Section 17 — Sequencing/MIDI Applications

This section covers a number of advanced sequencer applications, including using the ASR-10 with a variety of external MIDI devices.

Using the ASR-10 as a Master MIDI Controller

The MIDI Connection

Musical Instrument Digital Interface (MIDI) — that magical connection that lets you play one instrument (or a whole roomful of them) from another — is a standard that has been agreed upon by manufacturers for translating musical events into specific numbers that are transmitted and received by MIDI instruments.

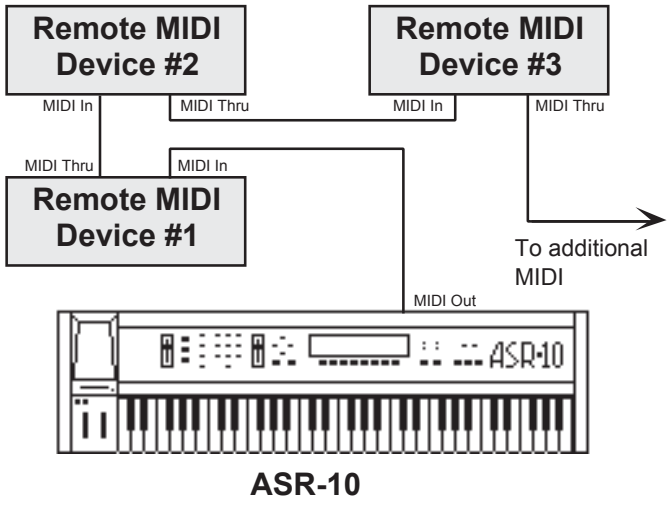
For instance, when you play middle C on the ASR-10, it instantly transmits a series of numbers out its MIDI Out jack. These numbers represent a *Key Down* event, along with the location of the note on the keyboard and how hard the key was struck. When you release the key, the ASR-10 transmits a number meaning *Key Up*. Any MIDI keyboard connected to the ASR-10 can receive and translate those numbers and will play the middle C itself. The same thing happens whenever you move a controller, such as the Pitch Bend or Mod Wheel, or when you select a new sound — each of these events is translated into a series of numbers which are transmitted out the MIDI Out jack.

Controlling Remote MIDI devices from the ASR-10 — MIDI Connections

You can use the ASR-10 banks or performance presets to drive external MIDI instruments, greatly enhancing the number of available voices and timbres. With the Edit/ Instrument MIDI STATUS parameter, an instrument, and its associated sequence and song track can be assigned one of the following settings:

- EXT or MIDI status — so that it will play only out via MIDI
- LOCAL status — so that it will play only locally on the ASR-10
- BOTH — in which case it will play a local sound *and* will transmit on its designated MIDI OUT CHANNEL

When controlling multiple remote MIDI devices, first connect the various devices to the ASR-10, and to each other, as shown here. Connect the MIDI Out jack of the ASR-10 to the MIDI In jack of the first device. Then connect the MIDI Thru jack of the first device to the MIDI In jack of the second device. Connect the MIDI Thru jack of the second device to the MIDI In jack of the third device. And so on, for as many devices as you will be using.



With this arrangement, once you set up the proper MIDI channels, etc., each remote MIDI device will receive and play only the data that is intended for it, and will "pass along" all other data. Also, each can be played from its own keyboard (as well as from the ASR-10's) without affecting the others, because MIDI Thru jacks only pass along incoming MIDI data, and do not transmit what is played on the instrument.

This set up is ideal for controlling everything right from the ASR-10. Simply by making a MIDI Instrument and setting the **Instrument• Sequence Track** to the same MIDI channel as a particular instrument, you can:

- Play the remote MIDI device from the ASR-10 keyboard
- Record a sequence track that will play back on the remote MIDI device when you play the sequence or song
- Send the remote MIDI device program changes and adjust its volume (assuming the device receives MIDI volume)

In other words, once you have made the appropriate connections and set up the MIDI configuration of the tracks and all remote MIDI devices, you can use the ASR-10's keyboard and its front panel to control and record all the remote MIDI devices in your rig.

Creating a MIDI Instrument

Let's suppose that you have a synthesizer module (say an ENSONIQ SQ-R PLUS 32 Voice) connected to the ASR-10 as shown below:

ASR-10 **SQ-R PLUS 32 Voice**

You want to be able to select the SQ-R PLUS 32 Voice from the ASR-10 front panel and then play or sequence it from the ASR-10 just as you would an ASR-10 instrument. To do this, you can make an ASR-10 instrument that contains no sample data, and that will not sound on the ASR-10, but will only transmit via MIDI. Such "MIDI Instruments," as we call them, use up very little memory, and can be loaded from disk almost instantly. They are the key to using the ASR-10 as a MIDI master controller.

- On the Edit/System• MIDI page, set the TRANSMIT ON parameter to TRANSMIT ON= INST CHAN.
- Press **Command**, then press **Instrument**.
- Scroll left or right until the display reads CREATE NEW INSTRUMENT.
- Press **Enter• Yes**. The display reads SELECT UNUSED INST= 1. The new instrument will be created in the **Instrument• Sequence Track** location indicated. You can select a different location (by pressing any unused **Instrument• Sequence Track** button), or just press **Enter• Yes**.
- Press **Enter• Yes**. The ASR-10 will create a new unnamed instrument in the location you indicated. The new instrument is selected (its yellow LED is lit). Note that it contains no layers or WaveSamples and will make no sound when you play the keyboard.
- Press **Edit**, then press **Instrument**. This puts you on the Edit/Instrument page where you will assign the characteristics of your new instrument.
- Using the **Arrow** buttons, scroll left (or right) until the display shows MIDI STATUS. Set MIDI STATUS = MIDI. Now the instrument will only play over MIDI, sending keys, controllers, etc. on its designated MIDI channel.
- Scroll left to the parameter MIDI OUT CHANNEL = __. This is the MIDI channel on which the instrument will transmit. Let's suppose that the SQ-R PLUS 32 Voice in our example is set to receive on MIDI channel 3. We would set this parameter to MIDI OUT CHANNEL= 3. Now, selecting and playing this instrument should play the SQ-R PLUS 32 Voice.
- Name the new instrument. Scroll left until the display shows NAME = UNNAMED INST and

use the **Arrow** buttons to name/rename the instrument. Give the new instrument a name which describes it. In this case we might name it SQR - CHAN 3.

- Press **Load** to return to LOAD mode and select the MIDI instrument. The instrument's name and volume level show on the display like any other ASR-10 instrument. When you play it from the ASR-10 keyboard you should hear the SQ-R PLUS 32 Voice.
- You can select, deselect, or stack the MIDI instrument as you would a local instrument.
- You can change its keyboard range so it only plays over a specified part of the keyboard.
- Changing its volume (by moving the **Data Entry Slider**) will send MIDI volume changes to the SQ-R PLUS 32 Voice, letting you mix its level just as you would a local instrument.
- Save the new instrument to disk. You can later load it into any of the eight **Instrument• Sequence Track** locations and play the SQ-R PLUS 32 Voice just as you would load and play a local sampled instrument.

Create customized MIDI-only ASR-10 instruments for each of your remote MIDI devices. Then load them into memory for playing and sequencing specific external instruments. Just remember to follow these rules:

- TRANSMIT ON = must be set to INST CHAN on the Edit/System• MIDI page.
- Each external device for which you create a MIDI instrument should always be set to receive in POLY (or MULTI) mode, OMNI OFF, and always on the same MIDI channel that you assign the related ASR-10 MIDI instrument to transmit on.
- Make sure that any ASR-10 instruments that you don't want transmitting notes via MIDI are assigned to SEND KEYS TO = LOCAL. Then save the instrument(s) to disk.

Recording into the ASR-10 Sequencer from a MIDI Controller

On many occasions, you may find it convenient to use an external controller to record a track into the ASR-10's internal sequencer. This could be for added authenticity (recording from Drum Pads to get a "live drummer" feel), performance flexibility (recording from a weighted-action MIDI keyboard controller like the ENSONIQ KS–32), or ease of use (a guitarist recording from a guitar controller). No matter which type of MIDI controller you use, there are a few parameters that need to be set in order to record into the sequencer.

Recording Onto a Single Track (One MIDI Channel)

- Connect a MIDI cable from the MIDI Out of the controller to the MIDI In of the ASR-10.
- Set the MIDI IN MODE to POLY on the Edit/System• MIDI page. The MIDI controller should be in POLY mode as well.
- Set the ASR-10 MIDI BASE CHANNEL to the same MIDI channel that the MIDI controller is set to transmit on.
- Select the track you want to record on by pressing the appropriate **Instrument• Sequence Track** button on the ASR-10. Make sure the Instrument on the selected **Instrument• Sequence Track** has its Edit/Instrument MIDI STATUS set to BOTH, LOCAL, or MIDI.
- On the Edit/Seq• Song page, set the SEQ REC SOURCE parameter to BOTH or MIDI.

Recording proceeds normally from this point, with the sequencer responding to the data from the MIDI controller the same as it would to data from its own keyboard.

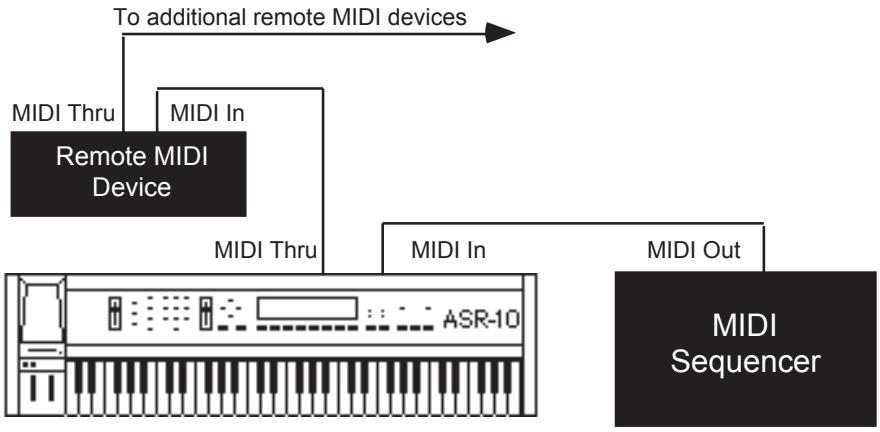
Recording Onto Several Tracks (Multiple MIDI Channels) — Multi-Track Record

- Connect a MIDI cable from the MIDI Out of the controller to the MIDI In of the ASR-10.
- Set the MIDI IN MODE to MULTI on the Edit/System• MIDI page.
- Set the MIDI controller to either MONO B (for guitar controllers sending on individual strings) or MULTI (for transferring data from another sequencer). Consult the manual for the external MIDI device for details.
- Set the individual MULTI IN MIDI CHANNEL for each track (found on the Edit/Track page), matching MIDI receive channels with those that will be transmitted on by the controller. Different MIDI receive channels must be selected for each **Instrument• Sequence Track** that you want to receive via MIDI. If more than one sequence track is set to the same MULTI IN MIDI CHAN, only the lowest numbered **Instrument• Sequence Track** will receive via MIDI.
- Make sure all of the instruments on the **Instrument• Sequence Tracks** that you want to record on have their Edit/Instrument MIDI STATUS set to BOTH, LOCAL, or MIDI.
- On the Edit/Seq• Song page, set the SEQ REC SOURCE parameter to MULTI.

Once these parameters are set, you can begin recording. For more information on recording with the SEQ REC SOURCE set to MULTI (Multi-Track Record), see *Section 12— Sequencer and Audio Track Concepts.*

Using the ASR-10 with an External Sequencer

Because of its multi-timbral capabilities, the ASR-10 is an ideal instrument for use with a MIDI sequencer. Its ability to receive on up to eight MIDI channels at once means that the ASR-10 can take the place of several keyboards in your rig.



The illustration above shows a typical sequencing set-up. Of course the ASR-10 doesn't have to be the first in the chain after the sequencer — you can chain MIDI devices in any order, with one exception; if a unit doesn't have a MIDI Thru jack, you must place that unit last in the chain.

POLY Mode — The ASR-10 as One Instrument

We'll start with the most basic sequencing situation, in which the ASR-10 will be used as if it were an ordinary instrument. This is how it will act in POLY mode. In POLY mode, the ASR-10 will respond only to information received on the base MIDI channel, and will play only the sounds that are selected on the front panel.

- On the Edit/ System• MIDI page, set the MIDI mode parameter to MIDI IN MODE=POLY.
- Also on the Edit/ System• MIDI page, set the MIDI channel (MIDI BASE CHANNEL=___) to the MIDI channel you want the ASR-10 to receive on. In POLY mode, the ASR-10 will only respond to MIDI messages received on this MIDI channel.

MULTI Mode — The ASR-10 as Eight Independent Instruments

When you set the MIDI IN MODE= MULTI on the Edit/ System• MIDI page, the ASR-10 becomes eight "virtual instruments," each receiving on its own MIDI channel, but all sharing the same pool of voices.

- On the Edit/ System• MIDI page, set the MIDI IN MODE parameter to MULTI.
- For each instrument, set the MULTI IN MIDI CHANNEL parameter, found on the Edit/ Track page. The MIDI channels you select for each track should correspond to the MIDI channels that the external MIDI sequencer will transmit on.

Some Important Points about MULTI Mode

- Each of the eight **Instrument• Sequence Tracks** is completely independent and polyphonic. The ASR-10's dynamic voice allocation means that at any moment, each track can play all of the ASR-10's voices, if it needs them. If all voices are in use and a track needs a voice, it will "steal" the voice from the oldest note playing.
- In MULTI mode it doesn't matter what instruments are selected or stacked on the front panel. Which instruments will play depends entirely on what MIDI channel(s) the data is received on.
- Different MIDI receive channels must be selected for each **Instrument• Sequence Track** that you want to receive via MIDI. If more than one sequence track is set to the same MULTI IN MIDI CHAN, only the lowest numbered **Instrument• Sequence Track** will receive via MIDI.
- In MULTI mode, program changes received by a given **Instrument• Sequence Track** on its MIDI channel will cause the ASR-10 to try to load the same numbered instrument disk file into that **Instrument• Sequence Track** location, replacing the instrument that is currently loaded in that location.
- When using a MIDI sequencer, it's generally a good practice to assign a certain MIDI channel (or channels) to each instrument in your rig and always leave them set to that channel.
- When recording in MULTI mode, the SEQ REC SOURCE parameter on the Edit/Seq• Song page must also be set to MULTI.

Synchronizing to an External MIDI Clock Source

When you set the CLOCK SOURCE= MIDI on the Edit/Seq• Song page, the ASR-10 will sync to incoming MIDI clocks from a remote device. The MIDI indicator light will flash and the display will show WAITING… Recording will begin with the first MIDI clock received after a MIDI Start command. If the **Stop• Continue** button is pressed *before* a MIDI Start command is received, the ASR-10 waits 5 seconds before stopping.

Using the ASR-10 with a Drum Machine

When you use the ASR-10 in conjunction with a drum machine or other rhythm sequencer, there are three ways to have them operate together:

- Sync the drum machine's clock to the ASR-10
- Sync the ASR-10's clock to the drum machine
- Sequence the drum machine from the ASR-10, just as you would a synthesizer

To Sync a Drum Machine to the ASR-10:

- Connect the MIDI Out of the ASR-10 to the MIDI In of the drum machine.
- Set the drum machine to sync to MIDI clocks.
- Set the drum machine to receive on an unused MIDI Channel, OMNI Off; or disable channel information. You don't want the drum machine receiving and playing back ASR-10 sequence data intended for other instruments. MIDI clocks, start, stop, and continue are *real time* commands that are sent and received regardless of MIDI channel or mode.
- The drum machine should now sync to the ASR-10's clock. Pressing **Play** or **Stop• Continue** will start, stop, and continue the drum machine, assuming it receives those commands.

To Sync the ASR-10 to a Drum Machine:

- Connect the MIDI Out of the drum machine to the MIDI In of the ASR-10.
- Set the ASR-10 to sync to MIDI clocks. On the Edit/Seq• Song page, select CLOCK SOURCE=MIDI.
- Set the drum machine to not transmit channel information, or to transmit on a MIDI Channel that none of the ASR-10 **Instrument• Sequence Tracks** have their Edit/Track MULTI-IN MIDI CHANNEL set to receive on. Again, MIDI clocks, start, stop, and continue are sent and received regardless of MIDI channel or mode.
- The ASR-10 should now sync to the drum machine's clock. Starting, stopping, or continuing the drum machine will start, stop, and continue the ASR-10.

To Sequence a Drum Machine from a Track of the ASR-10:

- Connect the MIDI Out of the ASR-10 to the MIDI In of the drum machine.
- Set the drum machine to Tape Sync or External Clock, or any setting other than Internal or MIDI Clock. This way it will not play its own patterns, but will act only as a sound-producing device, sequenced from a track of the ASR-10.
- Set the drum machine to POLY (OMNI Off) mode and select a MIDI channel.
- From the Edit/Instrument page, set the MIDI Status for an ASR-10 Instrument to MIDI. Set the instrument's MIDI OUT CHANNEL to the same MIDI channel you assigned the drum machine to receive on.
- You should now be able to play the drum machine from the ASR-10 keyboard. You can then record a track on the ASR-10, from the ASR-10 keyboard, which will play on the drum machine — just as if you were sequencing an external synthesizer. The advantage of this approach is that some drum machines respond better to velocity when played via MIDI than when played from their own front panels. Thus, you may get more dynamic range out of your drum machine if you use this approach. The disadvantage is that you use up ASR-10 sequencer memory to sequence the drum machine.

Using the ASR-10 with a MIDI Guitar Controller

The ASR-10 is an ideal instrument to use with any MIDI guitar controller that is capable of transmitting in MONO mode. MONO mode allows a guitar controller to transmit the notes played on each string on a different MIDI channel. This has the advantage of letting each string send pitch bends independently, which is the only way to truly recreate guitar technique on a synthesizer.

Some earlier guitar controllers do not support MONO mode. You will have to consult the manual of your particular model to see if it does. If you have a guitar controller that only sends in POLY mode (i.e. send all six strings on the same MIDI channel) you should use the ASR-10 in POLY mode or OMNI mode.

For MIDI guitar controllers that do support MONO mode, you will want to put the ASR-10 in one of the two types of MONO mode that are available. In MONO A, the ASR-10 receives on eight consecutive MIDI channels with only one voice assigned to each MIDI channel. In MONO B, the ASR-10 receives on the Edit/ Track MULTI-IN MIDI channel assigned to each **Instrument• Sequence Track**.

- MONO A is the mode you will probably use most often. This is the mode to use when you want to play the same sound on all the strings of your guitar controller. In MONO A, the ASR-10 receives on eight consecutive MIDI channels (the MIDI BASE CHANNEL through MIDI BASE CHANNEL +7) and will play whatever **Instrument• Sequence Track** (s) are selected or stacked on the front panel. In other words, the ASR-10 behaves as it does in POLY or OMNI modes, except that it receives monophonically on multiple MIDI channels. This provides the advantage of multiple tracks that will respond independently to controllers received on multiple channels, but you do not have to set up the instruments for each track separately.
- MONO B is the mode to use if you want to be able to play a different sound on each string of your guitar controller. In MONO B, each **Instrument• Sequence Track** receives on its own Edit/ Track MULTI-IN MIDI channel. In other words, the ASR-10 behaves as it does in MULTI mode, except that each **Instrument• Sequence Track** receives monophonically on multiple MIDI channels. This is the only way to get a different sound on each string when using a MIDI guitar controller.

Using MONO A Mode

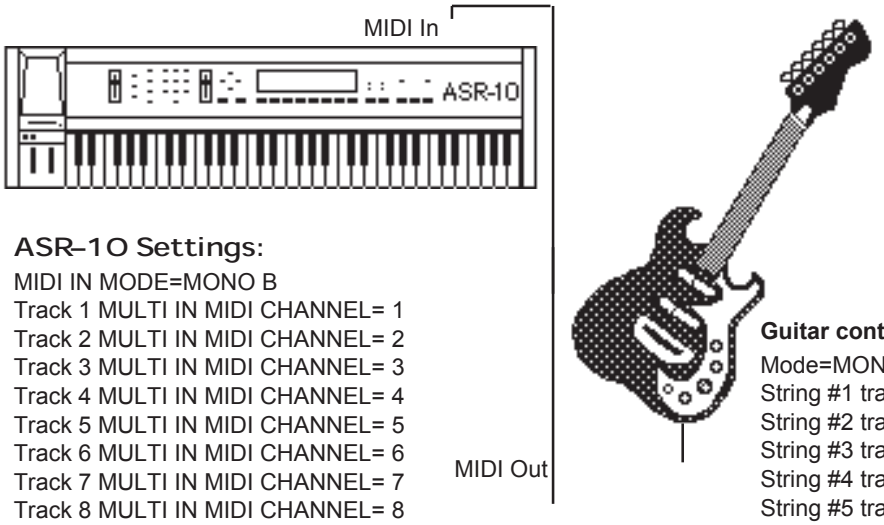
To use the ASR-10 in MONO A mode, set it up as follows:

- Load one or more instruments into the ASR-10.
- Press **Edit**, then **System• MIDI**. Scroll to MIDI IN MODE.
- Select MIDI IN MODE= MONO A.
- Set your guitar controller to transmit in MONO mode on channels 1– 6 (some models have an easy shortcut for getting into this state).
- Connect the MIDI Out of the guitar controller module to the MIDI In of the ASR-10.
- Press **Load** on the ASR-10 to return to Load mode. (Remember — the ASR-10 will only respond to program changes or select multiple instruments when in LOAD mode.)
- Select an **Instrument• Sequence Track** either by pressing a front panel button or by sending a program change from the guitar controller.
- You should now be able to play the ASR-10 from the guitar controller with all six strings playing whatever instrument(s) are selected or stacked on the front panel.

Using MONO B Mode

To use the ASR-10 in MONO B mode, set it up as follows:

- Load one or more instruments into the ASR-10.
- Press **Edit**, then **System• MIDI**. Scroll to MIDI IN MODE.
- Select MIDI IN MODE= MONO B.
- Press **Edit**, then **Track**. Scroll to MULTI-IN MIDI CHANNEL.
- Set each **Instrument• Sequence Track** MULTI-IN MIDI CHANNEL to correspond with its track number (Track 1 MULTI-IN MIDI CHANNEL= 1, Track 2 MULTI-IN MIDI CHANNEL= 2, etc.).
- Set your guitar controller to transmit in MONO mode on channels 1– 6 (some models have an easy shortcut for getting into this state).
- Connect the MIDI Out of the guitar controller module to the MIDI In of the ASR-10.
- You should now be able to play the ASR-10 from the guitar controller with each string playing its corresponding **Instrument• Sequence Track** as shown below:



ASR–10 Settings:

MIDI IN MODE=MONO B
Track 1 MULTI IN MIDI CHANNEL= 1
Track 2 MULTI IN MIDI CHANNEL= 2
Track 3 MULTI IN MIDI CHANNEL= 3
Track 4 MULTI IN MIDI CHANNEL= 4
Track 5 MULTI IN MIDI CHANNEL= 5
Track 6 MULTI IN MIDI CHANNEL= 6
Track 7 MULTI IN MIDI CHANNEL= 7
Track 8 MULTI IN MIDI CHANNEL= 8
MIDI BASE CHANNEL= 1
Global Controllers received on base channel minus one (Chan. 16)

Guitar controller Settings

Mode=MONO
String #1 transmits on Channel 1
String #2 transmits on Channel 2
String #3 transmits on Channel 3
String #4 transmits on Channel 4
String #5 transmits on Channel 5
String #6 transmits on Channel 6
Global controllers transmitted on Chan. 16

A few important points about MONO B Mode:

- Notes played on each string will play only the corresponding **Instrument• Sequence Track**. Each string/**Instrument• Sequence Track** combination is totally independent.
- MULTI-IN MIDI CHANNELs do not have to be set 1-8. They can be set to any channel from 1 to 16, as long as each track has a different MULTI-IN MIDI CHANNEL and the guitar controller transmits accordingly. Unless you have a very complex MIDI setup, setting things up as shown above will provide the most straight-forward and intuitive arrangement.
- Different MIDI receive channels must be selected for each **Instrument• Sequence Track** that you want to receive via MIDI. If more than one sequence track is set to the same MULTI IN MIDI CHAN, only the lowest numbered **Instrument• Sequence Track** will receive via MIDI.

Global Controllers in MONO A and B Modes

Global controllers are controllers sent on one channel that affect all other channels simultaneously. They can be useful in reducing the number of MIDI events required to achieve particular effects, and can thereby reduce the delays sometimes associated with overloading MIDI. Some guitar controllers can transmit global controllers, and the ASR-10 can respond to them.

In MONO mode (A or B) the base channel minus one becomes the MIDI channel for global controllers (pitch bend, pressure, etc.). For example, if the base channel is channel 3, any controllers received on channel 2 will be interpreted as global controllers and will affect *all* voices being played. If the base channel is channel 1, channel 16 becomes the channel for global controllers. Each track will also respond independently to controllers sent on its own channel. For example, each guitar string on a MIDI guitar can send independent pitch bend, while the "whammy bar" controller could be sent on the global channel (channel 16 in the example above) to affect all voices.

Note: The ASR-10 will not receive note data via MIDI on the base channel minus one in MONO A and B modes. Therefore, we recommend that the MIDI BASE CHANNEL parameter on the Edit/System • MIDI page be set to the same channel as the **Instrument • Sequence Track** with the lowest numbered Edit/Track MULTI-IN MIDI CHAN number.

Patch Selects and Presets

Making patch select changes from a continuous controller (i.e. mod wheel, whammy bar, etc.) can be an adventure. The patch select buttons are sent and received as MIDI controller #70. Since the ASR-10 recognizes the 0-31 range as both patch selects up; 32-63 as the right patch select down; 64-95 as the left patch select; 96-127 as both patch selects down, it can be difficult to make predictable changes from a continuous controller. If your MIDI guitar controller has the capability of sending discrete or specific controller values, rather than continuous controller numbers, then you'll be able to send predictable patch select changes.

Another alternative is to use the two pedals of the optional SW-10 Dual Foot Switch. When plugged into the rear panel Patch Select jack, the SW-10 will act as patch select buttons. This way you can change patches with you feet as you play the MIDI guitar controller.

Also, patch select configurations can be stored within performance presets which can be accessed by program changes 17-24 (in MONO A mode only). Each time you send a program change from your MIDI guitar controller, the ASR-10 will respond to that message by selecting one of the eight presets. Check the program change and patch assignment section in your MIDI guitar controller manual.

Song Position Pointers

The ASR-10 sends and receives Song Position Pointers via MIDI. Song Position Pointers are MIDI commands that tell a sequencer or drum machine where to locate within a song or sequence.

When the ASR-10 receives a Song Position Pointer, it will locate to the appropriate place in the selected song or sequence.

The ASR-10 sends a Song Position Pointer over MIDI whenever you use the Auto-Locate control (the GOTO function on the Edit/Seq• Song page). Any receiving unit which recognizes Song Position Pointers will locate to the same spot. (Not all devices recognize Song Position Pointers. Consult the manual of any other sequencing device you are using to see if it does.)

MIDI Song Selects

MIDI Song Selects allow a sequencer such as the ASR-10 to instruct a remote sequencer or drum machine to select a new song. The song can be assigned a MIDI Song Select number from 0 through 127. MIDI Song Select numbers 0 through 127 are transmitted via MIDI when you load a new song into the ASR-10, or when the currently loaded song is selected. The MIDI SONG SELECT parameter (on the Edit/System• MIDI page) must be set to "ON" for this to work.

The SEQUENCER INFORMATION parameter on the Command/Seq• Song page allows you to set the MIDI SONG SELECT number that will be sent whenever the song is selected. MIDI Song Select numbers are stored with the song when you save the song to disk.

Delay Times/Tempo BPM Chart

This chart shows the relationship between delay times and tempo beats per minute. Values shown are accurate to 2decimal places—since most delay devices are not accurate to 2decimal places, you may have to round off these values. You can use this chart to set the effect delay times to sync to your sequence or song.

BPM	1/4 NOTE	1/8th NOTE	1/8 TRIPLET	1/16th NOTE
40	1500.00	750.00	500.00	375.00
41	1463.41	731.71	487.80	365.85
42	1428.57	714.29	476.19	357.14
43	1395.35	697.67	465.12	348.84
44	1363.64	681.82	454.55	340.91
45	1333.33	666.67	444.44	333.33
46	1304.35	652.17	434.78	326.09
47	1276.60	638.30	425.53	319.15
48	1250.00	625.00	416.67	312.50
49	1224.49	612.24	408.16	306.12
50	1200.00	600.00	400.00	300.00
51	1176.47	588.24	392.16	294.12
52	1153.85	576.92	384.62	288.46
53	1132.08	566.04	377.36	283.02
54	1111.11	555.56	370.37	277.78
55	1090.91	545.45	363.64	272.73
56	1071.43	535.71	357.14	267.86
57	1052.63	526.32	350.88	263.16
58	1034.48	517.24	344.83	258.62
59	1016.95	508.47	338.98	254.24
60	1000.00	500.00	333.33	250.00
61	983.61	491.80	327.87	245.90
62	967.74	483.87	322.58	241.94
63	952.38	476.19	317.46	238.10
64	937.50	468.75	312.50	234.38
65	923.08	461.54	307.69	230.77
66	909.09	454.55	303.03	227.27
67	895.52	447.76	298.51	223.88
68	882.35	441.18	294.12	220.59
69	869.57	434.78	289.86	217.39
70	857.14	428.57	285.71	214.29
71	845.07	422.54	281.69	211.27
72	833.33	416.67	277.78	208.33
73	821.92	410.96	273.97	205.48
74	810.81	405.41	270.27	202.70
75	800.00	400.00	266.67	200.00
76	789.47	394.74	263.16	197.37
77	779.22	389.61	259.74	194.81
78	769.23	384.62	256.41	192.31
79	759.49	379.75	253.16	189.87
80	750.00	375.00	250.00	187.50
81	740.74	370.37	246.91	185.19
82	731.71	365.85	243.90	182.93
83	722.89	361.45	240.96	180.72
84	714.29	357.14	238.10	178.57
85	705.88	352.94	235.29	176.47
86	697.67	348.84	232.56	174.42
87	689.66	344.83	229.89	172.41
88	681.82	340.91	227.27	170.45
89	674.16	337.08	224.72	168.54
90	666.67	333.33	222.22	166.67
91	659.34	329.67	219.78	164.84
92	652.17	326.09	217.39	163.04
93	645.16	322.58	215.05	161.29
94	638.30	319.15	212.77	159.57
95	631.58	315.79	210.53	157.89
96	625.00	312.50	208.33	156.25
97	618.56	309.28	206.19	154.64
98	612.24	306.12	204.08	153.06
99	606.06	303.03	202.02	151.52
100	600.00	300.00	200.00	150.00
101	594.06	297.03	198.02	148.51
102	588.24	294.12	196.08	147.06

BPM	1/4 NOTE	1/8th NOTE	1/8 TRIPLET	1/16th NOTE
103	582.52	291.26	194.17	145.63
104	576.92	288.46	192.31	144.23
105	571.43	285.71	190.48	142.86
106	566.04	283.02	188.68	141.51
107	560.75	280.37	186.92	140.19
108	555.56	277.78	185.19	138.89
109	550.46	275.23	183.49	137.61
110	545.45	272.73	181.82	136.36
111	540.54	270.27	180.18	135.14
112	535.71	267.86	178.57	133.93
113	530.97	265.49	176.99	132.74
114	526.32	263.16	175.44	131.58
115	521.74	260.87	173.91	130.43
116	517.24	258.62	172.41	129.31
117	512.82	256.41	170.94	128.21
118	508.47	254.24	169.49	127.12
119	504.20	252.10	168.07	126.05
120	500.00	250.00	166.67	125.00
121	495.87	247.93	165.29	123.97
122	491.80	245.90	163.93	122.95
123	487.80	243.90	162.60	121.95
124	483.87	241.94	161.29	120.97
125	480.00	240.00	160.00	120.00
126	476.19	238.10	158.73	119.05
127	472.44	236.22	157.48	118.11
128	468.75	234.38	156.25	117.19
129	465.12	232.56	155.04	116.28
130	461.54	230.77	153.85	115.38
131	458.02	229.01	152.67	114.50
132	454.55	227.27	151.52	113.64
133	451.13	225.56	150.38	112.78
134	447.76	223.88	149.25	111.94
135	444.44	222.22	148.15	111.11
136	441.18	220.59	147.06	110.29
137	437.96	218.98	145.99	109.49
138	434.78	217.39	144.93	108.70
139	431.65	215.83	143.88	107.91
140	428.57	214.29	142.86	107.14
141	425.53	212.77	141.84	106.38
142	422.54	211.27	140.85	105.63
143	419.58	209.79	139.86	104.90
144	416.67	208.33	138.89	104.17
145	413.79	206.90	137.93	103.45
146	410.96	205.48	136.99	102.74
147	408.16	204.08	136.05	102.04
148	405.41	202.70	135.14	101.35
149	402.68	201.34	134.23	100.67
150	400.00	200.00	133.33	100.00
151	397.35	198.68	132.45	99.34
152	394.74	197.37	131.58	98.68
153	392.16	196.08	130.72	98.04
154	389.61	194.81	129.87	97.40
155	387.10	193.55	129.03	96.77
156	384.62	192.31	128.21	96.15
157	382.17	191.08	127.39	95.54
158	379.75	189.87	126.58	94.94
159	377.36	188.68	125.79	94.34
160	375.00	187.50	125.00	93.75
161	372.67	186.34	124.22	93.17
162	370.37	185.19	123.46	92.59
163	368.10	184.05	122.70	92.02
164	365.85	182.93	121.95	91.46
165	363.64	181.82	121.21	90.91

BPM	1/4 NOTE	1/8th NOTE	1/8 TRIPLET	1/16th NOTE
166	361.45	180.72	120.48	90.36
167	359.28	179.64	119.76	89.82
168	357.14	178.57	119.05	89.29
169	355.03	177.51	118.34	88.76
170	352.94	176.47	117.65	88.24
171	350.88	175.44	116.96	87.72
172	348.84	174.42	116.28	87.21
173	346.82	173.41	115.61	86.71
174	344.83	172.41	114.94	86.21
175	342.86	171.43	114.29	85.71
176	340.91	170.45	113.64	85.23
177	338.98	169.49	112.99	84.75
178	337.08	168.54	112.36	84.27
179	335.20	167.60	111.73	83.80
180	333.33	166.67	111.11	83.33
181	331.49	165.75	110.50	82.87
182	329.67	164.84	109.89	82.42
183	327.87	163.93	109.29	81.97
184	326.09	163.04	108.70	81.52
185	324.32	162.16	108.11	81.08
186	322.58	161.29	107.53	80.65
187	320.86	160.43	106.95	80.21
188	319.15	159.57	106.38	79.79
189	317.46	158.73	105.82	79.37
190	315.79	157.89	105.26	78.95
191	314.14	157.07	104.71	78.53
192	312.50	156.25	104.17	78.13
193	310.88	155.44	103.63	77.72
194	309.28	154.64	103.09	77.32
195	307.69	153.85	102.56	76.92
196	306.12	153.06	102.04	76.53
197	304.57	152.28	101.52	76.14
198	303.03	151.52	101.01	75.76
199	301.51	150.75	100.50	75.38
200	300.00	150.00	100.00	75.00
201	298.51	149.25	99.50	74.63
202	297.03	148.51	99.01	74.26
203	295.57	147.78	98.52	73.89
204	294.12	147.06	98.04	73.53
205	292.68	146.34	97.56	73.17
206	291.26	145.63	97.09	72.82
207	289.86	144.93	96.62	72.46
208	288.46	144.23	96.15	72.12
BPM	**1/4 NOTE**	**1/8th NOTE**	**1/8 TRIPLET**	**1/16th NOTE**
209	287.08	143.54	95.69	71.77
210	285.71	142.86	95.24	71.43
211	284.36	142.18	94.79	71.09
212	283.02	141.51	94.34	70.75
213	281.69	140.85	93.90	70.42
214	280.37	140.19	93.46	70.09
215	279.07	139.53	93.02	69.77
216	277.78	138.89	92.59	69.44
217	276.50	138.25	92.17	69.12
218	275.23	137.61	91.74	68.81
219	273.97	136.99	91.32	68.49
220	272.73	136.36	90.91	68.18
221	271.49	135.75	90.50	67.87
222	270.27	135.14	90.09	67.57
223	269.06	134.53	89.69	67.26
224	267.86	133.93	89.29	66.96
225	266.67	133.33	88.89	66.67
226	265.49	132.74	88.50	66.37
227	264.32	132.16	88.11	66.08
228	263.16	131.58	87.72	65.79
229	262.01	131.00	87.34	65.50
230	260.87	130.43	86.96	65.22
231	259.74	129.87	86.58	64.94
232	258.62	129.31	86.21	64.66
233	257.51	128.76	85.84	64.38
234	256.41	128.21	85.47	64.10
235	255.32	127.66	85.11	63.83
236	254.24	127.12	84.75	63.56
237	253.16	126.58	84.39	63.29
238	252.10	126.05	84.03	63.03
239	251.05	125.52	83.68	62.76
240	250.00	125.00	83.33	62.50
241	248.96	124.48	82.99	62.24
242	247.93	123.97	82.64	61.98
243	246.91	123.46	82.30	61.73
244	245.90	122.95	81.97	61.48
245	244.90	122.45	81.63	61.22
246	243.90	121.95	81.30	60.98
247	242.91	121.46	80.97	60.73
248	241.94	120.97	80.65	60.48
249	240.96	120.48	80.32	60.24
250	240.00	120.00	80.00	60.00

Tip: Assign a controller to modulate the effect delay times, and select a specified minimum and maximum range so that you can create unique poly-rhythms in real-time.