Product Review Column from *QST* Magazine

June 1982

AEA Isopole-220 220-MHz Vertical Gain Antennas

Edmund Scientific Mini Solar Panels

Egbert RTTY Program

Heathkit Model VL-2280 2-Meter Base Station Amplifier

M & M Electronics Model MSB-1 Audio Filter

Macrotronics Terminall

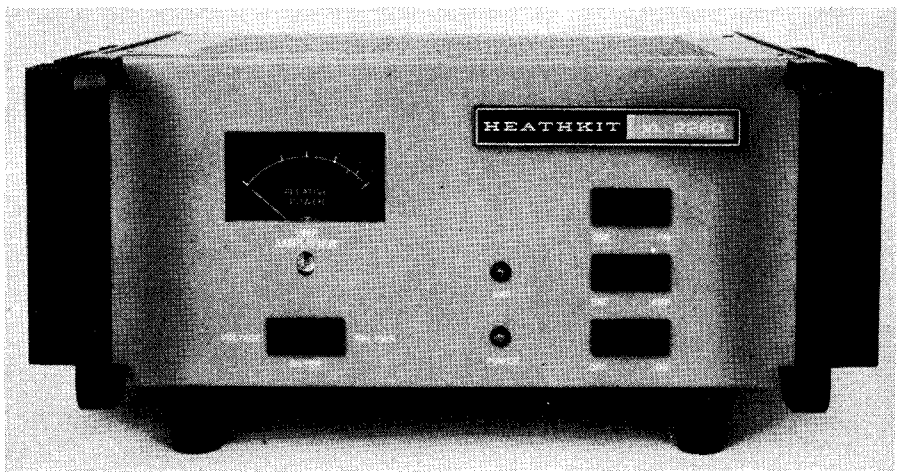
Product Review

Conducted By Paul K. Pagel,* N1FB

Heathkit Model VL-2280 2-Meter Base Station Amplifier

Have you ever tried to operate your 2-meter mobile rig from home, using an external power amplifier and associated heavy-duty power supply? Unless you do this often, what results from such a setup is a disastrous mess of coaxial cable and power cables. Heathkit has provided a solution to this problem, and in the process has designed a fine base station amplifier — the VL-2280, a 75-watt linear amplifier and a heavy-duty, regulated supply in one cabinet.

The front panel of the '2280 is simple, yet functional. A back-lighted panel meter reads switch-selected relative power or supply voltage. Three other switches select amplifier bypass (EXC/AMP), transmit-receive delay (SSB/FM), and ac POWER. Two green LEDs indicate when the dc supply is on, and when the amplifier is on. The rear panel has connections for rf in and out, fuses for primary power and supply output, the ac line cord and an accessory socket with connections for T-R control. There is provision for a 13.8-V, 4-A output for powering external equipment.



Construction and Circuit Details

Because the VL-1180 mobile amplifier and the VL-2280 are basically the same, the information will not be repeated here. The reader is requested to refer to the earlier review.[1] Construction time did vary; it took 13 hours to complete the VL-2280.

Testing and Operation

During the initial testing of the amplifier, the MRF247 failed — cause unknown. Heath promptly supplied a replacement device, and it has provided trouble-free service ever since.

Because of some constructional errors caused by yours truly (the over-anxious builder), the '2280 failed to meet the manufacturer's published specifications. Once the errors were corrected, the '2280 passed with flying colors.

The VL-2280 was used during a mountain-topping contest effort, on a very hot day. During 24 hours of operation, the power output remained constant. Two anomalies appeared during the contest. Rf energy from other transmitters in the area caused the T-R relay to chatter, and the T-R switching delay on ssb was much too long for rapid-fire communications. Each of these problems was corrected, the former by placing the amplifier in the bypass mode when not in use, and the latter by using T-R control from the exciter.

I'm very happy with the amplifier. Operating my mobile rig from inside the house is a simple task, and the amplifier delivers an outstanding signal. Since I enjoy operating linear modes, I'm glad Heath made the '2280 a linear amplifier — not one just for fm (Class C)! Price class for the VL-2280 is $275. For more information, contact Heath Company, Benton Harbor, MI 49022 — *Gerry Hull, AK4L*

[1]Product Review, *QST*, May 1982.

*Assistant Technical Editor

Heathkit VL-2280 2-Meter Amplifier

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 144-148 MHz.	As specified.
Power output: 75 W nominal with 10 W drive.	80 W at 10 W drive.
Spurious and harmonics: 60 dB down.	Greater than 70 dB.
Third-order distortion: −30 dB below PEP.	Exceeds −24 dB measurement ability of test equipment.
Power requirements: 120 V ac at 4 A, 240 V ac at 2 A or 12 V dc at 11 A.	
Modes of operation: Ssb, cw, RTTY and fm.	As specified.
Duty Cycle: 50%; 10 min on, 10 min off.	Not measured.
Size (HWD): 5-1/2 × 13-1/2 × 12-3/4 in.†	
Color: Gray and Black.	
Net Weight: 27 lb .	

†mm = in. × 25.4.; g = oz × 28.35; kg = lb × 0.454.

MACROTRONICS TERMINALL

☐ I've used a number of RTTY/cw "interfaces" with my TRS-80® (Model I) computer and, in my opinion, the Macrotronics Terminall is the best. It is easy to install and use. Also, there are many options that make it versatile.

Installation

All radio connections are made by means of a 24-pin edge connector on the rear panel. Three cables, two with standard quarter-inch phone connectors, are already soldered to the edge connector. These are used to interconnect the terminal to the transmitter cw key jack and the receiver headphone jack. The third cable is wired to the transmitter microphone connector.

A small interface board mounts directly on the expansion port of the TRS-80® keyboard or expansion interface. A 2-foot long ribbon cable connects this interface to the main unit. The final connection is to an ac power source (117 or 234 volts, selectable).

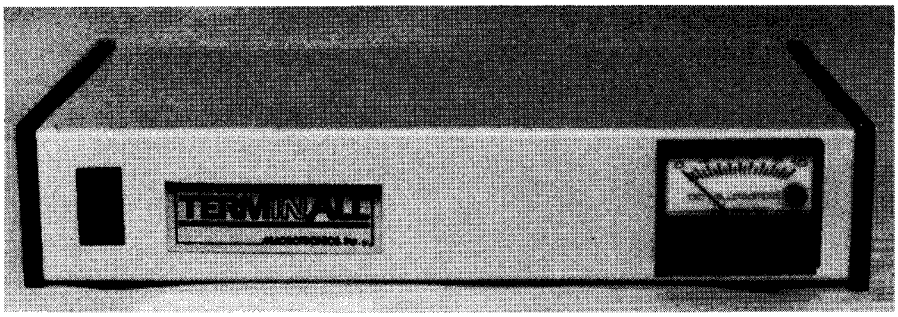
Software

Terminall software is provided in cassette and diskette formats. Cassette software requires 16k of RAM and Level II or Model III BASIC; the diskette software calls for 32k of RAM and a disk system.

The most-wanted cw and RTTY operating options are included in the software. You can create and save preprogrammed messages, such as equipment description, name, location, etc. These messages may be mixed with control functions that permit automatic station identification, time announcements, mode changes, etc., during message transmission. For RTTY, you can choose fast, slow or no "diddle," UT4-type delay, wide or narrow shift (170 or 850 Hz), automatic cw identification, ignore carriage returns/line feeds, and automatic unshift-on-space. WRU functions are also provided.

In the cw mode you can transmit and receive at speeds from 1 to 135 wpm (the Terminall automatically adapts to whatever cw speed is received). In the RTTY mode, the standard Baudot speeds are included (60, 66, 75 and 100 wpm). ASCII at 75 and 110 baud, with 6- 7- or 8-bit word lengths and odd, even or no parity, is also provided.

Once you set up the software options to your liking, you can save that option configuration



on cassette or diskette for loading at future operating sessions. You can save as many configurations as you need: one for cw contests, another for RTTY traffic handling, for example.

Hardware

Terminall hardware consists of a complete RTTY/cw terminal unit. The RTTY demodulator, employing active filters, is quite sensitive and selective. Signals that are barely audible are printed perfectly, and, unless another signal zero-beats the one being received, QRM is no problem. A front panel tuning meter is used during RTTY reception.

The cw demodulator uses band-pass filtering tuned for an overall bandwidth of 100 Hz centered at 1 kHz. Sensitivity and selectivity are comparable to that of the RTTY demodulator. The algorithm used to decode cw is as successful with sloppy fists as it is with good fists. A front panel LED is used when zeroing in on the desired cw signal.

The hardware also includes a crystal-controlled afsk generator, a loop keyer and receiver, RS-232-C input/output, a sidetone generator and a "real-time (time of day) clock." This clock is used for transmitting real-time information on the air, and is the source of the time continually displayed on the video screen during operation. It is independent of the computer; therefore, disk I/O operations do not disrupt the clock function.

A separate interface board is used to latch the control signals from the computer and to buffer input into the computer. It also limits the radiation of rf from the address and data bus to reduce interference to radio equipment.

Evaluation

All Terminall software and hardware performed faultlessly.

After an hour or so on the air, one should become an expert with the major operating controls. The Terminall is available for either the TRS-80® Model I or the Model III from Macrotronics, Inc., 1125 N. Golden State Blvd., Turlock, CA 95380. Price class: $500. — *Stan Horzepa, WA1LOU*

EGBERT RTTY PROGRAM

☐ I remember RTTY — that's the mode that uses those noisy mechanical nightmares . . . Gladys almost divorced me the last time I tried RTTY . . . I'd *love* to try RTTY, but I can't justify the expense of the required equipment.

If the thought of RTTY brings one of the above lines to mind, the Egbert RTTY Program could be for you. Noisy mechanical teleprinters and most of the expensive interfacing hardware are no longer necessary to get started in RTTY operation.

This program is designed for use with the Apple II Plus® personal computer, or an Apple II® with an Applesoft BASIC language card. With either system, 48k of Random Access Memory (RAM) and one disk drive are required. The diskette will work with either of the Apple II® Disk Operating Systems (DOS), so there is no need to run a "loader" or "format" program ahead of this one. This makes the program compatible with all Apple II® computers, old and new alike.

Features

Egbert RTTY has several capabilities that make it a pleasure to use: (1) Transmission and reception of 170-Hz shift Baudot at 60, 67, 75 and 100 wpm and 110-baud ASCII make the package compatible with almost every station on the RTTY airwaves. (2) Receiver tuning is accomplished via the Apple® high-resolution graphics mode. (3) End-of line indication is provided to alert the operator when a carriage return must be inserted. (4) This program has provisions for sending any one of the nine operator-stored "canned" messages with two keystrokes. This is a handy feature for station description or traffic handling. (5) The program features an "n-key rollover," which allows the user to type ahead of the transmitted text. This system allows formulation of a reply *even while receiving*. (6) Cw identification is generated automatically at the end of each transmission.

The most outstanding feature of this package is that no terminal unit (TU) or frequency-shift keyer (fsk) is necessary for initial operation — the Apple II® decodes the incoming signal and generates the afsk tones internally. The only connections that need be made are between the receiver audio output and the Apple® CASSETTE IN jack (for reception), and between the CASSETTE OUT jack of the Apple® to the MIC INPUT connector of the ssb transmitter. After setting the audio levels (instructions included), you're on the air.

How well does the system work? For a barebones system, results are very gratifying. After several months of use, with no additional filtering than that offered by my transceiver, I worked 25 states and the same number of countries. For the casual operator, the system will "play" well as is. For the serious RTTYer, I'd recommend using an audio filtering device or terminal unit.

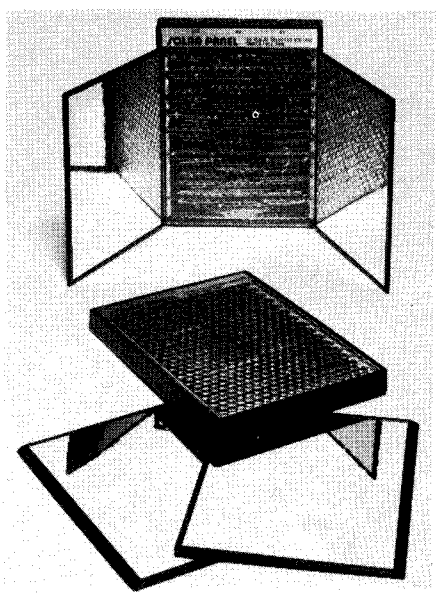
All factors considered, the Egbert RTTY Program is a great way for the Apple II® owner to get involved in RTTY with a modest initial investment. The package is available through the W. H. Nail Co., 275 Lodgeview Dr., Oroville, CA 95965. Price class: $25. — *Michael B. Kaczynski, W1OD*

EDMUND SCIENTIFIC MINI SOLAR PANELS

☐ Edmund Scientific is selling two small, lightweight, low-voltage, low-current solar panels that are ideal for use with QRP equipment. Both panels produce approximately 50 mA at the rated voltage when exposed to bright sunlight. One panel is designed for 12-V output, while the other has taps for 3, 6 or 9 volts. Output is through subminiature phone jacks. Each panel is equipped with a set of folding mirrors that reflect extra light onto the 24 crescent-shaped solar cells.

Tests conducted at ARRL Hq. indicated that the panels are useful for recharging battery packs. On a slightly overcast winter day, I was able to achieve a charge rate of 35 mA into two nickel-cadmium cells while using the 6-V tap. The charge rate dropped to approximately 18 mA from the 3-V tap. We can extrapolate that the 12-V panel will provide a moderate charge rate into 7- to 9-V battery packs.

Each panel measures 5-3/4 × 4-1/4 × 1/2 inches (HWD) (without the mirrors) and weighs approximately 4 ounces. Price class is $20 for the multivoltage version and $15 for the 12-V version. For more information contact Edmund Scientific Co., 101 East Gloucester Pike, Barrington, NJ 08007 — *Peter O'Dell, KB1N*



AEA ISOPOLE-220 220-MHz VERTICAL GAIN ANTENNAS

☐ The IsoPole-220 is similar in construction and design to the IsoPole-144.[2] It is a 5/8-λ antenna designed with decoupling in mind. What effect does decoupling have on the performance of a vertical radiator? Plenty! Decoupling keeps current from flowing on the outside of the coaxial cable that feeds the antenna. If current is permitted to flow it generates additional fields that interact with the antenna radiation field. This results in a distortion of the radiation pattern. The distortion will vary with the particulars of each antenna and installation. In some cases, a quarter-wavelength ground-plane radiator may outperform a *gain* antenna, because the combined fields of the antenna and the transmis-

[2]L. Aurick, Product Review, *QST*, April 1980, p. 51.

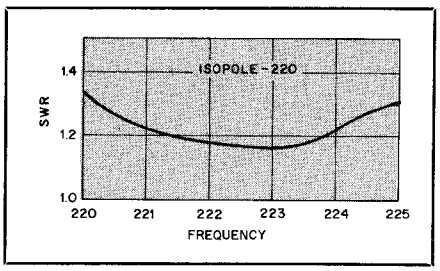


Fig. 1 — SWR curve of the AEA IsoPole-220

sion line result in a major lobe elevated several degrees above the horizon.

So much for the theory. How well does the IsoPole-220 perform? Because of an intermittent problem with a commercially manufactured gain antenna at W1AW/R, a quarter-wavelength ground-plane antenna built in the ARRL lab was installed. With the ground-plane antenna in service, I had difficulty accessing the repeater from my home (about 15 miles away) with 10 watts feeding an outside antenna. Things changed when we installed the IsoPole-220. Now I am able to key the repeater from inside my house while using a 1-watt portable rig with a "rubber ducky." I don't know what this means in terms of decibels, but I do know what it means with regard to performance.

A "junior" version of the antenna is also available. It is a 1/2-λ antenna with one decoupling cone. Price class for the IsoPole-220 is $40. Additional information may be obtained from Advanced Electronics Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036 — *Peter O'Dell, KB1N*

M & M ELECTRONICS MODEL MSB-1 AUDIO FILTER

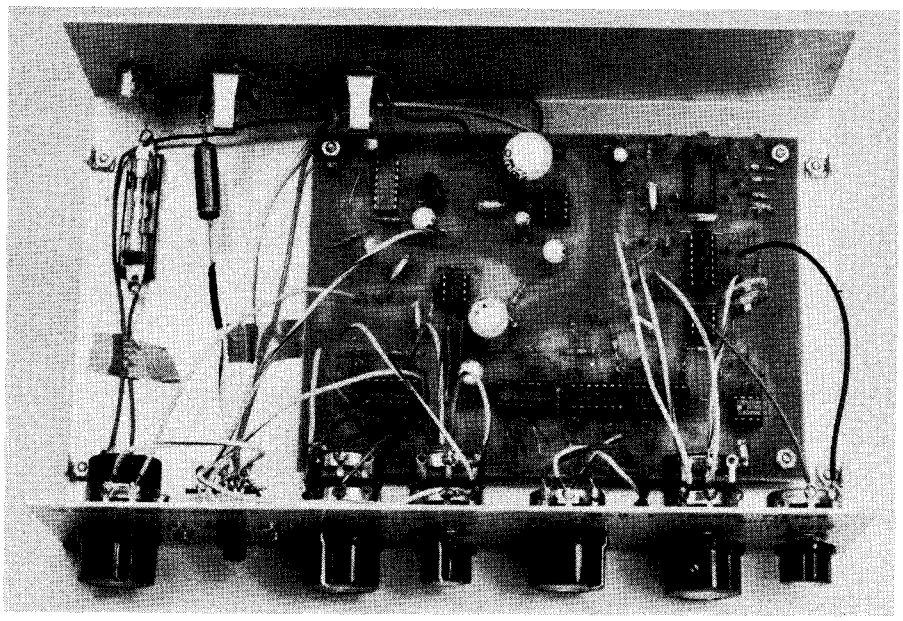
☐ With the influx of new operators to the amateur ranks, the hf bands seem more crowded than ever. This overcrowding and the state of the art have spurred several equipment manufacturers to hunt for different means of interference reduction in their new products. Variable bandwidth, tunable passbands and notch filters are definitely here to stay, along with large price tags for new gear with these features. In these tough economic times, many amateurs are opting for relatively inexpensive audio filters rather than springing for an expensive "state-of-the-art" transceiver.

If your late-model rig is still working like new, but lacks some of the modern i-f "goodies," an audio filter could be the answer. A wide variety of audio filters is available today, ranging from single-element cw to complex multistage units. The M & M Electronics MSB-1 falls into the latter category.

Features

The MSB-1 contains four separate filter sections, all designed to achieve optimum signal intelligibility. A brief description of each follows.

In ssb operation, very little intelligence is contained in the frequency spectrum below 300 Hz. The designers at M & M incorporated a high-pass section with a low-frequency cutoff of 300 Hz. This thoughtful inclusion eliminates both ac hum and off-frequency "rumble," while not reducing the intelligence of the desired signal. Most other audio filters rely on the selectivity of other stages to reduce low-frequency interference, while the MSB-1 eliminates this interference before processing the signal. This is a definite plus — less interference reaches the filter to begin with, so it can do a better job of signal handling.



If the i-f bandwidth of a rig is too wide, unwanted off-frequency (adjacent channel) signals will be heard. The band-pass and low-pass filter sections of the MSB-1 are designed to reduce this interference.

The adjustable band-pass filter allows the user to select the optimum band-pass center frequency and width for reception. Many other units offer only adjustable bandwidth while making no provision for adjustment of the center frequency. For true versatility, both should be adjustable, and in the MSB-1, they are.

After the passband is optimized, an adjustable low-pass section is available to eliminate any remaining "hiss" from off-frequency cw and ssb signals. This section is an 8-pole device, variable over the 300- to 3000-Hz range. During ssb and RTTY operation, this can be used to eliminate splatter.

Last, but definitely *not* least is the adjustable notch section. If you have ever listened to the 40-meter band in the evening, you have undoubtedly noticed the presence of broadcast carrier "whistle." The MSB-1 rounds out its filtering capabilities with a notch filter designed to eliminate almost any single-tone signal that will be encountered in normal operation. Like the band-pass-filter section described previously, both the frequency and selectivity are completely variable over the 300-to 3000-Hz range. This is handy during RTTY operation. The notch depth is approximately 50 dB, which is more than adequate even under the most severe conditions.

Performance

Initial operation of the filter was attempted using a 9-V power supply. At this voltage level, the audio output of the filter was quite weak and distorted. These problems were cured immediately when the supply voltage was raised to 12. I used the MSB-1 for several months under widely varying conditions, from casual ragchewing and low-band DXing to contesting. The improvement in reception was quite surprising. Signals buried "in the noise" jumped to Q-5 copy almost every time with the filter in line. The four filter sections help to increase the signal-to-noise ratio while offering little or no additional noise.

During RTTY operation, the separate band-pass, low-pass and notch sections were quite useful in elimination of unwanted information contained in the ssb passband. This produced almost error-free copy while using the Apple II® microcomputer with no terminal unit. The notch is set between the mark and space tones, with band-pass and low-pass sections adjusted for a "double-hump" response.

The manufacturer offers an ac adapter as an accessory, but I would have preferred a built-in supply. Price class of the MSB-1 is $84.95; ac adapter, $8.95. Both units are available from M & M Electronics, P.O. Box 1206, Brewton, AL 36427. — *Michael B. Kaczynski, W1OD*

M & M Electronics MSB-1

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Notch filter: Adjustable from 300 to 3000 Hz, notch depth 50 dB.	As specified.
Band-pass filter: Tunable center frequency, 300 to 3000 Hz; variable bandwidth, from 75 to 1500 Hz.	As specified.
Low-pass filter: Tunable, from 300 to 3000 Hz.	As specified.
Power requirement: 9 to 12 V dc at 300 mA.	12 V required at 300 mA.
Size (HWD): 2-3/4 × 10 × 5-1/2 in.	As specified.