge, and one of my very favorite mottos is "Knowledge is always preferable to ignorance." However, all that sensitivity is not really needed here. The simple coupling using R4 makes an excellent two stage rf amplifier, which is really a four stage job counting all the active devices used, in the CA3102E. And, it

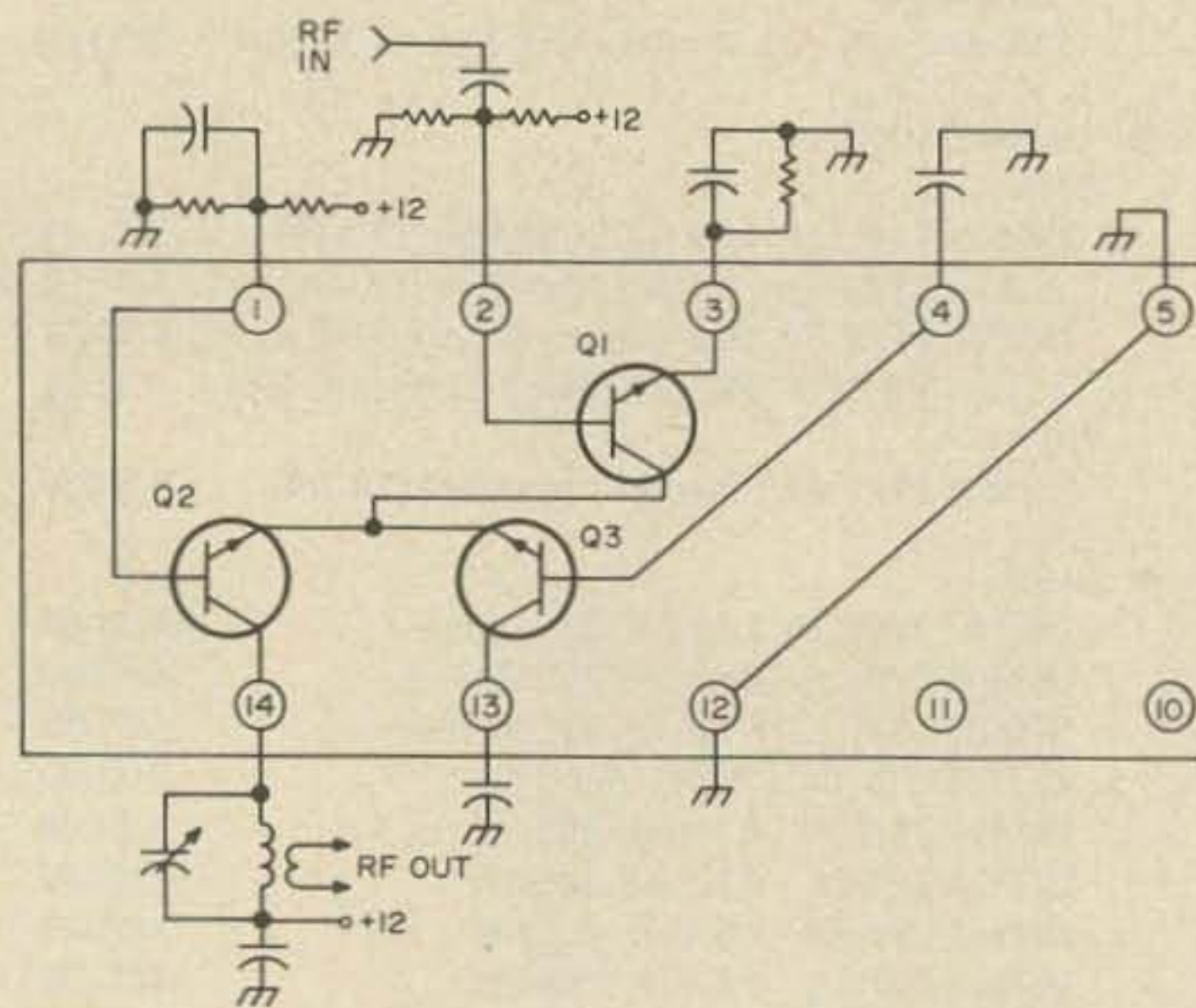


Fig. 4. Cascode rf amplifier general schematic.

handles nice and smooth, nothing tricky about it, no oscillation, and still has about the sensitivity of a good superhet, without rf stages in front.

Last minute note from RCA, use a tuned inductor across the 470 ohm resistor in Q1's collector. This can cut down another fraction of a dB on the noise figure by narrowing the bandwidth of that coupling circuit.

Shielding. As RCA says, "Shielding is important, if you wish to realize the benefits of these cascode compound amplifiers." Indeed it is. With so much gain, nuisance currents can be found even on the flat

copper base board used, 20.32cm wide by 10.16cm deep. After considerable trials, and not wishing to get into "brass boxes" which are a mechanical nuisance and difficult to build, (I never could make those corners come out straight!) the simple shield as in Fig. 7, does the trick. As well as reducing coupling through the air, it seems to reduce surface currents through the copper surface of the baseboard.

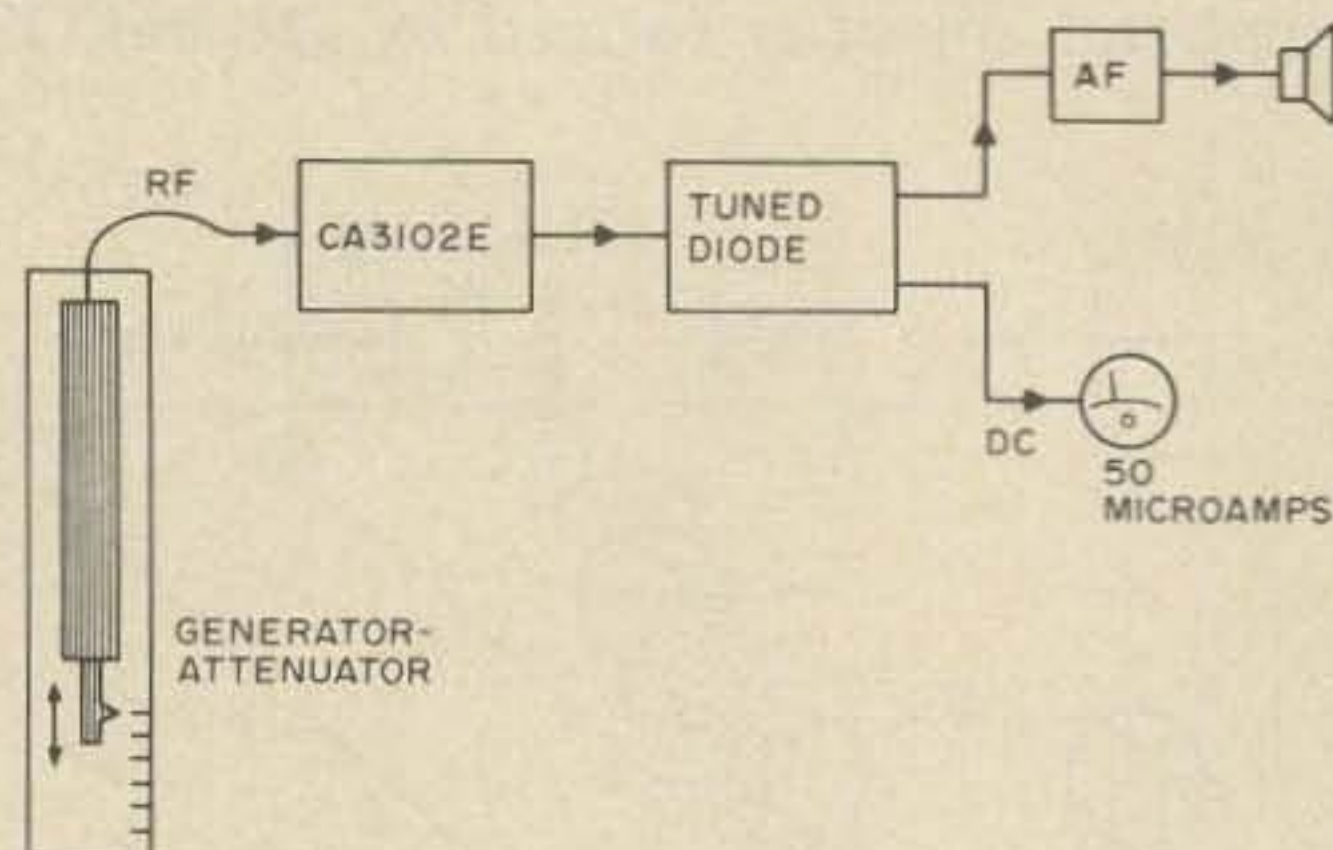


Fig. 5. Test set up, CA3102E rf stages.

Second cascode. So now we come straight into Q4, the first stage of the second cascode. Again, if you monkey with the base bias resistor R5 and R6, do it in relation to the other bias values of Q4 and Q5. R7, the emitter resistor of Q4 stabilizes well at 470, (this "stability" by the way, refers to the changing of values as you proceed with the testing), but the base bias of Q5 requires a little attention though it is not critical, using 10K to ground and 15K to the +12 volts.

The collector circuit of Q5 started to give me a lot of "static" (trouble, not noise) at first, but after eliminating the parallel tuning on L2, which caused bad 600 MHz oscillation, and going to series tuning, L2 and C3, no more 600 MHz crud. For a 50 ohm cable output, C4 will be found to do a lot of the tuning on L2, which is only natural. C3 can almost be omitted for certain "not completely matched conditions at the far end of the output cable." Better leave it in though, and bring up the match into the mixer section. When this connection to the mixer is only short, such as 2.54 or 5.08 cm you probably will have

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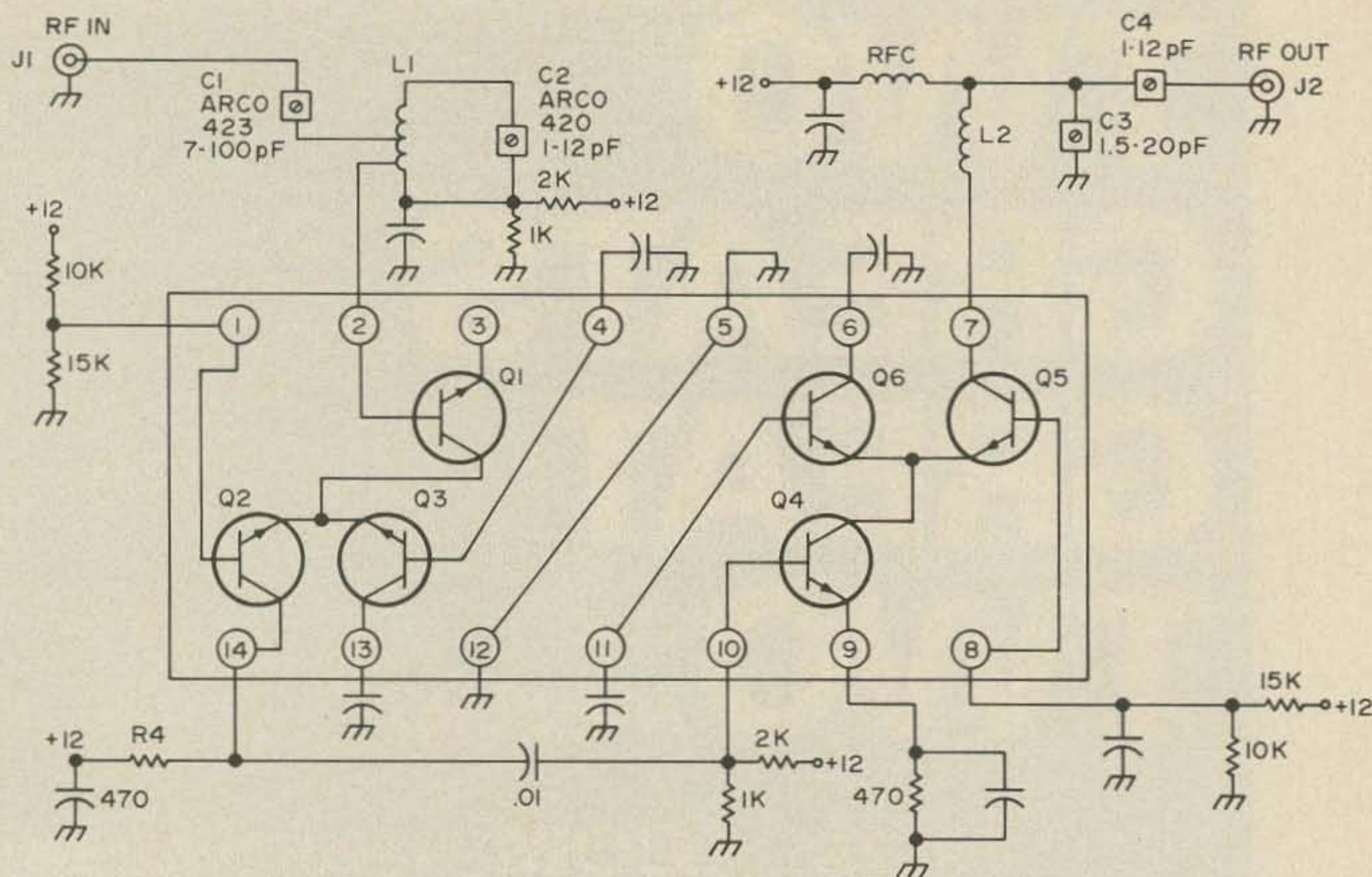
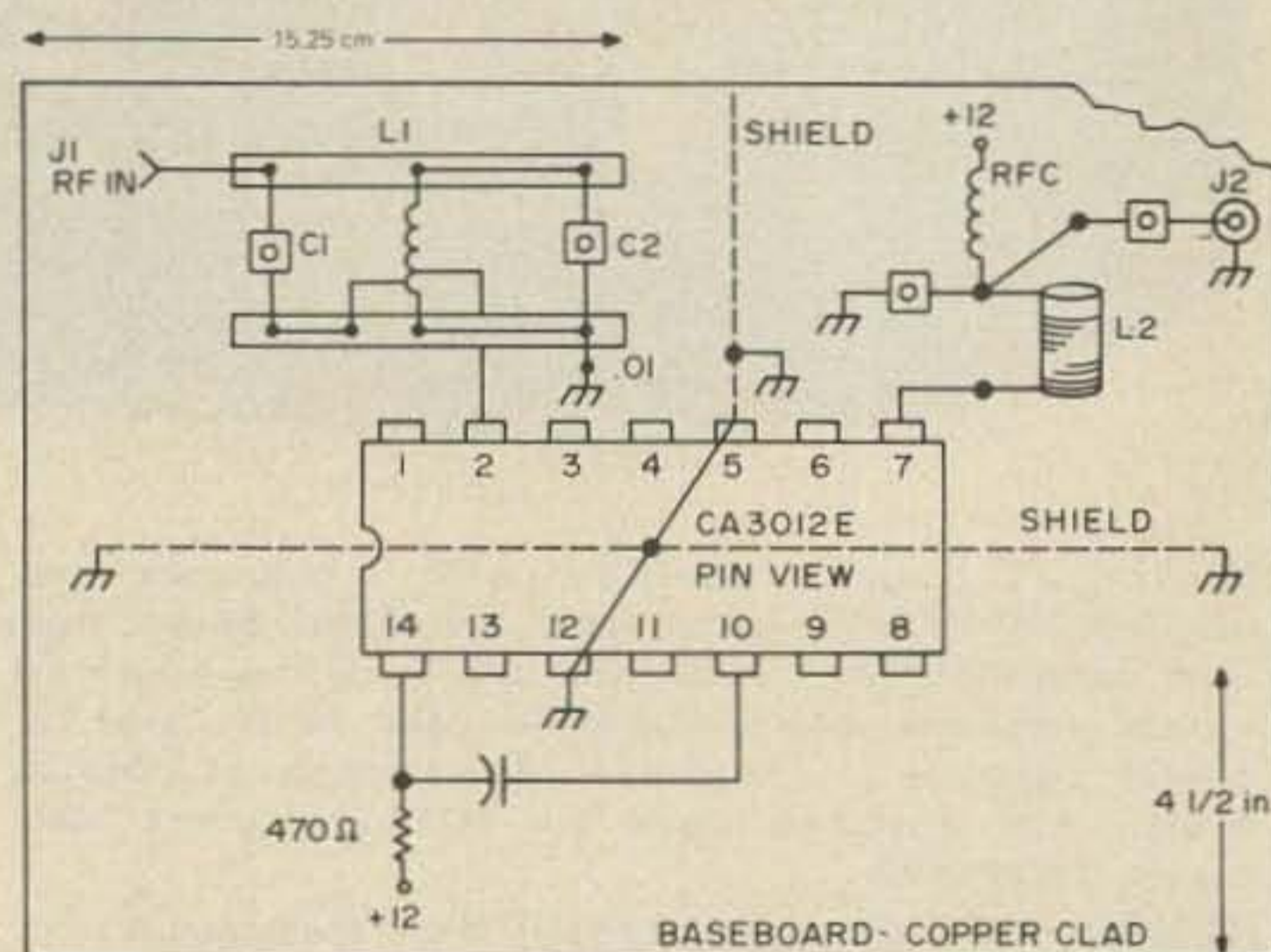


Fig. 6. rf stages for 2 meter FM using the I.C. CA3102E. L2 to resonate to 2m.

no trouble. Where you use a long cable, with perhaps a 1/8th wave or so standing on it (or in it) (such as 22.56 cm) you will have to work a little with C3 and C4. Again, the test set up of Fig. 5 will do the job for you, allowing you to measure (relative values, or even actual microvolts if you calibrate the infinite attenuator against a known "microvolter") and listen at the same time for noise, unwanted spurious, squegging, etc.

Layout and shielding. These are important for a project of this kind, but not critical. I turned the 14 pin in line package upside down and used my regular tie points made of common pins, 5.33mm O.D. hammered into 5.08mm holes in a piece of fiberglass about 3.81cm x 2.54cm wide, as in Fig. 7. Using small clean copper wire or small tinned bus, solder each lead of the CA3102E to these pins, and make all component connections to the tie pins to avoid breaking a lead on the 3102E. I ran a wire over the package from pin 5 to pin 12 and then to ground on each side. Then I also brought the shielding over the package, with a cutout, and soldered it to the wire going over from pin 5 to pin 12. Keep all those 2.5mm bypass leads very short. The average length here is a 3.18 to 4.76mm long. If you keep everything close to the package you

will find that quite a small baseboard will result, which you can easily install in an aluminum minibox, with J1 on one end and J2 on the other. Or on the same side if you are careful with possible coupling. Remember, about 40 dB gain or more between those two points.



NOTE: VERTICAL EXTENSION OF SHIELD IS 2.54 cm

Fig. 7. Layout, shielding two meter rf stages using CA3102E.

Conclusion

This little unit is one of the smoothest tuning jobs I have ever seen for 2 meter FM, especially when you consider that gain. And an IC at that! You can see where the future lies.

...K1CLL

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The converter itself features excellent sensitivity, selectivity and freedom from cross modulation. Construction is simplified both because of the requirement to cover

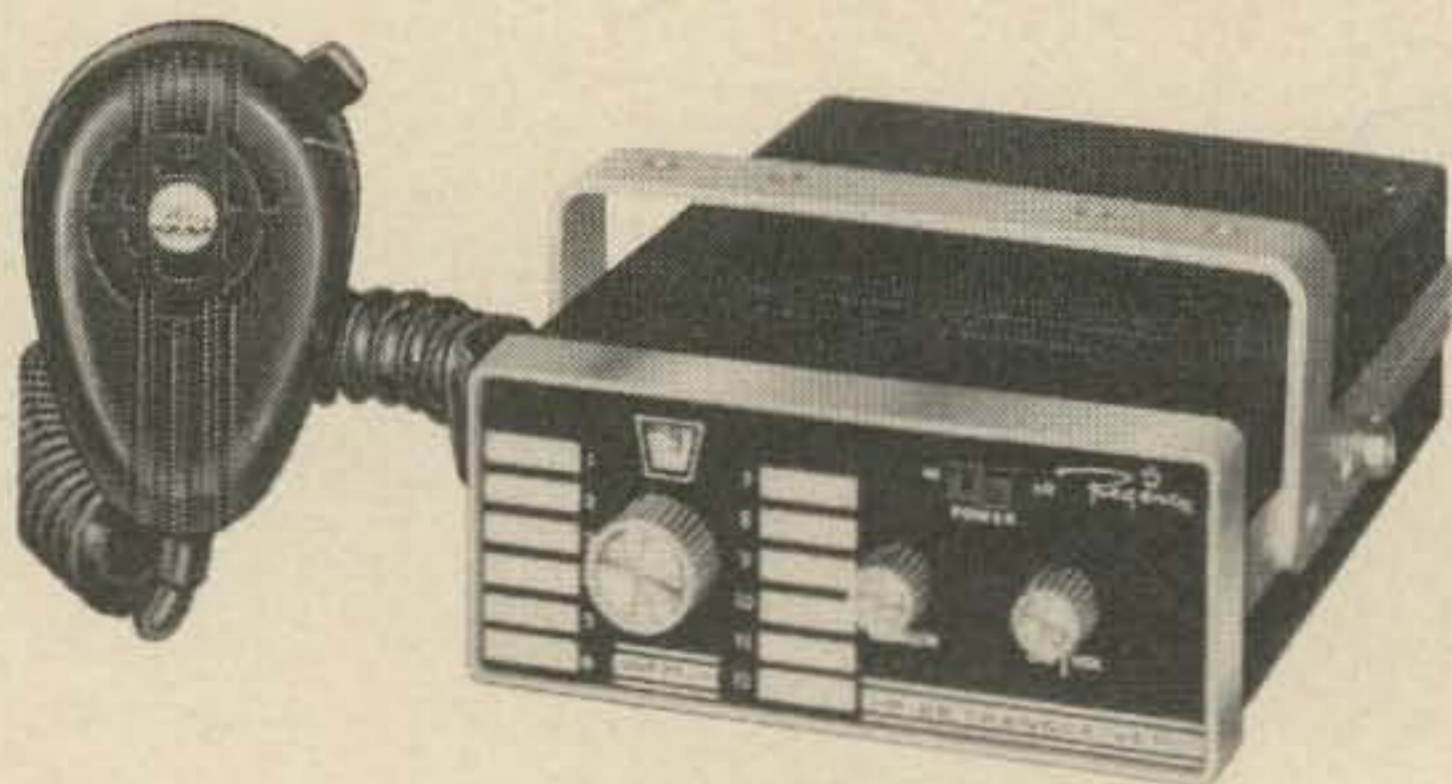
only a relatively small bandwidth and the method of construction used.

Circuitry

The circuit of the converter is shown in Fig. 2. It consists of two stages of rf amplification using JFET's in a grounded gate configuration. The JFET's are 400 MHz low-noise types but yet are not expensive (about \$1.00 each). The grounded base configuration does not provide the absolute low noise figure of a neutralized type FET amplifier but its excellent freedom from cross modulation and stability more than compensates for this on 10 meters. Its noise figure of about 2–3 dB even in the grounded gate configuration is more than one needs on 10 meters for Oscar reception (or any weak signal reception for that matter on 10 meters). The four tuned circuits provide fine selectivity and by peaking these circuits for different portions of the 100 kHz wide down-link, even performance is achieved throughout the 100 kHz range without any need for continuous tuning of the circuits. The mixer stage following the two rf stages

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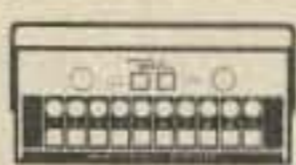
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Toothpaste in the Ham Shack

Common toothpaste is one of the most useful items you can have around the shack. It will clean, polish, and grind, it costs very little, and it is always available.

As a grinding compound it is useful in grinding crystals. When used in conjunction with a small piece of plate glass, a few drops of water and the classic figure 8's, it is easy to move a crystal upwards in frequency.

A second and more in demand use is in the cleaning and polishing of various plastics around the shack. An excellent example is found in the plastic meter faces which are now almost universal. After a few years on a workbench the average meter has developed a film and scratches which are impossible to remove with normal cleaning methods. Older rigs too are prone to this sort of deterioration; dial covers, "S" meters and the like suffer much the same fate as test equipment.

To give plastic a new lease on life wet a soft cloth, add a small amount of toothpaste and rub lightly. Use a sweeping motion and avoid concentration on any one spot. If the paste tends to smear, add a little more water. When the job meets with your approval, rinse in hot water and dry thoroughly with a soft, dry cloth.

. . .WA0ABI

is a MOSFET to continue the good cross-modulation qualities of the converter and to provide for a minimum generation of spurious mixing products. The input signal is fed to one gate of the MOSFET mixer and the local oscillator signal to the other gate. The local oscillator signal is generated by either a crystal controlled FET oscillator or by an alternative vfo using a FET. The alternate vfo circuit is shown in Fig. 2.

The frequency of the crystal used in the oscillator will, of course, depend upon the tuning range one is trying to shift the Oscar band down to. For instance, if one intends to tune the Oscar band on the 7000–7100 kHz range of an existing transceiver, one needs a 22.450 MHz injection frequency from the FET oscillator. A 11.225 MHz fundamental mode crystal would be used and the tuned circuit in the drain of the FET oscillator would be tuned to double the oscillator output to 22.450 MHz. Unless one needs exact calibration, a surplus crystal can be found at low cost which will suffice rather than ordering a new crystal. It should

be mentioned that the total Oscar down-link extends a bit more than from 29.450 MHz to 29.550 MHz. It extends 70 kHz either side of the above frequencies but at these extremes its effectiveness is down 10 dB as compared to that of the prime passband.

Since any i-f can be used, one has quite a bit of latitude when choosing a crystal frequency, at least for the initial setup of the converter. The same is true of the vfo circuit range of Fig. 2, in case one wishes to work the converter output into a fixed i-f. The vfo circuit itself does not employ any multiplication and operates at the desired injection frequency. Nonetheless it is quite stable and easy to tune as long as one takes care to make the LC circuit mechanically stable. Be sure that the two fixed capacitors in the gate circuit of the oscillator are of the silver-mica type.

The output circuit of the converter is shown only as a single tuned circuit. This selectivity is adequate since the unit the converter works into should provide the prime signal selectivity. If a very short lead is

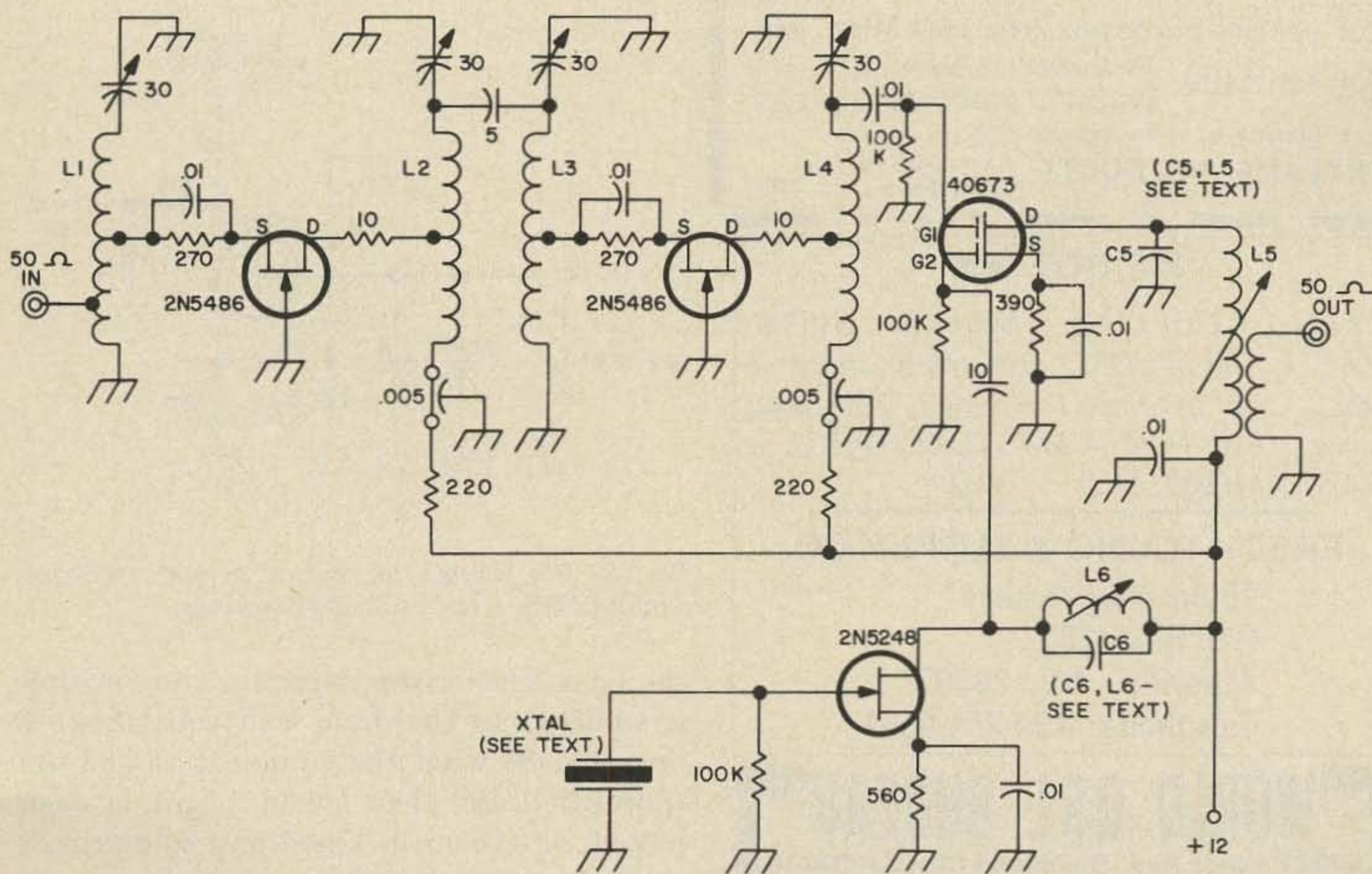


Fig. 1. Crystal controlled converter circuit. L1 through L4 = 0.9 μ H, 10 turns, 1.58 cm dia., 16 T.P.I. Tap all coils at midpoint and also tap L, 2 turns from ground end.

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used between the converter and the following unit, one can probably eliminate the tuned circuit altogether (replace it with an rf choke) as long as a tuned circuit is immediately present in the following unit.

Construction

There are very few critical points to be considered in the construction of the unit. A suggested method of construction is shown in Fig. 3, although other methods are certainly possible. The method shown utilizes a copper clad board but the board need not be etched and it is used with the copper side tuned up. The board size is about 6x14 cm. Smaller pieces of board (or copper sheeting) are used as shields between sections of the rf stages. Most of the details of construction are shown but a few points should be made.

Construction is best started with L1. One end is soldered directly to the board and the other to its associated trimmer. A small hole is drilled in the center of the first shield. The gate lead is soldered to the shield board near the hole with the shortest possible lead length. The 10Ω resistor is attached to the source lead of the transistor and centered in

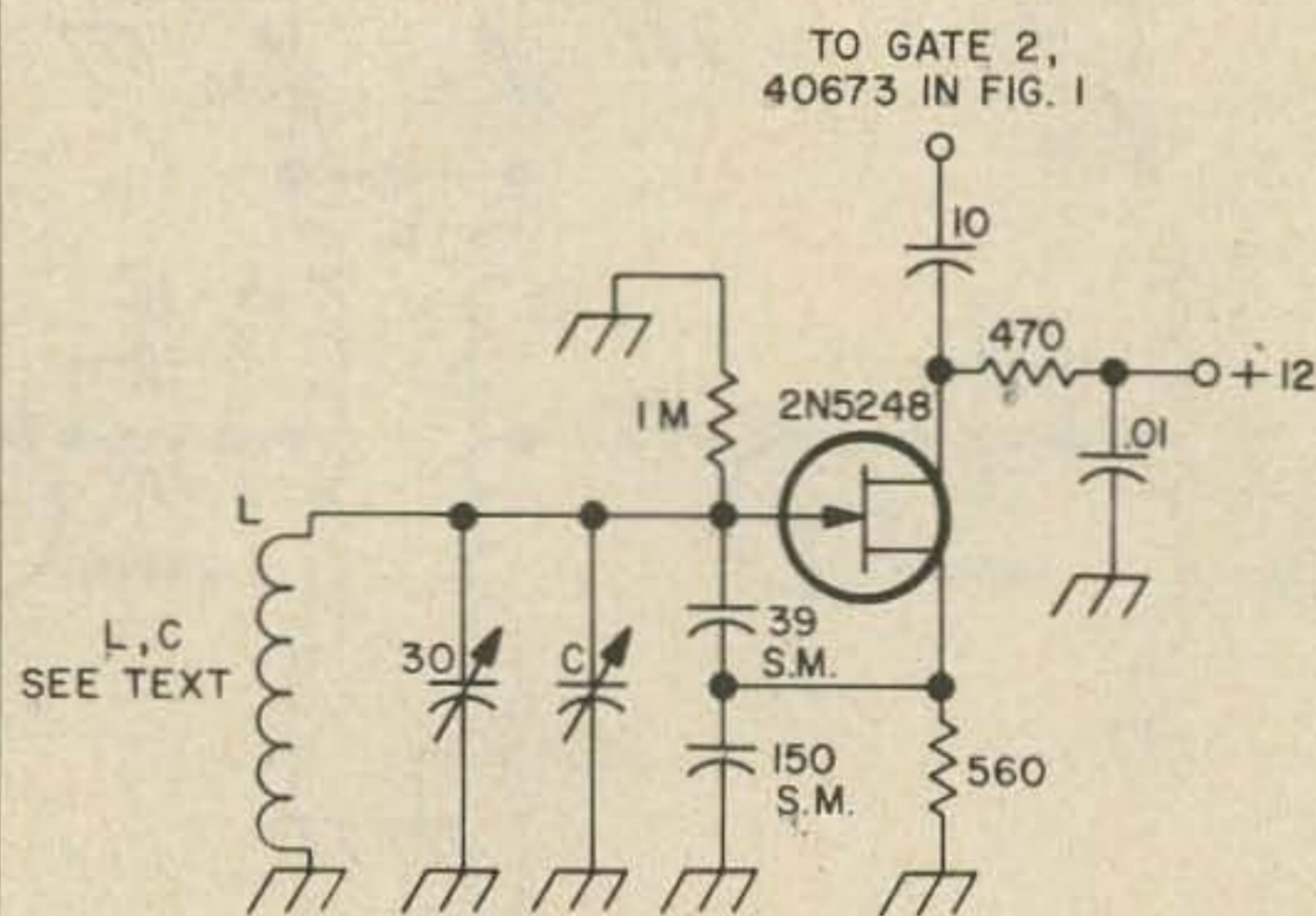


Fig. 2. Vfo circuit to replace crystal oscillator circuit of Fig. 1, for a tunable converter.

the hole. The resistor/capacitor combination is soldered to the drain lead with about 4 mm lead between the combination and the transistor case. The shield board is then placed on the main board and soldered all along its bottom edge to the main board. Connections are then made to L1. Construction is continued in a similar manner for the remaining sections. The feedthrough

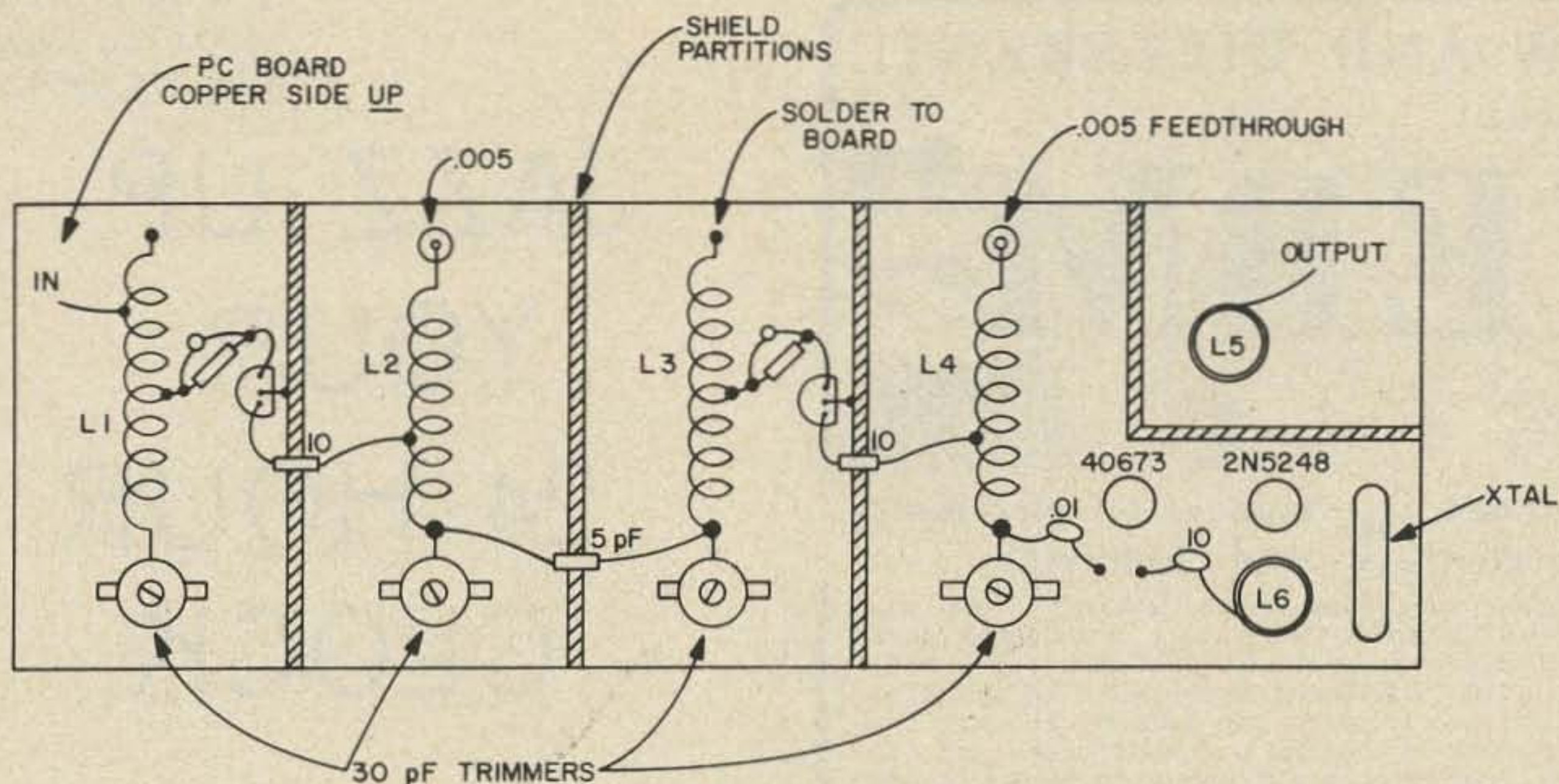


Fig. 3. Parts layout. Exact layout shown need not be followed but shields should be placed between coils shown. Remaining components, as explained in text, are places on underside of board.

capacitors at L2 and L4 are soldered to the board and the +12V connections made on the underside of the board. The mounting of the mixer and oscillator stage transistors can be done with sockets if desired. In either case, to accommodate either the leads of the transistors or pins of the sockets, a hole is drilled first just large enough to accommodate the leads or pins. The tip of a larger size drill is then used to clear enough copper away from around the sides of the hole so no danger exists of shorting to the board. Component ends which are grounded require of course only the lead hole. The components themselves are mounted on the underside of the board with the component lead ends requiring grounding brought up through to the top of the board and grounded. The whole method of construction is a bit unusual but leaves a maximum amount of copper left on the board for good shielding and grounding. Tie points underneath the board such as for the +12V line are made by miniature terminal strips mounted on the underside with regular metal hardware. The whole board can be mounted in a separate enclosure or inside an existing receiver.

Adjustments

Alternate tuned circuits in the rf amplifier stages are tuned to opposite ends of the 29.450–29.550 MHz range. That is, the L1

circuit peaked at 29,450 MHz using a signal source at this frequency, the L2 circuit peaked at 29,550 MHz etc. The tuned circuit in the drain of the crystal oscillator stage is peaked at the desired output frequency using a receiver or grid-dip meter. The circuit is then tuned sufficiently off resonance to produce from 0.5 to 0.6V across the 100K resistor at the second gate lead of the mixer MOSFET. If a variable frequency injection oscillator is used, its tuning range should first be checked using a receiver. The voltage it develops across the 100K resistor should be also 0.5–0.6V and adjusted if necessary by changing the drain load resistor in the oscillator. If one cannot measure these voltages, just make sure the oscillator stage is operating on the desired frequency. The injection voltage level can then be adjusted during actual reception for the best sounding results.

Conclusion

The converter described in conjunction with a reasonably sensitive receiver or transceiver will provide excellent reception of Oscar 10 meter signals. The old rule about the antenna still being the most important part of any receiving system still holds true, but even with a 10 meter ground plane one will be able to hear Oscar for most of the time available during each of its passes.

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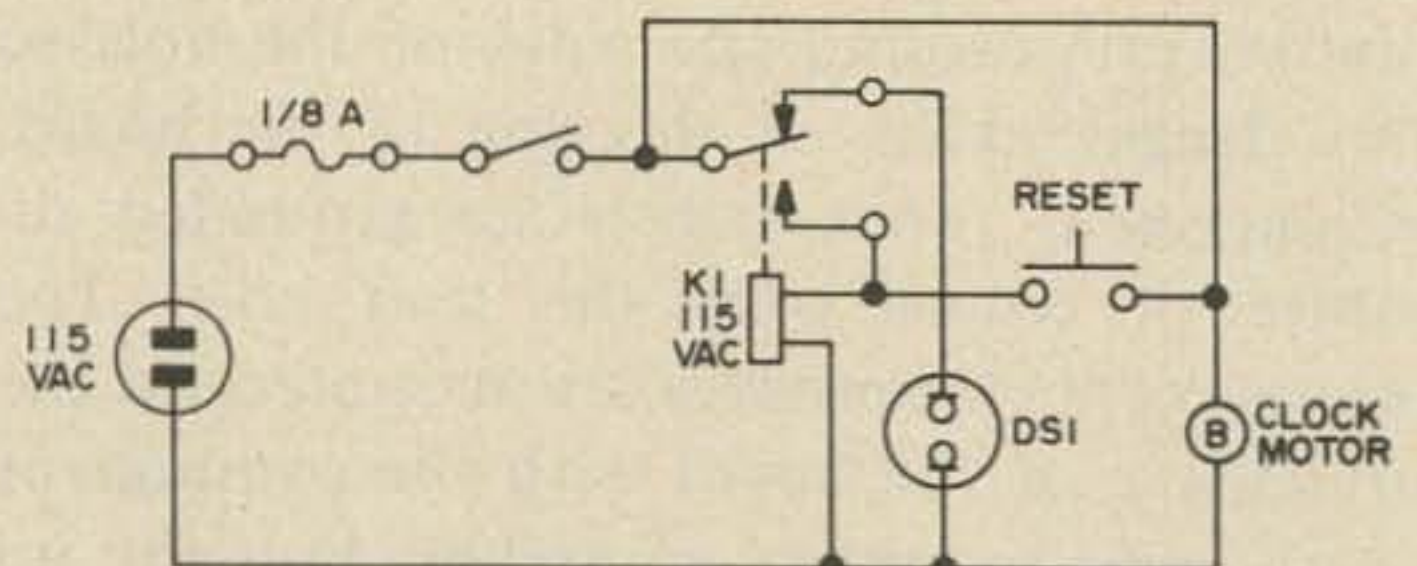


Fig. 1.

With this simple clock modification, an alarm lamp will come on any time the ac power has failed and then been restored. The lamp will remain lighted until you reset the circuit. Should you awaken some morning and see the "power fail" alarm, you'll know that a quick check with WWV is in order. Also, the rest of the family is thereby alerted to check the other clocks in the house.

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...K7KHA

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TOWARD MOBILE SECURITY

Helpful hints on how to protect your gear from the potential thief.

With the emergence of two meter FM, more and more amateurs are investing in good two meter mobile rigs. As most of us who have gone mobile know, we dislike leaving a mobile rig unattended for fear of its absence on our return. What can be done?

Being involved in automotive security, I am asked many questions as to what a person can do to add extra security to his car. One of the major problems I have encountered is that people are very reluctant to spend money on security. However, one does not always have to spend a lot of money to protect his car a little bit more.

Before going mobile one must consider three things: type of rig, type of antenna, and a suitable mounting location for each. The type of rig is independent from the view of security. The antenna, as well as the mounting locations of the rig and antenna should be considered as a security factor.

Let's consider the antenna and its mounting first. As we all know, there are many types of antennas to choose from. Each has its own points. I look at antennas under two categories, permanent and temporary mounting. Again, each has its own advan-

tage. From the viewpoint of security, there is no question as to which type of mounting is best. The temporary antenna will perform well at any point in the car, will not hurt the value of the car come trade-in time and can be moved to the XYL's car easily if yours happens to break down.

Now let's consider the type of mounting and location of your rig. The standard location for mounting is under the dashboard and it provides the driver with an easily reached unit. I have no complaints about that, but I would like you to consider these options: inside the glove compartment, under the driver's seat, inside a console, and – if you have bucket seats – how about between the two buckets. As you can easily see, there is a large selection of locations to mount your rig. I named only a few. The location is your decision. But don't forget that the easier it can be seen, the faster it will be stolen. That's where the type of mounting comes in. Just like the antennas, there is either a permanent or temporary type of mount. You're probably saying to yourself, "I've never seen a rig on the market that provides a temporary mount." You're

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probably right; to my knowledge there is not. Although many manufacturers provide a thumb wheel dismount for their rigs, I don't consider this type of mounting to be temporary. One must still disconnect all the wires leading to the rig before it can be removed.

But just because rigs are considered permanently mounted does not mean they have to be: there is a new item on the market today called the universal lock mount for car tape players. This piece of hardware will work fine for almost any mobile rig on the market today. The universal mount consists of two interlocking brackets. One bracket mounts permanently to — let's say — under the dashboard, the other bracket mounts directly onto the rig itself. When the two brackets are joined together, all electrical connections with the exception of the antenna lead are made by a pressure contact terminal strip. The cost of the unit varies depending upon the store, but is usually in the range of \$5 to \$10. It can be picked up at just about any car tape supplier, Lafayette, Radio Shack, and at many discount houses that carry automotive car radios.

Getting back to the purpose of the universal mount, it enables you to mount your rig anywhere in the car and be able to remove it with a simple press of your finger. Once the unit is removed it can be put into the trunk, brought into the house, or put into another car where it can be used again with a simple purchase of another mounting bracket and antenna.

Apart from the mobile rig and antenna, what else can one do for added security? Here are a few inexpensive ideas:

1. Remove the finger button lock on the doors and replace it with a bullet-shaped finger button. This defeats the use of a coat hanger.
2. Obtain security decals from a local alarm company. These decals should be placed on the rear window on both sides of the car.
3. Obtain a key lock used for car alarms from a local alarm company. This lock should be mounted on the front left fender in plain sight. (Don't be afraid to let them know there might be an alarm.)

One final idea to add to the security of your car would be to have an automotive alarm installed. There are many brands and models available today, so shop around and compare them all. Here are a few tips on what to look for:

1. What type of siren does it have, mechanical or electrical? (I've had better luck with mechanical.)
2. Try to choose a system with a voltage drop sensor. This type of system will give you better protection.
3. Be sure they install a security lock (round key).
4. Consider having a motion detector installed (similar to a tilt on a pinball machine).
5. Be sure you receive a written guarantee from the installing company.

Finally, security does not end with an alarm system. As a matter of fact, security is endless. Don't consider it to be a one-shot deal, it's a day-by-day practice. The more you practice it, the safer you'll be.

One closing thought: The best security in the world is to have nothing to steal.

...WAIJOS

Scott Baxter WA4BXI
111 Acklen Park Drive
Nashville TN 37203

IMPROVING THE PEARCE-SIMPSON GLADDING - 25 AND BIMINI-VHF

Pearce-Simpson, long well-known in communications gear, has recently introduced a VHF-FM transceiver which it supplies in two versions (the Amateur Gladding-25 and the Marine Bimini-VHF). The marine model is FCC type-accepted, and the amateur version is virtually identical. Features of both units include 25 watt/1 watt switch-selected power output, sensitivity typically $0.22 \mu\text{V}$ for 12 dB SINAD quieting, and squelch adjustable from "open" through clean thresholds of 0.1 to $1.0 \mu\text{V}$ "full tight." Selectivity is ± 7.5 kHz at the edges of the sharp crystal filter, ideal for amateur "compromise" deviation or strict narrow band systems. Present production Gladding-25's feature a concentric 6 channel independent transmit/receive crystal switch. (The concentric switch is available free for Gladdings now in the field and can be added to a Bimini for \$8.50).

The Gladding-25 is furnished with a palm PTT microphone, while the Bimini-VHF comes with a handset. Prices of the units compete with the cheapest "amateur" products, including the imports. The amazing fact is that the gear is type-accepted, and it performs. Service is easy too, because you don't see plug-in transistors, all-Motorola and RCA transistors and ICs, and fiberglass boards in the imported sets. Because the Bimini-VHF appeared first in this area,

several of them were already converted to two meters by the time the Gladding-25 was in town. Dealer cost is about \$160 for the Bimini-VHF with no crystals, and about \$180 for the Gladding with 4 crystals of the buyer's choice.

Additional crystals from Pearce-Simpson are \$4.50 each, although you may wait up to six weeks for unusual frequencies. International can deliver quickly, but at \$9.25 transmit/\$11.25 receive.

Like most new products, these sets have a few minor bugs. If you decide to buy one, you will want to check it against the following information. Some of these changes are now being incorporated into new units at the factory, while some are original with the writer. Sets from dealer's shelves may or may not contain any of the following. In over a dozen of the sets, no problems were experienced after these changes were made.

Converting A Bimini-VHF To Two Meters

In the event you have a Bimini, you can easily convert it to two meters. It should be mentioned that this is not preferable to buying a new Gladding, but many amateurs did not expect an amateur version so soon and a number of Biminis are now in amateur hands. The conversion introduces no special problems and performance is about equiva-

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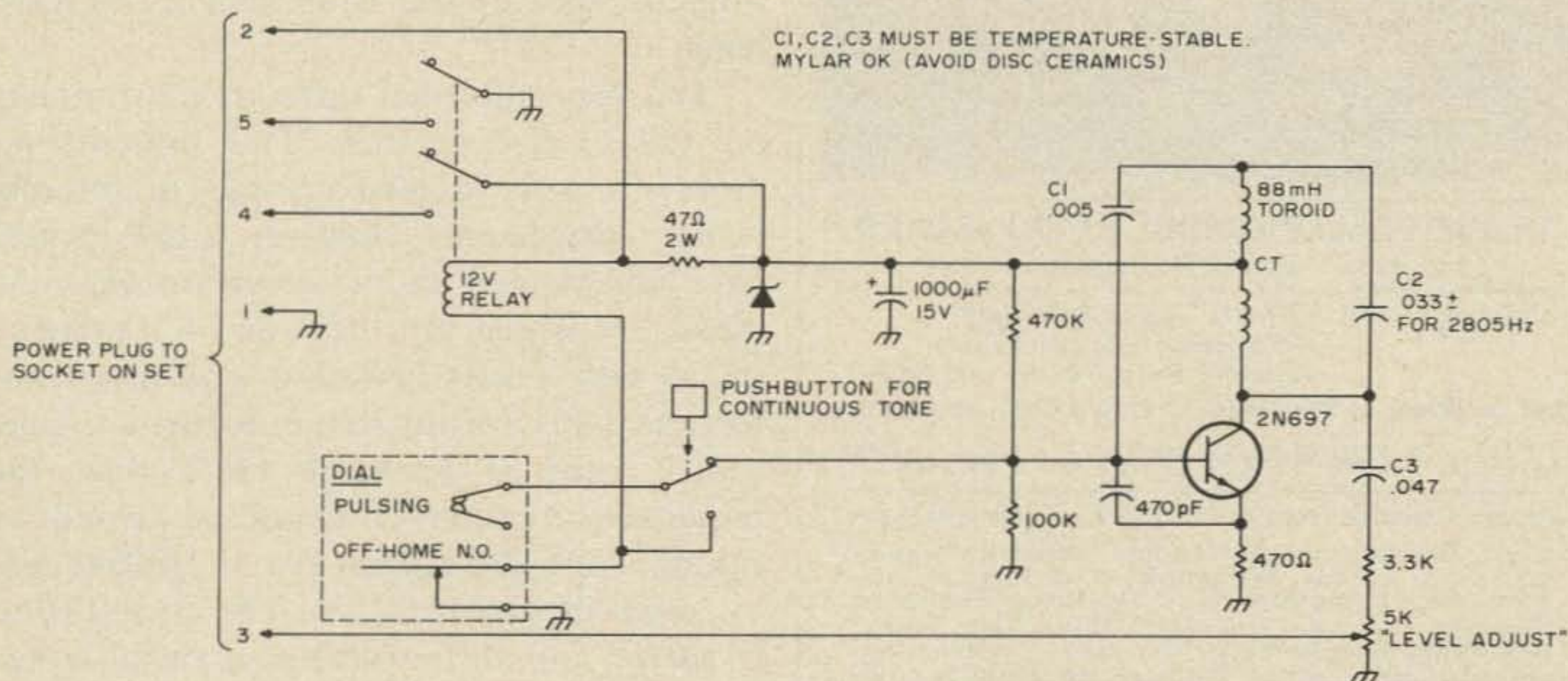


Fig. 1. 2805 Hz on-pulsing encoder.

lent to the Gladding, but the warranty remains an open question.

Conversion consists of disabling the receiver split-tuning circuit by removing R229 and tying together all the front wafer contacts of the channel switch. L201, L202, L203, L204 and L206 are then tuned for best quieting. In most sets, no padding is required. However, an extra picofarad can be added across any of the coils which fail to tune before hitting bottom.

A single crystal can be used on more than one channel in the Bimini (or a Gladding with the old switch), provided the paralleled rear lugs are bent away from the shorting ring on the affected wafer of the channel switch. For a transmit crystal, the trimmer capacitors of all but one of the paralleled switch positions should be disconnected.

Improving Receiver Sensitivity

For full sensitivity of about $0.22 \mu\text{V}$, check the value of R209. In early units this resistor was 15K. Best sensitivity occurs when this is changed to 3.9K. Paralleling a 5.6K across the 15K will serve nicely for the earlier version. A 1/4 watt resistor is satisfactory.

Audio Distortion in The Transmitter

The microphone amplifier, Q501, tends to saturate above room temperature. Change

the emitter resistor R504 from 22Ω 1/4 watt to 30Ω 1/2 watt.

Because the basic audio circuit was developed for mike-shy boat owners, the average amateur's hearty and robust tones are likely to cause excessive clipping. In most sets I have seen the mike amplifier itself driven to clipping at moderate audio levels. Change the mike series resistor R101, located between terminal strips on the bottom of the set, from 470Ω to 2000Ω . Your friends will thank you. After these changes the audio will probably receive compliments; the frequency response of the total system is ideal for reliable communications through noisy FM channels.

Pilot Lamp

Paralleling 33Ω (1 watt) across the lamp will increase the life. There's a difference between 12V and the 13.6 in most automobiles.

Receiver Oscillator

By far the most frustrating problem in the receiver is the first oscillator. After a transmission or two, the rig's internal temperature rises slightly and the oscillator quits. This development had almost eliminated longwinded QSOs on the local repeaters before the problem was found. Although the condition can be aggravated by cheap crystals, it is due primarily to changes with



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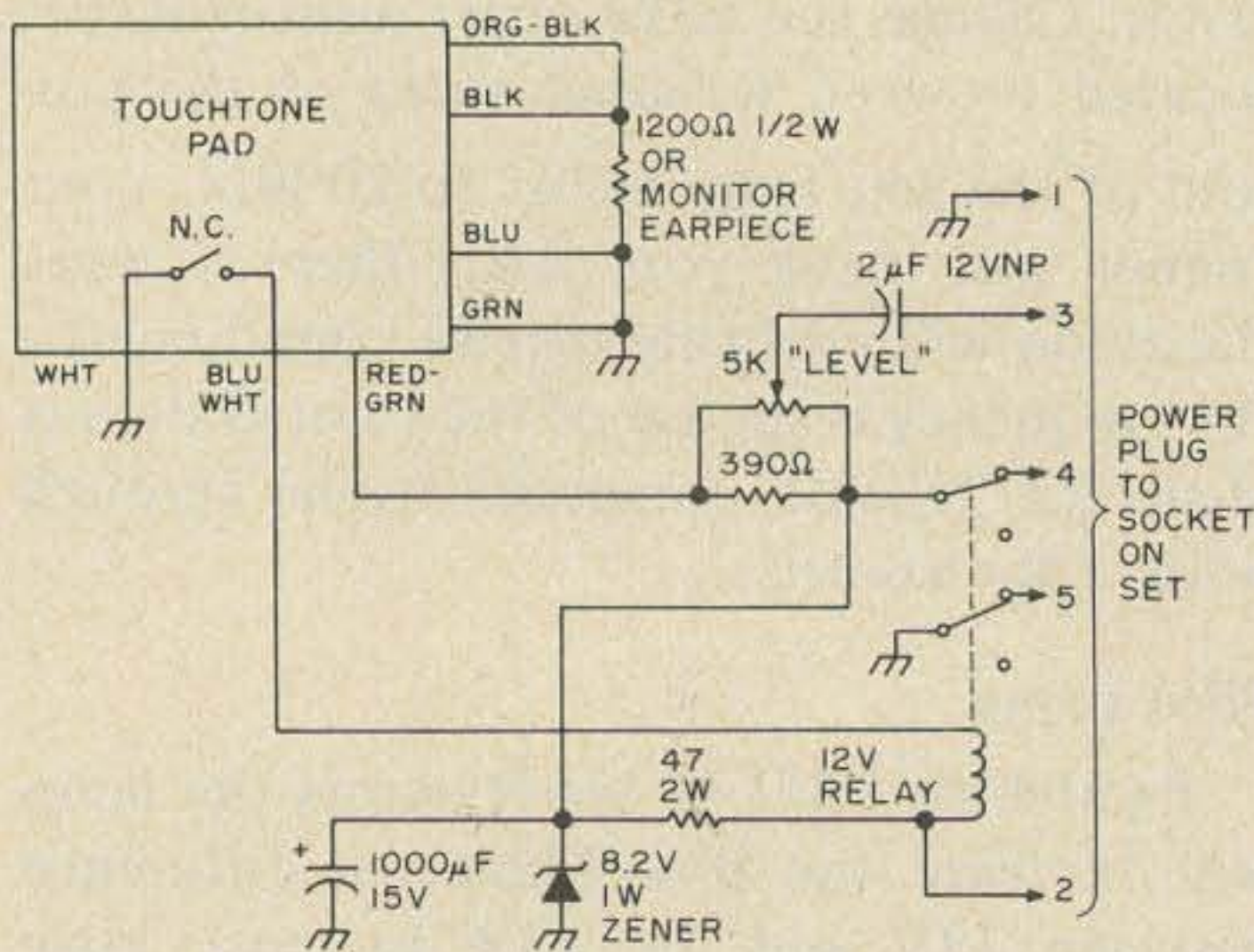


Fig. 2. Touch-Tone encoder.

temperature in the value of R222 and R223. The little 1/4 watt resistors have adequate dissipation but their tolerances under ambient variations are very poor. Replace the two with 1/2 watt 5% units of the same value and leave 1/4" leads above the board. Solder lightly and quickly. Check C226; if yours is .001 μ F, change to .003 μ F. This increases the drive slightly and can make a real difference, especially if your crystals do

not quite make the manufacturer's specifications of 40Ω or less equivalent series resistance.

You may note that there are no trimmers on the receive crystals. This presents no problems with original crystals or International replacements. However, a few owners have complained about distortion on some signals. Provided you have an on frequency signal with 5 kHz deviation, you may want to tune T401 for minimum distortion. One-fourth turn is probably more than the required correction. Of course no amount of tuning T401 can correct for an off frequency signal or overdeviation. The crystal filter is sharp, and if the incoming signal is not reasonably close to its center frequency, you can expect distortion just as you would with a brand new MICOR.

Encoder Operation

Encoder use is made more complicated by the requirement that the mike, handset, or encoder directly switches the receiver/exciter B+ voltage. There is no adverse effect in leaving the receiver voltage on during encoder transmission, so the encoder need only provide an extra contact closure to perform all keying functions. Connections for the excellent encoder circuits which follow can be made through the existing rear-chassis connector. Because the W4AY autopatch uses 2805 Hz "on-pulsing" instead of the Secode or "interrupter" type, the tone encoder shown is for that system. The dial pulsing contacts could, of course, be used differently to produce the other system. The Touch-Tone circuit shown has also been used extensively on W4AY, with excellent results.

The following internal connections must be made in the rig to permit encoder operation:

Attach a 5.6K resistor to the junction of R510 and R511 on the exciter board. Run a wire from the free end of this resistor to pin 3 of the power connector.

Run a wire from the yellow mike/handset lead to the power connector pin 4.

Run a wire from the red handset lead to power connector pin 5. This completes the required changes in the set.

...WA4BXI

Henry B. Ruh WB8HEE
140 Ash
Whitmore Lake, MI 49189

PUTTING YOURSELF ON TV

Many of us who are on A5 (wide band TV) on 450, 1296 etc., often have a desire to put some of our goodies over the YL's TV, as well as our own. Usually most YL's object to the OM "messing around" with THEIR TV. A sure-fire way to encourage her to be less obstinate is to put her mug shot over the walnut knothole, and surprise the kids (hey look at mommy!).

ATV Research has a little device at a ridiculously low price which can be put together in a few minutes time, and provide enough RF on a desired TV channel to please everyone in the house. Their PIXEVERTER (From ATV, 13th & Broadway, Dakota City, Neb. 68731, for \$6.95 & shipping) is a small modulated oscillator using a single transistor and a pc board coil to generate a small signal which can be adjusted to any channel from 2 to 6. A few changes in their basic circuit help the unit in flexibility and performance. The kit as arrived here was complete and needed only a small power source (6 volts at a few mA) to fire it up. Video is ac coupled through an electrolytic capacitor to avoid any dc voltage problems, making it an ideal general purpose generator. It was found that it was able to modulate a video signal with 1.5 MHz as top frequency response. Since the circuit is very non-critical, it is easy to experiment to try to improve on the basic design. First, to improve low frequency response (like sync signals) replace the 10 μ F video input capacitor with a 100 to 250 μ F unit. To improve high frequency response, put a 5 to 10 pF capacitor between the input of the coil and the output tap. This is a small area of foil near the coil and has 1.5 pF coupling for the rf out. Increasing this coupling provides better output, better frequency response, and appears to help

stability which is already quite good. A 2.7k resistor between the collector and ground also helps frequency response without appreciable loss of output. Better response can be had with lower output by going to a 1.8k resistor, but for most applications, the change is adequate with the 2.7k. Care must be taken for if you go to low, you will overload the output and the unit will not oscillate.

Depending on the characteristics of each transistor, the 15K bias resistor may have to be changed to 18K or 22K to prevent sync compression (low sync but normal video). The supply voltage should be stable and 6 volts seems optimum. Less voltage and the unit won't oscillate, and more voltage tends to produce white compression (lack of detail in bright areas).

If you replace the 10 μ F disc capacitor between base and collector with an erie 9-20 pF or similar small trimmer disc (like those used to net rocks in FM rigs) you can "net" the frequency after you find the approximate spot on the coil tap. It helps if you put in the fixed unit first, run the wire around the coil until you find the spot to produce a signal in an unused channel of your tv, then replace the 10 μ F with the trimmer, and while watching the pix on the tv, adjust the cap for best signal.

In the photo you can see where I mounted the coupling capacitor and padding resistor on the foil side of the board. There are spots in the foil where you could drill through and mount the parts from the component side if you like, but it's not critical. You will also note a pot in one corner. This is used to adjust the video input since I use it with several sources of varying voltage level. It's most happy with a video signal of .5 to 5 volts, but with a pot, you can use most any signal to be had.

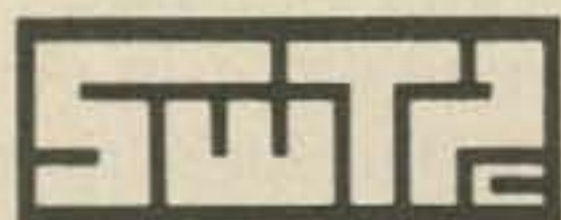
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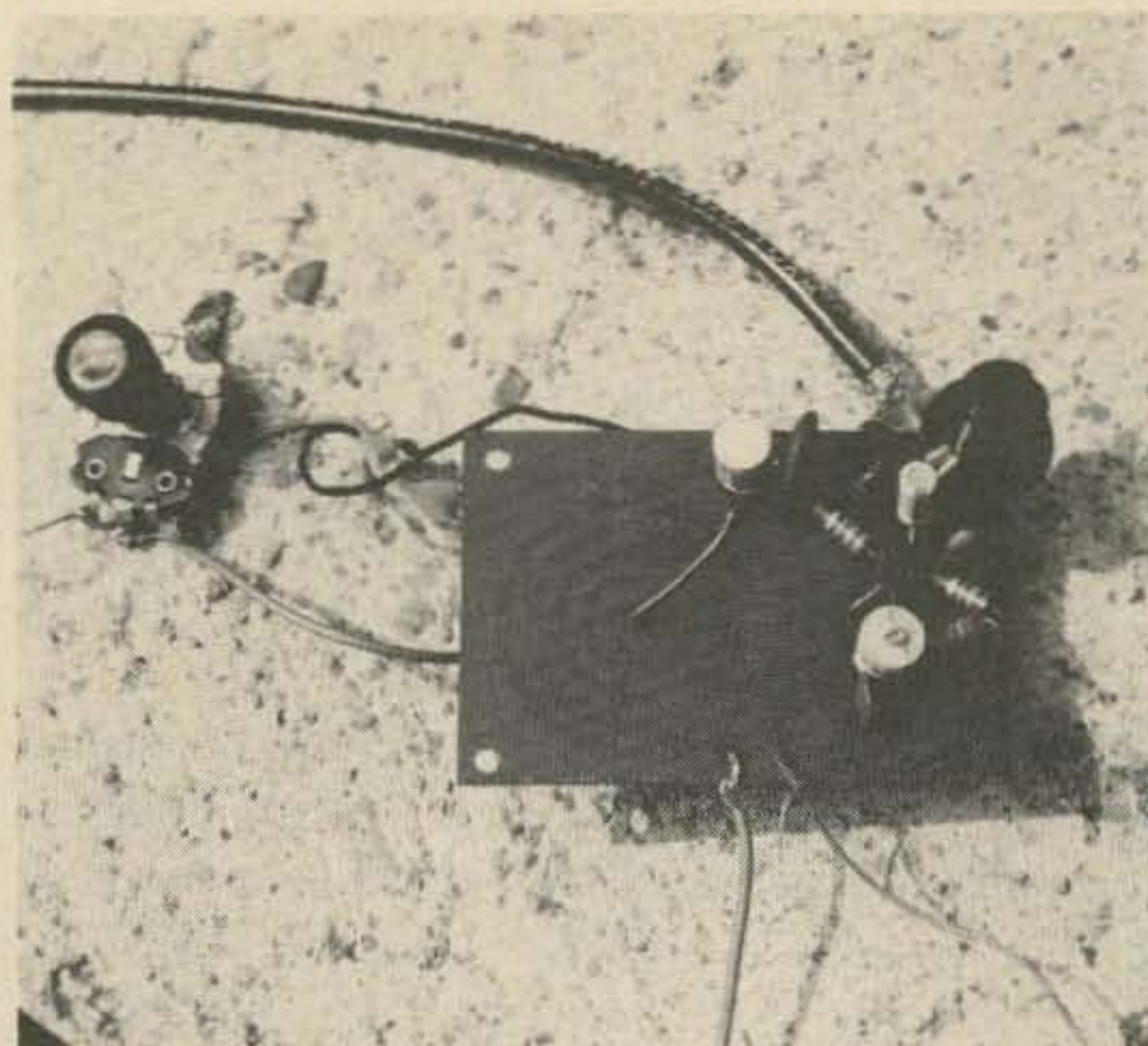


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ATV Reaserch "pixi-verter" modified with trimmer capacitor level control, upper right. Voltage control on left

I run my video tape recorders playing into the PIXI-VERTER into my Heathkit Color TV, which won't accept a video signal since it pulls sync from the i-f tube and video from the output side of the transformer which makes it somewhat less than useful for reproducing a video tape playback. The rf unit is clipped leaded to the antenna terminals in back.

Hooking the little device to the roof top antenna produced a good signal in the neighbors TV sets, which helps to drive the drabs up the wall when they dial past a "vacant" channel to see a clear "Sonny and Cher" program on the wrong night, without commercials and no sound. (I use my stereo for the audio.)

If you feel like being nice, you can add an ATV Research audio subcarrier generator (\$18.95 and easy to build in an hour or so) and provide audio in the appropriate relationship (4.5MHz removed from the video carrier) and go wireless completely.*

Besides putting yourself and family on TV, its a lot of fun to put a camera in hiding and casually dial the TV to the signal when there are visitors and catch the comments as they notice that they are on TV! There are more serious applications of course, but it can be a lot of fun too.

... WB8HEE

* Available from ATV Research for \$18.95.

Jon Matthews WBØ FKZ
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Sioux Falls SD 57105

CATCHING THAT TWO METER STREAKER

The author in disguise.



The public service record of 2m FMs brief history has been rather outstanding — lives have been saved, pizzas have been ordered, ideas on deciphering tax laws have been exchanged, and dozens of new jobs have been created in Washington for out of work cryptographers because of someone's intense love for creating repeater regulations in the form of crossword puzzles.

But all of these heroic and patriotic deeds fall flat on their face like QRP to a 2K-4 when compared to a recent but little known incident involving a college FM repeater club

faced with having to net the biggest catch in the history of ham radio — a 2m stalker. And believe it or not, he was running barefoot!

It was a beautiful spring evening with the sun slowly scanning the lower half of our ham club's 20m beer can verticle when we first received word that our college President desired a "word" with us. Needless to say, the eight of us in the club were highly worried about the meeting, because a "word" usually meant 20 to 30 minutes of non-stop QRM of an S9 nature, which not

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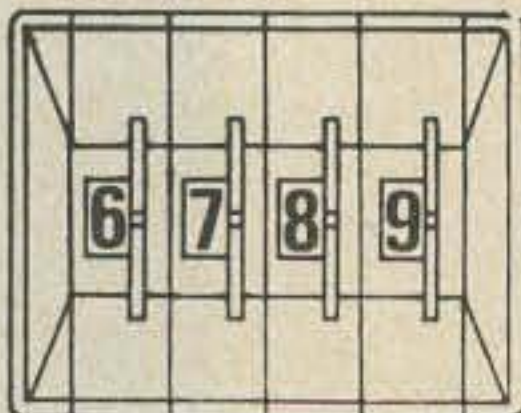
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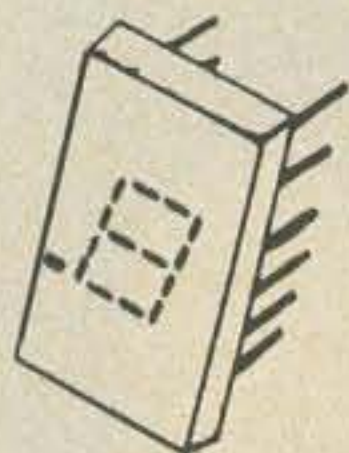
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only insulted our puritan amateur upbringings, but also had a tendency to dim our hopes for sneaking through that new HR-2B as a much-needed "replacement" for our broken dictating machine.

"It could be that he just wants to congratulate us for traffic control during the homecoming parade," said George, the group's president and resident hieroglyphs/regulations expert.

We all hopefully agreed, taking worried swigs out of our beer cans and busily conjuring up excuses for any misdeeds that we might be charged with — unjustly, of course.

The college President looked downright ill, his green face slightly resembling the average American's around income tax time.

"Sit down boys," he muttered in a one by one signal, "I've got a little problem that perhaps you can help me with."

"You're aware of course," the grim looking President continued, "that the ungodly art of streaking is becoming more and more of a major pastime on campuses across the nation. So far we've been lucky on this campus, mainly because most students are occupied with worthwhile pastimes, like you CB radio for instance..."

Now it was our turn to get ill.

"But, as of this evening," our President continued, "my office has been informed that certain subversive elements on this campus are planning the worst of all possible deeds — **THEY'RE GOING TO STREAK THE MOTHER-DAUGHTER BANQUET!!!**"

The President shuddered, his bald head glowing with the most acute resemblance to an overloaded LED readout. We thought he was going to keel over right on the spot, so we hurriedly assured him that we would do our best to stop this planned SSB (suddenly streaked banquet) with images of a Heath gear dancing in our eyes.

Outside of our patriotic club duty to continue building that new 160m relay link verticle (come on now!), we spent every minute of our spare time during the next few days checking and re-checking our equipment and income tax forms, polishing our Standards, and preparing a master plan which we hoped would lay bare the facts

about the stalker plot before some 700 odd unsuspecting mothers got permanently squelched from heart attacks.

Genius George, in between cooking hot dogs in the final of his new 440 linear, managed to persuade a fellow stalker to rat on the guy who had plans for the banquet. All George did was merely promise the stoolie a nation-wide special on SSTV, providing that he streaked in slow motion. It was an easy matter for George to convince the prospective banquet stalker to wear a 2m rig and a ni-cad pack for decoration in addition to the traditional ski mask and tennis shoes. So it was an easy matter to keep track of his every movement through triangulation, and the rig got plenty of ventilation from streak to streak.

Needless to say, the stalker wasn't a licensed ham, but we easily got a couple co-ed members of our club to run along beside the "mobile station" and shout an ID into the mike every so often. They really didn't mind the effort, in the true amateur tradition.

They sold an awful lot more tickets to the Mother-Daughter banquet than they ever have before, or probably ever will, because word had gotten around that the event could become an SSB. That was the most alert audience listening to a boring after-dinner speech that you've ever seen (the topic was prevention of the common cold). Heck, we even had the event patched into the college's closed-circuit TV system, but chickened out at the last minute because our anti-stalker measures might fail and make some unsuspecting faculty member swallow his pipe.

Sure enough, just as the banquet speech was concluding, up the dining hall stairs into the banquet room came the FM toting stalker, running at full blast with the greatest of ease. But just as he reached the top of the stairs, word was passed through our trusty repeater, and George closed a relay that let go of the end of a "cocked" mobile 10m whip antenna. The poor stalker got it right on the back side of his beam, and he forgot all about the banquet, to this day never trusting a ham with the naked truth about anything, much less his rear panel.

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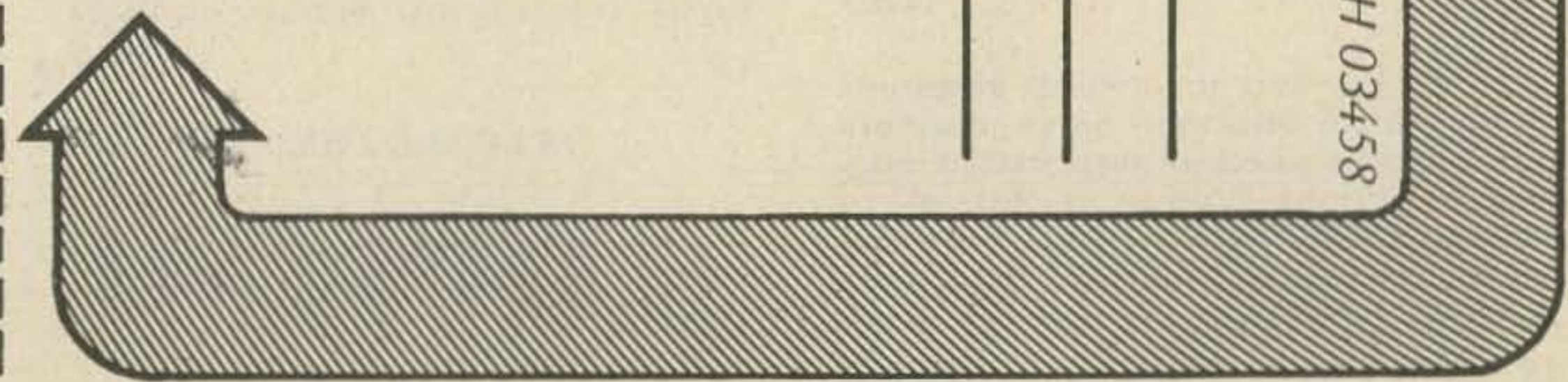
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73 Magazine, Peterborough NH 03458

the Stuff



73

DUZZII

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- An open forum for you in our letters to the editor column. Here you can sound off on your likes and dislikes (about us or anyone else). We publish both sides.
- Wayne's Editorials – never boring, sometimes controversial. They're a great conversation starter at ham clubs and on the air.
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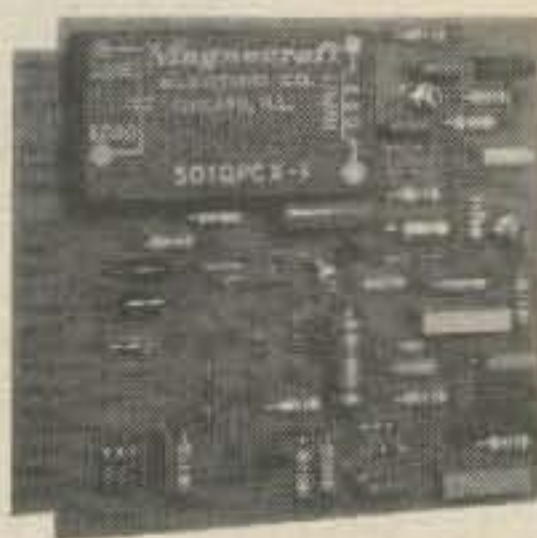
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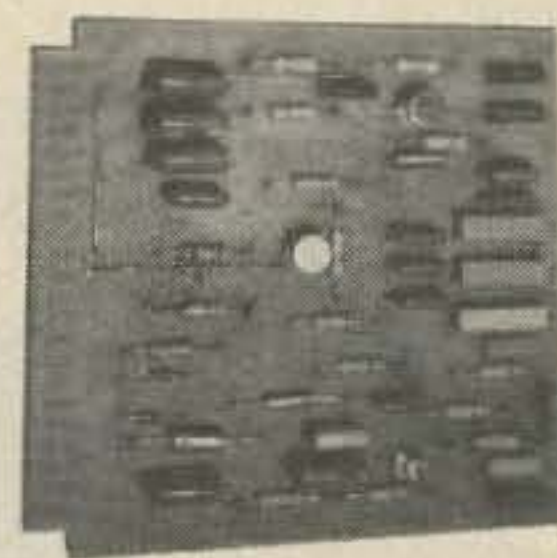


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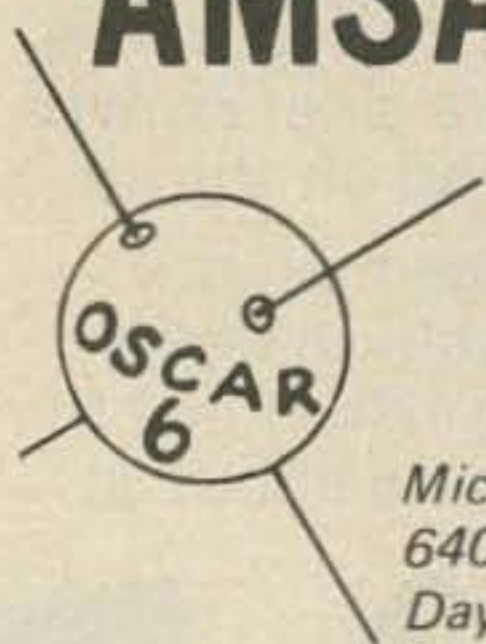
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AMSAT

NEWS



Michael Frye WB8LBP
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Dayton OH 45429

Launch of OSCAR 7 is still eminent, watch the 73 HOTLINE for up to the minute details.

The following is from the summary sheet on OSCAR 6. Presented at the IEE international conference held in New York on March 28, 1974.

In its first year and a half of operation, successful use of OSCAR 6 by 2000 amateur radio operators in some 75 countries and all 50 US states had been reported. Approximately 60% of the users have been outside the United States, including approximately 130 stations throughout the East European countries.

Operational Results

To date, New Zealand, Australia, Finland, France, Sweden and Czechoslovakia all have one percent or more of their amateur population using OSCAR 6 for two-way communications. In addition to these countries,

West Germany, England, Japan, Canada, Italy, the United States, U.S.S.R. and Argentina each have 20 or more radio amateurs using the satellite. Together, these fourteen countries represent about 85% of the total user population, which numbers approximately 2,000 stations. For countries such as Angola, Austria, Bermuda, Iceland, Ireland and several others, OSCAR 6 has provided the first, and so far only, means for direct communications via satellite.

Amateur Satellite Education Program

The lifetime longevity of OSCAR 6 has made it possible to plan educational instruction programs with the satellite, using the spacecraft as a laboratory tool to demonstrate physical principles and bring the student firsthand experience with satellite applications. With the assistance of the American Radio Relay League curriculum source material has been prepared by educators, showing teachers how to set up inexpensive OSCAR ground terminals in their classrooms and how to use them to teach their students space-age concepts such as Doppler measurement, orbit plotting, determining orbital period, communications range, and decoding and interpreting telemetry data.

ORBITAL INFORMATION

Orbit	Date (May)	Time (GMT)	Longitude of Eq. Crossing °W
7042	1	0101.3	63.1
7054	2	0001.2	48.1
7067	3	0056.2	61.8
7080	4	0151.1	75.5
7092	5	0051.0	60.5
7105	6	0146.0	74.3
7117	7	0045.9	59.2
7130	8	0140.8	73.0
7142	9	0040.8	58.0
7155	10	0135.7	71.7
7167	11	0035.6	56.7
7180	12	0130.6	70.4
7192	13	0030.5	55.4
7205	14	0125.4	69.1
7217	15	0025.4	54.1
7230	16	0120.3	67.8
7242	17	0020.2	52.8
7255	18	0115.1	66.6
7267	19	0015.1	51.5
7280	20	0110.0	65.3
7292	21	0009.9	50.3
7305	22	0104.9	64.0
7317	23	0004.8	49.0
7330	24	0059.7	62.7
7343	25	0154.7	76.5
7355	26	0054.6	61.4
7368	27	0149.5	75.2
7380	28	0049.5	60.2
7393	29	0144.4	73.9
7405	30	0044.3	58.9
7418	31	0139.3	72.6

WB8LBP

Con't, from page 3.

intention of honoring this law, feeling that they are a law unto themselves. When it takes a court order to even see an IRS telephone book, then something is rotten.

And something is very, very rotten.

Fear of 73!

A letter from a reader in Phoenix tells me about some of the members of his club who are seemingly afraid to read 73 — afraid to let anyone know they read 73 — and in general up tight about the whole matter.

Wow!

He tells about a recent time when someone brought in some back issues of 73 to give away at a meeting and several of the members were so surreptitious in their interest in 73 that one might think it was banned literature.

This situation does exist in some places I guess — but it's sad to hear about it. Obviously it isn't the myriad of construction articles or the advertising that has so frightened these amateurs — it obviously has been my editorials. Fantastic!

Imagine it — I am able to write editorials that make people actually afraid to pick up the magazine. I might even feel proud of this if I had a better inkling of what things I've written about that have brought this

on? Normally I would expect the mail to give me a good indication of such a violent reader response, but the fact is that letters and notes from the readers have been quite positive in backing my editorial stands. This in itself is unusual, for normally the people who get mad are the first to write and compliments are few and far between.

The fact is that I have often asked readers to take the time to sit down and put their ideas on paper and send them in. I believe that amateur radio needs one forum for ideas. . . and I think that 73 is the *only* such forum we have. The only reason that my ideas have been prominent is because there has been such a dearth of any other ideas. If anyone has any ideas or opinions, they have been pretty close with them.

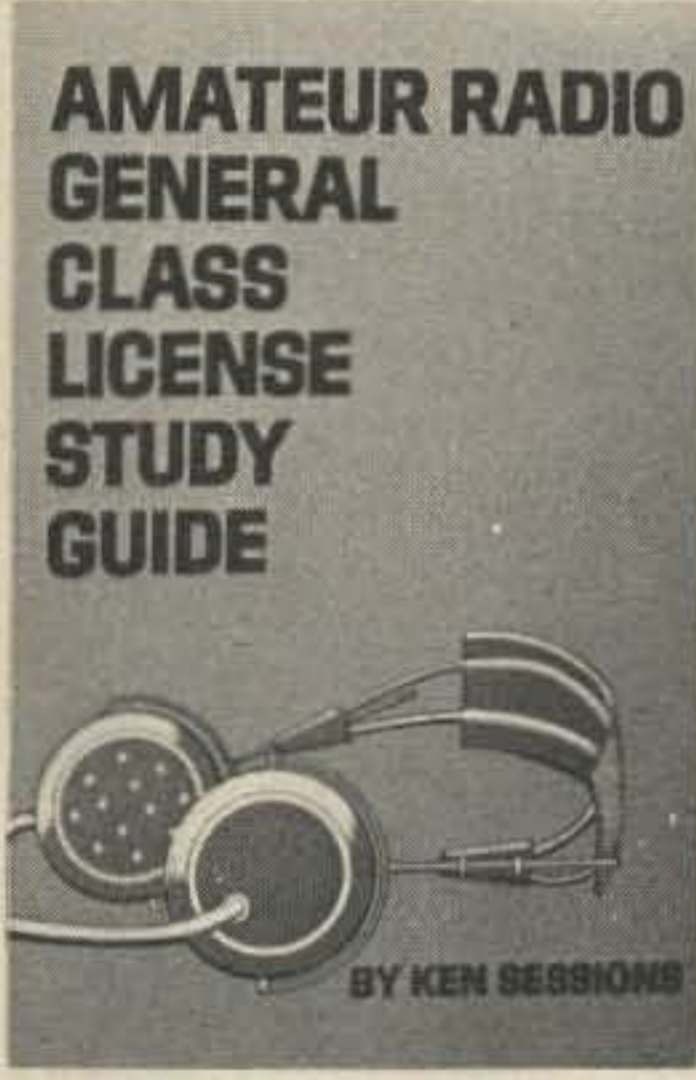
Perhaps I should qualify that a mite, for there are some sources of strong opinions within the hobby, but they are characterized by rhetoric rather than substance, and are not very productive. I realize that I have an advantage over most amateurs in that I am so immersed in the hobby that I am able to get involved more than just about anyone else. Few amateurs have been able to go on DXpeditions — run up a substantial loss of countries worked — be involved in slow scan — with fast scan — with mobile FM — with their own

repeaters — with RTTY — with nets — with rag chewing — with contests — getting to hamfests and conventions all over the country — and do this over a period of twenty some years. Few amateurs get letters from up to a hundred or so other amateurs a day — or read most of the club bulletins from all around the world (and there are hundreds of them). This does give me an unfair advantage in the broad sense — yet any individual amateur can easily become an expert in any particular aspect of the hobby and far outshine me in knowledge and accomplishments — and be a far better source of information on the League than I, even though I've known the top HQ people for many, many years — but have you ever seen even one director try to reach the amateurs outside of the framework of the League? I haven't.

It is curious.

The pages of 73 are wide open for ideas — and there is no requirement (nor has there ever been this requirement) that the ideas be acceptable to me or to the staff of 73. We do ask that they be reasoned and supported. If anyone has any good arguments against anything that I write about I wish they would let me know so I can pass along the information — and perhaps explain further my own ideas. Often I am much too brief in my

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explanations and this leads to misunderstanding. Outside of my attempts to reason with one official of the FCC, I have found there to be very few times when, with a little discussion, there was not a meeting of the minds and general agreement.

This is a challenge: the next time you find anyone who is afraid of 73 — see if you can find out why — and tell this chap that I challenge him to write to me with his specific disagreements — so we can see if they are that. What usually happens when someone who violently disagrees with me finally comes to face is that I try to find out what the disagreement is — and then try to explain either what it was that I really wrote or said (which is often a whole lot different from what people have heard that I have written or said) or I try to explain why it was that I wrote such a thing — with what background — then I listen to the other side and, if there is merit there, the chances are that I change my own ideas — it happens all the time.

One of the most common greetings I get at hamfests is, "I read your editorials and, while I don't agree with all of them, I enjoy them and they make me think." Nobody can be right 100% of the time — and since I am not nobody, it stands to reason that I will have a percentage of being wrong. I try to keep the percentage small, but when you think I'm wrong — take the time to write to me about it or call — and the chances are we will be able to come to an agreement.

Please do write. You are writing most of the magazine now...the articles and newspages...and I'll be happy if you, the reader, will write the editorials too so I can get in a few more hours of hamming...and perhaps a little DXpedition or two.

SPACE PROBE?

Recent articles in the National Enquirer have brought forth explanations of the long delayed echoes phenomena. This has been explored by some radio amateurs in the past and certainly needs further investigation. I recall some articles in QST on the subject in years gone by, but no satisfactory explanations.

The current idea is that these echoes are coming back from a satellite out there in space, possibly put there from some other galaxy as a means of communication. Experimenters have discovered that the pattern of echo delays can be plotted on a graph and the result is a reasonably accurate map of the stars in one part of the sky. Could this be an indication that this satellite is trying to tell us that this is its origination?

Several articles have been published recently on the subject and I wonder if there is a reader out there who

would like to become custodian of progress reports on this line of investigation? I'll bet that there are a number of amateurs who would be interested in experimenting with this idea. We need to know what frequencies have been productive...what directions the echoes have been coming from...who has been working on the project...etc.

FCC NEWS

Reciprocal licensing, how's it doing? Just fine! The FCC issued 38 licenses to foreign visitors during January, with 11 of them going to Colombians, four to Nicaraguans three to Germans, G's and CE's, two to VKs, PYs, HBs and TIs, and one each for LU, CP, HI, HC 9K and SM. There's even a repeater licensed under this arrangement — DL2AA/W1 on 147.81-21 near Boston.

MAIL BY SATELLITE

Word from W4ATE is that a study is being made at the Marshall Space Flight Center in Huntsville for the U.S. Postal Service of a plan to move business mail by satellite. It's about time!

Practically speaking, though the current postage rates merely reflect the ravages of inflation...not having risen any more than most other things...with a two cent letter now running is it eight or ten cents?...it does seem odd that in this day of instant communication we still have to send a specific piece of paper in order to communicate.

It is time that some system be worked out, using satellite links or the ubiquitous telephone lines, or a combination of them, for semi-instant mail. Even the television cables might be used.

CASSETTE RECORDER BARGAIN

Several readers who have invested in the cassette recorder being offered with the Morse code cassette courses have written or called to tell us that this exact same recorder is being offered in their locality for \$44.50 or more. They wonder how we can sell this for only \$23.95. The fact is that when you buy recorders directly from the importer in large quantities and pass them along at virtually our cost, the price is kept remarkably low. We're not in the tape recorder business — we only want to make sure that our readers have a good cassette recorder to use with their code cassettes so they can get their ham licenses.

KEEP THOSE CARDS AND LETTERS COMING

Yes indeedly, when you see something about amateur radio in your newspaper or in a magazine get out

the scissors and clip it out for us here at 73. We're always on the watch for items of value for the 73 newspages, for showings to congress, and we like to paste things into scrap books. We particularly want to thank all the readers who sent in the stuff about illegal use of CB for truck blockades...that sort of stuff helps in little battles like trying to save 220 MHz.

W2NSD/I

HAM HELP

This column is for those needing help in obtaining their amateur radio license.

If you are interested, send 73 your name, address and phone number. Don't be bashful — remember, it's always easier when you have someone to give you that added bit of confidence.

73 would appreciate amateurs and clubs looking this list over and helping whoever they can. Do you remember when you needed help?

Jerry L. Smith Sr.
29 Toth Avenue
Coatesville PA 19320

James Eller
4784 Clyde Road
Howell MI 48843
517-546-4103

Thomas Beaudry
364 Clay Street
Sparta MI 49345

Lyle Fisher
R. R. 1, Box 104
Cook NE 68329
402-864-4525

SP/4 C. E. Bailey
546-90-3709
HHC 708th Mt. Bn.
APO 09034
Baumholder, Germany

H. L. Moore Jr. WNØIRV
424 N. Lone Pine Avenue
Springfield MO 65802
(Would like help with General license.)

Gil Boyd
414 Kickerillo Ct.
Houston TX 77024

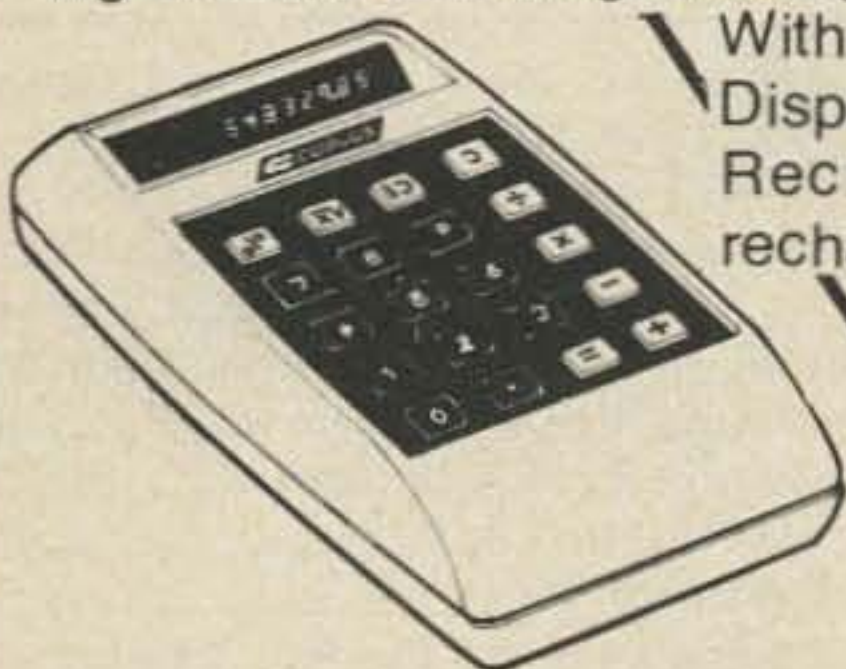
Don Fowler
P. O. Box 1186
Orlando FL 32802

Bradley Bunk (age 11)
George Bunk (age 14)
36 Mitchell Place
Avenel NJ
634-0523

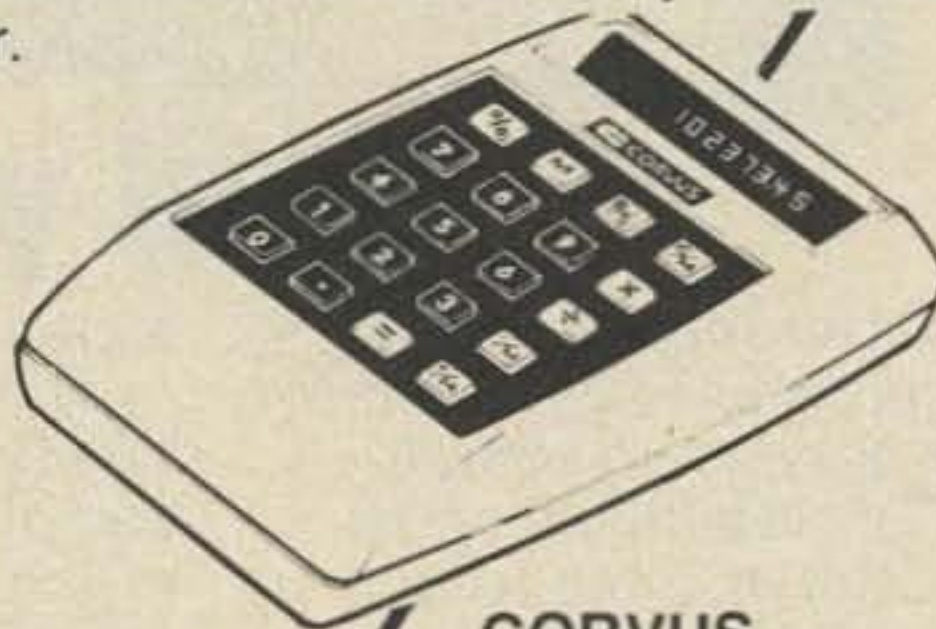
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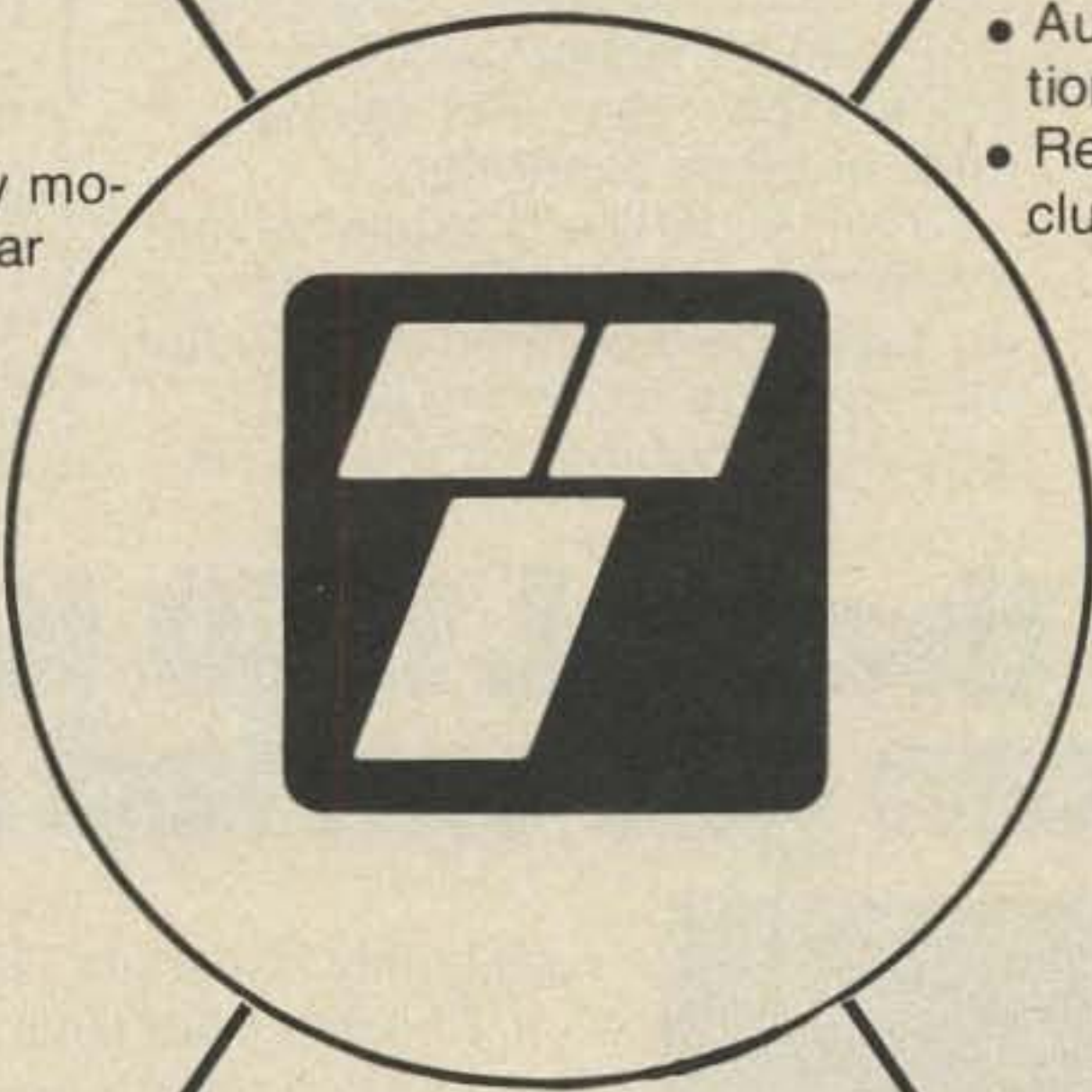


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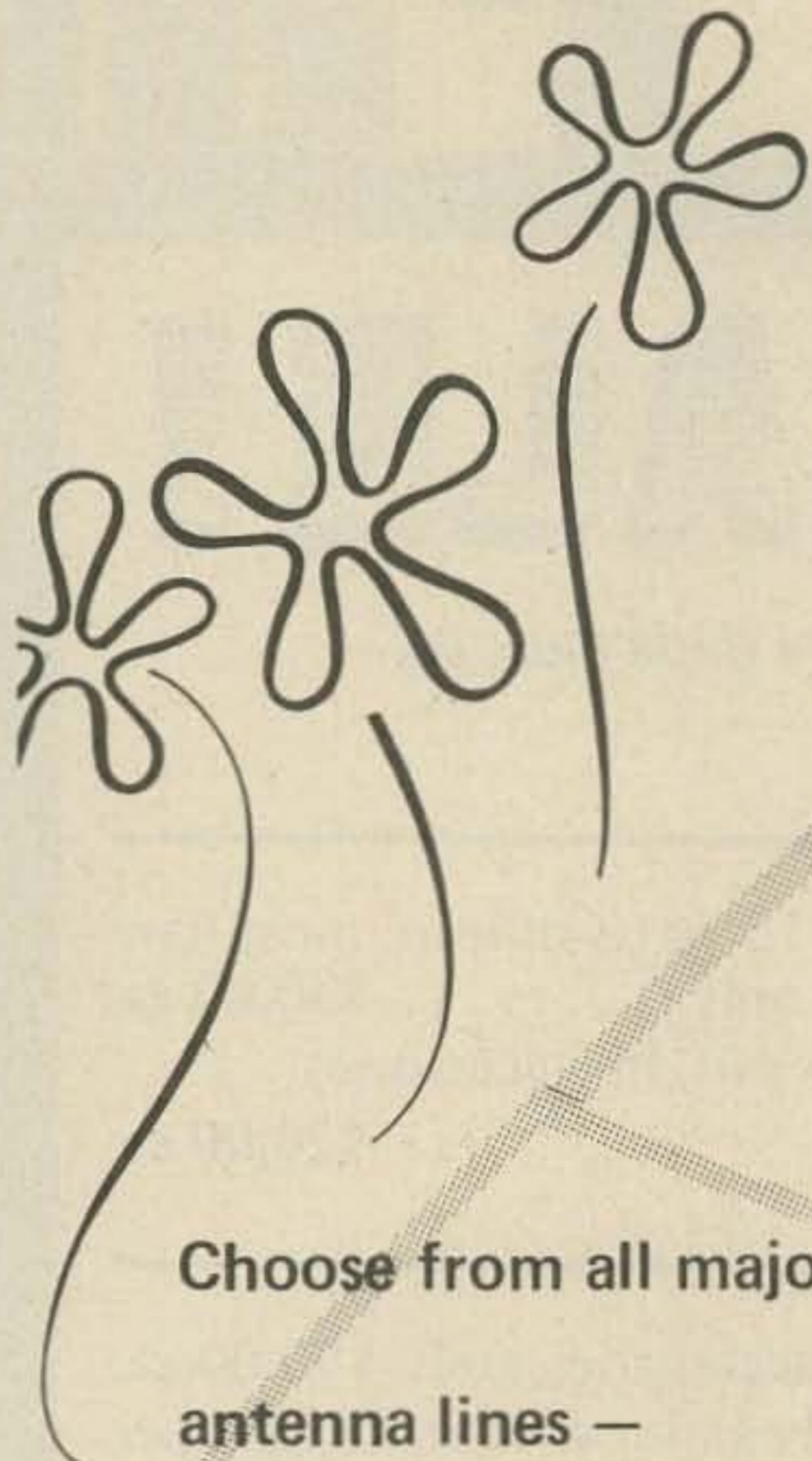
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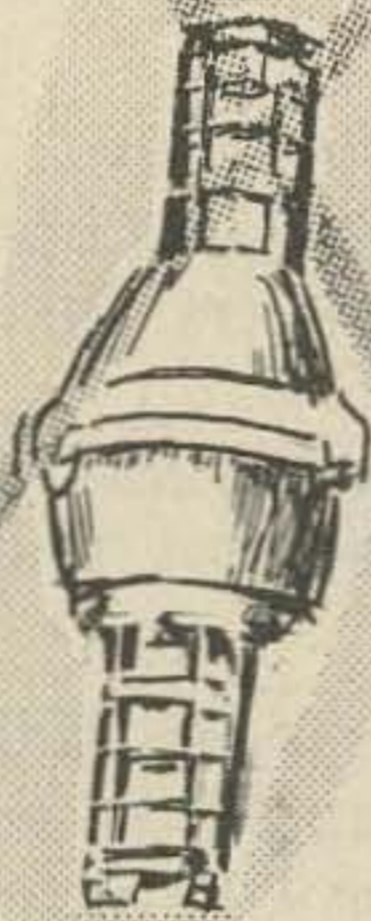
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- 1 dual gate mosfet 1 I.C. 18 transistors 7 diodes
- Antenna - collapsible 17" whip
- Can be tuned to any 2 MHz segment between 140 and 170 MHz
- Plenty of room in case for add ons (PL and tone)

HT-144 TRANSMITTER SPECIFICATIONS: OUTPUT 2 watts minimum. 3 dB BANDWIDTH 2 MHz typical. STABILITY .002 typical (depends on crystal). SPURIOUS outputs down 30 dB or better. MODULATION true FM with varactor in crystal circuit. NETTING separate trimmers for each channel. DEVIATION adjustable to 5 kHz. AUDIO limiter and active low pass filter. MICROPHONE speaker type. CRYSTAL 18 MHz parallel at 20 pF. MULTIPLICATION FACTOR frequency times 8. CURRENT DRAIN 500 mA typical.

HT-144 RECEIVER SPECIFICATIONS: SENSITIVITY better than .5µV for 20 dB quieting. SQUELCH THRESHOLD better than .3µV. STABILITY .002 typical (depends on crystal). ADJACENT CHANNEL REJECTION 60 dB. SPURIOUS RESPONSES down 70 dB. FIRST IF 10.7 MHz. SECOND IF 455 kHz. BANDWIDTH 15 kHz at 3 dB points. CRYSTAL 45 MHz parallel at 20 pF. CRYSTAL FORMULA receive frequency minus 10.7 divided by 3. AUDIO OUTPUT .5w typical. CURRENT DRAIN 15 mA squelched, 100 mA on voice peaks.

ACCESSORIES

- Battery charger \$4.95
- "Rubber Duckie" antenna with male & female BNC connectors \$12.95

ORDER YOURS NOW!

*HT-144 KIT only \$99.95
complete less batteries & crystals*

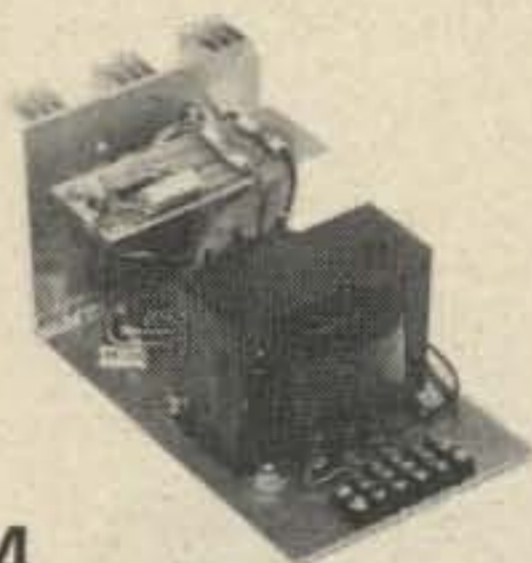


PS-12

12 Amp regulated 2%
50 mV Ripple Max.
Adjustable 11-15 VDC

WIRED \$79.95
KIT \$59.95

Shipping Weight 12 lbs.



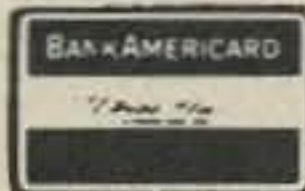
PS-24

24 Amp regulated 2%
50 mV Ripple Max.
Adjustable 11-15 VDC

WIRED \$89.95*
KIT \$69.95*

Shipping Weight 21 lbs.

** PS-24 SHIPPED with BASE PLATE - LESS CASE, AS SHOWN*



VHF ENGINEERING

- DIV. of BROWNIAN ELECT. CORP. -

320 WATER ST. POB 1921 BINGHAMTON, NY 13902 607-723-9574

A&W FM VHF UHF A&W

SPRING SPECIAL!

Standard 146A package

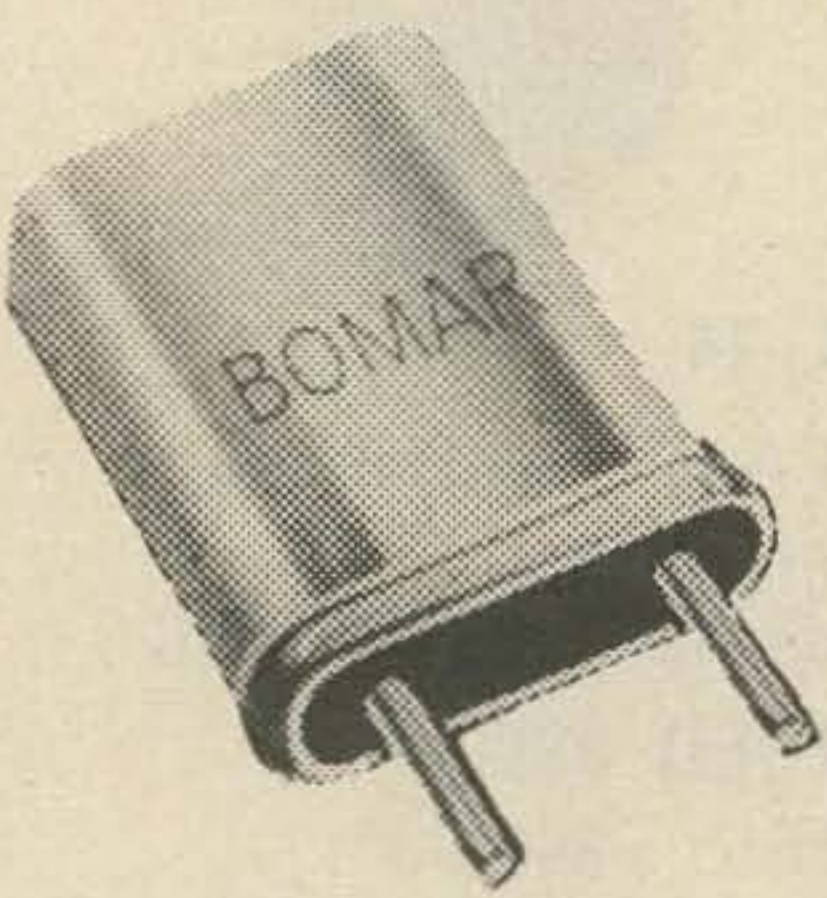


146A	\$289.00
Charger	38.00
Case	10.00
Stubby Ant. ...	6.00
Batteries	
Eveready ni-cads	22.50
3 xtra sets of crystals	
	30.00
	<hr/>
	\$395.50

\$325.00
Cash!

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ALL COMMON REPEATER & SIMPLEX PAIRS IN STOCK FOR IMMEDIATE SHIPMENT.



FOR THESE RIGS ONLY.

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SEND FOR OUR FREE '74 CATALOG.

A&W ELECTRONICS

491 Riverside, Medford, Mass. 02155
(617-396-5550)

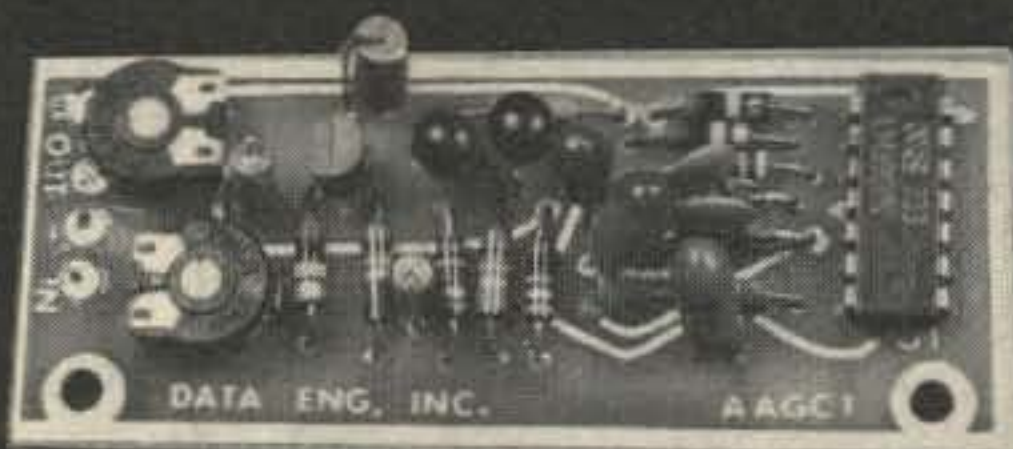
DATA ENGINEERING

IS ON THE MOVE

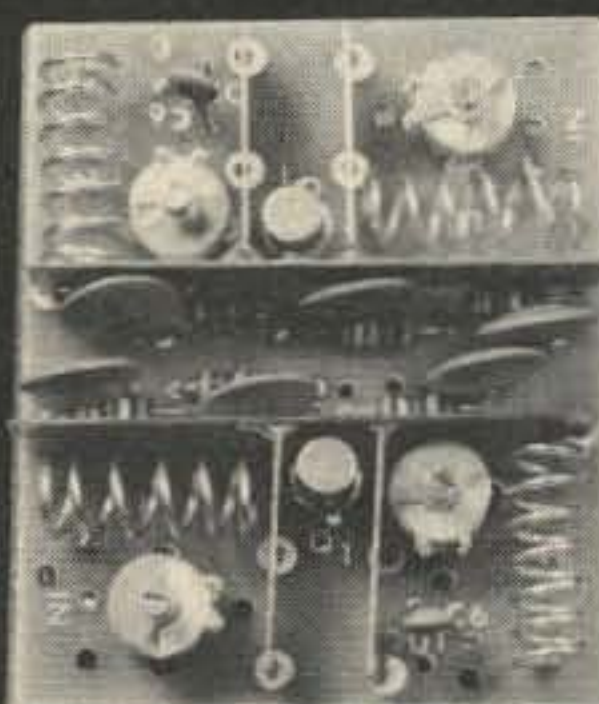
NEW PRODUCTS

NEW LOCATION

NEW



NEW



LOOK FOR THESE
EXCITING NEW PRODUCTS
IN 1974

Complete RTTY System
and Accessories

Touch-Tone* to
Dial Pulse Converter

Repeater Auto-Patch

Low-Cost Memory Keyer

Morse/Baudot/ASCII
Keyboard

Variable Frequency, Variable
Bandwidth CW/Phone Filter

AUDIO AUTOMATIC GAIN CONTROL AMPLIFIER

Is your tone decoder having problems due to input signal variations? If so, eliminate these and other problems caused by weak, strong or varying input signals. The AAGC-1 will take signal levels between 50 mV to 5 Volts and feed a clean rock stable signal to any decoder for perfect operation. Give your decoder a chance to decode properly with our AAGC-1 amplifier.

Shipping Weight 3 oz. \$12.95 kit

\$17.95 wired

DELUXE RECEIVER PREAMPS

Specially made for both OLD and NEW receivers. The smallest and most powerful single and dual stage preamps available. Bring in the weakest signals with a Data Preamp.

BAND	STAGES	GAIN	NOISE FIGURE	KIT PRICE	WIRED PRICE
10 meter	Single	20 dB	2 dB	\$9.50	\$12.50
6 meter	Single	20 dB	2 dB	\$9.50	\$12.50
2 meter	Single	20 dB	2.5 dB	\$9.50	\$12.50
2 meter	Double	40 dB	2.5 dB	\$18.50	\$24.50
220 MHz	Single	17 dB	2.5 dB	\$9.50	\$12.50
220 MHz	Double	35 dB	2.5 dB	\$18.50	\$24.50
*440 MHz	Single	14 dB	3 dB	\$9.50	\$12.50
*440 MHz	Double	28 dB	3 dB	\$18.50	\$24.50

*Available in June

DATA ENGINEERING INC.



P. O. BOX 688, ALBANY, GA 31702

CRICKET 1

A popularly-priced IC keyer with more features for your dollar. Cricket 1 is small in size and designed for the beginner as well as the most advanced operator. It provides fatigue-free sending and its clean, crisp CW allows for easy copying at all speeds. Turned on its side, the Cricket can be used as a straight key for manual keying. Right or left hand operation. AC/DC.

Shipping Weight 3 lbs. \$49.95

SPACE-MATIC 21B

The SWITCHABLE Keyer — eight keyers in one! Selectable dot/dash memories, and character/word spacing. The perfectly-timed code sent by the SM-21B is as easy to copy as "Tape Code", and it gives the sender a distinguished "professional fist". When you buy the Space-Matic, you buy a "keyer for keeps". No need to trade next year for another keyer with additional features. They are all here today — in the SPACE-MATIC 21B!

Shipping Weight 4 lbs. \$119.50

the most powerful antennas under the sun!



The Best Vertical There IS! 80 through 10 meters

Hy-gain 18AVT/WB

New, from the inventors of wideband verticals.

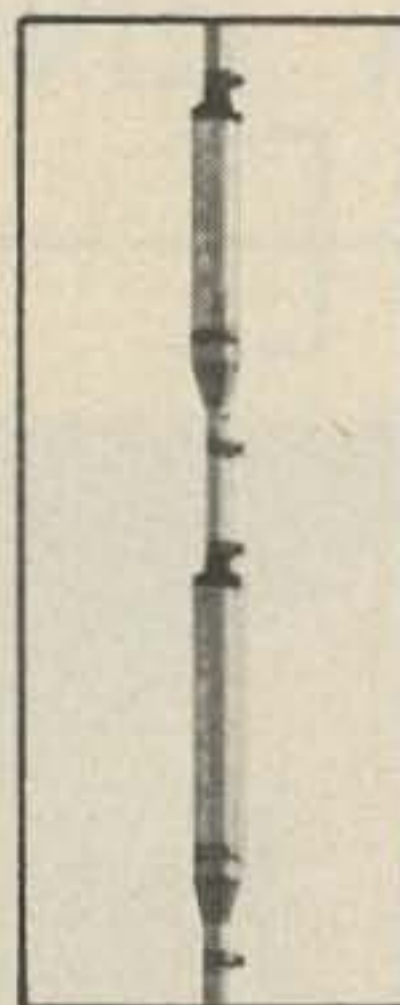
Pack some punch! All the omnidirectional performance of Hy-Gain's famous 14AVQ/WB...plus 80 meter capability! Unrivaled performance, rugged extra heavy duty construction, and the price you want...all in one powerful package!

- Automatic switching on all five bands through the use of three beefed-up Hy-Q traps...featuring extra large diameter coils for exceptional L/C ratio and extremely high Q.
- Recessed coax connector furnished.
- Top loading coil and four element static hat.
- Constructed of extra heavy wall high tensile aluminum.
- Hot performance all the way across the band with just one setting (10 through 40).
- Hy-Q traps effectively isolate antenna sections for full 1/4 wave resonance on all bands.
- No dissimilar metals to cause noise.
- SWR 2:1 or less at band edges.
- Maximum legal power with low frequency drift.
- Exceedingly low radiation angle makes DX and long haul contacts a cinch...whether roof or ground mounted.
- Very low RF absorption from insulating materials.

The 18AVT/WB is constructed of extra heavy duty, taper swaged, seamless aircraft aluminum with full circumference, corrosion resistant compression clamps at all tubing joints. This antenna is so rigid, so rugged...that its full 25' height may be mounted using only a 12" double grip mast bracket...no guy wires, no extra support...the 18AVT/WB just stands up and dishes it out!

Order No. 386

\$87.00



Get the strength, the performance and the price you want...from the man who sells the complete line of quality Hy-Gain equipment.

HY-GAIN ELECTRONICS CORPORATION

Dept. CE 8601 Northeast Highway Six
402/464-9151

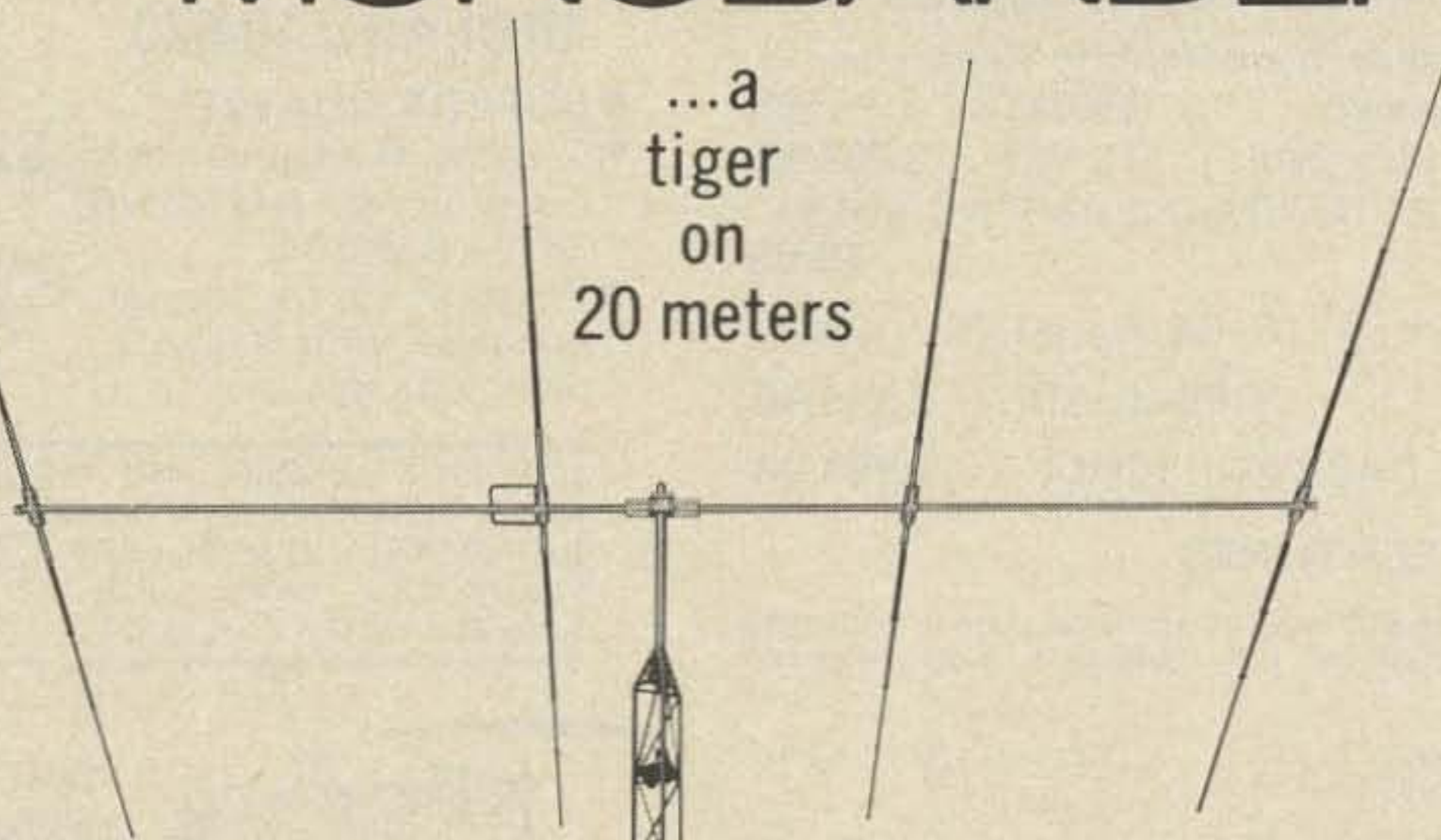
Lincoln, NE 68507
Telex 48-6424

for the most advanced antennas under the sun!



HY-GAIN 204BA MONOBANDER

...a
tiger
on
20 meters



The best antenna of its type on the market. Four wide spaced elements (the longest 36'6") on a 26' boom along with Hy-Gain's exclusive Beta Match produce a high performance DX beam for phone or CW across the entire 20 meter band.

- 10 db forward gain
- 28 db F/B ratio
- Less than 1.05:1 SWR at resonance
- Feeds with 52 ohm coax
- Maximum power input 1 kw AM; 4 kw PEP
- Wind load 99.8 lbs. at 80 MPH
- Surface area 3.9 sq. ft.

The 204BA Monobander is ruggedly built to insure mechanical as well as electrical reliability, yet light enough to mount on a lightweight tower. (Recommended rotator: Hy-Gain's new Roto-Brake 400.) Construction features include taper swaged slotted tubing with full circumference clamps; tiltable cast aluminum boom-to-mast clamp; heavy gauge machine formed element-to-boom brackets; boom 2" OD; mast diameters from 1½" to 2½"; wind survival up to 100 MPH. Shipping weight 51 pounds.

See the best distributor under the sun...the one who handles the Hy-Gain 204BA Monobander.

Model 204BA (4-element, 20 meters).....	\$169.95
Model 203BA (3-element, 20 meters).....	\$149.95
Model 153BA (3-element, 15 meters).....	\$ 79.95
Model 103BA (3-element, 10 meters).....	\$ 64.95



FERRITE BALUN MODEL BN-86

Improves transfer of energy to the antenna; eliminates stray RF; improves pattern and F/B ratio. **\$15.95**



ELECTRONICS CORPORATION

Dept. CE, 8601 Northeast Highway Six, Lincoln, NE 68507
402/464-9151

Telex 48-6424

Distributed in Canada by: LECTRON RADIO SALES, LTD. 211 Hunter Street West, Peterborough, Ontario

30 WATTS OUTPUT



- 2-meter FM amateur band mobile transceiver
 - 30 watts, 12 channels **MODEL 13-505**
 (1) Midland 13-505 (built-in DC PS) . . \$299.95
 (2) DELUXE REGULATED 8 AMP AC SUPPLY
 69.95
 (3) 5 crystals: Tx 34, 16, 94; Rx 94,76 . . . N/C
REGULAR . . . \$369.90
OUR SPECIAL PACKAGE PRICE . . . \$299.00

IMPORTANT FEATURES:

- Separate channel selectors give simultaneous or selective control of transmit and receive frequencies
- Crystal controlled - crystals for three channels installed
- Discrimeter shows frequency shift of received signals, acts as calibration meter for receiver and transmitter
- S/Rf/SWR meter shows received signal strength, RF power output, switches to show antenna SWR
- Hi/lo transmitter power: 5 watt or 30 watt
- 12-volt DC power, compact size for easy mobile mounting
- Superb Quality



CLEGG FM-27Bs

Reg. \$479.95, or
 with Clegg AC. . .
 Reg. \$559
**WRITE FOR
 SPECIAL DEAL!**

MIDLAND 13-520

- SUPERB QUALITY
- 2 watts, 6 channels with carrying case and 16/76, 34/94 & 94/94.
- Please write for special packages with NI-CAD pack, charger, etc.

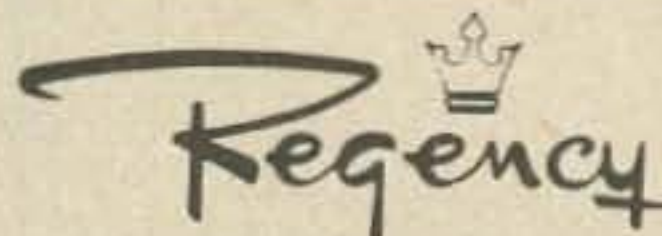
Reg.

\$229.95

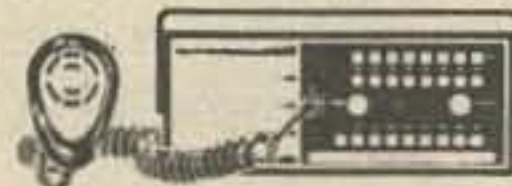
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REGENCY, CLEGG, SBE, INOUE, CUSHCRAFT, DATA ENG., BIRD, OLIVER SWAN (KLM), HY-GAIN, B&K, KENWOOD, TEMPO, TEN TEC, DX ENG., MINI PRODUCTS, SWAN, MIDLAND, ETC., IN STOCK - PLEASE WRITE FOR QUOTE.



**WRITE FOR
 SPECIAL DEAL**



HR-2MS

8 Channel Transcan
 2 Meter FM Transceiver



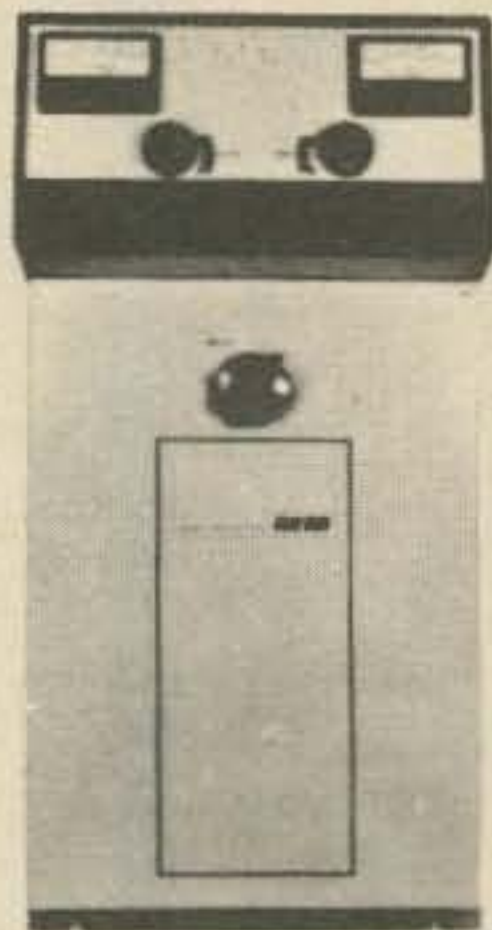
HR-212

12 Channel-20 Watt
 2 Meter FM Transceiver



HR-2B

UNEQUALED AT ANY PRICE



HENRY 3K-A

Cool and Easy
 Max. Legal Power
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 KW min, in com-
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The Finest Commercial Grade Amateur Linear Amplifier Available Anywhere in the World at ANY Price for **ONLY \$1080** - The **HENRY 3k-A**.

You will never know how little it costs to own THE incomparable HENRY 3K-A until YOU write or phone us and let us know the trade in deal YOU WANT. We usually say yes! **NO ONE ANYWHERE BEATS OUR DEAL.**



KENWOOD TS-520

The new TS-520 is the transceiver you have wanted, but could not buy until now. It is a no-compromise, do everything, go everywhere 5 band transceiver for SSB or CW that performs equally well at home, in an automobile, airplane, boat or trailer. The TS-520 features built-in AC power supply, built-in 12 volt DC power supply, built-in VOX with adjustable gain delay and anti-VOX . .

PLUS A HOST OF OTHER IMPORTANT FEATURES AND PROVEN Kenwood reliability. All at a price most amateurs can afford. The price . . . \$599.00



KENWOOD TS-900

. . . the ultimate transceiver. The promise of the transistor has been fulfilled. Here is the transceiver you will want to own . . . whatever you have now, get ready to trade up. Its important features are far too numerous to list. Its specifications are superb. The TS-900 is unquestionably the best transceiver of its kind ever offered. The price . . . \$795.00

**PLEASE WRITE FOR
 COMPLETE INFORMATION**

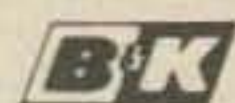
NO ONE ANYWHERE BEATS OUR DEAL!

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MAY SPECIAL

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+15V regulated power supply parts. Kit output +15V, nominal + or -5% regulation. 0.5% output current. 150mA each side. Kit includes line filter and internally shielded transformer to provide excellent rf and line noise rejection. Output is short-circuit protected. **For May only - \$8.95. Orders placed after May 31 - \$9.95.**

- BIPOLAR MEMORY 1 x 256 bit 74200 \$9.50
- MOS DYNAMIC MEMORY 1 x 1024 bit MM5260 \$5.00
- 1000 ASSORTED RESISTORS, CAPACITORS, DIODES including over 100 TTL, DTL & Linear ICs on pc boards
(include postage for 4 lbs.)\$10.00
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- LM 309K 5V 1A REG \$2.00
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- 4194 TK adjustable dual tracking reg 8V TO66 \$3.90
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- SUPER MEMORY Static N MOS 1 x 1024 bit. Runs on single 5 Volt supply, with data sheet, type 2102 \$16.50
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ICs, most TTL & LINEAR in stock - Send stamp for FREE catalog

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LM382	1.75	
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741T	.50	
741 Mini	.45	10/3.95
CA3028	.75	
CA3065	.75	
CA3086	.45	
5558	1.00	

ALL ITEMS IN STOCK and will be shipped within 24 working hours of receipt of order!

Include 50¢ postage and handling on orders under \$10.00

Sorry, NO C.O.D.'s. CALIFORNIA RESIDENTS ADD sales tax.

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"REAL GOOD STUFF"

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MINI-DIP OP AMPS

LM301 \$.45	LM709 \$.25	LM748 \$.40
5558 \$1.00	LM307 \$.45	LM741 \$.45

7 SEGMENT DISPLAYS

MAN 3 com. cat., .125 in. high. \$2.00 4/\$6.00

MAN 4 com. cat., 2 in. high. \$2.75 4/\$8.00

MISSING SEGMENT/NO DECIMAL POINT

(take your chances; no choice)

MAN 3 \$.25 MAN 4 \$.50

DISCRETE RED LEDS

1-9	10+
MV10 TO-18	\$.25 .20
MV50 tiny	.35 .30
MV5024 diffused	.35 .30
bright red lens	.50
clear lens, fisheye	.50

DISCRETE COLORED LEDS

MV1 amber	.50
MV5020 type, amber	.50
MV50 type, amber	.50
MV2 TO-18 green	.75 .70
MV5222 green	1.00
MV5322 yellow	2.00

JUNCTION FETs, TO-18 case

N-CHANNEL:	SIMILAR TO:	
NJF10	2N4416, MPF102	3/\$1.00
NJF11	2N4091-93	4/\$1.00
NJF12	2N4338-41	4/\$1.00
NJF13	2N3089	3/\$1.00
NJF14	2N4221-22	4/\$1.00
P-CHANNEL:		
PJF11	2N3382-86	4/\$1.00
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All FETs come with data sheets.

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All marked units, dual in-line packages. 20/\$1.00

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NPN TO-18 general purpose silicon	.15
10 or more,	.10
PNP TO-18 general purpose silicon	.15
10 or more,	.10
2N2222 (NPN) TO-18	.25
10 or more,	.20
2N2907 (PNP) TO-18	.25
10 or more,	.20

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14 pin	\$.50
16 pin	.60
24 pin	1.25
28 pin	1.35
40 pin	1.80
wire-wrap socket pins	.05
100 or more,	.04

1/4 WATT RESISTORS

100	2.2K
120	2.7K
150	3.3K
180	3.9K
220	4.7K
270	6.8K
330	8.2K
390	10K
470	12K
560	15K
680	18K
820	47K
1K	100K
1.2K	220K
1.5K	470K
1.8K	1M

Please specify how many you want and of which values.

LEDS

LED 10R - Pack of 10 discrete red lens

LEDs, various MV5020-series types. \$1.50

LED 10C - Pack of 10 discrete clear lens

LEDs, various MV5020-series types. \$1.50

Application note included.

RECTIFIERS & DIODES

1amp 50PIV silicon rectifier	\$.10
3amp 400PIV silicon rectifier	.25
FB50 1a 50PIV bridge rect.	.60
40429 triac 4amp 200PIV, brand new	1.00
1N914 equivalent	1-99 100+ .10 .07 ea.

MEMORIES

MM1101	256-bit static RAM	\$2.25
MM5260	1024-bit dynamic RAM	8.00
2102	1024-bit static RAM	
	NMOS +5v. supply	16.50

OP AMPS

301T	\$.40	709T	\$.20	748M	\$.40
301M	\$.45	709M	\$.25	747/	
307T	\$.40	739D	\$1.00	5558T	\$.90
307M	\$.45	741D	\$.35	5558M	\$1.00
318T	\$1.50	741T	\$.35	4131M	\$1.25
709D	\$.20	741M	\$.45	4132M	\$1.25

LEGEND

T = TO-5
D = DIP
M = miniDIP

POWER SUPPLY KIT PS5-1

5 volt 1 amp regulated power supply kit with p/c board and instructions. Board measures 2" x 6"; completed kit is 2" high. Transformer has internal rf shield. **\$8.00**

RGS ELECTRONICS (408) 247-0158
3650 Charles St., Suite K, Santa Clara, CA 95050

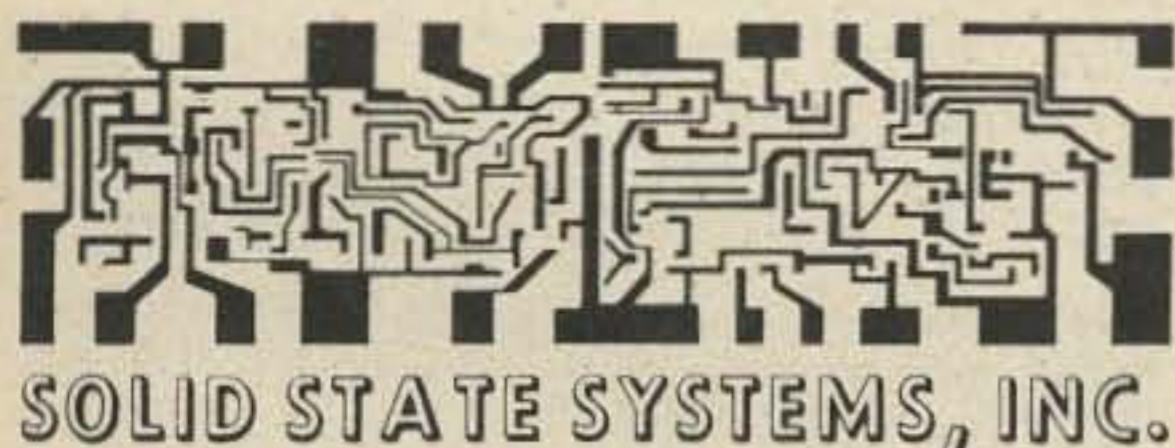
We sell many ICs and components not listed in this ad. Send a stamp for our free flyer. **TERMS OF SALE:** All orders prepaid; we pay postage. \$1.00 for handling charge on orders under \$10.00. California residents add sales tax. Please include name, address and zip code on all orders and flyer requests.

SOLID STATE SYSTEMS, INC. now has a wider selection of LED displays, lower prices. Now available are:

- ★ 7-segment numeric displays in 3 colors
- ★ Resistor packages for each display
- ★ 9-digit calculator displays

Catalog Number	Description	Character Height	Color	Price Each					Grouping code
				1-49	50-99	100-499	500-999	1000-up	
21-00001	OPCOA SLA-1, 7-Segment, 15mA, left decimal	0.33"	Red	2.00	1.85	1.70	1.55	1.40	10
11-48001	Pkg of 8 current limiting resistors for SLA-1	----	----	.36	.32	.28	.24	.20	16
21-10001	OPCOA SLA-11, 7-Segment, 40mA, left decimal	0.33"	Green	2.00	1.85	1.70	1.55	1.40	10
21-20001	OPCOA SLA-21, 7-Segment, 40mA, left Decimal	0.33"	Yellow	2.00	1.85	1.70	1.55	1.40	10
11-58001	Pkg. of 8 current limiting resistors for SLA-11 & -21	----	----	.36	.32	.28	.24	.20	16
24-00002	OPCOA SLA-2, ±1, 15mA	0.33"	Red	2.00	1.85	1.70	1.55	1.40	10
11-44002	Pkg. of 4 current limiting resistors for SLA-2	----	----	.20	.17	.14	.12	.10	16
24-10001	OPCOA SLA-12, ±1, 40mA	0.33"	Green	2.00	1.85	1.70	1.55	1.40	10
24-20001	OPCOA SLA-22, ±1, 40mA	0.33"	Yellow	2.00	1.85	1.70	1.55	1.40	10
11-54002	Pkg. of 4 current limiting resistors for SLA-12 & -22	----	----	.20	.17	.14	.12	.10	16
23-00011	OPCOA SLA-1C, 7-Segment with Colon, 15mA	0.33"	Red	2.30	2.15	2.00	1.85	1.70	10
11-49011	Pkg. of 9 current limiting resistors for SLA-1C	----	----	.40	.36	.32	.28	.24	16
23-10011	OPCOA SLA-11C, 7-segment with Colon, 40mA	0.33"	Green	2.30	2.15	2.00	1.85	1.70	10
23-20011	OPCOA SLA-21C, 7-Segment with Colon, 40mA	0.33"	Yellow	2.30	2.15	2.00	1.85	1.70	10
11-59011	Pkg. of 9 current limiting resis. for SLA-11C & -21C	----	----	.40	.36	.32	.28	.24	16
21-00007	OPCOA SLA-7, 7-segment, 20mA, left decimal	0.33"	Red	1.50	1.40	1.30	1.20	1.10	10
11-48007	Pkg. of 8 current limiting resistors for SLA-7	----	----	.36	.32	.28	.24	.20	16
24-00009	OPCOA SLA-9, ±1, 20mA	0.33"	Red	1.50	1.40	1.30	1.20	1.10	10
11-44009	Pkg. of 4 current limiting resistors for SLA-9	----	----	.20	.17	.14	.12	.10	16
21-00008	OPCOA SLA-8, 7-segment, 20mA, left decimal	0.33"	Red	1.50	1.40	1.30	1.20	1.10	10
11-48007	Pkg. of 8 current limiting resistors for SLA-8	----	----	.36	.32	.28	.24	.20	16
24-00010	OPCOA SLA-10, ±1, 20mA	0.33"	Red	1.50	1.40	1.30	1.20	1.10	10
11-44009	Pkg. of 4 current limiting resistors for SLA-10	----	----	.20	.17	.14	.12	.10	16
21-10008	OPCOA SLA-18, 7-segment, 40mA, left decimal	0.33"	Green	1.50	1.40	1.30	1.20	1.10	10
11-58008	Pkg. of 8 current limiting resistors for SLA-18	----	----	.36	.32	.28	.24	.20	16
24-10010	OPCOA SLA-20, ±1, 40mA	0.33"	Green	1.50	1.40	1.30	1.20	1.10	10
11-54010	Pkg. of 4 current limiting resistors for SLA-20	----	----	.20	.17	.14	.12	.10	16
21-20008	OPCOA SLA-28, 7-segment, 40mA, left decimal	0.33"	Yellow	1.50	1.40	1.30	1.20	1.10	10
11-58008	Pkg. of 8 current limiting resistors for SLA-28	----	----	.36	.32	.28	.24	.20	16
24-20010	OPCOA SLA-30, ±1, 40mA	0.33"	Yellow	1.50	1.40	1.30	1.20	1.10	10
11-54010	Pkg. of 4 current limiting resistors for SLA-30	----	----	.20	.17	.14	.12	.10	16
21-00003	OPCOA SLA-3H, 7-segment, 30mA, right decimal	0.77"	Red	5.50	5.10	4.70	4.30	3.90	10
11-48003	Pkg. of 8 current limiting resistors for SLA-3H	----	----	.36	.32	.28	.24	.20	16
21-20003	OPCOA SLA-23H, 7-segment, 30mA, right decimal	0.77"	Yellow	5.50	5.10	4.70	4.30	3.90	10
11-58003	Pkg. of 8 current limiting resistors for SLA-23H	----	----	.36	.32	.28	.24	.20	16
24-00004	OPCOA SLA-4H, ±1, 30mA, right decimal	0.77"	Red	5.50	5.10	4.70	4.30	3.90	10
11-45004	Pkg. of 5 current limiting resistors for SLA-4H	----	----	.24	.21	.18	.15	.12	16
24-20004	OPCOA SLA-24H, ±1, 30mA, right decimal	0.77"	Yellow	5.50	5.10	4.70	4.30	3.90	10
11-55004	Pkg. of 5 current limiting resistors for SLA-24H	----	----	.24	.21	.18	.15	.12	16
29-00125	OPCOA 9B125, 9-digit calculator display	0.125"	Red	10.00	9.25	8.50	7.75	7.00	10
29-10125	OPCOA G9B125, 9-digit calculator display	0.125"	Green	10.00	9.25	8.50	7.75	7.00	10

All resistors in packages are supplied for operation with 5V TTL supply.
All items with the same grouping code may be combined for quantity pricing.



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Attractively designed! Excellent craftsmanship. Case and keyboard (designed as one unit). Cabinet is made of high-impact plastic beige color with black bezel and amber window. Keyboard consists of a 3-position slide switch and 25 keys, 5 of which are used for memory function. 20 keys gray, 5 keys orange. All keys mounted on one printed circuit board. This modular unit is well suited for our calculator chips. Ideal for the CT5005. Case and Keyboard Complete: ONLY \$15.95



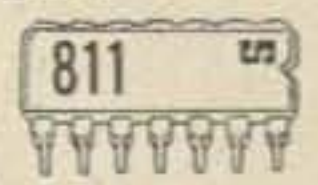
RECTIFIERS

VARO FULL-WAVE BRIDGES			
V5447	2A	400V	\$.90
V5647	2A	600V	1.10
MR810 Rect.	50V	1A	.10

Special 811: Hex Inverter

TTL DIP Hex Inverter; pin interchangeable with SN 7404. Parts are brand new and are branded Signetics and marked "811."

Data Sheet Supplied	EACH.....\$.30	10 FOR..... 2.50	100 FOR.... 23.00	1000 FOR... 220.00
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RCA NUMITRON

EACH.....\$ 5.00
SPECIAL: 5 FOR \$20.00



LED's

MV50 red emitting	\$.20
10-4 ma @ 2V	10 FOR 1.25
MV5024 red TO-18 high dome	\$.35
	10 FOR 2.95
MV10B visible red	\$.30
5-7 ma @ 2V	10 FOR 2.50

MAN 3M

0-9 plus letters. Right-hand decimal point. Flat-pack type case. Long operating life. IC voltage requirements. Ideal for pocket calculators!



3-CHIP CALCULATOR

This calculator set provides all of the electronics for an 8-digit, floating point calculator with left-hand entry. Keyboard, display, clock generator, and display driver is all that need be added to make a calculator that will add, subtract, multiply and divide. Overflow and negative signals are also provided. Complete instructions to build a calculator included.



CHIPS AND DATA.....\$8.95
DATA ONLY (Refundable).... 1.00

Memory IC 74S206

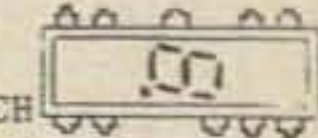
1x256 Bipolar TTL RAM (45 ns). One bit wide by 256 deep random access memory. Three-chip enable lines. Output is complement. Complete data supplied.

\$3.95 ea. 10 for \$32.00

MAN4

Seven-segment, 0-9 plus letters. Right-hand decimal point. Snaps in 14-pin DIP socket or Molex. IC voltage requirements. Ideal for desk or pocket calculators!

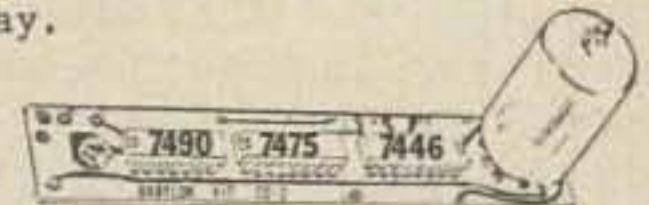
EACH.....\$2.75
TEN OR MORE 2.50 EACH



CD-2 Counter Kit

This kit provides a highly sophisticated display section module for clocks, counters, or other numerical display needs. The unit is .8" wide and 4 3/8" long. A single 5-volt power source powers both the ICs and the display tube. It can attain typical count rates of up to 30 MHz and also has a lamp test, causing all 7 segments to light. Kit includes a 2-sided (with plated thru holes) fiberglass printed circuit board, a 7490, a 7475, a 7447, a DR 2010 RCA Numitron display tube, complete instructions, and enough Molex pins for the ICs. NOTE: boards can be supplied in a single panel of up to 10 digits (with all interconnects); therefore, when ordering, please specify whether you want them in single panels or in one multiple digit board. Not specifying will result in shipping delay.

COMPLETE KIT, ONLY \$11.95
FULLY-ASSEMBLED UNIT \$13.00
Boards can be supplied separately @ \$2.00 per digit.



CT5005 CALCULATOR

This calculator chip has a full four-function memory, which is controlled by four keys, +M (adds entry into memory), -M (subtracts entry from memory), CM (clear memory, without clearing rest of registers), RM (read memory or use as entry).

- 12-Digit display and calculate
- Fixed decimal at 0, 1, 2, 3, 4, or 5
- Leading zero suppression
- 7-Segment multiplexed output
- True credit sign display
- Single 28-pin chip

CHIP AND DATA.....ONLY \$14.95
DATA ONLY (Refundable)..... 1.00

5001 CALCULATOR

40-Pin calculator chip will add, subtract, multiply, and divide. 12-Digit display and calculate. Chain calculations. True credit balance sign output. Automatic over-flow indication. Fixed decimal point at 1, 2, 3, or 4. Leading zero suppression. Complete data supplied with chip.

CHIP AND DATA.....ONLY \$9.95
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All ICs are new and fully-tested; leads are plated with gold or solder. Orders for \$5 or more will be shipped prepaid. Add 35c for handling and postage for smaller orders; residents of California add sales tax. IC orders are shipped within 2 workdays--kits are shipped within 10 days of receipt of order. \$10.00 minimum on C.O.D.s (phone in).

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100.....	\$.10	800.....	\$.30
200.....	.15	1000....	.40
400.....	.18	1200....	.50
600.....	.23	1500....	.65

CMOS

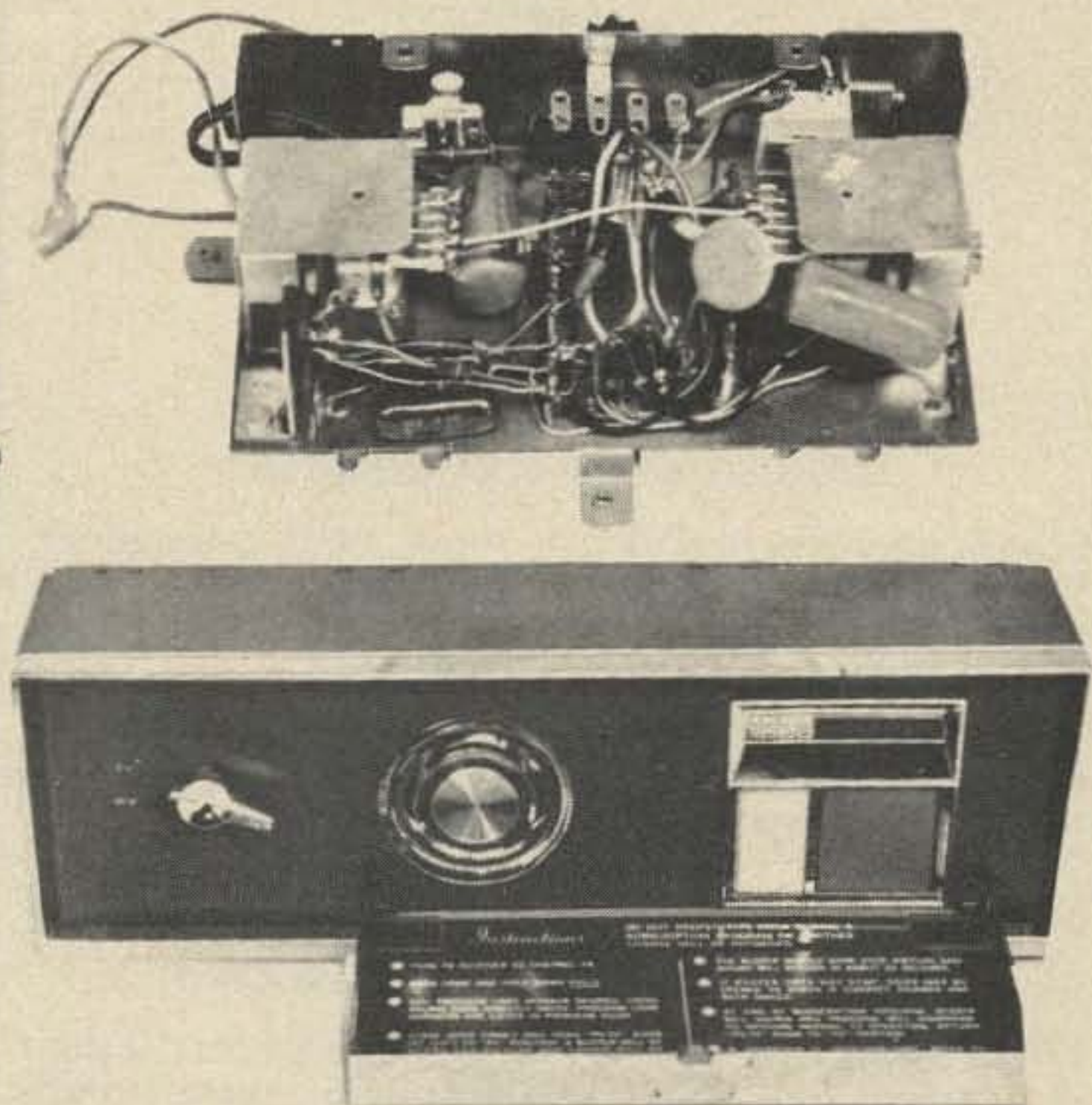
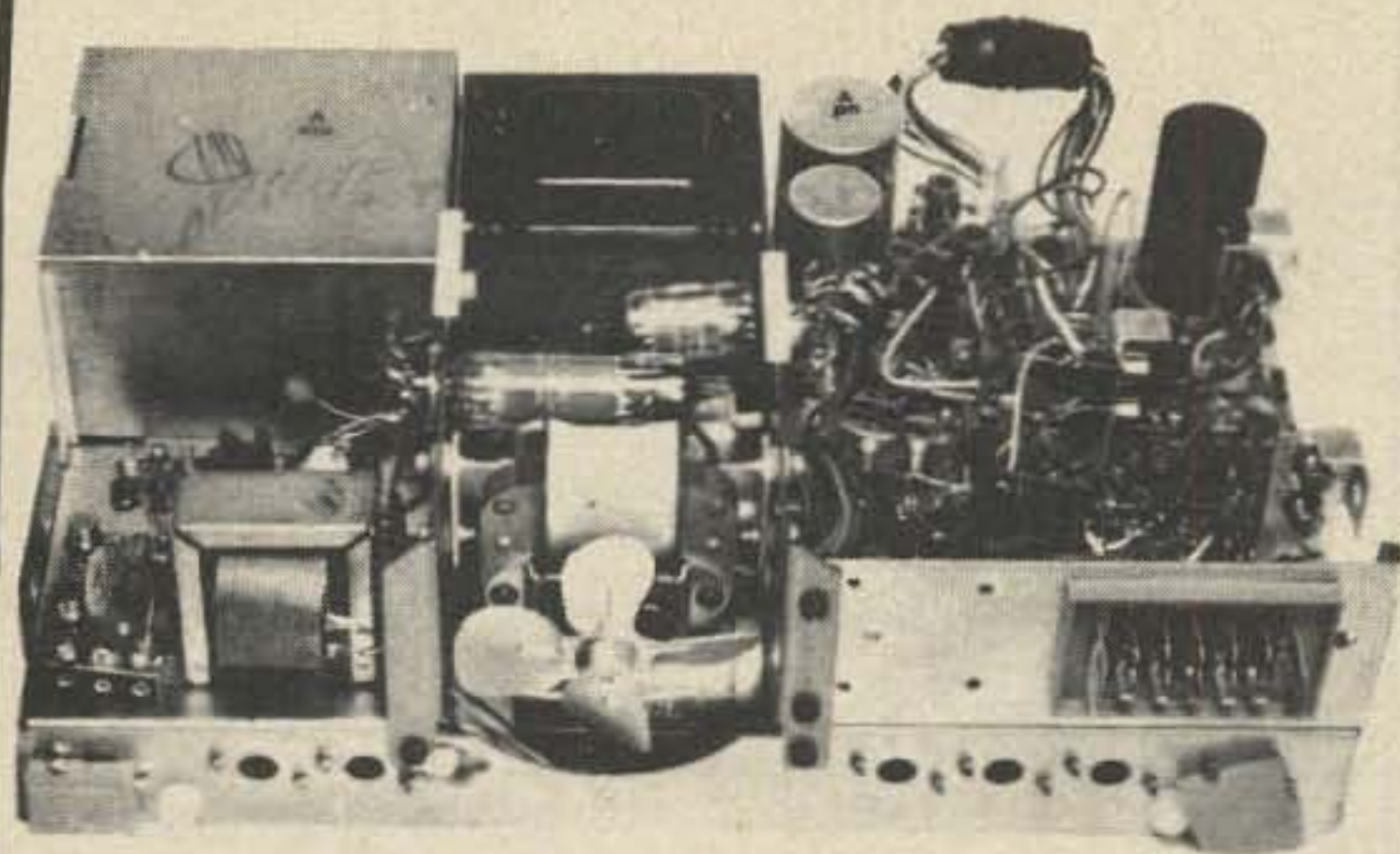
CD4001	\$.75	74C00	.75
CD4002	.75	74C20	.75
CD4010	1.00	74C160	3.25
CD4011	.75		

7400 Series DIP

7400	\$.25	74L51	\$.30
74H00	.35	74H51	.35
7401	.25	7453	.20
7402	.35	7454	.25
74H01	.35	74L54	.35
7403	.30	74L55	.35
7404	.28	7460	.20
74H04	.35	74L71	.30
7405	.28	7472	.40
7406	.70	74L72	.50
74H05	.35	7473	.60
7408	.35	74L73	.75
74H08	.35	7474	.65
7410	.25	74L74	.80
74L10	.35	74H74	.80
74H11	.35	7475	1.40
7413	1.25	7476	.60
7417	.40	74L78	.80
7420	.25	7480	.65
74L20	.35	7483	1.00
74H20	.35	7489	4.00
74H22	.35	7490	1.20
7430	.25	7491	1.00
74H30	.35	7492	.90
74L30	.40	7493	1.15
7440	.25	7494	1.15
74H40	.35	7495	1.15
7441	1.25	74L95	2.00
7442	1.20	74L21	1.25
7446	1.20	74L23	1.50
7447	1.20	74L54	2.30
		74L61	2.00
7450	.25	74L63	2.00
74H50	.35	74L93	1.50
7451	.25	74L95	1.00

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NE5558	dual 741 op amp MINI DIP.....	1.00
709	popular op amp DIP.....	.45
710	voltage comparator DIP.....	.75
711	dual comparator DIP.....	.40
723	precision voltage regulator DIP.....	1.00
741	op amp TO-5/MINI DIP.....	.55
747	dual 741 op amp DIP.....	1.00
748	op amp TO-5.....	1.00
CA3018	2 isolated transistors and a Darlington-connected transistor pair.....	1.00
CA3045	5 NPN transistor array.....	1.00
CA3026	dual differential amp.....	1.00
LM100	positive DC regulator TO-5.....	1.00
LM105	voltage regulator.....	1.25
LM302	op amp voltage follower TO-5.....	1.25
LM308	op amp TO-5.....	2.00
LM311	comparator TO-5.....	1.75
LM370	AGC amplifier.....	2.00
LM309K	5V-1A power supply module TO-3..	2.00
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A "Super Value" for the gadgeteer. A complete Pay TV installation made for ZENITH and all in original packing (3 cartons - wgt 36 lbs) and all unused. Operates on regular 115 volt 60 cycle power. A wealth of parts, easily removed due to long leads on components, most over one inch long. The 3 units consist of Translator, Adapter, Decoder. Transistors, tubes, solid state bridge power supply, geared clock motor, 35mm geared transport, time recorder, solenoid, relays, hundreds of small parts such as resistors, caps, etc. Our estimate as to cost to Zenith, approx \$1,000 per set. Schematics with each purchase. One set of 3 units \$15.00 wgt of 36 lbs. Special . . . 3 sets \$30 wgt of 108 lbs. All unused, original boxed.

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Military surplus. 20-200,000 CPS in 4 bands. Amplitude variable 0-10 volts. Freq. response 20 CPS to 150,000 CPS. Operation from regular 115 volts. Ship wgt. 75 pounds.

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Buy three for\$125

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From the military. Standard 455 kc IF. A rare item. Power input 24-28 volts DC. Ship wgt. approx 20 lbs.

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An old friend amongst the surplus buyers, but long gone from the market. Once again available as surplus. Covers 1.5-18 MHz tuneable in 6 bands. Also covers 200 kHz-500 kHz. Crystal phasing, MVC, AVC, BFO, etc. 60 lbs.

#348\$55

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#312 \$49

TWO COLOR LED RED/GREEN

Bidirectional, reversing polarity reverses color, the same diode emits red or green depending on polarity. Limited quantity.

Two color LED \$1.50 each, 12/\$15

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Silicon diode stacks at amazing ratings. Good for 50 Ma.

45,000 PIV	\$4.00
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Brand new keyboards for hand held calculators. Two styles available. One for CAL TEX 5001-5002-5012 or MOSTEK 5010-5012. Another for use with GEN INSTR C500.

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CT 5001 CALCULATOR CHIP

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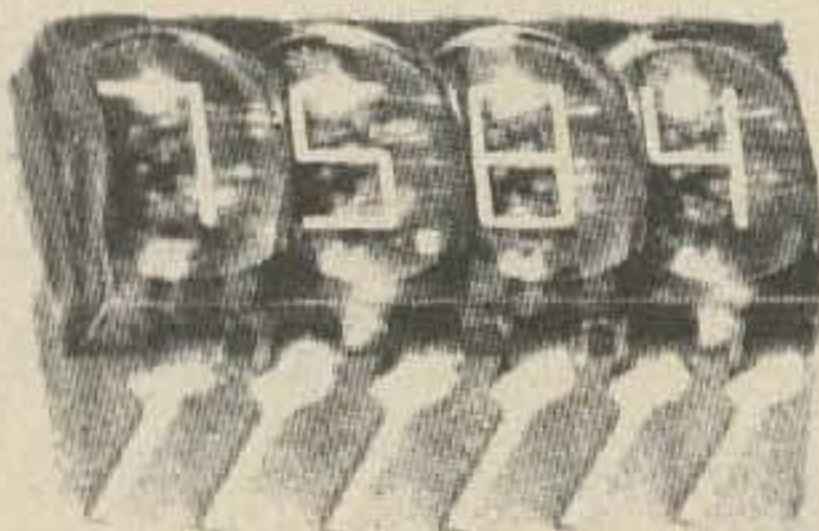
CT 5005 CALCULATOR ON A CHIP

Single MOS chip with all logic required for 12 digit 4 function desk top calculator with extra storage register for memory or constant. Multiplexed 7 segment outputs for LED, Incandescent, Fluorescent or Gas Discharge displays. Brand new and bargain priced. With Specs.

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\$9.00. Another strip . . . this one a clock readout. The strip has 2 digits . . . space . . . 2 digits. Perfect for reading hours & minutes.

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DIP with operation 3-18 Volts. Dual diode protection against static charge destruction. Dielectrically isolated complimentary MOS.

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Serial MOS by PHILCO in TO-5 case. Brand new with 2 page specs.

#PLR 532

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AM PATCH - \$5.00

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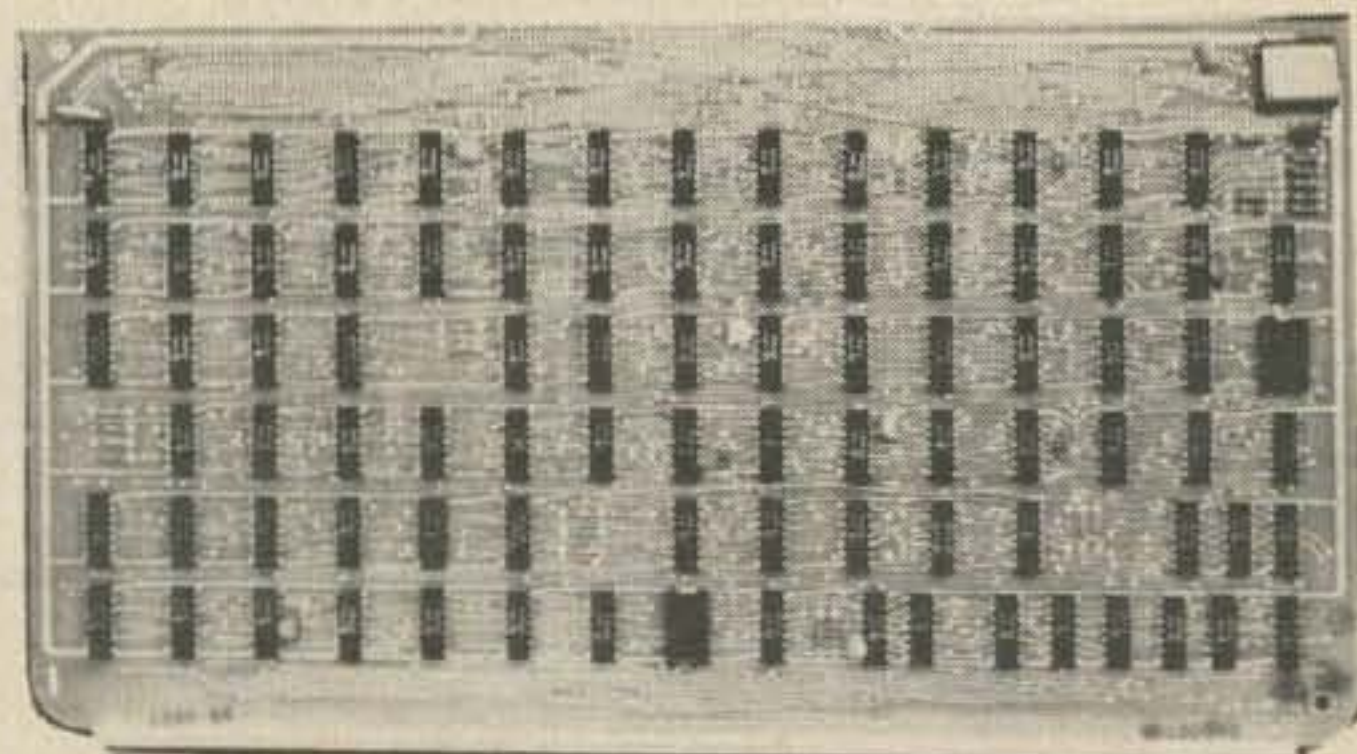
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SN7404	.26	SN7441	1.19	SN7475	.85
SN7405	.26	SN7442	1.12	SN7476	.53
SN7406	.45	SN7443	1.12	SN7477	.85
SN7407	.49	SN7444	1.25	SN7480	.65
SN7408	.27	SN7445	1.19	SN7481	1.25
SN7409	.28	SN7446	1.29	SN7482	.99
SN7410	.24	SN7447	1.29	SN7483	1.15
SN7411	.31	SN7448	1.35	SN7485	1.15
SN7413	.89	SN7449	.27	SN7486	.49
SN7415	.49	SN7450	.31	SN7489	3.10
SN7416	.49	SN7451	.31	SN7490	.85
SN7417	.49	SN7453	.31	SN7491	1.35
SN7420	.24	SN7454	.43	SN7492	.85
SN7421	.55	SN7455	.31	SN7493	.85
SN7422	.31	SN7460	.27	SN7494	1.05
SN7425	.50	SN7461	.27	SN7495	1.00
SN7426	.33	SN7462	.35	SN7496	1.00
SN7430	.24	SN7464	.43	SN74106	.95
		SN7465	.43	SN74107	.51
		SN7470	.36		
				SN74108	.95
				SN74112	.95
				SN74113	.95
				SN74114	.95
				SN74121	.61
				SN74122	.69
				SN74123	1.05
				SN74125	1.45
				SN74126	1.45
				SN74139	1.25
				SN74140	2.50
				SN74145	1.19
				SN74148	4.50
				SN74150	1.19
				SN74151	1.00
				SN74152	4.95
				SN74153	1.39
				SN74154	1.69
				SN74155	1.29
				SN74156	1.45
				SN74157	1.45
				SN74158	1.45
				SN74160	1.85
				SN74161	1.59
				SN74163	1.75
				SN74164	2.10
				SN74165	2.10
				SN74166	1.85
				SN74173	1.85
				SN74174	2.20
				SN74175	2.60
				SN74176	1.85
				SN74177	1.85
				SN74179	1.85
				SN74180	1.10
				SN74181	4.10
				SN74182	1.05
				SN74185	2.50
				SN74192	1.55
				SN74193	1.50
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3 for \$3

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Only **\$6.95**
3 for \$18.

For hand-held units, properly multiplexed for chip CT-5001, 2, 12 or Mostek 5010-12, 18 feather-touch keys, by FLEX-KEY.

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KRONOS WITH "TIME BASE"*

Cabinet is 6" x 5 1/2" x 6"



\$47. Any Type Clock less time-base **NEW FOR 1974!**

CHOOSE YOUR READOUT

Type	LED	Charac.	Sale
KR-101	MAN-3	.12	\$47.
KR-103	MAN-4	.19	47.
KR-104	Nixie*	.45	47.
KR-105	707†	.33	47.
KR-106	704†	.33	47.
KR-107	SLA-1†	.33	47.
KR-108	Same as SLA-1 but GREEN.		add \$12.

* With TIME BASE \$64.95

† "MAN" LED readouts are "all LEDs" but the Litronix 707 and Opcoa SLA-1, like the MAN-1, are of the reflective bar segment technique, the 704 is the reflective bar version of the MAN-4. *The Nixie tube is a 7-segment device as others.

- Now two clocks in one!
- For 12VDC* 110VAC!
- Now adaptable to boats, planes & cars too!
- One price for any LED!
- The only clock of its kind in USA today!
- 12 or 24-hr clock

CRYSTAL TIME BASE FOR ANY KRONOS*

\$19.95

Includes precision crystal, time-base IC, pc board & accessories with info.

*Not for KR-104

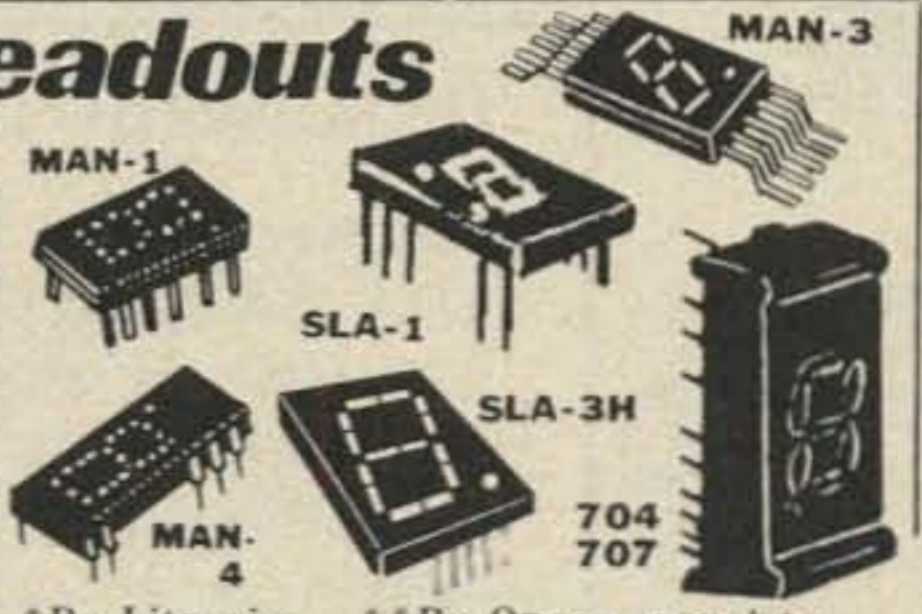
Scientific Devices introduces the new any LED Kronos digital clock. That's right, you can choose the "ALL-LED" Man-1, Man-3, and Man-4, and the new reflective bar types with the larger digits, at only one price, \$47. This is a Scientific Device first! We even have the GREEN LED readouts at a slightly extra cost. We have more ... for \$19.95 we have available as an (*) extra option to Naval Observatory your clock, or making it an all-purpose all-duty unit. For indoor and outdoor activity. This "TIME BASE" is the simplest on the market today with the help of one of the largest time base manufacturers for the famous digital wrist watches. Therefore, current drain is negligible, not like other cumbersome types. It's easy to construct, easy to slip into the Kronos of your choice and connect with easy instructions. Its overall design is simple and easy to construct. The kit is complete with famous black-and-white TEN-TEC cabinet, plus all accessories with booklets. Features include 3 setting controls, 1-hour per second, 1-minute per second, and hold button. KR100 series is a Scientific Device exclusive!

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Type	Char.	Each	Special
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*By Litronix. **By Opcoa, equal to MAN-1 or MAN-4 specs. Color - RED †Green.



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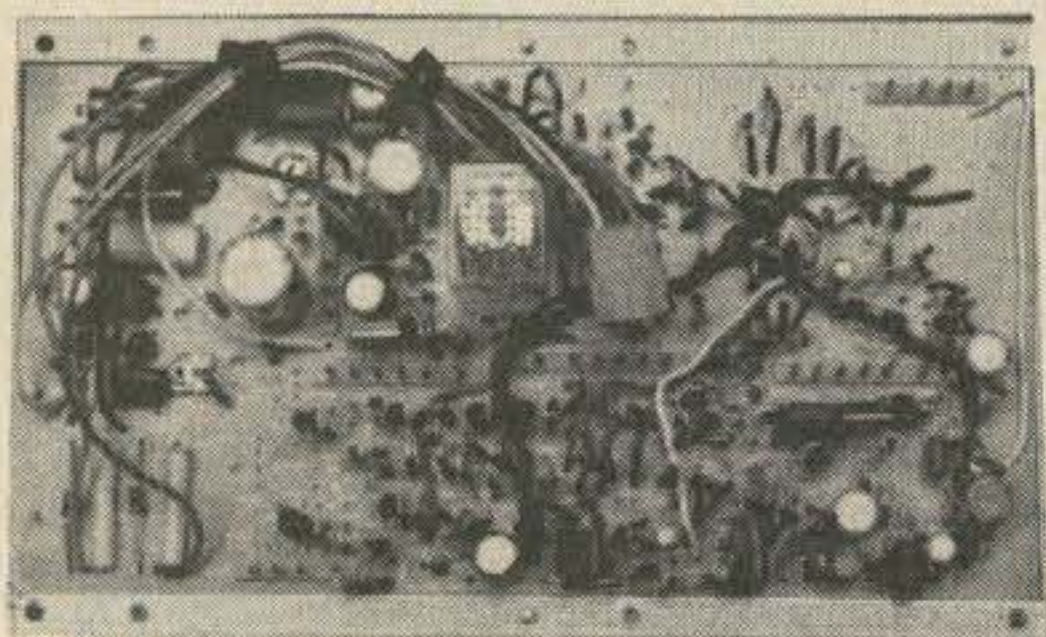
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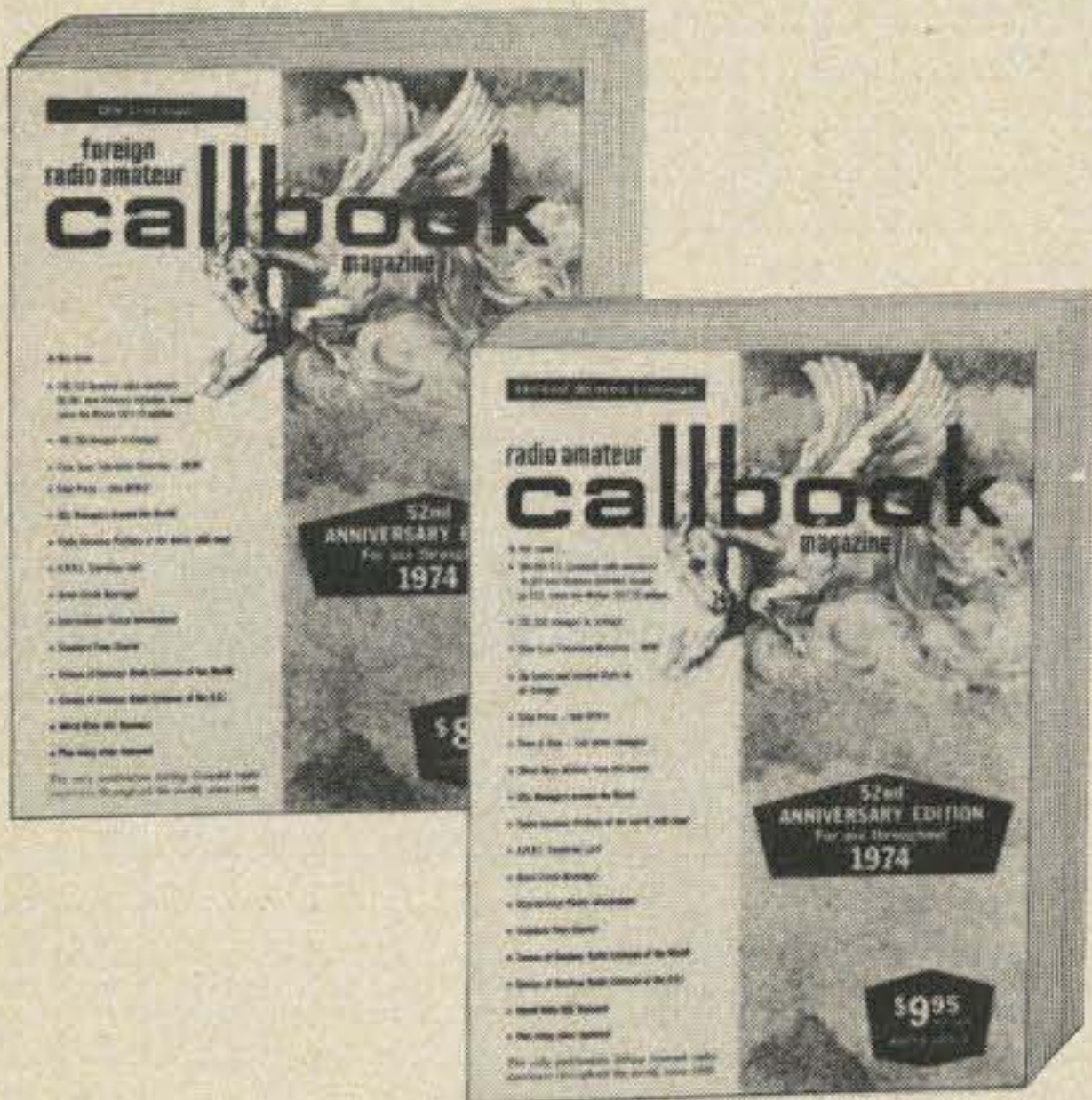
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May 1974

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			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

EASTERN UNITED STATES TO:

	GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	14	14	7	7	7	7	7	7	7	7	7	7	7A
ARGENTINA	14	14	14	7A	7	7	14	14	14A	21	21	14A	
AUSTRALIA	14	14	7B	7B	7B	7	7	7	7	7	14	14	
CANAL ZONE	14	14	7A	7	7	7	7	14	14	14	14	14	14A
ENGLAND	7	7	7	7	7	7	14	14	14	14	14	14	
HAWAII	14	14	7B	7B	7	7	7	7	7A	14	14	14	
INDIA	7	7B	7B	7B	7B	7B	14	14	14	14	14	14	7
JAPAN	14	7B	7B	7	7	7	7	7	7	7	7	7A	14
MEXICO	14	14	7	7	7	7	7	7A	14	14	14	14	
PHILIPPINES	14	14	7B	7B	7B	7B	7B	7	7	7	7	7A	14
PUERTO RICO	14	7	7	7	7	7	7	7	14	14	14	14	
SOUTH AFRICA	7B	7	3A	7	7B	7B	14	14	14	14	21	14	7B
U. S. S. R.	7	7	7	7	7	7	7	7A	14	14	14	14	7
WEST COAST	14	14	7A	7	7	7	7	7A	14	14	14	14	

CENTRAL UNITED STATES TO:

ALASKA	14	14	14	7	7	7	7	7	7	7	7	7	14
ARGENTINA	14	14	14	7A	7	7	14	14	14	14	21	21	
AUSTRALIA	14	14	14	7B	7B	7	7	7	7	7	14	14	
CANAL ZONE	14A	14	14	7	7	7	7	14	14	14	14	14	
ENGLAND	7	7	7	7	7	7	7	7	14	14	14	14	
HAWAII	14	14	14	7B	7	7	7	7	14	14	14	14	
INDIA	7	7B	7B	7B	7B	7B	7B	7B	14	14	7	7	
JAPAN	14	14	14	7B	7	7	7	7	7	7	7	7A	14
MEXICO	14	14	7	7	7	7	7	7	7A	14	14	14	
PHILIPPINES	14	14	14	7B	7B	7B	7B	7	7	7	7	7A	14
PUERTO RICO	14	14	7	7	7	7	14	14	14	14	14	14	
SOUTH AFRICA	7B	7	3A	7	7B	7B	14	14	14	14	14	14	7B
U. S. S. R.	7	7	7	7	7	7	7	7	7	7	7A	14	7

WESTERN UNITED STATES TO:

ALASKA	7A	14	7A	7	7	7	7	7	7	7	7	7	7
ARGENTINA	21	14	14	7	7	7	7	14	14	14	14A	21	
AUSTRALIA	21	21	21	14	14	7A	7	7	7	7	14	14A	
CANAL ZONE	14A	14	14	7	7	7	7	14	14	14	14	14	
ENGLAND	7B	7B	7	7	7	7	7B	7B	7B	7B	14	14	
HAWAII	14A	21	14	14	14	7	7	7	14	14	14	14	
INDIA	14	14	14	7B	7B	7B	7B	7B	7	7	7	7	
JAPAN	14	14	14	14	7	7	7	7	7	7	7	7A	14
MEXICO	14	14	14	7	7	7	7	7	14	14	14	14	
PHILIPPINES	14	14	14	14	7B	7B	7B	7	7	7	7	7A	14
PUERTO RICO	14	14	7A	7	7	7	7	14	14	14	14	14	
SOUTH AFRICA	7B	7B	3A	7	7B	7B	7B	7B	7B	14	14	14	
U. S. S. R.	7	7	7	7	7	7	7	7	7A	7A	7	7	
EAST COAST	14	14	7A	7	7	7	7	7A	14	14	14	14	

A = Next higher frequency may be useful also.
B = Difficult circuit this period.

Savoy

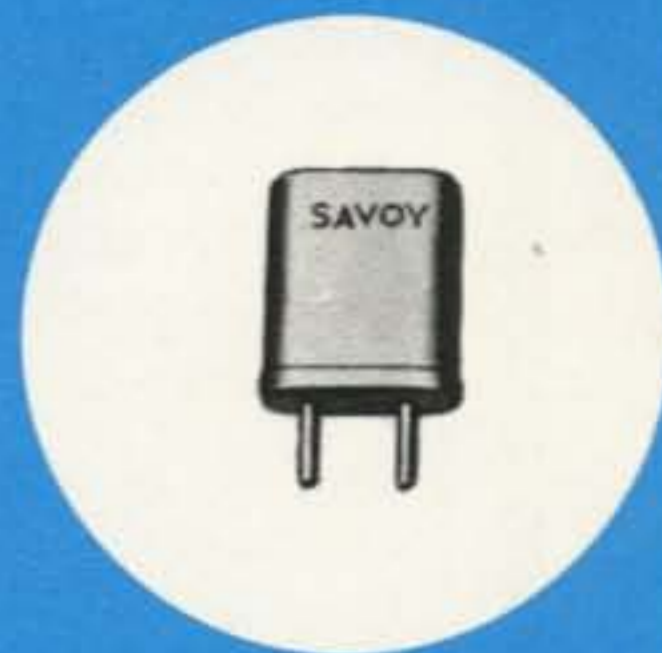


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Cassette Code Courses

With these Code Courses from 73, the average person can learn the International Morse Code fast enough to pass FCC code exams from Novice thru Extra Class in a few painless hours! One of the beauties of cassette tapes is that you can take them with you anywhere — at work for lunch break (code on rye is great) — even in the car while you are driving (or what's more likely, moldering away in line at a service station *trying* to get gas). With the help of these tapes passing the code portion of the various exams is a gas . . . er . . . snap!

☞ My class was so enthused over your code cassette tapes that after hearing the 13 word per minute cassette every student in the class decided to get one for home practice. Enclosed is an order for 23 of the 13 word per minute tapes.

K6MLC

☞ After about a week of playing your 13 word per minute cassette (which I timed out at 14 words per minute, incidentally!), I went down and passed the General exam with no strain. The plain language of the FCC exam seemed so slow that I lost all fear after the first few letters and made perfect copy from then on. It's fear that gets you, and your tape gave me confidence. Thanks!

WN9JGQ

☞ I've been teaching code for over twenty years now and I've tried every record and tape and other gadget that has come out. Let me say that the 73 MAGAZINE code course is by far the finest that I have ever heard. I never thought I would learn new tricks, but you've taught me a lot about teaching code. Suffice it to say, I am recommending that every student of mine get your tapes.

K1IF

☞ My wife, who has been almost totally resistant to the code, breezed through your 5 word per minute beginners cassette and was ready for the Novice exam in one day.

WB8JON

1 Basic 5 WPM Code — this cassette code course will teach the IMC at five words per minute, all letters, numbers and punctuation. The tape not only gives all these characters, but gives them in a very simple order so you can start copying code within one minute of hearing it. This has got to be the easiest way to learn code ever invented. The cassette actually has the code being sent at 6 WPM, allowing a margin for operator panic when the chips are down and the real exam is at hand.

Basic Code 5 WPM — 60 min. **\$3.95**

2 6 WPM Practice Tape — (also known as The Back Breaker) this is a toughie — five character code groups sent in no particular order, so there is no way to memorize the tape. It is sent at six words per minute to give you that margin for error you'll need when faced with a stern examiner at THE EXAM. Practice in your head or on paper wherever you are, whenever you have a minute or two.

BB-6 WPM — 60 min. **\$3.95**

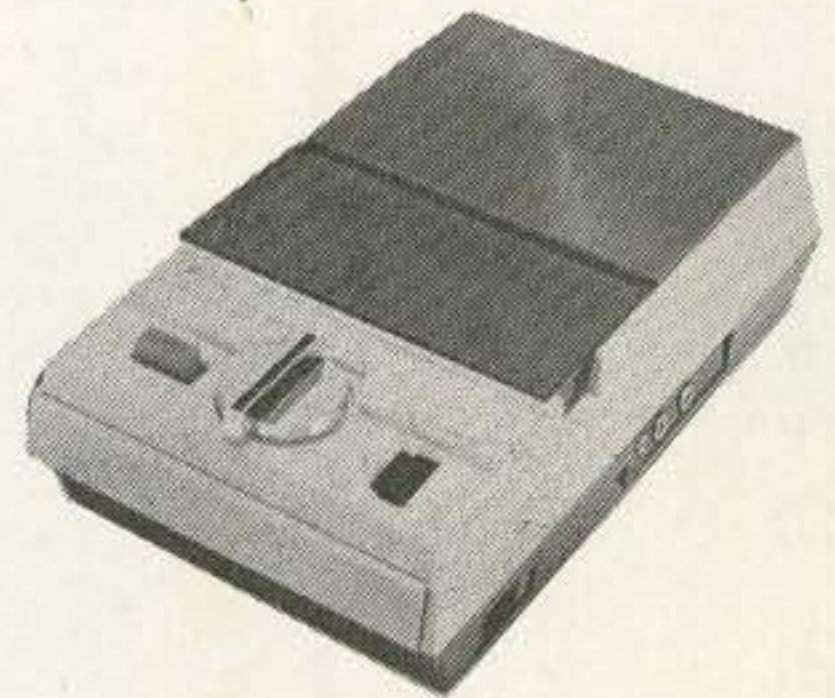
3 13 WPM Practice Tape — This tape will take anyone over the hump which exists when you have

to stop translating the dits and dahs, and go to an automatic recognition system where you "know" what the character is without thinking, thus enabling you to pass the general or advanced code test. This very nasty tape is really at 14 wpm, to give you that added edge when taking the exam.

BB-13 WPM — 60 min. **\$3.95**

4 20 WPM Practice Tape — This cassette has been fiendishly designed to get you through the FCC Extra Class code test with flying colours. The code on this actually runs about 21 words per minute, though it starts out at a lazy 18 per for the first few minutes. The intermix of letters, numbers and punctuation instead of plain language will give you such an edge when you sit down to take the exam that you should be able to breeze through. Though much of your practice with this cassette can be just copying in your head — after all, the important object of practice is to train your brain to convert code into letters — be sure that you exercise your pencil too. The cassette will make your code practice portable, available to you whenever you have a few minutes to spare — even while driving.

BB-20 WPM — 60 min. **\$3.95**



Cassette Recorder

Here is a cassette recorder that is ideal for use with the code courses since it can be operated anywhere.

Comes complete with four "D" batteries, AC power cord, earphone and mike and is useful for dozens of ham applications. Cassette tape recorder is available for only **\$23.95** (plus \$1.00 for shipping and handling).



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Deluxe Recorder

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