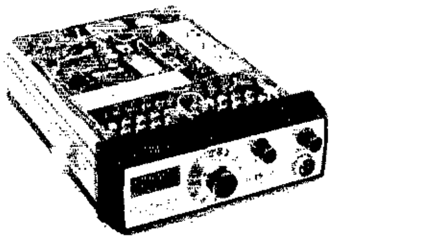
Recent Equipment

To acquaint you with the technical features of current amateur gear.



This view shows the front panel and receiver circuit board. Directly behind the panel is the crystal switching section and the netting capacitors for each crystal. The cover, mounting bracket, and microphone have been removed in the interests of clarity.

SBE Linear Systems

SB-450

UHF/FM Transceiver

THE SB-450? Sounds like one of those new 450-watt hf-band ssb transceivers, doesn't it? Well, it isn't. Not only doesn't it run QRO, but it can't work on hf and won't work on ssb. What it does do is to put out more than 5-watts of phase-modulated rf in the 420- to 450-MHz (70-cm) band. Into a box which measures 6-1/2 inches wide, 2-1/4 inches high and about 10 inches deep (including knobs and connectors), SBE has managed strategically to stuff 29 transistors, 24 diodes, 4 ICs, one SCR and scads of other, albeit mundane, components and make them work (very well indeed) at 450 MHz.

Typical of what one would expect of an fm rig on the two-meter band, this little box comes complete (less antenna) and ready for under-the-dash mounting. It is already set up for 446.0-MHz simplex operation and for 449.5/444.5-MHz repeaters. Connect +13.8 volts and a matched 70-cm antenna and you're on uhf fm – yes, the state of the art *is* moving that fast these days. Only a few years ago rigs for 144 MHz with these features were just coming into prominence. Now the compact-equipment frontier has shifted to 70 cm without sacrificing any of the features considered so necessary for today's operation.

Receiver Section

Two bipolar transistors (in cascade) are used in the rf stage of the receiver, placing four tuned circuits between the antenna and the receiver mixer. Front-end selectivity and sensitivity requirements are thereby acknowledged and met. The receiver oscillator/multiplier chain is quite conventional. The required crystal frequency can be found by subtracting the receiver i-f (10.7 MHz) from the operating frequency and dividing that figure by 12. Crystals in the 36-MHz range are needed.

The output of the mixer goes into a crystal-lattice filter and from there through an i-f/limiter strip which contains two ICs, two bipolar transistors, and three unspecified devices which are, presumedly, ceramic filters. The discriminator feeds a rather elaborate af system consisting of four bipolar transistors and an IC. The resulting 2 watts of audio really can rattle the cone of the built-in 2-1/4-inch speaker. A rear-apron jack is provided for use of an external speaker, if desired: its use disables the built-in speaker.

Sensitivity is 0.5 μV for 20 dB of quieting. Although we lacked adequate local activity, tests made in the ARRL lab using signal generators indicated the SB-450 has good rejection characteristics of near-frequency signals at substantial amplitude levels.

Transmitter Section

The phase-modulated transmitter employs nine bipolar transistors in the rf portion and one bipolar type and an IC in the modulator. Output from the modulator is split into two equal branches and applied to a pair of voltage-variable-capacitance diodes, each located across the tuned circuit of a lightly coupled band-pass filter at the output of the oscillator. See Fig. 1.

Multiple-tuned circuits and shielded band-pass filters are much in evidence throughout the design. Transmitter output is very clean. And speaking of power output, there's a fair amount of it, too. We measured approximately 5-1/2 watts into a 50-ohm

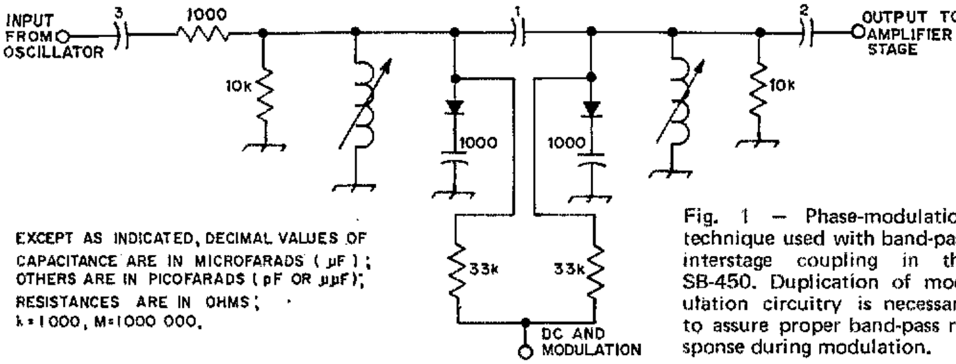


Fig. 1 — Phase-modulation technique used with band-pass interstage coupling in the SB-450. Duplication of modulation circuitry is necessary to assure proper band-pass response during modulation.

dummy load. Tweaking for maximum output at one frequency can produce up to 6 watts at the sacrifice of power at other frequencies.

The proper transmitting crystal frequency may be determined by dividing the desired output frequency by 18. Crystals in the upper reaches of the 24-MHz range are used. The final amplifier is protected in the usual shutdown manner should the rig be operated into an open or short circuit or too high an SWR (over 2). The manual details adjustment of this circuit.

Pluses

Obviously a unit of this general type is not something that just gets slapped together in haywire fashion. A great deal of thought went into the design of this package. For example, in addition to the aforementioned provisions for an external speaker, another rear-apron jack is provided for remotely keying the unit. These features, together, make it possible to trunk-mount the unit out of the sight of would-be thieves. The feature may be a handy thing for big-city dwellers. Because its designers were far thinking, the SB-450 has 12-channel capability on both receive and transmit modes. All 24 crystals are separately trimmed for exactitude of netting.

Another attention-to-detail feature is the low current demand of the circuitry. The receiver idles at less than 200 mA with no signal input; with a fully modulated, full-quieting signal and the af gain running wide open, the current drain is less than 450 mA. On transmit an output of 5-1/2-watts may be obtained with only 1.7 amperes being drawn.

Minuses

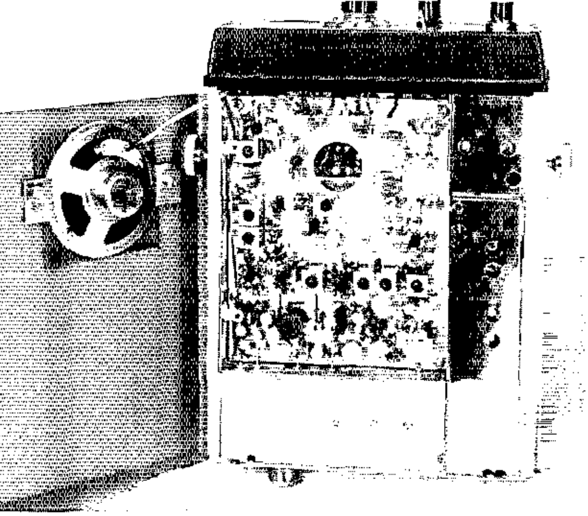
Nothing negative could be found with the unit itself, but the manual leaves great room for technical-information improvement. As an operator's manual, it's fine. The only circuit described therein is the final-amplifier protection circuit. Some, but not all, of the pc boards and subassemblies are diagrammed; board layouts for certain sections of the transmitter are unaccountably missing. There are test points on the boards which don't show up in the schematic diagram. Because of the compactness of the unit and the paucity of the manual, troubleshooting could be trying to all but the most tenacious and experienced technicians.

SBE Linear Systems
SB-450 UHF/FM Transceiver

Power requirements: 13.8 V dc, nominal, negative ground only. Less than 450 mA on receive and less than 1.8 A on transmit.*
Channel capability: 12 channels each on receive and transmit; all have adjustment trimmers.
Dimensions (HWD) and Weight:
2-1/4 × 6-1/2 × 8-1/4 inches (less mounting bracket, knobs and connectors): 4 pounds, 10-1/2 ounces less mounting bracket (5 pounds 8 ounces with mounting bracket).*
Crystal holder type: HC-25/U for both receive and transmit.
Transmitter power output: 5.5 watts.*
Transmitter deviation: Adjustable 0-15 kHz.*
Transmitter crystal frequency: Output frequency divided by 18.
Receiver crystal frequency: Operating frequency minus 10.7, divided by 12.
Frequency range: 420-450 MHz.
Receiver i-f: 10.7 MHz, single conversion.
Receiver sensitivity: 0.5 μV for 20 dB quieting.*

Receiver filter: Crystal lattice type.
Price class: $400.
Manufacturer: SBE Linear Systems, Inc., 220 Airport Blvd., Watsonville, CA 95076.

* Measured in ARRL Lab.



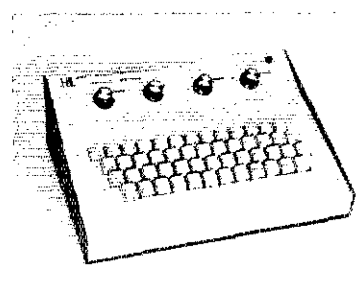
Bottom view showing the transmitter board. The output band-pass filter is along the bottom, directly above the UHF connector. The 70-cm amplifiers are in the shielded areas to the right.

Summary

The manual notwithstanding, the SB-450 is a fine package. It's very compact and multifeature laden. When the gang wakes up to uhf fm, SBEs SB-450 will be there waiting. It's tomorrow's rig today, in the truest sense. *W1GRE*

QST —— QST —— QST

Hal MKB-1 Morse Keyboard



A RECENT addition to the growing list of equipment offered to the amateur by HAL Communications Corp. is their MKB-1 self-contained Morse-code keyboard keyer. In appearance it is similar to the HAL RKB-1 TTY keyboard,[1] but in function it is entirely different. The TTY keyboard sends Baudot code and the Morse keyboard sends Morse code; other than the fact that both are operated by depressing keyboard keys, there is little other similarity in their operation. (To be technically correct, the MKB-1 keyboard sends International Morse, or Continental code.)

Keyboard-operated keyers have been around for a number of years, long before the days of modern solid-state electronics. A few early versions were constructed by using rather complicated arrangements of relays and interconnecting wiring. One of the first all-electronic solid-state keyboard keyers to be published appeared in *QST* for May, 1961.[2] Since that time, several articles on keyboard keyers for home construction have appeared in the various amateur magazines, and a number of models have become available commercially.

In general, all of the recently designed keyers work in the same fashion. The operator pokes the keyboard key corresponding to the code character he wishes to send, and out comes the proper code. Punch another key, and out comes the code for that character. Of course there's a speed control to vary the rate at which the code is sent. In most keyers, depressing and holding one key will initiate a string of identical code characters, separated by the proper spacing interval. (In a few keyboard keyers, depending on the circuit design, it is necessary to release the key and depress it again in order to repeat a character.) In operation, the various keyboard keys are depressed in the desired sequence, one after the other. Because the code characters vary in their duration, it is necessary for the operator's fingers to linger on some keys, such as the J, Ø Y, and Q, and to move quickly off of other keys, such as E and I. To the touch typist and "hunt and peck" artist alike, typing various

[1] See Recent Equipment, "The HAL Communications RVD-1002 RTTY Video Display Unit and the RKB-1 TTY Keyboard," *QST*, April, 1973.
[2] Johnson, "Codamite," *QST* for May, 1961.