

and stripping a multitude of wires during construction. Even though the two 20-volt supplies use discrete parts altogether (no integrated circuits), the circuit-board technique makes for a surprising amount of open space inside the enclosure. When you first remove the cover you get the impression there's "nobody home," even though there are nearly a hundred components inside.

The enclosure for the tri-power supply measures 7-1/4 x 10-1/2 x 4-1/8 inches. The overall dimensions are slightly greater because of protruding knobs, binding posts, etc. The weight of the completed supply is just a tad under 10 pounds, and of course most of that weight is in the power transformer. The supply has provision for switching to operation from either of two input ac voltage ranges, 105-135 or 200-270. The supply may be operated from either 50- or 60-Hz lines, and requires an input of 100 watts at full load. Price class at the time of this review is \$80 in kit form, or \$140 if you wish to purchase a factory-assembled version. The IP-2718 is available from Heath Company, Benton Harbor, MI 49022. — *KITD*

HAL ST-6000 DEMODULATOR

One of the more recent offerings in HAL Communications Corporation's line of radio-teleprinter demodulators was evidently designed for "no compromise" operation. The HAL ST-6000 demodulator includes both pre- and post-detection filters, input-agc stage and automatic bias-distortion-correcting circuitry to ensure reception in the presence of interference or noise, and the autostart and anti-space features prevent the TTY machine from printing garble when no valid RTTY signal is being received. A keyboard-operated switch (KOS) circuit turns on your transmitter auto-

matically whenever you type on a keyboard or send cw identification, and a crystal-controlled audio frequency-shift keyer (afsk) is built into the ST-6000 circuitry.

State-of-the-art circuitry is used throughout. R-C active filters replace the ubiquitous 88-mH toroid coils in the input (pre-detection) filter, discriminator and post-detection filter. The six-pole input filter (equivalent to three tuned circuits) is very effective in reducing the effects of noise and interference. One disadvantage of active filters — susceptibility to overloading by strong signals — is ameliorated by including an automatic gain-control circuit (agc) preceding the filter.

The afsk generator uses high-frequency crystal-controlled oscillators for good stability. The hf signal is run through a digital frequency divider and digital-to-analog converter to produce the audio tones. Frequency shift is selected by the same front-panel push buttons that switch the pre-detection and discriminator filters so that the afsk and demodulator frequencies are always the same. The unit can be supplied with the low-frequency (mark) tone on either 2125 or 1275 Hz. Frequency shifts provided are 170, 425 and 850 Hz. In addition, the cw identification feature produces a tone 100 Hz below the mark frequency.

Some commercial shortwave RTTY stations use 425-Hz shift, so this shift width is useful for those who enjoy shortwave listening. The post-detection filter has a bandwidth wide enough to copy speeds in excess of the 100 wpm that some commercial stations use. Although this bandwidth is wider than optimum for amateur 60-wpm operation, it doesn't seem to cause any serious decrease in copying ability. If desired, the bandwidth could be changed by changing the value of three capacitors in the filter.

The tuning meter uses the "plus-plus"

method — that is, both mark and space signals give a positive indication on the meter. Correct tuning is achieved when the meter doesn't flicker while an RTTY signal is being received. An optional oscilloscope tuning indicator gives the standard "plus-sign" readout (vertical line for space, horizontal line for mark).

Most internal signals are available for use through a connector on the rear panel. For example, it is possible to route the CMOS compatible post-detection RTTY signal out to a digital processor (such as a UART signal regenerator IC) and then back into the keyer stage to control a 60-mA loop. The ST-6000 can key a current loop (up to 100 mA) using either the internal 175-volt, 60-mA supply or an external voltage source (or both simultaneously). In addition, outputs are supplied that conform with EIA RS-232C specifications (± 12 volts space/mark) or MIL STD-188C specs (± 6 volts mark/space). Power requirements are either 110 or 220 volts ac.

Cabinet styling is designed to match that of the companion DS-3000 KSR video terminal. However, the flexible input/output (I/O) options make the ST-6000 compatible with just about any TTY gear on the market today, and its advanced features ensure that this unit should satisfy the amateur RTTY operator's demodulator needs for years to come! — *WA3JSU*

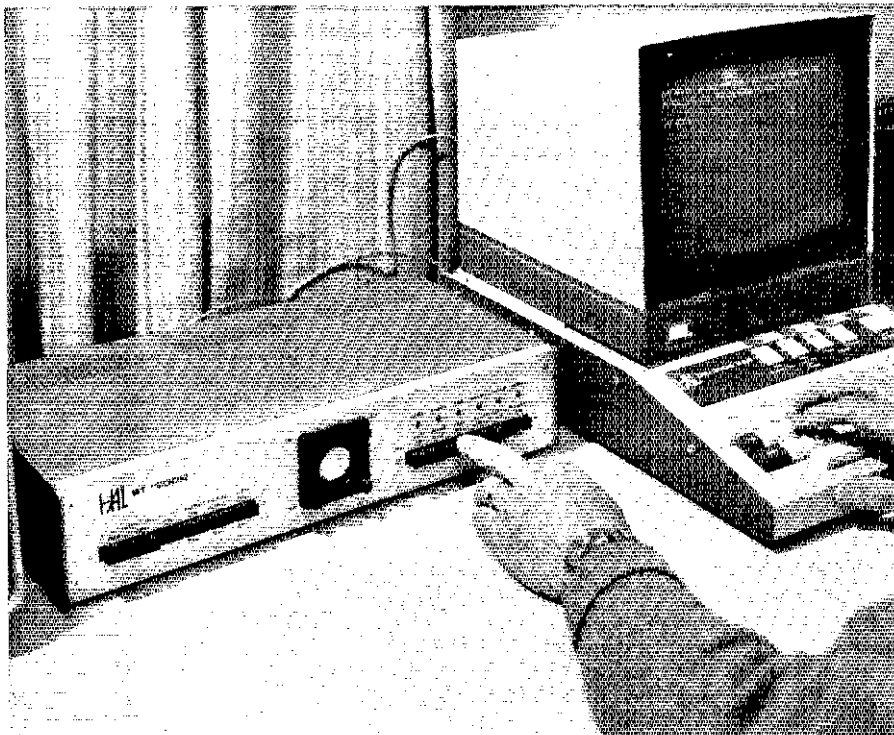
HAL DS-3000 VIDEO DISPLAY TERMINAL

With microprocessors being used in everything from missiles to toasters, it seems only logical to expect to find them in teleprinter circuitry. After all, TTY machines are controlled by digital signals readily adaptable to the binary language of computers. The HAL DS-3000 KSR video display terminal is an all-electronic TTY "machine." It comes complete with keyboard and a TV screen to take the place of the ubiquitous roll of yellow paper found on conventional teleprinters.

With a 72-character-per-line capability, the unit is compatible with most surplus TTY machines in use today. The screen can display up to 16 lines of text. When you start to type the 17th line, the top line disappears and all the other lines move up to make room for the new one at the bottom. This process is known as "scrolling."

An Intel 8080A microprocessor IC gives the DS-3000 the ability to perform a bevy of functions never before available in a communications teleprinter. The unit will print (and send) both Baudot (communications) and ASCII (computer) codes at a variety of speeds. (ASCII is available in the "2X" version only.) Available are 60, 66, 75, 100 and 132 words per minute using Baudot code and 100, 150, 300, 600 and 1200 wpm ASCII. Even if you never use anything but 60 wpm on the ham bands, the extra Baudot speeds are fun to have for copying the commercial shortwave stations (most of whom seem to be using 66 and 100 wpm). The ASCII option, of course, makes the device usable as an "intelligent" computer terminal.

Microprocessor control allows you to type a whole page (TV screen) of text, go back and correct your mistakes, then send the corrected copy at the speed of your choice. The



The HAL ST-6000 demodulator (left) and the DS-3000 video display terminal (right).

feature makes composing keyboard pictures easy. In addition, you can store up to 255 characters in a special memory which may be recalled at will by pressing a button. For example, you can load in CQ CQ CQ DE WIAW WIAW WIAW and then fill the whole screen with CQs merely by pressing the button a few times. A third 255-character memory acts as a buffer so that if you type faster than the machine is printing out, it will remember what you typed for later transmission. Thus, you can type up to 255 characters ahead. On a conventional teleprinter, if you type even one character ahead, the key will lock until the previous character has been sent.

Other "bells and whistles" include a feature that causes the machine to type out THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG'S BACK 1234567890 whenever you hit the proper keys. If the machine is placed in the "word mode," it won't output a word until you start typing the next one. Thus, if you notice a mistake before the word is finished, you can just backspace and correct it so that the fellow at the other end of the circuit thinks you're a faultless typist!

Even more impressive to the other operator is the "blankfill" switch. This sends blanks whenever the buffer memory is empty. Even a hunt-and-peck typist can send a steady 60 wpm with this feature!

"Unshift-on-space" (machine returns to lower case whenever a space character is sent or received) can be switched on or off from the front panel. Automatic carriage return/line feed (machine automatically starts a new line whenever a line runs over 72 characters) is always available. In fact, when the "word wrap-around" mode is selected, the unit will

move the *whole word* to the next line so that the word won't be broken in the middle. This means you never have to worry about carriage returns — the machine will automatically start the new line at the proper place as you type!

A keyboard-operated switch (KOS) circuit is available for "break-in" RTTY operation. Whenever data are being sent, a keying transistor is biased ON to ground the push-to-talk line in your transmitter. When the machine stops sending, it will automatically return the station to receive.

Input/output (I/O) standards are quite versatile. Either EIA standard RS-232C or a standard high-voltage TTY current loop may be used.

For the apartment dweller, or for the RTTY enthusiast who simply doesn't like large, noisy TTY machines, the DS-3000 KSR may be the perfect solution. Small, lightweight, attractive and noiseless, it's an alternative that even the most fastidious spouse can approve! — *W4JJSU*

HAMTRONICS P8 VHF PREAMPLIFIER

Older model receivers (and some new ones too) often need a little help receiving weak signals. When feed-line losses have been reduced to a minimum, when antenna operation has been optimized and when the receiver front end has been tweaked, the simplest way to improve sensitivity is to install a preamplifier in front of the receiver. For casual operation, a preamp with an extremely low noise figure is not required. In most cases, the gain of the preamp will mask the poor noise

figure of the receiver, and its own noise figure will be low enough. The Hamtronics P8 preamplifier is such a device. Using two JFETs in cascade, the P8 provides a gain of 20 to 23 dB.* The preamp we tested was intended for use on the 2-meter amateur band, but a unit may be selected to provide amplification over various ranges between 83 and 190 MHz. Hamtronics will supply a finished preamp, aligned at the desired frequency (model no. P16) for about \$17, or a kit of parts (model no. P8) for about \$8. The kit provides all parts including an etched glass-epoxy circuit board. One aspect of the kit may surprise some builders; a short piece of enameled wire is supplied, and the constructor must wind the coils per the instruction sheet for the desired frequency of operation. This should pose no problem for the builder, as the coils are small and require only a few turns of wire. One obvious advantage to this method is that the builder may change the operating frequency in the future by referring to the instruction sheet and rewinding the coils accordingly. The kit went together quickly and worked as soon as power was applied. Alignment took only 15 minutes to optimize. Because most vhf rigs are transceivers, the 1/2 x 2-3/8-inch circuit board should make it easier to install the preamp between the antenna relay and the receiver input, making external connections and switching unnecessary. The preamp should make a significant improvement in reception of vhf cw and ssb, fm repeater, and OSCAR 7 Mode B signals. The P8 preamp is available from Hamtronics, Inc., 182 Belmont Rd., Rochester, NY 14612. — *W1XZ*

*Measured in the ARRL lab.

the experimenters. For many years he has served as a pathfinder for those who wanted to try their luck in low-frequency QRP work. His notebook is a reflection of his efforts and acquired skills over the years, but it contains a lot of technical meat as well.

Ken's book is sure to elicit the praise of those who are smitten with radio nostalgia, as it contains a lot of miscellany about old-time circuits and techniques which were in vogue during the early days of amateur radio. There is even a section on winding old-style coils and loops from yesteryear!

For those who still "dig" vacuum tubes there is material that will make the reader bristle with delight — numerous tube-type circuits for transmitting and receiving between 160 and 190 kHz. Most of the circuits, including a few solid-state ones, are somewhat removed from the state of the art, but they should serve as good starting points and stepping stones to a permanent foothold on the low-frequency band.

Adding spice, the author's philosophies are sprinkled throughout the pages. The narrative is totally casual — the sort of reading that goes well with a glass of your favorite beverage and a few puffs of well-aged pipe tobacco. Once you digest this notebook you'll probably be given to fits of impatience to warm up the soldering iron, raid the ham junk box, and start building your first low-frequency station.

Cornell has included a reprint of the FCC rules and regulations concerning operation in the band. There is a fascinating section on antennas for use in the 160- to 190-kHz range, and none of them are hard to build and adjust.

Even if you don't intend to "fire up" a station for the experimenter's band, you'll want this book for plain old pine-stump reading. It's a refreshing departure from the oft-times stilted and highly technical narrative found in much of the amateur literature of today. — *W1FB*

Strays



I would like to get in touch with . . .

□ a pen pal who shares my interest in stamps, swimming, baseball, hiking, television and reading. I am 41 years old and have a wife and two children. Imao Kaneko, no. 654, Yoshida-cho, Totuka-ku, Yokohama, Japan.

□ anyone who has converted a GF PLL CB set for use on an amateur band. Vic Davis, WA1SLV, Armory Rd., Milford, NH 03055.

N7PC AT PC '77

□ Special-events station N7PC was set up at the main entrance to the Las Vegas Convention Center for delegates attending the Per-

sonal Communications and the Automotive Parts Conventions. Over 200 radio amateurs attended these conventions and visited N7PC from nearly every state and many foreign countries, with the JA amateurs getting the honors. Approximately 300 contacts were made by WA7MRS, W7MWF, W7PBV, K7ZOK and WB7BDX. A special QSL card is available to all who worked N7PC. QSL to N7PC, P. O. Box 945, Boulder City, NV 89005. — *W7PBV*

NEW BOOKS

The Low and Medium Frequency Radio Scrap Book, by Ken Cornell, W2IMB. Published by *Ham Radio Magazine*, Greenville, NH 03048. Soft-cover version, 8-1/2 x 11 inches, 110 pages. Price: \$6.95.

This fascinating and informative publication is probably the most complete collection of notes available to those who are interested in the frequencies between 10 and 1600 kHz and, more particularly, the so-called experimenter's band between 160 and 190 kHz. If you aren't familiar with the latter, it's a band where operation is legal without an FCC license. [The restrictions are one watt maximum dc input power to the last stage of the transmitter, and an antenna whose total length, including the feed line, does not exceed 50 feet. Scattered groups of experimenters are active in the U.S. They transmit beacon signals for one another to hear, and use their initials, amateur calls, or whatever as call letters. QSOs are mostly carried out by means of cw.

The author is the unofficial patriarch of



Kay Davis, WB7BDX, operating in Las Vegas.