Advanced Electronic Applications, Inc.
2400 bps Modem
Operation Instructions

Congratulations on your purchase of the 2400 bps DPSK Modem for the PK-232. You can now "speed up" your packets when communicating with another 2400 bps DPSK station. This document explains briefly how to utilize this new modem. Please see the attached PK-232 Firmware Revision Supplement for the changes that have been made to the PK-232 firmware.

EXPLANATION

Your PK-232 has two separate and distinct modem circuits inside the chassis. One is the 'standard' modem which resides on the main printed circuit board and allows you to operate Packet, AMTOR, RTTY, and CW, as well as receive WEFAX, NAVTEX, and TDM, at speeds up to 1200 baud using Frequency Shift Keying (FSK). The other modem circuit resides on a printed circuit "daughter-board", and allows you to operate Packet at 2400 bits per second (bps) using Differential Phase Shift Keying (DPSK).

FSK involves "shifting" between two audio tones (mark & space) corresponding to digital high (1) and low (0) states for the data transmission. DPSK involves changing the phase of a single audio tone between four possible phase angles, which correspond to four possible bit pairs (00, 01, 10, 11). A more complete description can be found in Digital Transmission Systems by David R. Smith (Van Nostrand Reinhold Co. Inc., New York, NY. Copyright 1985).

OPERATION

To control which modem is active, the ALTMODEM command is used. When ALTMODEM is set to 0 (default), the 'standard' FSK modem on the main board is active. Set ALTMODEM to 0 if you wish to do standard 300/1200 baud packet connects or operate RTTY, CW, AMTOR, etc. Set the baud rate accordingly.

When ALTMODEM is set to 1, the 2400 bps DPSK Modem is active. Set ALTMODEM to 1 when you wish to operate 2400 bps packet. Set HBAUD to 2400 whenever ALTMODEM is set to 1. Be sure to perform the adjustment procedure outlined below before using this unit on the air.

Because of the nature of PSK, the receive audio level may be more critical than standard FSK reception. If you are having difficulties receiving, try experimenting with the receive audio level by adjusting your radio's volume control. Also, keep in mind that PSK is more sensitive to multi-path distortion than FSK is.

Please note, this 2400 bps DPSK Modem is not compatible with TAPR's PSK modem and cannot be used for satellite work. Satellites use 1200 and 400 baud, and as this modem is digitally set at 2400 bps, it cannot be used at other data rates.

SELF-TEST

- **If you are trying this test prior to performing the adjustment procedure below, you will not have to adjust the transmit audio level. If you have already done the adjustment procedure, you may need to increase the audio output level by rotating R39 (located in the center of the DPSK daughter-board) slightly clockwise.**

To make sure the modem is working properly, you may wish to perform a 'loopback test' on the unit. To do this, you will need to short together the TRANSMIT AUDIO and RECEIVE AUDIO lines on the grey radio cable. These are the WHITE and GREEN wires respectively. If your cable is already wired up, you may wish to short together pins 1 and 2 on the RADIO 1 or RADIO 2 connector instead. This achieves the same result.

Once these lines are shorted together, make sure your call sign is entered properly (check the MYCALL parameter), and also set ALTMODEM to 1 and set HBAUD to 2400. Once this is done, CONNECT to your own call sign. If you connect to yourself and can send a message and have it echo on the screen, then everything is working properly. See chapter 2 of the PK-232 operating manual for more details on the loop-back test.

ADJUSTMENT PROCEDURE

There are three variable resistors residing on the DPSK daughter- board (located near the right-center of the main circuit board). Resistors R66 and R67 are factory adjusted and should not be tampered with except by a qualified service technician. Resistor R39 is the audio output level control, and you should adjust it according to the following procedure before operating on the air (Note: This procedure assumes you have previously connected and used the PK-232 with your FM radio. If you haven't, see chapter 2 of the PK-232 operating manual.):

1. Remove the six screws around the outside of the PK- 232's chassis and remove the top cover. Reconnect the power, computer and radio cables to the PK-232.
2. Turn on your computer and PK-232 and start your terminal program.
3. Connect the radio to a dummy load; be prepared to monitor your transmission with another nearby radio.
4. Type ALTMODEM 1 and press the ENTER key. This will activate the 2400 bps DPSK Modem and disable the 1200 baud FSK modem.
5. Locate the AFSK LEVEL adjust on the right side of the PK-232's rear panel. With a pencil, mark the location of the slot so it can be easily readjusted after this procedure. Using a small flat-bladed screwdriver, turn the adjustment fully counter-clockwise (zero AFSK output level).
6. Type CAL and press the ENTER key. This puts the PK-232 in the Calibrate mode.

- **Note: In the Calibrate mode only, the 'K' key toggles the transmitter's PTT line on and off. The PK-232 has a PTT watchdog timer circuit that unkeys your transmitter automatically after a period of continuous keying. As you perform the following adjustments, unkey periodically, then rekey the transmitter by typing 'K'.**

7. Press the 'K' key on the keyboard to key the transmitter. You should hear the DPSK signal the on monitor receiver. You may be used to hearing a single tone when calibrating the PK-232, but do not be alarmed. The tone you are now hearing is phase modulated, and therefore is not a clean-sounding tone.

8. Adjust the transmit audio level as follows:

- Listen to the monitor receiver; turn Resistor R39 fully counter-clockwise. The audio signal on the monitor receiver should go out. Slowly turn R39 clockwise until the volume level of the monitored signal does not increase any further.
- Turn R39 counter-clockwise until the audio signal on the monitoring receiver is reduced to about half of the maximum level.

9. Type 'K' to unkey the transmitter.
10. Type 'Q' to 'Quit' (exit) the Calibrate mode.

You've now adjusted the 2400 bps DPSK Modem for about 3 KHz deviation. Be sure to readjust the rear-panel AFSK LEVEL adjustment using the pencil-mark as a guide.

The correct firmware version has been installed in your PK-232 along with the DPSK modem. Please note that if any firmware dated before July 1990 is installed in the unit, the DPSK modem will not function.

ADVANCED ELECTRONIC APPLICATIONS, Inc.		
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LEVEL: COMPONENT I.D		

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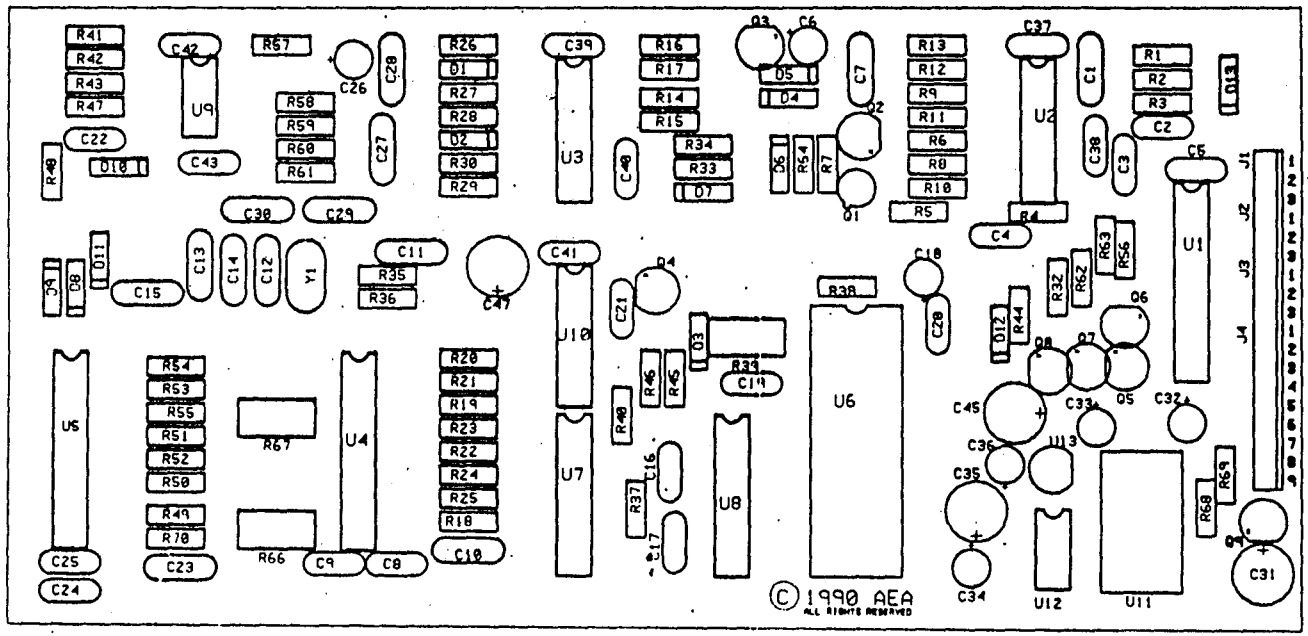
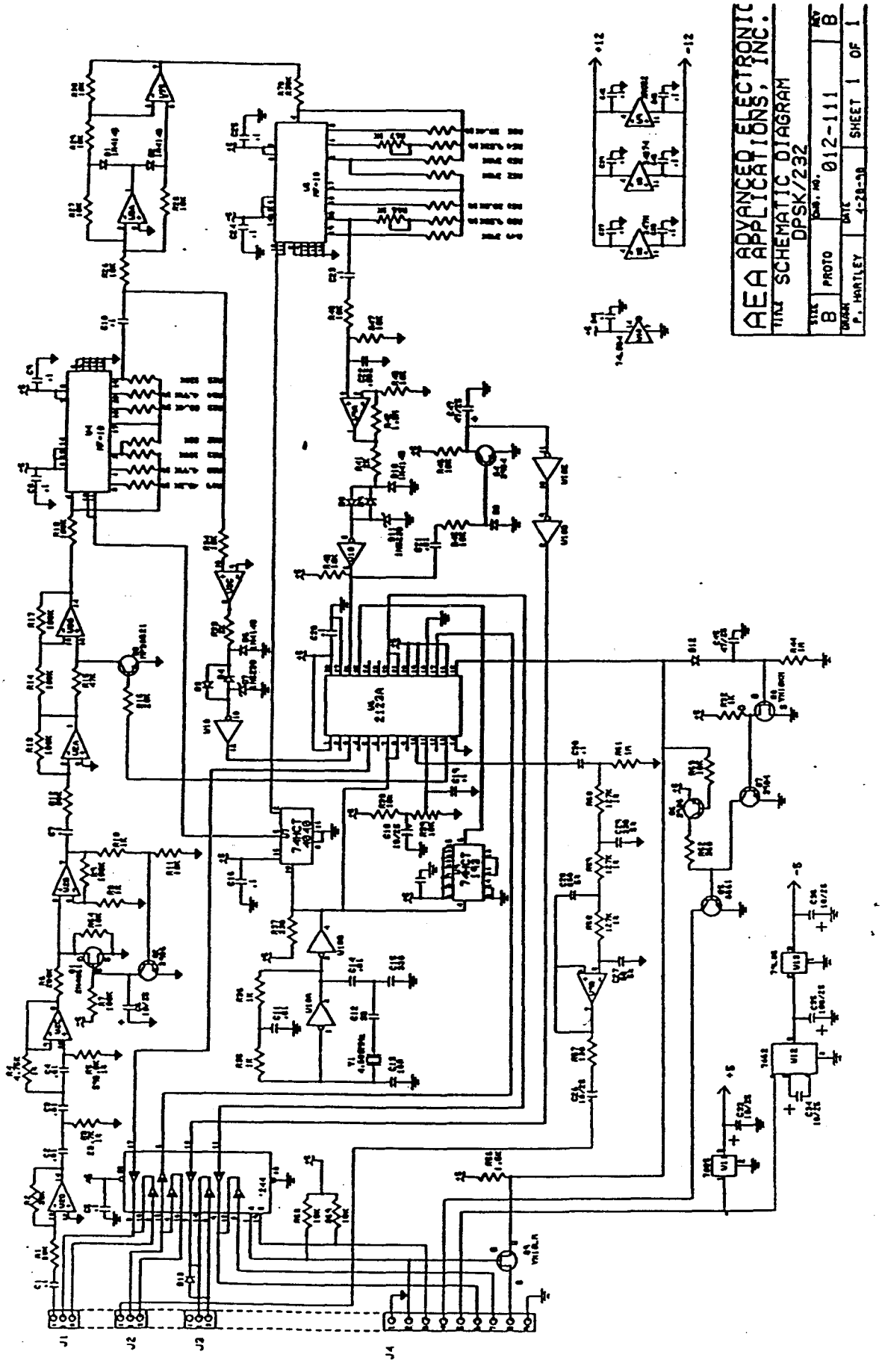
LTR	HOLE DIA.	QTY





part no. 040-050

August 1990