10:00-10:30 p.m.	0300-0330	R. Kiev	B	12080, 11780, 9800, 9775
10:00-10:50 p.m.	0300-0350	V. of Free China	C	17890, 15345
10:00-10:55 p.m.	0300-0355	R. Prague	B	11990, 9630, 9540, 7345, 5930
10:00-10:55 p.m.	0300-0355	R. Peking	B	17532, 15300, 15060, 12080, 12055, 11685
10:00-11:00 p.m.	0300-0400	RAE, Argentina	C	9690 (Tue-Sat)
10:00-11:00 p.m.	0300-0400	R. Beghdad	C	11935
10:00-11:00 p.m.	0300-0400	UBC, Uganda	B	15325
10:00-11:00 p.m.	0300-0400	R. Moscow	B	11960, 11770, 11750, 11720, 9700, 9685, 9530
10:00-11:26 p.m.	0300-0426	R. RSA	B	9585, 7270, 5980, 4990, 3995
10:00 p.m.-2:00 a.m.	0300-0700	VOA	A	15240, 9670, 5995
10:25-10:30 p.m.	0325-0330	V. of Armenia	B	15405, 15180, 15100, 11870 (Sun., Wed, Thu, Sat)
10:30-10:55 p.m.	0330-0355	R. Tirana	B	7300, 6200
10:30-10:55 p.m.	0330-0355	Austrian Radio	C	9770, 6155
10:30-11:00 p.m.	0330-0400	R. Australia	B	17795
10:30-11:15 p.m.	0330-0415	R. Berlin International	B	11970, 11890, 11840
10:30-11:45 p.m.	0330-0445	BBC	A	11910 (to 0430), 9410, 6175, 5975
10:30-11:50 p.m.	0330-0450	R. Habana Cuba	A	11930, 11725
10:30-12:00 p.m.	0330-0500	R. Tanzania	D	15435
10:30 p.m.-1:00 a.m.	0330-0600	R. Habana Cuba	A	11760
10:30 p.m.-2:30 a.m.	0330-0730	R. Moscow	B	15180, 15100, 12050, 12000, 11720, 11690, 9710
11:00-11:15 p.m.	0400-0415	R. Japan	B	17755
11:00-11:15 p.m.	0400-0415	R. Budapest	B	15220, 11910, 9833, 9585, 6105, 6040 (Wed & Sat)
11:00-11:30 p.m.	0400-0430	R. Bucharest	C	11940, 11840, 9690, 9570, 6155, 5990
11:00-11:30 p.m.	0400-0430	R. Canada International	A	9535, 5960
11:00-11:30 p.m.	0400-0430	R. Norway	B	11860, 9645 (Mon only)
11:00-11:55 p.m.	0400-0455	R. Peking	B	17532, 15300, 15060, 12055, 11685
11:00-12:00 p.m.	0400-0500	R. Australia	B	17795, 15320
11:30-11:55 p.m.	0430-0455	Austrian R.	C	5945
11:30-12:00 p.m.	0430-0500	Swiss R. International	B	11715, 9725
11:30-12:00 p.m.	0430-0500	R. Sofia	B	11860 (frequent changes)
11:30 p.m.-2:00 a.m.	0430-0700	AFRTS-Washington	A	17765, 15430, 15330, 9685, 6030
11:45 p.m.-12:45 a.m.	0445-0545	BBC	A	9510, 6175, 5975
12:00-12:15 a.m.	0500-0515	Israel R.	B	15485, 15105, 11655
12:00-12:15 a.m.	0500-0515	R. Japan	B	15105
12:00-12:30 a.m.	0500-0530	R. Portugal	B	11935, 6025 (Mon-0520)
12:00-1:00 a.m.	0500-0600	R. Australia	C	21680, 17890, 17670, 17725, 15240
12:00-2:00 a.m.	0500-0700	HCJB, Ecuador	B	11915, 9745, 6095
12:15-1:15 a.m.	0515-0615	Spanish Foreign R.	B	11880, 9630
12:22-12:30 a.m.	0522-0530	UN Radio	A	9540, 6055 (Sat)
12:30-12:50 a.m.	0530-0550	V. of Germany	A	11785, 9545, 6185, 6100, 5960
12:30-1:25 a.m.	0530-0625	R. Nederland	A	9715, 6165
12:45-1:00 a.m.	0545-0600	UN Radio	A	9540, 6135 (Sat)
12:45-2:30 a.m.	0545-0730	BBC	B	15070, 11955, 11860, 9640, 9510, 6175
12:55-3:35 a.m.	0555-0835	V. of Nigeria	B	15185, 15120, 11770, 7255
1:00-1:15 a.m.	0600-0615	R. Japan	B	15105
1:00-1:30 a.m.	0600-0630	R. Norway	B	11860 (Mon only)
1:00-2:00 a.m.	0600-0700	RAE, Argentina	C	9690 (Tue-Sat only)
1:00-2:00 a.m.	0600-0700	R. RSA	C	21535, 17780, 15220
1:00-4:15 a.m.	0600-0915	R. Australia	B	15320
1:15-1:30 a.m.	0615-0630	R. Canada International	B	11845, 11775, 9655, 9590 6140, 6045 (Mon-Fri)
1:25-3:55 a.m.	0625-0855	V. of Malaysia	C	15295, 12350, 9750
1:30-2:00 a.m.	0630-0700	R. Korea	C	9640
1:30-3:00 a.m.	0630-0800	R. Habana Cuba	A	9525
1:40-7:15 a.m.	0640-1215	R. New Zealand	C	6105
1:45-2:00 a.m.	0645-0700	R. Canada International	B	11845, 11775, 9655, 9590 6140, 6045 (Mon-Fri)
2:00-2:15 a.m.	0700-0715	R. Japan	B	15105
2:00-3:00 a.m.	0700-0800	Xandir Malta	C	9670 (Sat only) (frequent changes)
2:00-4:00 a.m.	0700-0900	R. Australia	B	11740, 9570
2:07-2:15 a.m.	0707-0715	UN Radio	A	9540, 6135 (Sat)
2:30-2:45 a.m.	0730-0745	UN Radio	A	9540, 6135 (Tue-Sat)
2:30-3:25 a.m.	0730-0825	R. Nederland	B	9770, 9715
2:30-4:00 a.m.	0730-0900	BBC	B	15070, 11955, 9640, 9510
3:00-3:15 a.m.	0800-0815	R. Japan	B	9505
3:30-4:25 a.m.	0830-0925	R. Nederland	B	9715

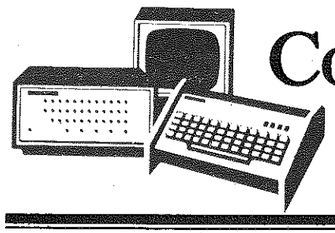
Explanatory Notes.

1. Times in first column are CDT. For EDT, add 1 hour. MDT, subtract 1 hour. PDT, subtract 2 hours. Days of week are in GMT.

2. Quality. A—strong signal and very reliable reception. B—regular reception. C—occasional reception under favorable conditions. D—rarely audible. These ratings are for locations in the central USA. European and African stations are in general, more reliably received in eastern North America. Asian and Pacific stations are more reliably received in western North America. North American stations are received well except in areas too close to the transmitter site.

3. The information in this listing is correct to press time. However, frequencies and schedules are constantly changing. Listen to "DX Digest" at 1807, 1920 to Europe, Sunday; 0120, 0320, on Monday and 1915 Wednesday to Africa on R. Canada International for late changes.

4. R.–Radio; V.–Voice



Computer Bits

By Leslie Solomon
Technical Director

TWO NEW GRAPHIC SYSTEMS

THIS MONTH, our focus is on a couple of fascinating graphic systems. One is a computer plug-in that uses an external tablet and pen. The other is a very low-cost true light pen that works in conjunction with the CRT screen just like the big guys.

The computer plug-in system is the Talos Digitizer Interface ($449) from Talos Systems, Inc. (7419 East Helm Drive, Scottsdale, AZ 85260; Tel: 602-948-6540). The version we tested was for the Apple-II microcomputer. Other versions, including those for the IMSAI and Radio Shack TRS-80, are planned. There is also an RS-232 version available.

The interface comes with an Apple plug-in card, a 6′ (1.8-m) interconnecting ribbon cable, an 11″ (28-cm) square plastic "writing surface" tablet, and a built-in pen at the end of a soft flexible cable. Power is supplied by the Apple computer. All you do is plug the board into an I/O slot, riffle in a small (about 33 bytes) machine-language program and a short BASIC program—both are in the manual—and run. Using the integer BASIC residing in the Apple, up pops a low-resolution graphics program that demonstrates the usefulness of the Talos system.

The screen shows all black, with a "menu" display of seven different colors (in boxes) arranged across the bottom. You "dip" the pen into one of these colors, and proceed to "paint" on-screen. Colors as well as the background can be changed when desired. Erase is also provided. Drawing speed is 100 coordinate pairs (X and Y axis) per second, somewhat faster than a 9600-baud RS-232 port. Although the large block graphics appear crude, the system does show how to create graphics in the high-resolution mode of the Apple.

To take full advantage of the high-resolution graphics, you should have floating-point BASIC like Apple's "Applesoft-II." Unfortunately, the cassette version of this language needs 10K of RAM and since we have only 16K (almost an Apple "standard"), we elected to use an Applesoft-in-ROM board. This board plugs into an I/O slot, and the BASIC pops up when the usual control-B is operated. This option costs about $200, but when you consider that you still have 16K of RAM and the 10K floating-point BASIC at your fingertips, the cost balances out.

Since Applesoft (from Microsoft) is a version of a widely used BASIC, there is lots of software for it. Like other Apple manuals, the Applesoft manual is excellent. It completely explains the BASIC with many programming examples. It also does an excellent job of answering a big problem—how can a hardware-oriented computerist create the great high-resolution color graphics that programmers find so easy?

The manual completely explains how to create high-resolution color shapes, move them around, change their size, and even rotate them. There are programming examples to illustrate each step. If you want to see this BASIC you can buy the Applesoft-II manual for $6.95, a small investment for a good book on BASIC even if you don't have an Apple microcomputer.

Once we had the Applesoft running, we played the Talos Super-Graphics tape. This BASIC high-resolution (280 × 160 or 280 × 192) program resides in the 16K of RAM. Once running, it requires no further contact with the computer. There are seven programs available. The first displays the X–Y coordinates of the pen as it is moved around the tablet. It also indicates pen (on/off)

status. The second program allows measuring the distance between any two points on the tablet, including irregular lines. The third program allows measuring the area of any irregular polygon, while the fourth program is a demonstration of music in which pen position on the tablet determines pitch and duration. The fifth program is the low-resolution color graphics previously described.

The fun starts with the sixth program—drawing on the screen in high resolution. In this mode, a small "crosshair" cursor indicates pen position. You can have a black screen with white drawing or a white screen with black drawings. You can have an automatic point-to-point feature (black or white) to make nice straight lines. In this high-resolution mode, handwriting looks almost normal. We traced newspaper and magazine photos and drawings with ease and excellent quality.

The seventh program is similar to the CALMA and CALCOMP drafting programs. There is a menu of AND and OR gates and an inverter symbol. Any symbols can be brought on screen, positioned, and rotated as desired. You can draw in the interconnects to draw a logic diagram, or use the automatic point-to-point mode at inputs and outputs to make clean interconnects.

Using the Applesoft and Talos manuals, we have written a couple of animated "shoot-em-up" programs and, for the first time, feel a good sense of graphic accomplishment. Take a look at the Talos Digitizer at your local computer store, if graphics is your interest.

Light Pen. The second graphics approach we tested uses a simple low-cost real light pen and some relatively simple software. Many of us have seen light pens in use, mostly in large mainframe systems in conjunction with marvelous graphics systems. This seemed to be one area where microcomputers were far behind.

The particular light pen we played with is the Vidiet-Stik from Esmark Inc. (507½ McKinley Hwy., Mishawaka, IN 46544), priced at $39.95 plus $1.50 postage and handling.

The pen itself is extremely simple. It consists of just a light-sensitive Darlington phototransistor, mounted near the tip of a slender plastic tube. The tip becomes active when its movable end piece is pressed against the CRT screen. The flexible cable coming from the pen has three color-coded leads: one for +5 volts, one for ground, and the third carries the signal. The first two leads are conventionally connected, while the third (signal) lead is connected to bit-8 of the computer parallel port.

The manual that comes with the Vidiet-Stik explains its operating software in detail. It also shows several approaches for the pen's use, including a program used both for testing and learning operation of the light pen. Some machine language (Z80/8080) programs are shown for creating the interface between the computer and light pen.

We modified the latter machine-language program for our computer and used it as a subroutine in BASIC programs. When "called," this subroutine Pokes the machine-language program into an out-of-the-way memory location (we used the spare RAM space in our VDM-1) so that it will not get written over by the BASIC.

When called, this subroutine "keeps an eye" on bit-8 of the parallel port, looking for some action of the light pen. When the light pen reacts to a light signal on the CRT screen, the machine-language program passes a bit into the computer. Once the signal is entered, the machine-language subroutine then passes back to the BASIC program, awaiting another call.

All you have to know is which bit of the parallel port is being used and the address of the parallel port. If your machine does not have a parallel port, one of the keyboard entry bits can be used.

With this machine-language program as a subroutine in BASIC, we have used it in conjunction with a graphics board that has much better resolution than the VDM-1. We've been having a ball trying out our artistic skill with this light pen.

Studio II Conversion. Information package on how to construct a new cartridge for the RCA Studio II to convert it into a simple microcomputer is available. It includes schematics, ROM monitor listings, operating instructions, and program listings. No modifications to Studio II are required. Price is $5.00. A pc board and PROM are also available. ARESCO, P.O. Box 43, Audubon, PA 19407 (Tel: 215–631-9052 or 9257).

PET Floppy/S100. The EXS100 is a single S100 size board that connects to the PET memory expansion socket and provides a floppy-disk controller. The board can then be plugged into an S100 "motherboard" for further expansion. Up to three minifloppy-disk drives plug directly into the EXS100. The board uses the IBM3740 format. A special software package that permits loading and storing on disk is available. The board also has provisions for on-board EPROM. Three versions are available: S100 adapter alone ($199.95); disk controller alone ($299.95); and a combination of the two ($349.95). The board is also available as a complete disk package for $799.95. CGRS Microtech, P.O. Box 368, Southampton, PA 18966 (Tel: 215–757-0284).

SS-50 Control Interface. This 6800 computer interface plugs into the SS-50 (SWTP) bus and has 16 DIP switches for address selection. Fully buffered, the board has eight relays (28 volts at 0.1 ampere). It also features eight optoisolators for real world/computer communication. It can be used to input keyboard data or a response from the device it is controlling. The optoisolators can be software and the relays manually disabled to allow the outputs to form a parallel interface. The board can be controlled by assembly language or BASIC Peek and Poke instructions. Priced at $98 (kit) or $125 (assembled), the board is available from Transition Enterprises Inc., Star Route Box 241, Buckeye, AZ 85326.

Heath Printer. The WH-14 Line printer ($895) prints standard 96-character ASCII (upper and lower case) using a 5 × 7 dot matrix print head with a maximum instantaneous print speed of 135 characters per second. Line spacing is 6 lines per inch (8 lines per inch software selectable) with selectable line length of 80, 96, or 132 characters. Baud rate is selectable between 110 and 9600. The device uses 0.5" nylon inked ribbon on 2" spools. Adjustable-width sprocket feed allows paper from 2.5" to 9.5" width. The WH-14 uses an RS-232C or 20-mA current-loop serial interface. A kit version will soon be available. Heath Co., Benton Harbor, MI 49022.

S100/S50 Bus. If you have an S100 bus system and would like to use S50 SWTP peripherals, or vice versa, AUM-ideas (P.O. Box 2582, Richardson, TX 75080) is manufacturing its Dual Bus Board ($29.85, for the bare board) that allows this combination. The Wire-Wrap board comes with layout sheets, instructions, four matching heat sinks, and two yards of #18 wire. The board is fully compatible with the S50 bus. An S50 extender board, with 22 slots is also available for $49.95. ◇