KURZWEIL

910366

rsp8
hub7

user's guide

RADIO AND TELEVISION INTERFERENCE

Warning: Changes or modifications to this instrument not expressly approved by Young Chang could void your authority to operate the instrument.

Important: When connecting this product to accessories and/or other equipment use only high quality shielded cables.

Note: This instrument has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This instrument generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this instrument does cause harmful interference to radio or television reception, which can be determined by turning the instrument off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
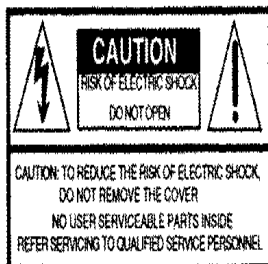
• Reorient or relocate the receiving antenna.

• Increase the separation between the instrument and the receiver.

• Connect the instrument into an outlet on a circuit other than the one to which the receiver is connected.

• If necessary consult your dealer or an experienced radio/television technician for additional suggestions.

NOTICE

This apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

AVIS

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE THE COVER
NO USER SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL

The lightning flash with the arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

Chapter 1
Using the RSP8

The RSP8 is a remote control for Kurzweil's KSP8 multi-bus signal processor that provides you convenient access to all of the KSP8's front panel functions. The RSP8 also gives you eight knobs for adjusting effect and other parameters, along with a joystick for surround panning. You can also configure the knobs and/or joystick to send MIDI controller values, to either a KSP8 or an external device.
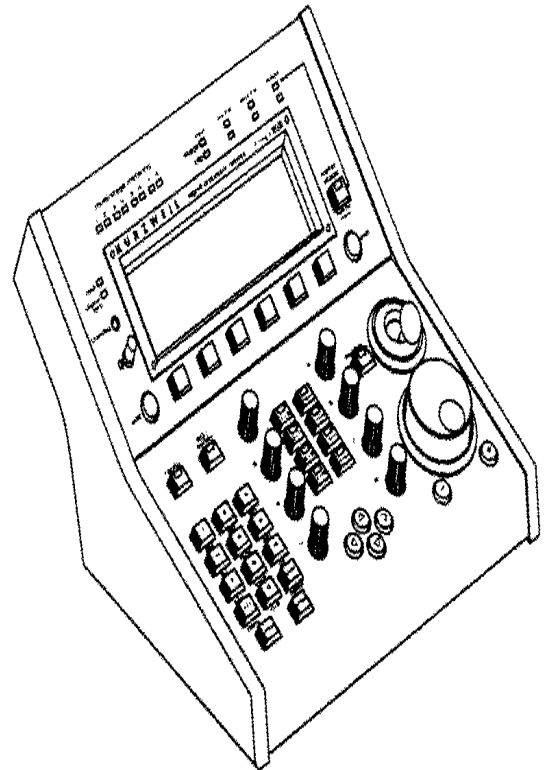
HUB7

Chapter 2 of this manual describes the HUB7 repeater/ concentrator, which lets you use a single RSP8 to control up to seven KSP8s, and also allows you to extend cable distances between the RSP8 and KSP8(s).

KSP8 Software

To make use of the RSP8, you need operating system software version 1.5 or higher running on your KSP8. If the version level of your KSP8 software (as shown on the KSP8 startup screen) is lower than 1.5, and you have not been provided with a software update, contact your Kurzweil dealer, or check for the latest updates by logging on to our web site:

http://www.kurzweilmusicsystems.com

For Other KSP8 Questions

This manual describes only KSP8 features that pertain to the RSP8 and HUB7. For information on all other KSP8 functions, refer to the *KSP8 User's Guide*.

Setting Up Your RSP8

The RSP8 lets you access up to seven KSP8s from any location that's convenient for you. You can either:

· set the RSP8 on top of a table or mixing desk (the bottom of the RSP8 is covered with a soft material that will not scratch surfaces).

· attach the supplied microphone stand adapter to the bottom of the RSP8, then thread the adapter onto the top of a standard microphone stand, as shown in Figure 1-1. You'll probably find this works best if you attach the adapter to the bottom of the RSP8 before you attach it to the mic stand.
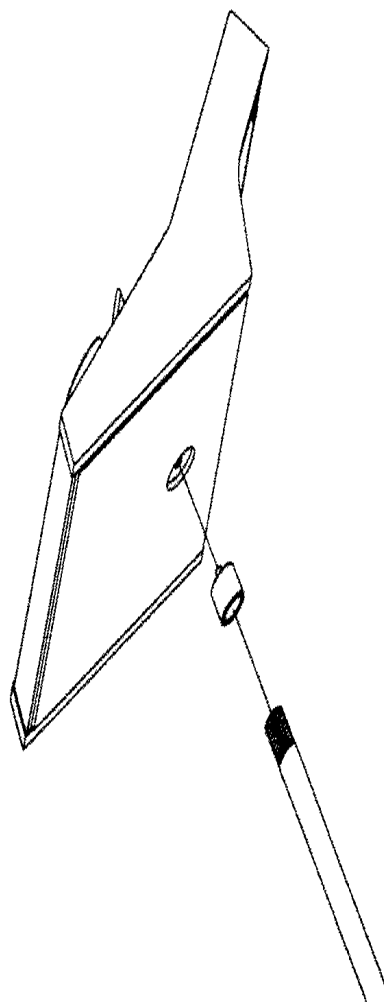

Figure 1-1. Attaching the RSP8 to a microphone stand.

Connecting Your RSP8

Your RSP8 is supplied with a fully-shielded 16 meter (52 foot) connecting cable. Plug one end of this cable into the Remote connector on the back of your KSP8, then plug the other end into the rear of your RSP8. Note that the flat side or arrow marking on the connector should face up on the RSP8 and down on the KSP8. The RSP8 is also powered through this cable so there is no separate power cord or adapter to worry about.

The KSP8 and RSP8 allow "hot plugging," which means that you can connect and disconnect the cable at any time, whether or not the power is on.

There is no power switch on the RSP8; it simply follows the power status of the connected KSP8. If you want your RSP8 to be fully off, simply unplug it. You may find it more convenient to use the standby feature (described in the *KSP8 User's Guide*), which reduces power consumption, extends display life, and allows for near-instant waking.

Aftermarket Cables

If the original cable becomes damaged or you would like to use a different length cable, you can buy replacements from sources listed on the www.kurzweilmusicsystems.com web site.

The required cable characteristics are:

A. MiniDin-8 male plug at each end
B. All 8 pins wired
C. "Straight through" or "one-to-one" wiring, NOT "cross-over" wiring
D. Overall braid and foil shield, wired to the plug's shell at each end
E. #24 gauge wires for length up to 16 meters (52 feet)
   #26 gauge wires for length up to 10 meters (33 feet)
   #28 gauge wires for length up to 6.5 meters (21 feet)
F. The 8 wires must be arranged as 4 twisted pairs paired as follows:
   Pins 1 and 8 or pins 1 and 2
   Pins 2 and 7 or pins 7 and 8
   Pins 3 and 4
   Pins 5 and 6

Note: Apple Macintosh "serial cables" will NOT work because they violate requirement C above (they are "crossover wired").

The wire gauge and length limits listed above are very important to ensure that adequate power is delivered to your RSP8. If in doubt, refer to the Diagnostics section of this manual for a voltage test you can run. To go longer than 16 meters – up to 300 meters – you will need to use a HUB7; see the HUB7 section for details.

Starting Up Your RSP8

When you first start up your RSP8, either by plugging in the connecting cable or by powering up the KSP8 to which it is attached, there will first be a short pause, after which all LEDs turn on for 1 second then turn off.

The display backlight then turns on gradually until it stabilizes; self diagnostics run, and the joystick calibration is read from non-volatile memory. After the RSP8 startup screen displays, notification that an RSP8 is connected is sent to the KSP8, and the KSP8 and RSP8 synchronize their displays.

At this point you can control the KSP8 from either its front panel or from the RSP8.

If the self diagnostics fail, you will be asked whether to continue or recalibrate the joystick. See Appendix A of this manual for details on how to proceed.

Adjusting the RSP8 Display

You can adjust the display contrast using the thumb knob to the left of the display. Adjust for the most pleasing contrast when viewing from your normal work position. It is normal for the setting to change slightly as your work surface and RSP8 warm up, so you may need to readjust the display after an hour or so.

By default the overall display and LED brightness will be at their maximum, which is suitable for a brightly lit institutional area. For a dimly lit studio you may desire to reduce the brightness. Enter Master mode by pressing the MASTER soft button (the button on the front panel that is just below the word MASTER on the RSP8's display), then press the UTIL soft button followed by the REMOTE soft button. Scroll down to the fourth item, Backlight, using the down cursor button. You can change the value using the Alphanumeric Pad or the Alpha Wheel to any value from 1 (minimum) to 127 (maximum). The brightness of the LEDs will also change to match the display, although they will not turn off completely.

Remote Configuration Menus

Most RSP8 features work automatically when you connect it to a KSP8. Some of the specialized functions, however, may require some configuration before you can use them.

To access the Remote Configuration Menus (either from the front panel of the KSP8, or from the RSP8 itself), press the MASTER soft button, then UTIL followed by REMOTE. Or, you can double press the rightmost two soft buttons beneath your KSP8 or RSP8's display for a shortcut to this page.

```
Remote:SETUP

Knob Mode  :Auto
Joy Mode   :Auto
3-way Mode :All axis
Backlight  :127
MIDI Xmit  :Local
SELECT SETUP KNOBS JOYSTIK        Done
```

Soft Buttons on the Remote Configuration Menus

You'll use SELECT when you have several KSP8s connected to the RSP8 through a HUB7. This soft button lets you choose the current KSP8 for RSP8 control.

SETUP, KNOBS, and JOYSTIK take you to the Remote pages of the same names. They're discussed in detail a little further on.

Press Done when you are ready to leave the Remote Configuration Menus.

Menu Items on the Remote:SETUP Page

The Remote:SETUP page includes the following:

- **Knob Mode** – Quick, MIDI, Auto
  Specifies whether the eight control knobs on the RSP8 control the values of Quick and EQ/Sends parameters (Quick), send MIDI data (MIDI), or do either (Auto) depending on the currently displayed page. Auto is the default. Although this item appears on the Remote:SETUP and Remote:KNOBS pages, it cannot be set separately for individual knob banks. When you change the setting of Knob Mode on any of the pages where it is displayed, the setting is changed globally.

- **Joy Mode** – Pan, MIDI, Auto
  Specifies whether the RSP8's joystick sends panning information (Pan), MIDI data (MIDI), or either (Auto) depending on the currently displayed page. Auto is the default. Although this item appears on the Remote:SETUP and Remote:JOYSTIK pages, it cannot be set separately for individual joystick banks. When you change the setting of Joy Mode on any of the pages where it is displayed, the setting is changed globally.

- **3-way Mode** – Front-back, All axis
  Sets the way that the joystick works when you use the "FX1-6 3-Way" mono-to-5.1 panner on the FXSEND page. **Front-back** keeps the front-back axis fixed, while **All axis** allows you to move the front back axis as well as the sound source position.

- **Backlight** – 1-127
  Controls the RSP8 display intensity. See "Adjusting the RSP8 Display" on page 1-6.

- **MIDI Xmit** – Local, MIDI, Both
  You can send MIDI data from the RSP8 only to the attached KSP8 (Local), to the KSP8's MIDI Out port (MIDI), or Both. When MIDI Xmit is set to Local or Both, the MIDI LED will light every time the KSP8 receives MIDI data.

Using the Joystick

The RSP8's joystick is a positioning control that gives you maximum flexibility when panning or sending MIDI controller values.

The most convenient place to start using the joystick is the Remote:JOYSTIK page, and the quickest way to get to this page is to press and hold the **joystick** button on the RSP8. The Remote:JOYSTIK page will appear, as shown below:
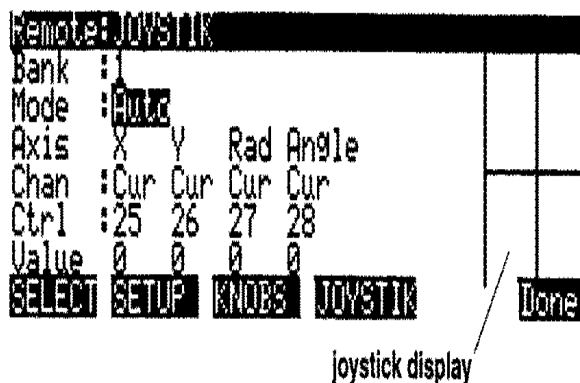
joystick display

By default, the joystick is off. To enable it, press the joystick button to the left of the joystick, and the LED within that button will light. The dot on the joystick display (at the far right of the screen) will jump to show the current position of the joystick. To disable the joystick, press the button again, and the LED will go out. Needless to say, the light must be on for the joystick to function.

The Remote:JOYSTIK Page

The parameters for the joystick are all displayed on the Remote:
JOYSTIK page. You can reach this page by either pressing the
JOYSTIK soft button on any Remote Configuration Menu, or by
pressing and holding the **joystick** button on the RSP8. Note that
being on this page doesn't make the joystick active; you still have
to press the **joystick** button on the RSP8 to do that.
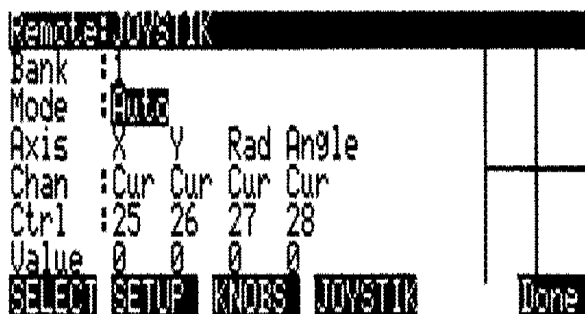
- **Bank** - 1-8
  For your convenience, you can configure and store up to
  eight banks of joystick settings. These are separate from the
  eight knob banks that you can also create.

- **Mode** - Auto, MIDI, or Pan
  Specifies whether the RSP8's joystick sends panning
  information, MIDI data, or either (Auto) depending on the
  currently displayed page. Auto is the default.
  Although this item appears on the Remote:SETUP and
  Remote:JOYSTIK pages, it cannot be set separately for
  individual joystick banks. When you change the setting of
  Joy Mode on any of the pages where it is displayed, the
  setting is changed globally.

- **Axis** - X, Y, Rad, Angle *(display field only)*
  These are the labels for the four columns showing the values
  that the joystick sends: X and Y axis position values, as well
  as the numeric values for Radius and Angle. Generally a
  panner will use two of these axes together: X and Y, or Radius
  and Angle, depending on the panner. All four are available at
  all times, however, so you can use any or all of them as
  controllers when you use the joystick to send MIDI.

- **Chan** - Off, 1-16, Cur, Stu
  For MIDI or Auto mode, sets the MIDI channel for MIDI data
  sent from this axis. "Cur" means that the channel used by the
  current FXBus will automatically be selected. "Stu" tracks the
  studio channel (as set on the Master page).

- **Ctrl** - 0-127
  (MIDI or Auto mode): specifies MIDI controller for this axis.

  The default MIDI controllers sent by the joystick are:

X:	25	Rad:	27
Y:	26	Angle:	28

- **Value** - 1-127 *(display field only)*
  Displays the current numeric value of X, Y, Rad, or Angle,
  based on the joystick position.

What the Joystick Transmits

The RSP8's joystick can transmit 4 values: X, Y, Rad and Angle. You can configure these values to:

* control surround sound panners on the KSP8's FXSEND pages

* send MIDI controller values to KSP8 parameters

* send MIDI to external gear.

The chart below summarizes the MIDI and pan values you can send with the joystick. Note that zero is always where the handle is pointing upwards (the 12 o'clock position).
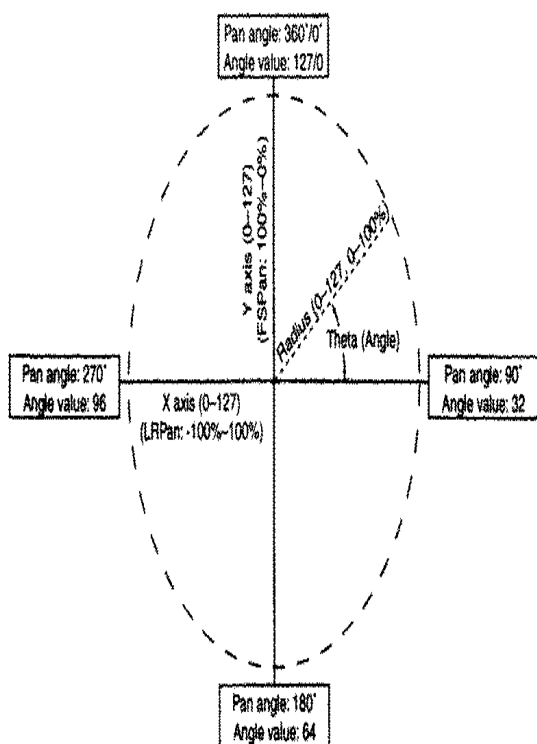

Figure 1-2. MIDI and pan values sent by the RSP8 joystick.

X and Y perform exactly as you might expect, describing the vertical and horizontal position of the joystick handle. X is left-to-right movement of the handle, with the far left being the minimum numeric value, and the far right being the maximum. Y

is the bottom-to-top position. In other words, X and Y basically describe a point within a square. Because the joystick has a circular base, however, the combinations of X and Y that are "in the corners" are not generally available.

The other 2 parameters, Rad and Angle, also describe the position of the joystick handle, but using polar geometry: the location of the point in the circle is expressed as a distance from the center and an angle.

Rad is short for radius, which indicates the distance of the handle from the center of the circle. When the joystick is centered in its ring, the radius is 0. As you move the joystick in any direction, the value increases, until it reaches the outer ring, where Rad will be at a maximum (127).

Angle, sometimes called **theta**, tells the angle of the handle. As you move the joystick clockwise, the value of angle will increase; when you move the joystick counterclockwise, the angle will decrease. The value is greatest just before the 12 o'clock position, where it jumps abruptly down to 0. When the Angle controller is connected to the Angle parameter in a panner, there does not appear to be an abrupt change, because of the circular behavior of the panner (i.e., 0 degrees is the same as 360 degrees). The panner wraps smoothly back around to center, even though the Angle controller value jumps from 127 to 0.

You can play with the joystick while on the Remote:JOYSTIK page to get a sense of how each value changes when you move the handle. Following the outer ring with the handle allows you careful control of the angle parameter, while the radius will be at maximum. If you center the joystick in the ring, you can reduce the radius to nearly zero, but controlling the angle parameter will be more difficult.

The numeric value generated by the joystick will be the same whether you are using the joystick for panning or MIDI. The parameters that are being controlled inside the KSP8, however, and how they are interpreted, will depend on the mode you have selected. The following sections describe the three joystick modes: Pan, MIDI, and Auto.

Joystick Modes

You can set the joystick to be in Auto, MIDI, or Pan mode.

Auto Mode

Auto is the default joystick mode, and means that the joystick automatically performs panning and / or MIDI capabilities, depending on the currently displayed screen. When the currently displayed page is a Studio:FXSEND page for a 5.1 panner, for example, the joystick will perform panning.

Pan Mode

In Pan (or Auto) mode, you can use the joystick to perform surround sound panning. Depending on the 5.1 panner you select, the KSP8 will use either the X and Y or the Radius and Angle values sent by the joystick to position the sound source.

First make sure that the current studio is set up to use one of the 5.1 panners. Press the EQ/Sends button, then check the FXSEND page for the current studio to see a joystick display just like the one on the Remote:JOYSTIK page. If the joystick display does not appear on the right side of the FXSEND page, double check to see if you've selected one of the 5.1 panners (FX1-6 X-Y, FX1-6 R-Theta, or FX1-6 3-Way). Keep in mind, too, that the choice of panners available to you on the FXSEND page will depend on the input grouping you have selected on the Studio:INGRP page.

See the *KSP8 User's Guide* if you need more information about setting up a 5.1 studio.

When performing surround panning, what you see on the joystick display will depend on the type of panner you have selected:

On a **mono-to-5.1** panner, the positioning dot moves with the handle and represents the sound location. With the 3-Way panners, three dots appear on the joystick display; these represent front (top), back (bottom), and sound position. Use the 3-Way Mode parameter on the Remote:SETUP page to specify whether or not you want the front and back positions to move as you pan.

For a **stereo-to-5.1** panner, two dots are shown. The joystick points at the center of the image, and unless the width is set to 0, the center of the image is a point between the two dots.

With **5.1-to-5.1** panners, there are five dots representing the surround image. The joystick points at the center of the image, which is the location of the center channel.

The following controllers match the way that the three types of 5.1 panners act when controlled directly:

X-Y Panner:

Joystick X axis = LRPan

Joystick Y axis = FSPan

R-Theta panner:

Joystick Rad value = Rad

Joystick Angle (Theta) value = Angle

3-Way panner:
When 3-Way mode is Front-Back, only FSPan is changed by the joystick.

Joystick X axis = LRPan

Joystick X axis = SurLR

Joystick Y axis = FSPan

MIDI Mode

When you use the joystick to send MIDI controller data to the KSP8, you will need to route that data to the desired parameters. Do this using Studio and Chain MODs, as described in the *KSP8 User's Guide*. MODs let you route the joystick (or any MIDI controller) to any parameter in the unit. Each axis can send on a different MIDI channel. Furthermore, you can assign each axis to multiple parameters on the same channel.

Before you send MIDI from the RSP8 to the KSP8, make sure that the MIDI Xmit parameter on the Remote:SETUP page is set to "Both" or "Local," since the "MIDI" setting sends MIDI straight to the KSP8's MIDI Out port. If you're unsure whether the joystick is sending MIDI to the KSP8, first make sure that the LED in the **joystick** button is on, then check the **midi** LED. If the **midi** LED lights when you move the joystick, then you're sending MIDI to the KSP8. (It will not light if MIDI Xmit is set to MIDI, because the MIDI messages are passing through the KSP8 without actually being received by it.)

MIDI messages will also show up in the MIDIscope utility, which you can reach quickly by double pressing the middle two soft buttons (labeled **utility**) then pressing the **MIDI** soft button. See the *KSP8 User's Guide* for more information about MIDIscope.

Using MIDI to Record Panning Information

Use MIDI to automate panning by recording joystick moves from the RSP8 and KSP8 to an external sequencer. You can subsequently play back the prerecorded pan moves from the sequencer to the KSP8.

Because there are up to 8 input/EQ buses in a Studio, when you wish to control one of them explicitly, it is necessary to "set up a MOD" in the studio to patch the desired control in to the desired parameter. Once you have set up your modulators to use a MIDI controller such as the joystick, you can use an external MIDI sequencer to record and play back panning movements. Here's how:

Go to the Remote:SETUP page by pressing the rightmost two soft buttons together. Set Joy Mode to MIDI, and set MIDI Xmit to Both. This enables transmission of exclusively MIDI data from the joystick to both the local KSP8 and the MIDI Out port on the KSP8. Now press the **JOYSTIK** soft button.

Assuming you have not yet customized the joystick settings, you will see the screen shown on page 1-10. Switch the bank parameter to 2, and you will see that all four Channel values change from Cur (current FXBus channel) to Stu (Studio channel). Since the Studio MIDI channel defaults to 9, you will be transmitting the MIDI data on channel 9. (The Studio channel may be changed on the Master page.)

For the first example, we will automate a stereo panner, so we will only need a single MIDI controller, presumably the joystick's X-axis, so side-to-side motion of the joystick will pan the signal side-to-side. Note that the X-axis Ctrl value is set to 25, meaning MIDI CC#25. You may wish to disable transmission of the Y, Rad, and Angle controllers by setting the Chan parameter for each column to Off. Alternately, you can leave them on, but you will record excess data into your sequencer and will probably want to remove it later. Now press Done to exit the Remote menu.

Next, select Studio 1, 4SterIn>4SterFX. To see what is selected as a panner for input buses 1-2, press **EQ/sends**, then **FXSEND**, then the **1-2** button. You should see the output of EQ1-2 being sent to FXbuses 1-2 using the "FX1-2 Bal" block. Press the **EQ/sends** button to go back to the main Studio view.

Next, press the rightmost button, labelled **more>** to go to the S MOD pages.

Press S MOD1. Across one line on the screen, set the Bus column to In1-2, the Param column to Send1Bal, the Adjust value to -100% (hard left), the Source to MIDI25, and the Depth to 200% (-100% + 200% = 100%, or hard right).

The screen should look like this:

```
Studio:S MOD1
Bus:   Param:    Adjust:  Source:  Depth:
In1-2  Send1Bal  -100%    MIDI25    200%
None   None               Off
None   None               Off
None   None               Off
None   None               Off
 <more  S MOD1  S MOD2  S MOD3  S MOD4  more>
```

Now press the **store** button and save the studio by either pressing the **store** button again (to save wherever the dialogue suggests) or by selecting a new ID# then pressing **store** again.

Make sure the joystick is enabled by pressing it once. The LED should come on to indicate that it is on. Play some audio into your KSP8's 1-2 analog inputs. Move the joystick side-to-side to hear your input signal pan accordingly. If it does not appear to work, verify the above steps. Make sure that you are sending on the correct channel (the studio channel or "Stu") on the Remote:JOYSTIK page, and verify that the Joy Mode is MIDI and MIDI Xmit on the Remote:SETUP page is set to Both. (Local will work audibly but will not be transmitted to the MIDI Out port, so you won't see the MIDI data in your sequencer.) Also verify that the Studio MOD is set up correctly, as shown above, that the controller sent on the JOYSTIK page matches that set on the S MOD page, and verify that the joystick LED is on. If you are using a digital input, say, the base AES pair, you won't be hearing any audio at all, so press the **config** button and set In 1 and In 2 to AES/EBU 1L and AES/EBU 1R, respectively.

Now that your MOD is set up and working, press record on your sequencer and record some pan movements. You should end up recording a stream of MIDI25 controller messages on MIDI channel 9. When you play back the sequence, the KSP8 will "hear" those messages on its studio channel, and will respond in real-time because of the S MOD you set up.

To record another pan movement in the same studio, but on another bus, simply change the joystick X-axis controller on the Remote:JOYSTIK page to send a different MIDI CC#, and use that as the source for your second Studio MOD.

To record pan movements for a surround panner, follow the same basic steps, with the following differences:

1. Select Studio#9 6 MonoIn>5.1 FX+ instead of Studio#1. Set up your incoming signal so that it is a mono signal coming in on Input 1. You can do this from your mixer, or on the INSEL page by turning off anything other than In 1. As before, make sure that if you are using a digital input, you select the proper source, such as AES/EBU 1L for Input 1. Select the panner you want to use on the FXSEND page (FX1-6 X-Y, FX1-6 R-Theta, or FX1-6 3-Way).

2. You will need two controllers, either X and Y (for the X-Y panner), or Rad and Angle (for the R-Theta panner). As in the previous example, you may want to disable the controllers you are not using on the Remote:JOYSTIK page. (You may only need the Y-axis control for controlling the 3-Way panner as it was intended to work, with a fixed front and rear position and a single front-to-back controller for the FSPan parameter, to move a signal along a path from the front position (LRPan) to the back position (SurLR).)

Your S MODs will look like this:

For the X-Y Panner:

```
Bus:  Param:      Adjust:  Source:  Depth:

In1   Send LRPan  -100%    MIDI25    200%
In1   Send FSPan   100%    MIDI26   -100%
```

For the R-Theta panner:

```
Bus:  Param:       Adjust:  Source:  Depth:

In1   Send Rad     0%       MIDI27   100%
In1   Send Angle  0.0deg    MIDI28   360.0d
```

For the 3-Way Panner (suggested):

```
Bus:  Param:      Adjust:  Source:  Depth:

In1   Send FSPan  100%      MIDI26 -100%
```

Using MIDI for Effect Modulations

You can also use the joystick to control effect parameters within a KSP8 chain. In this case, the MIDI controller will be patched in as a Chain MOD (C MOD) instead of a Studio MOD, as in the previous example. Still, these effect modulations may be recorded and played back with an external MIDI sequencer in much the same way as described above, with some minor differences.

First, each FXBus has its own MIDI channel, in contrast to the single Studio channel in the panning example. These MIDI channels are set for each bus on the FXBUS page; by default FXBus1 is MIDI channel 1, FXBus2 is MIDI channel 2, etc. Only when all FXBuses are configured as mono buses, however, do all the channels get used. With the KSP8 set up as four stereo buses, for example, the active MIDI channels for the buses are 1, 3, 5, & 7, corresponding to the first bus of each stereo pair. In such a configuration, the other channels are not used.

As before, go to the Remote:SETUP page by pressing the rightmost two soft buttons together. Set Joy Mode to MIDI, and set MIDI Xmit to Both. This enables transmission of exclusively MIDI data from the joystick to both the local KSP8 and the MIDI Out port on the KSP8. Now press the JOYSTIK soft button. Assuming you have not yet customized the joystick settings, you will see the screen shown on page 1-10. Set the bank parameter to 1, and you will see that all four Channel values will say "Cur" (current FXBus channel). By using the Current FXBus channel setting, the RSP8 will know which FXBus is currently selected, and will send MIDI data on the MIDI channel that is specified for that bus on the FXBUS page.

Many of the chains that come installed in your KSP8 have some MIDI controllers, usually the X and / or Y axes (MIDI 25 and MIDI 26) assigned as Chain MODs, so that you can quickly see and hear the real-time MIDI capabilities of the KSP8. Let's look at a couple of Chains to see how Chain MODs are assigned, and to allow you to try out the joystick as a multi-dimensional effect controller.

For simplicity, we will look at stereo chains only. First, choose studio #1, 4SterIn>4SterFX, and make sure you have audio at reasonable levels going into your KSP8 on channels 1-2, with audible output of KSP8 output channels 1-2 through your monitoring system. Now press the FXBUS soft button to bring up the FXBUS page for buses 1-2. You may need to press the 1-2 bus select button to make FXBus1-2 the active bus. Cursor down to the Type parameter and set it to Chain. Now cursor to the chain field and select chain #1, Phaser Cubed. Make sure the joystick is enabled by checking the LED in the joystick button. Press the joystick button once to activate the joystick if you need to. At this point, you should be able to move the joystick around and hear the phaser effects in the chain change in response to the position of the joystick. (As a rule of thumb for chains, the lower-left position is generally considered the default, or "minimum" position, with the upper-right as the "maximum" position.) To see how the joystick is patched into this chain, press the edit button, then the more> soft button, followed by the C MOD1 soft button. You should see a page that looks like this:

```
Chain:C MOD1
Box: Param:        Adjust:  Source:  Depth:X
Box3 CenterFreq    1976Hz   MIDI25   3600ctX
Box3 LFO Rate      0.32Hz   MIDI26   8.50HX
Box2 FLFO Rate     0.25Hz   MIDI26   4.60HX
Box2 CenterFreq    5588Hz   MIDI25   6000ctX
Box2 NLFO Rate     0.70Hz   MIDI26   6.20HX
<more  C MOD1  C MOD2  C MOD3  C MOD4  more>
```

You can see that the several rate parameters are being controlled by the Y-axis (MIDI 26) and the center frequencies for two of the phaser presets are being controlled by the X-axis (MIDI 25). For more information on Chain MODs, see the KSP8 User's Guide.

Now that you've proven that you can control effect parameters in real-time with the joystick, you can also record your controller movements into your external MIDI sequencer. Just press record on your sequencer and move the joystick. You should record a series of MIDI controllers (whichever ones are enabled on the Remote:JOYSTIK page) on MIDI channel 1. Then when you play the sequence back, those controllers will cause the Chain MODs shown above to respond in the same way you heard when you recorded the movements.

To record controller movements for chains on other buses, simply change to another bus, say, FXBus3-4. Because we set the channel for the controllers to Cur (current) on the Remote:JOYSTIK page, the controller data will be transmitted to the current bus, FXBus3-4, and will appear in your sequencer on MIDI channel 3.

KSP8 presets do not contain any modulation data, so any effect modulations must be done within a chain. If you want to control a parameter within a preset, put that preset into a chain, even if it is the only box in the chain, and then use the C MOD pages to patch in whatever control you want.

As stated earlier, many of the chains provided with the KSP8 have some MODs patched in. Scroll through the chains and experiment with the joystick to see what kinds of things are possible.

Some other examples of chains with joystick MODs are:

- **Chain #68 Wide Slow Pan** has only a single MOD, which uses the Y-axis (MIDI26) to control the rate of the panner. Note that this is a pan algorithm within a chain, as opposed to the dedicated panners at the studio level.

- **Chain #8 Reverb Morpher** has only 2 MODs, but utilizes FUNs (functions) inside the chain to combine MIDI control data from the joystick with an LFO inside the chain. In the lower-left quadrant, the LFO automatically controls the two reverb presets in the chain, "morphing" from a small room ambience to a larger space, and so on. Moving the joystick to the lower-right quadrant speeds up the LFO. In the upper two quadrants, the LFO is disabled and you control the morphing yourself, with the small space in the upper left and the larger space in the upper right.

Using the Control Knobs

The RSP8's control knobs let you conveniently control the eight parameters on the currently displayed QUICK page, as well as send MIDI controller data to control Chain or Studio MODs.

The Remote:KNOBS Page

The Remote: KNOBS page is where you see and set parameters for the control knobs.

- Bank - 1-8
For your convenience, you can configure and store up to eight banks of control knob settings. These are separate from the eight joystick banks that you can also create.

- Mode - Auto, MIDI, or Quick
Specifies whether the eight control knobs on the RSP8 control the values of Quick and EQ/Sends parameters (Quick), send only MIDI data (MIDI), or do either (Auto) depending on the currently displayed page. Auto is the default.
Although this item appears on the Remote:SETUP and Remote:KNOBS pages, it cannot be set separately for individual knob banks. When you change the setting of Knob Mode on any of the pages where it is displayed, the setting is changed globally.

- Knob - 1-8 (display field only)
These columns show the settings for the eight control knobs.

- **Chan** - Off, 1-16, Cur, Stu

  For MIDI or Auto mode, sets the MIDI channel for data sent from this knob. "Cur" means that the channel used by the current FXBus will automatically be selected. "Stu" tracks the studio channel, as set on the Master page.

- **Ctrl** - 0-127

  For MIDI or Auto mode, specifies a MIDI controller for this knob. The default MIDI controllers for the eight knobs are 76, 77, 78, 79, 86, 87, 88, and 89.

- **Value** - 0-127 *(display field only)*

  This is the numeric value of the current knob position.

Changing Quick Parameters with Control Knobs

In Auto or Quick mode, you can use the RSP8's control knobs to control the eight parameters on the currently displayed QUICK page. All you need to do is make a Studio:QUICK or Chain:QUICK page the currently displayed page. Quick pages have up to eight parameters per page, and the value of each parameter on the page can be controlled with the corresponding knob on the RSP8. For example, you can change the value of the second parameter in the left column by moving the second knob in the left column of control knobs.

The illustration below shows control knob 1 being used to change the value of the first parameter (Wet/Dry) on a Studio:QUICK page.
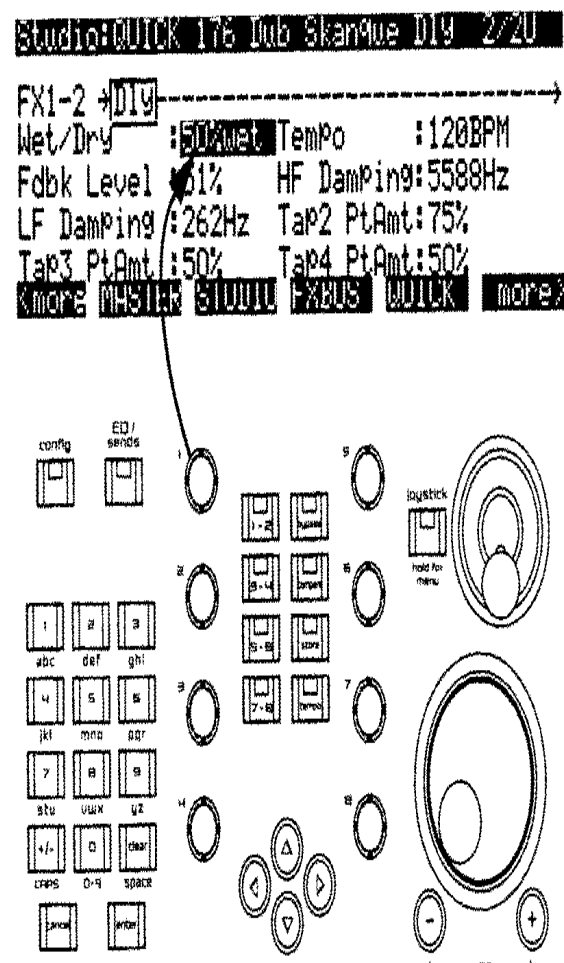

Figure 1-3. Using Control Knobs on a QUICK page.

Quick mode also enable you to change EQ/Sends parameters with the control knobs. The page displaying the parameter(s) you wish to control must be the current (i.e., visible) page on the screen.

Use the RSP8 knobs to control the items on the screen, as shown in the illustration below. Note that the top knob in each column controls the selection in the box. The bottom three knobs in each column control any parameters listed below the box.
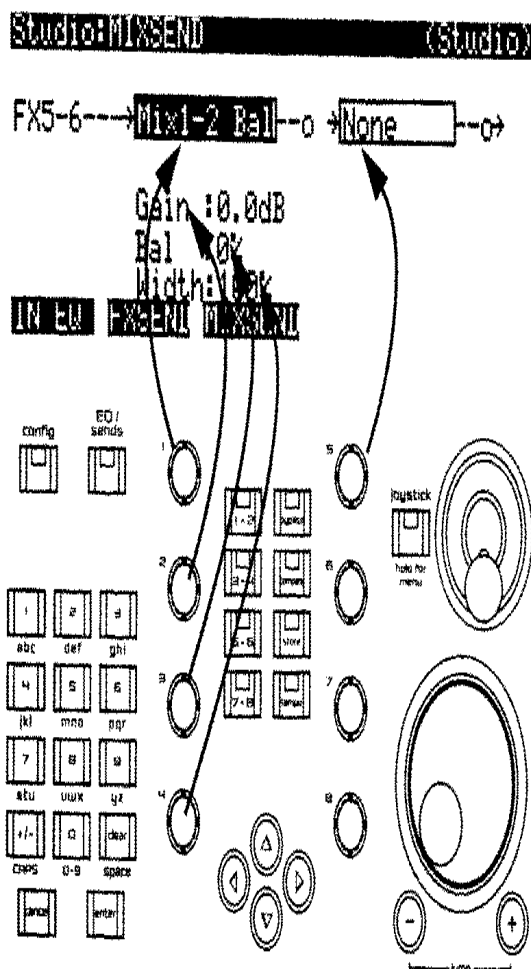

Figure 1-4. Using Control Knobs on an EQ/Sends page.

Sending MIDI Data with Control Knobs

In Auto or MIDI mode, you can use the control knobs to send MIDI data either to MODs on an attached KSP8, to the KSP8's MIDI Out port, or to both places (depending on the setting of the MIDI Xmit parameter on the Remote:SETUP page). You can, for example, control the value of any KSP8 algorithm parameter through Chain MODs.

Unlike Quick mode, MIDI mode sends its data regardless of the currently visible screen on the RSP8/KSP8. Keep in mind, however, that to get the full range of MIDI controller values (0 to 127) takes several turns of the knob.

The default MIDI controllers sent by the control knobs are:

1:	76	5:	86
2:	77	6:	87
3:	78	7:	88
4:	79	8:	89

Intuitive Entry with Control Knobs or Joystick

When setting up Studio or Chain MODs, there's a handy intuitive entry shortcut that you may want to use. (Intuitive entry is covered in detail in the *KSP8 User's Guide.*) Highlight the appropriate Source field on an S MOD or C MOD page, then hold the **enter** key and move the controller you want to use (e.g., one of the control knobs) to automatically select that MIDI controller. Don't forget to set Knob Mode (Remote:SETUP page) to Auto or MIDI if you're doing this, by the way.

Intuitive entry works with the joystick, too. However, since the joystick sends four different controllers (MIDI 25 through MIDI 28 for X, Y, Rad, and Angle, respectively), make sure that you've actually entered the controller you want to use when employing this method. Remember that you can always edit the Source parameter using the alphanumeric keypad.

When setting up Studio MODs, you'll want to make sure that the MIDI channel values on the Remote:JOYSTIK or Remote:KNOBS page are set to "Stu" or that they match the StudioChanl value on the Master page. For Chain MODs, you'll want to make sure that the MIDI channel values on the Remote:JOYSTIK or Remote:KNOBS page are set to "Cur" or that they match the MIDICh value on the given FXBus.

Chapter 2
Using the HUB7

Adding a HUB7 to your KSP8/RSP8 setup allows you to access up to 7 KSP8s from a single RSP8. The HUB7 also serves as a repeater, allowing you to greatly extend the cable distance between KSP8s and an RSP8.

The illustration below shows the HUB7 front panel, including all of the indicators and ports:

- The 7 KSP8 ports connect to up to 7 KSP8 and compatible units.
- The Port Selected LED glows red if the KSP8 connected to that port is currently selected.
- The RSP8 port connects to the single RSP8 in the system or to another HUB7.
- The RSP8 port LED glows red if power is being applied to the connected RSP8 or second hub.
- The power jack accepts power from a DC power adapter to operate the HUB7 and connected RSP8.
- The Power LED indicates that the adapter is connected and operating.
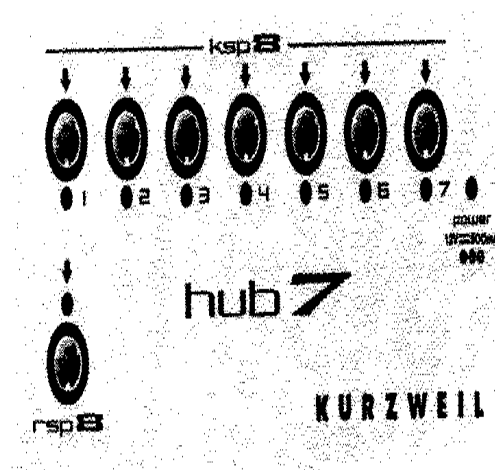
The HUB7 comes with a pair of two meter cables.

Which KSP8 Are You Talking To?

The Remote:SELECT page lets you activate any remotely attached KSP8. Press the SELECT soft button on any Remote page to bring up the Remote: SELECT page. The host number of the currently active KSP8 will be prominently displayed on this page, and there will be soft buttons for each of the other hosts (KSP8s) attached to the HUB7.

The quickest way to move between hosts in a multiple-host environment is this shortcut: using the numeric keypad on the RSP8, hold down **cancel** then press the port number of the desired host.

The host number, by the way, is simply the number of the HUB7 port to which the KSP8 is attached. So if you attach a KSP8 to Port 2 of the HUB7 it will be known as Host 2. If you were to subsequently unplug that KSP8 and plug it into Port 4, the RSP8 would now see it as Host 4. In order for all the devices to correctly recognize each other, however, it may be necessary to restart the HUB7 or KSP8(s) after you've swapped cables.

Standby and Multiple Hosts

The KSP8's Standby feature is a convenient way to turn off a unit's display, reduce its power consumption, and mute its output. When you're controlling multiple hosts from an RSP8, however, you need to indicate which host(s) you want to stand by. Using the soft buttons, as shown below, you can stand by the current host, all hosts other than the current one, or all hosts including the current one.

Which host(s) would you like to standby?

Curr   Others   All   Cancel

Press any key on the RSP8 to wake up the current host.

Configuration Examples

The examples in the three figures that follow show three possible ways to configure your system using one or two HUB7s:

Repeater for long cable

In this configuration, the HUB7 is placed near the RSP8. A long cable, up to 300 meters (980 feet), then runs from the KSP8 to one of the KSP8 ports of the HUB7. The RSP8 is then connected using its default 16 meter cable plugged into the RSP8 port of the HUB7. The HUB7's power adapter (not shown), supplies power for both the HUB7 and RSP8; you can plug it into any convenient outlet near the HUB7.
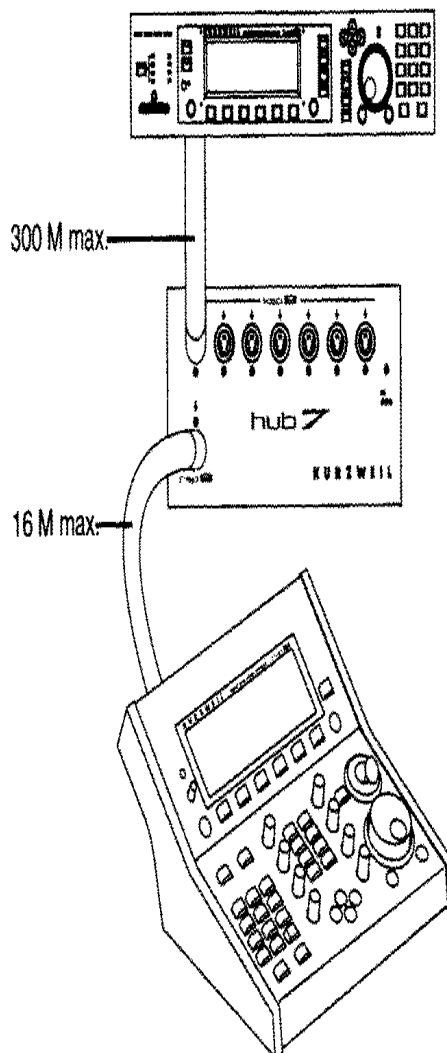

Figure 2-1. HUB7 as repeater.

Concentrator for up to 7 KSP8s

This is similar to the example above except that more KSP8s are added. Each added KSP8 connects to a KSP8 port on the HUB7 up to a total of 7. Any combination of the KSP8 ports may be used. When the system powers up, the KSP8 in the lowest numbered port will be selected by default.
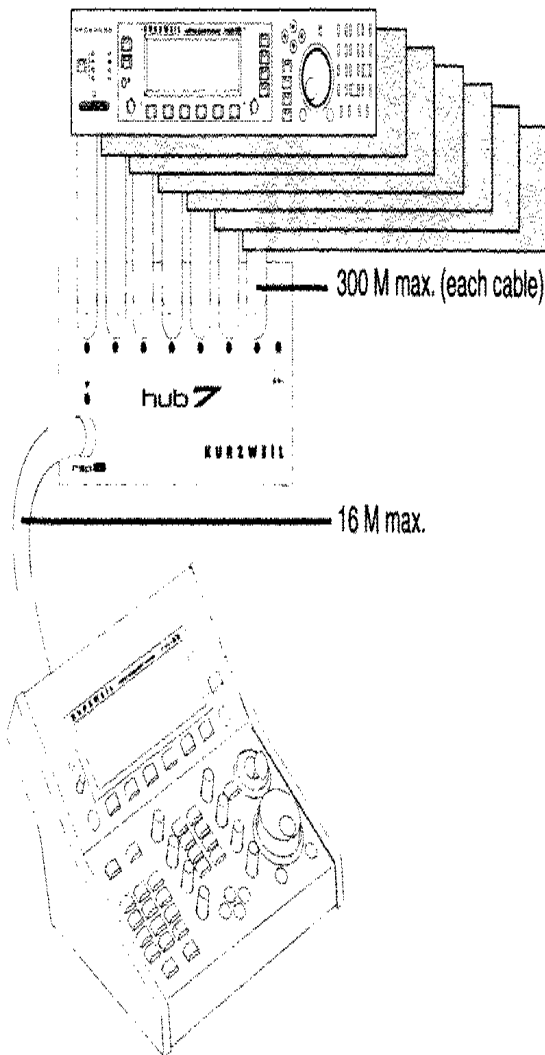

300 M max. (each cable)

16 M max.

Figure 2-2. HUB7 as Concentrator.

Concentrator and Repeater

When there are many KSP8s in a cluster and all are far away from the RSP8, you can use a pair of HUB7s to connect up to six KSP8s, as shown in Figure 2-3.

300 M max. (each cable)

Port 7 is connecting the two hubs, so it is not available for connecting a KSP8.
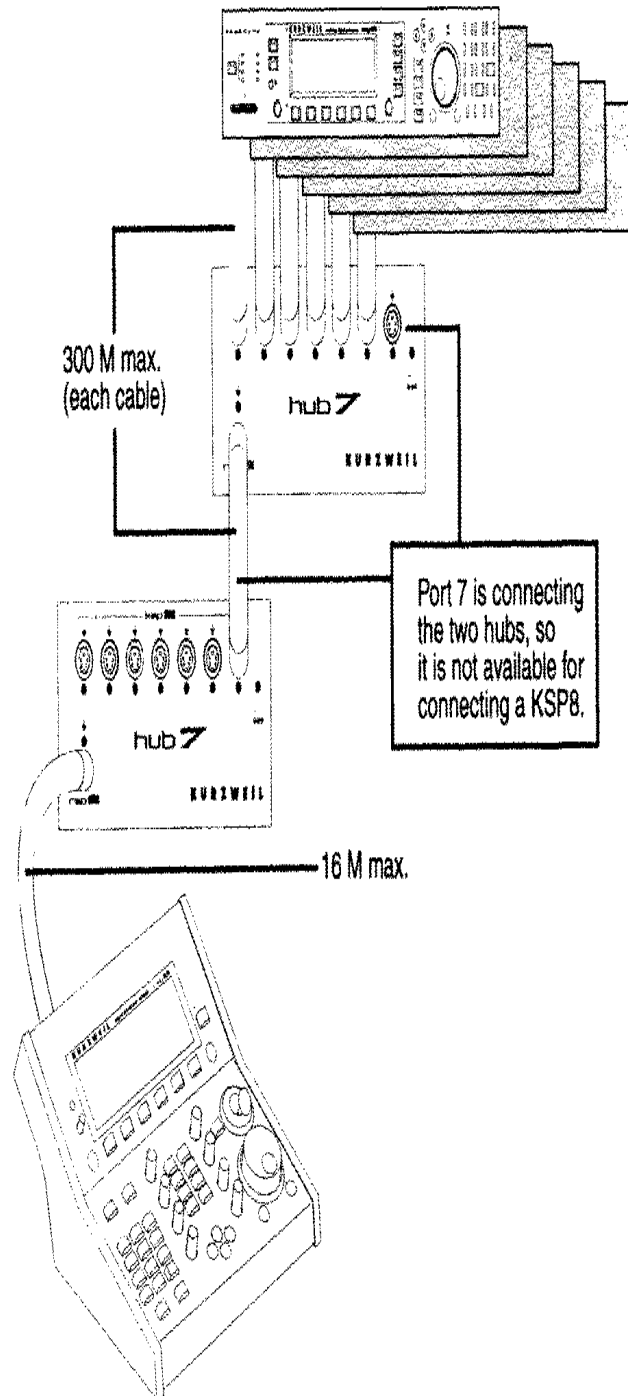
16 M max.

Figure 2-3. HUB7 used as concentrator and repeater.

The first HUB7 is near the KSP8 cluster and acts as a concentrator while the second HUB7 is near the RSP8 and acts as a repeater and power source (although both HUB7s must be plugged into outlets). The advantage is that only one long cable is necessary instead of several long cables. Note that in this case only KSP8 ports 1-6 on the concentrator hub may be used, since the repeater hub uses port 7.

RSP8 power in all of these configurations is controlled automatically. If at least one KSP8 is powered, then the RSP8 will also be powered. When all KSP8s are powered off (even if there is only one), then the RSP8 will be powered off. The hubs are always on however.

The RSP8 and HUB7s work together at power up to automatically detect the connection pattern. There are no configuration switches or menus to worry about. Although hot plugging of any of the cables is OK, if the connection pattern is rearranged, you should cycle power so the system can adapt.

HUB7 Connecting Cables

The rules that apply to RSP8 connecting cables (see page 1-4) also apply to HUB7 connecting cables, with two exceptions. Since cables connecting to HUB7 inputs do not carry power, they may be much longer and the wire gauge does not matter. Even the smallest common wire gauge, #28, can handle the power requirements for a 300 meter cable.

However, since it is usually impossible to tell which connector pins form pairs in aftermarket cables, it is strongly suggested that hub cables be ordered through dealers listed on the Kurzweil Music Systems web site.

You'll also find instructions for building your own cables at www.kurzweilmusicsystems.com.

HUB7 Power Adapter

If the hub power adapter should become lost or defective, replacements are available from your Kurzweil dealer. Aftermarket adapters may also be suitable if they conform to the following specifications. (NOTE: European customers must obtain specially filtered replacements from Kurzweil only.)

. Voltage: 9 - 12 volts DC
. Current: 500mA minimum
. Plug: Coaxial DC power plug, 5.5mm OD, 2.0mm ID, center positive

CAUTION! The HUB7 and its power adapter generate significant heat while operating. Do not hide under a carpet or place where ventilation is severely restricted. Allow at least 1 inch clearance above the adapter and HUB7 unit for air flow.

Appendix A
RSP8 Diagnostics and
Troubleshooting

RSP8 Diagnostics

Your RSP8 has extensive built-in diagnostics that let you verify proper operation and also isolate and characterize problems.

To start diagnostics immediately at power-up:

1. With connecting cable unplugged, press and hold the 4, 5, and 6 buttons.

2. While continuing to hold, plug in the connecting cable.

3. Continue to hold until all of the LEDs flash the second time then release.

4. The Main Diagnostic Menu and RSP8 software version number will be displayed and you can select a diagnostic to run.

To start diagnostics during normal operation:

1. Press and hold the 4, 5, and 6 buttons.

2. Continue to hold until all of the LEDs flash once then release. This requires up to 3 seconds.

3. The Diagnostic Menu and RSP8 software version number will be displayed and you can select a diagnostic to run.

To Exit diagnostics:

1. If the Diagnostic Menu is showing, press the rightmost soft button labeled EXIT.

2. If the Controls diagnostic is running, press soft buttons 3 and 4 (marked EXIT) together. That will take you to the main diagnostic menu.

Exit from the diagnostics will briefly show the RSP8 startup screen then resynchronize to the currently selected KSP8's screen.

Main Diagnostic Menu

The Main Diagnostic Menu lets you select and run one of eight individual hardware diagnostics. You may also run an interactive control panel diagnostic and an automated burnin sequence. The soft buttons under the display control the main diagnostic menu as follows:

CONTROLS – Starts the interactive Control Panel diagnostic.

SELECT – Moves the highlight among the available diagnostics.

RUN – Runs the currently selected individual hardware diagnostic.

BURNIN – Runs all of the diagnostics in sequence repeatedly.

EXIT – Exit diagnostics and return to normal operation.

For the individual diagnostics, press RUN to start the diagnostic indicated by the highlight. A short time later the result, either Pass or Fail, is shown. The soft button labels then change to RERUN and OK. Pressing RERUN will rerun the diagnostic while OK will restore the Main Diagnostic Menu labels.

Burnin Diagnostic

Burnin runs all of the individual diagnostics except EEProm Init repeatedly until stopped or there is a failure. Pressing the BURNIN soft button starts the sequence with the first individual diagnostic, Timer Test. The soft button labels change to show a single STOP button which, if pressed and held until the currently running diagnostic completes, will exit the burnin sequence. After all of the diagnostics in the cycle have run, the cycle count at the top right corner will increment.

In case of failure, the soft button legends change as follows:

RETRY – Rerun the current diagnostic

STOP – Stop burnin and return to the Main Diagnostic Menu.

SKIP – Skip this diagnostic and continue, skipping it again each cycle.

CONTINUE – Continue running the burnin and retry this diagnostic next cycle.

The Skip option is handy if you wish to continue burning-in even though one of the tests is always failing.

Description of the Individual Diagnostic Tests

Timer Test

Checks the functioning of the hardware timers that are part of the RSP8's internal microprocessor. Each of the three hardware timers is compared to a software simulated timer and passes if the timing result is the same. When complete the diagnostic displays either PASS or FAIL. A failure indicates a problem with the microprocessor chip on the CPU board.

EPROM Test

Verifies the accuracy of the software EPROM content by calculating the sum of all of its data and comparing to a stored checksum value. When complete the diagnostic displays the checksum and either PASS or FAIL. A failure indicates a problem with the EPROM chip on the CPU board.

RAM Test

Writes a pseudo-random pattern into the 32K of RAM then reads it back and checks against the same pseudo-random sequence. Several passes with different data are performed. When complete the diagnostic displays either PASS or FAIL. A failure indicates a problem with the RAM chip on the CPU board.

EEPROM Test

Verifies that the small non-volatile memory used to hold joystick calibration and other permanent data has retained valid data from the last time this test was run. It also verifies that this data can be successfully updated. Note: If the EERPOM chip has been changed, the EEPROM Initialize test must be run first (see below). When complete the diagnostic displays either PASS or FAIL. A failure indicates a problem with the EEPROM chip on the CPU board or that it hasn't been initialized.

Display Test

Verifies proper communication with the display module and also checks accurate functioning of the display's memory. It also checks the restrike capability of the backlight power supply. When run, the display will show several different random patterns which is part of the display memory test and will also turn the backlight off and on once. When complete the diagnostic displays either PASS or FAIL. A failure indicates a problem with the LCD module or connecting cable. If the backlight fails to turn back on promptly, it may be nearing the end of its useful life of approximately 20,000 hours or the RSP8 is not receiving sufficient power due to a long or defective connecting cable.

Communication Test

Confirms error-free communication with the attached KSP8 through the connecting cable. For it to work, the RSP8 must be connected to a KSP8, either directly or through a HUB7, and the KSP8 must be operating normally (not in diagnostic mode itself). The test works by sending a large number of messages containing pseudo-random data to the KSP8 which is expected to complement the data and return it to the RSP8 which then recomplements it and compares with the original data sent. This is called a "buffered test" because the KSP8 receives an entire message before complementing and returning it. Its also possible to use a special "loopback cable" to run this test which is typically only done at the factory.

When run, the display will immediately show either "LB" for loopback or "BF" for buffered to indicate which test its running. When connected to a KSP8, "buffered" should be chosen automatically. After running for several seconds, the display will show either PASSED or one or more failure types.

"DATA ERR" means that communication is working but that there were errors in transmission. This can be caused by a defective or improperly constructed cable, excessive electrical noise, or a large ground voltage difference between the location where the KSP8 resides and the location of the RSP8.

"TIMEOUT" means that the KSP8 did not respond to one or more of the random messages. Usual cause is a non-responsive KSP8, possibly because it was in diagnostic mode. More severe cases of the factors that cause data errors (see above) can also cause timeout errors.

"XTALK ERR" means that one or more of the messages to the KSP8 was received back in its original form rather than complemented. This can be caused by a long cable using parallel (instead of twisted-pair) wires or incorrect pairing of twisted pairs. A severe case of crosstalk may cause the loopback test to be run instead of the buffered test even though connected to a KSP8.

Hub Test

Confirms communication with the HUB7 in a system using one or two HUB7s. If there are multiple KSP8s in the system, all should be turned on to maximize the validity of the test. Note that the connected KSP8s will be switched into standby mode while the test is run. The test result will show the number of hubs in the system; 0, 1, or 2; the ports used by each hub; and the currently selected port for each hub. You should manually verify that the report matches your system configuration.

EEPROM Initialize

Interactively calibrates the joystick and 8 control knobs then writes the calibration data into the non-volatile EEPROM. When run, the screen first changes to show joystick calibration instructions. The calibration data is at the bottom of the display and consists of minimum and maximum readings for the X and Y axes of the joystick. These are initially 32 for the minimum and 192 for the maximum.

As the joystick handle is rotated per the displayed instructions, these values are updated. After a few rotations when the values are firmly established and don't change any more, the button beside the joystick should be pressed to write them into the EEPROM. Typical minimums are 10 +-8 and typical maximums are 245 +-8.

Next the screen changes to show control knob calibration instructions. Knob #1 should be rotated exactly 10 clicks clockwise then the Joystick button pressed again. At the bottom of the screen is a count of the number of contact state changes seen which should be near 10, 20, or 40 after the 10 clicks depending on the encoder type in the unit. If it is not near one of these values when the Joystick button is pressed, you will be asked to try again.

Following control knob calibration, the calibration data is written into the EEPROM. If writing to the EEPROM is successful, PASSED will be displayed; if not, FAILED will be displayed. In the latter case it is likely that the EEPROM chip on the CPU board is defective.

Description of the Controls Diagnostic

Enter the Controls Diagnostic by pressing the leftmost soft button while the main diagnostic menu is showing. The screen will change to a special format that shows the exact electrical response of every control so that problems can be easily detected and diagnosed.

Buttons – When any button is pressed, its name will be shown after "BUTTON:" and its row / column address shown after "ADDRESS:". The latter can be helpful when troubleshooting short circuits in the button wiring. Response to changes in button status is also very fast allowing easy detection of intermittent button contacts.

LEDS – When a button with an associated LED is pressed, the LED will light as long as the button is held down. The leftmost soft button is associated with the LEDs on the left side of the display panel. Each press lights the next LED in sequence. For the tri-color meter LEDs, each will sequence through its 3 colors - Red, Orange, and Green. Soft button #2 works similarly for the right side of the display panel. If you wish to hold one or more LEDs on without having to hold the associated buttons, just press and hold any button then press momentarily any button whose associated LED you wish to turn on. Only when all buttons are released will the LEDs extinguish.

Main Encoder – Rotating this will update the "Alpha" display. The spinner shows the electrical state of the encoder's contacts while the numerical display below shows its cumulative position. This value is also sent to the LCD backlight brightness control. CAUTION: Do not set this above 160 except for short periods. Settings above 160 will cause the RSP8 to exceed the power rating of the KSP8 or HUB7 powering it. Use such settings only for testing voltage drop in cables as described below.

Control Knobs – Turning any of these will update the second spinner display in a manner similar to the main encoder. There is also a number from 1 to 8 just to the left which identifies the encoder being turned. Additionally, the joystick display at the right end of the display will show an oscilloscope-like trace of the encoder's movement. Each "click" of an encoder should draw one more dot on the display along an upward slant for clockwise or downward slant for counter-clockwise rotation. Spurious or unstable operation of the encoder is thus easily seen. Pressing the rightmost soft button will clear the joystick display area.

Joystick – Moving the joystick will update the X and Y position display. Values shown are raw readings and do not use the joystick calibration data. Typically x should span a range of -118 to +118 give or take 8 counts on each end and Y should span a

similar range. If the actual range is much smaller than this or hits +127 or -128, you may lose some resolution or range in actual use. Joystick movement also draws on the joystick display area. Look for smooth tracking without sudden jumps or jags and also a reasonably round total movement area that closely approaches or just kisses the boarders. Finally there are two bar displays just to the left of the joystick display. The "R" (radius) bar shows the handle's distance from center and the "TH" (theta or angle) moving dot shows the angle on an imaginary clock face with 12:00 being at the center. Rotating the handle around the limits of movement should produce a constant length bar on the R display and a smoothly moving dot on the TH display. As with the control knob display, the rightmost soft button clears the joystick display. Also, while the adjacent soft button is held down, drawing will be suppressed.

Power Voltage – Just under the joystick X,Y display is a reading of the incoming power voltage. This will generally decrease as the backlight is made brighter (see Main Encoder above) or increase as it is made dimmer. At the brightest allowable setting (160), the voltage reading should be at least 4.00V for proper operation. Briefly higher settings (not over 30 seconds) are allowable for margin checking. If the voltage reading is low, the likely cause is a cable that is too long for its wire size or possibly a defective cable which has one of the 4 power and ground wires open. The 16 meter cable supplied with the RSP8 will typically give a reading of 4.48V with a backlight setting of 160.

In Case of Problems

RSP8 does not power-up (LEDs do not flash, display remains dark)

1. Defective cable.

2. Incorrect cable (not one-to-one wired).

3. Other cable end not plugged into KSP8 or RSP8 port of HUB7.

4. If plugged into a KSP8, the KSP8 is not on.

5. If plugged into a HUB7, no input port is connected to a powered KSP8.

6. If plugged into a HUB7, its adapter is not plugged in or not powered.

7. Cable too long or wire gauge too small between power source and RSP8.

Power-up sequence repeats indefinitely

1. Cable too long or wire gauge too small between power source and RSP8.

2. Defective cable.

Display brightness unstable at high settings

1. Cable too long or wire gauge too small between power source and RSP8.

2. Run the Controls Diagnostic and verify that voltage reading remains above 4.0 volts with a backlight setting of 160.

Communication errors (bad characters on screen, flickering LEDs)

1. Defective cable.

2. KSP8 power cord is not grounded.

3. Excessive ground potential difference between KSP8(s) and HUB7/RSP8. Try insulating the Hub-7 and/or RSP8 enclosure from other equipment enclosures.

Joystick does not have full range of parameter control

1. Run the Joystick Calibration (EEProm Init) diagnostic.

2. Defective joystick, run Controls diagnostic to verify.

At power up, display reads "EEPROM read or checksum error" then enters diagnostics about 10 seconds later.

1. Run the joystick calibration as requested. If this happens more than once, the EEPROM chip on the CPU board needs replacement but you may continue to use the unit until it is replaced.

At power up or when entering diagnostics, display reads "Button XXXXXXXX is stuck down".

1. Pull up the indicated button if visibly stuck down.

2. A conductive particle has become lodged in the internal wiring. Unplug, remove the bottom cover, and shake smartly to dislodge.

3. The indicated switch may have become defective.

4. To try running anyway, press the soft button marked "OK".

KSP8 Front Panel behaves strangely when RSP8 is unplugged at the RSP8 end.

1. Remote cable is not of twisted-pair construction, or the wrong connector pin numbers are paired.

2. Unplug the remote cable at the KSP8 end.

An angry rodent is gnawing your RSP8 cable.

1. Enter diagnostics by holding down the 4, 5, and 6 keys until all the LEDs flash.

2. Press the second soft button from the left, which is unlabeled.

3. Watch the instructions and demo then press the **joystick** button to start play or the **exit** button if the boss walks by.