Amateur Radio and the Blind

Part 3: In this installment, we'll ready the computer to talk to the modem. Then, we'll look at modems and some terminal software, too.†

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(photo by Gary McDuffie, AGØN)

RTTY, packet radio and AMTOR are fun to operate! The latter two modes, however, are more technically sophisticated than Baudot RTTY. Blind or otherwise handicapped hams certainly can enjoy using packet and AMTOR, but the procedure isn't as simple as buying a box and plugging it in! Packet radio and AMTOR offer fun and challenges, but the long and short of it is that you'll need help—at first, anyway.

First, a Few Comments

As I mentioned way back in Part 1, it's helpful to have a radio that tells you exactly what frequency you're on. You've got to be close to the right frequency, and that doesn't mean within 1 kHz! On AMTOR and RTTY, you're working with tones 170 Hz apart, and both tones have to be in the modem filter passband.

I'll be the first to admit that I'm a bit picky, but I want my transceiver to be within 10 Hz of where the readout says I am. If it isn't, the last digit might as well be a question mark! I like my Kenwood TS-440. It's equipped with the optional speech synthesizer and automatic antenna-matching network. The '440 has keyboard frequency entry, and at the touch of a button, I know what frequency I'm on. Touching another button activates the antenna-matching network. The radio is stable and has 100 memories, many of which I've set up for phone, packet and AMTOR operation. The only feature I miss having in the '440 (that the Yaesu FT-980 I owned has) is the IF-signal monitor—it helped me set audio levels.

Many older rigs (and some modern ones) will not work on AMTOR at all, or at least need some modification to properly do so. This is because of the fast transmit/receive (TR) switching required. If you're thinking of operating AMTOR, check out the transceiver before you spend extra money for an all-mode modem only to find your rig can't switch fast enough to use AMTOR.

Computer I/O Needs

To communicate with your modem, you'll need a serial card. Most PCs come equipped with a serial port or two either on the motherboard or on a separate expansion card. If your PC isn't so equipped, there are many inexpensive plug-in cards you can purchase that will provide you with what you need.

The Laser 128, like the Apple® //c, is equipped with the required serial port. If you intend to use an Apple //e, however, you'll have to add a serial card. I recommend the Apple Super Serial card or the Apricorn card that emulates the Super Serial card.[14] (The Apricorn card setup is slightly different from the Apple card; more on that in a minute.) Plug either card into expansion slot 2; the angled corner of the card faces the front of the computer. (Slot 2 is usually used, but in an Apple //e, almost any slot is okay. The exception is slot 3: If an 80-column card is installed, slot 3 cannot be used.)

The Super Serial and Apricorn cards are supplied with a short ribbon cable equipped with a female DB-25 connector on one end. The DB-25 mounts on the back panel of the computer. The other end of the cable connects to the serial card. Apple's card requires positioning a DIP jumper plug to select printer or modem connection. Position the plug to select modem operation; the beveled corner of the plug is positioned toward the front and bottom of the card. In lieu of the jumper plug, the Apricorn card has two on-card connectors for the jumper cable between the card and the DB-25 connector. Plug the cable into the card connector nearest the front of the computer.

Super Serial Card Setup

Two banks of switches must be set to configure the Super Serial Card for the communications mode. The switch levers are long enough to be felt and moved easily. The following switch settings are given as seen from front to rear.

Set the first switch in the front bank OFF (down). Put the next five switches in this bank in the ON (up) position. Set the last switch in this bank, switch seven, OFF. (The Talking Transend software manual shows this switch in the ON position. I have found in some cases that this switch needs to be set to OFF. No one has been able to explain to me why this is. All I know is that with the AMT-1 and KPC-2, the card works with this switch set to OFF.) At the rear of the card, the first four switches in the second bank are set to ON, and the remaining three switches are placed in the OFF position.

Apricorn Card Setup

Though the Apricorn card emulates the Apple Super Serial Card, it is different physically. You'll notice that there are eight switches in each switch bank (instead of seven as on the Apple card). The switch levers on this card are harder to move than those of the Apple card. You'll need a pencil or sharp-pointed instrument to move them. In both switch banks, switch eight is placed in the OFF, or down, position.

[14]Notes appear on page 31.

Talking Terminals for the Blind Amateur

ProTERM and ProTERM+ are terminal programs designed for use with the Apple® //e, //c and //GS computers. (In the case of the //e, the enhanced ROMs should be installed.) The programs perform well for sighted people using standard video displays, but are intended primarily for blind users who must rely on speech synthesizer output for reading screen information.

Many programs designed for use by sighted persons are embellished with lines of asterisks, ampersands or other "window-dressing" characters. To a blind ham relying on an audio representation of the screen, the prospect of listening to "star" (the synthesizer's word for "asterisk") 16 or more times is less than inviting! The ProTERM software eliminates this hassle. One of the keyboard-selectable options allows you to choose characters you want trapped from audio presentation. The characters can be seen on the screen and captured on disk or in memory, but are not acted on by the speech synthesizer.

Another useful feature of the ProTERM series is the ease with which parameters such as baud rate, data-word length, number of stop bits and parity can be set. For example, pressing OPEN-APPLE P enables you to set parameters. You select the desired baud rate (300 to 9,600 bps) by entering only the first digit. Any combination of parameters can be established and saved to disk as the default settings.

Incoming data can be saved to disk or read from the buffer without turning on the capture buffer. You can scroll through roughly 30 kbytes of buffer space to look at the data. This potential is extremely useful in rag-chews.

You can turn off the speech synthesizer, too. That comes in handy when you're handling high-speed transfers of large amounts of data. The program has a built-in "clicker" that serves to monitor transfer activities. When data is flowing, the clicker sounds; at 9,600 bauds, the clicks become a continuous tone.

Among the terminal programs designed for use with Apple computers, ProTERM and ProTERM+ are by far the easiest to learn to use. There's one feature that is especially attractive to radio amateurs. Most talking software intended for use by the blind does its best to treat all letter groupings bounded by spaces or punctuation marks as words. As a consequence, it tries to pronounce them. Thus, it would try to pronounce the call letters WA1XXX as if it were a word. To circumvent this when using the program for packet-radio or RTTY operation, you simultaneously press the CLOSED-APPLE and C keys. Now, when the program sees anything that may be a call sign (an alphanumeric group), it pronounces separately each character within the group.

Using a combination of ProTERM and the appropriate Echo or Cricket speech synthesizer for the Apple computer being used, it is even possible to examine data intended to be read in columnar form. With the Screen Review feature of the Textalker, the software that drives the speech synthesizers, it is possible to define column boundaries and examine columns within these defined limits quickly and efficiently. Should there be uncertainty about the pronunciation of a given word, the word can be spelled out character by character.

ProTERM+ allows you to transfer programs and other data over the phone line using the ASCII EXPRESS™ terminal program approach. Though I have not used ProTERM with AMTOR or RTTY, I have used it on packet radio and can attest to its efficiency and operational ease.

These programs are available from Microtalk, 337 South Peterson Ave, Louisville, KY 40206, tel 502-896-1288. ProTERM is $150; ProTERM+ is $195.—*Fred L. Gissoni, K4JLX, 310 Pleasantview Ave, Louisville, KY 40206*

Otherwise, the switch positions are the same as those of the Apple card.

Software Considerations

If you are using Talking Transend, you'll need to configure the program so that it knows which serial card you're using, and in which slot it is placed. This should be slot 2 for the Laser 128 or Apple //e. Also, tell the program that you are using a dumb modem. Be sure to perform this configuration with a *copy* of Talking Transend you intend to use strictly for Amateur Radio purposes! Otherwise, if you have a smart telephone-line modem and use the same copy of the program with it, the program will no longer support autodial and other features. (Talking Transend cannot be copied with Apple's standard copy program, but any bit copier should do the job.)

Next, select option D (Define Transend Parameters) from the main menu. If you're using an AMT-1, select 8 data bits, no parity and 2 stop bits. Choose a baud rate of 110, and select full duplex. I also redefined each incoming space character as a carriage return. This gives me a more even flow of data from the speech synthesizer, but consequently prints only one word to a line on the screen. For both the PK-232 and KPC-2, I set the parameters for a baud rate of 300, 8 data bits, 1 stop bit and no parity.

At the Text Transfer Protocol menu, you define the "START/STOP on buffer full" and "STOP/START from remote" parameters. In both cases, unless you have already changed them as parameter settings, set STOP to a Control S, and START to a Control Q. Talking Transend expects decimal numbers, so use 19 for Control S and 17 for Control Q.

I can't cover all the features of Talking Transend here, but I can tell you it is a powerful and flexible program. (See the sidebar for a discussion of another pair of terminal programs.) One drawback of Talking Transend is that "the keys talk" as you type (the synthesizer voices each keystroke), so it is difficult to type ahead on AMTOR while receiving incoming data. Also, Control R is the Talking Transend line review command and Control E is a Textalker command. If your modem also has these keys defined in your parameter set, you will need to change them; otherwise, the Control R or the Control E will not be sent. Remember: These control characters must be entered as hexadecimal numbers for both the KPC-2 and PK-232, and are thus preceded by a $.

Textalker will not usually speak unless it sees a carriage return. Written into Talking Transend (and the program I am writing) is a time-out feature.[15] After a certain length of time, Talking Transend will force the characters accumulated in Textalker's buffer to be spoken even if a carriage return is not sent. I can change this

Fig 5—A mound of modems; the AMT-1 is at the bottom. *(AGØN photo)*

timing variable in my program, but not in Transend. In Talking Transend, this time delay is short enough that it sometimes causes problems. If, for some reason, data flow is quite slow, you will get individual characters or parts of words spoken. If you type a Control E followed by a W, Transend will wait for a carriage return. Cancel this mode by typing a Control E L.

Modems

Consider buying the same kind of modem that a friend has, so you can get assistance when setting up parameters and the like. Though most modems will talk to each other, their parameter settings and command structures can be, and usually are, quite different.

I have been on AMTOR for about three years, and enjoy that mode a lot. The first AMTOR modem I bought was the AMT-1 (see Fig 5). It's *command* driven (responding to immediate keyboard entry) and has a large transmit-text buffer. It's geared for AMTOR use only, however, and is no longer being manufactured by AEA. You can still find them at hamfests or dealer closeouts, though. The AMT-1 uses 110-baud input, and some computer terminals and programs won't operate below 300 bauds.

I borrowed a Kantronics UTU (Fig 5) to try on AMTOR. It works fine, but it's *menu* driven. This means that every time I change from mode A to mode B, I have to wait for a menu to be displayed. This leads to excessive talking by the speech synthesizer (remember, it's reading the screen). Unfortunately, I didn't get a chance to try the Kantronics UTU-XT. I understand it's command driven, so it probably works better with a speech synthesizer.

The UTU has only a 32-character transmit-text buffer that I was always overtyping. Especially on AMTOR, I like to type ahead as I'm receiving the other station. With some terminal programs, this causes problems. In some cases, the synthesizer speaks each keystroke as you type. So, if you try and type while you're listening to incoming data, things get a bit confusing! Ideally, I don't want the keys to talk as I'm typing. I usually know what I have typed, and can tell when I make a mistake.

Kantronics KPC-2

When the KPC-2 (Fig 5) arrived, I asked Gary McDuffie, AGØN, for help. He had bought a KPC-2 at Dayton, and was familiar with its operation. Gary talked me through the on-air routine. Before that, though, I had to get the modem hooked up to the computer and radio.

What drives me nuts is getting a brand new toy and not knowing how to hook it up! You may be in the same situation, so get someone to read the instruction manual to you. Here are a few things I learned—luckily, not the hard way!

The KPC-2 comes with all necessary cables and a multiple-voltage ac adapter. I didn't use the modem/computer cable provided with the KPC-2 because it has a DB-25 connector on one end only. I used a straight-through, 25-conductor, male-to-male cable of my own. (Only five wires are used in the KPC-2 cable.) The manual warns you that some of the other cable wires are used for special purposes. Pin 25, for example, has +12 V on it, and pin 18 is a processor test input used only by the factory. The only pins you're supposed to use are 1 through 8, and pin 20 (1 and 7 are common). In this regard, I was lucky—none of the computers I use has anything connected to the reserved pins—and I didn't find out about all this until later!

The power supply is a multiple-voltage-output ac adapter equipped with two switches, so be sure the switches are set correctly before you plug it in. Hold the supply with the wire coming out of it toward you, and the prongs that plug into the wall socket pointing down. Make sure the left-hand two-position switch is toward you. This switch reverses the dc output voltage polarity. Be sure the right-hand slide switch is in the second position from the left. This is the 12-V position. My power supply came from the factory set properly, but it's better to check yours and make sure.

Another cable supplied with the KPC-2 has a DB-9 connector on one end. This cable contains the transmit audio, PTT and squelch lines, and has a lead equipped with a miniature phone plug for receiver audio and ground. There's also a red lead that carries +12 V when using the Kantronics power supply. These wires all have bare ends, so clip and tape the red wire to be sure you don't accidentally short it to ground if it's not being used. (This precaution is covered in the manual.) The only wires in this cable that I use are AFSK out (white), PTT (brown) and ground (black or shield).

I won't go into a detailed description of the KPC-2 rear-panel connections as there are few of them, and no two are alike. Also, the KPC-2 has its memory backup battery already installed. The back of the KPC-2 has an on/off switch, a DB-25 connector, a coaxial power jack, a DB-9 connector and miniature phone jack.

The KPC-2 has provisions for accommodating an external speaker. Just insert the miniature phone plug into your radio, and connect an external speaker to the miniature phone jack provided on the back panel of the KPC-2.

My Kenwood TS-440 has a fixed-level audio-output phono jack (AFSK OUT) on the back. There's enough audio there to drive the PK-232, but not enough for the KPC-2, so I had to use the transceiver's external speaker jack as the audio source. There are resistors in the KPC-2 that can be changed to decrease the audio input-level requirement, but I didn't bother with the modification.

AEA PK-232

The PK-232 (see Fig 6) I received bore serial number 51. Besides packet, the PK-232 works AMTOR, CW, ASCII and RTTY (later models include HF WEFAX reception capabilities—Ed.) The modem isn't equipped with a power supply, so you have to provide one. A two-wire power cable is supplied; it has a coaxial plug on one end that plugs into the PK-232. You don't have to worry about soldering that connector. The red wire that carries +12 V goes to the center pin, and the ground connection is made to the outside shell. If you have a multimeter, you can figure out how to get the PK-232 powered up. If no one is around to tell you the wire colors, just check for continuity. I usually tie a knot in the ground wire and put a small piece of tape on the positive wire for easy identification.

You'll also need to install the memory backup batteries so that the parameters that you have set won't "go away" when you turn off the PK-232. Remove the cabinet top by taking out two screws in the back and two on each side. (The top, back and sides of the cabinet are one piece.) Take care you don't move it too far—wires from the battery holder, which is fastened to the top of the cabinet, lead to the circuit board. Just lift the top of the cabinet up and toward the back. You'll find a battery holder that holds three AA cells. If you're looking from the front of the box toward the back, install the cells this way: With the front of the PK-232 toward you, and the top of the cabinet lifted up and toward the back, the cell to the right is inserted with the positive terminal up. In other words, the positive terminal will be toward the front of the unit when it's put back together. The middle cell is inserted with the positive terminal down or toward the back. The left-hand cell has its positive terminal up or toward the front. When you put the top back on the cabinet, be sure that the miniature phone jacks on the back line

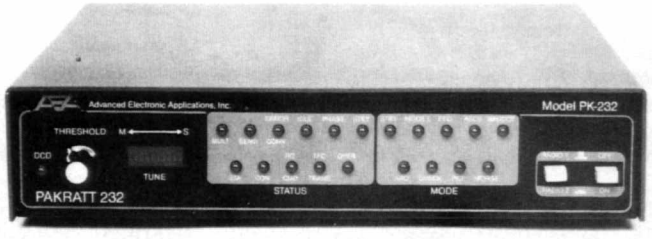

Fig 6—The AEA PK-232. In addition to CW, RTTY, AMTOR and packet-radio modes, current versions of this modem also provide for HF WEFAX reception.

up with the matching holes in the cover. Take note that there are two different types of screws used. The four screws with the pointed ends go on each side, and the two screws with the blunt ends go in the back.

Besides the power cable, the PK-232 comes with two audio cables, each with a miniature phone plug on both ends. You can use these cables to feed receiver audio to the PK-232. If you use the external speaker jack on your rig, you'll probably want to use a Y connector to hook up an external speaker as the internal speaker in your radio is usually disconnected when an external speaker is plugged in. There are also two cables with a 5-pin connector on one end for transmit audio and PTT. The green wire in this cable feeds receiver audio to the PK-232. The brown wire is tied to the shield or ground wire. The white lead feeds AFSK audio to the transmitter, red is PTT, and black is squelch inhibit. I didn't use the squelch inhibit on either the KPC-2 or the PK-232.

As with the KPC-2, use of certain wires in the cable between the modem and computer should be avoided. AEA's manual cautions that wires connected to pins 1 through 8 and pin 20 only should be used.

Because the PK-232 is designed to be used with two radios, you'll need to know which rear-panel connectors do what. The rightmost push button on the front panel is the ON/OFF switch. The OUT position of the switch selects radio one, and the IN position selects radio two. Place the PK-232 so that the front panel faces you. Reach over the top of the modem and feel the back panel. Here's what you'll find: To the very right is the power jack. Just left of that is the miniature phone jack for receiver audio from radio one. Next to it is the 5-pin connector for radio one. Plug the cables into the 5-pin connectors with the wire pointing down or toward the bottom of the cabinet. The next connector to the left is the 5-pin connector for radio two, and to its immediate left is the miniature phone jack for radio two. Moving to the left, you'll find a female DIN jack used for a scope hookup, and then another 5-pin connector that's used for an external modem. To the left of these connectors are the two CW key jacks. These are phono jacks. The one on the right is for negative keying lines, and the one to the left is for positive keying lines. I use the left-hand jack (positive-voltage keying) with my Kenwood TS-440. Next is the DB-25 connector for the serial cable to your computer. To the far left is a small hole that provides access to the transmit-audio level adjustment.

In Use

Both the KPC-2 and PK-232 have an autobaud routine that is active when the modem is first powered up. This is how it works: When you see the screen printing properly, you type an asterisk, and the modem sets itself to the baud rate for which your computer is set. This presents a problem, however: By the time you hear the speech synthesizer, it's usually too late. I had the best luck turning on the power and immediately typing asterisk after asterisk until the modem locked on and started talking properly. I set both the KPC-2 and the PK-232 at 300 bauds. The speech synthesizer cannot talk that fast anyway, and one of the programs I was playing with on the Apple would not work at 1200 bauds.

Software

It's possible to write your own terminal program for any computer, but I found it easier to do on PCs than on the Apple. I used Microsoft® BASIC, which works great. You have commands such as ON KEY GOTO or ON COMM GOTO that you don't have in Applesoft™. Also, Applesoft can't directly, or quickly enough, handle the interrupts required by many applications. On PCs, you have function keys with which you can do some fun things.

I have used all of the programs I talk about in this series, and they work well. A simple dumb-terminal program will get you on the air, but there are additional features that are nice to have. Unless you're a real computer nut like me, you probably won't want to write your own terminal program.

If you jump back and forth from HF to VHF on packet, you'll find that there are several parameters that need changing. It's nice to have these in a disk file that you can quickly send to the modem. This feature is also nice for sending files to bulletin boards or sending and receiving programs and the like. You'll also want some kind of line review so you can check digipeated paths, call letters and other text you may not have understood the first time. Call letters are a problem as the synthesizers try and pronounce them as words, so you almost always need line review to check out a particular call. One thing I'm working on is a version of Textalker (the software used with the Echo II or Echo Plus) that will look for a number in a word and go into letters mode. Then it would pronounce the call sign properly instead of trying to make a single word out of it.

There seems to be a big push among software developers toward interruptibility. This feature silences the speech synthesizer whenever a key is pressed. It has its place, and in some cases I like it, but not while I'm on line, running packet. If you cannot turn this feature off, you cannot type at all when receiving data. If you do turn it off, output from the synthesizer is not stopped and you won't miss incoming data. As mentioned earlier, I particularly like to type ahead into the transmit buffer when on AMTOR. I can answer questions just as I receive them. When the other station turns it over to me, the transmit buffer is sent as I typed it while listening to his previous transmission. (This gives me time to grab a quick cup of coffee without missing a thing.) Doug Geoffray, a programmer I know, and I are working on software for Apple computers that does this quite nicely. The keys and incoming data are both buffered, but completely independently. The synthesizer doesn't talk as I type, but I can type at the same time I'm listening to stuff coming in on the screen.

The "sendpak" character is usually a return, so that destroys the type-ahead thing I like to do, at least while I'm on packet. It's nice on AMTOR though, and you usually want the ECHO parameter on and the terminal program set for full duplex. With EAS on when using the PK-232 on AMTOR, the synthesizer doesn't speak the characters until they have been transmitted.[16] This gives me a good idea of how fast data is actually being received. It isn't quite that easy on packet because the mode allows for so much activity on the channel. I'll be discussing a few specific parameters and why I set them the way I do.

I found that the PK-232 and KPC-2 work equally well with the computers and programs I used. Though I have not tried them, I see no reason why other modems on the market would not interface as easily and work fine. These include the TAPR TNC II, MFJ, GLB and others. Some of the command structures for these modems may be quite different, though. The PK-232 and KPC-2 are not identical, but are close in most respects. As an example, the TX DELAY parameter does the same thing on both units, but the number of milliseconds for each number set for TX DELAY is different.

Next month, I'll have a few operating tricks for you. Tune in!

In our October installment, an incorrect address was given for the Recording for the Blind, Inc. The correct address is: 20 Rozel Rd, Princeton, NJ 08540; tel 609-452-0606. *(Thanks to Babette M. Richman, KA9UVF, Studio Director.)*

Notes

†Parts 1 and 2 appeared in the Oct and Nov 1987 issues of *QST*.

[14]Apricorn, 10670 Treena St, Suite 10, San Diego, CA 92131, tel 619-271-4880.

[15]I'm presently writing a communications program for the Apple that is done primarily in machine language and works well. You can contact me about the programs I'm writing for both the Apple and PCs.

[16]EAS—echo as sent. This command functions in all modes *except* packet. It permits you to choose the type of data displayed on your monitor or printer.

Strays

I would like to get in touch with...

☐ anyone with a manual/schematic for a Data Signal Cricket II electronic keyer. Robert Pinkus, WA8NYY, 5280 Gander Rd W, Dayton, OH 45424.

☐ anyone with manuals for a Hallicrafters transceiver Model TR-20J and a Motorola Handie-Talkie Model H23-1. John Knuckles, N4QBK, Rte 2-Box 193A, White Bluff, TN 37187.