PK-900/PSK

Sound Card Interface Upgrade Kit A.06265

Installation
and
Operation
Manual

TIMEWAVE
TECHNOLOGY INC.

WARRANTY

TIMEWAVE TECHNOLOGY INC.
LIMITED ONE YEAR WARRANTY

WHO IS COVERED

This warranty is extended only to the original purchaser of the A.06265.

WHAT WE WILL DO

If your A.06265 fails in normal use because of a defect in workmanship or materials within one year of the date of purchase, we will repair or replace (at our option) the equipment at our factory without charge to you. Timewave will pay for the return of the warranty-repaired unit to you.

WHAT YOU MUST DO

First, double check your connections and operating procedure. If you're certain that the unit is faulty, notify Timewave Customer Service immediately. If Timewave is unable to resolve the problem by telephone or email, we will give you an RMA number and ask you to return the unit. You must pay all shipping and insurance charges for returning the unit to our factory.

WHAT IS NOT COVERED

We cannot be responsible for damage caused by accidents, abuse, misuse, improper installation, or unauthorized attempts to repair the unit. This warranty does not cover any parts of the PK-900 except the A.06265.

SERVICE WARRANTY

Timewave service work performed in connection with this warranty is warranted to be free from defects in materials and workmanship for 30 days from the date of rerpair. All other terms of the limited warranty apply to the service warranty.

HOW TO CONTACT TIMEWAVE

Contact Timewave Customer Service by telephone at (651) 489-5080 or by FAX at (651) 489-5066.

Mailing and shipping address is 501 W. Lawson Ave., St.Paul, MN 55117

email: sales@timewave.com
          techsupport@timewave.com
          service@timewave.com

web: www.timewave.com

TIMEWAVE MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Table of Contents

Welcome to PSK for the PK-900

Thank you for purchasing the PSK Soundcard Interface upgrade kit for the PK-900 and PK-900/DSP. The Timewave part number of this kit is A.06265.

Follow the instructions carefully and you should have no problem in getting the unit on the air. If you do have questions, Timewave has technical support available at (651) 489-5080 and service@timewave.com

<u>Please read before installing this upgrade kit.</u>

If your PK-900 has a version A mainboard, contact Timewave for installation instructions.

PK-900/PSK Upgrade Kit

Section 1

PSK Sound Card Interface Board Installation

Installation steps

If you have purchased a PK-900 DSP upgrade kit, install it before you install the PSK upgrade kit.

Please check the contents of the kit at this time. You should have received:

1	PK-900/PSK Upgrade assembly
1	Eprom I.C. ver. 7.3
1	PAL I.C. ver. C (not used with PK-900/DSP units)
2	cables – 3.5 mm to 3.5 mm stereo phone jack – 6 ft.
1	PK-900/PSK installation and Operation instructions
1	Warranty card
1	Timewave CD ROM (also contains this document in .pdf format)

Here are the tools you will need:

Wire Cutters
Phillips Screwdriver
Needle nose pliers
Flat head screwdriver
3/16" hex nut driver
Solder pencil and solder
Solder sucker tool or solder wick for cleaning the pads on C40, C89 and the R253

Clear an area to work on your PK-900. You should take standard anti-static electricity precautions when working on any ham equipment.

Here are the steps in the upgrade procedure:

Disassembly

Keep all removed parts, some are necessary to re-assemble the PK-900.

1) Remove Power

2) Remove 2 hex jack screws on either side of the RS-232 SERIAL jack screw.
   Use a 3/16" hex nut driver to avoid scarring the jack screw finish.

3) Remove the two serrated nuts from the RX IN AUDIO jacks. Use a special nut driver made for this purpose if you have one. If not, use a spanner wrench if you have one. A pair of needle nose pliers can be used as a spanner wrench if you are very careful not to slip and scratch the panel or break the tips on the pliers.

4) Remove 4 screws holding chassis top - two on each side of the PK-900 top cover.

5) Disconnect the cables connecting the PK-900 front panel and the mother board.

6) Remove 3 screws holding back panel - one on each side and one on the bottom of the PK-900 bottom cover.

7) Remove the back panel from the PK-900.

8) Remove the remaining screws on the bottom of the chassis that fastens the motherboard to the chassis.

9) Remove the motherboard from the chassis.

10) If you have a 9600 baud board installed near the back panel, carefully remove the 9600 baud board by removing the four screws holding it down and gently pulling it upward to remove it from its socket. Be very careful not to bend the 20 pins on the bottom of the board. Set it aside in a protected place. It will be reinstalled later.

11) If you have a PK-900/DSP <u>with</u> a Timewave DSP daughterboard, go to section named "**Instal-lation <u>with</u> a DSP Daughterboard"** for further installation instructions.

12) If you have a PK-900 <u>without</u> a Timewave DSP upgrade kit, go to section named "**Installa-tion <u>without</u> a DSP Daughterboard"** for further installation instructions.

Installation <u>*with*</u> a DSP Daughterboard

1) Skip this step if Eprom U7 on the DSP daughterboard is ver. 7.3. If Eprom U7 is ver. 7.2 or lower, locate and remove U7.

2) *Use an IC removal tool if you have one. If not, slide the flat blade of the screwdriver under one end of the chip and elevate carefully. Do the same thing at the other end of the IC and it will pop out cleanly. BE SURE the screwdriver is between the IC and the chip socket, <u>NOT between the chip socket and the board.</u>*

3) Install the new 32 pin eprom in the U7 socket on the DSP daughterboard. Be very careful to orient the notch in the end of the chip to match the notch in the outline on the circuit board. Make sure all pins are straight and fit direcltly into the Eprom socket before you carefully press the new eprom into the socket. All pins should be inserted directly into the socket with no pins curled under the chip or bent outside the socket.

4) Follow the next steps to remove components from the main PC board.

5) Locate and remove C40 near J1 (see figure B).

   We recommend that you remove the capacitors and resistors by desoldering them from the back of the board. Remove the solder from the holes with a solder sucker tool or solder wick. Use care not to overheat the board. You may burn the board or damage the pad or barrel in the hole. When hole and the lead are clear of solder, gently remove the component from the top of the board. In some cases, it may be easier to remove the component by clipping the leads of the component close to the body of the component before desoldering it.. Then while holding the lead with the needle nose pliers, CAREFULLY heat the solder just until the lead can be removed without force. Be very careful not to pull the barrel from the board by pulling before the solder flows. DO NOT OVER-HEAT. The hole can then be cleaned with a solder sucker tool or solder wick.

   You will also need to clean the solder from the C40 pads. Observe the same precautions as above and do not overheat the board.

6) Locate and remove the wire on the pad on the DSP daughterboard labeled "C89 Rear". Remove the other end of the wire from the rear pad of C89 on the PK-900 main board. Discard the the removed wire.

   You will also need to clean the solder from the C89 rear pad and the daughterboard pad labeled "C89 Rear" Observe the same precautions as above and do not overheat the board.

7) Remove R253, if it is installed on your PK-900. See Figure A.

   You will also need to clean the solder from the R253 pads. Observe the same precautions as above and do not overheat the board.

8) Re-install the main board on the chassis using the screws you saved when you removed it.

9) Reconnect the front panel connectors to the main board.

Installation _with_ a DSP Daughterboard

Connections

Follow the next steps to connect the wires from the back panel as shown in Figure A and B.

1) Connect PSK enable J5 on PSK board (grey wire) to PB0 (hole from lead of R253 closest to left side of PK-900).

2) Connect J1 (+12V) (red wire) to D21 (1N4004 smaller diode on the left closest to the heatsink) anode lead on PK-900 main board. The anode lead is toward the front of the PK-900 and is the end of the diode _without_ the light-colored band on the body of the diode. Wrap the stripped wire lead from J1 around the lead of the diode as far as possible from the body of the diode. Solder the two leads together.

3) Connect J6 (GND) (black wire) to to the solder lug on the top of the DC power jack on PK-900 main board.

4). Connect J2 (RX Audio in) (violet wire) to C89 Rear Pad on PK-900 main board.

5) Connect J3 (RX audio out) (white wire) to the pad on the PK-900 DSP board labeled "C89 Rear".

6). Connect J7 (TX audio in) (brown wire) to the C40 left pad on PK-900 Main board.

7). Connect J4 (TX Audio out) (orange wire) to the C40 right pad on PK-900 main board.

8) If you have one, re-install the 9600 baud board. Be very careful not to bend the 20 pins on the bottom of the board. Fasten the board with the four screws removed when the board was temporaily re-moved. All the leads from the PSK board should be under the 9600 baud board. Do not pinch any wires under the board standoffs or sockets.

9) Fasten the new back panel assembly to the bottom cover of the PK-900 with 3 screws removed with the old back panel.

10) Secure the chassis top with all 4 screws.

11) Place the enclosed sticker (PSK) below the raised "AEA" logo on the left side of the front panel of the PK-900. Place it one inch above the bottom edge of the panel.

12) Reconnect the unit and reset when powering on for the first time.

Installation *<u>without</u>* a DSP Daughterboard

1) Locate and remove U36, U37 and U44 (See Figure A.)

2) *Use an IC removal tool if you have one. If not, slide the flat blade of the screwdriver under one end of the chip and elevate carefully. Do the same thing at the other end of the IC and it will pop out cleanly. BE SURE the screwdriver is between the IC and the chip socket, <u>NOT between the chip socket and the board.</u>*

3) Install the new 32 pin eprom in U36. Be very careful to orient the notch in the end of the chip to match the notch in the outline on the circuit board. Make sure all pins are straight and fit direcltly into the Eprom socket before you carefully press the new eprom into the socket. All pins should be inserted directly into the socket with no pins curled under the chip or bent outside the socket.

4) Install the new PAL C in U44. Be very careful to orient the notch in the end of the chip to match the notch in the outline on the circuit board. Make sure all pins are straight and fit direcltly into the Eprom socket before you carefully press the new eprom into the socket. All pins should be inserted directly into the socket with no pins curled under the chip or bent outside the socket.

5) Locate and remove C40 near J1 (see Figure B).

   We recommend that you remove the capacitors and resistors by desoldering them from the back of the board. Remove the solder from the holes with a solder sucker tool or solder wick. Use care not to overheat the board. You may burn the board or damage the pad or barrel in the hole. When hole and the lead are clear of solder, gently remove the component from the top of the board. In some cases, it may be easier to remove the component by clipping the leads of the component close to the body of the component before desoldering it.. Then while holding the lead with the needle nose pliers, CAREFULLY heat the solder just until the lead can be removed without force. Be very careful not to pull the barrel from the board by pulling before the solder flows. DO NOT OVER-HEAT. The hole can then be cleaned with a solder sucker tool or solder wick.

   You will also need to clean the solder from the C40 pads. Observe the same precautions as above and do not overheat the board.

6) Locate and remove C89 (see Figure B).

   You will also need to clean the solder from the C89 pads. Observe the same precautions as above and do not overheat the board.

7) Remove R253, if it is installed on your PK-900. See Figure A.

   You will also need to clean the solder from the R253 pads. Observe the same precautions as above and do not overheat the board.

8) Re-install the main board on the chassis using the screws you saved when you removed it.

9) Reconnect the front panel connectors to the main board.

Installation *<u>without</u>* a DSP Daughterboard

Connections

Follow the next steps to connect the wires from the back panel as shown in Figure A and B.

1) Connect PSK enable J5 on PSK board (grey wire) to PB0 (hole from lead of R253 closest to left side of PK-900).

2) Connect J1 (+12V) (red wire) to D21 (1N4004 smaller diode on the left closest to the heatsink) anode lead on PK-900 main board. The anode lead is toward the front of the PK-900 and is the end of the diode <u>without</u> the light-colored band on the body of the diode. Wrap the stripped wire lead from J1 around the lead of the diode as far as possible from the body of the diode. Solder the two leads together.

3) Connect J6 (GND) (black wire) to to the solder lug on the top of the DC power jack on PK-900 main board.

4). Connect J2 (RX Audio in) (violet wire) to C89 Rear Pad on PK-900 main board.

5) Connect J3 (RX audio out) (white wire) to the C89 Front pad on the PK-900 main board.

6). Connect J7 (TX audio in) (brown wire) to the C40 left pad on PK-900 Main board.

7). Connect J4 (TX Audio out) (orange wire) to the C40 right pad on PK-900 main board.

8) If you have one, re-install the 9600 baud board. Be very careful not to bend the 20 pins on the bottom of the board. Fasten the board with the four screws removed when the board was temporaily re-moved. All the leads from the PSK board should be under the 9600 baud board. Do not pinch any wires under the board standoffs or sockets.

9) Fasten the new back panel assembly to the bottom cover of the PK-900 with 3 screws removed with the old back panel, the two knurled nuts on the RX AUDIO IN jacks, and the two jack screws on the RS-232 Serial Connector.

10) Secure the chassis top with all 4 screws.

11) Place the enclosed sticker (PSK) below the raised "AEA" logo on the left side of the front panel of the PK-900. Place it one inch above the bottom edge of the panel.

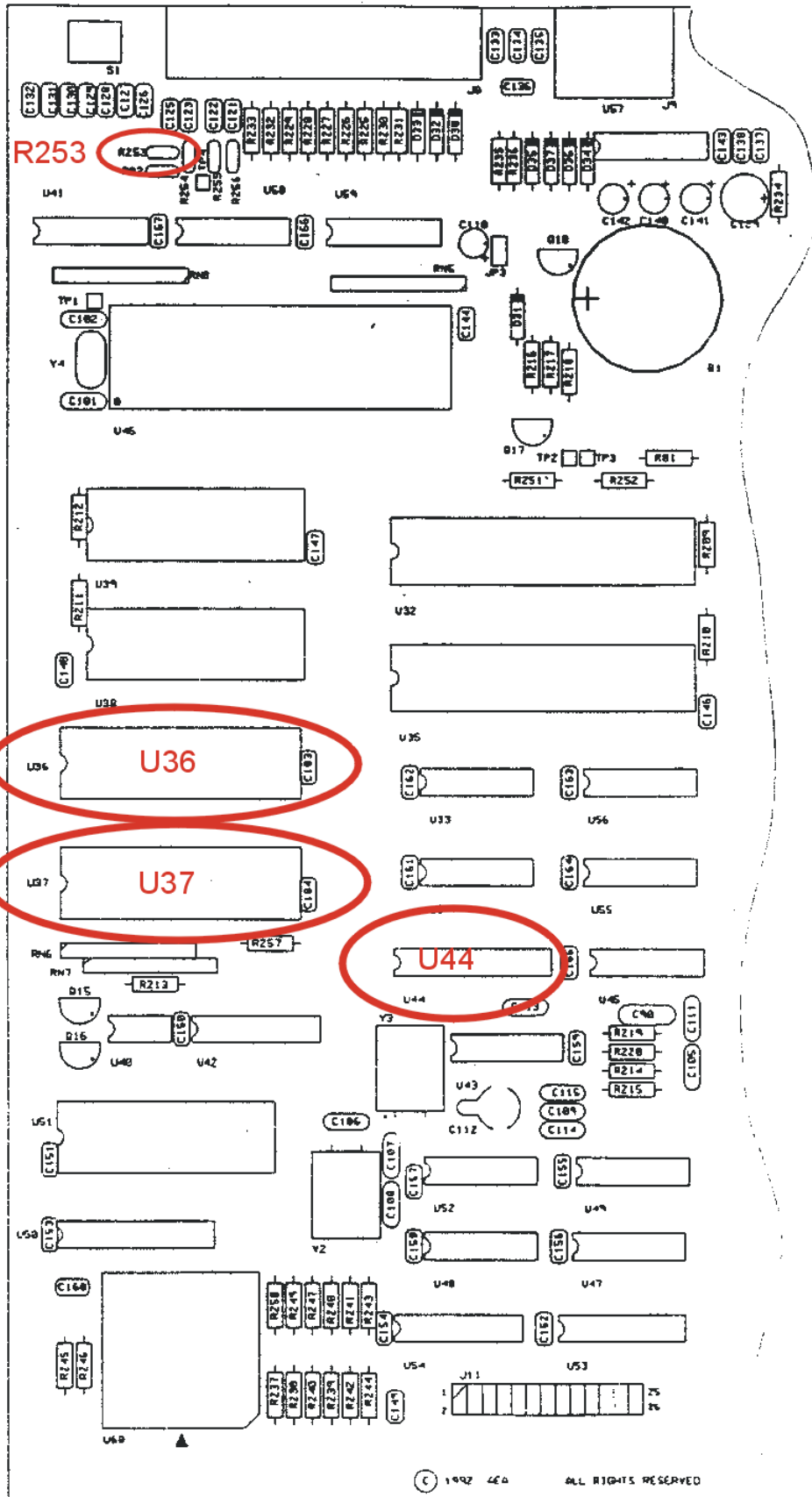12) Reconnect the unit and reset when powering on for the first time.

Fig. A

R253

U36

U37

U44
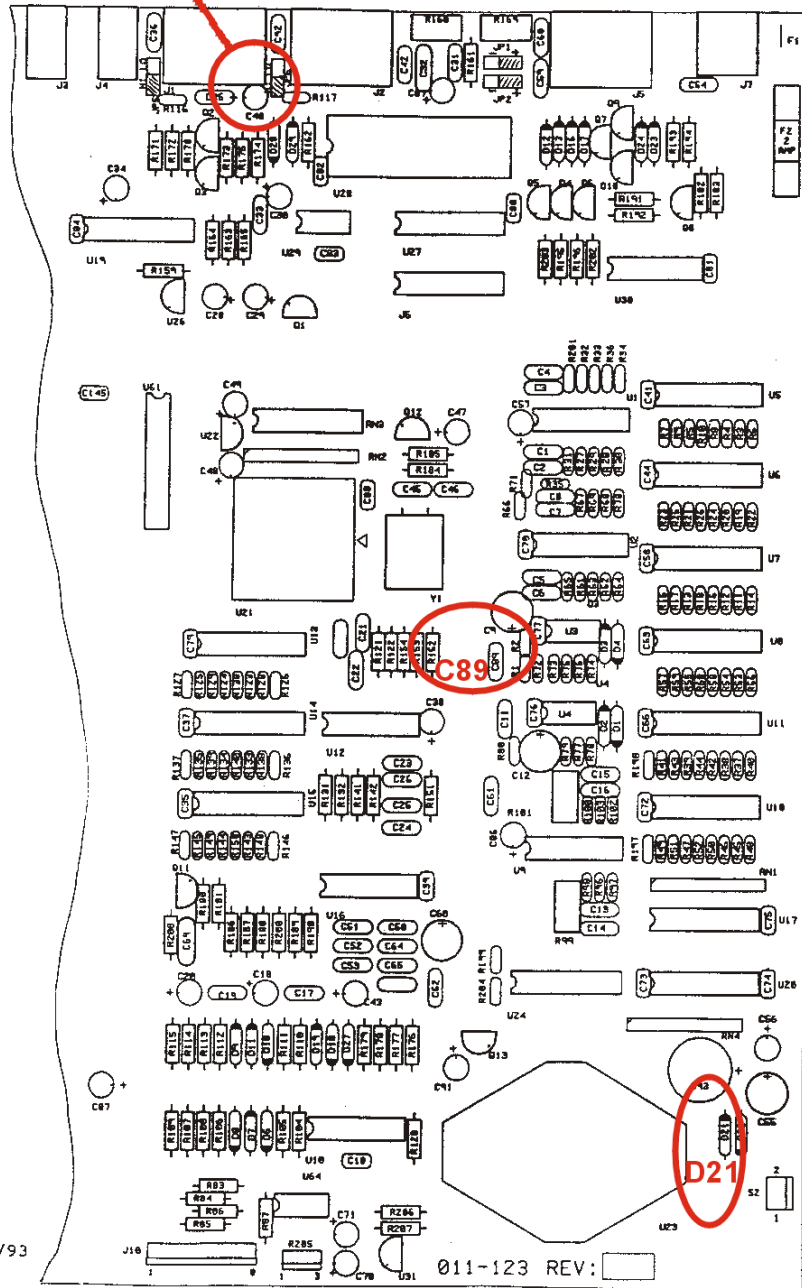
11

PARTS PICTORIAL PK-900 MAIN BOARD
(Analog Section)

Section 2
PK900/PSK Sound Card Interface Board Settings

Jumper settings

JH1 Jumper must be ON for units with a DSP board installed. It must be OFF for all other units.
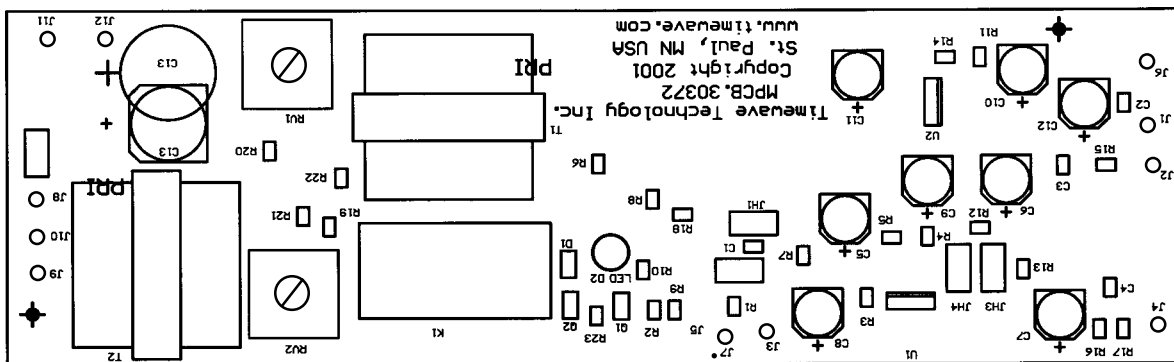
JH3 and JH4 Jumpers adjust the receive gain to the input of the PK-900/PSK according to following table:

JH3	JH4	Relative Gain
OFF	OFF	High
ON	OFF	Medium (Factory Default)
OFF	ON	Low
ON	ON	Low

Trimpot settings

Trimpot RV1 adjusts the receiver audio signal output level to the sound card input. Use this trimpot to reduce the signal level to the soundcard if your received signal level is overdriving your sound card input. (Check the sound card input level indicators on your computer audio control program.)

Trimpot RV2 adjusts the Sound Card audio signal output level to the transmitter audio input. Use this trimpot to reduce the signal level to the transmit if your sound card output signal level is overdriving your transmitter input. I**t is very important not to overdrive your transmitter to avoid interfering with other stations!**

Section 3

Sound Card Interface Connections for the PK-900/PSK

The Sound Card interface connections are made to the gold connectors labeled "**SOUND CARD AUDIO**" on the back of the PK-900/PSK. Timewave supplies cables to connect the sound card to the PK-900/PSK. The cables are supplied with each PK-900/PSK and upgrade kit. This connection information is provided for the user's convenience.

PK-900/PSK   Connection

TO   To Sound Card Audio input.
INPUT   Insert phone plug into sound card input jack (blue ring around jack on most sound cards). Use the mic jack input (pink) if you need more gain.

The phone plug tip and ring are the signal connections. The tip is the factory default connection. To select the ring use Jumper JH1 on the Jack PC board mounted on the back panel.

Phone plug sleeve is the signal return connection.

FROM   From Sound Card Audio Ouput (to transmitter audio input)
OUTPUT   Insert phone plug into sound input card jack (green ring around jack on most sound cards).

The phone plug tip and ring are the signal connections. The tip is the factory default connection. To select the ring use Jumper JH2 on the Jack PC board mounted on the back panel.

Phone plug sleeve is the signal return connection.

TO   Plug computer speaker into this jack. It is a parallel connection
SPKRS   to the" **FROM OUTPUT "** jack, so that you don't have to have a separate "Y" connector to plug in your computer speakers.

System Block Diagram
PK-900/PSK
Multimode Controller

Computer

Computer CPU

Computer Sound Card   OUT   IN

Serial - RS-232

To Computer Speakers

PK-900/PSK

Serial - RS-232

Sound Card Audio Port

PK-900 CPU

Sound Card Data Audio

PK-900 Modems

PK-900 Data Audio

DSP Filters

Isolation Transformers

Sound Card Adaptor

Data Audio

PTT

Radio Port 1

PTT IN   AFSK OUT   AFSK IN

Radio Transceiver

Section 4

Sound Card Interface Operation for the PK-900/PSK

To use the sound card interface, you will need a PC software program for the mode you wish to use. PK-Term for Windows and Digipan are two programs that include PSK-31. PK-Term fully supports the PK-900/PSK for seamless automatic sound card operation. Programs like Digipan may not support the new PK-900 SCD command to select the PK-900 Sound Card mode and switch the PK-900 PTT output between transmit and receive. To support programs like Digipan that have not yet been updated, Timewave has included a free utility program called ModemSwitch™. This program helps you set up the correct COM port and baud rate on your computer, and lets you select the sound card mode and operate the PK-900 PTT output with a few clicks of your computer mouse buttons. It even has a rudimentary dumb terminal for a quick check of your data controller. Read the ModemSwitch help file for more information. Be sure to download the latest upgrade for ModemSwitch™. See the Timewave document "PSKSoftware.pdf" for more third party software information on Sound Card programs. Both are on the Timewave CD and the the Timewave website:
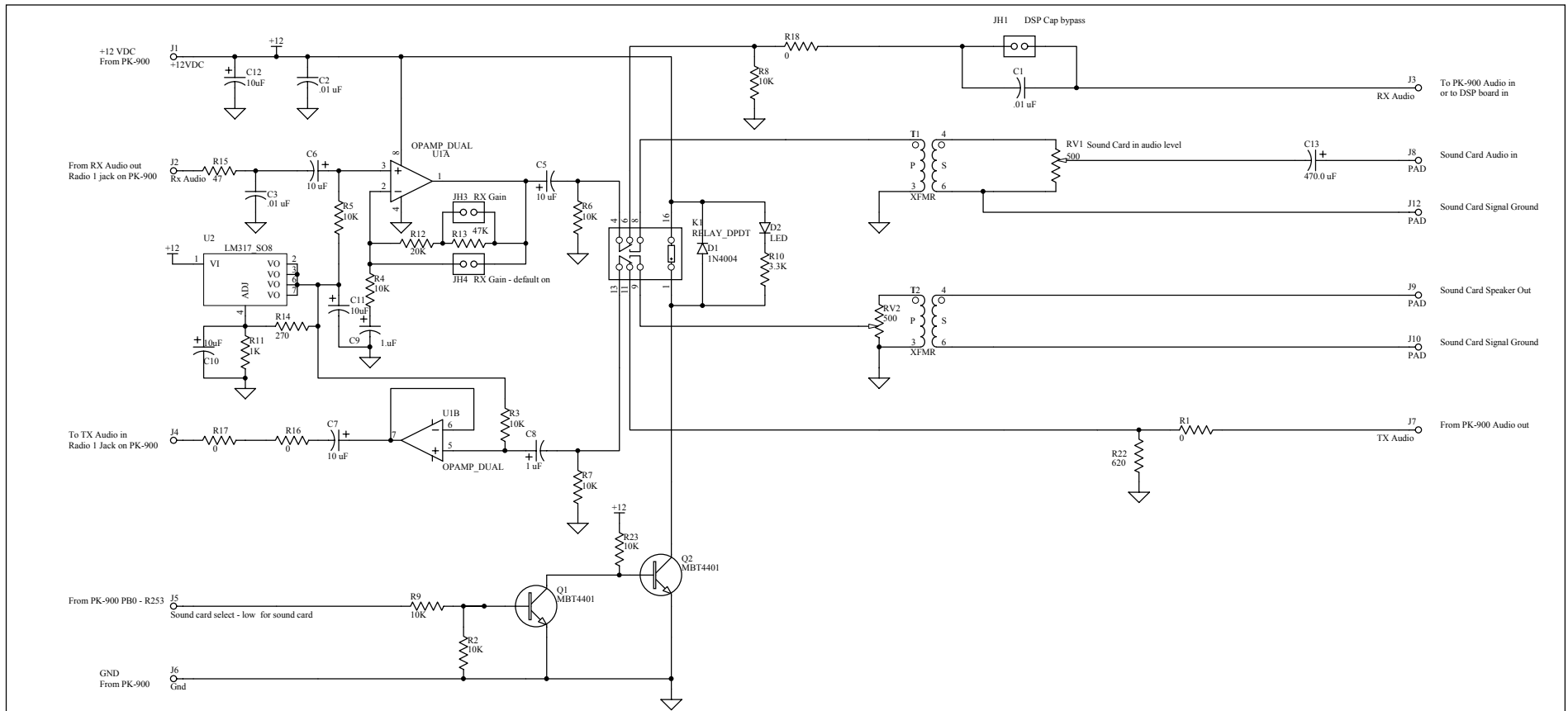 http://www.timewave.com

A new command has been added to the PK-900 to select the sound card interface. The new command is "Soundcard". The short version of the command is "SCD". To select the sound card interface, type "SCD ON" when you are in the PK-900 command mode (CMD:). To return to the normal TNC mode, type "SCD OFF" when you are in the PK-900 command mode (CMD:). Some programs, such as PK-Term for Windows from CSS, have integrated the sound card command into their operation. In those programs the sound card command will be executed automatically whenever you select the PSK-31 mode.
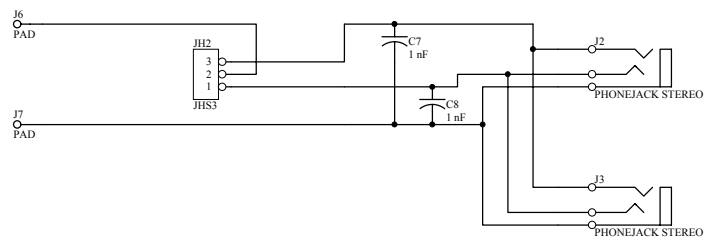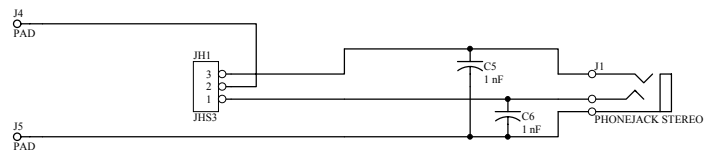
 If you would like the latest demo copy of PK-Term for Windows, download it from http://www.cssincorp.com. A copy is also on the Tmewave CD for your convenience.

Section 5
PK-900/PSK Sound Card Interface Schematic Diagrams

+12 VDC
From PK-900
J1
+12VDC

+12

C12
10uF

C2
.01 uF

JH1   DSP Cap bypass

R18
0

R8
10K

C1
.01 uF

J3
To PK-900 Audio in
or to DSP board in
RX Audio

From RX Audio out
Radio 1 jack on PK-900
J2
Rx Audio   47

R15

C6
10 uF

C3
.01 uF

OPAMP_DUAL
U1A

3
2
1
8
4

R5
10K

JH3 RX Gain

R12
20K

R13 47K

JH4 RX Gain - default on

R4
10K

C5
10 uF

R6
10K

T1   4
P   S
3   6
XFMR

RV1 Sound Card in audio level
500

C13
470.0 uF

J8
Sound Card Audio in
PAD

J12
Sound Card Signal Ground
PAD

K1
RELAY_DPDT

D2
LED

D1
1N4004

R10
3.3K

+12
U2
LM317_SO8
VI   VO
ADJ VO
VO
VO
1
2
3
6
7
4

C11
10uF

C9
1.uF

R14
270

R11
1K

C10
10uF

RV2
500

T2   4
P   S
3   6
XFMR

J9
Sound Card Speaker Out
PAD

J10
Sound Card Signal Ground
PAD

To TX Audio in
Radio 1 Jack on PK-900
J4

R17
0

R16
0

C7
10 uF

U1B
7
6
5
OPAMP_DUAL

R3
10K

C8
1 uF

R7
10K

R1
0

J7
From PK-900 Audio out
TX Audio

R22
620

+12
R23
10K

Q2
MBT4401

From PK-900 PB0 - R253
J5
Sound card select - low for sound card

R9
10K

Q1
MBT4401

R2
10K

GND
From PK-900
J6
Gnd

Title:

TW P/N:

Project:

Date: 23-Dec-2002

File: N:\PRODUC~1\PK-900\PK900PSK\PCB0AR~1\PK232P~1\PK900PS

Timewave Technology Inc.

Engineer: R. Gawtry

Size: A   Sheet 1 of 1

J4
PAD

JH1
3
2
1
JHS3

C5
1 nF

J1

PHONEJACK STEREO

J5
PAD

C6
1 nF

J6
PAD

JH2
3
2
1
JHS3

C7
1 nF

J2

PHONEJACK STEREO

J7
PAD

C8
1 nF

J3

PHONEJACK STEREO