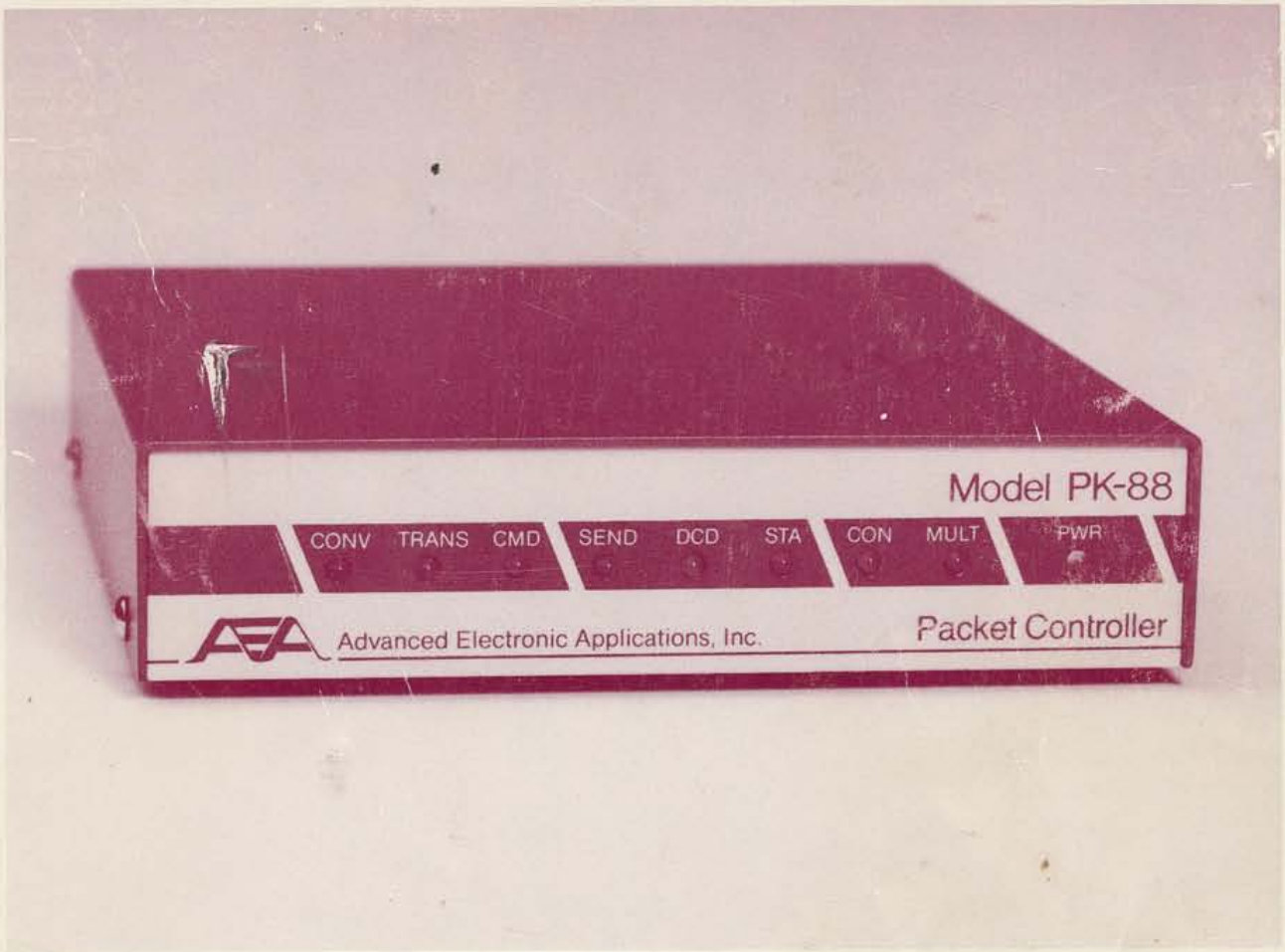


ADVANCED ELECTRONIC APPLICATIONS, INC.

Model PK-88

Packet Controller

OPERATING MANUAL

OPERATING MANUAL

MODEL PK-88 PACKET CONTROLLER

ADVANCED ELECTRONIC APPLICATIONS, INC.

Rev. D 3/90

PROPRIETARY INFORMATION

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Getting Started with the PK-88

Congratulations and thank you for your purchase of the AEA PK-88 Packet Data Controller. The following is intended to help get you started and "on the air" with the PK-88 quickly and easily.

The PK-88 Operating Manual is filled with complete information on all commands and operating modes. This doesn't mean you have to read it cover to cover before using your PK-88. Most of the information you will need to connect your computer or terminal and radio to the PK-88 can be found in Chapter 2 of the PK-88 Operating Manual.

If you are using one of our programs such as PC-Pakratt or PK-FAX for the IBM-PC and compatibles, COM-PAKRATT for the Commodore 64 and 128 or MacRATT for the Macintosh, then you should start with the Installation section of the Program manual. After you have the program installed and running on your computer, then Chapter 2 of the PK-88 Operating Manual will describe how to connect the PK-88 to your computer and transceiver.

AEA's programs such as PC-Pakratt simplify the way you enter commands to the PK-88. This means that some of the sections of the PK-88 Manual that tell you to enter a command in a certain manner will not apply. When using one of our programs on your computer, sections 2.5, 2.6 and 2.7 of the manual can be skipped.

In general, if you are using one of AEA's programs such as PC-Pakratt, PK-FAX, COM-PAKRATT, or MacRATT, the manual that comes with the program should answer most questions. The PK-88 Operating Manual should only be needed as a reference when specific Hardware or Command information is sought.

On the other hand, if you are using a Dedicated Terminal or Terminal Program on your computer, you should carefully follow the set-up procedure outlined in all of Chapter 2 of the PK-88 Operating Manual. Sections 2.11 and 2.12 of the Manual describe how to connect the PK-88 to several different kinds of computers which may be especially helpful.

You will not need any of this information to get your PK-88 up and running, but you may want to skim through the Addendum for the latest information on the PK-88 operating firmware.

NOTE TO PC-Pakratt USERS:
In order to run the PK-88 with PC-Pakratt, your PC-Pakratt disk must contain a file PCPAKRA87.CFG. Contact AEA at 206-775-7373 if you have any questions.

PREFACE TO THE PK-88 PACKET CONTROLLER MANUAL

Please read this preface in its entirety. It contains information about how to receive warranty service, the current software installed in your PK-88, our software update policy and how to get involved in the digital radio community.

RF Interference Information To User

This PK-88 has been certified under Subpart J of Part 15 of the FCC rules.

This equipment generates and uses radio frequency energy. If it is not installed and used properly, that is, in strict accordance with AEA's instructions, it may cause interference to radio and TV reception. It has been type-tested and has been found to comply with the limits of a Class B computing device in accordance with the specifications in Subpart J of Part 15 of the FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or TV reception, which can be determined by turning the PK-88 on and off, the user is encouraged to try and correct the interference using one or more of the following measures:

- Reorient the antenna of the device receiving interference.
- Relocate the computer with respect to this device.
- Plug the computer into a different outlet so the computer and the device are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/TV technician for additional suggestions. The user may find 'How to Identify and Resolve Radio-TV Interference Problems,' a booklet prepared by the FCC, helpful.

PLEASE USE SHIELDED CABLE FOR ALL RS-232 CONNECTIONS

As part of our continuing program of product improvement, we reserve the right to make changes in this product's specifications. Changes will be made periodically to the information in this document. These changes will be incorporated in new issues of this manual.

There may be technical inaccuracies or typographical errors in this document. Please address comments and corrections to AEA Incorporated, PO Box C2160, Lynnwood, WA 98036-0918. AEA reserves the right to incorporate and issue any information thus supplied in whatever manner it deems suitable without incurring any obligations whatever.

FIRST ISSUE (MAY 1988)

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Welcome

Congratulations on your purchase of another fine AEA product.

PLEASE COMPLETE AND RETURN the Warranty Registration Card packed with your PK-88 system.

WE WILL NOT BE ABLE TO FURNISH YOU WITH ANY UPDATES TO THE SOFTWARE IF YOU DO NOT RETURN THE ABOVE DOCUMENT. AS NEW FEATURES ARE DEVELOPED, WE ARE SURE YOU WILL WANT TO BE ABLE TO OBTAIN THEM.

If you call for any kind of customer assistance, we will ask for the serial number on your warranty card. Because of the numerous situations in which our product is used by an unauthorized third party, we MUST verify that you are the licensed user. We may choose to call you at the phone number listed in our records to verify your identity. THANK YOU for your patience.

Product Update Policy

From time to time we will make available updates to the design of our products. These sometimes are made available to the user who has previously purchased its products. We can only tell you about these updates if we have your warranty card. PLEASE SEND IT IN If you have not already done so. Future versions of software for the PK-88 will most likely become available. We will make these updates available, if possible.

In Case of Trouble

Application and troubleshooting assistance may be had by calling AEA during our 8-12, 1-4:30 working hours in Seattle WA. Ask for the Customer Service Department. The phone number is (206) 775-7373. Please have your product serial number, and version date of the software available. The version date is on the first screen that comes up when you turn on the PK-88. We will also need to know the nature of any other equipment connected to the PK-88.

Please attempt to solve problems locally or ask an AEA dealer. Substituting a PK-80, PK-87, PK-232 or other TNC that you know is working properly for your questionable one is a diagnostic technique that will check out the rest of your station. Also try running your PK-88 in another station.

Many of the AEA products that are sent to us for repair are in perfectly good order when we receive them. Please perform whatever steps are applicable from the information on installation and troubleshooting.

If you call for assistance, please have your PK-88 configured and operating near the phone. Our service technician may ask you to perform certain keyboard routines to aid in diagnosis. If you have a voltmeter handy, you might have the PK-88 open so you can report measurements to the service technician.

PLEASE DO NOT RETURN THE PK-88 TO US WITHOUT FIRST CONTACTING US FOR PERMISSION. WE WOULD LIKE THE OPPORTUNITY TO TROUBLESHOOT THE PROBLEM OVER THE PHONE FIRST, SAVING YOU BOTH TIME AND MONEY.

If you return the PK-88 to us by United Parcel Service or other freight carriers, the PK-88 must be sent to our street address, not to our post office box number. Our street address is:

AEA. Inc.
2006 196th St. SW
Lynnwood, WA 98036
USA

We will need YOUR street address for proper return shipment. Be sure to include your shipping or mailing address.

For domestic customers, United Parcel Service Surface (Brown Label) takes 7-8 days; Blue takes 2-3 days and Red is an expensive overnight service. Send the PK-88 in a way that it can be traced if we cannot verify receipt of shipment. We suggest United Parcel Service, Federal Express or insured postal shipment.

If the PK-88 is still under the original owner's warranty, AEA will pay the cost of the return shipment. The current policy is that it will be returned UPS Brown if received Brown or by US Mail; returned UPS Blue if received Blue or by overnight service; or returned as the owner states in his letter if he furnishes the return cost for the method he selects.

If the PK-88 is out of warranty, it will be returned by UPS Brown COD unless: 1) It was received UPS Blue/Red in which case it will go back UPS Blue COD, or 2) If you designate billing to VISA or MASTERCARD, or 3) you enclose a BLANK personal check endorsed 'not to exceed ...$,' or 4) you specify some other method of return.

We will typically service the product in two or three days if we have all the facts. It may take longer if we must call you. PLEASE, if you send it in, include a letter stating the problem and where you can be reached. If you can be reached by phone in the evening on the East Coast, let us know where. Our current rate for out-of-warranty service is $40/hour with a 3/4 hour minimum. Parts and shipping are extra.

AEA is not responsible for damage such as caused by lightning, nonprofessional alterations, poor storage/handling, etc.

Should your warranty card not be on file at AEA, you need to send the proof of purchase date to receive warranty service. Typically a copy of your bill of sale from an AEA dealer will suffice.

The warranty is for the original owner only and is not transferable.

INTRODUCTION

Welcome to the exciting world of digital Amateur Radio! You've joined the ranks of the fastest growing mode in Amateur Radio since the FM repeater.

Your AEA PK-88 Packet Controller is the connection between your computer and radio. The PK-88 performs all the 'magic' of establishing data and text communications between your station, as well as many other communication facilities equipped for digital communications.

With packet radio you'll have a 'private channel' while sharing a frequency with other packet stations; you'll be able to 'read the mail' from other packet stations, log on to computer-based 'bulletin board' or 'mailbox' systems, handle message traffic - in short, you're now equipped to enjoy the advantages of digital communications and error-correcting radio techniques in your ham shack.

Your new AEA PK-88 is the heart of your digital radio station. The PK-88's system software is derived from the original TAPR TNC; it presents many of the advanced features of that design, coupled with significant enhancements based on the experience gained by thousands of TAPR-equipped amateur packet stations worldwide.

This manual is your guide into the realm of Amateur Packet Radio.

Join a Packet Club - Subscribe To Newsletters - Join a Voice Net

Join a packet radio club - they exist in all states as of this writing. You might also subscribe to the ARRL publication 'Gateway,' which describes all the 'goings on' in packet radio, and to the TAPR 'Packet Status Register,' which describes the technically interesting happenings in the movement. There are many voice nets on VHF and HF; they usually meet weekly. They are usually dedicated to making the newcomer feel at home.

Acknowledgment

AEA, Inc. gratefully acknowledges the Tucson Amateur Packet Radio Corporation, Tucson, AZ, for permission to include excerpts from their TNC-2 documentation in this manual, and to Mike Chepponis and Phil Karn for their specifications for the KISS code.

Norm Sternberg (W2JUP) and Barbara Argilo developed, wrote and edited this Operating Manual on Tandy 1000SX computers with IBM's Displaywrite 3 V1.1 program.

Our special thanks to Mike Lamb (N7ML), Dr. Alan Chandler (K6RFK), John Gates (N7BTI), Steve Stuart (N6IA), Andy Madsen (KB7B), Joe Schimmel (W2HPM), Jeff Jacobsen (WA7MBL), Hank Oredsen (W0RLI), Brian Riley (KA2BQE), Phil Karn (KA9Q) and Mike Chepponis (K3MC) for their help.

AEA, Inc. dedicates itself to the advancement of digital radio communications.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The PK-88 Operating Manual describes the general characteristics and operation of your PK-88 Packet Controller. This Operating Manual will help you to install, adjust and operate your system.

1.1.1 Scope

The Operating Manual provides detailed information on installation and operation of the PK-88. The manual describes the PK-88's features, system components and basic operation on Packet Radio. Information on theory of operation, hardware and software descriptions, protocols and troubleshooting instructions is also available.

1.1.2 General

The PK-88 can be used with any standard communications terminal or computer equipped with an RS-232C ASCII serial data port and an appropriate communications program or terminal emulator. For information on operation with nonstandard interfaces or terminals, please contact the manufacturer.

1.1.3 Application

The PK-88 Packet Controller is a digital link between your radio and your computer or terminal. The PK-88 provides all decoding, encoding and transmitter control routines needed to send and receive packet radio. You can use your computer or any ASCII data terminal with the same communications program or terminal emulator that you use with a telephone line modem.

1.2 Specifications

As part of its program of product improvement, the manufacturer reserves the right to change this product's specifications. Changes will be made to the information in this document and incorporated in revisions to this manual. Specifications are subject to change without notice.

1.2.1 Description

The Model PK-88 is an asynchronous PAD (Packet Assembler/Disassembler) or data controller that includes a built-in modem for packet radio operation. The PK-88 hardware HDLC system converts serial, asynchronous, ASCII data to the internationally accepted AX.25 packet radio protocol via an EIA standard RS-232 serial port. In addition, a Host mode, raw HDLC and KISS ('Keep It Simple, Stupid') TNC protocols are available for applications other than AX-25 protocols.

Operating Modes:	Packet Radio per AX.25, half- or full-duplex. MailDrop - personal mailbox system Host Mode with Raw HDLC and KISS TNC protocol for service with TCP/IP and specialized applications.

1.2.2 Modem Characteristics

Modulator/Demodulator:	AMD 7910 'World Chip' modem.
Data format:	Serial, asynchronous
Modem Tones:	Bell 103 and Bell 202
Transmitter:	
Modulation method:	Binary, phase-coherent NRZI FSK
Frequency accuracy:	Bell 202 (mark) +/- 1Hz All others (mark) +/- 0.4 Hz
Harmonics:	45 dB below fundamental, single tone
Receiver:	
Demodulation method:	Differential FM detection
Output Level:	5 to 100 millivolts RMS, adjustable by internal control

1.2.3 Processor System

Protocol conversion:	Zilog Z-80 microprocessor
RAM:	32 kilobytes
ROM:	Up to 48 kilobytes of ROM may be used
Hardware HDLC:	Zilog 8530 SCC

1.2.4 Input/Output Connections

Radio Interface:	Eight-pin microphone connector
Input/Output Lines	Receive audio Transmit audio Push-To-Talk (PTT) External squelch input Ground
External Modem Interface:	Pins 13 through 17 of Connector J1
TTL Input/Output Lines	Receive data (RXD) Transmit data (TXD) Transmit Clock (TXC) Data Carrier Detect (DCD) Ground
Terminal Interface:	Standard RS-232C 25-pin DB25 connector
Input/Output Lines	RS-232C (CCITT V.24/V.28) with full handshake (hardware and software)
Terminal Data Rates	Auto-baud selection of 300, 1200, 2400, 4800, and 9600 BPS. TBAUD adds 45, 50, 57, 75, 100, 110, 150, 200, 600 and 19,200 BPS terminal rates.

1.2.5 Controls and Indicators

Front Panel Controls:	Power Switch
Status and Mode Indicators:	CONV, TRANS, CMD, SEND, DCD, STA, CON, MULT, PWR

1.2.6 General

Power Requirements:	+13 VDC (12 to 16 VDC) at 500 mA. Internally fused, with reverse-polarity protection.
Mechanical:	7.5 inches by 6.05 inches by 1.5 inches (19.05 mm by 15.4 mm by 3.8 mm) Weight 2 pounds 5 ounces (1.05 kg)
Environmental:	
Ambient Temperature:	Operating: 0 C to +55 C Storage: -40 C to +60 C

1.4 System Components

The PK-88 Packet Controller package contains the following items:

- o One PK-88 Packet Controller
- o Power cable with single 3.5-mm coaxial connector
- o Operating Manual
- o Two DIP Bypass Headers for TTL Serial Interface Compatibility

1.5 Input/Output Devices

The PK-88 can be used with any standard ASCII data terminal or computer equipped with an RS-232C serial data port and a communications program or terminal emulator. Data and control signals are exchanged between the PK-88 and the computer or terminal at standard RS-232C (CCITT V.24/V.28) levels.

Your computer and terminal program and their associated tape, disk and printer I/O devices provide the means to store messages received and retrieve messages for transmission. Although highly desirable, these peripheral or I/O devices are not needed for PK-88 operation.

Note In this Operating Manual, 'computer' and 'terminal' mean the same thing - the keyboard and monitor or printer with which you communicate with the PK-88.

1.6 System Transmitter/Receiver Performance Requirements

Most modern radio transceivers are capable of excellent packet radio performance. Radio switching and other delays can be compensated by parameter value adjustments to the PK-88.

The PK-88 provides software-controlled timing variations that permit operation with almost all HF and VHF/UHF radios in general use today.

CHAPTER 2

INSTALLATION

2.1 Preliminary Information

This section contains instructions for a 'generic' installation and system checkout to install and verify the PK-88's operation with both VHF-FM and HF SSB radios.

2.1.1 Equipment Required

A complete PK-88 Packet Controller system consists of the PK-88 and a 12 to 16-volt DC power supply, a computer, a terminal emulator or communication program for the computer, a radio transceiver or receiver-transmitter combination and its power supply.

Your PK-88 Packet Controller is furnished with the cables required for connection to your radio and to an external power supply. You must add the microphone connector required by your radio, the power supply and the RS-232 cable that connects the PK-88 to your computer.

RAM battery backup is provided by two internal AA batteries. (user supplied and installed)

2.1.2 Precautions

We strongly recommend that all RS-232 cables and connectors be made with the best commercial quality shielded materials, and that careful and correct grounding and bonding procedures be observed in the installation of the radio equipment being used with the PK-88.

2.2 Installation

The following sections describe the connectors and their connections to your computer and your radio.

2.2.1 Power Connections

Power is connected to the PK-88's rear-panel coaxial power receptacle from any well regulated 12-volt DC power supply (12 to 16 VDC) capable of supplying at least 600 milliamperes. An optional wall adapter power supply can be used.

- Be sure your power supply can furnish the required current with a ripple voltage of less than one volt peak to peak.
- Be sure you connect the positive voltage to the center pin of the coaxial power plug.
- Check the supplied cord to determine which lead is positive.

If you accidentally invert the power power cable, an internal fuse will open to protect the PK-88 from reverse-voltage damage. Note that the 0.1 mfd bypass capacitor C1 may be damaged. If polarity reversal does occur, open the PK-88, replace the internal fuse and capacitor C1 with identical components.

2.2.2 Radio Input and Output Connections (See Table 2-1)

We supply a shielded cable with your PK-88. You must supply and connect the plugs for the cable ends. This cable connects your PK-88 to your radio's microphone receptacle or PTT and phone patch/tone inputs.

NOTE: Wire only the PK-88 cable end at this time. Leave the "radio" end unwired. You will use the radio cable in a test configuration during your first 'loopback' experiments with packet operation.

Four signals and ground pass between your PK-88 and your radio via eight-pin receptacle J2. The pin wiring is shown in Table 2-1.

Pin	Signal Name	Color	Description
1	Ground	GRN ~~Brown~~	Audio and PTT common return
3	Push-To-Talk	WHT ~~Red~~	PK-88 keys transmitter
2	Microphone audio	RED ~~White~~	AFSK from PK-88 to transmitter
8	Receive audio	BLK ~~Green~~	AFSK from receiver to PK-88
7	Squelch input (Optional)	Black	Allows PK-88 to detect activity on a shared-mode channel (optional)

NOTE: The remaining pins are not connected.

Table 2-1 J2 Radio Port Connector

2.2.3 Computer Connections (See Table 2-2)

NOTE: The serial interface in the PK-88 comes from the factory configured for RS-232C voltage levels. Please see Appendix B for the TTL header installation instructions if your computer does not support RS-232C.

The PK-88's rear-panel serial port connector carries data and control signals between your computer and the PK-88. The PK-88 is connected to a computer just like you connect a RS-232C modem. If you now use your computer with a modem, connect the PK-88 the same way. Use any terminal program you now use with your modem. The minimum number of pins that must be connected is shown in Table 2-2.

NOTE: The following are the least number of wires you can use to connect the PK-88 with a computer or terminal. This three-wire connection does not permit hardware flow control. In this case, software flow control (XON-XOFF) must be provided by the terminal program.

Pin	Signal Name	Description
2	Transmit Data	Serial data from computer to PK-88
3	Receive Data	Serial data from PK-88 to computer
7	Signal Ground	Common ground for both data lines

Table 2-2 Minimum Serial Port Connections Required by PK-88

2.3 Controls and Indicators

The PK-88 has a single rear-panel control:

- o POWER ON/OFF push switch - disconnects power from external supply

2.4 Status LEDs

The PK-88's front panel has the following LED (Light Emitting Diode) indicators:

CONV	System is in Converse Mode
TRANS	System is in Transparent Mode
CMD	System is in Command Mode
SEND	Transmitter Push-to-Talk line is enabled
DCD	Data Carrier Detect
STA	Packet frame(s) unacknowledged
CON	Packet link is in connected state
MULT	Multiple Connection in progress
PWR	Power On Indicator

2.5 Serial Port Configuration

Verify that the PK-88's serial port and data words are set up properly for your computer. Should your monitor display garbled or incorrect characters or 'funny' graphic symbols, you can change the PK-88's serial port parity and word length. The common parity and word length combination is seven data bits, even parity, one stop bit.

Your computer will probably accept the PK-88's default setting, even if it actually uses a different setting. If your computer requires eight data bits, you may have to set parity to 'none'; otherwise text may be interpreted as graphics or other special characters.

To set eight bits, no parity, type:

```
AWLEN 8  (eight-bit words)    PARITY 0  (no parity bit)
```

To return to seven bits, even parity, type:

```
AWLEN 7  (seven-bit words)    PARITY 3  (even parity)
```

You must type the command "RESTART" for the settings to take effect. One of these combinations will satisfy most computers. You are more likely to require a different setting if you have a 'dumb' terminal rather than a computer, or if you have configured your computer's serial port for some special application. If your computer needs odd parity, set PARITY to 1.

If you see framing errors, try this for shorter characters:

```
AWLEN 7  (seven-bit words)    PARITY 0  (no parity bit)
```

2.6 Screen Displays

Some computers and terminal programs are configured to certain default characteristics that may at first seem incompatible with the PK-88. Follow these hints as you begin to 'dialogue' with your new TNC.

2.6.1 Echoes

If you see two characters on your screen for each character you type, then your computer and the PK-88 are echoing your typed characters.

```
cmd:RREESSEETT
```

- Type: ECHO OFF to stop the PK-88's echoes.

If you use the PK-88 later with a different terminal program, you may see nothing displayed when you type. In that case, set ECHO ON.

2.6.2 Line Feeds and Carriage Returns

If lines displayed appear to be double spaced, your computer is adding an extra line feed <LF> when it displays a carriage return <CR>.

- Set ALFDISP OFF to stop the PK-88 from adding an <LF>.

If you change terminal equipment you may have to set ALFDISP ON to restore the PK-88's automatic line feeds.

2.6.3 Screen Width

If ALFDISP is ON, the PK-88 sends an extra <CR>, or <CR><LF> to your terminal when 80 characters have been displayed on a line. The screen width default value is 80, the width of most CRT displays.

If your computer does not automatically break long lines:

- Set ACRDISP (the screen width) to the width of your display.
- For a computer using a TV set for a display, set ACRDISP to 40.

If your computer does automatically break long lines:

- Set ACRDISP to 0 to disable this feature. Otherwise, you will get two <CR>s when the line wraps around.

2.6.4 Display Speeds

A few computers or terminal programs may lose the first characters of a line when several lines are displayed in rapid succession.

- Set NUCR ON (delay after <CR>), or NULF ON (delay after <LF>) to give the computer more time between lines.

The delay is adjusted by NULLS, which sets the number of character times for the delay.

2.7 System Setup and Verification

DISCONNECT POWER BEFORE MAKING ANY OTHER CONNECTIONS!

Do these steps before connecting any cables between the PK-88 and your radio.

1. Open the PK-88 and install 2 AA batteries in the Battery Holder.
2. Connect the PK-88 to your computer via the RS-232 cable.
3. Turn ON your computer. Load and run your communications program.
4. Connect the wired end of the shielded cable to J2 on your PK-88.
5. Connect the wires from the PK-88's J2 pins 2 and 8 to each other.
6. Connect the PK-88 to a regulated 12-volt DC power supply.
7. Press the PK-88's power switch to the ON position.
8. Set your computer's data rate to 1200 bauds, 7 bits, even parity if possible. If your serial port is operating at 1200 bauds, you will see the following message right away:

   Please type a star (*) for autobaud routine.

   If this message appears, go to Step 10 now.

9. If you are using your computer or terminal at a different data rate, word length or parity, your screen may show meaningless 'garbage' or mutilated characters, or nothing at all. If true, go to Step 10 now.

   (Don't worry! - the PK-88 is doing its 'auto-baud' routine. It measures your computer's data rate, digital word length, parity, and then sets itself accordingly. The PK-88 automatically scans baud rates of 300, 1200, 2400, 4800 and 9600 bauds.)

10. Type several asterisks (*) at intervals of one second.

    If the cable and connections between the PK-88 and your computer are correct, the MULT LED will be extinguished and other LEDs will be lit as the PK-88 does its 'auto-baud' routine. As soon as the PK-88 has recognized your data rate and set itself to your data rate, the CMD LED is lit and your screen displays the sign-on message ending with the "cmd:" command prompt:

```
PK-88 is using default values.

AEA PK-88 Packet Controller
AX.25 Level 2 Version 2.0
Copyright (C) 1986, 1987, 1988 by
Advanced Electronic Applications, Inc.
Release xx.xxx.xx +
Checksum $xx
cmd:
```

NOTE: The Release date and checksum shown above will change as the PK-88's firmware is revised or updated. Please note this Date and Checksum on the inside front cover of this manual.

11. Do not turn on your radio yet!

12. Type 'MY AAA' followed by a RETURN (or ENTER key). Your monitor should display:

```
cmd:my aaa
MYCALL   was PK88
MYCALL   now AAA
```

13. Type 'C AAA' followed by a RETURN. After a few moments, your monitor should display:

```
cmd:c aaa
*** CONNECTED to AAA
```

14. Type a few characters, any characters, followed by a RETURN. After a few moments, your monitor should echo the same characters that you have just typed.

15. Type '(CONTROL-C)' (type 'C' while pressing the CONTROL key down) Your monitor should respond with:

```
cmd:
```

16. Type 'HB 300' followed by a RETURN. Your monitor should respond with:

```
HBAUD    was 1200
HBAUD    now 300
```

17. Type 'K' followed by a RETURN. Your monitor should echo the characters you've just typed.

18. Type '(CONTROL-C).' Your monitor should respond with:

```
cmd:
```

19. Type 'D' followed by a RETURN. Your monitor should respond with:

```
cmd:d
*** DISCONNECTED: AAA
```

20. If you have done all these steps successfully, you have completed the system installation and you are ready to begin operating.

21. If you have problems with the steps shown above, return to Step 1 AFTER checking all cables and connectors. Read each step again carefully. If you still have problems, shut down the PK-88 and contact our Customer Service Department as suggested in the front of this manual.

    If all the front-panel LEDs remain lit at system start. verify that your power supply can provide at least 600 ma. at 12 VDC.

2.8 Radio Connections and Setup

DISCONNECT ALL POWER BEFORE MAKING ANY OTHER CONNECTIONS!

Use this simple step-by-step routine to verify that all cables and connectors are properly installed, and that the PK-88 Packet Controller is operating correctly. The procedure will also help you become familiar with the software commands and responses.

If you cannot solve a problem after carefully reading this manual and checking all cables and connectors, please refer to the instructions for calling the manufacturer in the beginning of the manual.

During these initial checkout procedures, do not connect the PK-88's PTT and AFSK lines to your radio until instructed to do so. Make all the other connections as described below.

After all the cables between the PK-88, your radio and your computer have been installed, apply power to your equipment in this order: radio, computer, PK-88.

The installation procedure uses the simplest method of connecting the PK-88 to your radio, via the radio's microphone jack. However, unless you have an auxiliary speaker-mike jack, you may not be able to monitor the channel or conveniently use the radio on voice.

This type of connection may also be susceptible to RFI from nearby transmitters. After your first trials with the installation routines in an initial test phase, you can consider alternate methods shown later in this Operating Manual for permanent station installation.

Use only shielded wire for microphone audio circuits. If you notice significant hum in the monitored audio during modulation adjustments, verify ground and shield connections in the cable between the radio and the PK-88. The cable supplied with the PK-88 is shielded for these applications.

This method requires a second receiver at the same site so that you can listen to your own signal. Read the remainder of this chapter carefully before connecting the PK-88 to your radio.

In this method, the PK-88 is connected directly to the radio; initial tests are performed without making any adjustments in the radio or adding any signal-level balancing devices in the cables.

This procedure is is divided into separate sections for FM and SSB radios. Follow these steps exactly in order to:

- o Verify that your radio and PK-88 are connected as shown in Table 2-1 earlier in this manual, and Figure 2-1 below.
- o Connect the PK-88's AFSK audio output to your radio's microphone receptacle or auxiliary input jack.
- o Adjust the PK-88's internal output-level control (VR1) to obtain proper modulation.
- o Take the receiver's audio output from an earphone plug or speaker jack and feed the audio directly to the PK-88.

Insert the eight-pin connector into J2 on the PK-88's rear panel and connect the microphone plug to your radio's microphone jack.

2.8.1 PTT (Push-to-Talk) Configuration

The PK-88 is configured at the factory for positive PTT. This seems to work with most modern radios. However, you can change the polarity of the PTT configuration as needed. Follow these steps:

- o Remove four screws from the sides of the PK-88 and lift off the cover.
- o Viewed from the front, jumper post JP5 is located at the rear left-hand side of the board in front of J4. JP5 is a three-pin jumper post on which you install a slip-on jumper to connect the center pin to one of the outside pins.
- o To change to negative PTT polarity, move the jumper block to the opposite center-end pair of pins.
- o Reinstall the cover and replace the four side screws.

2.8.2 Data Carrier Detect (DCD Pin 8) Jumper JP3

Certain applications may require that the connected state raises the Data Carrier Detect (DCD) signal on Pin 8 of the RS-232 interface at rear-panel connector J1. Jumper post JP3, located in front of J1, between integrated circuits U4 and U5, is factory set so that DCD Pin 8 is permanently pulled high.

If DCD is required active in the connected state only, move the JP3 jumper plug to the opposite position.

The WA7MBL packet BBS programs require that JP3 provide DCD high only in the connected state.

See the PK-88 schematic diagram in the Appendices section for further details on JP3.

2.8.3 FM Installation and Adjustment

Disconnect power before making any other connections.

1. Remove four screws from the sides of the PK-88 and lift off the cover.

2. Connect the PK-88 and FM radio as shown below in Figure 2-1.

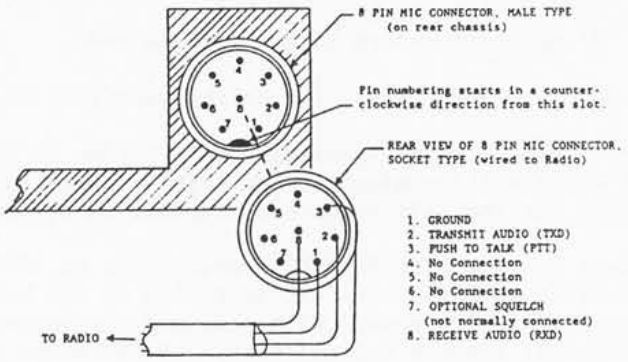


Figure 2-1 Radio-to-PK-88 Connections

3. Apply power to your computer and PK-88 and start your terminal program.

4. Connect the radio to a dummy load; be prepared to monitor your transmissions with another nearby radio.

5. Enter the Calibrate mode by typing 'CAL <RETURN>'.

   Ignore the 'zeros' scrolling down the left side of your screen. The self-contained 7910 modem chip does not require calibration or tone adjustments. The 'zeros' appear only to show that the PK-88 is in the 'Calibrate' mode for the purpose of keying the transmitter and applying steady-state tone modulation for transmitter adjustment.

   NOTE: In the Calibrate mode only, the 'K' key toggles the transmitter PTT line on and off. The 'SPACE BAR' toggles the PK-88's AFSK tone generator from 'Mark' (Stop Polarity, the lower-pitched tone) to 'Space' (Start Polarity, the higher-pitched tone). The PK-88's transmit watchdog timer circuit unkeys your transmitter automatically after sixty (60) seconds. As you perform the following adjustments, unkey periodically, then rekey the transmitter by typing 'K'.

6. Press the 'K' key on the keyboard to key the transmitter. You should hear a continuous tone in the monitor receiver.

7. Tap the space bar several times until you hear the higher-pitched of the two tones ('Space' or Start Polarity).

8. With the PK-88 keying the transmitter, adjust the transmit audio level as follows:

   - o Listen to the monitor receiver; turn the PK-88's internal AFSK Output Level adjustment screw clockwise (CW) until you hear no increase in output level in the monitoring receiver.

   - o Rotate the AFSK Output Level adjustment screw counterclockwise until the audio signal on the monitoring receiver is noticeably reduced below the maximum level.

9. Type 'K' again to return to the receive mode.

10. Type 'Q' to 'Quit' (exit) the calibration routine.

    You have set your FM transmitter's deviation to the approximate level which will be adequate for initial operation. However, an accurate setting will require a standard FM deviation meter.

    For best results with VHF/UHF transceivers at 1200 BPS, set the transmitter deviation so that deviation on the higher tone does not exceed 4.0 KHz peak. With standard pre-emphasis, most transmitters will produce approximately 2.5 KHz deviation on the lower (Mark/Stop) tone. Excessive deviation is likely to cause decoding errors at the receiving station.

    If your transmitter has an easily accessible microphone gain control, increase the setting of the "deviation control" and reduce the gain of the transmitter microphone circuit. This usually prevents excessive deviation limiting and bad mark-to-space tone amplitude ratios.

11. With your radio in the receive mode, open the squelch control so that a steady hiss or noise is heard on a speaker.

12. Set the receiver's volume control so the DCD LED on the PK-88 just lights with the receiver unsquelched.

    This is the approximate proper audio level for best receive performance from the PK-88's modem.

13. Reset your receiver's squelch control for normal operation.

14. Reinstall the cover and replace the four side screws.

2.8.4 SSB Installation and Adjustment

Installation and adjustment of the PK-88 with SSB radios is usually simpler and more direct than with FM equipment. You will use the same kind of cables and connectors that you use with your FM gear.

Digital modes with an SSB radio require some different settings of the radio's operating controls for proper packet operation. Be sure to observe the following precautions:

- Set VOX to OFF.
- Set speech compression to OFF.
- Set AGC to FAST (if available).
- Disconnect the ALC cables between your SSB radio and any external RF amplifier you wish to use in packet radio service.

NOTE: Make all connections with power off.

If your radio has a phone patch input and external PTT connections, the PK-88 AFSK output can be connected to those input jacks, leaving the microphone jack for normal service. However, some microphones are connected at all times (regardless of the PTT line's state. In this case, disconnect the microphone to prevent inadvertent loading of the audio input circuit. If the phone patch jack has a series isolating resistor, your microphone can remain connected.

1. Connect the PK-88 and SSB radio as shown in Figure 2-1.

2. Apply power to the PK-88 and your computer and start the terminal program.

3. Connect your SSB radio to a dummy load.

4. If your SSB radio has a 'monitor' facility, i.e., an audio output that lets you listen to the audio signals entering the microphone or phone patch jacks, turn that monitor circuit on.

5. Set the radio MODE selector to either USB (upper sideband) or LSB (lower sideband). Because packet radio uses NRZI data on the radio link, the sideband used does not affect the data sense or polarity. However, the radio's tuning calibration or frequency display will vary depending on which sideband is selected.

6. Set the radio's meter switch to the 'ALC' position. If the radio doesn't have an 'ALC' indication, set the meter switch to 'IP' to read output device or plate current. If an output device or plate current reading isn't available, set the meter to indicate power output.

7. Set the PK-88's TONE value to either TONE 0 for the low tone pair or TONE 1 for the high tone pair.

8. Set HBAUD to 300.

9. Enter the Calibrate mode by typing 'CAL <RETURN>'.

   Ignore the 'zeros' scrolling down the left side of your screen. The self-contained 7910 modem chip does not require calibration or tone adjustments. The 'zeros' appear only to show that the PK-88 is in the 'Calibrate' mode for the purpose of keying the transmitter and applying steady-state tone modulation for transmitter adjustment.

   NOTE: In the Calibrate mode only, the 'K' key toggles the transmitter PTT line on and off. The 'SPACE BAR' toggles the PK-88's AFSK tone generator from 'Mark' (Stop Polarity, the lower-pitched tone) to 'Space' (Start Polarity, the higher-pitched tone). The PK-88's transmit watchdog timer circuit unkeys your transmitter automatically after sixty (60) seconds. As you perform the following adjustments, unkey periodically, then rekey the transmitter by typing 'K'.

10. Press the 'K' key on the keyboard to key the transmitter. You should hear a continuous tone in the monitor output.

11. Tap the space bar several times until you hear the higher-pitched of the two tones ('Space').

12. With the PK-88 keying the transmitter, adjust the transmit audio level as follows:

    - Rotate the microphone gain control clockwise to about one-quarter open.

    - Turn the PK-88's internal AFSK Output Level adjustment screw (VR1) clockwise (CW) until until the ALC meter shows only a very small deflection from the unmodulated reading. Check the radio's output current or output power indicators.

    NOTE: Verify the radio manufacturer's output device current specifications.

    - Adjust the AFSK Output Level control until the radio's indicators show approximately fifty percent (50%) of the manufacturer's rated full-power reading.

    EXAMPLE: If the radio's output device current specification for CW operation is 200 mA, set the AFSK Output Level control and your microphone gain control so that the output device current indicates approximately 100 mA.

13. Type 'Q' to QUIT the calibrate mode.

You have now set the PK-88's transmit audio output level and the SSB radio's microphone gain control to an approximately correct level for packet radio operation.

14. With your radio in receive mode, tune the receiver to a clear, unoccupied frequency.

15. Set the receiver's audio volume control (AF Gain) to the position you would normally use for CW reception, or to a position such that the DCD LED on the PK-88 is just lit by the output noise signals from your receiver.

    This is the approximate receiver audio output level for best receive performance from the PK-88's modem.

2.9 Command List Displays

Type the command word 'display.' Your screen will show:

```
cmd:display
DISPLAY  A,C,I,L,M,T,Z
```

2.9.1 Display Complete Command List

At the 'cmd:' prompt, type the command word 'DISPLAY Z.' The PK-88 displays the entire list as shown in APPENDIX A.

The 'DISPLAY Z' command shows the complete command list. The defaults shown below are in effect when the PK-88 is turned on for the first time, and each time that you type the 'RESET' command.

2.9.2 Display Partial Command Lists

The command list can be displayed in sections according to the class of parameter or function you wish to see. The DISPLAY function is divided into the following seven classes:

A	Asynchronous port parameters
C	Special characters
I	Identification parameters
L	Link parameters
M	Monitor parameters
T	Timing parameters
Z	All parameters displayed

2.9.3 Display Asynchronous Port Parameters

```
cmd:disp a
8BITCONV  OFF       Strip bit 7 in CONVERSE
ACRDISP   80        Screen width
AFILTER   OFF       Never send MFILTER characters to radio.
ALFDISP   ON        Send <LF> after <CR> to terminal
AWLEN     8         Data bits per word, to terminal (autobaud)
BBSMSGS   OFF       Never show "was"; use older header format
CASEDISP  0 (as is) Select character case to terminal
ECHO      ON        Echo typed keyboard characters
ESCAPE    OFF       Send ESC character $1B as $24
FLOW      ON        Stop echo to screen while typing
ILFPACK   OFF       Ignore all <LFs> from terminal
NUCR      OFF       Nulls to terminal after <CR>
NULF      OFF       Nulls to terminal after <LF>
NULLS     0         Number of nulls for NUCR & NULF
PARITY    0 (none)  Terminal program parity (0-3, autobaud)
TBAUD     1200      Terminal baud rate (autobaud)
TRFLOW    OFF       Terminal flow control in Transparent mode
TXFLOW    OFF       PK-88 flow control in Transparent mode
XFLOW     ON        Software flow control
```

2.9.4 Display Special Characters

```
cmd:disp c
BKONDEL   ON             Send <BS> <SP> <BS> for DELETE char.
CANLINE   $18 (CTRL-X)   LINE DELETE character
CANPAC    $19 (CTRL-Y)   PACKET DELETE character
CHCALL    OFF            Show call sign after channel ID
CHDOUBLE  OFF            Show CHSWITCH character twice
CHSWITCH  $00            Channel-select (Link) character
COMMAND   $03 (CTRL-C)   Character escape to COMMAND Mode
DELETE    OFF            Use <BS> ($08), not <DEL> ($7F)
PASS      $16 (CTRL-V)   Pass input editing character
REDISPLA  $12 (CTRL-R)   Re-display current input buffer
SENDPAC   $0D (CTRL-M)   Character that 'sends' a packet
START     $11 (CTRL-Q)   Resume sending data to terminal
STOP      $13 (CTRL-S)   Stop sending data to terminal
TIME      $14 (CTRL-T)   Insert 'send time' in text
XOFF      $13 (CTRL-S)   Stop sending data to terminal
XON       $11 (CTRL-Q)   Resume sending data to terminal
```

2.9.5 Display Identification Parameters

```
cmd:disp i
UNPROTO   CQ                 Path/address to send UI frames
BEACON    EVERY 0            Set beacon timing (X10 seconds)
BTEXT     (empty)            120 byte (maximum) BEACON text
CBELL     OFF                Beep on connect and disconnect
CMSG      OFF                Send CTEXT message to caller
CTEXT     AEA PK-88 (etc)    120 byte (maximum) CONNECT text
HID       OFF                Send ID UI packet every 9.5 mins
MAILDROP  OFF                Personal MailDrop system
MDPROMPT  Enter message (etc) Prompt sent to Maildrop caller
MYALIAS   none               Alternate MYCALL
MYCALL    PK88               Your call sign for packet address
```

2.9.6 Display Link Parameters

```
cmd:disp l
CONNECT  Link state is: DISCONNECTED
ACRPACK  ON                    Add <CR> to packet
ALFPACK  OFF                   Send <LF> after <CR>, packet
AX25L2V2 ON                    Operate as AX.25 Version 2.0
CFROM    all                   Connect requests from list of calls
CONMODE  CONVERSE              Mode to enter when link starts
CONPERM  OFF                   Never disconnect this link
DFROM    all                   Digipeat these call signs only
FULLDUP  OFF                   Full-Duplex terminal operation
HBAUD    1200                  Packet link (radio) baud rate
MAXFRAME 4                     Maximum un-ACK'd frames allowed
NEWMODE  ON                    Return to Command Mode at DISC
NOMODE   OFF                   Never switch modes without command
PACLEN   128                   Maximum information bytes in packet
PASSALL  OFF                   Ignore CRC in HDLC ('Junk Mode')
RELINK   OFF                   Reconnect after retrying out
RETRY    10                    Maximum number of frame repeats
SQUELCH  OFF                   Select receiver squelch polarity
TONE     3 (1200/2200 eq)      Bell 202 modem tones, equalizer ON
TRIES    0                     Show or force retry count
USERS    1                     Maximum multiple connections
XMITOK   ON                    PTT line can be keyed
```

2.9.7 Display Monitor Parameters

```
cmd:disp m
CONSTAMP OFF                   Mark connections with time/date
DAYSTAMP OFF                   Include DATE in time-stamp
HEADERLN ON                    Insert <CR> after headers
MBELL    OFF                   Beep if selected station is heard
MBX      none                  Monitor channel without headers
MCON     0 (none)              Monitor while connected (0-6)
MDIGI    OFF                   Monitor digipeated frames
MDMON    ON                    Monitor remote caller's activity
MFILTER  $80                   Filter all received control
                               characters except CTRL-M (C/R),
                               CTRL-J (L/F) and TAB (CTRL-I)
MFROM    all                   Monitor source
MONITOR  4 (UA DM C D I UI)    Monitor mode level select (0-6)
MPROTO   ON                    Monitor I-frames with PID $F0
MRPT     ON                    Show digipeaters in headers
MSTAMP   OFF                   Time-stamp monitored frames
MTO      none                  Monitor destination
TRACE    OFF                   Hex dump of packet frame
```

2.9.8 Display Timing Parameters

```
cmd:disp t
AXDELAY  0 (00 msec.)          Repeater key-up delay (X10 ms.)
AXHANG   0 (000 msec.)         Repeater hang time (X10 ms.)
CHECK    30 (300 msec.)        Idle link timeout (X10 seconds)
CLKADJ   0                     Correction for real-time clock
CMDTIME  10 (1000 msec.)       Transparent Mode escape timer
CPACTIME OFF                   Use packet timeout in Converse
DWAIT    16 (160 msec.)        Delay for digi repeat (X10 ms.)
FRACK    3 (3 sec.)            Time (X1 seconds.) to wait for ACK
PACTIME  AFTER 10 (1000 msec)  Packet transmit timer (X100 ms.)
PERSIST  63                    P-persistent CSMA threshold
PPERSIST ON                    P-persistent CSMA instead of DWAIT
RESPTIME 5 (500 msec.)         Minimum delay before sending ACK
SLOTTIME 10 (100 msec.)        P-persistent slot time (X10 ms.)
TXDELAY  30 (300 msec.)        PTT key-to-data delay (X10 ms.)
```

2.10 Immediate Commands

The 'immediate' commands do not have default values. These commands take effect as soon as you type them (and a <RETURN>), to start, stop or activate a specific PK-88 function.

Like all other PK-88 commands, the immediate commands can be typed with a short mnemonic or abbreviated form. See the command descriptions in Chapter 7, 'Command Summary'.

```
CALIBRAT    Start calibration routine
CONNECT     Send connect request to <Call>
CONVERSE    Start Converse Mode from Command
CSTATUS     Show status of channels (links)
DAYTIME     Show or enter time of day
DISCONNE    Send DISC to distant station
DISPLAY     Show PK-88 parameters/classes
HELP        Show a brief list of commands
ID          Force ID packet via Unproto path
K           Same as CONVERSE
MDCHECK     Activate MailDrop from terminal side (SysOp)
MHEARD      Display call signs heard
RESET       RESET bbRAM to factory defaults
RESTART     Same as power-on/off reset
TCLEAR      Clear the Transmit Buffer
TRANS       Start Transparent Data Mode
```

2.10.1 Unlisted Commands

The following commands do not appear in the displayed command list:

ADDRESS CALIBRAT CONOK CR HELP HOST HPOLL IO KISS MDCHECK MEMORY RAWHDLC

These commands are explained in the Command Summary in Chapter 7.

2.11 Detailed Connections for Specific Computers

Many computers require a serial port adapter card that incorporates the necessary interface circuitry. Some popular computers in this category are the Apple II series, the IBM PC (and many compatibles), the Tandy 1000, 1200 and 3000-series computers and the Sanyo MBC-55X series. If you are using one of these computers refer to the section, 'Other Computers with Nonstandard Serial Ports.'

Computers that do not have a serial port and do not permit use of a suitable adapter or level converter cannot be used with the PK-88.

2.11.1 Computers with Specific Serial Interfaces

Apple Macintosh

The Macintosh serial port is compatible with the RS-422 standard, but can be used with the RS-232C port on the PK-88.

Wire a cable as shown below:

MACINTOSH (DB9P)		PK-88 (DB25P)
1	.....	1
5	.....	2
9	.....	3
3	.....	7
7	.....	8
6	.....	20

Note that pin 1 is not connected inside the Macintosh. Use a shielded serial cable and connect both pins numbered '1' to the shield. Connect pin 1 at the Macintosh end to the main ground on the computer.

2.11.2 Commodore 64, 64C, 128, VIC 20

Commodore and other manufacturers sell a signal level converter that is installed in the User Port Connector on the rear of the computer. The converter changes the computer's internal TTL voltage levels to the proper RS-232-C voltage levels and polarities. Unless you are very familiar with the inner workings of your computer, you should purchase a level converter rather than trying to 'do it yourself.'

2.11.3 IBM PCjr

The PCjr uses standard RS-232-C voltage levels; however, the connector is not standard and is sometimes hard to find. Pin-out information can be found in the IBM PCjr Technical Reference Manual.

Some computer dealers sell an 'IBM PCjr Adapter Cable for Serial Devices' that converts the connector on the PCjr to standard RS-232C. The cable is attached directly between the PCjr and the PK-88. The cable is only about three inches long; you may want to get a male-to-female RS-232C extension cable.

2.11.4 Tandy Color Computer

The CoCo series (except for the Micro Color Computer) uses a 4-pin DIN connector for its serial interface. Wire a cable as shown below.

```
CoCo                PK-88 (DB25P)

4 ..................... 2
2 ..................... 3
3 ..................... 7
```

2.11.5 Tandy Model 100/102, Kyocera KC-85 and NEC 8201

The Model 100/102, Kyocera KC-85 and NEC 8201 have built-in RS-232C serial ports compatible with the PK-88. You will need a standard male-to-male RS-232C extension cable to connect the computer and the PK-88.

2.11.6 Other Computers with 25-Pin RS-232-C Ports

If your computer has an RS-232C port, consult your manual to see which pins are used for Send data, Receive data and signal common. Read the instructions for connecting a modem and connect the PK-88 the same way.

The PK-88 is configured as Data Communications Equipment (DCE), the technical term for an RS-232C modem. Most computers and terminals are configured as Data Terminal Equipment (DTE).

- If your computer is configured as DTE:

  Wire pin 2 of the PK-88 connector to pin 2 of the computer's RS-232C port, pin 3 to pin 3 and pin 7 to pin 7. Use a standard 3-wire male-to-female or male-to-male RS-232C extension cable.

- If your computer is configured as DCE:

  Wire pin 2 of the PK-88 to pin 3 of the computer connector.
  Wire pin 2 of the computer connector to pin 3 of the PK-88.
  Wire pin 7 to pin 7.

Some computers require pin 5 of to be connected to an appropriate signal. Others may require connections for pin 8 and pin 20. You can use the computer's output signals on pins 4 and 6 as indicated below:

```
PK-88                    COMPUTER

 2 ........................ 2
 3 ........................ 3
 7 ........................ 7

                  :........ 4
                  :........ 5

                  :........ 6
                  :........ 8
                  :........ 20
```

2.11.7 Other Computers with Non-Standard Serial Ports

Computers with non-standard serial ports must meet the following conditions:

- Signal levels must be compatible with RS-232C or CCITT Recommendations V.24/V.28. The PK-88 requires the voltage levels from the computer be greater than about +3 volts in one state and less than 0 volts in the other state.

- Signal polarity must conform to the RS-232C/V.24/V.28 standard. The low-voltage state must correspond to logical '1'; the high-voltage state to logical '0.'

- The computer must be able to correctly receive signals that meet RS-232C/V.24/V.28 specifications. The PK-88 meets these specifications.

Make or buy a cable that provides the following connections:

- The computer's serial port common pin must be connected to the PK-88's serial port connector pin 7.

- The pin on which the computer SENDS data must be connected to the PK-88's connector pin 2.

- The pin on which the computer RECEIVES data must be connected to the PK-88's connector pin 3.

If your computer requires any other signals, you must arrange to provide them. The documentation provided with your computer or serial card should clarify any special requirements.

2.12 Terminal (Modem) Software for Specific Computers

Any communications program that enables your computer to emulate or act as an ASCII terminal with a telephone modem should work with the PK-88. If you have a familiar program you have used successfully, use it to communicate with the PK-88.

2.12.1 Apple Macintosh

Apple dealers sell a communications program called 'MacTerm' that will work well with the PK-88. Set the program options as listed below:

COMPATIBILITY:
1200 bauds, 7 bits/character, even parity, Handshake XON/XOFF, Modem connection, 'telephone' port.

TERMINAL:
VT100, ANSI, UNDERLINE, US, 80 columns, ON LINE, AUTOREPEAT.

2.12.2 Apple II, II+, IIE and IIC

The PK-88 operates well with the Apple II family of computers using both Apple-supplied and third-party serial interface cards. Terminal programs used successfully include ASCII EXPRESS PRO, Hayes SMARTCOMM IIE, Modem Manager and DataCapture 4.0

2.12.3 Commodore 64, 64C, 128, Vic 20

AEA's program COM-PAKRATT will work with the Commodore 64 and 128 series of computers. COM-PAKRATT will not work with the VIC-20. A BASIC communications program is printed in the Programmer's Reference Guide published by Commodore. Use the program listing for 'True ASCII'; Commodore computers use a modified ASCII format internally. We suggest you operate the PK-88 at 300 bauds with these computers to avoid possible data speed difficulties.

2.12.4 IBM PCjrTM

The PCjr's BASIC cartridge contains a terminal program. Start the program by typing 'TERM.' Refer to the PCjr's BASIC manual for details on the program. For best results with the PCjr do not run the PK-88's serial port baud rate faster than 1200 bauds.

2.12.5 Tandy Color Computer

Several terminal programs are available for the CoCo. We suggest that you use a commercial program rather than writing your own. The CoCo's 'software UART' may be difficult to program in BASIC.

2.12.6 Tandy Model 100/102, Kyocera KC-85 and NEC 8201

These portable computers have built-in terminal programs in ROM. Consult the computer documentation for instructions in their use.

2.12.7 IBM PCs, 'Clones' and True Compatibles

AEA's PC-PAKRATT will work with the PK-88 and the IBM-PC, AT and true compatibles. There are also many commercial, 'shareware' and public-domain communications and terminal programs available for the IBM PC family and compatible MS-DOS computers. Almost any of these programs can be used successfully with the PK-88.

Specialized terminal programs for packet radio and electronic mail or packet bulletin board service can be found throughout the packet radio community and can be downloaded from Compuserve, GEnie and from many telephone bulletin boards.

A partial list of terminal and BBS programs tested successfully with the PK-88 includes:

PCPAKRAT, PROCOMM, PROCOMM-PLUS, CROSSTALK, SMARTCOM, RELAY, CTERM, QMODEM, PC-TALK, HAMCOM, PK232COM, ASCII EXPRESS, BITCOM, PACKCOMM, PACKTALK, HAMPAC, MACPAC, YAPP, WA7MBL V3.x/4.x/5.x, W0RLI V4.5/6.03, KA2BQE PRMBS V0.97u, AC4X MPC V4.03, and others.

2.13 PBBS, Electronic Mail and File Server Program Compatibility

The PK-88 can be used successfully with a variety of electronic mail programs, as well as with several PBBS (Packet Bulletin Board) programs written for the PC/MS-DOS computers. The PK-88 operates with BBS programs by W0RLI, VE3GYQ, WA7MBL, KA2BQE, AC4X and others.

Please consult the authors of these applications programs directly for information on operating the PK-88 with their programs. Our Customer Service Department cannot provide this information.

The PK-88 also performs well with several applications that use the TCP/IP suite of protocols written by KA9Q for the PC/MS-DOS computers, available in the packet radio community. See Chapter 6 for details on Host Mode, KISS TNC, TCP/IP and other special applications.

The following default parameters should be considered as initial or experimental settings for these host applications:

PBBS Programs		TCP/IP Suite (KA9Q)
8BITCONV	ON	AWLEN 8
ACRDISP	0	CONMODE TRANS
ALFDISP	OFF	HID OFF
AWLEN	8	HPOLL OFF
AX25L2V2	ON	KISS ON
CANLINE	$00	PARITY 0
CANPAC	$00	PPERSIST ON
CHSWITCH	$00	RAWHDLC ON
DELETE	OFF	START $00
ECHO	OFF	STOP $00
FLOW	OFF	TRACE OFF
NEWMODE	OFF	XON $00
NOMODE	ON	XOFF $00
PARITY	0	XFLOW OFF
RELINK	OFF	HOST ON (Must be last!)
START	$00	
STOP	$00	
TXFLOW	OFF	
XFLOW	OFF	
XOFF	$00	
XON	$00	

2.13.1 Data Carrier Detect (DCD) Requirements

Certain host computer application programs require that Pin 8, 'DCD' (Data Carrier Detect) be asserted during connected state. In such cases, Pin 8 must be wired between the computer and the PK-88.

The PK-88's jumper JP3 must be set to force Pin 8 to follow the PK-88's connect status. This requires a change from the factory-set jumper position. See paragraph 2.8.2 for jumper JP3 details.

CHAPTER 3

BASIC OPERATION

3.1 Exploring the PK-88 Program

This chapter shows you how to use the PK-88, describes the keyboard commands you will use to 'talk' to the PK-88, and the answers, prompts and error messages you will receive from the PK-88.

3.2 LED Status and Mode Indicators

The PK-88's front-panel LEDs show you the operating mode and status at any moment. Each LED is marked with an abbreviated name. Scan the PK-88's front panel as we review the LEDs and their meanings.

The following LEDs show the operating mode:

CONV	Converse	Lit when in Converse Mode
TRANS	Transparent	Lit when in Transparent Mode
CMD	Command	Lit when in Command Mode

3.2.1 Status Indicator LEDs

The following LEDs show system status:

SEND	Send	Lit when PTT line is enabled
DCD	Data Carrier Detect	Lit when receiving signal
STA	Status	Lit when unacknowledged frames exist, or blinks when the MailDrop has messages not yet read by the owner (MYCALL)
CON	Connected	Lit when valid connect state exists
MULT	Multiple	Lit when multiple connection exists, or blinks when the receive buffer is full.

3.2.2 The DCD LED - Data Carrier Detect

The DCD LED is an indicator of channel activity. When another station transmits, the DCD LED on the PK-88 should light for the duration of the received packet frame. If the DCD LED is lit by random noises, reduce your receiver's output volume control until the LED goes out. Valid packets received should always light the DCD LED.

3.2.3 LEDs at System Start

After the PK-88 has been initialized at system start, or each time you type RESTART, the PK-88 should be in command mode.

CMD lit The PK-88 is in Command Mode.

3.3 Commands

The PK-88 Packet Radio Controller is a command-driven system. All control functions are performed by typing single- and multiple-character commands from your computer's keyboard. Menus are not used.

Commands can specify the variable values of the parameters that affect the PK-88's operation and its performance during specific actions.

3.3.1 Entering Commands

Commands are entered after the Command Mode prompt: cmd:

NOTE: Type <CTRL-C> if 'cmd:' is not displayed.

You will use English-like words or abbreviations to change the value of parameters and issue instructions to the PK-88.

- Commands are keywords or mnemonics (abbreviations that trigger your memory) composed of strings of characters typed by the user.

You will probably never change the values of some parameters; however, they give each user the flexibility to adapt the PK-88 to the local environment and operating conditions.

- Use either UPPER CASE (capital letters) or lower case (small letters) when entering commands.
- End the command with a carriage return <CR>. Carriage returns are not shown in the examples below.
- Correct your typing mistakes or cancel the line completely before you type the final <CR> of your command.
- See Chapter 3 for a discussion of line editing.

3.3.2 Command Responses

Whenever the PK-88 accepts a command that changes a value, the PK-88 responds with the previously stored value (unless BBSMSGS is set ON, in which case the previous value or state is not shown). For example, while in the Command mode, if you type

```
cmd:xflow off
```

and 'XFLOW' was 'ON' you'll see the display

```
XFLOW    was ON
XFLOW    now OFF
```

This message tells you that the value has been changed successfully.

3.3.3 Error Messages

If the PK-88 cannot understand what you have typed, you'll receive an error message in English telling you the nature of the error.

- If you type an unrecognized command:

  ?What?

- If the command name is correct, but the arguments are wrong:

  ?bad

- If you type a numerical value that is not within the proper range:

  ?range

- If you set the BEACON timing too often for busy channels:

  WARNING: BEACON too often

Here are a few more examples:

```
cmd:ASDFASDF
?What?              This is not a recognized command.

cmd:BEACON E
?bad                A parameter was left out.

cmd:PACLEN 265
?range              Unacceptable numerical value.

cmd:DAY
?clock not set      You did not set the PK-88's clock.
```

3.3.4 Command Names

The command name is the full word or character string you can type to tell the PK-88 to execute this command. You can command the PK-88 by typing a minimum abbreviation called a 'mnemonic' instead of the full word. You may always type out the entire command word, or any abbreviation longer than the minimum abbreviation. For example:

- The command MYCALL can be entered by simply typing 'MY.'
  (Note: DO NOT type the 'quotation marks' - we show these for clarity in identifying the letters you will type.)

The abbreviation 'M' is not enough (and will be interpreted as another command), but 'MY,' 'MYC,' 'MYCA,' 'MYCAL' or 'MYCALL' are acceptable.

If a command requires parameters, the type of parameter is indicated after the command name as well as the default value. For example, 'n' means that the command takes a numerical parameter value.

3.3.5 Default Values

Most commands have initial values that the PK-88 assumes as defaults or values suitable for the 'average case', or 'used most often.' These defaults are stored in EPROM and loaded into RAM when the system is first powered up - or when you give the RESET command.

3.3.6 Parameters, Arguments and Values

Some commands need additional information before they can be executed. This type of command has 'parameters' or requires 'arguments.'

For example, the command FULLDUP has a Boolean (YES/NO) parameter:

- The value that fills this parameter is either ON or OFF. You can also use YES for ON and NO for OFF. You can also use 'T' to "toggle" the state of the parameter.

When you type FULLDUP ON, FULLDUP is the command, ON is its argument - the value you want the PK-88 to use to execute the command FULLDUP.

- Immediate commands such as ID have no parameters. Typing only 'ID' causes the PK-88 to execute the command (if HID is ON).

Some commands such as CONNECT have optional parameters.

- If you enter CONNECT without an argument, the PK-88 displays the current status of the link.

However, if you enter CONNECT WX1AAA, the PK-88 issues the connect request and tries to establish the link to WX1AAA.

Some commands such as MFILTER can use several arguments at the same time. MFILTER accepts from 1 to 4 numerical arguments. You can type MFILTER 12 or MFILTER 12, 26. Both are legal commands.

Three different types of parameters are used: Boolean, numeric, and text or string.

Boolean Parameters

Boolean parameters have only two possible values: ON or OFF, YES or NO, or EVERY or AFTER. When a parameter is Boolean, its two possible choices are shown separated by a vertical bar. These values can be "toggled", or alternately switched by typing simply 'T' after the command name.

Numeric Parameters

A parameter designated as 'n' is a numeric value. Numeric values can be entered as decimal numbers, or optionally as hexadecimal numbers. When entering a hexadecimal number, you must prefix the number you type with a '$' character.

The PK-88 displays some of these numeric parameters (those which set special characters) in hexadecimal format. Here is a brief explanation of 'hex' numbers:

The 'digits' of a hex number represent powers of 16 in the same manner as the powers of 10 represented by a decimal number. The decimal numbers 10 through 15 are hexadecimal digits A through F. For example:

```
$1B  = (1 x 16) + (11 x 1) = 27 (decimal)
$120 = (1 x 256) + (2 x 16) + (0 x 1) = 288 (decimal)
```

Text or String Parameters

A parameter designated as text, such as the argument or 'message' for CTEXT ('connect' message), or the MDPROMPT command prompt in the MailDrop, can be entered in any combination of upper and lower case.

A text parameter can include numbers, spaces, and punctuation. The text is accepted exactly as you type it.

Some commands require call signs as parameters. Such parameters are usually call signs, but may be any string of numbers and at least one letter, up to six characters. The character strings identify stations sending and receiving packets.

A call sign can also include a substation identifier (SSID), a decimal number from 0 to 15 used to distinguish two or more stations on the air with the same call sign (such as a base station, a digital repeater or 'digipeater', or a packet switch or node).

The call sign and SSID are entered and displayed as 'call-n.' If an SSID is not entered, the system sets it to 0 (zero); SSID '0' is not displayed by the PK-88.

Certain commands have parameters which are lists of call signs:

- The MFROM and MTO commands allow you to specify from one to eight call signs for selective monitoring.

- You must separate multiple call sign lists with either blank spaces or commas.

Some examples will help you understand these explanations.

- BEACON EVERY|AFTER 'n'

The BEACON command requires both Boolean and numeric arguments. You must specify either EVERY or AFTER (abbreviated to E or A), followed by an argument 'n' chosen from some range of values.

An appropriate entry would be BEACON EVERY 180 (this tells the PK-88 to send a beacon every 180 X 10 seconds, every 30 minutes), or BEACON EVERY 0 (tells the PK-88 to never send the beacon at all).

o CONNECT call1 [VIA call2[,call3...,call9]]

The CONNECT command requires a string argument 'call1.'

You may include the keyword VIA, followed by a list of from one to eight call signs, 'call2' through 'call9.'

Multiple call signs in the list must be separated by commas or spaces.

An acceptable entry would be:

```
cmd:C WX1AAA V WX1BBB,WX1CCC
```

3.3.7 Using Commands Without Arguments

If you type a command name without an argument, the current value of the command's arguments is displayed. For example:

```
cmd:mdigi           Command typed without argument
MDIGI   ON          Displays the present value.

cmd:MDIGI Y         Sets the value to YES (ON)
MDIGI    was OFF    Displays the previous value
MDIGI    now ON     Displays the new value
```

NOTE: The DISPLAY command shows you the values of all parameters or groups of related parameters.

3.4 Controller Messages

The PK-88 will frequently send you messages during normal operating sessions. This section shows you typical messages and discusses the circumstances under which they can appear.

3.4.1 General Messages

```
AEA PK-88 Packet Controller
AX.25 Level 2 Version 2.0
Copyright (C) 1986, 1987, 1988 by
Advanced Electronic Applications, Inc.
Release 29.APR.88 +
Checksum $D9
```

This 'sign-on' message appears when you apply power to the PK-88, or when you issue the RESTART and RESET commands. The release date will change in each new firmware release. The checksum is a hexadecimal number that verifies the firmware version you are using is working.

```
PK-88 is using default values.
```

This message appears with the sign-on message shown above if the batteries are not installed (or have failed). You will see this message the first time you apply power to the PK-88. This message also appears if the PK-88 loads the defaults in response to the RESET command, or when the firmware version is changed.

cmd:

This Command Mode prompt tells you that the PK-88 is waiting for you to issue a command. Anything you type after this prompt is read as a command to the PK-88. If a monitored packet is being shown, the prompt may not be visible, even though you are in Command Mode. The front panel 'CMD' LED also indicates if the PK-88 is in Command Mode.

?What?

The PK-88 did not understand what you typed. Anytime you give the PK-88 a command it does not understand, a ?What? will be displayed.

was
now

The previous and current values are displayed whenever you change the value of one of the PK-88's parameters (unless BBSMSGS is set ON). The was and now responses confirm that the PK-88 properly interpreted your command, and remind you of what you have done.

3.4.2 Command Mode Error Messages

If you make a mistake typing a command to the PK-88, an error message is displayed. Depending on the type of error you have made, you may see the following messages:

?bad

You typed a command correctly, but the parameters, arguments or values in the command line could not be interpreted.

?VIA

You typed more than one call sign for the CONNECT or UNPROTO commands without the VIA keyword.

?callsign

You typed a call sign in a manner that does not meet the PK-88's requirements for call signs. A call sign may be any string of numbers and letters, including at least one letter. Punctuation and spaces are not allowed. Any substation ID used must be a decimal number from 0 to 15, separated from the call by a hyphen.

?clock not set

You typed the command DAYTIME, but you had not previously set the clock. DAYTIME sets the clock if it is typed with the daytime parameters, and displays the time if it is typed without parameters.

?not enough

You did not type enough arguments for a command that expects several parameters.

```
?need ALL/NONE/YES/NO
```

You did not type the arguments needed for CFROM, DFROM, MFROM and MTO.

```
?too many
```

You typed too many arguments for a command that expects several parameters. For example, MFILTER can have up to 4 arguments.

```
cmd:mfilter $1B,$0C,$1A,$03,$07
?too many
```

```
?too long
```

You typed too long a command line; the line was ignored. This happens if you type a BTEXT or CTEXT message of more than 120 characters.

```
?not while connected
```

You tried to change MYCALL or AX25L2V2 while already connected or while trying to establish a connection.

```
too many packets outstanding
```

This message appears after leaving CONVERSE or TRANS command if you have already typed packet data, filled the transmit buffer and then tried to return to the Data Mode. You can only enter the mode after some of the packets have been successfully transmitted.

3.4.3 Link Status Messages

Link status messages show the status of packet AX.25 connections in which the PK-88 is involved. You can ask for link status at any time from the Command Mode by typing the CONNECT command without parameters.

If you type a CONNECT command while the PK-88 is in connected state, your monitor will display the link status.

The following messages appear in response to the CONNECT command.

```
Link state is: CONNECTED to call1
          [VIA call2[,call3...,call9]]
```

Your station is connected to a distant station. The message shows the digipeater path in use, if any.

```
Link state is: DISCONNECTED
```

There is no link or connection at this time.

```
Link state is: CONNECT in progress
```

You typed a connect request, but the acknowledgment from the distant station has not been received. If you type the DISCONNE command, the connect process will be canceled.

Link state is: DISCONNECT in progress

You typed a disconnect request, but the acknowledgment from the distant station has not been received. If you type the DISCONNE command again the PK-88 is disconnected immediately.

Link state is: FRMR in progress

The PK-88 is connected to a distant station but a protocol error has occurred. This should never happen when AEA AX.25 systems are connected. An improper implementation of the AX.25 protocol could cause this condition. The PK-88 will try to resynchronize frame numbers with the distant TNC, although a disconnect may result. Connections are invalid in this state.

The PK-88 tells you whenever the link status changes. Link status may change in response to a command given the PK-88 (CONNECT or DISCONNE), a connect or disconnect request packet from a distant station, a disconnect resulting from exceeding the retry count, an automatic time-out disconnect (CHECK), or a protocol error.

*** CONNECTED to: call1 [VIA call2[,call3...,call9]]

This message appears when the PK-88 changes from the 'disconnected' or 'connect in progress' state to the connected state. The connection may be a result of a CONNECT command typed by you, or a connect request packet received from a distant station.

*** Connect request: call1 [VIA call2[,call3...,call9]]

The PK-88 has received but not accepted a connect request from a distant station. This can happen if you have set CFROM to NONE, or if you are already connected to another station. When the PK-88 displays this message, it also sends a DM packet (busy signal) to the station that initiated the connect request.

*** DISCONNECTED: <call sign>

The PK-88 has changed to the disconnected state from any other link state. This message may be preceded by a message explaining the reason for the disconnect, as shown below.

*** Retry count exceeded
*** DISCONNECTED: <call sign>

The PK-88 has disconnected because of a retry failure rather than a disconnect request from one of the stations.

*** <call sign> busy
*** DISCONNECTED: <call sign>

Your connect request was rejected by a DM packet (busy signal) from the other station. The PK-88 rejects connect requests if CFROM is set to NONE, or if you are already connected to another station.

FRMR sent: xx xx xx

The PK-88 is connected but a protocol error has occurred. The PK-88 has sent a special FRMR packet and is trying to resynchronize frame numbers with the distant station. The string xxxxxx is replaced with the hex codes for the three bytes sent in the information part of the FRMR frame. This message will not appear if the PK-88 is in Transparent Mode.

FRMR rcvd: xx xx xx

The PK-88 has received an FRMR protocol error described above. This message will not appear if the PK-88 is in Transparent Mode.

3.5 Special Keyboard Control Codes

Special uses have been assigned to certain keyboard characters. These characters are usually typed from the Command Mode. See the Command Summary in Chapter 7 for details on these control key commands.

CANLINE	CTRL-X	$18
CANPAC	CTRL-Y	$19
COMMAND	CTRL-C	$03
PASS	CTRL-V	$16
REDISPLA	CTRL-R	$12
SENDPAC	CTRL-M	$0D
START	CTRL-Q	$11
STOP	CTRL-S	$13
TIME	CTRL-T	$14
XOFF	CTRL-S	$13
XON	CTRL-Q	$11

3.6 Clear String Commands

The following commands can be cleared while in Command Mode by typing the command word followed by a single percent sign (%), an ampersand (&) or 'N,' 'NO,' 'NONE,' 'OFF' as the command's argument.

BTEXT	CFROM	CTEXT	DFROM	MBX	MFROM
MHEARD	MTO	MYALIAS			

3.7 Detailed Command Descriptions

Chapter 5, Command Summary, presents detailed descriptions of each command contained in the PK-88's operating system software. You will find more information on the meaning, use and effects of each command, its parameters and mnemonics, default values and arguments. Examples of command usage are included.

3.8 General Operating Information

Before discussing the specifics of each the PK-88's operating modes, here are some command concepts applicable to all packet modes.

3.8.1 Formatting Commands

These commands affect transmitted or displayed signals, or both.

3.8.1.1 Screen Line Length (ACRDISP n)

The ACRDISP command (default 80) formats your computer's screen display. A <CR> (or <CR><LF> sequence when ALFDISP is ON) is sent to your computer at the end of a line when 'n' characters have been displayed.

- If your computer formats or wraps output lines, set ACRDISP to zero (0) to disable the PK-88's word-wrap function.

3.8.1.2 Monitor Echo (ECHO)

The ECHO command controls local echo by the PK-88 except in Transparent Mode. If the characters you type are correctly displayed, the ECHO function is set properly.

- If you do not see your typing on your display, set ECHO to ON.
- If you see each typed character doubled, set ECHO to OFF.

3.8.1.3 Line Feed (<CTRL-J>)

<CTRL-J> is part of the standard terminal keyboard 'RETURN' or 'ENTER' key operation and is normally sent with a carriage return.

You can insert '<CTRL-J>' in any text where you need an isolated line feed function without an associated carriage return. This is known as an 'index' function in word processing, and can be useful when formatting text files in your buffers.

3.8.1.4 Carriage Return (<CTRL-M>)

<CTRL-M> is part of the standard terminal keyboard 'RETURN' or 'ENTER' key operation and is normally transmitted together with a line feed.

You can insert '<CTRL-M>' in any text where you need an isolated carriage return function without an associated line feed. This is also known as a 'Zero-Index Carriage Return (ZICR)' function in word processing, and can be useful when formatting text files in your message buffers.

3.8.1.5 Backspace and Delete (<DEL>)

Use your keyboard's <BACKSPACE> to backspace. Depending on how you have set the 'BKONDEL' and 'DELETE' parameters, your BACKSPACE key may be a 'destructive' backspace key.

- If 'DELETE' is ON, typing <BACKSPACE> erases the characters from the screen and from the transmit buffer as well.

3.9 Escape Functions (<ESC>)

The echoed ESCAPE character can be either your keyboard's ESCAPE ($1B, ASCII 27) key, or the '$' dollar sign character ($24, ASCII 36). The default is the ESCAPE key.

This option is provided because some terminals and computer terminal emulator programs may interpret the ESCAPE character as a special command prefix. These terminals change display functions depending on the characters that follow the ESCAPE key.

- If your computer presents this problem, set ESCAPE to ON.
- See the MFILTER and AFILTER commands which lets you strip or filter out any received characters and prevent them from reaching your computer or terminal.

3.10 Send Time of Day (<CTRL-T>)

Use the character specified by the TIME command (default <CTRL-T>) to insert the time of day in the text you type into the transmit buffer, or into a text file stored on disk.

The PK-88 reads the control code and sends the time to your radio in the data transmission code in use at that time, in format HH:MM, where 'HH' is the hour in the 24-hour system and 'MM' is the minute.

- If DAYSTAMP is ON the date is included with the time.

3.11 Clear Transmit Buffer (TCLEAR)

Use the TCLEAR command to clear the PK-88's transmit buffer and cancel any further transmission of data.

Type 'TCLEAR' or 'TC' followed by a <RETURN>.

- You must be in the Command Mode to use TCLEAR.
- Use <CTRL-C> (default) command to return to Command Mode.
- Type 'TCLEAR <RETURN>' or 'TC <RETURN>' to clear the transmit buffer.

CHAPTER 4

PACKET OPERATION

4.1 General Information

This section describes basic packet operation. For your first packet practice, the PK-88 is connected in a 'loopback' circuit so that it 'talks to itself.' You will have a chance become familiar with packet operation before you actually go on the air.

We will describe commands used for routine packet operations. These commands will get you ready for the section, 'Your First Packet Session.' The 'Special Input Characters' section contains information on editing from your keyboard and special characters used by the PK-88.

Most commands can be abbreviated by typing only the first two or three characters. The mnemonics or minimum abbreviations for each command are shown in Chapter 5, the 'Command Summary' chapter, along with a full description of each command.

The PK-88 automatically enters the Command Mode when you first apply power. If you have been in any other mode, type 'CONTROL-C' followed by a <RETURN>. The PK-88 answers with the following prompt:

```
cmd:
```

4.1.1 Change Radio Link Data Rate

The PK-88 provides radio link rates of 45, 50, 57, 75, 100, 110, 150, 200, 300, 600, 1200, 2400, 4800, 9600 and 19,200 BPS. The default data rate is set at the factory for 1200 BPS.

Use the HBAUD command from Command Mode to read or change the packet link data rate.

To read the present baud rate, type 'HBAUD <RETURN>' or 'HB <RETURN>.' The PK-88 responds with:

```
HBAUD    1200
```

To change the link rate, type 'HBAUD' followed two or three digits and a <RETURN>.

```
cmd:HBAUD 300<RETURN>
```

The PK-88 accepts the new baud rate and, if BBSMSGS is OFF, responds with the old baud rate:

```
HBAUD    was 1200
HBAUD    now 300
```

The number you enter becomes the new data rate and replaces the value previously stored in RAM. You can also change the baud rate one step at a time. For up type 'HB U' and for down type 'HB D'.

4.1.2 Station Identification

Use the MYCALL command to install your call sign in the PK-88's memory (see next section). The PK-88 will not key your transmitter until you've changed the MYCALL default "PK88" to a valid call sign.

4.1.2.1 MYCALL Required at System Start-Up

When you start the PK-88 for the first time, the system parameters are loaded from EPROM. MYCALL is initialized using "PK88" as its default. You must use the MYCALL command to install your call sign in the 88. You cannot operate until you have done this. If you try to connect to a station without installing your call sign, the PK-88 will not transmit, but instead sends you this error message:

```
?need MYCALL
```

4.1.2.2 Substation Identifiers (SSIDs)

You can identify additional stations with the Secondary Station ID, or SSID - a number from 0 to 15, appended to the call sign by a dash:

```
cmd:MYCALL WX1XXX
```

If you do not specify the SSID extension, the PK-88 retains its default value of zero (0) and the SSID is not displayed. You must specify the SSID to connect to a station with a SSID other than 0 or use such a station as a digipeater:

```
cmd:CONNECT WX1XXX-2 (or)
cmd:CONNECT WX1AAA VIA WX2BBB-2
```

4.1.2.3 Automatic Identification

The PK-88 can send an automatic identification (ID) packet every 9.5 minutes when your station is a digipeating. You can turn this feature on with the command HID ON. ID packets are displayed like this:

```
WX1XXX>ID:WX1XXX digipeater (or)
WX1XXX>ID:(MYALIAS), WX1XXX digipeater
```

When you shut down, you can command a final ID with the ID command.

4.2 Set Up Loopback Test Circuit

Do these steps in the exact order shown:

1. Get the shielded radio cable you set aside in Chapter 2.
2. Strip and tin the wires at the radio end of the cable.
3. Join the wires coming from pins 2 and 8.
4. Insert the eight-pin plug end of the cable into the J2 connector on the PK-88's rear panel.

You have connected the PK-88's transmit audio output to its receive audio input. The PK-88 can now 'talk to itself' in 'loopback.'

4.2.1 'Connect' and 'Disconnect'

Packet radio contacts begin with a connect process that sets up the 'handshaking' between the two stations to insure error-free communications. Contacts or connections are ended by a disconnect process that leaves both stations free to start new contacts.

Packet connections can also use digipeaters - other packet stations that automatically relay packets from one station to another over a specified route. We are going to 'connect' the PK-88 to itself to see how this works. You have already set up the PK-88 in loopback; therefore, the PK-88 will receive as well as send packets.

4.2.2 LED Status and Mode Indicators

The PK-88's front-panel LEDs show you the operating mode and system status at any moment. Each LED is marked with an abbreviated name.

CONV	Converse	Lit when in the Converse Mode
TRANS	Transparent	Lit when in the Transparent Mode
CMD	Command	Lit when in the Command Mode
SEND	Send	Lit when PTT line is active
DCD	Data Carrier Detect	Lit when valid data signals received
STA	Status	Lit when unacknowledged frames exist (Blinks when MailDrop has unread mail)
CON	Connect	Lit when valid connection exists
MULT	Multiple	Lit when multiple connection exists (Blinks when receive buffer is full)
PWR	Power	Lit when DC power is applied

4.3 System Loopback Test Connection

This first test uses your own call sign. Type 'CONNECT (MYCALL)'

```
cmd:CONNECT (MYCALL)
*** CONNECTED to (MYCALL)
```

The LEDs change to show the PK-88 in Packet Mode, in CONNECTED state and in CONVERSE Mode.

STATUS: CONV lit, CON lit

The PK-88 sends special packets to set up a connection. These packets are now leaving the PK-88 on J3's Pin 1 and returning on Pin 4 without being transmitted over your radio.

4.3.1 Connect Message

*** CONNECTED to MYCALL shows that the connection is established. The CON LED is now lit; the cmd: prompt does not appear on the next line. You are connected to yourself in Converse Mode, ready to begin. Try it. Type your message, ending the line with a <CR>:

```
Hello, there.
Hello, there. (Underscore here indicates received data)
```

4.3.2 Send Packet Character

<CR> tells the PK-88 to assemble your typed characters in a packet and transmit them. (We will explain how to use a different character to send packets in Chapter 5, the 'Command Summary' chapter.) In the Converse Mode, everything you type is assembled into packets and sent to the station to which you are connected. If a connect does not exist, the packet is addressed to CQ or whatever address you have typed into the UNPROTO field.

4.3.3 Return to Command Mode

The PK-88 automatically enters Converse Mode when the connection is established. Type '<CTRL-C>' (or whatever character you previously set ($00-$7F)) to return to Command Mode. The PK-88 does not echo the <CTRL-C>, but you should immediately see the Command Mode cmd: prompt.

You can return to Command Mode with the <BREAK> key. BREAK is a break in transmission (not an ASCII character) - your keyboard may have it.

If <CTRL-C> interferes with or stops your terminal program and you cannot send the BREAK signal, change the character that returns you to Command Mode. See 'COMMAND' in Chapter 5, the 'Command Summary'.

4.3.4 Return to Converse Mode

Type 'CONVERSE' to return to Converse Mode.

```
<CTRL-C>
cmd:CONVERSE
Whatever I type in Converse Mode is transmitted.
Whatever I type in Converse Mode is transmitted.
<CTRL-C>
cmd:
```

4.3.5 Terminate the Link - Disconnect

Type 'DISCONNE' (or 'D') to terminate the link or connection. The PK-88 transmits a special packet that ends the contact and notifies you when the link is disconnected:

```
cmd:DISCONNE
*** DISCONNECTED: (call sign)
```

An actual communication may be terminated by the other station. In that case, you will see the *** DISCONNECTED (call sign) message without having typed the command at your station.

You have now accomplished the basic operations of a packet contact:

- o You connected to the desired station to begin the contact.
- o You sent and received messages.
- o You disconnected from the station at the end of the contact.

4.4 Your First Packet Communication Session

There are more features you should be familiar with for comfortable packet operation - but you probably want to begin using the PK-88.

If possible, get help from an experienced packet operator to get you started. Be sure that the distant station is close enough to ensure good noise-free reception for your first 'on-the-air' communication.

4.4.1 System Cable and Switch Check

Before actually trying your first connection, take one more minute to verify your system setup:

1. Verify that the cable from the J2 connector is correctly wired to your radio's microphone jack.
2. Connect your radio to the PK-88 using the J2 jack.
3. Be sure you have adjusted the PK-88 and your radio using the installation procedure described earlier in this manual.

4.4.2 Starting the Communication

You are ready to try a connection. We will use WX1AAA in place of your call sign, and WX1BBB for the distant station's call sign. You can type upper case or lower case - the PK-88 doesn't care.

Type '<CTRL-C>' to verify that you are in Command Mode. Type 'CONNECT WX1BBB' after the cmd: prompt. After a moment you should see:

```
cmd:connect wx1bbb
*** CONNECTED to WX1BBB
```

You have begun your first packet communication. The PK-88 and the packet controller at the distant station are automatically switched to Converse Mode. The other station sees:

```
*** CONNECTED to WX1AAA
```

Exchange several messages to get the feel of packet radio. Watch your radio's transmit indicators and, if possible, listen to the audio from both radios; you will get a better idea of what is happening. Your radio is inactive most of the time, even while you are typing.

When you reach the end of a line and type <CR>, your radio is keyed briefly. The distant station hears 'brrrraaaap' on his speaker. As your message is displayed on his computer, his radio will be keyed for an even shorter burst; you will hear 'brraap' on your speaker. This is the ACK, the packet acknowledgment coming back.

The PK-88 notes that the packet was received correctly, but does not display anything on your screen. This is normal operation. If your system still had any unacknowledged packets outstanding, the PK-88's STA (Status) LED would be lit - but it is not. (Unless you have set MCON to a value higher than '4,' your terminal will not display ACK frames.)

4.4.3 What If....?

If you have trouble connecting, take a few minutes to verify each of the following items. Verify that:

- The PK-88's AFSK Output Level control, your microphone gain and deviation are set properly as shown and discussed in Chapter 2.
- All cables and connectors are properly installed.
- Your radio's volume and squelch are set for local conditions.
- You are in Command Mode. (Type '<CTRL-C>' to confirm this)
- If the cmd: prompt does not appear, press the PK-88 POWER switch off and then on again. You should get the normal sign-on message.
- TONE is set to 3 (or 2) for VHF, 0 or 1 for HF.
- HBAUD is 1200 if on VHF; 300 if on HF.
- CFROM is set to ALL.

Ask one of your area's experienced packet operators to listen to your transmissions and monitor with his TNC. Both you and the distant station should set MONITOR and MCON to '5' or '6', enter Converse Mode and send some packets. Each station should display packets sent by the other.

- If only one station is 'hearing' properly, verify the modulator and transmitter of that station and the demodulator and receiver of the other station.
- Experiment with the TXDELAY timing parameter for the sending TNC. Set TXDELAY to 60 for a long delay. If this solves the problem, decrease TXDELAY to the lowest value that works all the time.

4.5 Automatic Operation

The PK-88 offers a variety of automatic operating features including beacon operation, digipeater function and auto-answer messages.

Your packet station can be a digipeater for relaying packets to a more remote destination. Functions like CONNECT MESSAGE take care of situations not easily solved in modes other than packet. See the 'Command Summary' chapter for full details on the PK-88's commands.

4.5.1 Beacon Operation

The PK-88 can send an automatic beacon message at specified intervals. A beacon text can contain special announcements, or the MAIL FOR list in a bulletin board operation. The values '0' to '250' set the beacon timing in 10-second intervals. '0' turns off the beacon.

- Set your beacon text using the BTEXT command.
- Set the beacon timing interval using the BEACON EVERY or BEACON AFTER command.

For example, to transmit your beacon at 15-minute (15 X 60 seconds) intervals, type:

```
cmd:BEACON EVERY 90 (Beacon is sent every 900 seconds)
cmd:BEACON EVERY 0  (Beacon is disabled)
```

EVERY sends your beacon text at regular intervals. AFTER sends your beacon once after the specified interval after the last packet activity on the channel.

A beacon frame may be sent directly, and also sent via the digipeat addresses specified by the UNPROTO command.

Thoughtful beacon timing avoids cluttering the channel with unnecessary transmissions. Used with discretion, automatic beacons can be useful to verify propagation conditions and show usable radio paths. However, excessive beacons can be a source of interference to traffic flow. Use your beacon with consideration for others on the channel.

If you set the BEACON timing at a value considered too small for busy channels (less than '90'), you will see:

WARNING: BEACON too often

This warning appears in the Command Mode each time you type a command to remind you that your beacon interval may too short; your beacon may be bothering other channel users and need your attention.

4.5.2 Will You Accept Connections?

CFROM determines if call requests are accepted or rejected, which calls are accepted and which are rejected. You can also use synonyms CONOK ON and CONOK OFF in place of CFROM ALL and CFROM NONE. CFROM has four arguments: ALL, NONE, YES and NO.

ALL and NONE are used alone in the following manner:

- ALL - the PK-88 accepts connect requests from all callers;
- NONE - the PK-88 rejects connect requests from all callers.

YES and NO require a list of call signs:

- YES (list) - up to eight call signs whose call requests will be accepted;
- NO (list) - up to eight call signs whose call requests will be rejected.

CFROM's default argument is ALL. If ALL, the PK-88 will accept connect requests from any station that sends you a connect request.

Type 'CFROM NONE' or 'CONOK OFF' to reject connect requests from all stations. If the PK-88 receives a connect request when CFROM is set to NONE, your monitor displays:

*** Connect request: <call sign>

Your PK-88 sends the calling station a DM packet, or 'busy signal.' The caller sees:

*** MYCALL busy
*** DISCONNECTED: (call sign)

You can set the CFROM field to accept or reject call requests from specific stations.

To accept calls from one or more stations, type 'CFROM YES' (plus a list of calls signs). Connect requests will be accepted only from listed callers.

To reject calls from one or more stations, type 'CFROM NO' (plus a list of call signs). Connect requests will be rejected only from stations whose call signs are listed.

Type CFROM to display the ALL/NONE/YES list/NO list status. You can use the abbreviated command form or mnemonic:

```
cmd:cfrom                                   cmd:cf
CFROM    yes WX2BBB WX3CCC WX3CCC-5         CFROM    all
```

You can include SSIDs as '-n' after the call sign.

- o If CFROM is set to NO WX1AAA or YES WX1AAA, any combination WX1AAA, WX1AAA-1,...WX1AAA-15 will be matched and processed.
- o If CFROM is set to YES WX1AAA-1 or NO WX1AAA-1, then only WX1AAA-1 will match and be processed.

You can send your own connect command if you wish to communicate with the calling station even though his call request has been rejected.

Clear CFROM with '%,' '&,' or 'OFF' as arguments.

4.5.3 Are You Available to Chat?

Set CMSG ON (default is OFF) and use the CTEXT command to enter the type of message you might put in a telephone answering machine. The PK-88 automatically sends the CTEXT message to each station that connects to your system.

The CTEXT message can be any text string up to 120 characters. You can include <CR>s by prefixing them with the pass character (<CTRL-V> is the default):

```
cmd:CTEXT Sorry, I cannot talk right now.<CTRL-V><CR>
I will be on the air again after 8 PM.<CTRL-V><CR>
Joe
```

CFROM must be set to ALL (default) so that the connection takes place in order that this message be sent to stations connecting to you.

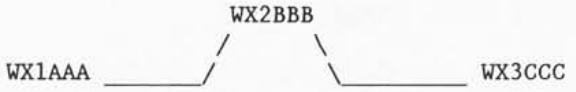
4.5.4 Do You Want to Transmit?

If you want to leave your station on to monitor and perhaps record the activity on the channel, but prevent your station from transmitting, set XMITOK OFF.

Type 'XMITOK OFF'

4.6 Digipeater Details

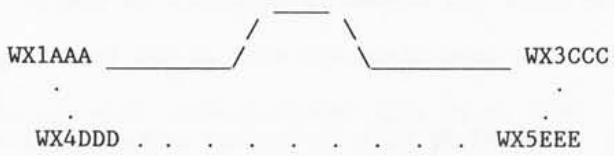
You may wish to connect to a packet station that is beyond your direct radio range. If a third packet station is on the air and both you and the station you want to talk to are in range of that third station, the third station can relay or 'digipeat' your packets. You set up the 'digipeater' routing when you request the connection. The PK-88 automatically includes the necessary routing information in the transmitted packets. Here is a sketch that shows how digipeating works:



You are station WX1AAA - you want to have a packet communication with WX3CCC. But there is a mountain between you and WX3CCC; you are out of range of each other. However, you know that there is a packet station located on the ridge - WX2BBB - which is in range of you and WX3CCC.

Instruct your PK-88 to set up a connection to WX3CCC using WX2BBB as an intermediate digipeater. After the cmd: prompt, type: 'CONNECT WX3CCC VIA WX2BBB.'

You can specify a routing list of up to eight intermediate stations. For example, consider a modification of the example above:



WX2BBB has turned off his station, but you can still contact WX3CCC by going around the mountain through WX4DDD and WX5EEE like this:

```
cmd:CONNECT WX3CCC VIA WX4DDD,WX5EEE
```

Type the digipeaters' call signs in the exact order of the intended path from your station to the station with which you wish to connect.

4.6.1 Are You a Digipeater?

Your station can be a digipeater for other stations. You do not have to 'do' anything. Your PK-88 digipeats other stations - unless you tell it not to! See the DFROM command in the Command Summary chapter.

The default argument of DFROM is ALL. If your transmitter is keyed when you are not using it, or during lulls in your own conversations, your PK-88 is being used as a digipeater by some other stations. This will not bother your communication with the distant station.

Set MDIGI to ON (default is OFF). The packet headers on your monitor will show the call signs of the stations that are using your station as a digipeater, and the data being transmitted through your station.

If MRPT is ON (default), you will also see your call sign in the packet header, showing the digipeater path in which you are included. The call sign of the station whose packet is being decoded is marked with as asterisk. Assume that your call sign is 'WX2BBB'. Here's a sample taken with Monitor 4 (default), MDIGI ON and MRPT ON:

```
WX1AAA*>WX2BBB>WX3CCC:
What time is the meeting?
WX3CCC*>WX2BBB>WX1AAA
```

4.6.2 Do You Want to be a Digipeater?

Many operators use their stations as digipeaters to provide a simple form of packet networking. If local circumstances prevent you from being a digipeater, you can disable the digipeat function.

DFROM determines if your station will digipeat other stations, and which stations packets will be digipeated.

DFROM's default argument is ALL. ALL means that the PK-88 will normally repeat packets from any station that includes your station's call sign in their digipeat path.

Type 'DFROM NONE' if you do not want to be used as a digipeater.

DFROM works with four arguments: ALL/NONE or YES/NO.

ALL and NONE are used alone and work in the following manner:

- ALL - your PK-88 will repeat packets from any station;
- NONE - your PK-88 will not repeat packets from any station.

YES and NO work with a list of call signs:

- YES (list) - call signs of up to eight stations whose packets will be repeated;
- NO (list) - call signs of up to eight stations whose packets will not be repeated.

Type 'DFROM' to display the ALL/NONE/YES list/NO list status of station call signs whose packets will or will not be repeated. You can use the abbreviated command form or mnemonic:

```
cmd:dfrom                cmd:df
DFROM    all             DFROM    yes WX1AAA WX2BBB WX3CCC
```

You can add SSIDs as '-n' after the call sign.

- If DFROM is set to NO WX1AAA or YES WX1AAA, any combination of WX1AAA, WX1AAA-1,...WX1AAA-15 will be matched and processed.
- If DFROM is set to YES WX1AAA-1 or NO WX1AAA-1 then only WX1AAA-1 will match and be processed.

Clear DFROM with '%,' '&,' or 'OFF' as the argument.

4.7 Unsuccessful Connections and Retries

Sometimes your attempt to connect to another station will fail; the desired station may not be on the air, it might be out of range, or you could have typed the other station's call sign incorrectly. If the distant station does not respond to your first connect request packet, your PK-88 will try again.

Use the RETRY command to control the number of times the PK-88 will repeat the connect request. The default value is 10. If your PK-88 does not get an ACK after that number (RETRY) of repeats, it quits and shows:

```
*** Retry count exceeded
*** DISCONNECTED: (call sign)
```

4.7.1 Retries While Connected

The same RETRY mechanism and count continues after the connection is established, you are in Converse Mode and the communication has begun. Each packet frame sent by your PK-88 must be acknowledged or 'ACKed' by the other station, and vice versa. ACK means that the packet was received correctly at the distant station; the error-detection protocol indicated it was received without errors. (This is how packet radio provides error-free communication.)

At times a packet will not be received correctly by the other station because of collisions with packet signals from other stations, or channel noise. If your PK-88 does not get an ACK within a specific time, it sends the same packet again and increments the RETRY count. If the RETRY count is exceeded, your PK-88 disconnects and displays:

```
*** Retry count exceeded
*** DISCONNECTED: (call sign)
```

The automatic disconnect feature avoids excessive retransmitting of useless packets. The disconnect prevents a 'hopeless' condition from tying up the channel if, for example, the other operator turns off his station without disconnecting, or your path is through a digipeater that stops operating, or the RF channel becomes unusable.

If you are operating under special conditions such as an emergency communications channel or a marginal HF channel, you can set RETRY to 0 (zero) to disable all automatic disconnects.

Please use this zero value (infinite retries) with discretion.

4.8 Monitoring Activity on the Channel

This section describes the monitor functions.

In addition to displaying data from the station to which you are connected, you can monitor all packet activity on the channel or display packets flowing between other stations. The PK-88 will also store the call signs of all stations heard on the channel in the MHEARD buffer.

4.8.1 Monitoring Other Stations

Use the MONITOR parameter to set the monitoring method; what stations will or will not be monitored and the type and amount of information shown by the monitor.

MONITOR takes a numerical value between zero (0) and six (6). Each higher number adds more detail to the monitoring. As the value of the MONITOR setting is increased, additional functions are included in the monitoring sequences.

The meanings of the MONITOR numbers are:

0 Monitoring is disabled.

1 Only unnumbered, 'unconnected' frames are displayed. Use 1 for 'unprotocolled,' communication with multiple stations. Other connected stations using the frequency are not displayed. This setting will also display beacons.

2 Numbered (I) frames are also displayed. I-frames are numbered in order of generation and appear in a connected transmission. Use this to monitor connected conversations in progress.

3 Connect request (C) frames and disconnect (D) frames are also displayed with the headers.

4 This is the PK-88's default value. Unnumbered acknowledgment (UA) of connect and disconnect frames are also displayed with either the characters UA or DM and a header.

5 Receive Ready (RR), Receive Not Ready (RN), Reject (RJ), Frame Reject (FR) and I-Frames (I) are also displayed.

6 Poll/Final bit and sequence numbers are also displayed.

Before this next step, verify that your loopback test cable is still connected to the PK-88's J2 RADIO connector.

- Type: <CTRL-C> D <RETURN> to make sure you are DISCONNECTED.
- Type: MONITOR 4. The PK-88 responds with: MONITOR was 4.
- Type: CONVERSE, then type: 'This is a test packet.'

Your monitor now shows:

```
MYCALL>CQ:This is a test packet.
```

Because the UNPROTO parameter is defaulted to the address CQ, your packets are sent to CQ - you are not connected to any other station. Your packet was 'heard' and decoded by the PK-88 and displayed with the packet header containing the sending station's call sign and the destination.

4.8.2 Monitoring Digipeaters - The MRPT Command

Set MRPT ON to see any digipeater stations being used. This feature is useful if you want to connect to a station you are monitoring and need to know a digipeater route in order to reach it. For example, you might see the following:

```
WX1AAA*>WX2BBB>WX3CCC:Hello, Bill!
```

This packet went from WX1AAA via WX2BBB to WX3CCC. The '*' shows you which station you actually decoded. If the PK-88 had decoded the packet from WX2BBB, the display would have shown:

```
WX1AAA>WX2BBB*>WX3CCC:Hello, Bill!
```

If several digipeaters are active, or if the message lines are long, the display may be difficult to read. You can put the header on a separate line from the text by setting HEADERLN ON:

```
WX1AAA*>WX2BBB>WX3CCC:
Hello, Bill!
```

4.8.3 Monitoring Other Stations While Connected

Use the MCON command for selective monitoring of other traffic on the channel while connected to a distant station. MCON works like MONITOR, but affects your display while in the connected state. As the value of MCON is increased, additional functions are included in the monitoring sequences.

The PK-88's default (MCON 0) tells your system not to show packets from other stations while you are connected to any station. This lets you converse without interruption and confusion caused by the mixture on your screen of everyone else's packets and those of the distant station to which you're connected.

You might use MCON set to 1 to monitor the Mail List beacons from a PBBS while holding connected conversations with the distant stations on the channel. Whenever a beacon is sent, that message is displayed while you are connected to another station. (See previous sections.)

4.9 Selective Monitoring

The MFROM, MTO and MONITOR commands provide certain monitor features not previously available in some earlier packet controllers. You can use these commands in combination to display or hide traffic to and from any stations or combination of stations as required. You might want to inhibit display of a busy bulletin board or electronic mail system while you are monitoring other conversations.

4.9.1 The MFROM Command

MFROM uses arguments to determine how the PK-88 monitors packet channels and displays information - which stations' packets will be displayed and which stations' packets will be masked or hidden.

MFROM is set to ALL when you start the PK-88 for the first time.

- Type MFROM to display the ALL/NONE/YES list/NO list status of call signs of stations <u>from</u> whom packets will or will not be displayed. You can use the abbreviated command form or mnemonic:

```
cmd:mfrom
MFROM    all

cmd:mf
MFROM    yes WX1AAA WX2BBB WX3CCC WX4DDD
```

- To stop display of all packets:

  type 'MFROM NONE' and 'MTO NONE'

  This has the same effect as setting MONITOR to zero (0).

- To display packets <u>only</u> <u>from</u> one or more specific stations:

  type 'MFROM YES' (followed by a list of calls signs).

  Only packets from stations whose call signs are listed after YES <u>will</u> <u>be</u> <u>displayed</u>. MTO should be NONE.

- To hide or mask packets <u>only</u> <u>from</u> one or more specific stations:

  type 'MFROM NO' (followed by a list of call signs).

  Only packets <u>from</u> stations whose call signs are listed after NO <u>will</u> <u>not</u> <u>be</u> <u>displayed</u>.

You can add optional SSIDs specified as '-n' after the call sign. If MFROM is set to NO WX1AAA or YES WX1AAA, any combination of WX1AAA, WX1AAA-1, WX1AAA-15 will be matched and processed.

If MFROM is set to YES WX1AAA-1 or NO WX1AAA-1, then <u>only</u> WX1AAA-1 will match and be processed.

When MFROM and MTO contain different types of arguments, to avoid any possible conflict, the arguments take the following priority:

ALL, NO-list, YES-list, NONE

Clear the MFROM field by typing '%,' '&,' or 'OFF' as the argument.

4.9.2 The MTO Command

MTO functions like MFROM and uses identical arguments to determine how the PK-88 monitors the packet channels and displays information; the stations whose packets will be displayed or hidden. MTO is set to NONE when you start the PK-88 for the first time.

- To display the ALL/NONE/YES list/NO list status of call signs of stations to whom packets will or will not be displayed:

  type 'MTO'

  You can use the abbreviated command form or mnemonic:

  ```
  cmd:mto
  MTO    all

  cmd:mt
  MTO    yes WX1AAA WX2BBB WX3CCC WX4DDD
  ```

- To stop display of all packets:

  type 'MFROM NONE' and 'MTO NONE'

  This has the same effect as setting MONITOR to 0 (zero).

- To display packets only to one or more specific stations:

  type 'MTO YES' (followed by a list of calls signs).

  Only packets from stations whose call signs are listed after YES will be displayed. MFROM should be NONE.

- To hide or mask packets only to one or more specific stations:

  type 'MTO NO' (followed by a list of call signs).

  Only packets to stations whose call signs are listed after NO will not be displayed.

You can add optional SSIDs specified as '-n' after the call sign. If MTO is set to NO WX2BBB or YES WX2BBB, any combination of WX2BBB, WX2BBB-1, WX2BBB-15 will be matched and processed.

If MTO is set to YES WX2BBB-1 or NO WX2BBB-1, then only WX2BBB-1 will match and be processed.

When MFROM and MTO contain different types of arguments, to avoid any possible conflict, the arguments take the following priority:

ALL, NO list, YES list, NONE

Clear MTO with '%,' '&,' or 'OFF' as the argument.

4.9.3 The MCON Command

Use the MCON command for selective monitoring of other traffic on the channel while connected to a distant station. Use this feature to 'listen' for specific stations while you are connected to someone else.

Set MCON to 0 or OFF if you do not wish to monitor packet activity when you are connected to someone.

MCON works like MONITOR but affects your display while connected. As the MCON setting is increased, more functions are added in monitoring sequences. The meanings of the parameter values are identical to those shown for the MONITOR command.

4.9.4 The MFILTER Command

Use the MFILTER command to 'filter' selected characters from packets received. For example, you can command the PK-88 system to filter out form feeds or bell characters that may be sent by the station with which you are connected, but which may interfere with your display or otherwise disturb your operations. You can specify up to four characters by giving the ASCII character codes in either hexadecimal or decimal numbers.

The default value of $80 (hex) filters all received control characters except <CTRL-M>, the carriage return, <CTRL-J>, the line feed, and <CTRL-I>, the TAB character.

When entering hexadecimal numbers, be sure to prefix the number with the '$' sign. Some examples follow:

- To prevent a <CTRL-L> character from clearing your screen, set MFILTER to 12.
- To eliminate <CTRL-Z> characters, which some computers interpret as the "clear screen" character, set MFILTER to 26.
- To prevent <CTRL-G> characters from 'beeping' your computer or terminal, set MFILTER to 7.

Enter the ASCII or hexadecimal values of the selected characters separating each value with a comma:

```
cmd:MFILTER $07, $13
```

4.9.5 The MHEARD Monitor Buffer

Use the MHEARD command to display a list of stations heard since the last time you applied power to the PK-88, or since the last time the MHEARD buffer was cleared. Entries in the 'heard' report are also time stamped if the date/time has been set with the DAYTIME command.

Clear the MHEARD buffer by typing either a 'percent sign' (%), an ampersand (&), 'N,' 'NO,' 'NONE' or 'OFF' after the command word.

- Stations heard directly are marked with a '*.'
- Stations heard through a digipeater are not marked.

4.9.6 MSTAMP - The Monitor Time-Stamp Command

Monitored packets can be time-stamped if DAYTIME has been set. To enable this function, set MSTAMP ON. You can also time-stamp connect and disconnect messages with the command CONSTAMP ON.

- If DAYSTAMP is OFF, CONSTAMP and MSTAMP show only TIME.
- If DAYSTAMP is ON, the DATE is included in CONSTAMP and MSTAMP.

Set DAYSTAMP ON when you want a dated record of packet channel activity, or when you are unavailable for local packet operation.

4.9.7 DAYTIME - Set the Real-Time Clock

Use the DAYTIME command to activate the PK-88's real-time clock by setting the date and time. The PK-88 displays current date and time information.

After the clock is set, you can display the time by entering DAYTIME <u>without</u> parameters. If you have removed power from the PK-88 since the last time you entered DAYTIME, you will have to reset the clock. The PK-88's time is updated continually as long as power is applied.

The clock is <u>not</u> set when the PK-88 is turned on. The DAYTIME command will display the following error message:

```
cmd:daytime
?clock not set
```

You must reset the date and time each time you RESET or remove power from the PK-88. Otherwise CONSTAMP and MSTAMP will not 'stamp' the time. The format of the display is dd-mm-yy hh:mm:ss.

```
DAYTIME  03-Feb-87  06:57:33
```

The format for entering the date and time is 'yymmddhhmmss,' where:

```
yy is the last two digits of the year
mm is the two-digit month code (01-12)
dd is date (01-31)
hh is the hour (00-23)
mm is the minutes after the hour (00-59)
ss is the seconds after the minute (00-59)
```

Example:
```
cmd:daytime 870628145040
DAYTIME  28-Jun-87  14:50:40
```

4.10 Packet Formatting

The PK-88 uses certain special characters to control its operations. Some of the PK-88's command parameters affect how your packets are formatted - how your typing appears to other stations. Other commands permit correction of typing errors before your packet is sent, cancel lines, and cancel entire packets if necessary. Most of the special input characters are active in both Command and Converse modes.

NOTE: Most console editing features and commands are disabled or not available when connected in Transparent mode.

If the default command character is unsuitable for your computer's terminal program, you can redefine each function using any ASCII character appropriate to your needs.

See Chapter 5, the 'Command Summary' chapter for full details on how to define these formatting and control features and commands.

4.10.1 PACLEN - Long or Short?

PACLEN sets the maximum length of your packet - the largest number of characters that can fit in one packet. If you type more than this number of characters (default 128) without typing a 'send-packet' character (default <CR>), the PK-88 will send a maximum-length packet.

Experimental evidence shows that reducing PACLEN to 64 or even 32 can improve throughput under difficult conditions such as on HF radio.

NOTE: Some other packet systems may be unable to accept packets longer than 128 characters.

4.10.2 Backspace and Delete

You can erase typing errors with your <BACKSPACE> key. If your terminal lacks <BACKSPACE>, set DELETE ON to erase characters with the <DELETE> key; set DELETE OFF to use the <BACKSPACE> key.

You will probably want to use the same key your computer normally uses to 'rub out' typing. If you are not sure what your rubout key does, try both settings of the DELETE command and see which works.

When you rub out typing errors, the PK-88 tries to correct the screen display. This works with most computers and display-type terminals. It will not work for hardcopy terminals. If your display does not look right after you rub out a character, try setting BKONDEL OFF. The PK-88 will not correct the display but will show the rubout with a '\' character (<BACKSLASH>). Restore the display correction by setting BKONDEL ON.

4.10.3 Cancel Line

If you make several mistakes, or change your mind, you can cancel the whole line by typing <CTRL-X> rather than rubbing out the characters one at a time. Your monitor displays a <BACKSLASH> and a <CR>:

```
cmd:Hi, John, how are you?<CTRL-X>\
[You started typing text while in Command Mode.]
cmd:CONVERSE
Hi, John, how are you?
```

4.10.4 Redisplay

If you have erased and retyped lots of characters, you may want to see 'fresh' input, especially if BKONDEL is OFF. The PK-88 shows the line you are entering when you type <CTRL-R>:

```
cmd:CONNECT KB7\\\WA7<CTRL-R>\
[You mistyped the call sign.]
cmd:CONNECT WA7GXD
```

Here you mistyped the first letters of the call and rubbed them out. The PK-88 displayed '\' for each letter erased. You then retyped the call and redisplayed the characters on the new line.

4.10.5 XON/XOFF, START/STOP - Display Flow Control

Type <CTRL-S> to stop the display if your monitor scrolls the data faster than you can read it.

Type <CTRL-Q> to resume output from the PK-88 to your computer.

4.10.6 The PASS Character

You may want to include a special input character in a packet. You can include any character in a packet (including special characters) by prefixing that character with the pass character, <CTRL-V>. For example, to send several lines in the same packet, you must include <CR> at the end of each line:

```
I was not at the meeting.<CTRL-V><CR>
What happened?
```

Without the PASS character, this message would go as two packets. By prefixing the first <CR> with <CTRL-V>, you send it all at once.

4.10.7 More Carriage Returns and Line Feeds

If the send-packet character is set to <CR>, you will probably want the <CR> to be included in the packet for display at the other end.

If you set the send-packet character to a non-printing character, you will probably want that character to be treated only as a command. The ACRPACK command determines whether the send-packet character is echoed and included in the packet.

If the other station reports that lines are overprinted on his display and he cannot change it at his end, set ALFPACK to ON.

These formatting features and commands are described in full detail in Chapter 5, the 'Command Summary' chapter.

4.11 Multiple Connections

Multiple connections are a powerful addition to the PK-88. This feature can be very useful for net operation, multi-user electronic mail, path checking and conversations with multiple stations.

In a multiple connection, you can establish 'point-to-point' links with several different stations. Think of multiple connections like a telephone with several different lines selected by line buttons. You will use a similar technique in handling packet multiple connections.

4.11.1 Default Multiple-Connect Conditions

At start-up time and until you change it, the PK-88 defaults to the following multiple-connect conditions:

CHCALL	OFF	CHDOUBLE	OFF
CHSWITCH	$00	USERS	1

These defaults set the PK-88 to operate exactly as would a TNC without the multiple-connect feature.

4.11.2 The USERS Command - Multiple-Connect Active

The USERS command affects only the manner in which incoming connect requests are handled, and has no effect on the number of connections you initiate with the PK-88.

A numerical value 'n' from 0 to 10 specifies the number of simultaneous connections that the PK-88 will receive. For example:

USERS 0	allows incoming connections on any free logical channel
USERS 1	allows incoming connections on logical channel 0 only
USERS 2	allows incoming connections on logical channels 0 and 1
USERS 3	allows incoming connections on logical channels 0, 1 and 2

and so on, through USERS 10.

4.11.3 CHSWITCH Character Selection

CHSWITCH selects the character used to change channels in multiple-connect operation. The value 'n' 0 to $FF (0 to 255 decimal) specifies the desired character.

- CHSWITCH characters must not be channel numbers (0 to 9).

The PK-88's default for CHSWITCH is $00, which disables the function.

Set the CHSWITCH character to a hexadecimal value from $00 to $FF, for any character that you will not normally use. You can switch 'logical channels' in a multiple-connect situation by typing the CHSWITCH character even when in the Converse Mode.

The CHSWITCH character can be PASSed in CONVERS mode, and is always ignored TRANSPARENT mode; it just flows through as data. The outgoing channel in fact cannot be changed while in TRANSPARENT mode.

4.11.4 The CHCALL Command - Display Multiple-Connect Call Signs

CHCALL displays the call sign of the 'connected-to' station after the channel identifier. Set CHCALL ON if you plan to use multiple connections.

4.11.5 The CHDOUBLE Command - Display Doubled Characters

When CHDOUBLE is set ON, your monitor displays received CHSWITCH characters as doubled characters.

Setting CHDOUBLE ON helps you tell the difference between CHSWITCH characters you type, and those received from other stations.

4.11.6 General Hints on Multiple-Connect Operation

Here are some general suggestions on multi-connect operation.

1. Choose the equals sign (=) as your switch character. Type 'CHSWITCH $3D' to enter the = sign.

2. To see the call signs of the stations with whom you are connected, type 'CHCALL ON.'

3. To accept the maximum number of multi-connects, type 'USERS 10.'

4. Assume you want to connect to both WX1AAA and WX2BBB type:

```
cmd:=0 CONNECT WX1AAA
          and
cmd:=1 CONNECT WX2BBB
```

   If you are not successful with either call, the PK-88 displays:

```
cmd:=0: *** Retry count exceeded
*** DISCONNECTED: WX1AAA
=1: *** Retry count exceeded
*** DISCONNECTED: WX2BBB
```

5. After you are connected, you can tell who's talking to you by:

```
=0:WX1AAA:  Hi Raplh.
=1:WX2BBB:  Long time no see!
```

6. To talk with WX1AAA in Converse mode, type:

```
=0 Hello Charlie!
```

   To talk with WX2BBB, do the same thing for his channel:

```
=1 Hello Frank how are you?
```

7. To disconnect from WX1AAA, type:

```
<CTRL-C>=0DISCONNECT
```

4.12 MailDrop Operation

The PK-88's MailDrop is a small, efficient personal mailbox that uses a subset of the well-known W0RLI/WA7MBL packet BBS commands. When your MailDrop feature is active, distant stations can connect to your PK-88, leave messages for you or read messages from you.

There are several important differences from standard "Mailbox" or BBS operation:

- o All messages are either from you or to you; to or from the call-sign stored as MYCALL.
- o Third-party messages are NOT accepted.
- o ALL messages are considered private.
- o SSIDs are always ignored on the MailDrop.

4.12.1 RAM Space for Message Storage

Approximately 8000 bytes of RAM are available to your MailDrop. RAM space is dynamically allocated so that it is possible to store a maximum of 15 messages.

The entire 8000 byte RAM can be used for a single message or for up to a maximum of 15 available message numbers (1-15). If all 8K of the RAM is used, or if the maximum 15 messages have been filed, the MailDrop displays the error message "*** No free memory". If there is enough room, the PK-88 displays the MailDrop command prompt.

4.12.2 System Commands

MailDrop operation is completely under your "SysOp" control from your local terminal or computer keyboard. Only you can start and stop MailDrop service. The commands shown below provide MailDrop control.

4.12.2.1 Start and Stop MailDrop Operation

Set MAILDROP to ON to start MailDrop operation (the default is OFF). This command activates or deactivates your MailDrop. The minimum command string is MAI. Set MAILDROP OFF to deactivate your MailDrop.

4.12.2.2 Local Logon and Verification

Type MDCHECK (or MDC) to verify that you have local control.

MDCHECK is an immediate command with which you can log on to your own MailDrop just as a calling station would. Once logged on to your MailDrop from your local keyboard, you are shown the MailDrop prompt as though you were the calling station:

```
[AEA PK-88]  8151  (B,K,L,R,S) >
```

where 8151 is the number of bytes of RAM available to the MailDrop.

You can now LIST, READ, SEND or KILL messages. While you're 'logged on' to your own MailDrop with the MDCHECK command, a connect request from a calling station will cause the PK-88 to send the 'BUSY' (DM) frame and DISCONNECT to the distant station.

If MAILDROP is OFF, the MDCHECK command will produce a '?What?' error message. A calling station's connect request will be treated as an ordinary packet connection. You cannot kill messages or clear the MailDrop. You must use the MDCHECK command to 'log on' to your MailDrop to use the MailDrop KILL command (see below).

A blinking STA LED shows that a message has been left for the PK-88 owner. Use of the MDCHECK command extinguishes the STA LED.

The following conditions are required to use the local logon feature:

- MAILDROP must be set ON.
- You cannot log on to your MailDrop while a calling station is connected or a connect is in progress.

Type 'B' (BYE) to 'log off' or quit control of your MailDrop. Your PK-88 is returned to MailDrop operation and made available to calling stations. A connect request from a calling station will now cause the PK-88 to connect and send the MailDrop prompt to the distant station.

You still have full control of your PK-88 while the MAILDROP is ON. You can initiate outbound connect requests to other packet stations and carry on normal connected-mode contacts. You can make multiple connections on any of the logical channels. However, you should not enter Converse or Transparent mode on the same logical channel as a calling station using the MailDrop.

4.12.2.3 Monitor MailDrop Operation

Set MDMON to ON (default) to monitor your MailDrop. The minimum command string is MDM. Set MDMON OFF to cancel MailDrop monitoring.

The MDMON command permits you to monitor a calling station's activity on your MailDrop showing you both sides of the MailDrop QSO. Packet headers are not shown while a caller is connected to your MailDrop.

When a caller is not connected to your MailDrop, channel activity is monitored in normal fashion according to the setting of MONITOR.

4.12.3 Caller Prompt

MDPROMPT (text) is the message prompt sent to a calling station by your MailDrop. This prompt has no connection with BTEXT and is sent only when a logged-on caller wishes to send a message.

You can install any 'personalized' text with a maximum length of 80 bytes. The minimum command string is MDP. The default prompt is:

"Enter message, ^Z (CTRL-Z) to end"

4.12.4 Caller and SysOp MailDrop Commands

While your MailDrop is active, or if you have logged on to your MailDrop from your local keyboard with the MDCHECK command, the only commands available to you and the calling station are:

B, K, L, R and S.

Any other command sent by the calling station is answered with the error message "*** What?". If you as SysOp enter an incorrect command, you'll see the error message "?What?" (no asterisks).

While a distant station is using the MailDrop, you can continue to issue commands to the PK-88 without interfering with the MailDrop.

The 'standard' BBS commands available to both you and the calling station are:

B	BYE	Log off the MailDrop
K	KILL	Kill or delete messages
L	LIST	List the message directory
R	READ	Read a specific message
S	SEND	Send a message

Only the first letter of the command is significant; for example, S, SP, ST and SB are all treated equally as the SEND command.

4.12.4.1 B (BYE)

The 'B' command logs the calling station (and you) off the MailDrop. A calling station will be disconnected; you will see the standard PK-88 "cmd:" prompt. The calling station may also simply disconnect.

4.12.4.2 K n (KILL n)

The 'K n' command deletes message number "n" from the MailDrop. As SysOp, you can kill <u>any</u> message. A calling station can kill only messages addressed to or from that caller. Messages are killed by number, not callsign.

4.12.4.3 L (LIST)

The 'L' command shows a list of all messages active on the MailDrop. The list is preceded by the following column header:

```
Msg# Size To     From   Date       Time
```

All active messages are listed under this line with the highest message number first.

DAYTIME must be set for the Date and Time to appear. Your MailDrop does <u>not</u> use message titles.

The MailDrop LIST command displays ALL message numbers, regardless of sender or addressee.

4.12.4.4 R n (READ n)

The 'R n' command displays the header and text of message number "n". As SysOp on the terminal side, you can read all messages. Messages are read by number, not callsign.

If the calling station or you as SysOp enter the 'R' command without a message number, both of you see the error message "*** Not enough".

A caller may READ only messages addressed to that caller's callsign, or to ALL or QST.

4.12.4.5 S callsign (SEND callsign)

The 'S callsign' command notifies the MailDrop that either you as SysOp or the calling station will now send text into a message buffer. A message is stored in the MailDrop under the lowest available message number.

If all 8K of the RAM is used, or if the maximum 15 messages have been filed, the MailDrop displays the error message "*** No free memory". If there is enough room, the MailDrop displays the MailDrop command prompt:

"Enter message, ^Z (CTRL-Z) to end"

When logged on from your local keyboard, if you use the 'S' command without a callsign, you'll see the error message "*** Need callsign".

However, a calling station may use the S command without a callsign; it is understood that the message is directed to the PK-88's SysOp. If a callsign is used, it must be either SYSOP or the same as the MYCALL of the PK-88.

The CTRL-Z can be the last character on a line, followed by a Return, or CTRL-Z can be typed on a separate line. In any case, the CTRL-Z is the last character stored in a message buffer. Any characters typed after the CTRL-Z are ignored. When the message is read, the MailDrop translates the CTRL-Z as a carriage return.

As soon as a calling station uses the S command, the STA light starts blinking to show that a message has been left for you. MDCHECK stops the blinking.

4.12.5 Sample Session - The Caller's Point of View

Let's see what the MailDrop looks like to a calling station. Let's assume that your call is "WX1AAA", and that you wish to connect and log on to "WX2BBB's" MailDrop system. During your session on his MailDrop, you wish to list the messages to see if there is a message for you, read it if it exists, kill it after you're done reading it, send a return message to WX2BBB and finally log off or disconnect from his MailDrop.

4.12.5.1 Connect and Logon

From the cmd: prompt, type the usual connect request:

```
cmd:c wx2bbb                              (Your connect request)
[AEA PK-88]  6270  (B,K,L,R,S) >          (The MailDrop's prompt)
*** CONNECTED to WX1AAA                   (Your PK-88's status line)
```

4.12.5.2 LIST Messages

You're logged on and have gotten the MailDrop's prompt:

```
[AEA PK-88]  6270  (B,K,L,R,S) >          (The MailDrop's prompt)
```

Now, type 'L' to LIST all the messages in the MailDrop.

```
L                                         (Type the LIST command)
Msg# Size To     From   Date       Time (The MailDrop responds)
  6   184 WX1AAA WX2BBB
  5   287 AD7I   WX2BBB
  4   178 G3PLX  WX2BBB
  3   324 W2HPM  WX2BBB
  2   679 W2JUP  WX2BBB
  1    56 G5ECI  WX2BBB
[AEA PK-88]  6270  (B,K,L,R,S) >   (The MailDrop is ready for next)
```

4.12.5.3 READ Messages

You've seen the list of messages and wish to READ yours. You've seen the MailDrop's prompt:

```
[AEA PK-88]  6270  (B,K,L,R,S) >          (The MailDrop's prompt)
```

Now, type 'R #' to READ <u>one</u> specific message in the MailDrop.

```
R 6                                       (Type the READ 6 command)
Msg# Size To     From   Date       Time (The MailDrop responds)
  6   144 WX1AAA WX2BBB                   (The message header)

Hello Joe.  Did you get the notice        (The message)
about next month's meeting of the
Radio Society at the Firehouse?
Will you be going? - I need a ride.
73.

[AEA PK-88]  6270  (B,K,L,R,S) >          (The MailDrop is ready again)
```

4.12.5.4 KILL Messages

You've read the message addressed to you and wish to KILL it. Again you see the MailDrop's prompt:

```
[AEA PK-88]  6270  (B,K,L,R,S) >          (The MailDrop's prompt)
```

Now, type 'K #' to KILL one specific message in the MailDrop.

```
K 6                                        (Type the 'KILL 6' command)
*** Done.                                  (The MailDrop's confirmation)
[AEA PK-88]  6270  (B,K,L,R,S) >           (The MailDrop's prompt again)
```

4.12.5.5 SEND Messages

You've killed the message and wish to SEND a reply to the MailDrop's operator, WX2BBB. Again you see the MailDrop's prompt. Remember - the number after the right bracket] shows you how much memory space is available in the MailDrop. Always verify that the MailDrop has enough memory remaining for the length of message you intend to send.

```
[AEA PK-88]  6270  (B,K,L,R,S) >           (The MailDrop's prompt)
```

Now, type 'S callsign' to SEND a message to the MailDrop's operator. If you omit the callsign, the MailDrop will automatically address the message to the MYCALL callsign stored in the MailDrop.

```
S WX2BBB                                   (Type the 'SEND callsign' command)
Enter message, ^Z (CTRL-Z) to end          (The MailDrop answers you)

YEAH, I GOT THE MAILING AND WILL           (Type your message to WX2BBB)
BE GLAD TO PICK YOU UP.  WHAT TIME
DO YOU WANT ME THERE?  IS MARY
GOING?  CUL. WX2BBB ^Z                     (End the message with CTRL-Z)

[AEA PK-88]  6336  (B,K,L,R,S) >           (The MailDrop is ready again)
```

4.12.5.6 Other People's Messages

You've done what you came to do. Now you're curious about the other messages on the MailDrop. You try to READ one of them.

```
[AEA PK-88]  6270  (B,K,L,R,S) >           (The MailDrop's prompt)
```

Now, type 'R #' to READ someone else's messages in the MailDrop.

```
R 5                                        (Type the 'READ 5' command)
*** Not your message.                      (The MailDrop won't let you!)
[AEA PK-88]  6336  (B,K,L,R,S) >           (The MailDrop is ready again)
```

4.12.5.7 Multiple Message Commands

You see that the MailDrop has more than one message for you, so you try to read them all at once.

```
[AEA PK-88]  6270  (B,K,L,R,S) >           (The MailDrop's prompt)
```

Now, type 'R # #' to READ more than one message in the MailDrop.

```
R 3 4                                      (You try to READ 2 messages)
*** Too many                               (The MailDrop won't let you!)
[AEA PK-88]  6336  (B,K,L,R,S) >           (The MailDrop is ready again)
```

4.12.5.8 Incorrect Commands

Your fingers slip, or you forget to type the number of the message you're trying to read.

```
[AEA PK-88]  6270  (B,K,L,R,S) >      (The MailDrop's prompt)

Now, type 'R' without any message number.

R                                     (You type invalid command)
*** Not enough                       (The MailDrop corrects you!)
[AEA PK-88]  6336  (B,K,L,R,S) >      (The MailDrop is ready again)
```

4.12.5.9 Sorry, Wrong Number!

You know that your friend WX3CCC also connects to this MailDrop so you try to send him a message. (He's not the MailDrop's operator.)

```
[AEA PK-88]  6270  (B,K,L,R,S) >      (The MailDrop's prompt)

Now, type 'S callsign' to SEND a message to anyone other than the
MailDrop's operator.

S WX3CCC                              (Send message to other call)
*** No 3rd party traffic.             (The MailDrop won't let you!)
[AEA PK-88]  6336  (B,K,L,R,S) >      (The MailDrop is ready again)
```

4.12.5.10 Log Off and Disconnect

You're finished with this session. Time to log off the MailDrop.

```
[AEA PK-88]  6270  (B,K,L,R,S) >      (The MailDrop's prompt)

Now, type 'B' (for Bye-Bye) to LOG OFF the MailDrop.

B                                      (Type the Bye-Bye command)
```

The MailDrop issues an immediate disconnect command to your PK-88 and the connection is over.

```
*** DISCONNECTED                      (Your PK-88's status line)
```

4.12.6 Sample Session - The MailDrop SysOp's Point of View

Here is a transcription of the entire session described step-by-step in the previous section, exactly as it would appear to the MailDrop's operator (SysOp). We're assuming that the MDMON command is still set to ON, the default state.

As long as MDMON is ON, you have the ability to directly supervise the activities of any station logged on to your MailDrop and - if needed - take any corrective actions.

```
WX1AAA>WX2BBB <C,P>
[AEA PK-88]  6270  (B,K,L,R,S) >

*** CONNECTED to WX1AAA
L
Msg# Size To     From   Date       Time
  6   184 WX1AAA WX2BBB
  5   287 AD7I   WX2BBB
  4   178 G3PLX  WX2BBB
  3   324 W2HPM  WX2BBB
  2   679 W2JUP  WX2BBB
  1    56 G5ECI  WX2BBB
[AEA PK-88]  6270  (B,K,L,R,S) >
R 6
Msg# Size To     From   Date       Time
  6   144 WX1AAA WX2BBB

Hello Joe.  Did you get the notice
about next month's meeting of the
Radio Society at the Firehouse?
Will you be going? - I need a ride.
73.

[AEA PK-88]  6270  (B,K,L,R,S) >
K 6
*** Done.
[AEA PK-88]  6468  (B,K,L,R,S) >
S WX2BBB
Enter message, ^Z (CTRL-Z) to end

YEAH, I GOT THE MAILING AND WILL
BE GLAD TO PICK YOU UP.  WHAT TIME
DO YOU WANT ME THERE?  IS MARY
GOING?  CUL. WX2BBB ^Z

[AEA PK-88]  6336  (B,K,L,R,S) >
R 5
*** Not your message.
[AEA PK-88]  6336  (B,K,L,R,S) >
R 3 4
*** Too many
[AEA PK-88]  6336  (B,K,L,R,S) >
R
*** Not enough
[AEA PK-88]  6336  (B,K,L,R,S) >
S WX3CCC
*** No 3rd party traffic.
[AEA PK-88]  6336  (B,K,L,R,S) >
B

*** DISCONNECTED
WX1AAA>CQ <UI>:
```

CHAPTER 5

COMMAND SUMMARY

5.1 Introduction

This chapter explains and illustrates the PK-88's commands. You will use some commands to control the PK-88 under specific conditions, and others to specify the values of parameters used in general operation.

The PK-88 is a 'command-driven' system; it does not provide 'menus'. You control the functions of the PK-88 by typing single- or multiple-character commands at your computer's keyboard,

We will use UPPER CASE in this chapter to show the commands, and lower case to explain the text.

5.1.1 Entering Commands

Commands are entered after the Command Mode prompt:

```
cmd:
```

You will use English-like words or abbreviations to change the value of parameters and issue instructions to the PK-88.

- Commands are either keywords or mnemonics (special abbreviations) made up of strings of characters that you type.

You may never need to change the values of some parameters. However, these commands give you maximum flexibility to adapt the PK-88 to your local environment and operating conditions.

- Use either upper case (capital letters) or lower case (small letters) when typing commands.
- End the command with a carriage return <CR>. Carriage returns are not shown in the examples below.
- Correct your typing mistakes or cancel the line completely before typing the final <CR> of your command.
- See Chapter 3 for a discussion of line editing.

5.1.2 Command Responses

Whenever the PK-88 accepts a command that changes a value, the PK-88 responds with the previously stored value.

For example, assume that 'XFLOW' is 'ON' and you type 'XFLOW OFF'; you will see the display:

```
XFLOW was ON
```

This message confirms that the value has been changed successfully.

5.1.3 Error Messages

If the PK-88 cannot understand what you have typed, you will see an error message in plain language reporting the nature of the error.

- If you type a command the PK-88 cannot understand - you will see:

  ?What?

- If you type a correct command word with a wrong argument:

  ?bad

- If you type a numerical value outside a parameter's range:

  ?range

- If you set the BEACON interval too short for busy channels:

  WARNING: BEACON too often

Here are a few more examples:

```
cmd:ASDFASDF          -   This is not a command.
?What?

cmd:BEACON E          -   A parameter was omitted.
?bad

cmd:PACLEN 265        -   Unacceptable numerical value.
?range

cmd:DAY               -   You did not set the PK-88's clock
?clock not set
```

5.2 Command List

Commands are listed alphabetically in the following detailed command descriptions.

Each command entry contains several sections:

- Command name
- Command abbreviation or mnemonic
- Default value
- Parameters

5.2.1 Command Names

The command name at the beginning of the description is the full word you can type to execute that command. You will also see the minimum abbreviation or mnemonic that you can use instead of the full word. You can always type the entire command word, or any abbreviation longer than the minimum abbreviation.

For example, consider the MYCALL command:

- Enter the command MYCALL by simply typing 'MY.' (NOTE: DO NOT type the 'quotation marks' - we use these only for clarity.)

The abbreviation 'M' is not sufficient and will be interpreted as the MONITOR command. However, 'MY,' 'MYC,' 'MYCA,' 'MYCAL' or 'MYCALL' are all acceptable.

If a command requires parameters, the type of parameter is indicated after the command name as well as the default value. For example:

- 'n' means the command takes a numerical parameter value.

5.2.2 Default Values

Most commands have initial (default) values that the PK-88 assumes for average operating conditions, or values that are used most often. These defaults are stored in EPROM and loaded when power is first applied to the PK-88, or when you type the RESET command.

You are encouraged to experiment with different values to determine changes that may be more efficient for your operating environment.

5.3 Parameters, Arguments and Values:

Some commands need additional information before they can be executed. This type of command has 'parameters' or requires 'arguments'.

For example, a command such as FULLDUP has a Boolean parameter. When you type 'FULLDUP ON', FULLDUP is the command, ON is its argument - the value you want the PK-88 to use to execute the command FULLDUP.

- The value that fills this parameter is either ON or OFF.
- Immediate commands such as 'ID' have no parameters. Typing only 'ID' causes the PK-88 to execute the command (if HID is set ON).

Some commands such as 'CONNECT' have optional parameters.

- If you type 'CONNECT' without an argument, the PK-88 displays the current status of the link.

However, if you type 'CONNECT WX1AAA,' the PK-88 issues the connect request and tries to establish the link to WX1AAA.

Some commands such as MFILTER can use several arguments at the same time. MFILTER accepts from one to four numerical arguments.

5.3.1 Parameters

Three different types of parameters are used: Boolean, numeric and text or string.

5.3.1.1 Boolean Parameters

Boolean parameters use one value out of a choice of only two possible values, such as ON or OFF, YES or NO, or EVERY or AFTER. Boolean parameters can also be toggled with an argument of 'TOGGLE' or 'T.'

- When a parameter is Boolean, its two possible choices are shown separated by a vertical bar.

5.3.1.2 Numeric Parameters

A parameter designated as 'n' is a numeric value.

- Numeric values can be entered by typing familiar decimal numbers, or optionally in hexadecimal numbers.

In using hexadecimal notation, you must prefix the number you type with a '$' character.

The PK-88 displays numeric parameters which set special characters in hexadecimal format. Here's a brief explanation of 'hex' numbers:

- The 'digits' of a hex number represent powers of 16 in the same manner as the powers of 10 represented by a decimal number.

- The numbers 10 through 15 are indicated by hexadecimal digits A through F. For example:

  $1B = (1 x 16) + (11 x 1) = 27 (decimal)
  $120 = (1 x 16 x 16) + (2 x 16) + (0 x 1) = 288 (decimal)

For numeric parameters in the range 0 to 255, arguments 'ON' or 'Y' set the value of the parameter to their ROM default values. Arguments 'OFF' or 'N' set the value to 0 (zero).

Baud-rate parameters can use arguments UP (U) or DOWN (D) to select the next higher or lower radio (HDLC) link or terminal baud rate.

5.3.1.3 Text or String Parameters

A text parameter such as the argument or 'message' for CTEXT (your 'connect' message), can be typed in upper or lower case.

- A text parameter can include numbers, spaces, and punctuation.

- The text is accepted exactly as you type it.

Some commands require call signs as parameters. The parameters may be any string of numbers or letters, up to six characters; character strings are used to identify stations sending and receiving packets.

A call sign can also include a numeric extension or substation identifier (SSID). These extensions distinguish between two or more stations with the same call (such as a base station and a digipeater).

The call sign and any required extensions or SSIDs are entered and displayed as 'call-n,' e.g., 'KX1AAA-12', or 'WX1AAA-1'. If an SSID or extension is not entered, the system assumes an SSID of '0' (zero). The zero SSID is not normally displayed by the PK-88.

Some commands have parameters which are really lists of call signs:

- o CFROM, MFROM, MTO and DFROM commands allow you to specify from one to eight call signs for selective or restrictive operations.

- o You must separate multiple call signs with blank spaces, commas, or tabs.

The following examples will help you understand these explanations.

- o BEACON EVERY|AFTER 'n'

  The BEACON command requires an argument;

  - You must specify either EVERY or AFTER (abbreviated E or A), and an argument 'n' which is chosen from a range of values.

  An appropriate entry would be BEACON EVERY 180. In this case, a beacon is sent every (180 times 10) seconds, every 30 minutes. If BEACON EVERY 0, the beacon is not transmitted.

- o CONNECT call1 [VIA call2[,call3...,call9]]

  The CONNECT command requires a call sign argument 'call1.'

  - You may optionally include the keyword VIA, followed by a list of one to eight call signs, 'call2' through 'call9'.

  - Multiple call signs in the list must be separated by commas (as shown) or by blank spaces.

  An acceptable entry would be: 'C WX1AAA V WX2BBB,WX3CCC'

5.3.2 Using Commands Without Arguments

If you type the command name without any arguments, the current value of the command's arguments is displayed. For example:

```
cmd:MRPT          -   Command typed without arguments
MRPT ON           -   displays the present value.

cmd:MRPT Y        -   Sets the value to YES (ON)
MRPT was OFF      -   Displays the previous value
```

NOTE: The DISPLAY command shows you the values of all parameters or groups of related parameters.

5.4 Controller Messages

This section describes the PK-88's messages and circumstances in which the messages can appear. The messages are shown in boldface type.

5.4.1 General

Sign-On Message

AEA PK-88 Packet Controller
AX.25 Level 2 Version 2.0
Copyright (C) 1986, 1987, 1988 by
Advanced Electronic Applications, Inc.
Release xx.xxx.xx +
Checksum $yy
cmd:

This sign-on message appears when you apply power to the PK-88, or when you type 'RESTART'. The release date is updated whenever the firmware is changed. The checksum is a number used to verify the EPROM firmware.

PK88 is using default values

This message appears along with the sign-on message above if the bbRAM checksum verification fails. This causes the PK-88 to load the default parameters from EPROM. This will happen the first time you apply power to the PK-88 or if the batteries fail. This message also appears after the RESET command is given.

cmd:

This is the Command Mode prompt. When this prompt appears, the PK-88 is waiting for you to issue a command. Anything you type after this prompt, up to and including the first <CR> is interpreted as a command. If a monitored packet has been displayed, the prompt may not be visible, even though you are in Command Mode. You can type the redisplay-line character (set by REDISPLA) to retype the prompt.

was
now

Whenever you change one of the PK-88's parameters, if BBSMSGS is set to OFF, both the previous value and the new value will be displayed. This confirms that the PK-88 interpreted your command properly, and reminds you of what you have done.

too many packets outstanding

This message appears in special circumstances in response to a CONVERS or TRANS command. For example, if you have already typed packet data and filled the outgoing buffer in the Converse Mode or Transparent Mode and then tried to return to the Command Mode, this message would appear. You will be allowed to enter one of these modes when some of the packets have been successfully transmitted.

5.4.2 Command Mode Error Messages

An error message is displayed if you make a mistake typing a command to the PK-88.

?bad

You typed a command correctly, but the remainder of the command line couldn't be interpreted.

?callsign

You typed a call sign that does not meet the PK-88's requirements for call signs. A call sign may be any string of numbers and letters. Punctuation and spaces are not allowed. The SSID or extension, if given, is a number from 0 to 15, separated from the call by a hyphen.

?clock not set

You typed the command DAYTIME, but you have not yet set the clock. DAYTIME sets the clock if it is typed with the daytime parameters, and displays the date and time if is typed without parameters.

?What?

Your first entry is not a command or a command abbreviation. The PK-88 did not understand the instructions.

?not enough

You did not type enough arguments for a command that expects several parameters. For example, 'CONNECT WX1AAA VIA.'

?not while connected

You attempted to change MYCALL or AX25L2V2 while in a connected or connecting state.

?range

You typed too large or too small a numeric argument.

?too long

You typed too-long a command line; the line is ignored. For example, you will see this message if you try to type too long a CTEXT message. The previous text entry is not changed when you see this error message.

?too many

You typed too many arguments for a command that expects several parameters. For example, MFILTER can have up to four arguments.

```
cmd:MFILTER $1B,$0C,$1A,$03,$07
?too many
```

?VIA

You typed more than one call sign for the CONNECT or UNPROTO commands without the VIA keyword.

?not while disconnected

You tried to set CONPERM while disconnected.

?channel must be 0-9

You typed an invalid character after the CHSWITCH character.

?already connected

You tried to CONNECT to a station to which you are already connected.

?different connectees

You tried to CONNECT to more than one station on the same logical channel.

5.4.3 Link Status Messages

Link status messages show you the status of AX.25 connections in which the PK-88 may be involved.

You can ask for link status at any time from the Command Mode by typing the CONNECT command without parameters.

If you attempt a connection when the PK-88 is not in the disconnected state, you see the link status but the PK-88 takes no other action.

The following messages appear in response to the CONNECT command.

```
Link state is: CONNECTED to call1
               [VIA call2[,call3...,call9]]
```

Your station is connected to a distant station - you'll see the digipeater path in use, if any. The call sign sequence is the same sequence you would type to initiate the connection.

```
Link state is: CONNECTED to call1; v2; 2 unACKed
               [VIA call2[,call3...,call9]]
```

You are connected to a station using Version 2; two frames remain unacknowledged.

```
Link state is: DISCONNECTED
```

No link or connection exists right now. You may type the CONNECT command to initiate a connection.

```
Link state is: CONNECT in progress:
               call1 [VIA call2[,call3...,call9]]
```

You have already typed a connect request but have not received the acknowledgment from the other station. Type the DISCONNE command to cancel the connect process.

```
Link state is: DISCONNECT in progress
          call1 [VIA call2[,call3...,call9]]
```

You have typed a disconnect request but have not received the acknowledgment from the other station. Type a second DISCONNE command to place the PK-88 immediately in the disconnected state.

```
Link state is: FRMR in progress
               call1 [VIA call2[,call3...,call9]]
```

The PK-88 is connected to a distant station but a protocol error has occurred. This should never happen when AEA AX.25 systems are connected. An improper implementation of the AX.25 protocol could cause this condition. Your PK-88 will try to resynchronize frame numbers with the packet controller on the other end although a disconnect may result. Connections are not valid in this state; a disconnect will start the disconnect process.

The PK-88 will tell you whenever the link status changes. Link status may change in response to:

- commands you have typed (CONNECT or DISCONNE)
- connect or disconnect requests from a distant station
- a disconnect because of the retry count being exceeded
- automatic time-out disconnect (CHECK)
- protocol errors

```
*** CONNECTED to: call1 [via call2[,call3...,call9]]
```

This message appears when the PK-88 switches from the 'disconnected' or 'connect in progress' state to the connected state. The connection may be a result of a CONNECT command typed by you, or a connect request packet received from a distant station.

```
*** Connect request:  call1 [via call2[,call3...,call9]]
```

Your PK-88 has received but not accepted a connect request from a distant station. This can happen if you have set CFROM to NONE, or if you are already connected to another station.

When the PK-88 displays this message, it also sends a DM packet (busy signal) to the station that initiated the connect request. If the PK-88 rejects a connect request because you've set CFROM to NONE or OFF, you can issue your own connect request to the other station.

*** DISCONNECTED: (call sign)

The PK-88 has switched to disconnected state from a different link state. This message may be preceded by a message explaining the reason for the disconnect, as shown below.

*** Retry count exceeded
*** DISCONNECTED: (call sign)

The PK-88 has disconnected because of a retry failure rather than a disconnect request from one of the stations.

*** (call sign) busy
*** DISCONNECTED: (call sign)

Your connect request was rejected by a DM packet (busy signal) from the other station. The PK-88 will reject a connect request if CFROM is set to NONE, or if you are already connected to another station.

FRMR sent: xx xx xx

The PK-88 is connected but a protocol error has occurred. Your PK-88 has transmitted a special FRMR packet and is trying to resynchronize frame numbers with the distant station's system. The string xxxxxx is replaced with the hexadecimal codes for three bytes sent in the information part of the FRMR frame. This message will not appear if the PK-88 is in Transparent Mode.

FRMR rcvd: xx xx xx

Your PK-88 has received an FRMR (protocol error described above) and displays the FRMR packet in hexadecimal format. This message will not appear if the PK-88 is in Transparent Mode.

5.5 Clear String Commands

While in Command Mode, the following commands can be cleared by typing the command word followed by a single percent sign (%), an ampersand (&) or 'N,' 'NO,' 'NONE,' 'OFF' as the command's argument.

BTEXT	CFROM	CTEXT	DFROM	MBX	MYALIAS
MHEARD	MFROM	MTO			

5.6 Specific Commands and Summary

The following section contains detailed descriptions of the meanings, uses and effects of each command and parameter, the default values and arguments. Examples of command usage are included.

Appendix A contains a concise list of all commands and parameters, mnemonics, defaults and definitions.

8BITCONV ON|OFF Mnemonic: 8B Default: OFF

Parameters:

ON - The high-order bit IS NOT stripped in Converse Mode.

OFF - The high-order bit IS stripped in Converse Mode.

8BITCONV permits packet transmission of eight-bit data in the Converse Mode.

If 8BITCONV is OFF, the high-order bit (bit seven) of characters received from the terminal is removed before the characters are transmitted in a packet.

The standard ASCII character set requires only seven bits - the eighth or final bit is used as a parity bit or ignored.

- Setting bit seven in text characters transmitted over the air may cause confusion at the other end.

If you need to transmit eight-bit data but don't want all the features of Transparent Mode, set 8BITCONV ON and AWLEN 8. This may be desirable if you're using a special non-ASCII character set.

Because commands require only the standard seven-bit ASCII character set, bit seven is always removed in Command Mode.

ACRDISP 'n' Mnemonic: ACRD Default: 80

Parameters:

'n' - 0 to 255 specifies the screen or printer width, in number of columns or characters.

0 (zero) disables the function.

The numerical value sets the proper terminal output format for your specific needs. The PK-88 sends a <CR><LF> sequence to your computer or terminal at the end of a line in the Command and Converse Modes when 'n' characters have been printed.

- Set ACRDISP to '0' (zero) if your computer or terminal automatically formats output lines. This avoids conflict between the two formats.

ACRPACK ON|OFF Mnemonic: ACRP Default: ON

Parameters:

ON - The send-packet character, normally <CR>, IS added to all packets sent in Converse Mode.
OFF - The send-packet character is NOT added to packets.

ACRPACK is synonymous with CR and is used in the same manner as the older command. Either command word has the same effect.

When ACRPACK is ON, all packets sent in Converse Mode include, as the last character of the packet, the send-packet character which forces the packet to be sent.

When ACRPACK is OFF, the send-packet character is interpreted only as a command to the PK-88, not as data to be included in the packet; the character is not echoed to the terminal.

Set ACRPACK ON and SENDPAC $0D to produce natural conversational mode. Each line is sent when a <CR> is entered, and arrives at its destination with a <CR> at the end of the line.

If the distant station reports overprinting of lines on his display, set ALFPACK ON, or the other station can set ALFDISP ON.

ADDRESS 'n' Mnemonic: ADD Default: none

Parameters:

n - a hexadecimal address used with the MEMORY and I/O commands to access the PK-88's memory and I/O locations, or to read values stored at a specified address.

The ADDRESS command permits access to memory and I/O locations as follows:

ADDRESS $aabb
or SOH $4F A E $ a a b b ETB (in the HOST mode).

where "aa" is the device address, and "bb" is the register address on the device.

Set the hexadecimal address as shown above and then use the MEMORY command to read the contents of that address. The ADDRESS counter is incremented or increased by 1 each time the MEMORY command is typed.

AFILTER ON|OFF Mnemonic: AF Default: OFF

Parameters:

ON - The ASCII characters specified in the MFILTER are filtered from the outbound data and never sent by your PK-88.

OFF - Characters in MFILTER list are only filtered from monitored packets.

Some terminals and computers use special characters to clear the screen or perform other "special" functions. Placing these characters in the MFILTER list and turning AFILTER ON will keep them from being sent to the distant station by your PK-88.

Exception: When ECHO is ON, and the terminal or computer sends a filtered character, the PK-88 will echo it back to the terminal or computer.

AFILTER works regardless of mode, or CONNECT/CONVERSE/TRANSPARENT status. NOTE: verify that AFILTER is OFF during Binary file transfers.

ALFDISP ON|OFF Mnemonic: ALFD Default: ON

Parameters:

ON - A line feed character <LF> IS sent to the terminal after each carriage return character <CR>.

OFF - A <LF> is NOT sent to the terminal after each <CR>.

ALFDISP controls the display of carriage return characters received in packets as well as echoing those that are typed in.

When ALFDISP is ON, the PK-88 adds a line feed <LF> to each carriage return <CR> received. Each line feed received is ignored. Use the PK-88's sign-on message to determine how carriage returns are being displayed.

- Set ALFDISP ON if the PK-88's sign-on message lines are typed over each other.
- Set ALFDISP OFF if the PK-88's sign-on message is double spaced.

ALFDISP is set correctly if the PK-88's sign-on message is single spaced. ALFDISP affects your local display. It does not affect the data sent in any mode.

ALFPACK ON|OFF Mnemonic: ALFP Default: OFF

Parameters:

ON - A <LF> character IS added to outgoing packets following each <CR> transmitted in the packet. Line feeds from the terminal are ignored.

OFF - A <LF> is NOT added to outgoing packets.

ALFPACK is similar to ALFDISP, except that the <LF> characters are added to outgoing packets, rather than only to text displayed locally.

ALFPACK is included to maintain compatibility with other packet radio controllers.

o If the person you are talking to reports overprinting of packets from your station set ALFPACK ON. Character insertion is disabled in Transparent Mode.

AWLEN 'n' Mnemonic: AW Default: 7

Parameters:

'n' - 7 or 8 specifies the number of data bits per word.

The parameter value defines the digital word length used by the serial input/output (IO) terminal port and your computer or terminal program.

o Set AWLEN to 7 for most packet operations, such as conversation, working electronic mail and bulletin board systems and transmission of ASCII files.

If eight-bit words are sent to the PK-88 in the Command or Converse Modes, the eighth bit is normally removed, leaving a standard ASCII character, regardless of the setting of AWLEN.

All eight data bits of each character must be retained to send executable files or other special data.

o Set AWLEN to 8 and use the Transparent Mode.

You can also use Converse Mode and set AWLEN 8 and 8BITCONV ON. However, you must precede the Converse Mode special characters with the PASS character in the data you send.

AX25L2V2 ON|OFF Mnemonic: A Default: ON

Parameters:

ON - The PK-88 uses AX.25 Level 2 Version 2.0 protocol.

OFF - The PK-88 uses AX.25 Level 2 Version 1.0 protocol.

Some implementations of the earlier version of AX.25 protocol will not repeat Version 2.0 AX.25 packets properly. This command provides compatibility with those older packet controllers.

Set AX25L2V2 to OFF if you suspect that local area systems are using Version 1.0 protocol.

AXDELAY 'n' Mnemonic: AXD Default: 0

Parameters:

'n' 0 to 180 specifies a key-up delay for voice repeater operation in ten-millisecond intervals.

AXDELAY specifies the period of time the PK-88 will wait (in addition to the normal delay set by TXDELAY) after keying the transmitter and before data is sent.

Repeaters with slow electromechanical relays, split sites, auxiliary links (or other circuits which delay transmission for some time after the RF carrier is present) require some amount of time to get RF on the air.

If you are using a repeater that has not been used for packet operations before, try various values to find the best value for 'n.'

If other packet stations have been using the repeater, check with them for the proper setting.

AXDELAY acts in conjunction with AXHANG.

AXHANG 'n' Mnemonic: AXH Default: 0

Parameters:

'n' - 0 to 20 specifies voice repeater hang time in 100-millisecond intervals.

The numeric value can be used to increase channel efficiency when a voice repeater has a hang time greater than 100 ms. For a repeater with a long hang time, it is not necessary to wait for the repeater key-up delay if the repeater is still transmitting.

When the PK-88 has heard a packet sent within the hang period, it does not add the repeater key-up delay (AXDELAY) to the key-up time. If you are using a repeater that hasn't been used for packet operations before, try various values to find the best value for 'n.'

If other packet stations have been using the repeater, ask them for the appropriate setting.

BBSMSGS ON|OFF Mnemonic: BBS Default: OFF

Parameters:

ON - Makes the PK-88 status messages look like the TAPR-style output.
OFF - The PK-88 status messages work as before.

When BBSMSGS is ON, some of the status messages change or are suppressed. This can improve operation of the PK-88 with certain BBS software. If MRPT is ON, digipeater paths are shown in TAPR format.

If BBSMSGS is ON, the following status messages from the PK-88 are suppressed:

No "(parm) now (value)"
Connect messages: No "; v2; 1 unACKed"
No "xxx in progress: (dest) via (digis)"
No space after comma in digipeater lists
"VIA" in upper case

If BBSMSGS is ON, the following status messages are deleted or changed:

No "*** connect request:"
No "*** retry count exceeded"
Sends carriage return before all other "***"
No "(parm) was (value)"
No "(callsign) busy" message

BEACON EVERY|AFTER 'n' Mnemonic: B Default: EVERY 0

Parameters:

EVERY	-	Send the beacon at regular intervals.
AFTER	-	Send the beacon once after the specified time interval without packet activity.
'n'	-	0 to 250 specifies timing in ten-second intervals.
0	-	Zero disables off the beacon function.

The BEACON command sets the conditions under which your packet beacon will be transmitted.

- A beacon frame contains the text you have typed into the BTEXT message in a packet addressed to 'CQ' or other UNPROTO address.

- A beacon frame may be sent directly, and also sent via the digipeat addresses specified by the UNPROTO command.

When the keyword EVERY is specified, a beacon packet is sent every n times 10 seconds. This mode can be used to transmit packets for testing purposes.

When AFTER is specified, a beacon is sent after n times 10 seconds have passed without packet activity.

- The beacon is sent only once until further activity is detected.

This mode can be used to send announcements or test messages only when packet stations are on the air.

- Proper choice of 'n' avoids cluttering a busy channel with lots of unnecessary transmissions.

Beacon frames from other packet stations can be monitored by setting MONITOR in the range 1-6.

- If you set the BEACON timing at less than '90,' a value judged by most authoritative sources as too small for busy channels, you will see the message:

  WARNING: BEACON too often

This message appears in the Command Mode each time a new command is typed.

BKONDEL ON|OFF Mnemonic: BK Default: ON

Parameters:

ON - The sequence <BACKSPACE><SPACE><BACKSPACE> is echoed when a character is deleted from the input line.

OFF - The <BACKSLASH> character <\> is echoed when a character is deleted.

BKONDEL determines how character deletion is displayed in Command or Converse Mode.

The <BACKSPACE><SPACE><BACKSPACE> sequence updates the video display screen.

- Set BKONDEL ON if you are using a video display terminal or computer.

On a printing terminal the <BACKSPACE><SPACE><BACKSPACE> sequence will result in overtyped text.

- Set BKONDEL OFF if you have a paper output display, or if your terminal does not respond to the <BACKSPACE> character <CTRL-H>.

The PK-88 displays a <BACKSLASH> for each character you delete. You can see a display of the corrected input by typing the redisplay-line character set by the command REDISPLA.

BTEXT text Mnemonic: BT Default: Empty

Parameters:

text Any combination of characters and spaces, up to a maximum length of 120 characters.

BTEXT is the content of the data portion of a beacon packet. The default text is an empty string (no message).

- Beacon packets are discussed in more detail under the BEACON command.

You can send multiple-line messages in your beacon by including <CR> characters in the text. <CR> is inserted by typing the PASS character before the <CR>

- The PASS character is set by the PASS command.

If you enter a text string longer than 120 characters, the command is ignored and the following error message appears:

```
?too long
```

An electronic mail system program may set the beacon text to a message like this, updating the text after each connection:

```
MAIL for:  WX1AAA WX2BBB WX3CCC WX4DDD
```

- Use a '%,' '&,' 'N,' 'NO,' 'NONE,' or OFF as the first characters in the text to clear the BTEXT text without issuing the RESET command.

- The normal packet header shows the call sign.

- Avoid filling your BTEXT with screen graphics such as asterisks, parentheses, colons and semicolons, etc. Use BTEXT for significant information.

- Avoid using BTEXT to send unimportant information. Put casual information in your CTEXT message so that it is seen only by the station that connects to you - the only one who can make use of the information.

CALIBRATE Mnemonic: CAL Immediate Command

CALIBRATE is an immediate command that provides a means to key your transmitter and send continuous ASFK tone modulation.

Use the CALIBRATE command to measure transmitter modulation and other performance characteristics.

Because the Am7910 chip does not require adjustment of transmitted or received tone frequencies, the '0' display is not significant and is presented only to show that the calibration mode is in effect.

Calibration may be checked at any time without altering the state of the existing link.

Commands available in the calibration routine are:

<SPACE>	Toggles the transmitted audio between 'mark' (low) and 'space' (high) tones.
D	Alternates the transmitted mark and space tones at a rate set by the radio baud (HB) rate.
K	Toggles the PTT line between ON and OFF.
Q	Quits the calibration routine.

NOTE: Set 'D" OFF to transmit a continuous mark or space tone.

CANLINE 'n' Mnemonic: CAN Default: $18 <CTRL-X>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

CANLINE changes the CANCEL-LINE input editing command character. Like all other input editing features, line cancellation is disabled in Transparent Mode.

The parameter 'n' is the ASCII code for the character you want to use to cancel an input line. You can enter the code in either hex or decimal. For example, either of the following commands sets the cancel-line character to <CTRL- U>.

- CANLINE $15 (hex), CANLINE 21 (decimal)

When you use the CANLINE character to cancel an input line in Command Mode, the line is terminated with a <BACKSLASH> character and new prompt (cmd:) appears.

When you cancel a line in Converse Mode, only the <BACKSLASH> and a new line appear.

- You can cancel only the line you are currently typing.
- Once <CR> has been typed, you cannot cancel an input line using the cancel-line character.
- Use the CANPAC character to cancel the entire packet.

NOTE: If your send-packet character is not <CR>, the cancel-line character cancels only the last line of a multi-line packet.

CANPAC 'n' Mnemonic: CANP Default: $19 <CTRL-Y>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

CANPAC changes the CANCEL-PACKET input editing command character.

The parameter 'n' is the ASCII code for the character you want to type in order to cancel an input packet.

- You can enter the code in either hex or decimal.

When you cancel a packet in Converse Mode, the line is terminated with a <BACKSLASH> character and a new line.

- You can only cancel the packet that is currently being entered.

Once you have typed the send-packet character, or waited PACTIME (if CPACTIME is enabled), the packet cannot be canceled even if it has not been transmitted.

Like other input editing features, packet cancellation is disabled in Transparent Mode.

The CANCEL-PACKET character also cancels the display output in Command Mode. If you are in Command Mode and type the CANCEL-PACKET character, any characters that would be typed on the screen (except those echoed) are 'thrown away' by the PK-88.

- Typing the cancel-output character a second time restores normal output.
- To see how this works type DISPLAY, then type a <CTRL-Y>.

The command list display will stop. You won't see any response from the PK-88 to commands.

To verify that the display is back to normal, type <CTR-L-Y>, and then type DISPLAY again.

Use the CANCEL-DISPLAY feature if you inadvertently do something that causes the PK-88 to generate large amounts of output to the terminal, such as giving the DISPLAY command or setting TRACE ON.

- If you are in Converse or Transparent Mode and want to cancel display output, you must exit to Command Mode and then type the CANCEL-PACKET character.

CASEDISP 'n' Mnemonic: CAS Default: 0 (as is)

Parameters:

'n' - 0 to 2 specifies how the PK-88 sends characters to your terminal.

CASEDISP allows you to set the case of the characters the PK-88 sends to your terminal. This may be helpful with certain terminal programs. CASEDISP is disabled in Transparent mode.

CASEDISP offers three choices:

CASEDISP 0 'As is' - received characters are not changed.

CASEDISP 1 Received characters are forced to lower case.

CASEDISP 2 Received characters are forced to upper case.

CASEDISP has no effect on your transmitted data.

CBELL ON|OFF Mnemonic: CB Default: OFF

Parameters:

ON - Three BELL characters <CTRL-G> ($07) are sent to your terminal with both the '*** CONNECTED to (call sign)' and the '*** DISCONNECTED: (call sign) messages.

OFF - BELLS are NOT sent with the CONNECTED and DISCONNECTED messages.

- Set CBELL ON if you want to be notified whenever someone connects to or disconnects from your station.
- If CBELL is ON and MFILTER contains the character ($07), you can be sure that whenever your terminal beeps there is a connection for you. At no other time will you hear a beep while you are in packet mode.

CFROM all,none,yes/no calll[,call2..] Mnemonic: CF Default: all

---

Parameters:

call - all, none, YES_list, NO_list.
list of up to eight call signs, separated by commas.

CFROM uses arguments to determine how the PK-88 responds to connect requests - which calls are accepted and which calls are rejected. CFROM is set to 'all' when you start the PK-88 for the first time.

CFROM ALL/NONE is synonymous with the CONOK ON|OFF command used in older packet controllers and can be used interchangeably if required.

Type CFROM to display the ALL/NONE/YES_list/NO_list status of station call signs to be rejected or accepted. You can use the abbreviated command form or mnemonic:

```
cmd:cfrom
CFROM    all
cmd:cf
CFROM    yes WX1AAA,WX2BBB,WX3CCC,WX4DDD
```

To reject all call requests, type CFROM NONE. Your PK-88 sends the calling station a DM packet, or 'busy signal.' The caller sees:

```
*** MYCALL busy
*** DISCONNECTED: (call sign)
```

Your PK-88 notifies you of these call requests:

```
*** Connect request: WX1AAA
```

To accept calls from one or more specific stations, type CFROM (YES followed by a list of calls signs). Connect requests will be accepted from stations whose call signs are listed.

To reject calls from one or more specific stations, type CFROM (NO followed by a list of call signs). Connect requests will be rejected from stations whose call signs are listed.

You can include optional SSIDs or extensions specified as '-n' after the call sign. If CFROM is set to 'no WX1ABC' or 'yes WX1ABC,' any combination WX1ABC, WX1ABC-1,...WX1ABC-15 will be matched and processed. If CFROM is set to 'yes WX1ABC-1' or 'no WX1ABC-1,' then only WX1ABC-1 will match and be processed.

You can send your own connect command if you wish to chat with the calling station even though his/her call request has been rejected.

Clear CFROM with '%,' '&,' or 'OFF' as arguments.

CHCALL ON|OFF Mnemonic: CHC Default: OFF

Parameters:

ON - Call sign of the distant station IS displayed in multiple connection operation.

OFF - Call sign of the distant station is NOT displayed

CHCALL displays the call sign of the 'connected-to' station after the channel identifier.

Set CHCALL ON if you intend to operate multiple connections (as opposed to having your 'host' computer operate multiple connections).

CHCALL is especially useful when operating with multiple connections. Using CHCALL is similar to using MRPT to show digipeat paths when monitoring the channel.

In the following examples, the 'equals sign' (=) is assumed to be the channel-changing character selected using the CHSWITCH command (in this case, CHSWITCH is set to decimal value 61).

o CHCALL OFF - the monitored activity looks like this:

```
=0:hi howie
 hello ted how goes it?
=1:*** CONNECTED to WA7GXD
=1:must be a dx record. ge lyle
=1:unreal ted! fl-az no digis!
=1:big band opening...ge
```

o CHCALL ON - the same activity looks like the following example. The additional information shown as a result of setting CHCALL ON is underlined.

```
=0:K4NTA:hi howie
 hello ted how goes it?
=1:WA7GXD:*** CONNECTED to WA7GXD
=1:must be a dx record.  ge lyle
=1:unreal ted! fl-az no digis
=1:WA7GXD:big band opening...ge
```

With CHCALL ON, '=1' becomes '=1:<call sign>:'

NOTE: To switch channels during your multi-connect conversations, type CHSWITCH characters '=0' and '=1' without a ':' after them.

CHDOUBLE ON|OFF Mnemonic: CHD Default: OFF

Parameters:

ON - Received CHSWITCH characters appear twice (doubled).

OFF - Received CHSWITCH characters appear once (not doubled).

CHDOUBLE displays received CHSWITCH characters as doubled characters.

In the following example CHDOUBLE is ON and CHSWITCH is set to '|':

```
|| this is a test.
```

The sending station actually transmitted:

```
| this is a test.
```

The same frame received with CHDOUBLE OFF would be displayed as:

```
| this is a test.
```

o Set CHDOUBLE ON When operating with multiple connections to tell the difference between CHSWITCH characters received from other stations and CHSWITCH characters generated by your PK-88.

NOTE: CHSWITCH characters must not be one of the channel numbers (0 to 9).

CHECK 'n' Mnemonic: CH Default: 30

Parameters:

'n' - 0 to 250 specifies the check time in ten-second intervals.

0 - Zero disables this feature.

CHECK sets a timeout value for a packet connection, and depends on the setting of AX25L2V2.

Without the CHECK feature, if your PK-88 were linked or 'connected' to another station and the other station seemed to 'disappear,' your PK-88 would remain in the connected state indefinitely, refusing connections from other stations.

This might happen if propagation changes unexpectedly or an intermediate digipeater station fails or is shut down while you and the distant station are connected 'via' that digipeater.

Your PK-88 tries to prevent this situation from occurring by sending a new connect request packet when RELINK is ON and the specified time elapses without any packets being heard from the other TNC.

If RELINK is ON, when a pre-Version 2 link is inactive for (CHECK times ten seconds), your PK-88 tries to save the link by starting a reconnect sequence. The PK-88 enters the 'connect in progress' state and sends SABM (Connect Request) frames. In addition, the PK-88 adds a random time of up to 30 seconds each time CHECK is used.

- If AX25L2V2 is ON and packets have not been heard from the distant end for 'n' times 10 seconds, your PK-88 sends a 'check packet' to test if the link still exists to the other station.

The 'check' packet frame contains no information, but is interpreted by the distant station's TNC to see if it is still connected. If the distant station's TNC is still connected, the distant station sends an appropriate response packet.

If your PK-88 initiates the 'check' and does not get an answer after RETRY+1 attempts, the PK-88 starts a reconnect sequence just as if you had typed the CONNECT command. If RELINK is OFF, the PK-88 goes to a disconnected state.

- If AX25L2V2 is OFF and the other station has not been heard for 'n' times 10 seconds, your PK-88 does not test the link to the distant station; your PK-88 sends a reconnect packet just as if you had typed the CONNECT command.

CHSWITCH 'n' Mnemonic: CHS Default: $00

Parameters:

'n' - 0 to $FF (0 to 255 decimal) specifies an ASCII character code.

CHSWITCH selects the characters used by both the PK-88 and the user to show that a new connection channel is being addressed.

The character can be PASSed in CONVERS mode. This character is always **ignored as a user-initiated channel switch in TRANSPARENT mode; it** just flows through as data.

- o The outgoing channel cannot be changed while active or 'on-line' in TRANSPARENT mode.
- o To switch channels, ESCAPE to Command Mode, then enter Converse Mode to use the CHSWITCH command.

NOTE: When using the PK-88 with an electronic mail system, PBBS, or other type of host or file server, change the CHSWITCH character to $00 to avoid possible problems with the characters frequently found in some types of data files.

See CHDOUBLE and CHCALL for further use of CHSWITCH.

CLKADJ n Mnemonic: CLK Default: 0 (zero)

Parameters:

'n' - 0 to 65535 specifies a correction factor to be applied to the real-time clock routine

---

CLKADJ provides a limited ability to correct the PK-88's real-time clock.

A value of '0' (zero) is a special case and means that NO correction will be applied. If the value of CLKADJ is anything other than zero, then the correction factor is calculated as:

relative clock speed in % = 100 - (9.16667 * 1/n)

The real-time clock routine keeps track of year, month, day, hour, minute and second as specified in the DAYTIME command.

NOTE: The real-time clock is not intended to serve as your station reference clock; it is useful for approximate time-stamping information in packet operation.

CMDTIME 'n' Mnemonic: CM Default: 10

Parameters:

'n' - 0 to 250 specifies timeout value in 100-millisecond intervals while in Transparent Mode.

If 'n' is 0 (zero), exit from Transparent Mode requires sending the BREAK signal or interrupting power to the PK-88.

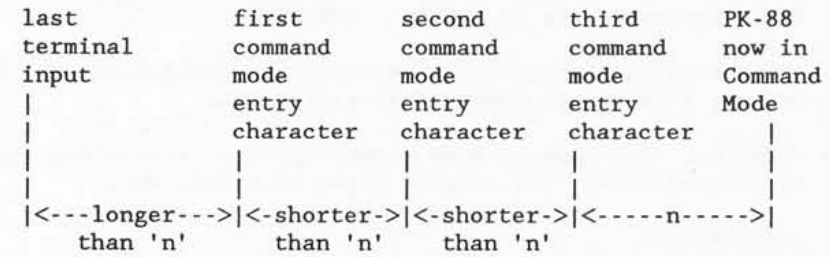
CMDTIME sets the timeout value in Transparent Mode. A guard time of 'n' seconds allows escape to Command Mode from Transparent Mode, while permitting any character to be sent as data.

The same Command Mode entry character (default <CTRL-C>) used to exit from the Converse Mode is used to exit Transparent Mode, although the procedure is different.

- The Command Mode entry character is set by COMMAND.
- Three Command Mode entry characters must be entered less than 'n' seconds apart, with no intervening characters, after a delay of 'n' seconds following the last characters typed.
- After a final delay of 'n' seconds, the PK-88 exits Transparent Mode and enters Command Mode.
- You will then see the normal Command Mode prompt:

```
cmd:
```

The following diagram illustrates this timing:



CMSG ON|OFF Mnemonic: CMS Default: OFF

Parameters:

ON - The stored CTEXT message is sent as the first packet after a connection is established by a connect request from a distant station.

OFF - The text message is not sent at all.

CMSG enables or disables automatic transmission of the CTEXT message when your PK-88 accepts a connect request from another station.

- Set CMSG ON to tell callers that you are not available to answer calls manually when they connect to your PK-88.

- Set CMSG OFF when available to operate or answer calls manually.

COMMAND 'n' Mnemonic: COM Default: $03 <CTRL-C>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

COMMAND is used to change the Command Mode entry character. You can enter the code in either hexadecimal or decimal numbers.

Type the COMMAND character to enter Command Mode from Converse Mode. No response is seen if you type the Command Mode entry character while you are already in Command Mode.

- Enter Converse Mode by typing: CONVERSE

Now, all characters typed on the keyboard and characters send from a disk or tape file are transmitted as packet data.

Type <CTRL-C>. The Command Mode prompt appears, indicating successful exit to Command Mode. The display might look like this:

```
cmd:CONVERSE
Hello world!  This is a test transmission.  [type <CTRL-C>]
cmd:
```

See CMDTIME or the discussion of Transparent Mode for instructions on the Command Mode entry character to escape from Transparent Mode.

CONMODE CONVERS|TRANS Mnemonic: CONM Default: CONVERS

Parameters:

CONVERS - The PK-88 automatically enters Converse Mode when a connection is established.

TRANS - The PK-88 automatically enters Transparent Mode when a connection is established.

CONMODE selects the mode the PK-88 uses after entering the CONNECTED state.

The connection may result either from a connect request received from a distant station, or a connection initiated by a CONNECT command that you've typed.

- Set CONMODE to CONVERS for most packet operations.
- Set CONMODE to TRANS if you are using Transparent Mode for a bulletin board program, so that the correct mode will be entered when your bulletin board receives a connect request.
- If the PK-88 is already in Converse or Transparent Mode when the connection is completed, the mode will not be changed.

NOTE: Set CONMODE to TRANS for KISS/TCP/IP operation.

CONNECT call1 [VIA call2[,call3...,call9]] Immediate Command

Parameters:

call1	-	Call sign of the distant station to which you wish to be connected.
call2	-	Optional call sign(s) of up to eight digipeaters via which you'll be repeated to reach the distant station.

CONNECT sends a connect request to station 'call1,' directly or via one or more digipeaters. Each call sign can include an optional SSID or extension 'n,' immediately after the call sign.

The part of the command line shown in brackets below is optional. The double-bracketed text ,'call3...,call9' is also optional and is used only when 'VIA call2' is used, that is, when connecting through one or more digipeaters. (The brackets and quotation marks are used in this text only for clarity - please don't type them!)

VIA call2[, call3...,call9]

o Type the digipeater fields in the exact sequence you wish to use to route your packets to destination station 'call1.'

If you type CONNECT while the PK-88 is connected, or trying to connect to or disconnect from a distant station, your monitor will show:

Link state is: CONNECT in progress

If the distant station does not 'ack' your connect request after the number of tries specified by RETRY, the CONNECT command is canceled. Your monitor displays:

*** Retry count exceeded
*** DISCONNECTED: (call sign)

To connect directly to WX1AAA, type:

cmd:CONNECT WX1AAA (or C WX1AAA)

To connect to WX1AAA using WX2BBB (with whom you can easily connect) and WX3CCC (who is near WX1AAA) as digipeaters, type:

cmd:CONNECT WX1AAA VIA WX2BBB,WX3CCC

Type CONNECT or 'C' without arguments to see the link status and the number of unacknowledged, outstanding packets.

CONOK ON|OFF Mnemonic: CONO Default: ON

Parameters:

ON - Functions identically to CFROM ALL.

OFF - Functions identically to CFROM NONE.

CONOK ON|OFF is synonymous with CFROM ALL/NONE and is provided for compatibility with terminal programs and other applications requiring this specific command used in older packet controllers.

CFROM must have been previously set to either ALL or NONE to use this command.

CONPERM ON|OFF Mnemonic: CONP Default: OFF

Parameters:

ON - The current connection on the current channel is not allowed to enter the disconnected state.

OFF - The current channel can be connected to and disconnected from other stations.

When ON, CONPERM forces the PK-88 to maintain the current connection, even when frames to the other station exceed RETRY attempts for an acknowledgment. RESTART and power off/on cycling do not affect this connected state.

CONPERM can be set only when a connection is established or when a connection is in progress (being established). CONPERM functions on a channel-by-channel basis when multiple connections are allowed.

CONPERM allows connections on other channels to operate normally. For example, automatic disconnect based on RETRY, when used under conditions such as:

- Certain networking applications
- Noisy, less reliable links

CONSTAMP ON|OFF Mnemonic: CONS Default: OFF

Parameters:

ON - Connect status messages ARE time stamped.

OFF - Connect status messages are NOT time stamped.

CONSTAMP activates time stamping of *** CONNECTED status messages.

If CONSTAMP is ON and DAYTIME (the PK-88's internal clock) is set, date and time information generated in the PK-88 is available for electronic mail programs or other host computer applications.

Date and time must be set initially by the DAYTIME command before time stamping will occur. For example, if CONSTAMP is ON and the date and time have been set in the PK-88, a connect and disconnect sequence appears as follows:

```
cmd:connect wxlaaa
10:55:23  *** CONNECTED to WX1AAA

cmd:disconnect
10:55:59  *** DISCONNECTED: WX1AAA
```

The CONNECT and DISCONNECT command can be abbreviated as shown below. The results are identical.

```
cmd:c wxlaaa
10:56:22  *** CONNECTED to WX1AAA

cmd:d
10:56:32  *** DISCONNECTED: WX1AAA
```

CONVERSE Mnemonic: CONV or K Immediate Command

CONVERSE is an immediate command that causes the PK-88 to switch from the Command Mode into the Converse Mode.

When the PK-88 is in the Converse Mode, all characters typed from the keyboard or sent from a disk file are processed and transmitted by your radio.

o To return the PK-88 to the Command Mode from the Converse Mode, type the Command Mode entry character (default is <CTRL-C>).

CPACTIME ON|OFF Mnemonic: CP Default: OFF

Parameters:

ON - Packet transmit timer IS used in Converse Mode.
OFF - Packet transmit timer is NOT used in Converse Mode.

CPACTIME activates automatic, periodic transmission of packets while in Converse Mode.

CPACTIME can be used for several types of computer communications such as electronic mail systems, bulletin board or host computer operation when full Transparent Mode features are not desired.

When CPACTIME is ON, characters are packetized and transmitted periodically as they are in Transparent Mode. Local keyboard editing and display features of the Converse Mode are available; software flow control can be used.

- See the PACTIME command, (which controls the rate and mode of packet assembly) for a discussion of how periodic packetizing works.
- Set ACRPACK OFF in this mode.

When ACRPACK is ON, the send-packet character is inserted in the data being packetized even though it was not typed.

- To include <CR> characters in transmitted packets, set SENDPAC to a character not normally used (e.g., <CTRL-P>); the PK-88 then treats a <CR> as an ordinary character.
- Set CPACTIME ON for an operation similar to full break-in CW.

Setting CPACTIME ON transmits your text soon after you type it, in short bursts of a few characters. The other station may break in at will. Some operators find it easier to chat in this mode. Delays are eliminated while long packets are being typed.

CR ON|OFF Mnemonic: CR Default: ON

Parameters:

ON - The send-packet character, normally <CR>, IS added to all packets sent in Converse Mode.
OFF - The send-packet character is NOT added to packets.

CR is synonymous with ACRPACK and is used in the same manner as the newer command. Either command word has the same effect.

CSTATUS Mnemonic: CS Immediate Command

CSTATUS is an immediate command used in multiple connections. When CSTATUS is typed, your monitor displays:

- The number of each logical channel.
- The link state of all ten logical channels.
- The current input/output channel - the one you're using.
- Whether each channel connection is 'permanent.' (See CONPERM.)

Depending on your use of multiple connections and the USERS command, CSTATUS will show you the following displays:

NOT CONNECTED TO ANY STATION

```
cmd:cs
Ch. 0 - IO DISCONNECTED
Ch. 1 -    DISCONNECTED
Ch. 2 -    DISCONNECTED
Ch. 3 -    DISCONNECTED
Ch. 4 -    DISCONNECTED
Ch. 5 -    DISCONNECTED
Ch. 6 -    DISCONNECTED
Ch. 7 -    DISCONNECTED
Ch. 8 -    DISCONNECTED
Ch. 9 -    DISCONNECTED
```

CONNECTED TO ONLY 1 STATION

```
cmd:cs
Ch. 0 - IO CONNECTED to WX1AAA
Ch. 1 -    DISCONNECTED
Ch. 2 -    DISCONNECTED
Ch. 3 -    DISCONNECTED
Ch. 4 -    DISCONNECTED
Ch. 5 -    DISCONNECTED
Ch. 6 -    DISCONNECTED
Ch. 7 -    DISCONNECTED
Ch. 8 -    DISCONNECTED
Ch. 9 -    DISCONNECTED
```

If you're connected to several stations, the CSTATUS command shows your connect status as follows:

CONNECTED TO SEVERAL STATIONS

```
cmd:cs
Ch. 0 - IO CONNECTED to WX1AAA
Ch. 1 -    CONNECTED to WX2BBB P
Ch. 2 -    CONNECTED to WX3CCC
Ch. 3 -    CONNECTED to WX4DDD
Ch. 4 -    CONNECT in progress
Ch. 5 -    DISCONNECTED
Ch. 6 -    DISCONNECTED
Ch. 7 -    CONNECTED to WX5EEE via WX6FFF
Ch. 8 -    DISCONNECTED
Ch. 9 -    DISCONNECTED
```

This sample display shows that:

- CHANNEL 0 has the input and output channels - you're using it!
- CHANNEL 1 is connected to WX2BBB 'permanently.'
- All other channels' states are shown as they might appear with multiple connections.

CTEXT text Mnemonic: CT Default: See sample

Parameters:

text Any combination of characters and spaces up to a maximum of 120 characters.

CTEXT is the 'automatic answer' text you type in to a special section of the PK-88's memory.

The default text says, 'Please leave a message, then disconnect.'

If CMSG is set ON:

- The CTEXT message is sent as soon as another station connects to your station.

To type multiple-line CTEXT messages and include a carriage return (<CR>) character in your text, use the PASS character (<CTRL-V> is the default value) immediately preceding the carriage return (see the PASS command).

A typical CTEXT message might be:

```
We're away for the weekend. <CTRL-V> <CR>
Please leave your message, then disconnect <CR>
```

- If you enter a text string longer than 120 characters, an error message appears and the command is ignored.

```
?too long
cmd:
```

- Use a percent sign (%), an ampersand (&), 'N,' 'NO,''NONE,' or 'OFF' as the first characters in the CTEXT message to clear the previous message without having to type a RESET command.

DAYTIME date&time Mnemonic: DA Default: not set

Parameters:

date&time - Current DATE and TIME to set.

DAYTIME sets the PK-88's internal clock current date and time. The date&time parameter is used in Packet Mode by the commands CONSTAMP and MSTAMP to 'time stamp' received and monitored messages.

Entries in the 'heard' (displayed by MHEARD) are also time stamped if date&time has been set. The PK-88's time is updated continuously, as long as it is powered up.

The clock is not set when the PK-88 is turned on. The DAYTIME command displays the following error message:

```
cmd:day
?clock not set
```

o You must reset date and time each time you turn on the PK-88. Otherwise CONSTAMP and MSTAMP will not 'stamp' the time.

If you type DAYTIME without a parameter, the PK-88 displays current date and time information. The format of the display is:

```
                dd-mm-yy hh:mm:ss
cmd:day
DAYTIME  08-Jul-86  06:57:33
```

o The format for entering the date&time is:

```
                   yymmddhhmmss
cmd:daytime 860708065930
```

where:

yy is the last two digits of the year
mm is the two-digit month code (01-12)
dd is date (01-31)
hh is the hour (00-23)
mm is the minutes after the hour (00-59)
ss is the seconds after the minute (00-59)

o Enter the numbers 0-9 with leading zeros; codes must be exactly two digits.

o Be aware of the month when you set the date - the PK-88 does not check for the correct number of days in a month.

DAYSTAMP ON|OFF Mnemonic: DAYS Default: OFF

Parameters:

ON - The DATE is included in CONSTAMP and MSTAMP.

OFF - Only the TIME is included in CONSTAMP and MSTAMP.

DAYSTAMP activates the date in CONSTAMP and MSTAMP.

- Set DAYSTAMP ON when you want a dated record of packet channel activity, or when you are unavailable for local packet operation.

DELETE ON|OFF Mnemonic: DEL Default: OFF

Parameters:

ON - The <DELETE> ($7F) key is used for editing your typing.

OFF - The <BACKSPACE> ($08) key is used for editing your typing.

Use the DELETE command to select the key to use for deleting while editing.

- Type the selected DEL key to delete the last character from the input line.

You cannot use the DEL key to delete text before the beginning of a line. Use the PASS character to delete <CR> characters that have been typed into the text.

- The BKONDEL command controls how the PK-88 indicates deletion.
- To see a corrected display of the current line after deleting characters, type the redisplay-line character, which is set by the REDISPLA command.

DFROM all,none,yes/no calll[,call2..] Mnemonic: DF Default: all

---

Parameters:

call - all, none, YES list, NO list.
list of up to eight call signs, separated by commas.

DFROM uses arguments to determine how the PK-88 responds to stations trying to use your station as a digipeater - which stations will be repeated and which stations will not be repeated. DFROM is set to 'all' when you start the PK-88 for the first time.

DFROM ALL/NONE is synonymous with the DIGIPEAT ON|OFF command used in older packet controllers and can be used interchangeably as required.

Type DFROM to display the ALL/NONE/YES_list/NO_list status of station call signs whose packets will or will not be repeated. You can use the abbreviated command form or mnemonic:

```
cmd:dfrom
DFROM    all
cmd:df
DFROM    yes WX1AAA,WX2BBB,WX3CCC,WX4DDD
```

To prevent all stations from using your station as a digipeater, type DFROM NONE.

To permit one or more specific stations to digipeat through your station, type DFROM (YES followed by a list of calls signs). Packets will be digipeated only from and to stations whose call signs are listed.

To prevent one or more specific stations from digipeating through your station, type DFROM (NO followed by a list of call signs). Packets will not be digipeated only from and to stations whose call signs are listed.

You can include optional SSIDs or extensions specified as '-n' after the call sign.

If DFROM is set to 'no WX1AAA' or 'yes WX1AAA', combinations WX1AAA, WX1AAA-1,...WX1AAA-15 will be matched and processed.

If DFROM is set to 'yes WX1AAA-1' or 'no WX1AAA-1,' then only WX1AAA-1 will match and be processed.

Clear DFROM with '%,' '&,' or 'OFF' as arguments.

DIGIPEAT Mnemonic: DIG Default: ON

Parameters:

ON - Equivalent to DFROM ALL

OFF - Equivalent to DFROM NONE

In host computer applications that use a Boolean parameter switching routine rather than numeric values, the DIGIPEAT command can be used with ON and OFF instead of ALL or NONE.

This alternate DIGIPEAT command is appropriate in certain electronic mail and bulletin board systems.

Note that DIGIPEAT ON and OFF as Boolean commands do not provide the same capability for selective digipeating as with DFROM YES(calls) and DFROM NO(calls).

DISCONNE Mnemonic: D Immediate Command

DISCONNE is an immediate command that initiates a disconnect request to the station to which you are connected.

If your disconnect command is successful, your monitor will display:

*** DISCONNECTED: (call sign)

Other commands can be entered while a disconnect is in progress. New connections are not allowed until the disconnect is completed.

- If the retry count is exceeded while waiting for the distant station to acknowledge your disconnect command, your PK-88 switches to the disconnected state.

- If another disconnect command is entered while your PK-88 is trying to disconnect, the retry count is immediately set to the maximum number. In either case, your monitor displays:

  *** Retry count exceeded
  *** DISCONNECTED: (call sign)

  Disconnect messages are not displayed when the PK-88 is in the Transparent Mode.

DISPLAY [class] Mnemonic: DISP Immediate Command

Parameters:

class - Optional parameter identifier, one of the following:

(A)sync	display asynchronous port parameters
(C)haracter	display special characters
(I)d	display ID parameters
(L)ink	display link parameters
(M)onitor	display monitor parameters
(T)iming	display timing parameters
(Z)	display the entire command/parameter list

DISPLAY is an immediate command.

When DISPLAY is typed without a parameter, the PK-88 responds with:

```
cmd:DISPLAY A,C,I,L,M,T,Z
cmd:
```

You can display subgroups of related system parameters by specifying the optional class parameter:

```
cmd:disp a
8BITCONV OFF
ACRDISP  80
AFILTER  OFF
ALFDISP  OFF
AWLEN    7
CASEDISP 0
ECHO     ON
ESCAPE   OFF
FLOW     ON
ILFPACK  OFF
NUCR     OFF
NULF     OFF
NULLS    0
PARITY   3
TBAUD    1200
TRFLOW   OFF
TXFLOW   OFF
XFLOW    ON
cmd:
```

Individual system parameter values can be displayed by entering the parameter name without options.

```
cmd: mycall        cmd:frack      cmd:dwait
MYCALL WX1AAA      FRACK   3      DWAIT   16
```

DWAIT 'n' Mnemonic: DW Default: 16

Parameters:

'n' - 0 to 250 specifies default wait time in ten-millisecond intervals.

DWAIT helps avoid collisions with digipeated packets.

Unless the PK-88 is waiting to send digipeated packets, DWAIT forces the PK-88 to pause after last hearing data on the channel, for the duration of the DWAIT (Default Wait) time, before beginning its transmitter key-up sequence.

Wherever possible, the value of DWAIT should be agreed on by all stations in a local area when digipeaters are used in the area. The best value will be determined by experimenting.

DWAIT is a function of the key-up time (TXDELAY) of the digipeater stations and helps alleviate the drastic reduction of throughput that occurs on a channel when digipeated packets suffer collisions.

DWAIT is necessary because digipeated packets are not retried by the digipeater, but are always restarted by the originating station. When all stations specify a default wait time, and the right value of 'n' is chosen, the digipeater captures the frequency every time it has data to send - digipeated packets are sent without this delay.

Recommended settings of DWAIT for different types of packet station operation are:

TYPE OF OPERATION	TIME (in ms)	DWAIT VALUE
Digipeaters	0	0
Local keyboards	160	16 (default)
PBBSs, Hosts	320	32
File transfers	480	48

Your PK-88 always uses a DWAIT value of 0 (zero) when you digipeat someone else's packet. If DWAIT is set to any other value, the PK-88 simply ignores it.

NOTE: DWAIT is inoperative when PPERSIST is ON as in KISS/TCP/IP operation.

ECHO ON|OFF Mnemonic: E Default: ON

Parameters:

ON - Characters received from the computer or terminal ARE echoed by the PK-88.

OFF - Characters are NOT echoed.

The ECHO command controls local echoing by the PK-88 when it is in Command or Converse Mode. Local echoing is disabled in Transparent Mode.

- Set ECHO ON if you do not see your typing appear on your display.
- Set ECHO OFF if you see each character you type doubled.

ECHO is set correctly when you see the characters you type displayed correctly.

ESCAPE ON|OFF Mnemonic: ES Default: OFF

Parameters:

ON - The <ESCAPE> character ($1B) is output as '$' ($24).

OFF - The <ESCAPE> character is output as <ESCAPE> ($1B).

The ESCAPE command selects the character to be output when an <ESCAPE> character is to be sent to the terminal. The <ESCAPE> translation is disabled in Transparent Mode.

The ESCAPE character selection is provided because some computers and terminal emulators interpret the <ESCAPE> character as a special command prefix. Such terminals may alter their displays depending on the characters following the <ESCAPE>.

- Set ESCAPE ON if your terminal requires it to avoid unexpected text strings from other packet operators.
- See the MFILTER command for information on character stripping (rather than character translation) in monitored packets.

FLOW ON|OFF Mnemonic: F Default: ON

Parameters:

ON - Type-in flow control IS active.

OFF - Type-in flow control is NOT active.

When FLOW is ON, type-in flow control is active. Any character typed on your keyboard causes output from the PK-88 to the terminal to stop until any of the following conditions exist:

- A packet is forced (in Converse Mode)
- A line is completed (in Command Mode)
- The packet length (See PACLEN) is exceeded
- The terminal output buffer fills up

Canceling the current command or packet or typing the redisplay-line character also causes output to resume. Type-in flow control is not used in Transparent Mode.

Setting FLOW ON prevents inbound or received data from interfering with your keyboard data entry. If you (and the person you are talking to) normally wait for a packet from the other end before starting to respond, you can set FLOW OFF.

- Some electronic mail and packet bulletin board systems may work best with FLOW set to OFF.
- Some interface boards or computers with 'software UARTs' may be unable to send and receive data at the same time. If you are using that type of computer, set FLOW to ON.

FRACK 'n' Mnemonic: FR Default: 3

Parameters:

'n' - 1 to 15, specifying frame acknowledgment time-out in one-second intervals.

FRACK is the FRame ACKnowledgment time in seconds that your PK-88 will wait for acknowledgment of the last-sent protocol frame before resending or 'retrying' that frame.

After sending a packet requiring acknowledgment, the PK-88 waits for FRACK seconds timeout before incrementing the retry counter and sending the frame again. If the packet address includes digipeat instructions, the time between retries is adjusted to:

Retry interval = 'n' x (2 x m + 1)
where m is the number of intermediate relay stations.

When a packet is retried, a random wait time is added to any other wait times in use. This avoids lockups in which two packet stations repeatedly send packets which collide with each other.

FULLDUP ON|OFF Mnemonic: FU Default: OFF

Parameters:

ON - Full duplex mode is ENABLED.
OFF - Full duplex mode is DISABLED.

When full-duplex mode is disabled (default), the PK-88 uses the DCD (Data Carrier Detect) signal from its modem to avoid collisions; the PK-88 acknowledges multiple packets in a single transmission with a single acknowledgment.

When full-duplex mode is enabled, the PK-88 ignores the DCD signal and acknowledges packets individually.

Full-duplex operation is useful for full-duplex radio operation, such as through OSCAR 10 or dedicated traffic trunks. It should not be used unless both your station and the distant station can operate in full-duplex.

You may also find full-duplex mode useful for some testing operations, such as analog or digital loopback tests.

HBAUD 'n' Mnemonic: HB Default: 1200 bauds

Parameters:

'n' values specifying the rate or signaling speed in bauds from the PK-88 to the radio.

Available HDLC packet data rates 'n' include 45, 50, 57, 75, 100, 110, 150, 200, 300, 600, 1200, 2400, 4800, 9600 and 19,200 bits per second.

o Example: HBAUD 300

HBAUD sets the radio ('on-air') baud rate only in the packet operating mode. HBAUD has no relationship to your computer terminal program's baud rate.

You must use the same radio data rate as the distant station.

NOTE: Modern terminology no longer refers to data rates in 'WPM.' The term 'bauds' is used universally for FSK and AFSK using monobit data. In these cases, the terms 'bauds' and 'bits per second' mean the same thing. Either term is correct. However, when using dibit or n-ary data such as DPSK or QPSK, 'bits per second' will never be the same as 'bauds'.

HEADERLN ON|OFF Mnemonic: HEA Default: OFF

Parameters:

ON - The header for a monitored packet is printed on a separate line from the packet text.

OFF - The header and the text of monitored packets are printed on the same line.

HEADERLN affects the display of monitored packets. When HEADERLN is OFF, the address information is shown on the same line as the packet text:

```
WX1AAA>WX2BBB: Go ahead and transfer the file.
```

When HEADERLN is ON, the address is shown, followed by a <CR><LF> that puts the packet text on a separate line:

```
WX1AAA>WX2BBB:
Go ahead and transfer the file.
```

If MRPT or MSTAMP are ON, set HEADERLN ON; long headers may extend across your screen or page when these functions are active.

HELP Mnemonic: H Immediate Command

While in Command Mode, type the command 'H' to read the abbreviated on-line HELP file.

Your monitor displays the following brief list:

```
cmd:help
HELP:
CONNECT   DISCONNE
CONVERSE  TRANS
DISPLAY   CALIBRAT
MHEARD    CSTATUS
RESTART   RESET
TCLEAR
cmd:
```

You can exit from your present operating mode and enter Command Mode at any time to list the HELP text.

HID ON|OFF Mnemonic: HI Default: OFF

Parameters:

ON - The PK-88 sends HDLC identification as a digipeater.

OFF - The PK-88 does not send HDLC identification.

The HID command activates or disables the PK-88's automatic periodic transmission of identification packets when operating as a digipeater. This identification consists of an unsequenced I-frame with your station identification (MYCALL) and MYALIAS in the data field.

- Set HID ON to force the PK-88 to send an ID packet every 9.5 minutes while used as a digipeater.
- Set HID OFF to stop the PK-88 from sending any ID packets.
- The HID identification packet is addressed to "ID".
- Your station identification is the call sign set with the MYCALL command, with 'digipeater' appended.

For example, you've set MYCALL to WX1AAA-8 and HID is ON. The resulting automatic identification transmission looks like:

```
WX1AAA-8>ID
(MYALIAS), WX1AAA digipeater
```

NOTE: You cannot change the 9.5-minute automatic interval timing.

HOST ON|OFF Mnemonic: HOST Default: OFF

Parameters:

ON - The PK-88 operates with a host computer or other special application program.
OFF - The PK-88 operates as a normal AX.25 TNC.

The HOST command permits the PK-88 to operate in the Host Mode, a 'computer-friendly' communications mode, over the RS-232 link between the PK-88 and a host computer.

In the Host Mode, the PK-88 sends data to the computer only when the computer requests data. The data are prefaced with a special header that identifies the type of information being sent.

Turning the PK-88 on or issuing a RESTART command while in Host Mode (HOST ON) causes the PK-88 to issue a RESTART response:

$01 $4F R T $00 $17

To cancel HOST mode, type three <CTRL-C> characters, or the sequence <CTRL-A> O H O N <CTRL-W>. The BREAK character will not cancel HOST.

NOTE: Set HOST ON as the last command when preparing the PK-88 for KISS/TCP/IP operation. See Chapter 6, Host Mode and Special Applications, for more details.

HPOLL ON|OFF Mnemonic: HP Default: ON

Parameters:

ON - In Host Mode, the host computer must poll the PK-88 for all data.

OFF - The PK-88 sends data blocks to the host computer as they are formed. Data poll is unnecessary.

The HPOLL command functions only in Host Mode and depends on specific characteristics of each application operating in the host computer or server.

Some application programs will poll the data controller as required. In such cases, set HPOLL to OFF.

ID Mnemonic: I Immediate Command

ID is an immediate command that sends a special identification packet. The ID command allows you to send a final identification packet when you take your station off the air. Note that HID must be set ON.

ID forces a final identification packet to be sent when a digipeater station is taken off the air. The identification consists of an unnumbered I-Frame, with its data field containing your MYALIAS (if any) and your MYCALL station identification and the word 'digipeater.'

- The ID identification packet is sent only if the digipeater has transmitted since the last automatic identification.
- The ID identification packet is addressed to 'ID.'
- Your station identification is the call sign you set with the MYCALL command, with your MYALIAS, your main call sign and the word 'digipeater' appended. The following example is shown as seen with and without a MYALIAS, with MONITOR set to 6.

WX1ABC*>ID <UI>	WX1ABC*>ID <UI>
WX1ABC digipeater	(MYALIAS), WX1ABC digipeater

ILFPACK ON|OFF Mnemonic: IL Default: ON

Parameters:

ON - The PK-88 suppresses line feeds from the terminal.

OFF - The PK-88 transmits line feeds from the terminal

Use ILFPACK ON when transmitting a computer file containing line feeds if the distant station does not want line feeds.

IO 'n' Mnemonic: IO Default: none

Parameters:

n - a hexadecimal value used with the I/O command to access the PK-88's memory and I/O locations, or read values stored at a specified address.

The I/O command works with the ADDRESS command and permits acess to memory and I/O locations as follows:

```
     ADDRESS $aabb
or   SOH $4F  A  E  $  a  a  b  b  ETB (in the HOST mode).
```

where "aa" is the device address, and "bb" is the register address on the device.

Use the I/O command without arguments to read an I/O location, and with one argument $0 to $FF to write to an I/O location. The value in ADDRESS is not incremented after using the I/O command.

K Mnemonic: K or CONV Immediate Command

The K command is synonymous with the CONVERSE command and places the PK-88 in the Converse mode.

When the PK-88 is in the Converse Mode, all characters typed from the keyboard or sent from a disk file are processed and transmitted by your radio.

o To return the PK-88 to the Command Mode from the Converse Mode, type the Command Mode entry character (default is <CTRL-C>).

KISS ON|OFF Mnemonic: KI Default: OFF

Parameters:

ON - The PK-88 operates as a KISS TNC in Host Mode.
OFF - The PK-88 operates as a normal AX.25 Level 2 TNC

The most popular use of the KISS mode is running Phil Karn's TCP/IP protocol suite. Note that KISS ON is not the only command that must be set for TCP/IP operation. See Chapter 6 for further details.

The following commands must be entered only if the terminal word length and parity are NOT 8 bits and NO parity:

```
AWLEN 8
PARITY 0
RESTART
```

The following commands must be entered if they have been changed from the default values:

```
TRACE OFF
HID OFF
BEACON EVERY 0
PACKET
```

The following commands must be entered.

```
CONMODE TRANS
PPERSIST ON
RAW ON
HPOLL OFF
KISS ON
HOST ON (NOTE: the HOST ON command must be entered last)
```

After entering Host Mode, you cannot use the normal human language or verbose commands, nor will you see normal responses from the PK-88. The host computer and its application program must assume control of the PK-88. AX.25, TCP/IP or other protocols must be executed in the host computer.

To quit the KISS mode, you must return to Command mode from Host Mode in order to use the KISS OFF command.

In KISS and Raw HDLC modes, communication activity on the RS-232 link is shown by illumination the STA and CON LEDs as follows:

Host to TNC Communication: STA LED illuminated.
TNC to host Communication: CON LED illuminated.

MAILDROP ON|OFF Mnemonic: MAI Default: OFF

Parameters:

ON - The PK-88 operates as a personal MailDrop.
OFF - The PK-88 operates as a normal AX.25 Level 2 TNC

The PK-88's MailDrop is a small personal mailbox that uses a subset of the well-known W0RLI/WA7MBL packet BBS commands. When your MailDrop feature is active, distant stations can connect to your PK-88, leave messages for you or read messages from you. Third-party messages are not accepted by your MailDrop. All messages are considered "private".

Your MailDrop will accept inbound mail forwarding from W0RLI/WA7MBL auto-forwarding packet BBSs, but will not forward mail outbound.

Approximately 8000 bytes of RAM are available to your MailDrop. The entire 8000 byte RAM can be used for a single message or for up to a maximum of 15 available message numbers (1-15). If all 8K of the RAM is used, or if the maximum 15 messages have been filed, the MailDrop displays the error message "*** No free memory". If there is enough room, the MailDrop displays the MailDrop command prompt.

A power on/off or RESTART clears all messages from the RAM.

MailDrop operation is completely under your "SysOp" control from your local terminal or computer keyboard. Only you can start and stop MailDrop service. The commands shown below provide MailDrop control.

Set MAILDROP to ON to start your MailDrop operation. This command activates or deactivates your MailDrop. The minimum command string is MAI. Set MAILDROP OFF to deactivate your MailDrop. The default condition is OFF.

Use the MDCHECK command to log on to your MailDrop while MAILDROP is ON. See the MDCHECK, MDPROMPT and MDMON commands for additional information on MailDrop operation.

While your MailDrop is active, or if you have logged on to your MailDrop from your local keyboard with the MDCHECK command, the only commands available to you and the calling station are:

B	BYE	Log off the MailDrop
K	KILL	Kill or delete messages
L	LIST	List the message directory
R	READ	Read a specific message
S	SEND	Send a message

Only the first letter of the command is significant; for example, S, SP, ST and SB are all treated equally as the SEND command.

MAXFRAME 'n' Mnemonic: MAX Default: 4

Parameters:

'n' - 1 to 7 specifies a number of packet frames.

MAXFRAME sets an upper limit on the maximum number of unacknowledged packets the PK-88 permits on the radio link at any one time.

MAXFRAME also sets the maximum number of contiguous packets the PK-88 will send during any given transmission.

If some, but not all, of the outstanding packets are acknowledged, a smaller number may be transmitted the next time, or new frames may be included in the retransmission, so that the total number of unacknowledged packet frames does not exceed 'n.'

The 'best' value of MAXFRAME depends on your local channel conditions. In most cases of keyboard-to-keyboard direct or local operation (links that don't require going through digipeaters), you can use the default value MAXFRAME 4.

NOTE: The FRACK counter begins counting from the first flag of each frame. If MAXFRAME is set to 7 and PACLEN is set to maximum (0), FRACK should be lengthened to prevent the distant station's ACK from colliding with a possibly-premature retry.

When the amount of packet traffic, the path in use, the digipeaters involved - or other variables not under your control - make packet operation difficult (as shown by lots of retries!), you can improve your throughput by reducing MAXFRAME.

Experimental evidence indicates that MAXFRAME 1 or 2 can sometimes produce best throughput, especially on HF radio, when operating in conditions of multipath propagation and numerous collisions.

- If packet traffic is heavy or the path is poor, reduce MAXFRAME to 3,2 or 1.

- If the radio link is good, an optimal relationship exists between the parameters set by these commands. The maximum number of data characters outstanding should not exceed the receive buffer space of the TNC receiving the data.

MBELL ON|OFF Mnemonic: MBE Default: OFF

Parameters:

ON - Ring the terminal when packets appear from callsigns listed in MFROM or MTO.

OFF - Don't ring the terminal when packets appear from callsigns listed in MFROM or MTO.

MBELL permits the terminal operator to be alerted when packet frames from a selected station or group of stations appears on the monitored radio link.

When MBELL is set to OFF, packet frames are monitored normally according to the MFROM and MTO callsign lists.

When MBELL is set to ON, packet frames are monitored FROM and TO all. If callsigns in the monitored headers match the MFROM or MTO lists, the PK-88 sends three BELL characters <CTRL-G> to the terminal.

Use MBELL ON to alert you to the presence of a specific station on the radio channel. Examples of typical applications are:

To detect when station WX1AAA is present, set:

- MBELL ON
- MONITOR 4
- MFROM YES WA1XXX
- MTO NONE.

To detect a beacon or CQ call, set:

- MBELL ON
- MONITOR 4
- MFROM NONE
- MTO YES CQ,BEACON

To return to normal operation, set:

- MBELL OFF
- MONITOR 4
- MFROM ALL
- MTO NONE

Note that if MBX is active and MBELL is ON, because of redundant I-frames, the PK-88 may send BELLS even when no data is displayed.

MBX call1[,call2][-'n'] Mnemonic: MB Default: empty

Parameters:
call - The call signs of one or two stations to be monitored.
'n' - alphanumerics indicating an optional SSID or extension.

The MBX command permits you to read or record useful or needed data without having to connect or log on to the source station(s). Channel occupancy and bandwidth are conserved on busy channels.

MBX filters the received packet data stream so that only packets to or from the selected station(s) are shown, without headers, codes or repeated frames. MBX overrides normal monitor functions and can show one or both sides of a conversation. You can enter a single call sign, or two call signs, separated by a comma:

```
cmd:MBX WX1AAA
 or
cmd:MBX WX2BBB-4,WX4DDD
```

NOTE: These stations must be connected to each other for this feature to work. Use two call signs if you suspect that your target station may be in a multiple connection.)

Use the MBX feature to:
- o Read or record transmissions from any packet station, without any extraneous material;
- o Read or record transmissions from a PBBS or mailbox,an electronic mail system or central file server while another station is downloading files or messages;
- o Read or record traffic between two connected packet stations or two electronic mail systems during mail forwarding operations.

The resulting information is free of all headers, frame identifier codes, repeats and improperly sequenced lines. This eliminates most editing usually needed to manually purge unwanted information.

NOTE: When using the MBX feature, your station is not part of the protocol handshake between the originating and receiving stations. If noise bursts or interfering packets collide with the data being transferred between the two distant stations, you may miss one or more packets and lose one or more lines of text.

Use the MBX feature when channel conditions are at their best and the source station originating the transmissions is strong.

- o An inbound connection deactivates the MBX command.

Clear MBX with '%,' '&,' 'N,' 'NO,' 'NONE' or 'OFF' as arguments.

MCON 'n' Mnemonic: MC Default: 0 (zero)

Parameters:

'n' - 0 to 6 specifies various levels of monitor indications

Use MCON for selective monitoring of other traffic while connected to a distant station.

MCON works in similar fashion to MONITOR, but affects your display while in the connected state.

As the value of MCON settings is increased, additional functions are included in the monitoring sequences.

Frames meant for you are displayed as though monitoring was OFF. You will see only the data. When MCON is set to '6,' frames meant for you are displayed as any other monitored frame. The headers appear together with the data.

The meanings of the parameter values are:

0 Monitoring while connected is disabled.

1 Only unnumbered (UI) frames resulting from an unconnected transmission are displayed. Use this for an 'unproto,' roundtable type contacts. Other mutually connected stations using the frequency are also displayed. This setting also display beacons.

2 Numbered (I) frames are also displayed. I-frames are numbered in order of generation and result from a connected transmission. Use this to monitor connected conversations in progress.

3 Connect request (SABM or 'C') frames and disconnect (DISC or 'D') frames are also displayed with the headers.

4 Unnumbered acknowledgment (UA) of connect- and disconnect-state frames are also displayed with either the characters 'UA' or 'DM' and a header.

5 Receive Ready (RR), Receive Not Ready (RNR), Reject (RJ), Frame Reject (FRMR) and (I)-Frames are also displayed.

6 Poll/Final bit and sequence numbers are also displayed.

Monitored frame protocols are shown by the type of brackets:
< > indicates AX.25 Level 2 Version 1 frames
[ ] indicates AX.25 Level 2 Version 2 command frames
( ) indicates AX.25 Level 2 Version 2 response frames

MDCHECK Mnemonic: MDC Immediate Command

MDCHECK is an immediate command with which you can log on to your own MailDrop just as a calling station would.

You can now LIST, READ, SEND or KILL messages. While you're 'logged on' to your own MailDrop with the MDCHECK command, a connect request from a calling station will cause the PK-88 to send the 'BUSY' (DM) frame and DISCONNECT to the distant station.

If MAILDROP is OFF, the MDCHECK command will produce a '?What?' error message. A calling station's connect request will be treated as an ordinary packet connection. You cannot kill messages or clear the MailDrop. You must use the MDCHECK command to 'log on' to your MailDrop to use the MailDrop KILL command (see below).

A blinking STA LED shows that a message has been left for the PK-88 owner. Use of the MDCHECK command extinguishes the STA LED.

The following conditions are required to use the local logon feature:

- MAILDROP must be set ON.
- You cannot log on to your MailDrop while a a calling station is connected or a connect is in progress.

Type 'B' (BYE) to 'log off' or quit local control of your MailDrop. Your PK-88 is returned to MailDrop operation and made available to calling stations. A connect request from a calling station will now cause the PK-88 to respond normally and send the MailDrop prompt to the distant station.

You still have full control of your PK-88 while the MAILDROP is ON. You can still initiate outbound connect requests to other packet stations and carry on normal connected-mode contacts. You can make multiple connections on any of the logical channels. However, you should not enter Converse or Transparent mode on the same logical channel as a calling station using the MailDrop.

These 'standard' BBS commands available to both you and the calling station are:

B	BYE	Log off the MailDrop
K	KILL	Kill or delete messages
L	LIST	List the message directory
R	READ	Read a specific message
S	SEND	Send a message

Only the first letter of the command is significant; for example, S, SP, ST and SB are all treated equally as the SEND command.

See Chapter 4 for additional information on MailDrop commands.

MDIGI ON|OFF Mnemonic: MD Default: OFF

Parameters:

ON - I and UI frames having your call sign (MYCALL or MYALIAS) as the next digipeater in the digipeater field are displayed, whether you are connected or disconnected.

OFF - Normal monitoring as determined by the monitoring mode commands

---

MDIGI permits you to display packet frames that your monitor would normally not show when another station uses your station as a digipeater. MDIGI helps you to better understand the digipeating paths that may involve your station, even when you've been unaware of what's happening on the channel.

Use MDIGI to see why your transmitter is being keyed when you're not actively involved in a communication session, or when your system is more active than you would expect.

When MDIGI is OFF you will see those frames that include your station as one of the digipeaters only if your monitor modes have been set this way. If your monitor modes have not been set so you can see these frames, set MDIGI ON to display them.

MDMON ON|OFF Mnemonic: MDM Default: ON

Parameters:

ON - Monitor a calling station's activity on your MailDrop

OFF - Normal monitoring as determined by the monitoring mode commands

---

Set MDMON to ON to monitor your MailDrop. The minimum command string is MDM. Set MDMON OFF to cancel MailDrop monitoring. The default condition is ON.

The MDMON command permits you to monitor a calling station's activity on your MailDrop showing you both sides of the MailDrop QSO. Packet headers are not shown while a caller is connected to your MailDrop.

When a caller is not connected to your MailDrop, channel activity is monitored in normal fashion according to the setting of the MONITOR parameter.

MDPROMPT text Mnemonic: MDP Default: (see text)

Parameters:

ON - Monitor a calling station's activity on your MailDrop

OFF - Normal monitoring as determined by the monitoring mode commands

---

MDPROMPT (text) is the command line sent to a calling station by your MailDrop, and is similar to the command prompts sent to a calling station by a full-service packet BBS. This prompt has no connection with BTEXT and is sent only to a logged-on caller.

You can install any 'personalized' text with a maximum length of 80 bytes. The minimum command string is MDP. The default prompt is:

"Enter message, ^Z (CTRL-Z) to end"

MEMORY 'n' Mnemonic: ME Default: none

Parameters:

n - a hexadecimal address used with the ADDRESS and I/O commands to access the PK-88's memory and I/O locations, or to read values stored at a specified address.

The MEMORY command permits access to memory and I/O locations.

To use the Memory command:
- o Set the memory address into the ADDRESS command.
- o Use the MEMORY command without arguments to read memory locations one after another.
- o Use MEMORY with one argument 0-$FF to write to memory locations. After each MEMORY command, the PK-88 adds 1 to the value of the ADDRESS.

PK-88 RAM locations are $8000-$FFFF. ROM begins at $0000.

The MEMORY command increments the ADDRESS counter by 1 each time MEMORY is typed.

MFILTER n1[,n2[,n3[,n4]]] Mnemonic: MFI Default: $80

Parameters:

'n' - 0 to $80 (0 to 128 decimal) specifies an ASCII character code. Up to four characters may be specified.

Use MFILTER to select characters to be 'filtered,' or excluded from monitored packets. Parameters 'n1,' 'n2,' etc., are the ASCII codes for the characters you want to filter. You can enter up to four characters in either hex or decimal.

The default value $80 filters all received control characters except <CTRL-J>, ($0A), the line feed, <CTRL-M>, ($0D),the carriage return, and <CTRL-I>, ($09), the HORIZONTAL TAB.

Use MFILTER selectively to remove specific characters from the data stream to the terminal or computer. Here are typical applications.

- To prevent a <CTRL-L> character from clearing your screen, set MFILTER 12.
- To eliminate <CTRL-Z> characters, which some computers interpret as end-of-file markers and some terminals interpret as a Clear Screen command, set MFILTER 26.
- To eliminate <CTRL-G> characters, which beep your computer or terminal, set MFILTER 7.

MFROM all,none,yes/no call1[,call2..] Mnemonic: MF Default: all

---

Parameters:

call - all, none, YES_list, NO_list.
list of up to eight call signs, separated by commas.

MFROM uses arguments to determine how the PK-88 monitors the packet channels and displays information - which stations' packets will be displayed and which stations' packets will be masked or hidden. MFROM is set to 'all' when you start the PK-88 for the first time.

Type MFROM to display the ALL/NONE/YES_list/NO_list status of station call signs whose packets will or will not be displayed. You can use the abbreviated command form or mnemonic:

```
cmd:mfrom
MFROM    all
cmd:mf
MFROM    yes WX1AAA,WX2BBB,WX3CCC,WX4DDD
```

To stop any packets from being displayed, type MFROM NONE.

To display packets from one or more specific stations type MFROM (YES followed by a list of calls signs). Packets will be displayed only from stations whose call signs are listed after YES.

To hide or mask packets from one or more specific stations, type MFROM (NO followed by a list of call signs). Packets from stations whose call signs are listed after NO will not be displayed.

You can include optional SSIDs or extensions specified as '-n' after the call sign.

If MFROM is set to 'no WX1AAA' or 'yes WX1AAA,' any combination like WX1AAA, WX1AAA-1,...WX1AAA-15 will be matched and processed. If MFROM is set to 'yes WX1AAA-1' or 'no WX1AAA-1,' then only WX1AAA-1 will match and be processed.

When MFROM and MTO contain different types of arguments, to avoid any possible conflict, the arguments take the following priority:

1. ALL
2. NO list
3. YES list
4. NONE

Clear MFROM with '%,' '&,' or 'OFF' as arguments.

MHEARD Mnemonic: MH Immediate Command

MHEARD is an immediate command that displays a list of stations heard since the last time the MHEARD buffer was cleared.

Use a percent sign (%), an ampersand (&), 'N,' 'NO,''NONE,' or 'OFF' after the command word to clear the MHEARD buffer.

The maximum number of heard stations that can be logged is 18. If more stations are heard, earlier entries are discarded.

- o Stations that are heard directly are marked with a * in the heard log.
- o Stations that have been repeated by a digipeater are not marked.
- o If you clear the list of stations heard at the beginning of a session, you can use this command to keep track of the stations that are active during that period.
- o Logging of stations heard is disabled when PASSALL is ON.

When DAYTIME has been used to set the date and time, entries in the heard log are time stamped. When DAYSTAMP is ON, the date is shown before the time. Here is an example of the MHEARD function with the clock set:

DAYSTAMP ON

```
cmd:mh
05-Jul-86  21:42:27  WA1FJW
05-Jul-86  21:42:24  W6IXU*
05-Jul-86  21:32:18  W1AW-5
05-Jul-86  21:27:57  W2HPM-4*
05-Jul-86  21:26:41  W1AW-4
05-Jul-86  21:26:38  W2JUP-9
05-Jul-86  21:21:24  W3EOU*
05-Jul-86  21:21:23  W2JUP-4*
05-Jul-86  21:05:07  K2AAA
05-Jul-86  20:56:40  W2LGQ
05-Jul-86  14:45:57  WASNA-1
05-Jul-86  14:45:53  WA2PBB
05-Jul-86  14:45:47  KA2AXM
05-Jul-86  14:28:16  WB2ANH
05-Jul-86  14:23:32  KA1NYC
05-Jul-86  14:23:19  WB2EUL
05-Jul-86  13:55:26  K4BWE
05-Jul-86  13:50:28  KA3BB-1*
cmd:
```

DAYSTAMP OFF

```
cmd:mh
21:42:27  WA1FJW
21:42:24  W6IXU*
21:32:18  W1AW-5
21:27:57  W2HPM-4*
21:26:41  W1AW-4
21:26:38  W2JUP-9
21:21:24  W3EOU*
21:21:23  W2JUP-4*
21:05:07  K2AAA
20:56:40  W2LGQ
14:45:57  WA2SNA-1
14:45:53  WA2PBB
14:45:47  KA2AXM
14:28:16  WB2ANH
14:23:32  KA1NYC
14:23:19  WB2EUL
13:55:26  K4BWE
13:50:28  KA3BB-1*
cmd:
```

MONITOR 'n' Mnemonic: M Default: 4

Parameters:

'n' - 0 to 6 specifies various levels of monitor indications

As the value of MONITOR settings is increased, additional functions are included in the monitoring sequences.

The meanings of the parameter values are:

0 All packet monitoring functions are disabled.

1 Only unnumbered (UI) frames resulting from an unconnected transmission are displayed. Use this for an 'unproto,' roundtable type contact. Other mutually connected stations using the frequency are not displayed. This setting also displays beacons.

2 Numbered (I) frames are also displayed. I-frames are numbered in order of generation and result from a connected transmission. Use this to monitor connected conversations in progress.

3 Connect request (SABM or 'C') frames and disconnect (DISC or 'D') frames are also displayed with the headers.

4 Unnumbered acknowledgment (UA) of connect- and disconnect-state frames are also displayed with either the characters 'UA' or 'DM' and a header.

5 Receive Ready (RR), Receive Not Ready (RNR), Reject (RJ), Frame Reject (FRMR) and (I)-Frames are also displayed.

6 Poll/Final bit and sequence numbers are also displayed.

Monitored frame protocols are shown by the type of brackets:

< > indicates AX.25 Level 2 Version 1 frames

[ ] indicates AX.25 Level 2 Version 2 command frames

( ) indicates AX.25 Level 2 Version 2 response frames

MONITOR ON|OFF Mnemonic: M Default: ON (4)

Parameters:

ON - Equivalent to MONITOR 4

OFF - Equivalent to MONITOR 0

In host computer applications that use a parameter value switching routine rather than numeric values, the **MONITOR** command can be used with ON and OFF instead of numbers 0 through 6.

This alternate MONITOR command is appropriate in certain electronic mail and bulletin board systems.

When MONITOR is set to ON, the response message will indicate the numeric value 4. When MONITOR is set to OFF, the response message will indicate the numeric value 0.

```
cmd:mon off                          cmd:mon on
MONITOR  was 4 (UA DM C D I UI)      MONITOR  was 0 (none)
MONITOR  now 0 (none)                MONITOR  now 4 (UA DM C D I UI)
```

MPROTO ON|OFF Mnemonic: MP Default: ON

Parameters:

ON - Monitor all I-frames regardless of PID byte

OFF - Monitor only I-frames with PID byte F0

Use the MPROTO command to restrict monitoring and screen display when sharing radio channels with systems or packet nodes using higher-level protocols.

Certain Level 3 packet node switching systems send frames containing control characters with a Protocol Identifier Byte (PID) of $CF or other values. Some types of packet switches send binary information which you may wish to suppress from your screen display.

Set MPROTO to OFF; such Level 3 frames will not be displayed.

MRPT ON|OFF Mnemonic: MR Default: ON

Parameters:

ON - Show digipeaters in the header; stations heard directly are marked with asterisk.
OFF - Show packets only from originating and destination stations.

MRPT affects the way monitored packets are displayed. When MRPT is OFF, only packets from the originating station and the destination are displayed as they appear with MONITOR set to 6.

```
WX1AAA*>WX2BBB <I;0,3>:
```

When MRPT is ON, the call signs of all stations in the entire digipeat path are displayed. The call sign of the stations heard directly are flagged with an asterisk (*):

```
WX1AAA*>WX3CCC>WX4DDD>WX2BBB <I;0,3>:
```

MSTAMP ON|OFF Mnemonic: MS Default: OFF

Parameters:
ON - Monitored frames ARE time stamped.
OFF - Monitored frames ARE NOT time stamped.

The MSTAMP command activates or disables time stamping of monitored packets. When the PK-88's internal software clock is set, date and time information is available for automatic logging of packet activity or other applications.

When MSTAMP is OFF, the packet header display looks like this:

```
WX1AAA*>WX2BBB>WX3CCC <I;2,2>:
```

When MSTAMP is ON and DAYSTAMP is OFF, the display looks like this:

```
22:51:33  WX1AAA*>WX2BBB>WX3CCC <I;1,7>:
```

When both MSTAMP and DAYSTAMP are ON, the display looks like this:

```
10-Jul-86  22:54:25  WX1AAA*>WX2BBB>WX3CCC <I;2,2>:
```

Set the date and time with the DAYTIME command. Setting MSTAMP ON increases the length of the address display. Set HEADERLN ON to display this information on a separate line.

MTO all,none,yes/no call1[,call2..] Mnemonic: MT Default: none

---

Parameters:

call - all, none, YES_list, NO_list.
list of up to eight call signs, separated by commas.

MTO uses arguments to determine how the PK-88 monitors packet channels and displays information - which stations' packets will be displayed and which stations' packets will be masked or hidden. MTO is set to 'none' when you start the PK-88 for the first time.

Type MTO to display the ALL/NONE/YES list/NO list status of call signs of stations to which addressed packets will or will not be displayed. You can use the abbreviated command form or mnemonic:

```
cmd:mto
MTO    all
cmd:mt
MTO    yes WX1AAA,WX2BBB,WX3CCC,WX4DDD
```

To stop packets addressed to all stations from being displayed, type MTO ALL.

To display only packets addressed TO one or more specific stations, type MTO (YES followed by a list of calls signs). Packets will be displayed only if addressed to stations whose call signs are listed after YES.

To hide or mask packets addressed to one or more specific stations, type MTO (NO followed by a list of call signs). Packets addressed to stations whose call signs are listed after NO will not be displayed.

You can include optional SSIDs or extensions specified as '-n' after the call sign. If MTO is set to 'no WX1AAA or 'yes WX1AAA,' any combination WX1AAA, WX1AAA-1,...WX1AAA-15 will be matched and processed. If MTO is set to 'yes WX1AAA-1' or 'no WX1AAA-1,' then only WX1AAA-1 will match and be processed.

When MFROM and MTO contain different types of arguments, to avoid any possible conflict, the arguments take the following priority:

1. ALL
2. NO list
3. YES list
4. NONE

Clear MTO with '%,' '&,' or 'OFF' as arguments.

MYALIAS call[-n] Mnemonic: MYA Default: empty

Parameters:

call Alternate identity of the PK-88.

'n' alphanumeric optional substation ID (SSID) or extension.

MYALIAS specifies an alternate call sign (in addition to the call sign specified in MYCALL) for use as a digipeater only.

MYALIAS permits both normal HID identification and an alias alternate, repeater-only 'call sign.'

Wide-coverage digipeater operators in some areas change their call sign to a shorter and (usually) easier to remember identifier.

Identifiers used include International Civil Aviation Organization (ICAO) airport IDs, sometimes combined with telephone area codes.

MYCALL call[-'n'] Mnemonic: MY Default: PK88

Parameters:

call	-	Your call sign.
'n'	-	alphanumerics indicating an optional substation ID (SSID) or extension.

NOTE: The PK-88 will not key your transmitter until you install your call sign in place of 'PK88.'

Use the MYCALL command to load your call sign into the PK-88's RAM. Your call sign is inserted automatically in the FROM address field for all packets originated by the PK-88. MYCALL is also used for identification packets (see HID and ID).

The PK-88 accepts connect request frames with your MYCALL in the TO field and repeats frames with this call sign in the digipeat field.

The 'PK88' default call sign is present in the PK-88's RAM when the system is manufactured. This 'artificial call' must be changed for proper operation of the packet protocols.

Two or more stations cannot use the same call sign (including SSID or extension) on the air at the same time.

- Use the SSID or extension to distinguish two stations with the same call.
- The SSID or extension will be zero (0) unless explicitly set to another value.

Although there is no standardization of SSIDs at present, most packet radio operators use SSID 0 (zero) for manual or local keyboard operation of their main station, and an SSID of (-1) or (-2) for a secondary station or dedicated digipeater under their responsibility.

Local area networks operated or maintained by a given organization may use the same call sign for several stations in their network, each node or unit being identified with a different SSID or extension. As packet networks grow and become more complex with multi-port switches, gateway systems and frequency translation between bands, SSIDs or extensions become especially significant. For example look at the hypothetical case:

```
WX1AAA>WX2BBB-6>WX2BBB-7>WX5EEE-1>WX5EEE-4
145.01  145.01   221.11   221.11   145.01
```

In this example, WX1AAA is linked to WX5EEE-4 via a combination of digipeaters and Level 3 switched, each having a distinctive SSID.

NEWMODE ON|OFF Mnemonic: NE Default: ON

Parameters:

ON - The PK-88 automatically returns to the Command Mode at disconnect.

OFF - The PK-88 does not return to Command Mode at disconnect.

NEWMODE determines how the PK-88 behaves when the link is broken.

The PK-88 always switches to a data transfer mode at the time of connection, unless NOMODE is ON.

Set NEWMODE for the type of operation most suitable to your needs.

If NEWMODE is OFF and the link is disconnected, the PK-88 remains in Converse or Transparent Mode unless you have forced it to return to Command Mode.

When NEWMODE is ON and the link is disconnected, or if the connect attempt fails, the PK-88 returns to Command Mode.

Certain electronic mail, packet bulletin board or other host computer programs may require NEWMODE to be set OFF. Please consult the software provider for additional information in this regard.

NOMODE ON|OFF Mnemonic: NO Default: OFF

Parameters:

ON - The PK-88 switch modes (Command, Converse, Transparent) only upon explicit command. NEWMODE function is ignored.

OFF - The PK-88 changes modes according to NEWMODE.

When NOMODE is ON, the PK-88 never switches from Converse or Transparent Mode to Command Mode (or vice versa) by itself. Only specific commands (CONVERSE, K, TRANS, or <CTRL-C>) typed by you can change the operating mode. NOMODE ON supersedes NEWMODE.

When NOMODE is OFF, the PK-88 switches modes automatically according to the way NEWMODE is set.

Certain electronic mail, packet bulletin board or other host computer programs may require NOMODE to be set ON. Please consult the software provider for additional information in this regard.

NUCR ON|OFF Mnemonic: NU Default: OFF

Parameters:

ON - <NULL> characters ARE sent to the terminal following <CR> characters.

OFF - <NULL> characters ARE NOT sent to the terminal following <CR> characters.

Some of the older electromechanical terminals (Teletypetm machines) and printer terminals require some extra time for the printing head to do a line feed and return to the left margin. NUCR ON solves this problem by making the PK-88 send <NULL> characters (ASCII code $00) to your computer or terminal. This introduces any necessary delay after any <CR> sent to the terminal.

The NULLS command sets the number of individual <NULL> characters that are to be sent when NUCR is ON.

o Set NUCR ON if your terminal or printer misses one or more characters after responding to a <CR>. If this is the case, you will sometimes see overtyped lines.

NULF ON|OFF Mnemonic: NUL Default: OFF

Parameters:

ON - <NULL> characters are sent to the terminal following <LF> characters.

OFF - <NULL> characters are not sent to the terminal following <LF> characters.

Some of the older electromechanical terminals (Teletypetm machines) and printer terminals require some extra time for the printing head to do a line feed and return to the left margin. NULF ON solves this problem my making the PK-88 send <NULL> characters (ASCII code $00) to your computer or terminal. This introduces any necessary delay after any <LF> sent to the terminal.

The NULLS command sets the number of individual <NULL> characters that are to be sent when NULF is ON.

Set NULF ON if your terminal or printer misses one or more characters at the beginning of a new line after responding to a <LF>.

NULLS 'n' Mnemonic: NULL Default: 0 (zero)

Parameters:

'n' - 0 to 30 specifies the number of <NULL> characters to be sent to your computer or terminal after <CR> or <LF> when NUCR or NULF are set ON.

NULLS specifies the number of <NULL> characters (ASCII code $00) to be sent to the terminal after a <CR> or <LF> is sent.

- NUCR and/or NULF must be set to indicate whether nulls are to be sent after <CR>, <LF> or both.

Devices requiring nulls after <CR> are typically hard-copy devices requiring time for carriage movement. This applies to most of the older electromechanical teleprinters and computer printers.

Devices requiring nulls after <LF> are usually slow-scrolling CRTs.

The null characters are sent from the PK-88 to your computer only in Converse and Command Modes.

PACLEN 'n' Mnemonic: PACL Default: 128

Parameters:

'n' - 0 to 255 specifies the maximum length of the data portion of a packet.

0 - Zero is equivalent to 256.

PACLEN sets the maximum number of user data bytes to be carried in each packet's 'information field.' 'User data' means the characters you actually type at your keyboard (or send from a stored file).

The PK-88 automatically transmits a packet when the number of characters you type (or send from disk) for a packet equals 'n.' This value is used in both Converse and Transparent Modes.

Most keyboard-to-keyboard operators use the default value of 128 bytes for routine VHF/UHF packet services.

Experiment with different values for MAXFRAME and PACLEN to find the combination best suited to your operating conditions - especially if you are transferring files.

- The lower the value of PACLEN, the greater the probability of getting packets though the link without 'hits' or retries.
- Increase PACLEN to 256 byes (set 0) if transferring files to a nearby station over a high quality path.
- Reduce PACLEN to 64, or even 32 when working 'difficult' HF radio paths.
- If the radio link is good, an optimal relationship will exist between the parameters set by these commands. Set PACLEN so that the maximum number of characters outstanding doesn't exceed the receive buffer space of the TNC receiving the data.

It is not necessary that two TNCs be set to the same PACLEN value to exchange data; however, some TNCs may not be compatible when frames contain more than 128 data characters.

NOTE: The FRACK counter begins counting from the first flag of each frame. If MAXFRAME is set to 7 and PACLEN is set to maximum (0), FRACK should be lengthened to prevent the distant station's ACK from colliding with your possibly-premature retry.

PACTIME EVERY|AFTER 'n' Mnemonic: PACT Default: AFTER 10

Parameters:

'n'	-	0 to 250 specifies 100-millisecond intervals.
EVERY	-	Packet timeout occurs every 'n' times 100 milliseconds.
AFTER	-	Packet timeout occurs when 'n' time 100 milliseconds elapse without input from the computer or terminal.

A PACTIME parameter is always used in Transparent Mode. PACTIME is also used in Converse Mode if CPACTIME is ON.

- When EVERY is specified, the characters you type or send from disk are packaged and queued for transmission every 'n' times 100 milliseconds.
- When AFTER is specified, the characters you type or send from disk are packaged when input from the terminal stops for 'n' times 100 milliseconds.

A zero-length packet will never be produced. The timer is not started until the first character or byte is entered.

A value of 0 (zero) for 'n' is allowed; zero means packets are sent with no wait time.

PARITY 'n' Mnemonic: PAR Default: 3 (even)

Parameters:

'n' - 0 to 3 selects a parity option from the table below.

PARITY sets the PK-88's data parity for terminal or computer data transfer according to the following table:

0 = no parity
1 = odd parity
2 = no parity
3 = even parity

The parity bit, if present, is stripped automatically on input, and is not checked in Command and Converse Modes.

In Transparent Mode all eight bits (including parity) are transmitted in packets. When 'no parity' is set and AWLEN is 7, the eighth bit is set to 0 (zero).

PASS 'n' Mnemonic: PAS Default: $16 <CTRL-V>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

PASS selects the ASCII character used for the 'pass' input editing command.

The parameter 'n' is the numeric ASCII code for the character you'll use to signal that the character immediately following it is to be included in a packet or text string.

o You can enter the code in either hex or decimal.

Use the PASS character (default <CTRL-V>) to send characters that usually have special functions.

A common use for the pass character is to allow <CR> to be included in the BTEXT and CTEXT messages so that the transmitted information appears on several short lines rather than a single longer line.

Use the PASS character to insert <CRs> at the end of a short line:

```
cmd:BT Notice:<CTRL-V><CTRL-M>
Meeting at the Firehouse tonight <CTRL-V><CTRL-M>
at 8:00 PM. All welcome! <CR>
```

The distant station's monitor shows:

```
Notice:
Meeting at the Firehouse tonight
at 8:00 PM. All welcome!.
```

Without the PASS character, the message would probably look like this:

```
Notice: Meeting at the Firehouse tonight at 8:00 PM. All welcome!
```

In like manner, you can include <CR> in text when you are in Converse Mode, to send multi-line packets. (The default send-packet character is <CR>.)

PASSALL ON|OFF Mnemonic: PASSA Default: OFF

Parameters:

ON - The PK-88 will accept packets with invalid CRCs.

OFF - The PK-88 will only accept packets with valid CRCs.

PASSALL permits the PK-88 to display packets received with invalid CRC fields; the error-detecting mechanism is turned off.

Packets are accepted for display despite CRC errors if they consist of an even multiple of eight bits and are up to 330 bytes. The PK-88 attempts to decode the address field and displays the call sign(s) in the standard monitor format, followed by the text of the packet.

PASSALL is normally turned off; therefore, the protocol ensures that received packet data is error-free by rejecting packets with invalid CRC fields.

PASSALL (sometimes called 'Garbage Mode') may be useful for testing a marginal RF link or during operation under other unusual conditions or circumstances.

When you set PASSALL ON while monitoring a moderately noisy channel, 'packets' are displayed periodically because there is no basis for distinguishing between actual packets and random noise.

- When PASSALL is ON, logging of stations heard (for display by MHEARD) is disabled; the call signs detected may be incorrect.

PERSIST 'n' Mnemonic: PE Default: 63

Parameters:

'n' - 0 to 255 specifies the threshold value for a random-number attempt to transmit.
'0' - Signifies a 1/256th chance of transmitting every SLOTTIME.
'255'- Signifies 'transmit right away without delay'.

The PERSIST parameter works with PPERSIST and SLOTTIME to achieve true p-persistent CSMA (Carrier-Sense Multiple Access) in KISS TNC mode and AX.25 operation. However, little improvement will be obtained in AX.25 operation unless other stations on the channel are also using PERSIST and SLOTTIME.

When the host (your computer) has queued data for transmission, the PK-88 monitors the DCD (Data Carrier Detect) signal from its internal modem. The PK-88 waits indefinitely for DCD to go inactive.

When the channel is clear, the PK-88 generates a random number between 0 and 255. If this number is less-than or equal to 'P', the PK-88 keys the PTT line, waits .01 * TXDELAY seconds, and then transmits all frames in its queue. The PK-88 then un-keys the PTT line and returns to the idle state.

If the randomly-generated number is greater than 'P', the PK-88 waits .01 * SLOTTIME seconds and repeats the procedure. If the DCD signal has gone active in the meantime, the PK-88 again waits for DCD to clear before continuing.

The PK-88 waits an exponentially-distributed random interval after sensing that the channel is clear before trying to transmit. With proper 'tuning' of the PERSIST and SLOTTIME parameters, several stations sending traffic are much less likely to collide with each other when they simultaneously see that the channel is clear.

The default value of 63 assumes that there are four stations on your channel. Modify this value according to your local conditions.

NOTE: P=255 means 'always transmit as soon as possible, regardless of the random number'.

See Chapter 6 for additional information on p-persistent operation.

PPERSIST ON|OFF Mnemonic: PP Default: ON

Parameters:

ON - The PK-88 uses PERSIST and SLOTTIME parameters in executing p-persistent CSMA (Carrier Sense Multiple Access).

OFF - The PK-88 uses DWAIT for AX.25-type 1-persistent CSMA.

Use the PPERSIST command to switch the PK-88 from 1-persistent CSMA operation based on the DWAIT value to p-persistent CSMA operation. This is required when using host computer applications based on the TCP/IP protocols and in certain electronic mail and bulletin board programs.

When PPERSIST is set ON, the PK-88 uses the PERSIST and SLOTTIME parameters for p-persistent CSMA instead of the normal AX.25 protocol DWAIT procedure to achieve CSMA operation.

PPERSIST is used in KISS TNC and, under certain specific conditions, in AX.25 operation.

See PERSIST and SLOTTIME in this chapter.

See Chapter 6 for additional information on p-persistent operation.

RAWHDLC ON|OFF Mnemonic: RAW Default: OFF

Parameters:

ON - The PK-88 functions as a direct or raw HDLC controller.

OFF - The PK-88 functions as a normal AX.25 controller.

Some host computer applications do not use AX.25 protocols. In such cases, the PK-88 can be operated as a raw HDLC controller, allowing the host to provide all protocol commands and responses. Applications may include some types of electronic mail systems, bulletin board programs and computers operating with TCP/IP and other communication protocols.

Use the RAWHDLC command to disable AX.25 protocols and permit the host system direct access to the PK-88's HDLC integrated circuit.

RAWHDLC must be set ON when using KISS TNC protocols with TCP/IP.

REDISPLA 'n' Mnemonic: RED Default: $12 <CTRL-R>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

REDISPLA changes the redisplay-line input editing character.

Parameter 'n' is the numeric ASCII code for the character to use when you want to re-display the current input line. You can enter the code in either hexadecimal or decimal numbers.

Type the REDISPLA character to redisplay a line you've just typed. The following things happen:

- Type-in flow control is temporarily turned off (if it had been active). Any incoming packets that are pending are displayed.
- A <BACKSLASH> is appended to the line you've just typed and the line is shown below it. Only the final form of the line is shown if you have deleted or or changed any characters.

You can now continue typing where you left off.

Use the REDISPLA command to see a 'clean' copy of your input if you are using a printing terminal and you have deleted characters. Use the REDISPLA command if a packet is received while you're typing a message in Converse Mode. You can see the incoming message before you send your packet without canceling your input.

If BKONDEL is set OFF, deletions are designated with <BACKSLASH> characters, rather than by trying to correct the input line display. The redisplayed line is the corrected text.

RELINK ON|OFF Mnemonic: REL Default: OFF

Parameters:

ON - In AX.25 Versions 1 and 2, the PK-88 will automatically try to reconnect the distant station after the link has timed out on retries.

OFF - The PK-88 will not attempt to re-establish the failed link.

When RELINK is ON, the PK-88 attempts to reconnect by sending SABM frames (Connect Requests) after retrying out. When RELINK is OFF, the PK-88 forces a disconnect by sending a DISC frame (Disconnect Command) after retrying out.

Set RELINK to OFF when using the PK-88 with host computer applications, computer-based message systems and electronic mail programs.

Please refer to the related CHECK command.

RESET Mnemonic: RESET Immediate Command

RESET is an immediate command that resets all parameters to default settings and reinitializes the PK-88.

CAUTION:

All personalized parameters and monitor lists are lost!

To reinitialize the PK-88 using the parameter values in bbRAM, turn the PK-88 OFF then ON, or use the RESTART command.

RESPTIME 'n' Mnemonic: RES Default: 5

Parameters:

'n' - 0 to 250 specifies 100-millisecond intervals.

RESPTIME adds a minimum delay before the PK-88 sends acknowledgment packets. This delay may run concurrently with the default wait time set by DWAIT and any random wait in effect.

Use RESPTIME delay to increase throughput during operations such as file transfer when the sending TNC usually sends the maximum number of full-length packets.

Occasionally, the sending TNC may not have a packet ready in time to prevent transmission from being stopped temporarily, with the result that the acknowledgment of earlier packets collides with the final packet of the series.

Set RESPTIME to 10 to avoid these collisions.

RESTART Mnemonic: RESTART Immediate Command

RESTART is an immediate command that reinitializes the PK-88 using the defaults stored in the PK-88's bbRAM. Your personalized parameter settings are retained unchanged.

The effect of the RESTART command is the same as turning the PK-88 OFF, then ON again. RESTART can be used remotely over the radio link to restart a PK-88 when required.

RESTART does not reset the parameter values in bbRAM. See the RESET command.

RETRY 'n' Mnemonic: RE Default: 10

Parameters:

'n' - 0 to 15 specifies the maximum number of packet retries.

The AX.25 protocol uses retries - retransmission of frames that have not been acknowledged. Frames are retransmitted 'n' times before the link is disconnected. A value of 0 for 'n' specifies an infinite number of retries.

The FRACK command sets the time between retries. See the FRACK command.

If the number of designated retries is exceeded, the PK-88 enters either the 'connect in progress' or 'disconnected' state depending on the setting of RELINK.

If you are not in Transparent Mode, the following message is shown:

*** Retry count exceeded

SENDPAC 'n' Mnemonic: SE Default: $0D <CTRL-M>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

The SENDPAC command selects the character used to cause a packet to be sent while in Converse Mode. The parameter 'n' is the numeric ASCII code for the character that packetizes the characters you type and queues them for transmission. You can enter the code in either hexadecimal or decimal numbers.

The default SENDPAC value $0D is fine for ordinary conversation with CR ON. This sends packets at natural intervals with <CRs> included in the packet.

When setting CPACTIME ON, set SENDPAC to some value not ordinarily used (for example <CTRL-A>), with CR OFF). This causes packets to be sent without extra <CR> characters included in the text.

The SENDPAC character is not necessarily treated as a <CR> unless it really is a carriage return.

SLOTTIME 'n' Mnemonic: SL Default: 10 (100 ms)

Parameters:

'n' - 0 to 250 specifies the time in ten-millisecond intervals during which the PK-88 waits between generating random numbers to see if it can transmit.

The SLOTTIME parameter works with the PPERSIST and PERSIST parameters to achieve true p-persistent CSMA (Carrier-Sense Multiple Access) in KISS TNC mode and in normal AX.25 operation. However, no real advantage will be obtained in AX.25 operation unless the other stations on the channel are also using PERSIST and SLOTTIME.

See Chapter 6 for further discussion of SLOTTIME, PERSIST and KISS TNC protocols.

SQUELCH ON|OFF Mnemonic: SQ Default: OFF

Parameters:

ON - The PK-88 responds to positive-going squelch voltage.

OFF - The PK-88 responds to negative-going squelch voltage.

Normally, to decide if the channel is clear so that it can transmit, the PK-88 uses its CSMA (Carrier Sense Multiple Access) circuit by sensing audio mark and space tones from your packet receiver.

If there are signals other than packet on the channel you're using (such as voice operation), it's possible that the PK-88 might not be quite as polite as it is normally and transmit on top of the other signals.

The PK-88 can use true RF-carrier CSMA by monitoring the squelch line voltage from your radio. This line can be easily connected in many radios to the 'busy' light or indicator on the radio's front panel, or to other circuit locations that indicate the presence or absence of carrier or received signals. Because your carrier-sensing signal can be active-low or active-high (depending on the individual radio manufacturer's design), you can set the PK-88 to sense either positive or negative squelch voltages.

START 'n' Mnemonic: STA Default: $11 <CTRL-Q>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

Use the START command to choose the User Start character you want to use to restart output from the PK-88 to the terminal after it has been halted by typing the User Stop character.

- The User Stop character is set by the STOP command.
- You can enter the value in either hex or decimal.

If the User Start and User Stop characters are set to $00 or XFLOW is set to OFF, software flow control to the PK-88 is disabled; the PK-88 will only respond to hardware flow control (CTS/RTS).

If the same character is used for both the User Start and User Stop characters, the PK-88 alternately starts and stops transmission on receipt of the character ('toggles').

STOP 'n' Mnemonic: STO Default: $13 <CTRL-S>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

Use the STOP command to select the User Stop character you want to use to stop output from the PK-88 to the terminal. Type this character to halt the PK-88's output to your monitor so that you can read the received text before it scrolls off your screen display.

Output is restarted with the User Start character.

- The User Start character is set by the START command.
- You can enter the value in either hex or decimal.

If the User Start and User Stop characters are set to $00 or XFLOW is set to OFF, software flow control to the PK-88 is disabled; the PK-88 will only respond to hardware flow control (CTS/RTS).

If the same character is used for both the User Start and User Stop characters, the PK-88 alternately starts and stops transmission upon receipt of the character ('toggles').

TBAUD 'n' Mnemonic: TB Default: 1200 bauds

Parameters:

'n' - Specifies the serial I/O port (terminal) data rate in bauds.

TBAUD displays the baud rate set by the autobaud routine when you first apply power to the PK-88, or after typing 'RESET.'

Use TBAUD to set terminal rates not covered by the autobaud routine, such as 75, 110 and 600 and 19,200 bauds. The new rate will become active at the next power-on or RESTART. A warning message reminds you of this.

If you plan to change terminals, but want to retain all the RAM parameter values, set TBAUD, AWLEN and PARITY to the new terminal's characteristics while you are still connected to the old terminal. Next, turn off the PK-88, change the terminal and turn the PK-88 on again.

TCLEAR Mnemonic: TC Immediate Command

The TCLEAR command clears the PK-88's transmit buffer and cancels further transmission of data except for a few remaining packets.

- You must be in the Command Mode to use TCLEAR.
- Use the <CTRL-C> (default) command to return to Command Mode.
- Type 'TC' to clear the transmit buffer.

TIME Mnemonic: TI Default: $14 <CTRL-T>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

The TIME command specifies a control character in the text you type into the transmit buffer or into a text file stored on disk.

- Type <CTRL-T> to embed the TIME command in your text or file.

At transmit time, the PK-88 reads the embedded control code (default <CTRL-T>), reads the time of day from the PK-88's internal clock and then sends the time to the radio in the data transmission code in use at that time.

When DAYSTAMP is set ON, the date is transmitted with the time.

NOTE: The TIME command cannot be embedded in CTEXT OR BTEXT.

TONE Mnemonic: TO Default: 3 (BELL 202)

Parameters:

'n' - 0 to 3 specifies an ASCII transmit and receive modem tones.

The TONE command sets the Am7910 Modem chip's send and receive tones and shift. Two sets of different modem tone combinations are available:

TONE	Specification	Stop Mark	Start Space	Type of Service
0	Bell 103 Originate	1070 Hz	1270 Hz	HF 300 bauds
1	Bell 103 Answer	2025 Hz	2225 Hz	HF 300 bauds
2	Bell 202	1200 Hz	2200 Hz	VHF 1200 bauds
3	Bell 202 Equalized	1200 Hz	2200 Hz	VHF 1200 bauds

TONE 3 provides a significant degree of frequency response equalization in the modem receiver. TONE 3 may be beneficial when working with radio receivers whose high frequency audio response is less than adequate.

In general practice, use Bell 103 tones at the lower data rates for HF radio, and Bell 202 tones for higher data rates authorized above 28 MHz in many countries.

Note that the PK-88 is shipped strapped for the Bell standard tones used in North America.

TRACE ON|OFF Mnemonic: TRAC Default: OFF

Parameters:

ON - Trace function is activated

OFF - Trace function is disabled.

The TRACE command activates the AX.25 protocol display. If TRACE is ON, all received frames are displayed in their entirety, including all header information.

NOTE: Be careful using the mnemonic - don't use 'TRA'! The PK-88 will change to Transparent Mode!

The TRACE display is shown as it appears on an 80-column display. The following monitored frame is a sample:

```
WX1AAA*>TESTER <UI>:
This is a test message packet.

Byte                Hex                      Shifted ASCII        ASCII

000: A88AA6A8 8AA460AE 6494AAA0 406103F0  TESTER0WX1AAA0.x  ......'.d...@a.
010: 54686973 20697320 61207465 7374206D  *449.49.0.:29:.6  This is a test
020: 65737361 67652070 61636B65 742E0D    299032.80152:..   essage packet..
```

The byte column shows the offset into the packet of the beginning byte of the line.

The hex display column shows the next 16 bytes of the packet, exactly as received, in standard hex format. The shifted ASCII column decodes the high-order seven bits of each byte as an ASCII character code.

The ASCII column decodes the low-order seven bits of each byte as an ASCII character code.

In a standard AX.25 packet,

- The call sign address field is displayed correctly in the shifted ASCII column.
- A text message is displayed correctly in the ASCII column.
- Non-printing characters and control characters are displayed in both ASCII fields as a period ('.').

You can examine the hex display field to see the contents of the SSID or extension byte and the control bytes used by the protocol.

TRANS Mnemonic: T Immediate Command

TRANS is an immediate command that switches the PK-88 switch from the Command Mode to Transparent Mode. The current state of the radio link is not affected.

Transparent Mode is primarily useful for computer communications. In Transparent Mode, 'human interface' features such as input editing, echoing of input characters, and type-in flow control are disabled.

o Use Transparent Mode for transferring binary or other non-text files.

TRFLOW ON|OFF Mnemonic: TRF Default: OFF

Parameters:

ON - Software flow control for the computer or terminal can be activated in Transparent Mode.

OFF - Software flow control for the computer or terminal is disabled in Transparent Mode.

If TRFLOW is ON, the type of flow control used in Transparent Mode is determined by how START and STOP are set.

If TRFLOW is OFF, only 'hardware' flow control (CTS, RTS) is available to the computer and all characters received by the PK-88 are transmitted as data.

If START and STOP are set to $00, the User Stop and User Start characters are disabled - hardware flow control must be used by the computer.

If TRFLOW is ON, and START and STOP are set to values other than zero, software flow control is enabled for the user's computer or terminal. The PK-88 responds to the User Start and User Stop characters (set by START and STOP) while remaining transparent to all other characters from the terminal.

Unless TXFLOW is also ON, only hardware flow control is available to the PK-88 to control output from the terminal.

TRIES 'n' Mnemonic: TRI Default: 0

Parameters:

'n' - 0 to 15 specifies the current RETRY level on the selected input channel.

TRIES retrieves (or forces) the count of 'tries' on the data channel presently selected.

If you type TRIES without an argument, the PK-88 returns the current number of tries if an outstanding unacknowledged frame exists. If no outstanding unacknowledged frame exists, the PK-88 returns the number of tries required to get an ACK for the previous frame.

If RETRY is set to zero (0), the TRIES command always returns zero (0).

Use TRIES for gathering statistics on a given path or channel. TRIES is especially useful for computer-operated stations (such as automatic message-forwarding stations) using less-than-optimal, noisy HF or satellite channels or paths.

Using TRIES under these conditions automatically optimizes the PACLEN and MAXFRAME parameters.

If you type TRIES with an argument, the 'tries' counter is forced to the entered value. Using this command to force a new count of tries is not recommended.

TXDELAY 'n' Mnemonic: TX Default: 30 (300 ms)

Parameters:

'n' - 0 to 120 specifies ten-millisecond intervals.

The TXDELAY command tells the PK-88 how long to wait before sending packet frame data after keying your transmitter's PTT line.

All transmitters need some amount of start-up time to put a signal on the air; some need more, some need less. Some general rules apply:

- Crystal-controlled radios with diode T/R switches are faster;
- Synthesized radios need time for phase-lock loops (PLLs) to lock;
- Radios with mechanical T/R relays need more time.

Experiment to determine the best TXDELAY value for a specific radio.

TXDELAY can also compensate for delays in the distant station's radio. If the distant station's radio has slow recovery or release times when switching from transmit to receive, increasing your TXDELAY may permit improved throughput by retarding the start of your data until the distant receiver has reached full sensitivity.

TXFLOW ON|OFF Mnemonic: TXF Default: OFF

Parameters:

ON - Software flow control for the PK-88 can be activated in Transparent Mode.
OFF - Software flow control for the PK-88 is disabled in Transparent Mode.

When TXFLOW is ON, the setting of XFLOW determines the type of flow control used in Transparent Mode.

When TXFLOW is OFF, the PK-88 uses only hardware flow control; all data sent to the terminal remains fully transparent.

When TXFLOW and XFLOW are ON, the PK-88 uses the Start and Stop characters (set by XON and XOFF) to control the input from the terminal.

Unless TRFLOW is also ON, only hardware flow control is available to the computer or terminal to control output from the PK-88.

If the PK-88 Start and Stop characters are set to $00, hardware flow control will always be selected regardless of the setting of TXFLOW.

UNPROTO call1 [VIA call2[,call3...,call9]] Mnemonic: U Default: CQ

Parameters:

call1 - Call sign to be placed in the TO address field.

call2-9 - Optional digipeater call list, up to eight calls.

UNPROTO sets the digipeat and destination address fields of packets sent in the unconnected (unprotocol) mode.

Unconnected packets are sent as unsequenced I-frames with the destination and digipeat fields taken from 'call1' through 'call9' options. When a destination is not specified, unconnected packets are sent to 'CQ.'

Unconnected packets sent from other packet stations can be monitored by setting MONITOR to a value greater than '1' and setting MFROM to ALL.

The digipeater list can also be used for beacon packets.

To send a beacon message through one or more digipeaters, type the following:

```
cmd:UNPROTO BEACON VIA WX1AAA,WX2BBB,WX3CCC
```

Your beacon is routed to and repeated by each of the digipeaters in the order listed.

USERS 'n' Mnemonic: US Default: 1

Parameters:

'n' - 0 to 10 specifies the number of active simultaneous connections that can be established with the PK-88.

USERS only affects the way that incoming connect requests are handled. It does not affect the number of connections you initiate with the PK-88. For example:

USERS 0 allows incoming connections on any free logical channel
USERS 1 allows incoming connections on logical channel 0 only
USERS 2 allows incoming connections on logical channels 0 and 1
USERS 3 allows incoming connections on logical channels 0, 1 and 2, and so on, through USERS 10.

XFLOW ON|OFF Mnemonic: XF Default: ON

Parameters:

ON - XON/XOFF (software) flow control is activated.

OFF - XON/XOFF flow control is disabled - hardware flow control is enabled.

When XFLOW is ON, software flow control is in effect - it's assumed that the computer or terminal will respond to the PK-88's Start and Stop characters defined by the XON and XOFF commands.

When XFLOW is OFF, the PK-88 uses hardware flow control commands on the CTS and RTS line.

For full hardware control in both directions, set XFLOW to OFF.

This type of hardware flow control is frequently required by certain host computer applications, electronic mail and some bulletin board systems.

XMITOK ON|OFF Mnemonic: XMITO Default: ON

Parameters:

ON - Transmit functions (PTT line) are active.

OFF - Transmit functions (PTT line) are disabled.

When XMITOK is OFF, the PTT line to your transmitter is disabled - the transmit function is inhibited. All other PK-88 functions remain the same. The PK-88 generates and sends packets as requested, but does not key the radio's PTT line.

Use the XMITOK command at any time to ensure that the PK-88 does not transmit.

Set XMITOK OFF if you're absent and wish to leave the PK-88 on as a channel activity monitor.

Set XMITOK OFF for testing in loopback or direct wire connections when PTT operation is not required.

XOFF 'n' Mnemonic: XO Default: $13 <CTRL-S>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

Use XOFF to select the Stop character to be used to stop input from the computer or terminal.

o You can enter the code in either hex or decimal.

The Stop character default value is <CTRL-S> for computer data transfers.

If you're operating in Converse Mode, and there is a chance that activity might fill the PK-88's buffers, you can define the Stop character as <CTRL-G> ($07), which 'beeps' many terminals.

XON 'n' Mnemonic: XON Default: $11 <CTRL-Q>

Parameters:

'n' - 0 to $7F (0 to 127 decimal) specifies an ASCII character code.

XON selects the PK-88 Start character that is sent to the computer or terminal to restart input from that device.

o You can enter the code in either hex or decimal.

The Start character default value is <CTRL-Q> for computer data transfers.

If you're operating in Converse Mode, and there is a chance that activity might fill the PK-88's buffers, you can define the Stop character as <CTRL-G> ($07), which 'beeps' many terminals.

CHAPTER 6

TROUBLESHOOTING

6.1 Introduction

WARNING!!

NEVER REMOVE OR INSERT AN INTEGRATED CIRCUIT DEVICE WITH POWER APPLIED

The AEA PK-88 is a complex piece of electronic equipment. Servicing must be performed in a logical manner. Prepare for troubleshooting by studying the circuit diagram in the appendices.

Although it is not possible to present all possible problems, symptoms and probable solutions, this section offers general troubleshooting directions based on our experience.

6.2 General Tests

In most cases, careful visual inspection combined with simple measurements usually reveals the problem.

The single most-useful tool for troubleshooting is a digital voltmeter (DVM) for reading AC and DC voltages, one that permits non-destructive resistance measurements while the integrated circuits are still in their sockets.

Although some tests can be done without the aid of an oscilloscope, certain signals must be verified at various points on the board if the problem cannot be located by visual means or with a meter.

Avoid short-circuiting pins on integrated circuits when connecting meter or oscilloscope probes to the board. It is good practice to attach a secure ground wire to the meter or oscilloscope, some point that cannot accidentally short-circuit components on the board.

A good point to pick up this ground is pin-1 of the Radio connector J2.

6.2.1 Power Supply

Verify Fuse F1. If the fuse is intact, then verify the power supply for correct operation. Verify power supply levels at the outputs of voltage regulators IC1 and DC-to-DC converter IC3.

- Are the voltages close to their nominal values?
- Do all the integrated circuits in the suspected area have the proper voltage on their power pins?
- Is there excessive ripple in any of the DC voltage lines?
- If so, verify the regulator and associated components, working backwards toward the input power source.
- If the voltage is low in conjunction with a hot regulator, suspect a short circuit on the board, or defective (hot) integrated circuit.

6.2.2 Obvious Problems

Look for any unusual physical symptoms.

- Are any components discolored?
- Does something smell burned?
- Do any of the parts seems excessively warm?

6.2.3 Assembly Problems

Carefully inspect the PC board and component installation.

- Are all the socketed ICs firmly seated in their sockets?
- Are any IC leads folded under the chip or bent so that they aren't making proper contact with the integrated circuit socket?

6.2.4 Cabling Problems

Inspect the interconnection cabling. Where possible, substitute a spare PK-88 or other compatible TNC and attempt normal operation.

- Do the cables perform correctly with another controller?
- Has the radio and/or terminal been successfully used with this or another controller?
- Are all the connections tight?
- Does the cable appear frayed or broken?

6.3 Specific Symptoms

Although the above steps may seem obvious, careful visual inspection often points to a problem or provides significant indications as to the PK-88's most suspect area.

Proceed to more specific analysis after completing the physical inspection and dealing with the apparent problems.

6.3.1 Symptom: PK-88 appears dead

If no LEDS are lit at startup or reset:

- Verify that the external power source is properly connected.
- Verify that the external power supply has sufficient current capacity to drive the PK-88.
- Verify the 74HCT574 LED driver device at location IC9.
- Verify that system clock Y1 is operating and that a square wave signal (4.9152 MHz, 0 to +5 volts) exists at IC16 pin 6. The clock signal should be a moderately-distorted square wave.

If the PK-88 responds to initial power application with ALL the LEDS lit but fails to respond to any commands:

- Verify that the 27256 EPROM at IC15 is correctly installed with the indicator notch position matching the marking on the PCB.
- Verify that the PK-88's power source can provide at least 500 milliamperes continuous current at 13 volts DC.

If the PK-88 responds to initial power application with only the MULT LED lit but fails to respond to any commands:

- Suspect the terminal port at this point. The processor and the software in EPROM are probably operating correctly.
- Verify the cable between the PK-88 and the terminal.
- Verify logic levels according to the terminal interface trouble-shooting section in this chapter.

Digital Logic Lines

All logic circuits operate at standard TTL levels. "Low" is less than +0.8 V; "High" is greater than +2.4 volts. All digital inputs and outputs alternate between these two levels.

NOTE: Make these measurements ONLY with an oscilloscope!

- If logic signals are alternating between 0 and perhaps 1 volt, there is a problem, usually a short circuit.
- Do not mistake switching transients on logic lines for improper operation - such transients appear as ringing and distortions.
- Verify with the oscilloscope that activity exists on the following lines:

ADDRESS LINE A0	IC14	Pin 30
DATA LINE D0	IC14	Pin 14
CHIP ENABLE CE*	IC15	Pin 20
OUTPUT ENABLE OE*	IC15	Pin 22
READ LINE RD*	IC14	Pin 21
WRITE LINE WR*	IC14	Pin 22
PCLK	IC12	Pin 20
CLOCK TRXCA	IC12	Pin 14
CLOCK RTXCA	IC12	Pin 12

Each of these lines should show activity. If any line is inactive, this is a sign of trouble.

Logic lines that do not show activity can often be traced to a short circuit on the printed circuit board.

Short circuits on the address and data lines can also appear as lack of activity on the control bus lines, especially device select lines.

- o Verify each of the 16 address and 8 data lines for activity. Any lines showing a lack of activity are not operating properly.
- o Remove all memory chips if you suspect problems with address or data lines. Each address and data line will now show a distinct pattern. The address lines should be (possibly distorted) square waves whose periods increase by a factor of two on successive lines as you move line by line from A0 to A15.
- o If you use an Ohmmeter to look for short-circuited lines, make sure it is a low-voltage, low-current test instrument. Most modern digital voltmeters are adequate for such tests. Disconnect the power source and remove any integrated circuits connected to the lines being measured if in doubt.
- o If you suspect a short circuit, verify the high-density areas of the printed circuit board for the problem.

6.3.2 Symptom: Transmitter cannot be keyed

If the transmitter cannot be keyed and the DCD LED is not lit:

- o Verify the watchdog timer circuit at TR3 and TR2.
- o Verify PTT driver transistors TR1, TR5 and TR4.
- o Verify timing capacitor C18.

6.3.3 Symptom: Transmitted signals not copyable by other stations

If stations are unable to decode your transmissions when using VHF FM:

- o Verify your transmitter's deviation or modulation index. Verify that peak deviation at any tone does not exceed 4 KHz.
- o Verify that your transmitter's modulation limiting circuits are not being driven into limiting or clipping, and that both tones are being transmitted in the correct amplitude ratio. A standard deviation meter should show the higher (Space or Start) tone to be higher in amplitude than the lower (Mark or Stop) tone.
- o Adjust the PK-88's AFSK output level with the internal adjustment potentiometer VR1 to produce the correct transmitter deviation.
- o Verify that your TXDELAY is long enough for the distant station's receiver to recover from transmit mode and squelch. Increase your TXDELAY in increments of 10 (100 milliseconds) to see if the distant station's decoding improves.

If stations are unable to decode your transmissions when using SSB:

- o Verify that you're using the same sideband used by the other stations in your network. (Although packet radio produces the same results on either sideband, the choice of LSB or USB may affect your radio tuning display or calibration.)
- o Verify that the transmitter's audio input stage and ALC systems are not being overdriven.
- o Adjust the transmitter's microphone gain in accordance with the radio manufacturer's duty-cycle, plate current and power dissipation specifications.
- o If reducing the radio's gain control does not solve the problem, adjust the PK-88's AFSK output level to produce the correct transmitter operating conditions.

6.3.4 Symptom: Received signals not copyable

If unable to correctly decode signals from other stations:

- o Verify that TONE is set for the proper modem tones.
- o Verify that the PK-88 is set to the proper HBAUD link rate.
- o Inject a 1200-Hz test tone into Pin 4 of J2.
- o Verify audio signal flow through C23, R18, U6 Pins 3 and 1, and that the audio tone appears at U10 Pin 5.

6.4 Terminal Interface Troubleshooting

If the PK-88 does not appear to start, respond to commands, or accept data from the terminal, the problem may be in the RS-232C interface.

The following troubleshooting suggestions can aid in resolving problems related to the RS-232C port.

6.4.1 Symptom: PK-88 does not communicate with the terminal.

Use a 'breakout box' or oscilloscope to verify that correct control voltages are present on pins 4, 5, 6 and 8 of J1, the RS-232 I/O connector.

- o Verify that the RTS line on Pin 4 of J1 (the RS-232 I/O connector) are not being held low.

If the PK-88 software flow control is disabled by setting XFLOW to OFF, the controller will not send data to the terminal unless RTS is asserted.

If the computer or terminal does not provide the DTR/CTS protocol or "handshake", the DTR/CTS lines (pins 20 and 5 on J1) should not be connected .

- o Verify that the voltages on the PK-88 are correct.

If the tests are valid, verify the signal on U12 pin 27 with an oscilloscope.

- o Recycle the power switch on the PK-88. Transitions on this pin shortly after reset indicate that the PK-88 is sending data.
- o Verify that transitions are also present on U4 pin 13.

6.4.2 Symptom: PK-88 signs on with mutilated data

If the terminal displays strange characters, 'garbage', graphics, etc., one or more of the following parameter values is incorrectly set and does not agree between the terminal and the PK-88:

data rate (TBAUD)
data word length (AWLEN)
parity (PARITY)
number of start and stop bits

- o Set the terminal rate to 1200 bauds if possible, seven data bits, even parity, and one stop bit. These are the default settings stored in the PK-88's EPROM.
- o Restart the PK-88 by cycling the power switch OFF then ON (out then in). The sign on message should appear.

If the PK-88 still prints gibberish:

- o Verify that the terminal is set to 1200 bauds and recycle the power switches on both the PK-88 and terminal.

If the sign-on message still fails to appear:

- o Verify signals with an oscilloscope connected to TXD pin 25 of U12, the Z8530A chip, and then at the X32 baud rate clock (38.4 KHz at 1200 bauds) on pin 14 of U12.

6.4.3 Symptom: PK-88 does not respond or accept commands.

Type a command such as MYCALL or any other command. If the default settings are in effect, the PK-88 should echo typed characters back to the screen.

- o Verify that U12 pin 21 shows a positive voltage level.

If the above tests are valid:

- o Type any keys on the terminal and verify that data is present on U12 pin 27 and U4 pin 11.

If data is not seen, the data is not reaching the PK-88 from the terminal.

- o Verify J1, the cable, and U4 again.

APPENDIX A

PK-88 COMPLETE COMMAND LIST

NOTE: Certain commands and parameters shown in the following alphabetical listing do not appear in response to the DISPLAY command.

COMMAND	MNEMONIC	DEFAULT	FUNCTION
8BITCONV	8B	OFF	Strip bit 7 in CONVERSE
ACRDISP	ACRD	80	Screen width
ACRPACK	ACRP	ON	Add <CR> to packet
ADDRESS	ADD	Enter hex addresses	For MEMORY & IO commands
AFILTER	AF	OFF	Never send MFILTER characters
ALFDISP	ALFD	ON	Send LF after <CR> to terminal
ALFPACK	ALFP	OFF	Send LF after <CR>, packet
AWLEN	AW	8 (set by autobaud)	Data bits per word, to terminal
AX25L2V2	A	ON	Operate as AX.25 Version 1.0
AXDELAY	AXD	0 (00 msec.)	Repeater key-up delay (X10 ms)
AXHANG	AXH	0 (000 msec.)	Repeater hang time (X10 ms)
BBSMSGS	BBS	OFF	Use TAPR-style status messages
BEACON	B	EVERY 0 (00 sec.)	Set beacon timing (X10 seconds)
BKONDEL	BK	ON	Send BS SP BS for DELETE char.
BTEXT	BT	(Empty)	120-byte BEACON message text
CALIBRA	CAL	Immediate Command	Start calibrate mode
CANLINE	CAN	$18 <CTRL-X>	Line delete character
CANPAC	CANP	$19 <CTRL-Y>	Packet delete character
CASEDISP	CAS	0 (as is)	Display case (as is/lower/UPPER)
CBELL	CB	OFF	Enable 'Connect' bell
CFROM	CF	all	Connect request accept/reject
CHCALL	CHC	OFF	Show call sign after channel ID
CHDOUBLE	CHD	OFF	Show CHSWITCH character twice
CHECK	CH	30 (300 sec.)	Idle link timeout (X10 seconds)
CHSWITCH	CHS	$00	Channel-select (Link) character
CLKADJ	CLK	0	Correction to real-time clock
CMDTIME	CM	10 (1000 msec.)	Transparent Mode escape timer
CMSG	CMS	OFF	Send CTEXT message to caller
COMMAND	COM	$03 <CTRL-C>	Character escape to COMMAND Mode
CONMODE	CONM	CONVERSE	Mode to enter when link starts
CONNECT	C	Immediate Command	Send connect request to <call>
CONOK	CONO	ON	Synonym for CFROM ALL
CONPERM	CONP	OFF	Never disconnect this link
CONSTAMP	CONS	OFF	Mark connections with time/date
CONVERSE	CONV or K	Immediate Command	Start Converse Mode from Command
CPACTIME	CP	OFF	Use packet timeout in Converse
CR	CR	ON	Synonym for ACRPACK
CSTATUS	CS	Immediate Command	Show status of channels (links)
CTEXT	CT	(Text)	120-byte CONNECT message text
DAYSTAMP	DAYS	OFF	Include DATE in time stamp
DAYTIME	DA	None	Set/read PK-88 internal clock
DELETE	DEL	OFF	Use BS ($08), not DEL ($7F)

PK-88 COMPLETE COMMAND LIST (Continued)

COMMAND	MNEMONIC	DEFAULT	FUNCTION
DFROM	DF	ALL	Selective digipeat call list
DIGIPEAT	DIG	ON	Allow digipeating (TAPR)
DISCONNE	D	Immediate Command	Send DISC to distant station
DISPLAY	DISP	Immediate Command	Show PK-88 parameters/classes
DWAIT	DW	16 (160 msec.)	Delay for digi repeat (X10 ms)
ECHO	E	ON	Echo typed keyboard characters
ESCAPE	ES	OFF	Send ESC character $1B as $24
FLOW	F	ON	Stop echo to screen while typing
FRACK	FR	3 (3 sec.)	Time (X1 sec) to wait for ACK
FULLDUP	FU	OFF	Full-Duplex terminal operation
HBAUD	HB	1200	Packet link (radio) baud rate
HEADERLN	HE	ON	Insert <CR> after headers
HELP	H	None	Show brief HELP text on screen
HID	HI	OFF	Send ID UI packet every 9.5 mins
HOST	HOST	OFF	Host/terminal interface
HPOLL	HPOLL	ON	Host poll, packet mode
ID	I	Immediate Command	Force ID packet via Unproto path
ILFPACK	IL	ON	Ignore line feeds in packet xmit
IO	IO	Enter hex addresses	Read/write IO register
K	K	Immediate Command	Same as CONVERSE
KISS	KI	OFF	Use KISS TNC protocol
MAILDROP	MAI	OFF	Activate personal MailDrop.
MAXFRAME	MAX	4	Maximum un-ACK'd frames allowed
MBELL	MBE	OFF	Beep if selected call is heard
MBX	MB	none, (enter calls)	Monitor channel without headers
MCON	MC	0 (zero)	Monitor while connected (0-6)
MDCHECK	MDC	Immediate Command	Log on to MailDrop as SysOp
MDIGI	MD	OFF	Monitor digipeated frames
MDMON	MDM	ON	Monitor callers on MailDrop
MDPROMPT	MDP	Enter message, (etc.)	Prompt sent to MailDrop callers
MEMORY	ME	Enter hex addresses	Read/write memory location
MFILTER	MFI	$80	Filter controls less CR, LF, TAB
MFROM	MF	all	Monitor MFROM call signs
MHEARD	MH	Immediate Command	Display call signs heard
MONITOR	M	4 (UA DM C D I UI)	Monitor mode level select (0-6)
MPROTO	MP	ON	Monitor I-frames with PID $F0
MRPT	MR	ON	Show digipeaters in headers
MSTAMP	MS	OFF	Time-stamp monitored frames
MTO	MT	none	Monitor MTO call signs
MYALIAS	MYA	none; enter yours	Alternate MYCALL
MYCALL	MY	PK88; enter yours	Your call sign packet address
NEWMODE	NE	ON	Return to Command mode at DISC
NOMODE	NO	OFF	Don't change modes unless told
NUCR	NU	OFF	Nulls to terminal after <CR>
NULF	NUL	OFF	Nulls to terminal after <LF>
NULLS	NULL	0 (zero)	Number of nulls for NUCR & NULF
PACLEN	PACL	128	# of user-typed bytes in packet
PACTIME	PACT	AFTER 10 (1000 msec.)	Packet transmit timer (X100 ms)

PK-88 COMPLETE COMMAND LIST (Continued)

COMMAND	MNEMONIC	DEFAULT	FUNCTION
PARITY	PAR	0 (none) (autobaud)	Terminal program parity (0-3)
PASS	PAS	$16 <CTRL-V>	Pass input editing character
PASSALL	PASSA	OFF	Ignore CRC in HDLC ('Junk Mode')
PERSIST	PE	63	P-persistent CSMA threshold
PPERSIST	PP	ON	p-persistence instead of DWAIT
RAWHDLC	RAW	OFF	Raw HDLC mode
REDISPLA	RED	$12 <CTRL-R>	Redisplay current input buffer
RELINK	REL	OFF	Reconnect after retrying out
RESET	RESET	Immediate Command	RESET bbRAM to factory defaults
RESPTIME	RES	5 (500 msec.)	Minimum delay before sending ACK
RESTART	RESTART	Immediate Command	Same as power-on/off reset
RETRY	RE	10	Maximum number of frame repeats
SENDPAC	SE	$0D <CTRL-M>	Character that 'sends' a packet
SLOTTIME	SL	10 (100 msec.)	P-persistent slot time in msecs
SQUELCH	SQ	OFF	Select receiver squelch polarity
START	STA	$11 <CTRL-Q>	Resume sending data to terminal
STOP	STO	$13 <CTRL-S>	Stop sending data to terminal
TBAUD	TB	1200 (autobaud)	Set terminal data rate
TCLEAR	TC	Immediate Command	Clear Transmit Buffer
TIME	TI	$14 <CTRL-T>	Insert 'send time' in text
TONE	TO	3 (1200/2200 eq)	Select modem tone pairs
TRACE	TRAC	OFF	Hex dump of packet frame
TRANS	T	Immediate Command	Start Transparent Data Mode
TRFLOW	TRF	OFF	Terminal flow ctrl - Transparent
TRIES	TRI	0 (zero)	Show or force retry count
TXDELAY	TX	30 (300 msec.)	PTT key-to-data delay (X10 ms)
TXFLOW	TXF	OFF	PK-88 flow control - Transparent
UNPROTO	U	CQ	Path/address to send UI frames
USERS	US	1	# of multi-connections allowed
XFLOW	XF	ON	Software flow control
XMITOK	XMITO	ON	PTT line can be keyed
XOFF	XO	$13 <CTRL-S>	Stop sending data to terminal
XON	XON	$11 <CTRL-Q>	Resume sending data to terminal

APPENDIX B

WARRANTY

LIMITED WARRANTY

ADVANCED ELECTRONIC APPLICATONS, INC. warrants to the original purchaser that this product shall be free from defects in material or workmanship for ninety days from the date of original purchase. In order to obtain warranty service: (1) Complete and mail the warranty registration card within 10 days to Advanced Electronic Applications, Inc., and (2) Send written notification to the address below or telephone as soon as possible after discovering a possible defect:

Advanced Electronic Applications, Inc.
Attention: Service Department
2006 - 196th S.W.
Lynnwood, WA 98036

The written notification must include a copy of the invoice. Include a description of the defective part or condition, with details of the electrical connections to associated equipment and list such equipment. Please enclose your name, phone number, and address. Shipping charges for any parts or units submitted for replacement under this warranty must be paid by the purchaser.

Correct maintenance, repair and use are important to insure proper performance from this product. Carefully read the Instruction Manual. This warranty does not apply to any defect AEA determines is caused by (1) improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specification of the original parts; (2) misuse, abuse, neglect, or improper installation; (3) accidental or intentional damage. The field installation of circuits or batteries according to the instructions in the manual will not nullify this warranty.

All implied warranties, if any, terminate ninety days from the date of original purchase. AEA is not responsible for damage to other equipment or property or any other consequential or incidental damage of any kind whether based on contract, negligence, or strict liability. Maximum liability shall not, in any case, exceed the purchase price of the unit.

The foregoing constitutes AEA's entire obligation with respect to this product. The original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations of how long an implied warranty lasts or do now allow the exclusion of incidental or consequential damages, therefore, the above limitations and exclusions may not apply to you.

This warranty gives specific legal rights. You may also have other rights which vary from state to state.

APPENDIX C

TTL SERIAL INTERFACE HEADER INSTALLATION

The PK-88 comes from the factory configured for RS-232 voltage levels on the 25-pin serial communication port. This is the most popular and indeed the safest way to connect your PK-88 to a terminal or computer. If your computer has an RS-232C compatible serial interface, then you do not need to bother with the following TTL information.

Not all computers support RS-232 voltage levels on their serial interfaces which can be a problem if your computer supports only TTL (0 and 5 Volt) voltage levels. Many of these computers such as the commodore 64 and 128 have RS-232 adapters available that will convert the computer's TTL levels to those compatible with RS-232C.

We recommend that you use an RS-232 level converter if one is available for your computer. If you have no way of making the computer produce RS-232 levels, then the following instructions describe how to make the PK-88 compatible with TTL voltage levels.

Included with the PK-88 are two 14-pin DIP headers that allow the PK-88 to generate and accept TTL (0 and 5 Volt) voltage levels on the 25-pin serial interface connector. To enable TTL operation of the serial interface, two socketed IC chips must be removed from the PK-88 and the two included DIP headers installed in their place.

This procedure may be accomplished as follows:

NOTE: When working on any electronic equipment, the work area should be as static free as possible. Try to avoid working in carpeted areas as rugs increase the chance your body will acquire a static charge. It is also a good idea to discharge any static you may have acquired by touching a grounded metal appliance before opening the TNC or working on any internal components.

1. Remove power and all other connections from the PK-88.

2. Open the PK-88 by removing the 4 screws that hold the top chassis in place.

3. Carefully remove the PK-88 top chassis and orient the PK-88 so the rear of the unit faces to the left.

4. Locate IC4 (1489) and IC5 (1488) immediately behind the 25-pin Serial I/O Connector on the rear of the PK-88 Printed Circuit Board as shown in figure B1. These are the RS-232 line-driver/receiver chips that provide/accept the RS-232 voltage levels on the serial interface.

5. Remove both IC4 and IC5 by carefully inserting a small straight-blade screwdriver between the socket and the IC and prying upward gently.

6. Open the plastic bag that contains the DIP Headers, and remove the one that has only two wire jumpers attached. This header should be inserted into socket IC4 such that both wires are closest to the rear of the PK-88 as shown below.

7. Remove the other DIP Header from the plastic bag. This Header should have 3 jumper wires soldered between the pins. Insert this Header into socket IC5 such that the side that has only one jumper wire on it is towards the PK-88 power switch.

9. Place the chips you removed from the PK-88 into the plastic bag that held the Headers for safe keeping. These chips will be needed to restore RS-232 capability to the PK-88 if desired.

10. Carefully replace the PK-88 top chassis and the four screws that hold it in place.

This completes the TTL Serial conversion of the PK-88. There are a few things you should be aware of when connecting a TTL or RS-232 computer to the PK-88. The ONLY pins that should EVER be wired in a TTL configuration are pins 1-5, 7, and 8. All other pins should be left unconnected.

NOTE: This is especially true of pin-6 which is the RS-232 DSR signal. This pin is wired through a resistor to +10 volts and should NEVER Be connected to a TTL level computer under any circumstances.

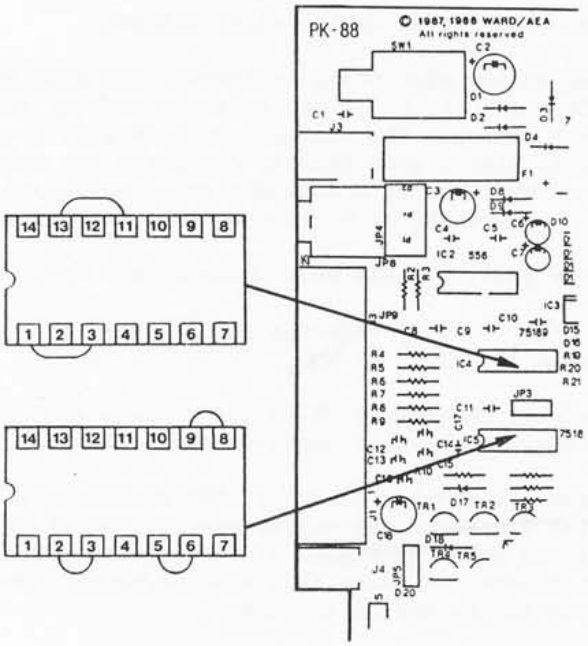
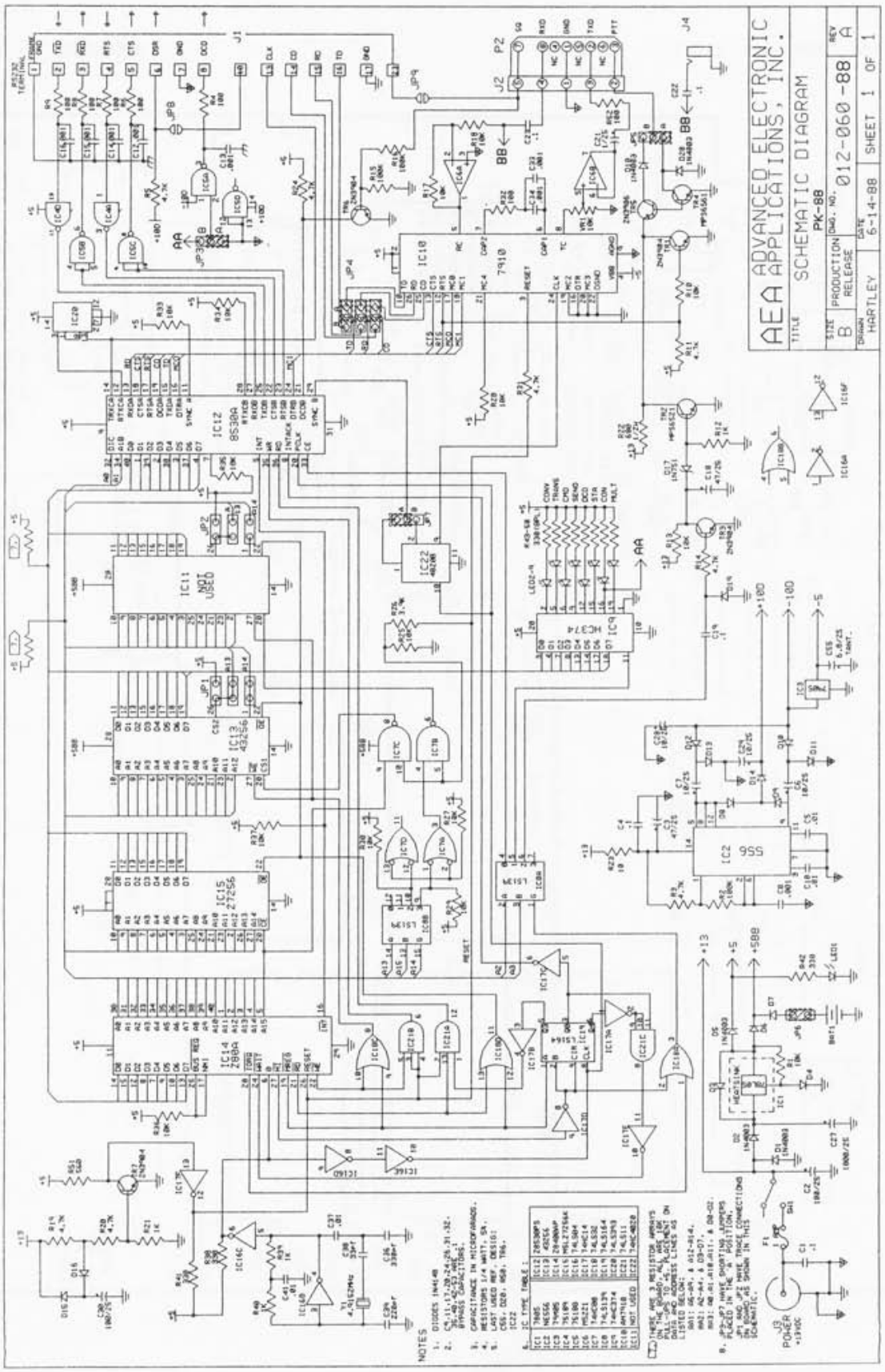
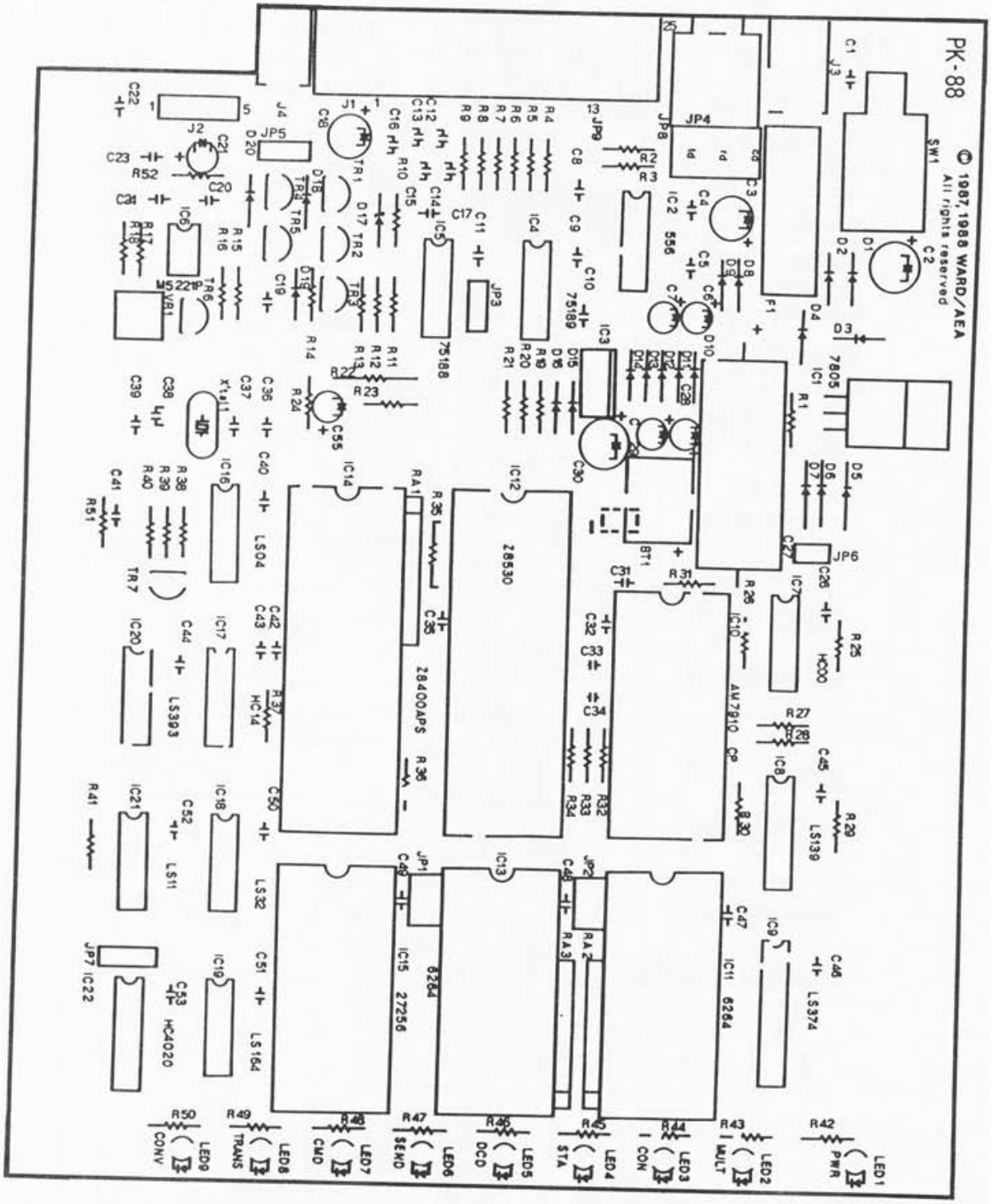
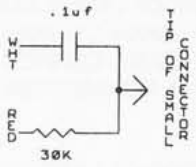
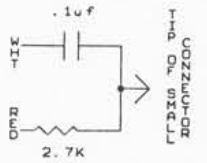


Figure C-1 TTL Header Installation Diagram.


AEA ADVANCED ELECTRONIC APPLICATIONS, INC.
TITLE SCHEMATIC DIAGRAM
PK-88
SIZE B
PRODUCTION RELEASE
DWG. NO. 012-060-88
REV A
DRAWN HARTLEY
DATE 6-14-88
SHEET 1 OF 1
NOTES


PK-88
© 1987, 1988 WARD/AEA
All rights reserved
SW1
J3
J4
J1
J2
JP4
JP8
JP9
JP5
JP3
JP6
JP1
JP2
JP7
IC22
F1
BT1
VR1
TR1
TR2
TR3
TR4
TR5
TR6
TR7
IC1
7805
IC2
556
IC3
75189
IC4
75188
IC5
IC6
IC7
IC8
IC9
IC10
AM7910 CP
IC11
6264
IC12
Z8530
IC13
Z8400APS
IC14
IC15
27256
IC16
LS04
IC17
LS393
IC18
LS32
IC19
LS164
IC20
IC21
LS11
HC4020
HC00
HC14
LS139
LS374
LED1
PWR
LED2
I MULT
LED3
I CON
LED4
STA
LED5
DCO
LED6
SEND
LED7
CMD
LED8
TRANS
LED9
CONV

SPECIFIC RADIO CONNECTIONS

MFT.	RADIO	PIN OUT	NOTES
ICOM	4 PIN	WHITE 1 RED 2 BROWN 4	
	8 PIN	WHITE 1 RED 5 BROWN 6 & 7	SPEAKER AUDIO AVAILABLE ON PIN 8 OF SOME MODELS. GREEN WIRE SHOULD BE USED.
	HT'S		GREEN WIRE TO THE TIP OF THE LARGE CONNECTOR. BROWN WIRE TO THE SLEEVE OF LARGE CONNECTOR.
YAESU	4 PIN	WHITE 2 RED 3 BROWN 1	
	6 PIN	RED 4 BROWN 5 WHITE 6	
	7 PIN	BROWN 1 WHITE 2 RED 3	
	8 PIN	WHITE 8 RED 6 BROWN 7	FT-230/FT-2300 .1 uF CAP ON WHITE WIRE AND A DIODE ON THE RED WIRE. DIODE 1N4148.
	FT-x03 x09 727		GREEN WIRE TO THE TIP OF THE LARGE CONNECTOR. BROWN WIRE TO THE SLEEVE OF THE LARGE CONNECTOR.
	FT-208	WHITE 1 RED 3 GREEN 2 BROWN 4	
KENWOOD	4 PIN	WHITE 1 RED 2 BROWN 3 & 4	
	5 PIN	WHITE 1 RED 2 BROWN 4 & 5	

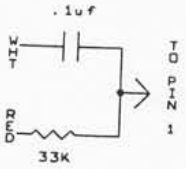
NOTE: The wire colors listed in the PIN OUT column assume you have wired the PK-88 RADIO connector as described in section 2.2.2 of this manual. These colors are:

PK-88 J2 Pin	Signal Name	Color
1	Ground	Brown
2	Push-To-Talk	Red
3	Microphone Audio	White
8	Receive Audio	Green
7	Squelch Input (Opt.)	Black

NOTE: On all radios, the shield should go to the same place as the brown wire, unless otherwise noted.

MFT.	RADIO	PIN OUT	NOTES
KENWOOD	6 PIN	WHITE 1 RED 2 BROWN 6	
	8 PIN	WHITE 1 RED 2 SHIELD 7 BROWN 8	
	TR-2500	WHITE RED BROWN GREEN (0.1 microfarad capacitor)	> - - | | - -> TIP OF LARGE CONNECTOR SLEEVE OF LARGE CONNECTOR SLEEVE OF SMALL CONNECTOR TIP OF SMALL CONNECTOR
	TR-x600 and TH-types	WHITE RED BROWN GREEN (0.1 microfarad capacitor)	> - - | | - -> RING OF LARGE CONNECTOR SLEEVE OF LARGE CONNECTOR SLEEVE OF SMALL CONNECTOR TIP OF SMALL CONNECTOR
	TR-751	KENWOOD RECOMMENDS A 0.1 MICROFARAD CAP IN SERIES WITH THE WHITE WIRE.	
	TS-940 TS-440 TS-140 TS-711 TS-680 TS-790	ON THESE RADIOS, THE 13 PIN ACC 2 CONNECTOR MAY BE USED.	
		RED SHIELD WHITE BROWN GREEN	PIN 13 PIN 12 PIN 11 PIN 8 PIN 3
TEN-TEC	4 PIN	WHITE 1 RED 3 BROWN 2	
	1/4" STEREO	WHITE RED BROWN	RING TIP SLEEVE
AZDEN	12 PIN	WHITE 12 RED 9 BROWN 2 & 11	
	8 PIN	WHITE 1 RED 7 BROWN 2	

NOTE: On all radios, the shield should go to the same place as the brown wire, unless otherwise noted.

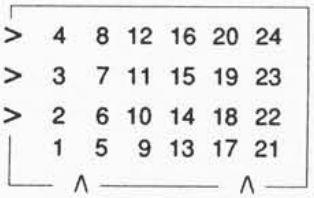
MFT.	RADIO	PIN OUT	NOTES
DRAKE	4 PIN	WHITE 1 RED 2 BROWN 3	
DRAKE	1/4 STEREO	WHITE RED BROWN	RING TIP SLEEVE
ALINCO	ALR 206T		BROWN AND SHIELD TO PIN 7. EXTERNAL SPEAKER FOR AUDIO.
RADIO SHACK	HTX 100	WHITE 1 RED 2 GREEN 6 SHIELD 7 BROWN 8	

NOTE: On all radios, the shield should go to the same place as the brown wire, unless otherwise noted.

ICOM

IC-751

Pin 1 ..... Output from the discriminator circuit.
Pin 2 ..... 13.8 volts DC, switched with front panel power.
Pin 3 ..... RED. PTT when grounded.
Pin 4 ..... GREEN. Fixed level audio out.
Pin 5 ..... WHITE. Input for mic gain control.
Pin 6 ..... 8 volts DC when transmitting, max. 5 mA.
Pin 7 ..... Input for external AGC.
Pin 8 ..... BROWN & SHIELD. Ground.
Pin 9 ..... FSK N. Input for RTTY. Mark High - Space Low.
Pin 10 ..... No Connection
Pin 11 ..... Input for transverter control.
Pin 12 ..... Output reference voltage for band switching.
Pin 13 ..... Output for external band switching.



IC-781 and IC-761
ACC1

Pin 1 ..... RTTY In. AEA's FSK line goes here.
Pin 2 ..... BROWN & SHIELD. Ground.
Pin 3 ..... RED. PTT.
Pin 4 ..... WHITE. Modulator In 100 mV RMS.
Pin 5 ..... GREEN. Audio out 47K, 100 - 300 mV.
Pin 6 ..... Squelch low when open.
Pin 7 ..... 13.8 volts @ 1.0 amps.
Pin 8 ..... ALC.

IC-781 ONLY
Data in for the CRT ..... Pin 1 ASCII Data In, Pin 4 Ground.

IC-735
ACC 1 (round 8 pin DIN.)

Pin 1 ..... No Connection.
Pin 2 ..... BROWN & SHIELD. Ground.
Pin 3 ..... RED. PTT.
Pin 4 ..... WHITE. Input to the modulator stage for AFSK.
Pin 5 ..... GREEN. Fixed level audio.
Pin 6 ..... SQUELCH. This goes to ground when squelch opens.
Pin 7 ..... 13.8 volts DC out switched by main power.
Pin 8 ..... ALC. Input for external ALC.

NOTE: When required to connect BROWN and SHIELD to TWO pins, (i.e., ICOM 8 pin), connect BROWN to one of the two pins, SHIELD to the other of the two pins, then connect the two pins together with a small piece of wire.

This information has been obtained from various sources, and AEA assumes no responsibility for accuracy. Please consult your particular transceiver operator's manual for confirmation.

APPENDIX F

Advanced Electronic Applications, Inc.
PK-88 Firmware Revision Supplement
16-MAY-89

The following is the list of commands that are either new or have changed since the 28-JUL-88 release of the PK-88 firmware.

CUSTOM 'nnnn' Mnemonic: CU Default: $0015
Mode: Packet Host: Cu

Parameters:

"n" - 0 to $40 (0 to 64 decimal) specifies a four-digit hex value, where each bit controls a different function.

Bit 0, position $0001: If bit 0 is set to 1 (default setting), then the PK-88 will discard a received packet if the signal is too weak to cause the DCD LED to light. If set to 0, packets will be received regardless of the setting of the DCD threshold.

Bit 1, position $0002: If bit 1 is set to 0 (default setting), then setting the MONITOR command to either ON or YES will result in a MONITOR value of 4. If bit 1 is set to 1, then setting MONITOR to ON or YES will force the MONITOR value to 6. PBBS Sysops may want to set CUSTOM to $0017 (23 decimal).

Bit 2, position $0004: If bit 2 is set to 1 (default setting), a break on the RS-232 line will put the PK-88 into the Command mode (except from Host Mode). If set to 0, a break on the RS-232 line will not affect the PK-88.

Bit 3, position $0008: If bit 3 is set to 0 (default setting), packet channel numbers will be numbered from 0-9. If bit 3 is set to one, then packet channel numbers are labeled A-J. Lower case a-j are also accepted.

Bit 4, position $0010: Not used with the PK-88.

Bit 5, position $0020: If bit 5 is set to 1, then the PK-88 when powered on, will stay in the last mode it was in, i.e., converse, command, or transparent. If bit 5 is set to 0, (default mode) the PK-88 will always power up in the Command mode.

Bit 6, position $0040: If bit 6 is set to 1, then monitoring is active in the transparent mode. The MFROM, MTO, MRPT, MONITOR, MCON, MPROTO, MSTAMP, CONSTAMP, and MBX are all active. If bit 6 is set to 0, (default setting), then monitoring is disabled in the transparent mode.

Bits 7-15 are all unused at the present time. To return the CUSTOM command to the default setting, type CU Y or CU ON at the command prompt.

A discussion describing the default settings and how the $0015 setting was derived may assist you with understanding the CUSTOM parameter.

The default setting for bits 0-6 is noted below:

Bit 0 is set to 1, bit 1 is set to 0, bit 2 is set to 1, bit 3 is set to 0, bit 4 is set to 1, bit 5 is set to 0, and bit 6 is set to 0. The following chart indicates the same information.

Bit Position	7	6	5	4	3	2	1	0
Setting	0	0	0	1	0	1	0	1

Looking at just the setting row in the chart, the binary number 00010101 becomes evident. The binary number 00010101 equals the decimal number 21, and the hexadecimal equivalent is $0015 hence the reason the default setting for CUSTOM is $0015.

Let us say, for example, that you have decided that as a MARS operator you want to change bit 4 from the default of 1 to a setting of 0. The chart below reflects this change.

Bit Position	7	6	5	4	3	2	1	0
Setting	0	0	0	0	0	1	0	1

This results in a binary number of 00000101 which is a decimal number 5. The hex equivalent is $0005, therefore, to change bit position 4 to a setting of zero, leaving the others unchanged, will require a CUSTOM setting of $0005.

The CUSTOM command will accept arguments in decimal format. For example, the default is $0015, however if you enter decimal 21, the PK-88 will accept this. The PK-88 will display on the screen the hexadecimal equivalent.

Using Hex Notation

Observe some simple rules if you choose to reassign parameter values in hexadecimal numbers. Begin the number with a '$'. The "digits" of a hex number represent multiples of powers of 16. The values from 10 to 15 are represented by the letters A through F. The letters can be typed in upper or lower case. For example:

Decimal Number 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 . . .

Hex Numbers 0 1 2 3 4 5 6 7 8 9 A B C D E F 10 . . .

$1B = (1 x 16) + (11 x 1) = 27 (decimal)

KISS ON|OFF Mnemonic: KI Default: OFF
Mode: Packet Host: KI

Parameters:

ON - The PK-88 operates as a KISS TNC.

OFF - The PK-88 operates as a normal AX.25 Level 2 TNC.

Turning KISS ON now has a temporary effect on several other parameters. KISS ON temporarily forces HPOLL OFF, PPERSIST ON, RAWHDLC ON and HOST ON. RAWHDLC ON temporarily forces CONMODE TRANS, TRACE OFF, HID OFF and no BEACON. HOST ON temporarily forces 8BITCONV ON, AWLEN 8, PARITY 0 and no software flow control.

This change makes going into the KISS much easier!

To exit KISS, you must type three control C's, all within one second. Also, no data can be received by the PK-88 during this operation or it will not work, and you will remain in KISS mode.

HOST OFF (3 CTRL-Cs) will force KISS OFF. The PK-88's CMD and PKT LEDs will be lit, confirming exit from KISS mode.

"Temporarily forcing" a function means that the PK-88 will behave as if the function is set that way, although the function setting does not actually change.

MBX call 1, call 2, Mnemonic: MB Default: none
Mode: Packet Host: MB

Parameters:

call - The call sign of one or two stations to be monitored.
"n" - 0-15, indicating an optional SSID.

The MBX command will now accept the argument of ALL. There are no changes in the functions of the arguments that have been permitted previously. The operation of MBX command is as follows.

MBX NONE	(Default setting.) All monitored frames are shown with their packet headers. See MFROM, MTO, MONITOR, CONSTAMP, MSTAMP and MPROTO.
MBX ALL	Only the data fields in the I-frames and UI frames are shown; no headers or other types of frames are shown. Data from retried frames will be shown each time such a frame is monitored. The MFROM and MTO commands are active.
MBX CALL 1	Only the data fields in the I and UI frames to or from CALL 1 are shown. CALL 1 can be in either the source or destination address field of the frame. Retried frames are not shown. The MFROM and MTO commands are ignored.
MBX CALL 1 CALL 2	Only the data fields in the I and UI frames are shown when CALL 1 is the source and CALL 2 is the destination or, CALL 1 is destination and CALL 2 is the source. Retried frames are not shown. The MFROM and MTO commands are ignored.

A packet connection on any channel inhibits monitoring, if MBX is not set to "none," MCON will only work if MBX is set to "none."

MID "n" Mnemonic: MI Default: 0
Mode: Packet Host: Mi

Parameters:

"n" - 0 - 250 specifies the Morse ID timing in units of 10 second intervals.

0 (zero) disables this function.

A setting of 0 (default) disables this function. If "n" is set to some value between 1 - 250, then the packet mode, the PK-88 will periodically issue a 20 wpm Morse ID. A Morse ID consists of 0.5 seconds of idle, the call sign in MYCALL, without the SSID, followed by 0.5 seconds of idle. For example, an MID of 177 seconds would cause a Morse ID every 1,770 seconds, or every 29.5 minutes. The Morse ID will only be issued if a packet was sent since the last Morse ID. The Morse ID uses TXDELAY, PPERSIST and DCD.

The ID command has now changed. If HID is ON, ID will cause the HDLC ID to be transmitted immediately, which is the same as before. If MID is set to a value other than 0, ID will force a Morse ID immediately. If both HID and MID are both active, the Morse ID will be sent first.

The PK-88 generates Morse code by switching from the mark tone to the space tone. This prevents other TNC's from accidentally transmitting and colliding with a CW ID.

WHYNOT ON|OFF Mnemonic: WHY Default: OFF
Mode: Packet Host: WN

Parameters:

ON - PK-88 will generate a reason why a received packet was not displayed to the screen.

OFF - This function is disabled.

During packet operation, the PK-88 may receive many packets that are not displayed to the screen. Turning WHYNOT on will cause the PK-88 to display a message explaining the reason the received packet was not displayed to the screen.

The messages and their meanings are shown on the following page.

Bit residue:	The frame ended in the middle of a byte. A weak packet signal might cause this, or, more likely, random noise that triggered the start of packet reception. Also, this may occur after a genuine frame has been received.
BUFFER OVERFLOW:	An incoming packet overflowed an internal buffer. Probably caused by a non-AX.25 packet.
FRAME TOO LONG:	More than 300 bytes were received in a packet frame. Probably caused by a non-AX.25 packet.
PASSALL:	The received packet frame had errors, and PASSALL was off, thereby preventing the packet from being displayed to the screen.
DCD Threshold:	The Threshold control was set to far counter clockwise. The DCD LED was off when the packet was received.
MONITOR:	The MONITOR value was set to low to receive this type of frame.
MCON:	MCON was set too low to receive this type of frame.
MPROTO:	MPROTO was set to off, and the received packet was probably a NET/ROM or TCP/IP frame.
MFROM/MTO:	The frame was blocked by the setting of either the MFROM or MTO command.
MBX:	The call sign of the sending station does not match the call sign setting in the MBX command.
MBX Sequence:	The packet frame has been received out of sequence, probably a retry.
RX Overrun:	Another HDLC byte was received before we could read the previous one out of the HDLC chip.

The MPROTO command default is set to OFF.

APPENDIX G

ANSWERS TO COMMONLY ASKED QUESTIONS AND SPECIAL NOTES TO AEA SOFTWARE USERS (PC-PAKRATT, COM-PAKRATT, AND MACRATT)

The PK-88 can be used with a multitude of computers and computer programs. This can lead to some confusion as to how to properly connect, access certain features and configure the PK-88. The following questions and answers may help you without having to make a long-distance phone call to AEA's Technical Support.

QUESTION 1. How do I connect my PK-88 to my radio?

ANSWER. The radio cable supplied with the unit is described in Table 2-1 on page 2-2 of the manual and in Figure 2-1 on page 2-9 of the manual. For specific radio connections, refer to Appendix E of the manual. Always connect the shield wire (non-insulated bare wire) to the ground wire (brown) on the radio end, unless otherwise instructed in Appendix D. If you are unsure about your radio connections, refer to the section in the radio's operating manual describing the microphone and its connections.

QUESTION 2. Do I connect the green wire AND the RX-IN audio input to my radio?

ANSWER. No! The green wire, and the RX-IN jack are the same thing. They are directly wired together inside the PK-88. You use one OR the other. A cable is supplied with the PK-88 that allows you to connect the RX-IN jack easily. Normally, the easiest place to get the audio from the radio is from the EXTERNAL SPEAKER OUT if you are using the RX-IN cable. Many transceivers have other places you can get receiver audio from as well. See Chapter 2 and Appendix E for more information about radio connections.

QUESTION 3. I have never installed batteries, but my PK-88 appears to hold its parameters after a power down. What gives?

ANSWER - The newer PK-88's come with a lithium battery installed inside the unit. Check JP-6 to see if it is OFF or ON. It uses a small shorting plug to short the two pins of JP-6 together. ON means the shorting plug is on both pins of JP-6, and the battery is enabled. OFF means the shorting plug is not on both pins of JP-6, and the battery is disabled.

QUESTION 4. Do I disable the lithium battery in my PK-88, or do I leave it enabled?

ANSWER. This depends mainly on what computer program you are going to use. The best thing to do regardless of what program you are using is to disable the battery until you get comfortable with the unit. The lithium battery is explained in Appendix I. The battery is used if you wish to save your callsign and parameters you might change after power to the PK-88 has been turned off. If you are using a program that saves parameters to disk, such as PC-Pakratt, generally it is best to disable the battery. This is because if the parameters conflict, the program may appear not to work. If you are using COM-Pakratt, MacRATT, or any terminal program that does not support automatically saving parameters to disk, you will probably want to enable the battery so the PK-88 can store parameters. This allows parameters such as your callsign (MYCALL) to be stored in its internal RAM even with the power OFF. The only way to change all of your parameters back to default is to issue a RESET command from a command prompt (cmd:), or to remove the battery power by lifting JP-6 (located near the large capacitor C27) for at least 30 seconds.

Some customers have expressed a desire to use several different programs, but do not wish to change their parameters every time they switch. This can be done by enabling the battery. One word of caution is that TERMINAL BAUD RATE of all programs must match to do this. For example, if you are using PC-Pakratt at a terminal baud rate of 4800 baud (selectable from the "Welcome To" opening screen) and wish to go to a program such as PROCOMM*, first exit PC-Pakratt, and then bring up PROCOMM. Turn off your PK-88, and set PROCOMM to 4800 N, 8, 1. Then turn on your PK-88. You may see the message "ORT" which is explained next. Send the PK-88 three control C's within one second, and a command prompt will be displayed. PROCOMM must be in the terminal mode for this to work. You can now access all the commands of the PK-88, but the parameters should be the same as used by PC-Pakratt.

QUESTION 5. Sometimes I get the message "ORT" on my screen. What does this mean?

ANSWER. This is the PK-88 sign-on message in Host Mode language. It means that when you turned off your PK-88, you were in the host mode, and now you are trying to communicate with it in the terminal mode. This is common if you are using the COM-Pakratt program, and have the battery enabled. You can get a command (cmd:) prompt by sending three control-C's within one second, get a command prompt, and take it from there. Or, if you are using COM-Pakratt, you can turn the computer off and then back on to get to the opening screen again. Then, instead of striking "T" for terminal mode, strike the RETURN key to bring up the split screen operation. With the battery enabled, the PK-88 "remembers" the parameters when you last turned it off. See Question 3 in "SPECIAL NOTES FOR COM-PAKRATT USERS."

QUESTION 6. How do I find the DATECODE and CHECKSUM of my PK-88 firmware?

ANSWER. You must always be in the terminal mode to find this. First, whatever program you are using, escape to the terminal mode so you are displaying a command prompt (cmd:). Now type in the command RESTART. The PK-88 will now display the sign-on message which includes the DATECODE and CHECKSUM of your firmware. This is important information, and should be written down on the first page of your manual in case you should have to call for technical assistance. We will want to know what the DATECODE and CHECKSUM of your firmware is, as well as the type of computer and the radio being used.

QUESTION 7. My PK-88 is not working - HELP!

ANSWER - First, turn to the "What If..." section on page 4-6, section 4.4.3 of the manual. There are some good suggestions to follow if you are having problems connecting to other packet stations. The next step is to start at the beginning. If you have the battery enabled, disable it, or if you are using a terminal program, make a new working copy from the original disk. If the problem is serious, such as all of the LED's on the front of the PK-88 stay on, or no LED's are lit, it is best to take the cover off and inspect your PK-88. Remove all cables and connectors, and remove the four Phillips head screws that hold the cover down. Carefully remove the top cover from the bottom. If no LED's are lit, check the fuse. Take the fuse out of its holder and check with an ohmeter. This is preferable to a visual inspection. It should measure as a short (zero ohms). If the fuse is bad, replace it with a one amp fuse. NEVER REPLACE THE FUSE WITH ONE THAT IS RATED ABOVE ONE AMP! If the fuses continue to blow, check the power cable. The tip of the power connector should go to the positive side of the power supply. Also check the power cable for shorts. ALWAYS DISCONNECT THE POWER CABLE FROM THE POWER SOURCE WHEN TESTING WITH AN OHMETER.

Inspect the socketed IC chips for bent-out or bent-under pins. If this looks good, then use your thumb to press down firmly on the socketed IC's. Re-install the top cover. The next thing to check is your power supply. A common problem is that the power supply is no longer supplying sufficient current to run the PK-88. The PK-88 is looking for 12 volts DC UNDER LOAD and at least 500 milliamps of current with less than two volts peak-to-peak of ripple. It is also a very good idea to closely inspect all interconnecting cables, and clean any contact connections. If all else fails, please call AEA and ask for Technical Support.

QUESTION 8. My PK-88 is not keying my radio properly. What's wrong?

ANSWER. It is possible to disable your PTT line in software. Turn ON the parameter called XMITOK.

If this is set properly, the next thing to do is to check your cable. The best way to do this is to unplug the 8-pin connector from the RADIO PORT on the PK-88, leaving it connected to your radio. Then hook the GROUND pin and the PTT pin together. These are pins one and three, respectively, and are the BROWN and RED wires. If it does not key your radio, your cable is bad, or your radio is bad. Check MIC operation. If the microphone keys your radio, check the configuration of the PTT jumpers inside the PK-88 for proper configuration. This is covered on page 2-8, section 2.8.1 of the manual.

If your radio is keyed all the time, use the above procedure starting with removing the cable. If unplugging the cable un-keys the transmitter, it is possible that the PTT transistor is shorted. This is TR4, and is located close to the radio connector on the PK-88 PCB. Replacing TR4, and possibly TR1 and TR5 also, should cure this problem. If it still persists, please call AEA and ask for Technical Support.

*** NOTE *** ONLY REPLACE THE TRANSISTORS IF YOU HAVE HAD PRIOR EXPERIENCE WORKING ON DOUBLE-SIDED GLASS EPOXY PCB ASSEMBLIES ! ! ! IF YOU DAMAGE THE BOARDS, YOU MAY RISK NOT BEING COVERED UNDER THE AEA WARRANTY.

QUESTION 9. The manual is so big, I can't find what I need quickly. Where do I look?

ANSWER. The first place to look is the TABLE OF CONTENTS in the front of the manual. Each chapter has a title that explains what it covers. Refer to the chapter that applies to your question. This is an excellent way to find information you require quickly. Another approach to finding information is to refer to APPENDIX A in the back of the manual. This covers all of the commands the PK-88 uses in alphabetical order and gives a brief description of their function and default setting. Chapter 5 describes these commands in full detail and can be an invaluable source of information.

SPECIAL NOTES FOR PC-PAKRATT USERS

1. PC-Pakratt contains a file named README.DOC that includes information and application notes that may be useful. To create a hardcopy of this file to your printer, type the following command at the DOS prompt followed by a carriage return:

copy readme.doc prn

You can obtain information on this file or a hardcopy by contacting AEA's Technical Support.

2. If you wish to access parameters in the PK-88 such as

CUSTOM, WHYNOT, etc., you must enter the DUMB TERMINAL mode. This is accessed from the main menu by pressing the F8 function key. If you try to change a parameter that already exists in the split screen mode from the dumb terminal mode, such as MYCALL, the split screen mode takes precedence over the dumb terminal mode and the parameter will be set to the value chosen in split screen mode. Always make sure you are at a command prompt (cmd:) in the dumb terminal mode before you strike the escape key to return to split screen mode. Failure to do so may result in a lock-up of the program, or an RS-232 Link-Error.

3. When going between PC-Pakratt and another program, after you exit the program, and before you bring up the other, it is a good idea to turn OFF your PK-88 for at least 10 seconds to let it return to DEFAULT parameters (unless you are running both programs with the same serial port parameters [see QUESTION 3]). Default status is indicated by only the MULT LED being lit on the front panel of the PK-88 when you turn it on. Setting PC-Pakratt for 4800 baud operation at the opening screen will ease switching between programs.

4. If you should get the message "UNABLE TO ESTABLISH COMMUNICATIONS..." etc., observe if the MULT LED is still lit, and also if any other LED's besides MULT were lit while it was trying to communicate with your PK-88. If the LED's did move around while the program was running, this means the program "saw" your PK-88 but could not link up with it. Remove **any** memory-resident (TSR) programs you may be using. You may also run the command "CHKDSK" from a DOS prompt to make sure you have over 320 KBytes of RAM free. Try another computer or serial port.

If the LED's did not move at all, this means the program most likely did not "see" the PK-88. Check your serial cable for proper configuration. Also check if your serial port is configured as a DCE or a DTE. If the serial port is configured as a DCE, you will want to swap the TRANSMIT and RECEIVE data lines. Refer to Chapter 2, page 19, section 2.11.6 of the manual concerning this. Chapter 2 also has some detailed connections for specific computers starting on page 18, section 2.11. Try another computer or serial port. If you have any other terminal programs, bring one up and see if you can "talk" to the PK-88. If you can, make a new copy of the malfunctioning program from the original disk and try again. Trying your PK-88 on another working system is an excellent way to find the problem also. Please call AEA's Technical Support if problems persist.

SPECIAL NOTES FOR COM-PAKRATT USERS

1. To allow the PK-88 to work with this program in the split screen mode, a simple modification must be done to the circuit board. To do this, simply short one end of R5 to one end of R7. Use the end of the resistors that are closest to the outside edge of the board (see Figure 1, page 6 of this section).

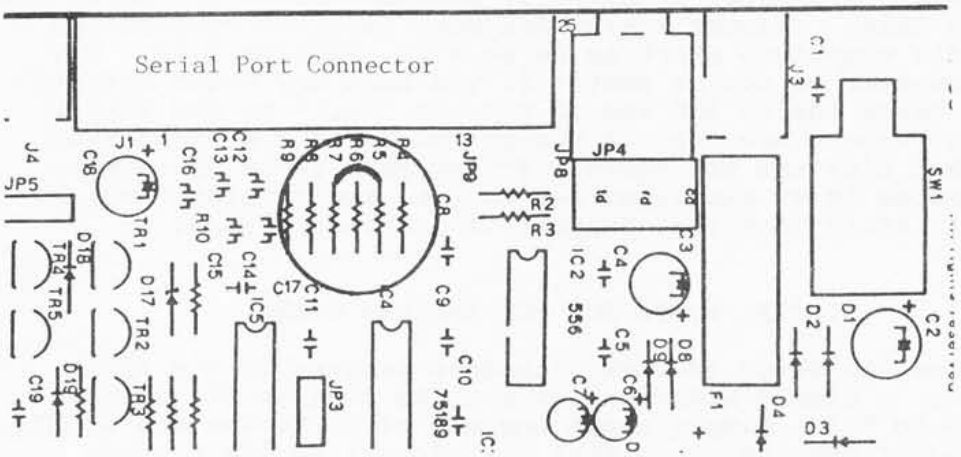
2. Always use your keyboard overlays that came with the package! Channel 0 on the top (upper) overlay lines up with the left-reading arrow key on the computer keyboard, and Channel 1 lines up over the "1" on the keyboard, etc. This will greatly simplify operation, and ease of use. Also, always press **"C= Q"** when quitting either program in the HOST mode. All quotation marks are used for clarification, and are NOT to be typed in.

3. There are two ways to start the program. You can press "T" for terminal mode, or press the "RETURN" key to go directly to HOST mode. You MUST turn it ON the way you turned it OFF, if you have the battery enabled. If you turned it off in the terminal mode, first press "T", and then turn on the PK-88. If you turned it off in the split screen mode using **"C=Q"**, you must have your PK-88 powered on, and then press "RETURN" at the opening screen. Both procedures are done presuming you have your computer ON with either cartridge installed and the main menu is being displayed. Also refer to question 4 in "COMMONLY ASKED QUESTIONS."

SPECIAL NOTES FOR MACRATT USERS

1. To allow the PK-88 to work with this program in the split screen mode, a simple modification must be done to the circuit board. To do this, simply short one end of R5 to one end of R7. Use the end of the resistors that are closest to the outside edge of the board (see Figure 1 below).

2. Be sure to enable the battery in your PK-88 before you load MacRATT for the first time. Then, after doing the procedure outlined in chapter 3 of the MacRATT manual once ("Getting Started with the PK-87/PK-88") loading the program next time will be much easier, because the PK-88 "remembers" the parameters for MacRATT. The next time you enter the program, make sure the PK-88 is already on, and everything will set up automatically.



*PROCOMM is a registered trademark of DATASTORM TECHNOLOGIES, INC.

APPENDIX H

NET/ROM# MODIFICATION FOR THE PK-88

To install the NET/ROM firmware into your PK-88, the simple modification described in the following steps must be done for proper operation.

NOTE: Because the PK-88 is not a TNC-2 clone, TheNET* firmware (and other firmware designed for TNC-2 clones) will not work in the PK-88. The main reasons are: 1) The TNC-2 uses hardware dip switches for selecting baud rates, whereas the PK-88 baud rates are software selectable; and 2) The SCC chip in the PK-88 is a Z8530, while the TNC-2 uses a Z8440 (which are not compatible).

The modification is done in three steps. First, move JP-7 to position B. This jumper is located in the front left corner of the circuit board, between IC21 and IC22 (Figure 1, below). Position B means that the small plug is on the center pin and the pin closest to the outside edge of the PCB. Secondly, solder-jump the two halves of JP-8 together, and do the same for JP-9. These are actually lands on the circuit board, and they are located near the serial port (Figure 2, below). Finally, touch a well-grounded metal object in your shack to discharge any static you may have built up in your fingers, and, using a small flat-bladed screwdriver, gingerly remove the firmware chip (IC15) from its socket, being careful not to pry the socket from the board itself. Once this is done, simply install the NET/ROM chip into the empty socket, making sure the notch on the EPROM points towards the rear of the PK-88.

Your PK-88 is now a NET/ROM node!

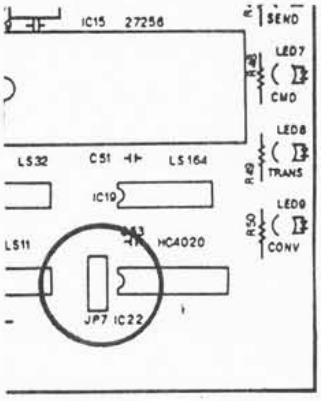
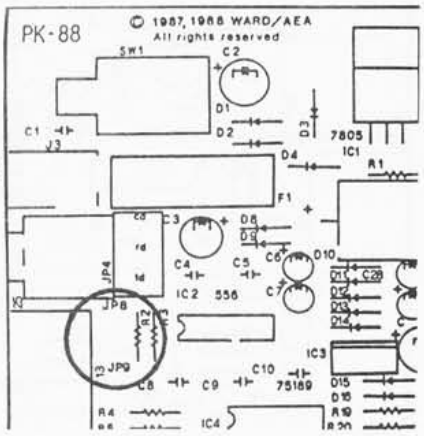


Figure 1
Front Panel

Figure 2
Rear Panel



#NET/ROM is a registered trademark of Software 2000

*TheNET is a registered trademark of <NORD-LINK>

APPENDIX I

LITHIUM BATTERY IN THE PK-88

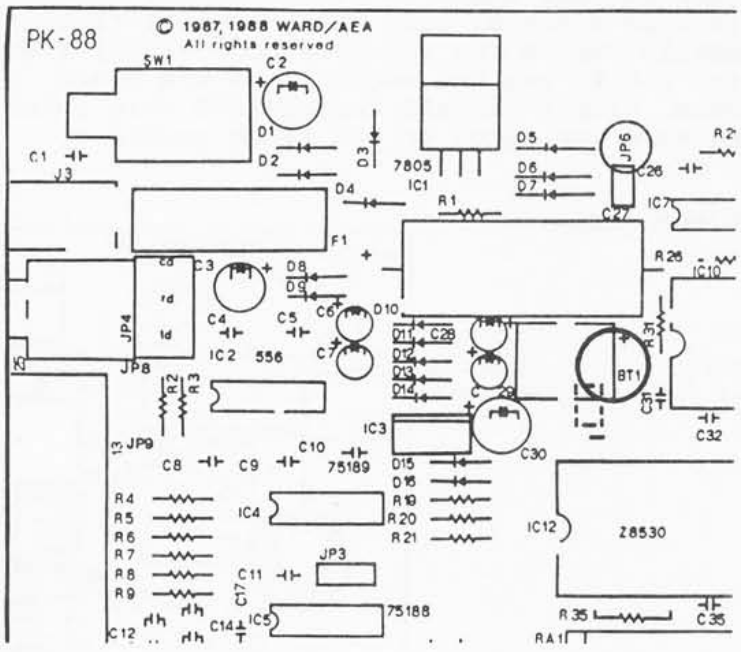
Your PK-88 has a lithium battery installed onto the printed circuit board just behind the heatsink, at the BT-1 location (see Figure 1, below). This battery replaces the two AA batteries used in earlier PK-88's. To electrically remove the battery from the PK-88 circuitry, leave JP-6 disconnected. If you wish to install the battery into the circuit, place the jumper over both pins of JP-6. Your PK-88 has been shipped to you with the battery disconnected from the circuit. In general, if you are using AEA's IBM program PC-Pakratt with FAX, you will want to leave the battery out of the circuit. With COM-Pakratt, MacRATT, or any other terminal program, you will want to install the jumper over both pins of JP-6.

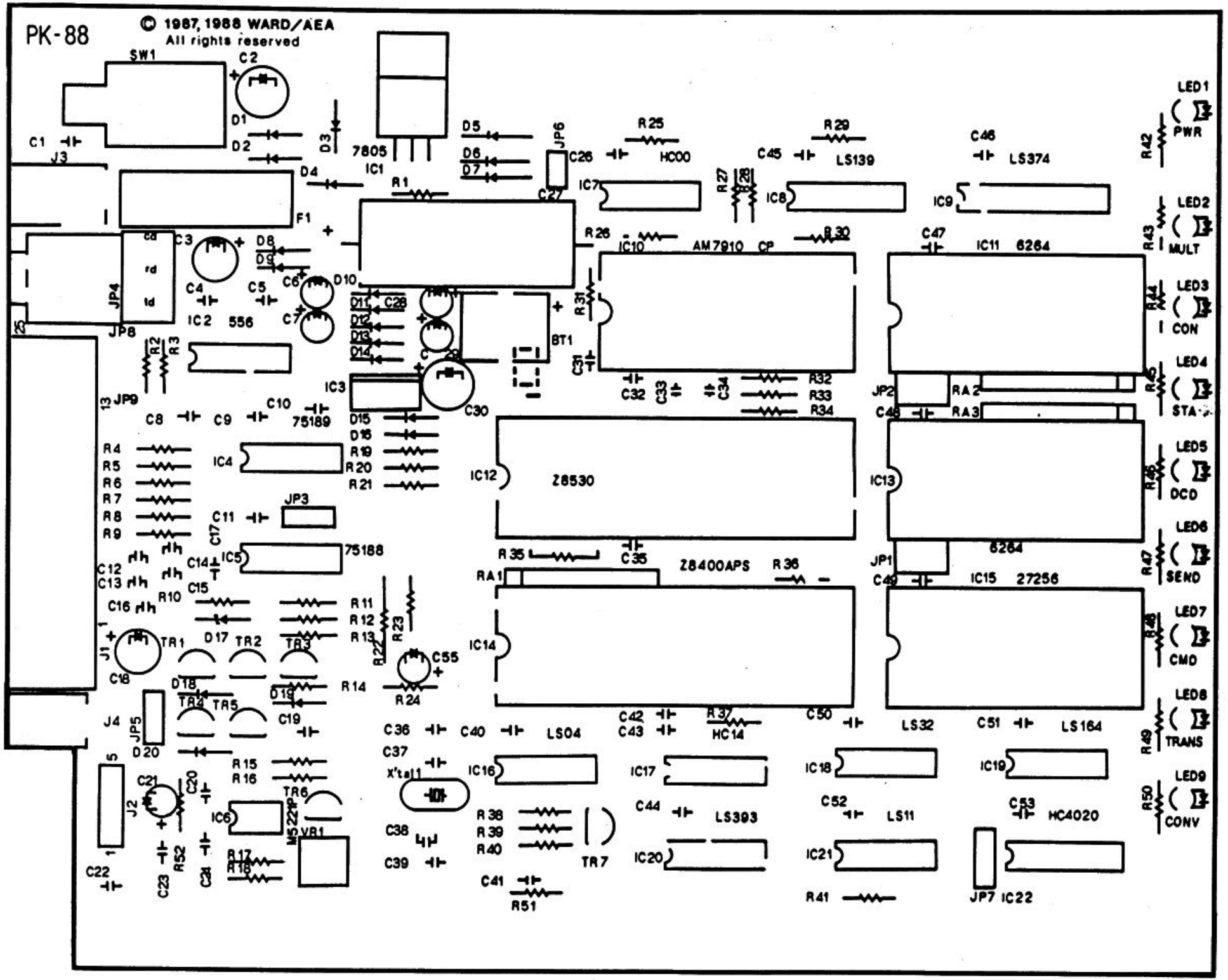
---WARNING---

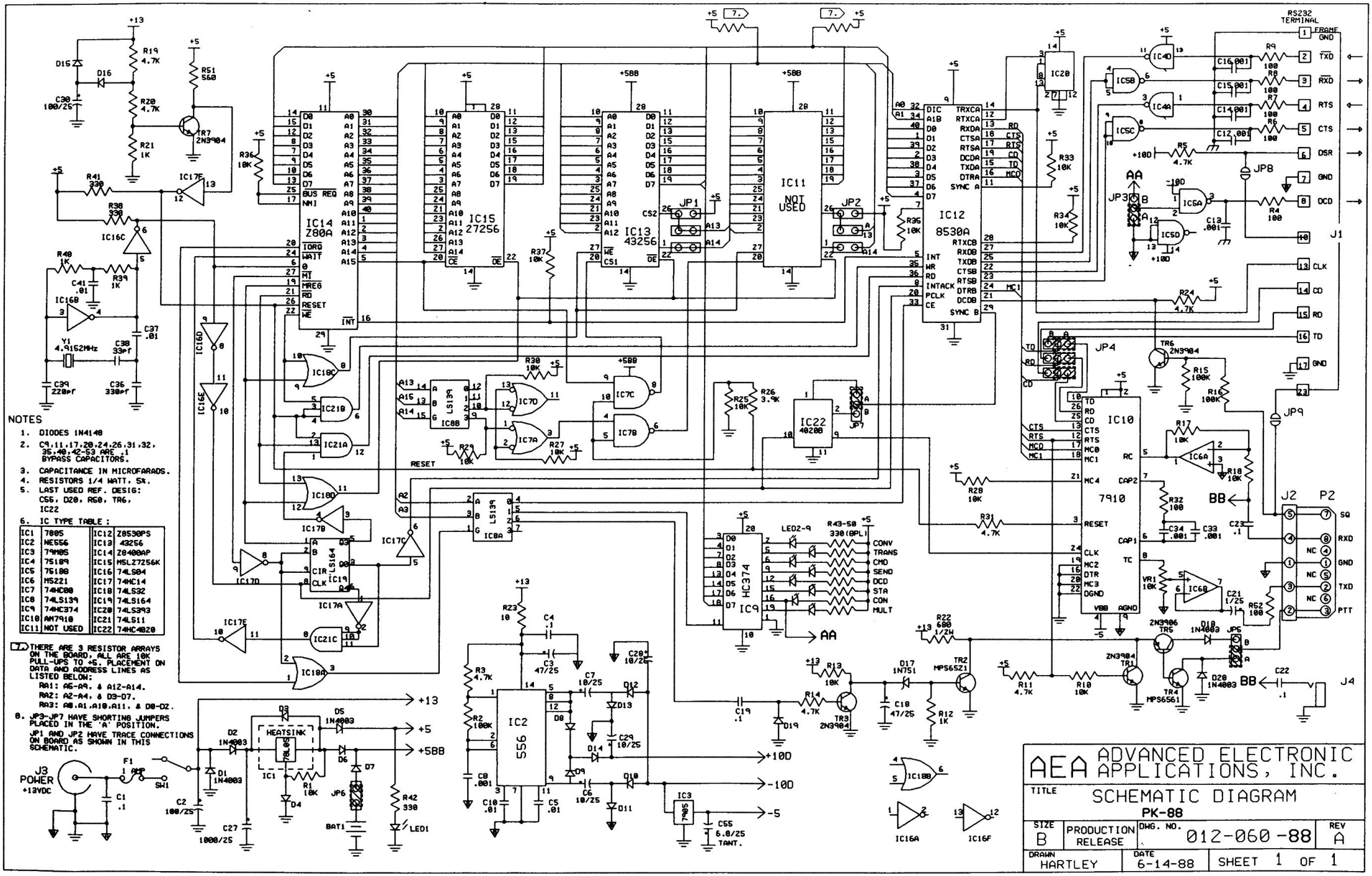
Do NOT dispose of lithium batteries in a fire.

Do NOT short the two leads of a lithium battery together.

Note battery polarity if ever installing a lithium battery.




PK-88
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SW1
C2
D1
D2
D3
C1
J3
7805
IC1
D5
D6
D7
JP6
C26
C27
R25
HC00
R29
LS139
C45
C46
LS374
LED1
PWR
R42
D4
R1
F1
IC7
R27
R28
IC8
IC9
LED2
MULT
R43
C3
D8
D9
C6
D10
C4
C5
C7
JP4
JP8
IC2
556
D11
D12
D13
D14
C28
C29
BT1
R26
IC10
AM7910 CP
R30
C47
IC11
6264
R31
C31
C32
C33
C34
R32
R33
R34
LED3
CON
R44
LED4
STA
R45
JP2
RA2
RA3
C48
R2
R3
JP9
IC3
C30
C8
C9
C10
75189
D15
D16
R19
R20
R21
R4
R5
R6
R7
R8
R9
IC4
IC12
Z8530
IC13
6264
LED5
DCD
R46
JP3
C11
C17
IC5
75188
C12
C13
C14
C15
C16
R10
R11
R12
R13
R23
R22
C55
R24
R35
C35
Z8400APS
R36
RA1
JP1
C49
IC15
27256
LED6
SEND
R47
J1
TR1
D17
TR2
TR3
C18
D18
TR4
TR5
D19
R14
J4
JP5
D20
C19
IC14
C42
C43
R37
HC14
C50
LS32
C51
LS164
LED7
CMD
R48
C36
C40
LS04
C37
x'tal
C38
C39
IC16
IC17
IC18
IC19
LED8
TRANS
R49
J5
J2
C21
C20
IC6
TR6
M5224P
VR1
R15
R16
R17
R18
C22
C23
R52
C24
R38
R39
R40
TR7
C44
LS393
C52
LS11
C53
HC4020
LED9
CONV
R50
IC20
IC21
C41
R51
R41
JP7
IC22


NOTES
1. DIODES 1N4148
2. C9,11,17,20,24,26,31,32, 35,40,42-53 ARE .1 BYPASS CAPACITORS.
3. CAPACITANCE IN MICROFARADS.
4. RESISTORS 1/4 WATT, 5%.
5. LAST USED REF. DESIG: C56, D20, R50, TR6, IC22
6. IC TYPE TABLE :
IC1 7805 | IC12 Z8530PS
IC2 NE556 | IC13 43256
IC3 79M05 | IC14 Z8400AP
IC4 75189 | IC15 M5LZ7256K
IC5 76188 | IC16 74LS04
IC6 M5221 | IC17 74HC14
IC7 74HC00 | IC18 74LS32
IC8 74LS139 | IC19 74LS164
IC9 74HC374 | IC20 74LS393
IC10 AM7910 | IC21 74LS11
IC11 NOT USED | IC22 74HC4020
7. THERE ARE 3 RESISTOR ARRAYS ON THE BOARD, ALL ARE 10K PULL-UPS TO +5. PLACEMENT ON DATA AND ADDRESS LINES AS LISTED BELOW:
RA1: A5-A9, & A12-A14.
RA2: A2-A4, & D3-D7.
RA3: A8,A1,A10,A11, & D8-D2.
8. JP3-JP7 HAVE SHORTING JUMPERS PLACED IN THE 'A' POSITION.
JP1 AND JP2 HAVE TRACE CONNECTIONS ON BOARD AS SHOWN IN THIS SCHEMATIC.
RS232 TERMINAL
IC14 Z80A
IC15 27256
IC13 43256
IC11 NOT USED
IC12 8530A
IC10 7910
IC9 HC374
IC2 556
IC1 7805
IC22 4020B
IC8A IC8B LS139
IC19 LS164
IC16A IC16B IC16C IC16D IC16E IC16F
IC17A IC17B IC17C IC17D IC17E IC17F
IC18A IC18B IC18C IC18D
IC21A IC21B IC21C
IC5A IC5B IC5C IC5D
IC6A IC6B
IC7A IC7B IC7C IC7D
IC40 IC4A IC20
TR1 TR2 TR3 TR4 TR5 TR6 TR7
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20
LED1 LED2-9
BAT1 HEATSINK
JP1 JP2 JP3 JP4 JP5 JP6 JP7 JP8 JP9
J1 J2 P2 J3 J4
SW1 F1
Y1 4.9152MHz
RESET
AA BB
CONV TRANS CMD SEND DCD STA CON MULT
FRAME GND TXD RXD RTS CTS DSR GND DCD +10 CLK CD RD TD GND
SG RXD GND TXD PTT
+13 +5 +5BB +10D -10D -5
POWER +13VDC
TITLE SCHEMATIC DIAGRAM
PK-88
SIZE B
PRODUCTION RELEASE
DWG. NO. 012-060-88
REV A
DRAWN HARTLEY
DATE 6-14-88
SHEET 1 OF 1
AEA ADVANCED ELECTRONIC APPLICATIONS, INC.



Advanced Electronic Applications, Inc.

PK-88 MANUAL
040-041 Rev D 3/90