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Kantronics Interface II Terminal Unit And Hamtext--Amtorsoft Software

Kantronics Interface II Terminal Unit and Hamtext™ — Amtorsoft™ Software

The Interface II Terminal Unit is an RTTY/CW/AMTOR modem that's designed for use with your radio equipment, computer and appropriate software. Kantronics supplies several software packages for popular personal computers; this review describes the software for the Apple® II series of computers. (If you're not interested in AMTOR operation, Kantronics offers CW/RTTY-only software, too.) The equipment is designed to send and receive CW at speeds of 5-99 WPM, Baudot at 60, 67, 75 and 100 WPM, and ASCII at 110 and 300 bauds, and offers AMTOR modes A, B and L. Operator-selectable features include Un-Shift On Space (USOS), diddle, automatic ID, word wraparound, automatic carriage return/line feed and printer line feed.

During the course of this review, I examined three software versions: V1.4 (the original disk packaged wth the Interface), V1.5 (the version current at the time of review) and V1.6 (a beta-test model). Changes are being made to the V1.6 software as this review is written; therefore, this review is as current as copy deadlines permit.

Description

Manuals

The Interface and software are sold separately, so two manuals are required reading. The Interface instruction manual is 22 pages long. A schematic diagram, a component-placement diagram and a parts list are included. No alignment (there are no variable controls) or troubleshooting instructions, PC-board overlays or PC-board X-ray views are supplied. A well-written functional description and a block diagram of the modem help you to understand its operation. Pictorial diagrams illustrate a typical station setup and I/O connections. Instructions for modifying the modem for 300-baud ASCII operation, use of the modem with a mechanical teleprinter keying loop and AFSK output-level alteration are given. These are all simple modifications.

Software information is contained in a 27-page, three-ring binder. There's a multiple-pocket, plastic retainer within the binder that's used for storing the master disk, the interface card and the modem/interface card connecting cable. (No schematic diagram or circuit information for the interface card is supplied.) This manual begins with a description of AMTOR operation and the invitation to read an enclosed book entitled, *Introduction to and the Operation of AMTOR,* written by Phil Anderson, WØXI.

The information in the software manual and the enclosed book is, for the most part, well presented, but errors do exist. (As the software is being revised, the printed information is being updated.) Tables are used to list the various keyboard commands for the different modes of operation. There are common tables for the Apple II and II + and another pair of tables for the //e. The primary difference between the table pairs is to show the use of ESCape key commands for the earlier model computers and the use of the OPEN-APPLE and CLOSED-APPLE keys on the //e.

Physicc!

A plastic, beige-colored, clam-shell enclosure houses the Interface electronics. This compact, lightweight unit measuring only 2-1/2 × 6-1/8 × 6-1/4 inches (HWD).[1] A single, 10-segment,

'mm = in × 25.4.
*Assistant Technical Editor
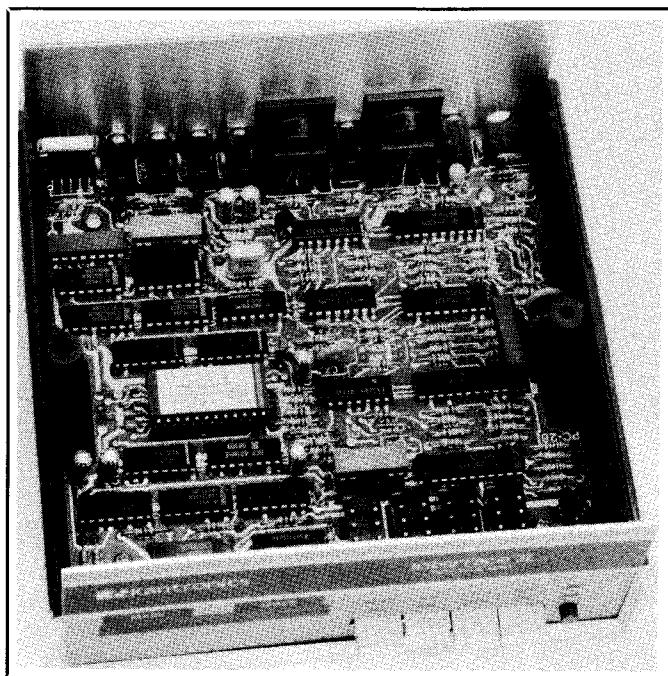
green LED tuning bar is situated at the left-center of the front panel. Immediately above the tuning bar are two labels: MARK (to the left) and SPACE (on the right). The tuning indicator has a "split personality": Half of the total number of segments are used to indicate the level of each RTTY tone. Beneath the bar are four other indicators: CW, 170, 425 and 850. These are illuminated when the desired mode and shift are selected. The CW indicator is red; the three shift indicators are green. Four push-button switches and a power-on LED are to the right of the tuning indicator. The push-button switches control SHIFT SELect, FM/AM operation, CH A/CH B switching and power OFF/ON. SHIFT SELect is a momentary-contact switch that permits a choice of CW operation or 170, 425 or 850-Hz RTTY shifts. As SHIFT SELect is repeatedly closed, the Interface will cycle through the four choices. (The power-on default mode is CW.) The remaining three switches are latching types. FM/AM turns the modem limiter circuit on or off to suit reception conditions. CH A/CH B allows the operator to select between two separate sets of I/O lines. This means you could have two rigs connected for use with the Interface — an ideal situation if you operate HF and VHF. OFF/ON controls the application of external dc power to the modem.

Kantronics supplies a number of connectors for use with the Interface. There are two 5-pin DIN plugs (one already attached to a 3-foot length of multiconductor cable), a 4-pin female microphone plug that is compatible with some transceivers, a 1/8-inch female power plug and four 1/8-inch, two-conductor male plugs for I/O

connections. There's also a length of two-conductor "zip" cord for making up a power-supply cable. You must supply an external, 11- to 15-V dc source with a current capability of at least 200 mA.

The rear panel supports all the modem I/O and power-supply connections. As mentioned earlier, there are two separate sets of front-panel-selected I/O lines. These are channeled through two 5-pin female DIN jacks and provide for PTT, AFSK output, scope mark/space output and ground connections. Separate 1/8-inch female AUDio IN jacks are used for each channel. A 1/8-inch male POWER input jack, four 1/8-inch female jacks (EXTernal SPEAKER, FSK OUT, KEY IN, KEY OUT) and a 5-pin male COMPUTer header jack round out the connections.

The COMPUTer jack is used to connect the modem with the computer by means of a 3-foot-long, five-wire cable and the interface card supplied with the Kantronics software (not with the modem). Of course, you don't have to use the Kantronics software and interface card with the Interface II modem. If you use another modem, though, the I/O lines may not be totally compatible, so you should check that before you apply power to the system.

Assuming you do use the complete Kantronics package, the interface card must be plugged into one of the Apple peripheral-card slots (2-5). This double-sided PC board contains a 6522 VIA (Versatile Interface Adapter), a couple of address-decoder ICs and a few resistors and capacitors. A jumper wire is used to set the card for use in one of the previously mentioned slots. (Apple //e owners with an 80-column card in-

stalled should not use slot 3.) The card provides the system with a time-of-day clock (hours/minutes/seconds) and the requisites for interfacing the modem and computer.

A single, well-populated, double-sided PC board carries the 23 ICs, two DIP relays and a number of other components that make up the modem proper. The board is screened with component identification numbers, but many of them are hidden by the components themselves. Although the top and bottom cabinet halves are plastic, the front and rear panels are aluminum, and the inside of the cabinet has been sprayed with a conductive coating.

Electrical

The audio input stage is amplitude limited, providing a fixed amount of gain for the following active filters. There are two prelimiter switched-capacitor filters (MF10s), one each for 170-Hz and 425-/850-Hz shift operation. The 170-Hz filter is used during CW operation and has a center frequency of 765 Hz. Following the input filters is a limiter stage. This stage may be bypassed for AM (limiterless) operation. Some operators prefer to use this mode when strong interfering signals are present. Kantronics mentions this mode is generally best for CW reception. After the limiter, the signal is passed to two more MF-10 switched-capacitor filters for mark and space detection. Low-pass filtering, threshold correction and slicer stages follow the detectors, and the signal is then passed on to the computer.

Here's a different approach for you: Mark and space tones for transmission are generated by a crystal-controlled circuit that uses an EPROM as a frequency cataloger! Basically, the EPROM determines the rate at which a counter is run. The counter drives a ring counter-D/A converter combination that generates a five-level synthesized sine wave. A two-pole, low-pass filter smooths the wave after which it is attenuated and passed to the output.

Plug-in DIP reed relays are used to control the CW KEY OUT and PTT lines. The DPDT front-panel CH A/CH B switch selects the audio input and PTT lines for the chosen channel; other connections on the output jacks are common.

Software

During the course of the review, I had the opportunity to use three versions of the Apple software. After I'd "gotten my feet wet" with the first version, found a few bugs in it and contacted Kantronics about them, I was told that the version I had was outdated. I returned the disk to Kantronics to have the software updated to V1.5 and also received a beta-test V1.6. Kantronics was kept informed of any difficulties I encountered during the review.

The Apple software offers a selection of three configurations: Apple II/II+, Apple //e 40-column mode and Apple //e 80-column mode. At last: RTTY/CW software that takes advantage of the 80-column feature of the Apple //e! (More on that later.) Unfortunately, provisions have not been made to recognize an 80-column card in the Apple II or II+. Because the software is not copy-protected, you can easily make a backup copy using the Apple COPYA program.

Although I don't recommend you do it (because of the different keyboard commands), Apple //e owners can take advantage of all three software configurations. Should you select to emulate the earlier-model Apples, you must remember to have the CAPS LOCK key set for upper-case characters. In any of the configurations, the screen presentation remains basically the same, the exception being, of course, 40 more columns per line of display in the //e 80-column mode.

The HELLO program BRUNs one of three binary files according to your menu selection. Next, you must identify the slot (2-5) in which the interface card has been placed. The third menu asks you to choose the mode of operation or one of a couple of other options. There is no program-configuration scheme provided (except on beta-test V1.6), so each time the program is run, you must pass through the first two menus answering the same questions each time. A SELCAL ID and other information requested on inner menus also requires reentry. Each time you elect to print the holding buffer (Programs Options menu), you must enter the printer-interface-card slot number. If you do much bouncing back and forth between menus (as I did during the review), this constant reentry of information can be bothersome. A better approach (appearing in V1.6) is to allow program configuration that requires a single entry of the SELCAL ID, Kantronics interface-card slot number, printer-interface card type and slot-number, then bypass the first two menus after configuration. After all, the chances are that the system in use will not change from one operating period to the other, and the master disk can always be used to reconfigure the program.

The software provides time transmission, and message storage and editing capabilities. There's a break-in buffer, printer options, disk storage and retrieval procedures, and a number of other features too long to list. Although a SELCAL ID is requested, that information is used only in AMTOR operation. No RTTY SELCAL or WRU (Who aRe yoU) provisions are included. You cannot select ASCII word length (set at 8 bits), parity (fixed at none), and word/character-mode transmission is not offered; the program uses letter-mode transmission only.

Received and transmitted information may be printed immediately, and data in the holding buffer may be sent to the printer as well. The software and manual indicate that a total of eight different printer-interface cards is supported, and an option for a user-specified card is provided. The cards listed are the Kantronics, Epson™, Grappler™, Grappler+™, SSM parallel, SSM serial, Apple parallel and EP12G. The Kantronics selection allows you to connect the printer directly to the Hamtext interface card. The cable (an option available from Kantronics) requires that one end be compatible with your printer, and the Kantronics interface card end requires a two-row, 20-pin connector. No printer/interface card cable is included with the software/interface card combination, so this option was not checked. Kantronics states that the output from the Hamtext card will drive any Centronics-compatible parallel printer.

The user-specified-card option requires that a machine-language program be written to accommodate your particular printer-interface card. This program must be stored on page three, beginning at $0300. Some hints on what the program should contain are given in the manual. You might also take a look at the code near $0C1C (location may vary according to software version); that's where the inherent printer routines are stored. Don't forget: You'll have to BLOAD the printer-card routine each time you use the software, so modify the HELLO program to do that for you.

Operation

I was pleased to be able to use the 80-column screen capabilities of my Apple //e with this setup. I immediately got the feeling of more "elbow room." The entire screen is initially devoted to displaying received text. Once you press a key, the screen is divided into four sections; all mode selections using essentially the same screen format. The top-most section has three status lines that display mode of operation,

transmit speed, receive speed, clock time, TR status, transmit-buffer space available (TBA) and holding-buffer space available (HBA). Beneath the status lines is a single "Times Square," right-to-left, output scroll. Below that is a four-line transmit buffer display with the rest of the screen (13 lines) devoted to displaying incoming text. The display format is easy on the eyes. It's also pleasing to note that the upward-scrolling text doesn't run into the bottom of the line above.

Once you've made your choice of operating mode, the interface-card clock starts "ticking." You can reset the clock at will. When the time is transmitted, hours and minutes are sent.

CW

This selection defaults to a receive/transmit speed of 10 WPM. No provisions are made to allow the default speed to be changed, but changing the speed (in receive mode only) is a matter of a few keystrokes. Although the receive algorithm is adaptive, Kantronics suggests that the program will function more smoothly if the transmit speed closely approximates that of the received CW. I found this to be true.

The software provides these prosigns: AA, AR, AS, BA, BT, K, KN, NNN, SN and SK. During receive, many (not all) of the prosigns are displayed as inverse characters; this helps to separate the text.

I quickly discovered that the AM (limiterless) reception mode of the modem is the best for CW operation. Incoming noise pulses play havoc with CW reception in most any setup, and this is evident with the Interface II in the FM mode. Switching to AM provides a different picture. The receive algorithm is quite good, and I was surprised to find that it copied some "fists" that other software I use is not able to understand.

Tuning in a CW signal is not difficult at all. During CW reception, the tuning bar will show a mid-range, brightly illuminated segment that appears to shift right and left. Proper tuning requires that the segments illuminate center to right (toward the SPACE panel label). When the signal is properly tuned in, you'll have a center and right-hand segment brightly illuminated, with more dimly lit segments in between. (Watching the LED bar graph during CW-signal tuning reminded me of "Little Brick Out," a low-resolution graphics game on the Apple programs disk!)

RTTY

Program default speed is 60 WPM, still the most commonly used amateur RTTY speed. Tuning in a Baudot or ASCII RTTY signal is a simple matter of getting the left- and right-most tuning-bar segments illuminated. I found weak-signal reception to be quite good, hampered primarily by QRM. Speed changes, selection of different inner menus, clearing the screen, etc., are accomplished with simple keystrokes. The 80-column display is a pleasure to use. Reverting to a 40-column display is difficult for me after using the "expanded" screen.

I tried mark-only reception by switching to the 425- and 850-Hz shift positions while copying stations using 170-Hz shift and speeds of 60 and 100 WPM. This method works quite well with strong signals.

AMTOR

There are three types of AMTOR operation you can use: Mode A, master/slave; Mode B, with forward error correction (FEC); and Mode L, listening. If you've never used AMTOR before, you might try spending some time in Mode L — just listening — to gain some familiarity with what you can expect to see on your screen. Since you're eavesdropping in Mode L, you won't be getting error-free copy (you'll see the repeated information), but it will give you

a taste of AMTOR operation.

AMTOR signals are a bit more difficult to tune in than a Baudot/ASCII RTTY signal. There isn't instant data display on the screen. Before the information is displayed, synchronization must be accomplished. Once that happens, and valid data is received, the incoming data will pop onto the screen in groups of three: three letters, two letters and a number, etc. (Spaces count, too, don't forget!)

The second status line of the AMTOR screen displays LOCK, VALID, XMIT and IDLE labels. Beneath these labels a cursor-like inverse block will appear when that function is active: LOCK, when synchronization has been achieved; VALID, when valid data is incoming; XMIT, while you're transmitting (in addition to the RECEIVE or TRANSMIT indication at the upper-right side of the screen); and IDLE, if idle characters (diddle) are being received. You can expect action (in Mode L, for instance) once the LOCK and VALID or IDLE cursors are present.

I found several AMTOR stations on the air during my weekend operational periods. It's apparent from some of the information I copied that there are a number of people learning to operate AMTOR, so I didn't feel alone! Mode L operation is simple to use, but I initially had difficulty trying to establish contact with other AMTOR stations in Mode A. Although both manuals led me to believe I could insert spaces to use as a general-purpose SELCAL ID as a means of establishing reception, none of the software versions allowed me to do that; only letters A-Z are accepted or I'd have to opt for the "CQCQ" default SELCAL ID. I learned that the blank SELCAL ID feature had been dispensed with, but the current manuals don't reflect that change. Should you exit the AMTOR mode (purposely or accidentally) and return to the main menu, you'll have to reenter the SELCAL ID. I found it too easy to inadvertently strike a key and find myself back at the main menu.

The present manuals lead you to believe that first calling in Mode B then chatting in Mode A is a thing of the past. Not so! Unless the SELCAL ID is known beforehand, you'll never get off the ground. If it's your first time on the air, you probably don't know *anyone's* SELCAL ID, and they don't know yours, so how are you going to contact someone? Basically, you should "broadcast" (Mode B) your SELCAL. Use a 3 × 3 × 3 — CQ, your call sign and SELCAL ID. Then, depending on the response you receive, stay in Mode B or switch to Mode A (select Slave). If the response you hear sounds like an ASCII transmission, remain in mode B; if it's a "chirping" response, switch to Slave and enter *your* SELCAL ID. (When you're the Master station, enter *the other station's* SELCAL ID.) If the station calling you is "chirping," he or she is using Mode A, and will assume the role of Master. When the Master station finishes transmission, you respond by typing the appropriate control keys to place your station in transmit mode. You must do this on the initial transmission of text even though your station is "chirping." After that, changeover will be automatic. This information ought to be enough to get you started . (For more AMTOR operation information, I'd recommend two *QST* articles.[2,3]

Immediately after selecting the Master AMTOR mode option from the menu (to call a specific station whose SELCAL is known), the AMTOR mode display appears and your station

is placed in transmit mode, cycling between receive and transmit for a period of 30 seconds. "If at first you don't succeed" in making contact, you can "try, try again" by simply pressing RETURN.

On several occasions, the 40- and 80-column Apple //e AMTOR programs (including V1.6) got confused when I switched from Mode L to the main menu. While the menu was displayed, the AMTOR mode blocks appeared on screen above the Kantronics Hamtext headline. This did not occur when I used the Apple II program option. The "fix is in" on this problem now.

Some Comments

I think that a modem package should be ready to go, right from the box. Some manufacturers don't package connectors and/or cables that must be used with their modems/interfaces; others (like Kantronics) leave out the power supply. I'd say the lack of a power supply is the lesser of the two evils, as most, if not all, hams today have 12-V dc sources on hand. Connectors, however, may often be difficult to obtain, especially the proper header types. Still, why not supply a complete package?

The printer-card selection portion of the software manual confused me. I initially got the impression that I could not print while receiving or from the holding buffer without first specifying which printer-interface card is in use. That's not so. You must select one of the printer card options to print during reception, but printing from the holding buffer is independent of which card you've selected. In fact, selecting NONE (Ø on the menu) still allows printing from the holding buffer — assuming, of course, you do have a printer-interface card installed and a printer connected! (The "printer selection" referred to in the manual and in the menu is a misnomer; it's actually "printer-interface card" selection.)

I experienced what I believe is another problem with the Apple //e software. The problem manifests itself when attempting to make more than one dump from the holding buffer to the printer. The first indication that this problem exists is the double-spaced letters that appear on the screen and scroll top to bottom (the 80-column card is active during printing of the buffer). During the course of the second and any successive buffer dumps prior to program hang-up, the displayed information becomes noticeably garbled. Shortly thereafter, the printed output becomes fouled and the program hangs.

I used the standard Apple 80-column text card and a Call-A.P.P.L.E. extended-memory, 80-column text card; this program selection functioned exactly the same way with both cards. When I run the 40-column (Apple II/II+) version of the program, the buffer dump works properly. The only cure I found is to press CONTROL/RESET from within the Programs Options portion of the program. After that, multiple buffer dumps print properly every time.

Program operation during the buffer dump is visually altered by the CONTROL/RESET action, and appears in one of two ways depending on whether CONTROL/RESET is pressed before or after printer-interface-card selection; you get a bottom-to-top scroll or no scroll at all. Without the scroll, the screen is blank except for a few double-spaced letters at the very top. (The early V1.4 software inserts random zeros in the holding-buffer printout, but V1.5 doesn't.) Of course, you can always save the holding buffer contents to disk and print the file later.

I noted some file-handling procedures are different, or missing, from normal Apple operation. In V1.4 and V1.5, you can CATALOG a disk, but you can't DELETE disk files from within the program. It's also possible to save a

file with no name, or files whose names begin with digits ("no-no's" under normal DOS operation). Such files are difficult to handle outside of the Kantronics program — try to DELETE one! (You can use FID to recopy desired files to another disk, and then INITialize the source disk to clear all the files.) Software V1.6 overcomes these anomolies.

AMTOR operation may certainly have its applications (and initially is a novelty), but for day-to-day ragchewing, I think I'll stick with RTTY or CW. I don't need absolutely error-free copy to have an enjoyable ragchew. Should I miss a necessary bit of information, I can always ask for a repeat. Sure, you can talk to Africa, or some other distant place, using low power and not miss a single word, and all your typographical errors and misspellings will be received error-free. AMTOR doesn't tire as it struggles to get the information through without error, but it's a slow, time-consuming process, and waiting for protracted periods of time for purely *conversational* information to pop on the screen tires me. I also did not relish listening to the constant cycling of the TR relays in my newly purchased Kenwood TS-430S; they get more of a workout during one AMTOR session than they do in a month of weekends. An SSB QSK transceiver (manufacturers: It's been done already) would be ideal for AMTOR.

There is another side to the coin, however. Unlike Baudot or ASCII RTTY, the duty cycle of the transmitter (in Mode A) is close to 50% — maybe 55% — as opposed to 100% for the other modes. And, generally speaking, AMTOR should fare better under conditions of CW QRM. AMTOR will just wait for the opportune moment and then push the message through. With the other modes, you'd have to retype the information.

One day, I realized that, in addition to the normal, low-level, computer-signal interference (a raucous buzz) present in the receiver, I had some unwanted "company" — low-level "chugging" noises — during RTTY reception. I mused that the noises sounded much like a heavily muffled, mechanical-teleprinter noise. The chugging is in rhythm with the blinking MARK LED tuning indicator. The interference doesn't register on the S meter, and I am still able to copy SØ RTTY signals with the "ghost teleprinter" chugging away in the background. I found I could eliminate some of the computer interference by passing the computer/modem interconnection cable through a large, ferrite toroid several times. This does shorten the effective cable length, however. It appears that much of the noise emanates from the line associated with the slot-determining jumper on the modem-interface card.

I think the Interface II and its matching software (despite the present software glitches) are a powerful and multifeatured package. You may find the package satisfies most, if not all, of your RTTY/CW/AMTOR requirements. Thankfully, the Kantronics software policy is friendly; updates of early software versions are made at no charge (you should have V1.5 at least), regardless of the elapsed time since purchase. This is a policy to be commended. (Few software houses provide cost-free updates.) Also, program changes made for your personal convenience are available at a nominal charge. The beta-test V1.6 (or later revision) software may be available by the time this review appears in print.

The Interface II and Hamtext/AMTORSOFT software are available from Kantronics, 1202 East 23rd St., Lawrence, KS 66044. Price classes: Interface II, $270; Hamtext for the Apple, Commodore-64™ and VIC 20™, $100; Amtorsoft (same computers), $90; Apple Hamtext/Amtorsoft, $140. — *Paul K. Pagel, N1FB*

[2]J. P. Martinez, "AMTOR, an Improved Error-Free RTTY System," *QST*, June 1981, pp. 25-27.
[3]P. Newland, "An Introduction to AMTOR," *QST*, July 1983, pp. 11-13.