

Table 1

DRIVE W	P _O W	E _P V	I _P mA	I _{SG} mA	I _G mA
8	190	1750	370	0	0
16	530	1750	620	0	0
20	730	1750	750	4	*
24	900	1750	830	10	*
30	1000	1730	910	15	*

Note: Amplifier adjusted for best output at highest power level and not retuned for lower drive. * = grid current slightly negative; this condition will vary depending upon loading and plate tuning. For this test, bias was adjusted for plate idling current of 100 mA, screen voltage was 360.

(W2GN) has also attracted crowds wherever he demonstrates his mobile Oscar-working setup that uses the same lineup.

A complete listing of the price classes for the various combinations of exciter/power supply/amplifier would be impractical here. However, a sampling shows the transmitting converter at \$155 (less tubes), the 2-kW supply at \$525, the 1-kW supply at \$250, the amplifier kit (less tubes) \$340, or the amplifier assembled and tested at \$490 without tubes. There are several variations available, as well as individual parts for the more ambitious do-it-yourselfer. You can write to ARCOS for a list, but do Fred and yourself a favor and send an s.a.s.e. to speed up the reply. Address: ARCOS, Box 546, East Greenbush, NY 12061. — W1SL

ARCOS UHF kW Amplifier

Dimensions (HWD): 6-1/4 X 12 X 8-1/4 inches.

Power input: See Table 1.

Power output: See Table 1.

Cooling: Forced air; 300-350 CFM blower recommended (available from ARCOS).

Power requirements: 2000 V dc, 1A; 360 V dc, 50 mA; 6.0 V ac (adjustable), 6 A; bias adjustable from 0 to -120 V dc. A suitable supply is available from ARCOS.

Tubes required: Two each 4X150A, 4CX250B or 4CX250R

Tuning range: Approximately 415 to 440 MHz.

Price class: \$340 for the amplifier kit without tubes. 4CX250R tubes available at \$94 a pair.

Manufacturer: Amateur Radio Component Service, 35 Highland Dr., East Greenbush, NY 12061.

MICROCOMM UHF MODULES

Getting to uhf and microwave frequencies via the modular assembly route is a concept that has been touted by several of the more active builders, experimenters and operators during the last two or three years. The idea has much merit when one considers that the state of the art is changing on an almost daily basis. By having the sections of a receiver or transmitter in separate enclosures or boards, it is easy to slip in a new design that incorporates the latest device available. Testing and troubleshooting are made easier, perhaps doubly so,

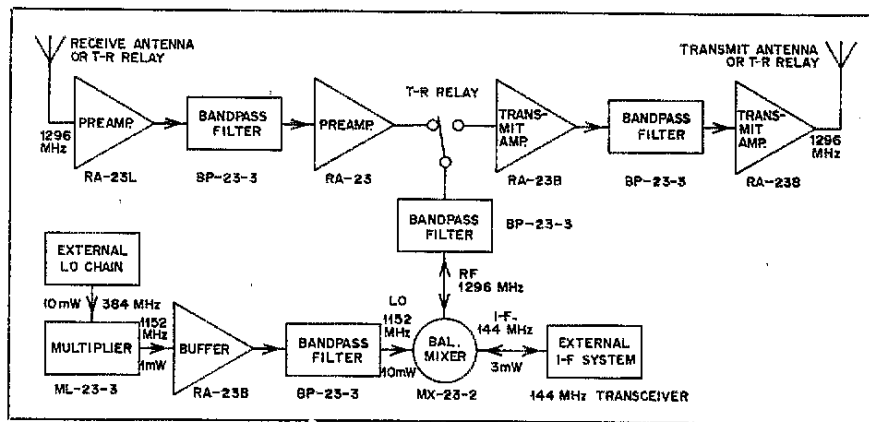


Fig. 1 — A functional block diagram of a 1296-MHz station using Microcomm components. Only a local oscillator and multiplier, along with a source of 2-meter ssb or cw, need be provided by the user.

since the interconnecting system utilizes an impedance common to much instrumentation in both amateur and commercial systems.

Operators and experimenters will find the Microcomm line of equipment a welcome addition to their station. There is something attractive about a well-made piece of equipment that can be plugged in and used without a lot of fuss and feathers. If you want to try designs of your own, it is nice to know that the next stage (mixer, amplifier, filter) is one of measured and stable performance so that you are evaluating *your* device, not the entire system.

The functional block diagram illustrates the building-block scheme suggested by Paul Shuch, WA6UAM, of Microcomm. Many of the design ideas for the modules have been described in *Ham Radio* magazine. Improvements and suggestions keep him busy, however, so that new designs are always being checked out in the lab. A case in point — the diode-switch board, shown in the photograph, will not be described here because there are some new ideas in the works which could well result in a different board layout with improved performance. Now for a look at the individual boards.

MX-23-2 Balanced Mixer

A good start in a 1296-MHz receiving or transmitting station would be the mixer. With the aid of some local-oscillator injection, this

module will enable you to hear (or transmit) a signal and provide the basis for much experimenting or local contacts. The MX-23-2 mixer is of the ring hybrid or "rat-race" type, much described in microwave literature for many years. The Microcomm circuit is optimized to use 144 MHz as an i-f for either transmitting or receiving.

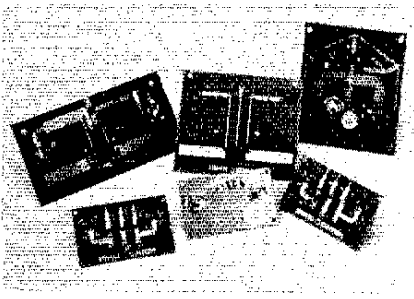
Conversion loss in the mixer is approximately 7 dB. Isolation between the rf to local oscillator ports is better than 20 dB. From the i-f to rf ports and the local oscillator to i-f ports the isolation is 15 dB or better. Local oscillator injection level should be between +5 and +15 dBm. Output power for transmitting will be on the order of 0.5 mW. Receiving noise figure should be in the vicinity of 9 to 10 dB.* Price class for the mixer is \$26.

ML-23-3 Diode Multiplier

A parallel requirement for the mixer is a source of local oscillator injection energy. Microcomm offers a diode multiplier that will provide 1152-MHz output to mix with a 2-meter signal for either receiving or transmitting. Input level from a 384-MHz oscillator and multiplier chain (user-provided) should be near 10mW. Output from the diode multiplier will then be approximately 1 mW. An amplifier should be used to bring this up to a suitable level for the mixer. Two poles of output filtering on the module help clean up the output spectrum and thus avoid degrading the noise figure of the mixer. Another use for the multiplier module is as an excellent weak-signal source for receiver or antenna alignment; simply change the frequency to provide an output at 1296 (or whatever) MHz. Price class is \$15.

RA-23 Preamp

There are four versions of this amplifier available, each with a specific designator and purpose. Of great interest to many experimenters would be the RA-23L, optimized for best noise figure. It utilizes the MRF-901 device, providing a noise figure of 3 dB* and a gain of approximately 10 to 12 dB. This would be a good choice for a first stage in a receiving system. For the second stage, a model RA-23 would suffice. It offers 12-dB



gain at a noise figure of 3.3 dB. The model RA-23B amplifier is biased to provide better large-signal handling ability, such as linear amplification of the output from the 1152-MHz multiplier, or the output of the mixer when transmitting. For even higher signal levels, an RA-23D should be used. It will handle input signal levels up to approximately 10 mW (if diode limiters are added).

All of the amplifier modules require 12-V dc for operation. Price class: RA-23, \$40; RA-23B, \$42; RA-23D, \$45; RA-23L, \$45.

BP-23-3 Band-pass Filters

Frequency-multiplying and mixing circuits are, by their very nature, producers of many products, most of which are unwanted and do the overall system performance no good, to say the least. Microcomm has a filter to help "sanitize" the spectrum throughout the receiving or transmitting process. It has 3 poles of filtering to offer better than 30 dB of off-frequency rejection. The 20-dB bandwidth is approximately 300 MHz, with an insertion loss of 1 dB. It also shows a 3-dB bandwidth of 150 MHz, and a Q_L of approximately 8.5. There is a two-pole version available that has 20 dB of rejection at a bandwidth of 570 MHz.

Both versions of the filter are tunable over the range of 1100 to 1500 MHz, thus making them suitable for use at either the injection frequency (1152 MHz) or at the signal frequency (1296 MHz) anywhere in the system. Input and output impedance is 50 ohms. Price class is \$13.

Connectors

With the exception of the i-f output port on the mixer, the Microcomm modules all use SMA connectors. These small units are well suited for low-loss applications at this frequency and power level. If obtaining mating connectors is a problem for the buyer, Microcomm will furnish them at cost (\$2.05 each) if ordered with a module. Separate connector orders will require an additional \$1 each for handling. The connectors are designed to fit RG-55, 58, 141, 142 or 223/U coaxial cable.

Other Products

Not being one to stand by and watch things happen, Paul is adding items to the list even as this is being written. Among things that are in the works are an improved diode switch, as mentioned before, and 432-MHz preamplifiers. He has also produced some programs for you HP-25 calculator buffs — four packages covering the design of amplifiers, microstripline, for calculating impedance matches and for reflection terms. These programs are available at \$2 each. If you would like more information on any of the Microcomm products, or to receive word on new products, send an s.a.s.e. to Microcomm, 14908 Sandy Lane, San Jose, CA 95124. — WISL

*[Editor's Note: Precise measurement of noise figures at uhf requires equipment that is beyond the reach of most amateurs; the ARRL laboratory and WISL's workshop are no exceptions. Comparison readings made on these modules using various HP and ALL noise-figure meters, produced no conclusive numbers with an accuracy of better than 0.3 dB. A more accurate method, utilizing a hot and cold source, was not available. Therefore, considering the variations in readings obtained, and after doing some listening tests, the conclusion is that the numbers given for noise figure are good "ball-park" specifications that fit the average devices.]

THE HEATH IC-2100 ELECTRONIC SLIDE RULE

What with all the pocket calculators available these days one would wonder why a review on another one? The answer is simple — this is not a pocket calculator. Probably most amateurs, such as this reviewer, have pocket-size calculators. However, in our case, the one that



gets the most use is not the pocket calculator but the "desk"-size Heath ESR (Electronic Slide Rule). Don't misunderstand, our battery-powered small calculator is great to use on some occasions. But the one that is best for our purposes is the Heath "computer" which is installed at the desk where most work is done. (We also find as one gets older the large display tubes with letters more than 1/2 inch high are much easier to read.)

The Heath Model IC-2100 ESR duplicates nearly all slide-rule functions and automatically locates the decimal point, and with greater accuracy. In addition to the standard arithmetic functions (+, -, x, ÷) with chain (series) operation in all modes, the ESR will compute A^x , \sqrt{x} , $1/x$, e^x , $\ln x$, $\log x$, $\sin x$, $\cos x$, $\tan x$, $\arcsin x$, $\arccos x$, $\arctan x$, and π .

Other significant features include the following: Angular computations in degrees or radians, automatic clear when turned on $\sqrt{\quad}$, a key to clear an incorrect entry and/or the complete computation. Two register keys ($X \leftrightarrow Y$ and $X \leftrightarrow M$) allow the display register (x) to be interchanged with the working register (y), and the display register (x) to be interchanged with the memory register (m).

The kit can be wired in two evenings. There are two circuit boards, one that holds the display tubes and primary circuitry, while the other holds the keyboard. The keyboard consists of 26 keys plus two switches. The readout uses an eight-digit display, with seven-segment tubes. As mentioned earlier, the display is easy to read because of the large size of the digits.

Either of two line voltages can be chosen during construction, 120 or 240 volts. Power consumption is five watts. The ESR measures 9-5/8 inches long, 7 inches wide, and 2-1/4 inches high. Its price class is \$80. — WJCP

MK-75 ELECTRONIC KEYSER WITH REPROGRAMMABLE MEMORY

One of the problems with new equipment is that of not having sufficient input from the "field" to aid the design. There's no doubt that the people at Brown and Simpson had all the correct information when they designed the MK-75. In addition to having a very attractive appearance it contains some unusual and worthwhile features useful for the contester or even the casual operator.

The first feature which might strike you is that the keyer has a weight control. Being a cross between the Accu-Keyer¹ and the TO², a weight control has been incorporated in this portion of the unit. Iambic operation, automatic letter-and-word space and self-completing characters are other features found in the keyer. A built-in oscillator, with tone and volume controls, acts as a monitor.

The reprogrammable memory incorporates a new method of storing the information. This effectively increases the length of the messages that can be stored. Another interesting feature: When a message is being sent, tapping the dot side of the paddle will stop the message instantly, or tapping the dash side will stop the message at the end of the next word. For Sweepstakes enthusiasts, the insert function is a "natural." By using the insert function it is possible to create a pause in a message so that a sequential number can be added. After the number has been inserted, the message will restart automatically. The edit function allows the operator to make corrections to portions of a message without reprogramming the entire message. A little time with the user's manual and the MK-75 will reveal all the features that are available.



The MK-75 was used at W2PV during the second cw weekend of the ARRL DX Competition. Its operation was flawless, even with several kilowatt amplifiers being run simultaneously. It is felt that the MK-75 would be a useful addition to the station of any cw operator. In the \$350-price class, the MK-75 is available from Brown and Simpson Engineering, Scarborough, Ontario, Canada, M1P 3K9. — WJGQ QST

Footnotes

¹ Garrett, "The WB4VVF Accu-Keyer," *QST* August, 1973.

² Opal, "The Micro-TO Keyer," *QST*, August 1967.