V3

TONE
WHEEL
ORGAN
SYNTHESIZER

VOCE

TECHNICAL QUESTIONS

Please call between 10:00AM - 5:00PM EST
Tel (201) 939-0052
Fax (201) 939-6914

REPAIRS

Please call Voce for a return authorization number (RA) before returning your V3 for repair. No returns will be accepted without an RA number.

Ship to: voce inc
111 Tenth Street
Wood-Ridge, NJ 07075

General Introduction

Setup

Programming The V3

How To do the Basic Stuff

Using the Percussion Effect

Using the Rotary Speaker Effect

Editing and Customizing MIDI Controller Maps

Appendices

Unpacking

Inside the V3 shipping carton you will find the following items:

1. V3 Tone Wheel Organ Synthesizer Module
2. AC Power Cord
3. V3 User's Manual (this manual)
4. Warranty Registration Card

Please return the warranty card soon after your purchase. The information you provide will help us keep you updated on new products and upgrades. We value and appreciate the information you provide us and no, we will not sell your name to any mailing lists.

Care and Precautions

When using the V3, we recommend that you adhere to the following guidelines:

1 Avoid spilling any type of liquid on the V3, be especially careful not to let any liquid fall in through the top or bottoms vents as this may cause serious damage to the V3.

2 Keep the V3 away from children, especially after it's been turned on. The V3 gets hot to the touch and although it will not get hot enough to cause burns, it may be too hot for a small child.

3 The V3 dissipates as much heat as a 25W light bulb. Keeping this in mind it may be a good idea to leave an extra space between it and other modules. Even if other modules are not near the V3, it's a good idea to place the V3 in such a way as to allow as much air flow as possible through the air vents, both top and bottom. While the V3 is rated for 8 hours of continuous use in a non ventilated rack (continuous use in ventilated racks) other modules may malfunction due to heat buildup. Be careful not to place the V3 next to modules that are heat sensitive such as analog synths or plastic cased modules. Voce is not responsible for heat damage to other modules in a rack.

4 Although the V3 is designed to withstand the rigors of being on the road, it is not indestructible. Be especially careful of dropping it on its front side since this is its most vulnerable area due to its LCD display.

V3 Concept and How it Produces Organ Tones

How It's Played Via MIDI

The V3 will respond to up to 3 MIDI channels. These MIDI channels are named Upper, Lower, and Pedal. The Upper and Lower MIDI channels have a range of 61 notes while the Pedal channel responds to a 25 note range. Some special features and restrictions for each of these manuals follow:

1. The Upper MIDI channel is the only channel which will respond to the Percussion effect. In the case of a split, only the upper part of the manual triggers the Percussion effect.
2. The Upper Manual MIDI channel is the one whose information is displayed on the front panel. Most of the effects information is derived from the patch used on the Upper Manual MIDI channel.
3. If a split is programmed for the patch called by the Upper Manual channel, the Lower Manual MIDI channel is disabled. Its resources are diverted to the lower part of the upper manual split. This is due to a restriction of resources caused by the strict adhearance to B-3 architecture.
4. The Pedal MIDI channel never uses the Lowest Octave Foldback feature. The 16' drawbar does not foldback in the lowest octave of this channel.

The only patch parameters utilized by patches called by the Lower and Pedal channels are Main Drawbar Setting, Aux Drawbar Setting, Transpose, and Lowest Octave Foldback (except the Pedal Channel).

The Tone Generator

The sound the V3 produces starts in the tone generator section of the circuitry. Note On events transmitted by MIDI from a keyboard cause the V3 to sound some of its 91 generators at levels determined by various parameters. Key click noise and percussion are also created by the tone generator.

The most important parameters for determining which generators and what levels to be assigned are the drawbar settings. The V3 allows for two sets of drawbars settings to be used by each patch. Its is possible to switch between the settings using the Morph function, which allows for a smooth transition between the two drawbar settings. Any drawbar setting may be modified in real-time by sending the appropriate MIDI control change or by changing it directly from the front panel.

Vibrato / Chorus Stage

The next stage in the signal chain is the Vibrato / Chorus circuit. Vibrato is a pleasant frequency modulation of the tones produced by the V3. Chorus is the sound produced when the vibrato sound is mixed in with a healthy portion of the original (straight) signal. Three levels of intensity for both Vibrato and Chorus effects are present in the V3.

The organ tones and keyclick are summed together to form the signal which is routed to the vibrato circuitry, while the percussion tones bypass the vibrato circuitry. There is never vibrato (or chorus) applied to percussion tones.

Expression and Effects Loop

Following the Vibrato / Chorus stage is the Expression stage. Expression is basically an equal-loudness volume control which is used by the player as a part of his or hers playing style. When the Expression level is low, most of the midrange frequencies are removed from the organ sound and only some of the low and high frequencies. With the Expression level set to full the frequency response is flat and at full volume.

There is an Effects Loop provided at this stage of the audio chain for effects units such as external distortion devices, reverb, etc. The Effects Loop Output is also a good place to "grab" the straight sound of the organ before the rotating speaker effect. The Effects Loop Input is useful for sending external signals to the rotating speaker effect but it is necessary to know that plugging into the Effects Loop Input jack breaks the normal audio path, removing the organ signal. Plugging into the effects loop output does not interrupt the signal flow.

Rotating Speaker Processor

After the effects loop input comes the amplifier overdrive simulator section of the rotating speaker processor. The level of signal sent to this stage greatly changes the amount of distortion created by this stage. This should be kept in mind when using external signals or when manipulating the expression function. The mix of overdriven to "straight" signal is controlled by patch parameters or external MIDI control changes.

The frequency, timbrel, and spatial processing section of the rotating speaker effect is connected to the output of the overdrive stage. The various rates, levels, and other parameters are derived from both patch information and MIDI control changes.

EQ, MIDI Volume, Output Interfaces

The next audio stage in the V3 is the equalization section. The stereo signal pair created by the rotating speaker simulator is routed to a pair of two band (Bass and Treble) equalizers which are controlled by patch parameters.

MIDI Volume is the next stage which processes the stereo audio. The front panel volume control is connected after the MIDI volume stage. It then feeds the Channels 1 and 2 outputs, the headphone amplifier and the model 122 rotating speaker output. The

model 122 speaker output is the mono sum of the stereo pair; its fast/slow control signal is derived from the state of the fast/slow front panel LED. This allows MIDI and patch control over the Model 122 speaker as well as the V3's own internal rotating speaker effect.

FRONT PANEL DESCRIPTION

HEADPHONE JACK
This is an audio output used for driving stereo headphones.

VOLUME CONTROL
Adjusts output volume. Turn clockwise to increase, counterclockwise to decrease.

POWER SWITCH
Push in to power up the V3.

OVERDRIVE
Adjusts amount of simulated overdriven tube amp distortion. Turn clockwise to increase, counterclockwise to decrease.

DATA/PRESET
When in NORMAL mode, this control selects 1 of 128 user presets. When in EDIT MODE, it sets the value of the parameter selected by the CURSOR.

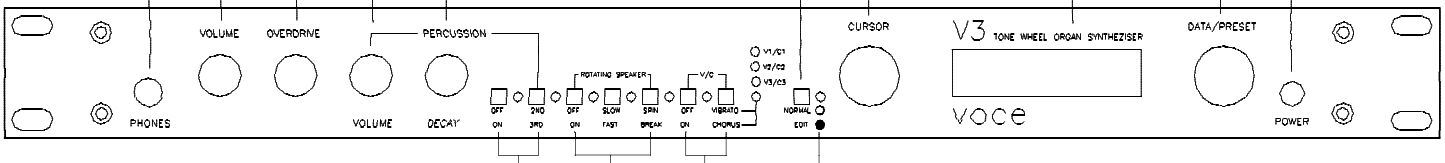
PERCUSSION VOLUME
Adjusts the percussion volume. Turn clockwise to increase, counterclockwise to decrease.

PERCUSSION DECAY
Adjusts the decay time. Turn clockwise To increase, counterclockwise to decrease.

LCD DISPLAY
Used in NORMAL mode to indicate preset information and in EDIT mode to display and edit the various parameters.

CURSOR
Used in EDIT mode to scroll through the different menu items.

NORMAL/EDIT
Selects between normal and edit mode.



PERCUSSION ON/OFF turns on Percussion effect and **2ND/3RD HARMONIC** selects between the 2nd and 3rd harmonic.

LED Mode Indicator
Specifies the state of the LEDs associated with each push-button. When the LEDs are lit, the state of the push buttons is determined by the lower row state descriptions. When off, the state of the push buttons is determined by the upper row state descriptions.

ROTATING SPEAKER ON/OFF turns on the Rotating Speaker effect, **SLOW/FAST** selects between slow and fast rotor velocity, **SPIN/BRAKE** keeps rotating speaker effect enabled but simulates a stationary rotor when in the BRAKE position. When in SPIN position the rotor will rotate at the speed specified by the SLOW/FAST control.

ON/OFF Turns on the vibrato/chorus effect, **VIBRATO/CHORUS** selects between the different vibrato/chorus options as indicated by the 4 LEDs. When the bottom LED is lit, the top three LEDs indicate the amount of chorus effect; when it is off, the top three LEDs indicate the amount of vibrato effect.

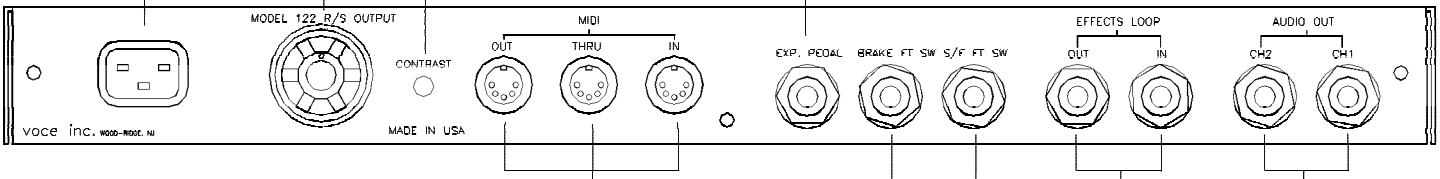
REAR PANEL DESCRIPTION

120/230VAC INPUT RECEPTACLE
IEC compatible receptacle for plugging in power cord supplied with the V3.

MODEL 122 ROTATING SPEAKER JACK
Standard 6 PIN jack for connecting to a model 122 rotating speaker. CAUTION: Connecting any type of rotating speaker other than a model 122 rotating speaker to this jack may cause serious damage to the speaker. Please contact Voce if you are unsure about using the 6 pin rotary speaker jack.

LCD DISPLAY CONTRAST CONTROL
This is a useful control which allows you to adjust the display contrast according to changes in viewing conditions and personal taste. Turn knob and observe change in contrast. Adjust to taste.

EXPRESSION PEDAL INPUT JACK
This jack is a control input that can be assigned for controlling Expression, Volume, or Overdrive. The default assignment is Expression. It can be used with a CV (continuous voltage) or potentiometer type pedal. Refer to How to do the Basic Stuff for information on using the pedal input.



MIDI IN/OUT/THRU CONNECTOR
These are the standard MIDI interface jacks used for connecting the V3 to your MIDI system. Refer to System Hook-Up for more information on MIDI system hook-up.

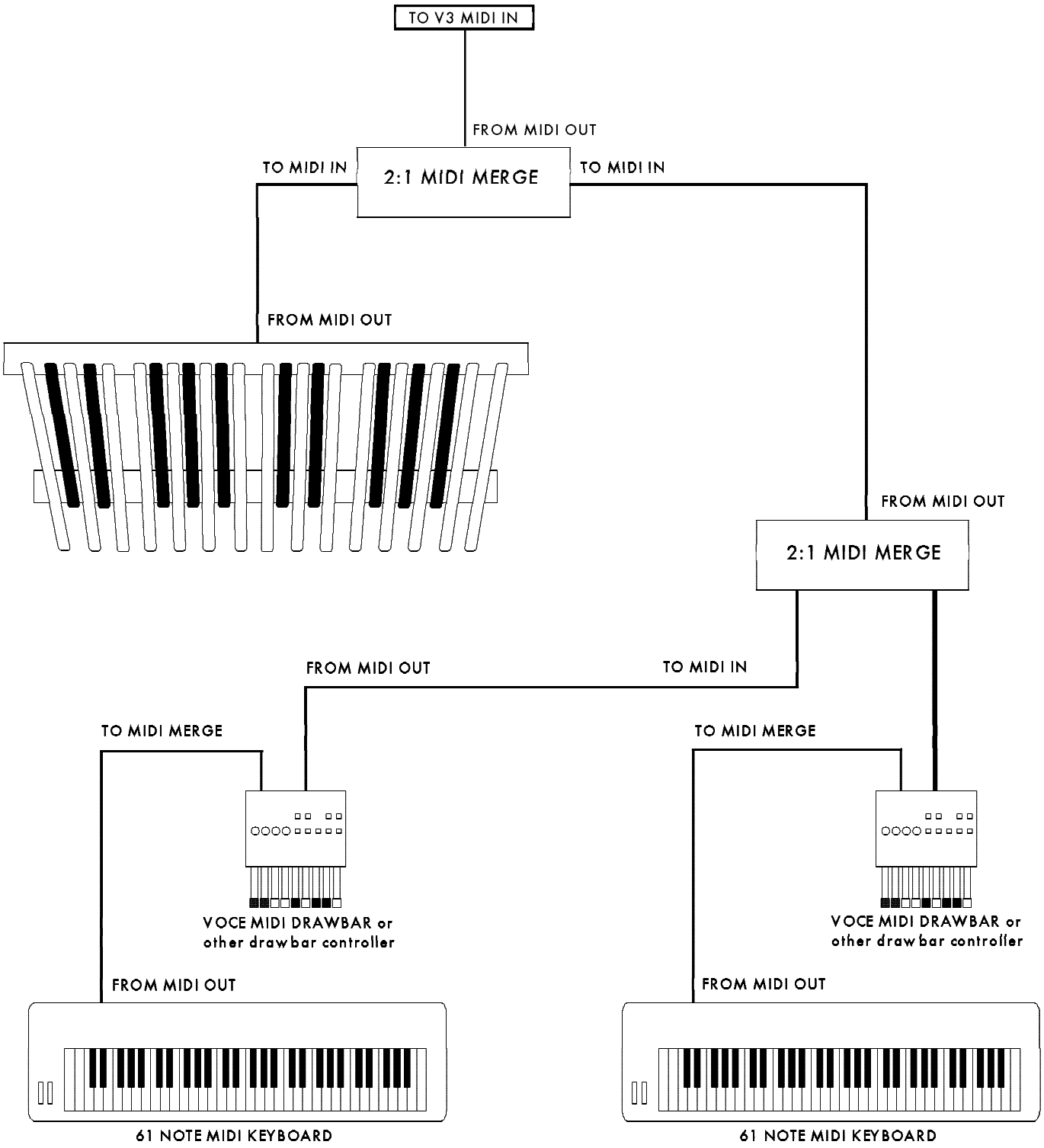
BRAKE FOOT SWITCH INPUT JACK
Used for connecting a momentary foot switch for controlling the rotary speaker brake feature. Refer to **Using the Rotary Speaker** and to **System Hook-Up** for more information.

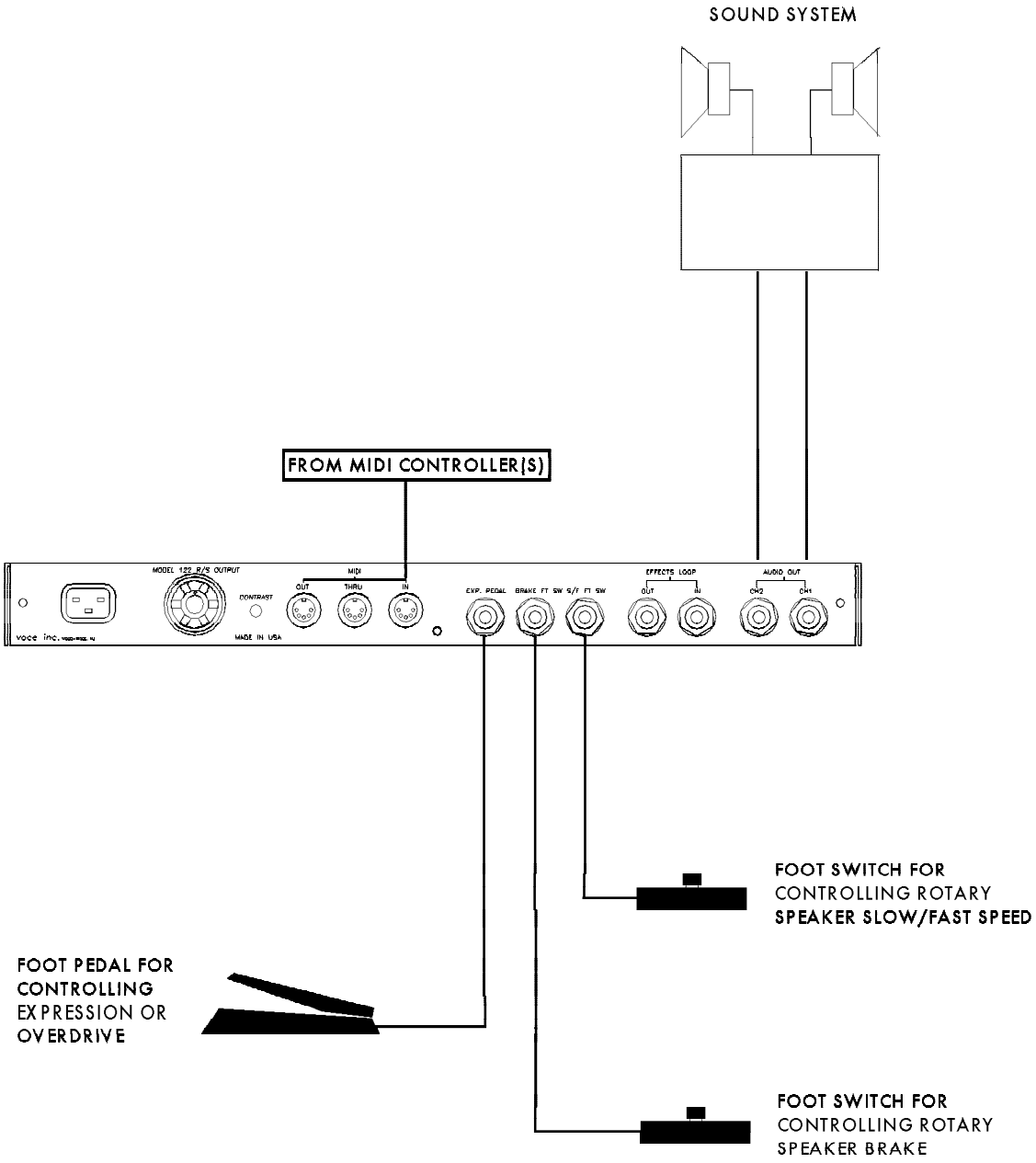
ROTATING SPEAKER SLOW/FAST FOOT SWITCH INPUT JACK
Used for connecting a momentary foot switch to select between the rotary speaker slow and fast speeds. Refer to **Using the Rotary Speaker** and to **System Hook-Up** for more information.

EFFECTS LOOP IN/OUT JACKS
Effects Loop In is used for inserting an effect or other signal source into the V3 signal path. Effects Loop Out provides the basic audio signal consisting of the organ tone and the chorus/vibrato effect to an external sound processing device. Refer to **System Hook-Up** for more information.

CHANNEL 1 AND 2 AUDIO OUTPUT JACK
These are the V3's audio outputs. Connect these to an instrument amplifier or sound system. Refer to **System Hook-Up** for more information.

SYSTEM HOOKUP




SOUND SYSTEM
FROM MIDI CONTROLLER(S)
MODEL 122 R/S OUTPUT
CONTRAST
MADE IN USA
MIDI
OUT
THRU
IN
EXP. PEDAL
BRAKE FT SW
S/F FT SW
EFFECTS LOOP
OUT
IN
AUDIO OUT
CH2
CH1
FOOT SWITCH FOR
CONTROLLING ROTARY
SPEAKER SLOW/FAST SPEED
FOOT PEDAL FOR
CONTROLLING
EXPRESSION OR
OVERDRIVE
FOOT SWITCH FOR
CONTROLLING ROTARY
SPEAKER BRAKE

PROGRAMMING

The Basics

The V3 comes with 128 user programs or patches, preset from the factory. These patches can be modified by changing parameters associated with a variety of V3 functions. The V3's parameters are organized into five parameter groups. They are: **Global, Patch, Rotating Speaker, MIDI Map,** and **Utilities.** These parameters affect the V3 in different ways. Global, Rotating Speaker, MIDI Map, and Utility parameters are not patch dependent, i.e., they have an effect on the instrument regardless of what patch is selected. Patch parameters are patch dependent and only affect the instrument depending on the parameter settings for whichever patch is selected. The five parameter groups are accessed through a contiguous "flat" menu system which allows you to "scroll" through the different parameters in each parameter group.

NOTE: Throughout this manual the words "patch" and "presets" are used interchangeably.

Programming the V3 consists of five basic steps:

1 Determine what changes need to be made, i.e. Drawbar settings, MIDI channel number selection, MIDI Control number assignments, etc.

2 Enter Edit Mode. Refer to the section **Entering Edit Mode** for more information.

3 Select the parameters that need to be modified by turning the CURSOR control knob. Refer to the **Front Panel** section for a description of the CURSOR control, Refer to the next section, **Menu System Description**, for description of the five parameter groups as related to the V3's menuing system and to the **Parameter Listing and Descriptions** section for more information on the V3's parameters.

4 Make the necessary changes to each parameter by turning the DATA/PRESET control knob to set the desired value for each parameter. Refer to the **Front Panel** section for a description of the DATA/PRESET control. **Parameter Listing and Descriptions** for a detailed description of each parameter. Refer to the section on **How to do the Basic Stuff, Using the Percussion Effect, Using the Rotary Speaker Effect,** and **Editing and Customizing MIDI Controller Maps** for a detailed description of programming the V3.

5 Save your changes or exit without saving if you don't want to keep your changes. Refer to the section on **Saving Your Changes/Exiting Edit Mode Without Saving.**

How the V3 Stores Information

The V3 operates according to the information stored in a temporary storage called the Edit Buffer. When you power up the V3 it immediately loads the information specified by patch number 1 in the Edit Buffer. When you select a new patch, the contents of the Edit Buffer will be replaced by the information specified by the new patch. Sending control changes or adjusting certain front panel controls will also affect the contents of the Edit Buffer.

There are four ways to change the contents of the Edit Buffer:

1 Editing parameters while in Edit Mode.

Before entering Edit Mode, the contents of the Edit Buffer is determined by the parameters specified by the selected preset or by any changes that may affect the Edit Buffer (see 2 below). The V3 uses the Edit Buffer as a scratch pad while you make changes in Edit Mode. This way your changes don't affect the patch data already programmed in the V3's memory until you decide to save them. This "non-destructive" editing allows unwanted changes to a parameter in a particular preset to be discard ed without affecting the preset. Once in Edit Mode, any changes you make to any of the V3's parameters will overwrite the corresponding parameter in the Edit Buffer. The contents of the preset being edited will be overwritten by the contents of the Edit Buffer if the edits are saved.

2 Changing front panel control settings and saving the changes to the current patch.

The V3 provides another useful and very intuitive method of data entry. When you make adjustments to the front panel controls, the contents of the edit buffer are updated for the parameter associated with this control. For Example, if you were to select the Percussion 3rd harmonic, by pressing the 2nd/3rd harmonic push button on the front panel, the 2nd/3rd harmonic select parameter would be updated in the Edit Buffer. For a listing and description of the V3's parameters, refer to section **Parameter Listing and Descriptions.** Similarly, any other adjustments or selections you make through the front panel controls will be reflected in the Edit Buffer. These adjustments can then be saved to the currently selected preset if desired. This is done by entering Edit Mode after making an adjustment, then saving the modified preset.

3 Sending control changes that affect the V3's settings and saving them to the current patch.

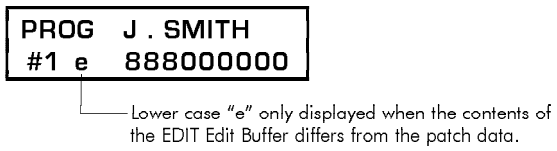
Just as you can make adjustments and selections via the front panel control to affect the Edit Buffer as explained in item 2 above, you can do the same, including saving your changes, by sending MIDI control changes with an external MIDI controller. For more information on these control changes, refer to section **Editing and Customizing MIDI Controller Maps** and to **MIDI Controller Parameters** in section **Parameter Listing and Descriptions.**

4 Selecting a different Patch

Whenever a patch is selected, either by an external MIDI controller via program changes or by selecting a preset via the front panel preset selector knob, the contents of the Edit Buffer is overwritten by the contents of the newly selected preset.

How the V3 Displays Information

The V3 uses a 2x16 character, back-lit LCD display to display information. There are two basic display modes; NORMAL MODE is used when you're playing the instrument and you're not changing any of its programmed settings or making use of its built-in utilities. EDIT MODE is used when you want to program the instrument or make use of the built-in utilities. In NORMAL MODE the display will look as follows: (patch #1 shown as an example)



When in EDIT MODE, the V3 will display the information shown in the **Parameter List and Descriptions.**

Whenever the contents of the Edit Buffer is modified via any of the methods explained above, the a lower case "e" is displayed next to the patch number. This is to remind you that the V3 is no longer operating according to the parameters programmed in the currently selected preset. The letter "e" will remain until one of two things happen: a) a new preset is selected in which case the Edit Buffer is overwritten by the new preset's data, b) you enter Edit Mode and save the changes, in which case the current preset is overwritten with the contents of the Edit Buffer.

Entering Edit Mode

You need to enter Edit Mode or use the Remote Save function if you would like to save any changes in the Edit Buffer as described in **Programming Overview**, in other words if you would like to save any changes to the currently selected patch.

To enter Edit Mode simply press the EDIT button on the front panel. Refer to the **Front Panel** section for a description of the EDIT button control. After pressing the EDIT button the LCD display will display the first parameter of the Global Parameters group. Next, make any necessary changes and follow the directions for exiting without saving or saving your changes and exiting.

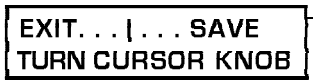
Saving Your Changes and Exiting Edit Mode

After making all the necessary changes you can either exit without saving your changes or save your changes and exit. To save or exit without saving do the following:

1 Assuming you are in Edit Mode, press the edit button. The V3 will display Save/Exit screen.

2 There are two ways to save the changes made in edit mode, via the front panel controls or through a remote save from an external MIDI controller. If you are saving from the front panel controls: Move the CURSOR control knob to the SAVE position if you want to save and exit, or to the EXIT position if you want to exit without saving. In the latter case, all changes made in Edit Mode will remain in the Edit Buffer until you do something else to change the Edit Buffer.

If you want to use the V3's remote save feature: Assign the MIDI controller number of the MIDI controller you wish to use to send the REMOTE SAVE command to the V3's REMOTE SAVE CONTROL. Refer to **MIDI Controller Maps** for a description of the REMOTE SAVE CONTROL. After you have made your changes, send the remote save control change from your MIDI controller to save your changes. For example: if you assign a MIDI ON/OFF push button controller to the SAVE function, you can save your changes by simply pressing the push button.



After you are done with your edits, press the EDIT button, the display will change as shown on the left. To SAVE, turn cursor to right, to EXIT, turn cursor to left.

Menu System Description

The V3 program menu is a contiguous flat menu system consisting of all the parameters in all five parameter groups. When you enter Edit Mode you are presented with the first parameter of the Global parameters group. To access other parameters in the menu you simply turn the CURSOR control knob on the front panel to "scroll" through the menu. If you look at the upper left hand corner of the LCD display you will notice a unique menu icon. There are five menu icons, one for each parameter group. As you scroll through different parameters within the menu you will notice that the menu icon will change to one of the other menu icons. These icons are to remind you which parameter group the displayed parameter belongs to. The five parameter groups are arranged in the same order as the parameter group descriptions shown below. The associated parameter group icon is shown in parentheses next to the parameter group name.

GLOBAL (**G**) Global parameters are those which affect the operation of the instrument as a whole, regardless of which patch is selected. Instances where Global Parameters would be used include: assigning the MIDI channel number to the upper or lower manual, tuning the V3, selecting between numeric or graphic drawbar setting display, or adjusting the min and max volume settings for control pedals. Refer to the **Global Parameters** list in **Parameter Listing and Descriptions** for a detailed description of the Global Parameters and to **How to do the Basic Stuff** for more information on using Global parameters.

PATCH (**P**) Patch Parameters are those which affect the instrument according to the value specified for the different patch parameters in the individual patches. In other words, Patch Parameters are patch dependent. Examples of Patch Parameter usage include; setting keyboard splits, editing patch names, and creating drawbar settings. Refer to the **Patch Parameters** list in **Parameter Listing and Descriptions** for a detailed description of the Patch Parameters and to **How to do the Basic Stuff** for more information on using Patch parameters.

ROTATING SPEAKER (**R**) Rotating Speaker Parameters are specific to the 20 rotating speaker programs or setups. A rotary speaker setup is a set of specifications that define a particular rotary speaker effect which you can then assign to any of the V3's 128 patches. Each rotary speaker setup you create can consist of a different combination of such things as terminal velocity, acceleration rate, pitch modulation and even the distance and angle of the microphone to the upper and or lower rotor. Refer to the **Rotating Speaker Parameters** list in **Parameter Listing and Descriptions** for a detailed description of the Rotating Speaker Parameters and to **Using the Rotary Speaker Effect** for a detailed description of using and customizing the V3's rotary speaker effect.

MIDI CONTROLLER MAP (**C**) MIDI Controller Map parameters are used, as the name suggests, to specify custom MIDI controller maps. You can specify up to 10 different MIDI controller maps, each with their own name and MIDI controller assignments to the V3's controls. Refer to the **MIDI Controller Maps** parameters list in **Parameter Listing and Descriptions** for a detailed description of the MIDI Controller Maps parameters and to **Editing and Customizing MIDI Controller Maps** for more information on using the MIDI Controller Map parameters.

UTILITIES (**U**) The utilities parameters are used for performing tasks such as re-initializing to factory settings, copying from one patch to another, and transmitting SYSEX patch dumps to an external MIDI device such a as a sequencer or editor librarian in a computer. Refer to the **Utilities Parameters** list in **Parameter Listing and Descriptions** for a detailed description of the Utilities parameters and to **How to do the Basic Stuff** for more information on using the Utilities parameters.

PARAMETER LISTING AND DESCRIPTIONS

The following is a complete listing of all the parameters in the five parameter groups including a description of each parameter. This listing is meant to be used a a reference when programming the V3. The following conventions are used in the parameter descriptions:

a) X is used to denote an alpha-numeric character for the parameter value.
b) [choice] is used to denote a non numeric parameter value chosen from a list.
c) [name] is used to denote a parameter value consisting of a user defined name.

GLOBAL PARAMETERS	VALUE	DISPLAY
MIDI CHANNEL UPPER MANUAL XXX Assigns the MIDI channel for the Upper Manual.	XXX = 1 - 16, OFF, OMN (OMN = OMNI)	**G MIDI CHANNEL UPPER MANUAL XXX**
MIDI CHANNEL LOWER MANUAL XXX Assigns the MIDI channel for the lower manual.	XXX = 1 - 16, OFF	**G MIDI CHANNEL LOWER MANUAL XXX**
LOWER MANUAL DEFAULT PAT XXX Assigns the default patch for the lower manual.	XXX = 1 - 128	**G LOWER MANUAL DEFAULT PAT. XXX**
MIDI CHANNEL FOR PEDALS XXX Assigns the MIDI channel for the pedal manual.	XXX = 1 - 16, OFF	**G MIDI CHANNEL FOR PEDALS XXX**
PEDAL MANUAL DEFAULT PAT XXX Assigns the default patch for the pedal manual.	XXX = 1 - 128	**G PEDAL MANUAL DEFAULT PAT. XXX**
MASTER TUNING Sets the tuning for the V-3 in increments of one one-hundredth of a semitone (cents). The V-3 can be tuned up to one semitone (100 cents)above or below standard A440 tuning.	XXXX = +/-100	**G MASTER TUNING XXXX CENTS**
RELEASE CLICK [choice] Used for settings the character of the click at the release of each note.	[choice] = HARD, SLIGHTLY SOFT, SOFT, MUSHY	**G RELEASE CLICK [choice]**
DRAWBAR DISPLAY Used for selecting between GRAPHIC (barline) or NUMERIC drawbar display.	[choice] = GRAPHIC, NUMERIC	**G DRAWBAR DISPLA [choice]**
GLOBAL ROTATING SPK OVERRIDE Allows the user to override the Rotating Speaker assignments of all patches and assign a single Rotating Speaker to all patches. To return to the Rotating Speaker assignments programmed into each individual patch, set this parameter to OFF.	XXX = 1 - 20, 0FF	**G GLOBAL ROTATING SPK OVERRIDE**

GLOBAL PARAMETERS	VALUE	DISPLAY
GLOBAL CONTROL MAP OVERRIDE XXX Allows the user to override the Control Map assignments of all patches and assign a single Global Map to all patches. To return to the Control Map assignments programmed into each individual patch, set this parameter to OFF.	XXX = 1-10 / OFF	**G GLOBAL CONTROL MAP OVERRIDE XXX**
PATCH CHANGES BUTTONS? [choice] Allows the user to determine whether the parameters controlled by the front-panel buttons - such as PERCUSSION ON/OFF and PERCUSSION HARMONIC - will be altered by a new patch change, or if they remain unchanged.	[choice] = YES, NO	**G PATCH CHANGES BUTTONS? [choice]**
PEDAL IN RANGE MIN XXX MAX XXX Adjusts the minimum and maximum range setting for a control pedal hooked up to the V3. Used for adapting pedal with different ranges.	XXX = 0 - 254	**G PEDAL IN RANGE MIN XXX MAX XXX**

PATCH PARAMETERS	VALUE	DISPLAY
SPLIT @ MIDI NOTE# Sets the split point between the Upper And Lower Manual patches.	XXX = OFF, 1 - 127	**P SPLIT @ MIDI NOTE # XXX**
USE PRESET XXX FOR BELOW SPLIT Assigns a particular preset patch for the keyboard area below the split point.	XXX = 1 - 128	**P USE PRESET XXX FOR BELOW SPLIT**
TRANSPOSE XXX SEMITONES Allows the user to transpose the V-3 up or down by as much as two octaves (24 semitones).	XXX = -24 to +24	**P TRANSPOSE XXX SEMITONES**
P BEND RANGE XX SEMITONES Sets the maximum effect of the pitch bend wheel, in semitones (0 to 12, or one octave).	XX = 0 - 12	**P P BEND RANGE XX SEMITONES**
EDIT PATCHNAME [name] Here is where the name of a new patch is recorded or an old one edited.	[name] = any name up to 10 characters long.	**P EDIT PATCHNAME [name]**
DRAWBAR SETTING XXXXXXXXX The settings of the patch's 9 drawbars are displayed here in numeric format.	<XXXXXXXXX> Where X = 0 - 8	**P DRAWBR SETTING XXXXXXXXX**
AUX DB SETTING XXXXXXXXX This is the patch's auxiliary drawbar setting, for use in the DRAWBAR MORPH feature. On a B-3 tone-wheel organ there are two sets of drawbars, either of which can be engaged with the push of a button. The V-3 has this feature as well, but also allows the user to shift smoothly, or MORPH, From one drawbar setting to another. The AUX DRAWBAR SETTING is the setting into which the main setting MORPHS when this feature is engaged.	<XXXXXXXXX> Where X = 0 - 8	**P AUX DB SETTING XXXXXXXXX**
ORGAN TYPE [choice] The V-3 is currently capable of simulating three types of vintage organs: TONE WHEEL (the legendary B-3), CONTINENTAL and COMPACT, referring to popular Italian Portable organs manufactured in the 1960's. The CONTINENTAL sound can be heard on such Sixties classic tunes as "Light My Fire" by the Doors.	[choice] = TONE WHEEL, CONTINENTAL, COMPACT	**P ORGAN TYPE [choice]**

PATCH PARAMETERS	VALUE	DISPLAY
GENERATOR LEAKAGE XX % This refers to the signal leakage from the tone-wheel generator into the main signal path. This sounds as if the player were holding all the keys down at once with the volume very low. This effect is an important part of the character of tone-wheel organ sound. Adjust to taste.	XX = 0 - 99	**P GENERATOR LEAKAGE XX %**
LOWEST OCTAVE FOLDBACK [choice] On the lowest octave of the B-3 tone-wheel organ, the lowest drawbar is assigned to the same harmonics as it is in the next-highest octave. This repetition is called FOLDBACK, and the user has the option of turning it ON or OFF.	[choice] = YES or NO	**P LOWEST OCTAVE FOLDBACK [choice]**
EQUALIZATION BASS XXX Adjusts the equalization of the BASS frequencies, measured in dB.	XXX = +/- 12	**P EQUALIZATION BASS XXX dB**
EQUALIZATION TREBLE XXX Adjusts the equalization of the TREBLE frequencies, measured in dB.	XXX = +/- 12	**P EQUALIZATION TREBLE XXX dB**
OVERDRIVE MIX RATIO XXX % Adjusts the ratio of OVERDRIVEN signal to clean signal in the output.	XXX = 0-100	**P OVERDRIVE MIX RATIO XXX %**
KEY CLICK LEVEL XXX % Adjusts the level of the KEYCLICK, an electrical contact noise which occurs at random volume every time a key is pressed. This is also referred to as "spit" or "bite" in the attack.	XXX = 0 - 100	**P KEYCLICK LEVEL XXX %**
CHORUS/VIBRATO SELECT - [choice] This is the equivalent of the vibrato controls found on the B-3 tone-wheel organ. There are three levels of "CHORUS" type vibrato (primarily amplitude modulation) and three levels of "VIBRATO" type vibrato (primarily frequency modulation).	[choice] = V1, V2, V3, C1, C2, C3, OFF	**P CHORUS/VIBRATO SELECT - [choice]**
PERCUSSION ON/OFF - [choice] Turns on and off the PERCUSSION feature, which adds a transient pitch harmonically related to the fundamental of the organ tone, either at the second or third harmonic.	[choice] = ON, OFF	**P PERCUSSION ON/OFF- [choice]**

PATCH PARAMETERS	VALUE	DISPLAY
PERCUSSION VOLUME [choice] Chooses between NORMAL and SOFT volume for the percussion effect.	[choice] = NORM, SOFT	**P PERCUSSION VOLUME [choice]**
PERCUSSION DECAY [choice] Chooses between the SLOW and FAST decay times for the percussion effect.	[choice] = SLOW, FAST	**P PERCUSSION DECAY [choice]**
PERCUSSION HARMONIC X Chooses between the SECOND or THIRD harmonic for the percussion effect.	X= 2, 3	**P PERCUSSION HARMONIC X**
PERCUSSION VOLUME NORMAL POSITION Allows the user to define the volume level considered "NORMAL POSITION" for the percussion effect.	XXX = 0 - 100%	**P PERC VOLUME NORM POS XXX %**
PERCUSSION VOLUME SOFT POSITION Allows the user to define the volume level considered the "SOFT POSITION" for the percussion effect.	XXX = 0 - 100%	**P PERC VOLUME SOFT POS XXX %**
PERCUSSION DECAYSLOW POSITION Allows the user to define the decay time (in seconds) considered "SLOW POSITION" for the percussion effect.	XXX = 0.5 - 6.9 seconds	**P PERC DECAY SLOW POS XXX S**
PERCUSSION DECAY FAST POSITION Allows the user to define the decay time (in seconds) considered "FAST" for the percussion effect.	XXX= 0.5 - 6.9 seconds	**P PERC DECAY FAST POS XXX S**
ROTATING SPEAKER [choice] Sets the state of the rotating speaker through which the organ tone is processed - either spinning FAST or SLOW, with the BRAKE on (stopped), or BYPASSED altogether. (Note that even with the BRAKE on, the signal is still being processed through the cabinet simulation.)	[choice] = FAST, SLOW, BRAKE, BYPASS	**P ROTATING SPKR [choice]**
PEDAL INPUT ASSIGN [choice] Controls whether the pedal input on the back panel of the V-3 is assigned to EXPRESSION (loudness) or OVERDRIVE or VOLUME.	[choice]= EXPRESSION-OVERDRIVE, VOLUME	**P PEDAL INPUT ASSIGN [choice]**
PERCUSSION VELOCITY CURVE XXX Assigns one of three velocity curves to the PERCUSSION volume, or turns velocity sensitivity off altogether.	XXX = 1- 3, OFF	**P PERCUSSION VEL CURVE XXX**

PATCH PARAMETER	VALUE	DISPLAY
ROTARY SPEAKER TYPE XX Assigns one of 20 user-definable ROTARY SPEAKERS to process the organ tone. **LC# XX** is displayed in the lower left hand corner if a global override is enabled. (xx=override type)	XX = 0 - 20 [name] is the Rotary Speaker name.	**P RS TYPE #** **[name]**
		P CTRL MAP #X **[name]**
CONTROL MAP #X Assigns one of 10 user-definable CONTROL MAPS to the patch for real time parameter manipulation. **LC# XX** is displayed in the lower left hand corner if a global override is enabled. (xx=override map #)	XX = 0 - 10 [name] is the Control Map name.	

ROTATING SPEAKER PARAMETERS	VALUE	DISPLAY
EDIT ROTARY SPEAKER NAME Allows the user to name a particular rotary speaker setting.	[name] = User defined Rotating Speaker name consisting of up to 10 characters.	**R EDIT RSPK NAME [name]**
ROTOR BAL UPPER TO LOWER XXXX dB Adjusts the relative volume levels of the upper (horn) and lower (drum) rotors.	XXXX = +/- 12dB	**R ROTR BAL UPPER TO LOWER XXXX dB**
UPPER ROTOR MIC DISTANCE XXXX Ft. Adjusts the distance of the UPPER ROTOR to the microphones.	XXXX = 0.1 - 12.7 Ft	**R UPPER ROTOR MIC DIST XXXX Ft**
UPPER ROTOR PITCH MOD XXX% Adjusts the degree to which the spinning of the upper rotor affects the pitch of the Doppler shift of the signal	XXX = 0 - 100%	**R UPPER ROTOR PITCH MOD XXX %**
UPPER ROTOR FAST RATE - Hz Adjusts the rate of the upper rotor when in FAST mode.	XXX = 0.3 - 9.3 Hz	**R UP ROTOR FAST RATE XXX Hz**
UPPER ROTOR SLOW RATE XXX Hz Adjusts the rate of the upper rotor when in SLOW mode.	XXX = 0.0 - 9.3 Hz	**R UP ROTOR SLOW RATE XXX Hz**
UPPER ROTOR ACCL RATE XXXX SEC. Adjusts the time, in seconds, that it takes for the upper rotor to ACCELERATE from its assigned SLOW rate to its assigned FAST rate.	XXXX = 0.3 - 25.4 Seconds	**R UP ROTOR ACCL RATE XXXX Sec.**
UPPER ROTOR DECL RATE XXXX SEC. Adjusts the time, in seconds, that it takes for the upper rotor to DECELERATE from its assigned FAST rate to its assigned SLOW rate.	XXXX = 0.3 - 25.4 Seconds	**R UP ROTOR DECL RATE XXXX Sec**
UPPER ROTOR BRAKE RATE XXXX SEC. Adjusts the time, in seconds, that it takes for the upper rotor to reach a full stop when the BRAKE is applied.	XXXX = 0 - 25.4 Seconds	**R UP ROTOR BRKE RATE XXXX Sec**
UPPER ROTOR MIC ANGLE XXX DEG The angle between the microphones also affects the character of the sound. This parameter essentially varies the amount of stereo separation in the signal.	XXX = 0 - 180 Degrees	**R UP ROTOR MIC ANGLE XXX DEG**
LOWER ROTOR MIC DISTANCE Adjusts the distance of the microphone from the lower rotor.	XXXX = 0.1 - 12.7 Ft	**R LOWER ROTOR MIC DIST XXXX Ft**

ROTATING SPEAKER PARAMETERS	VALUE	DISPLAY
LOWER ROTOR PITCH MOD Adjusts the degree to which the spinning of the lower rotor affects the pitch of the Doppler shift of the signal.	XXX = 0 - 100%	**R LOWER ROTOR PITCH MOD XXX %**
LOWER ROTOR FAST RATE Adjusts the rate of the lower rotor when in FAST mode.	XXX = 0.3 - 9.3 Hz	**R LOW ROTOR FAST RATE XXX Hz**
LOWER ROTOR SLOW RATE Adjusts the rate of the lower rotor when in SLOW mode.	XXX = 0.0 - 9.3 Hz	**R LOW ROTOR SLOW RATE XXX Hz**
LOWER ROTOR ACCELERATION RATE - SEC. Adjusts the time, in seconds, that it takes for the lower rotor to ACCELERATE from its assigned SLOW rate to its assigned FAST rate.	XXXX = 0.3 - 25.4 Seconds	**R LOW ROTOR ACCL RATE XXXX Sec**
LOWER ROTOR DECELERATION RATE Adjusts the time, in seconds, that it takes for the lower rotor to DECELERATE from its assigned FAST rate to its assigned SLOW rate.	XXXX = 0.3 - 25.4 Seconds	**R LOW ROTOR DECL RATE XXXX Sec**
LOWER ROTOR BRAKE RATE - SEC. Adjusts the time, in seconds, that it takes for the lower rotor to reach a full stop when the BRAKE is Applied.	XXXX = 0 - 25.4 Seconds	**R LOW ROTOR BRKE RATE XXXX Sec**
LOWER ROTOR MIC ANGLE. See UPPER ROTOR MIC ANGLE - DEG. for explanation.	XXX = 0 - 180°	**R LOW ROTOR MIC. ANGLE XXX °**

MIDI CONTROLLER MAPS	VALUE	DISPLAY
EDIT CONTROL MAP NAME [name] Edits the assigned name for the control map.	[name] = Any user defined name up to 10 characters long.	C EDIT CMAP NAME [name]
16′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 1st, or 16′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 16' DRAWBAR CTRL NUMBER XXX
5-1/3′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 2nd, or 5-1/3′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 5-1/3' DRAWBAR CTRL NUMBER XXX
8′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 3rd, or 8′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 8' DRAWBAR CTRL NUMBER XXX
4′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 4th, or 4′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 4' DRAWBAR CTRL NUMBER XXX
2-2/3′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 5th, or 2-2/3′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 2-2/3' DRAWBAR CTRL NUMBER XXX
2′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 6th, or 2′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 2' DRAWBAR CTRL NUMBER XXX
1-3/5′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 7th, or 1-3/5′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 1-3/5' DRAWBAR CTRL NUMBER XXX
1-1/3′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 8th, or 1-1/3′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 1-1/3' DRAWBAR CTRL NUMBER XXX
1′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 9th, or 1′, drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C 1' DRAWBAR CTRL NUMBER XXX
AUX 16′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 1st, or 16′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 16' DRAWBR CTRL NUMBER XXX
AUX 5-1/3′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 2nd, or 5-1/3′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 5-1/3' DBR CTRL NUMBER XXX

MIDI CONTROLLER MAPS	VALUE	DISPLAY
AUX 8′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 3rd, or 8′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 8' DRAWBAR CTRL NUMBER XXX
AUX 4′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 4th, or 4′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 4' DRAWBAR CTRL NUMBER XXX
AUX 2-2/3′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 5th, or 2-2/3′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 2-2/3' DBR CTRL NUMBER XXX
AUX 2′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 6th, or 2′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 2' DRAWBAR CTRL NUMBER XXX
AUX 1-3/5′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 7th, or 1-3/5′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 1-3/5' DBR CTRL NUMBER XXX
AUX 1-1/3′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 8th, or 1-1/3′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 1-1/3' DBR CTRL NUMBER XXX
AUX 1′ DRAWBAR CONTROL Assigns the MIDI controller number or Aftertouch for the 9th, or 1′, auxiliary drawbar.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C AUX 1' DRAWBAR CTRL NUMBER XXX
DRAWBAR MORPH CONTROL Assigns the MIDI controller number or Aftertouch for the DRAWBAR MORPH function.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C DRAWBAR MORPH CTRL NUMBER XXX
MIDI VOLUME CONTROL Assigns the MIDI controller number or Aftertouch for MIDI VOLUME. (Standard default is CONTROLLER #7).	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C MIDI VOLUME CTRL NUMBER XXX
MIDI EXPRESSION CONTROL Assigns the MIDI controller number or Aftertouch for EXPRESSION (a combination of volume and brightness, used in the built-in pedals of most tone-wheel organs).	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C MIDI EXPRESSION CTRL NUMBER XXX

MIDI CONTROLLER MAPS	VALUE	VALUE
PERCUSSION ON/OFF SWITCH CONTROL Assigns the MIDI controller number for turning the PERCUSSION effect ON and OFF.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C PERC ON/OFF SW CTRL NUMBER XXX
PERCUSSION VOLUME SWITCH CONTROL Assigns the MIDI controller number for switching between NORMAL and SOFT volume for the PERCUSSION effect.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C PERC VOLUME SW CTRL NUMBER XXX
PERCUSSION DECAY SWITCH CONTROL Assigns the MIDI controller number for switching between SLOW and FAST decay for the PERCUSSION effect.	XXX = 0 - 121, OFF	C PERC DECAY SW CTRL NUMBER XXX
PERCUSSION HARMONIC SWITCH CONTROL Assigns the MIDI controller number for switching between the SECOND and THIRD harmonics for the PERCUSSION effect.	XXX = 0 - 121, OFF	C PERC HARM SW. CTRL NUMBER XXX
CHORUS/VIBRATO ON/OFF CONTROL Assigns the MIDI controller number for turning the CHORUS/VIBRATO effect ON and OFF.	XXX = 0 - 121, OFF	C C/VIB ON/OFF CTRL NUMBER XXX
CHORUS/VIBRATO SELECT CONTROL Assigns the MIDI controller or Aftertouch number for choosing between the three CHORUS effects and the three VIBRATO effects.	XXX = 0 - 121, OFF	C C/VIB SELECT CTRL NUMBER XXX
ROTARY SPEAKER BYPASS CONTROL Assigns the MIDI controller number for the ROTARY SPEAKER BYPASS function.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C ROT SPKR BYP CTRL NUMBER XXX
ROTARY SPEAKER SLOW/FAST CONTROL Assigns the MIDI controller number for switching the rotary speaker between SLOW and FAST speeds.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C R SPKR SL/FAST CTRL NUMBER XXX
ROTARY SPEAKER BRAKE CONTROL Assigns the MIDI controller number for the ROTARY SPEAKER BRAKE function.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C ROT SPKR BRAKE CTRL NUMBER XXX
OVERDRIVE MIDI CONTROL Assigns the MIDI controller number which adjusts the amount of OVERDRIVE.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C OVERDRIVE MIDI CTRL NUMBER XXX
KEY CLICK MIDI CONTROL Assigns the MIDI controller number which adjusts the amount of KEY CLICK.	XX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C KEY CLICK MIDI CTRL NUMBER XXX

MIDI CONTROLLER MAPS	VALUE	DISPLAY
LEAKAGE MIDI CONTROL Assigns the MIDI controller number which adjusts the amount of GENERATOR LEAKAGE.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C LEAKAGE MIDI CTRL NUMBER XXX**
UPPER ROTOR MIC DISTANCE CONTROL Assigns the MIDI controller number which adjusts the amount of MIC DISTANCE for the upper rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UPR ROTOR MIC DIST CTRL # XXX**
UPPER ROTOR PITCH MODULATION CTLR Assigns the MIDI controller number which adjusts the amount of PITCH MODULATION for the upper rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UPR ROTOR PITCH MOD CTRL # XXX**
UPPER ROTOR FAST CONTROL Assigns the MIDI controller number which adjusts the FAST speed of the upper rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UP ROTOR FAST CTRL NUMBER XXX**
UPPER ROTOR SLOW CONTROL Assigns the MIDI controller number which adjusts the SLOW speed of the upper rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UP ROTOR SLOW CTRL NUMBER XXX**
UPPER ROTOR ACCELERATION CONTROL Assigns the MIDI controller number which adjusts the ACCELERATION RATE of the upper rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UP ROTOR ACCL CTRL NUMBER XXX**
UPPER ROTOR DECELERATION CONTROL Assigns the MIDI controller number which adjusts the DECELERATION RATE of the upper rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UP ROTOR DECL CTRL NUMBER XXX**
UPPER ROTOR BRAKE CONTROL Assigns the MIDI controller number which adjusts the BRAKE RATE of the upper Rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UP ROTOR BRKE CTRL NUMBER XXX**
UPPER ROTOR MIC ANGLE CONTROL Assigns the MIDI controller number which adjusts the MIC ANGLE of the upper rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C UP ROTOR MIC ANG CTRL NUMBER XXX**
LOWER ROTOR MIC DISTANCE CONTROL Assigns the MIDI controller number which adjusts the amount of MIC DISTANCE for the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C LOW ROTOR MIC DIST CTRL # XXX**
LOWER ROTOR PITCH MODULATION CTRL Assigns the MIDI controller number which adjusts the amount of PITCH MODULATION for the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	**C LOW ROTR PITCH MOD CTRL # XXX**

MIDI CONTROLLER MAPS	VALUE	DISPLAY
LOWER ROTOR FAST CONTROL Assigns the MIDI controller number which adjusts the FAST speed of the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C LOW ROTOR FAST CTRL NUMBER XXX
LOWER ROTOR SLOW CONTROL Assigns the MIDI controller number which adjusts the SLOW speed of the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C LOW ROTOR SLOW CTRL NUMBER XXX
LOWER ROTOR ACCELERATION RATE CTRL Assigns the MIDI controller number which adjusts the ACCELERATION RATE of the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C LOW ROTOR ACCL CTRL NUMBER XXX
LOWER ROTOR DECELERATION RATE CTRL Assigns the MIDI controller number which adjusts the DECELERATION RATE of the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C LOW ROTOR DECL CTRL NUMBER XXX
LOWER ROTOR BRAKE RATE CONTROL Assigns the MIDI controller number which adjusts the BRAKE RATE of the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C LOW ROTOR BRKE CTRL NUMBER XXX
LOWER ROTOR MIC ANGLE CONTROL Assigns the MIDI controller number which adjusts the MIC ANGLE of the lower rotor.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C LOW ROTOR MIC ANG CTRL NUMBER XXX
ROTOR BALANCE CONTROL Assigns the MIDI controller number which adjusts the volume BALANCE between the upper and lower rotors.	XXX = 0 - 121, AFT, OFF AFT = AFTER-TOUCH	C ROTOR BAL. CTRL NUMBER XXX
REMOTE SAVE CONTROL Assigns the MIDI controller number to the remote save function. Works the same as the front panel save function.	XXX = 0 - 121, OFF	C REMOTE SAVE CTRL NUMBER XXX
SUSTAIN PEDAL CONTROL Assigns the MIDI controller number to the note hold function. Usually assigned to number 64.	XXX = 0 - 121, OFF	C SUSTAIN PEDAL CTRL NUMBER XXX

UTILITIES PARAMETERS	VALUE/DESCRIPTION	DISPLAY
TRANSMIT SYSEX PATCH DUMP This causes the V-3 to transmit a system-exclusive dump of all patches, rotary speakers and control maps.	Turn DATA/PRESET control to initialize patch dump.	**U XMIT SYSEX PAT DUMP [TURN DATA]**
	Displayed when PATCH DUMP is in progress.	**U XMIT SYSEX PAT XMITING PLS WAIT**
RE-INITIALIZE MEMORY This utility completely erases all user-programmed data from the V-3's memory and reinstalls the factory patches, rotary speakers and control maps.	Set XX to 50 to re-initialize	**U RE-INITIALIZE [SET TO 50] XX**
COPY FROM PATCH # TO PATCH # This utility allows the user to copy a single patch from one location to another.	A = Source Patch B = Destination Patch	**U COPY FROM PAT #A TO #B**
	[choice] = YES or NO	**U COPY PATCH??? #A TO #B [choice]**
	If [choice] is YES, then Copy complete message is displayed.	**U PATCH COPIED! #A TO #B YES**
COPY FROM ROTARY SPEAKER # TO ROTARY SPEAKER # This utility allows the user to copy a specific rotary speaker setup to another.	A = Source Rotary Speaker B = Destination Rotary Speaker	**U COPY FROM RSPK # A TO # B**
	[choice] = YES or NO	**U COPY R. SPEAKR? #A TO #B [choice]**
	If [choice] is YES, then Copy complete message is displayed.	**U R. SPK COPIED! #A TO #B YES**

UTILITIES PARAMETERS	VALUE/DESCRIPTION	DISPLAY
COPY MIDI MAP? This utility is used or for copying the contents of one MIDI MAP, the source map, to another, the destination MIDI MAP.	A = Source MIDI MAP B = Destination MIDI MAP	**U COPY FROM MMAP** **#A TO #B**
	[choice] = YES or NO	**U COPY MIDI MAP?** **#A TO #B [choice]**
	If [choice] is YES, then Copy complete message is displayed.	**U M MAP COPIED!** **#A TO #B YES**
SEE MIDI DATA This is a utility screen which displays MIDI data activity. Useful for monitoring MIDI setup and to verify that A MIDI controller is communicating with the V3.	Displayed when there is no MIDI activity or if the V3 is not receiving MIDI data due to a fault in the MIDI setup.	**U SEE MIDI DATA** **NO DATA RECEIVED**
	If there is MIDI data activity, it will display MIDI status and channel data on the lower row of the LCD display.	**U SEE MIDI DATA** **[midi data activity]**

HOW TO DO THE BASIC STUFF

This section helps you get right down to the nitty gritty of programming the V3. The following is a listing of procedures for programming those things which are most common when using the V3. When performing any of the following procedures, it is assumed that you have read the previous section, **Programming the V3**, and that you understand how to enter Edit Mode and how to save your changes once you are done editing. It is also assumed that you are already in Edit Mode. Parameters will be referred to by their name and to further aid in finding specific parameters called out in each procedure, the parameter group icon will be shown in parentheses following the parameter name. When in Edit Mode, you select the parameters you which to edit by turning the CURSOR control knob until the desired parameter is displayed. You then select the parameter value by turning the DATA/PRESET control knob to the desired value. You may want to refer to the **Parameter Listing and Descriptions** for a description of each parameter and a listing of valid parameter values while performing any of the following procedures.

Tuning the V3

This is the global tuning parameter for the instrument. It affects all the patches equally. This tuning control allows the user to set the pitch of the instrument to be within a semitone of A440. To tune the instrument:

1 Select MASTER TUNING XXX CENTS (**G**).

2 Set the data value of XXX to be within the range of -100 cents to +100 cents.

Assigning the MIDI Channel

The V3 allows you to assign a MIDI channel to the upper manual, lower manual, and bass pedals. If you are using two manuals, one manual gets assigned to one MIDI channel and the other to a different MID channel. If only one manual is being used, then the upper manual should be assigned to whatever MIDI channel you would like to assign to your MIDI controller and the lower manual should be set to OFF. If you are using MIDI bass pedals you can assign a MIDI channel for this controller also. To assign the MIDI channel to the upper and lower manual and to bass pedals, do the following:

1 Select MIDI CHANNEL - UPPER MANUAL (**G**) for setting the upper manual MIDI channel assignment, MIDI CHANNEL - LOWER MANUAL (**G**) for setting the upper manual MIDI channel assignment,or MIDI CHANNEL FOR PEDALS(**G**) for setting the MIDI bass pedal channel assignment.

2 Set the channel number to the desired MIDI channel (1-16 or OMNI for the upper manual, 1-16 for the lower manual and bass pedals.) for either the upper manual, lower manual, or MIDI bass pedals. If using only one manual, set the channel number to the desired channel (1 - 16 or OMNI) for the upper manual then select MIDI CHANNEL- LOWER MANUAL (**G**) and set the MIDI channel to OFF. Upper manual OMNI supercedes all other channels.

Adjusting the Release and Attack Key Click

The V3 allows you to adjust the amount of attack key click and the amount of release key click. Key click is caused by a combination of contact noise and voltage transient whenever a note is pressed or released. This clicking or popping sound although considered a flaw in the original tone wheel organ design, is actually an integral part of the tone wheel organ sound (B3, C3, M3 etc..). However there are those who don't like this type of "effect" or simply find that key click is just too annoying. This effect is also what is know as "SPIT" or BITE". If you prefer your organ sound a little less aggressive then you may want to turn down the amount of key click.

The attack key click can be adjusted differently for each patch. However, the release click adjustment is global. To adjust the amount attack key click:

1 Select the patch where you want to make the key click adjustment, enter Edit Mode, then select parameter KEY CLICK LEVEL (**P**)

2 Play some notes on your keyboard and adjust level to taste. Set between 0 to 100 %.

To adjust the amount of release click:

1 Select RELEASE CLICK (**G**). (from any patch)

2 Play some notes on your keyboard switching between HARD, SLIGHTLY SOFT, SOFT, and MUSHY. Notice the change in character of the release click as you switch between the four Levels. Then set it to the desired level.

Selecting how the Drawbar Settings are Displayed

Numeric Display Style

Graphical Display Style

The V3 has two drawbar settings styles. Graphical and numerical. The graphical display style consists of nine vertical bars of varying heigh depending on the individual drawbar settings. These are displayed from left to right on the LCD display. The numerical display style consists of nine numbers displayed from left to right on the display showing the exact value of each drawbar setting. The display style setting is global, meaning that once a display style is chosen it will apply to all patches until it is changed again. The two menus on the right show the examples of both display styles. To select the drawbar display method: (NORMAL MODE only)

1 Select DRAWBAR DISPLAY (**G**)

NOTE: This affects NORMAL MODE only. in EDIT MODE, the drawbar display is always numeric.

2 Set to GRAPHIC or NUMERIC by turning the DATA/PRESET knob left or right

Let Patch Changes Alter the States of the Front Panel Push Buttons

The state of the front panel push buttons can be forced to the settings of the selected patch or they can remain at whatever state they were in before a new patch was selected. This is useful if you want to use the push button to control your settings and don't want to have to keep resetting them each time you select a new patch. This features only applies to those parameters corresponding to the front panel push buttons. Refer to FRONT PANEL for a description of the front panel push buttons.

To allow patch changes to affect the state of the push buttons, do the following:

1 Select PATCH CHANGES BUTTONS (**G**).

2 Set to YES if you want patch changes to affect the state of the push buttons, set to NO if you want the state of the push buttons to remain unchanged as you select different patches.

Set Keyboard Splits

The V3 allows the user one split for the upper manual MIDI channel only. This is very useful when using only one keyboard to play the V3. The procedure of setting a split is as follows:

1 Select SPLIT @ MIDI NOTE # XXX (**P**).

2 Set the data value of XXX to be the MIDI note number which you'd like the split point to be.

3 Select USE PRESET XXX FOR BELOW SPLIT (**P**).

4 Set the data value of XXX to be the split patch which will play below the split note. Using the split features disables the lower manual channel.

Set Note Transposition

The V3 lets you transpose up or down by as much as two octaves (24 semitones). This allows you to either play in a different key or to better utilize a smaller keyboard in order to access a specific note range. To transpose the V3 do the following:

1 Select TRANSPOSE BY XXX SEMITONES (**P**).

2 To transpose up by 1 to 24 semitones set to +1 to +24 in increments of one semitone. To transpose down by 1 to 24 semitones, set to -1 to -24 in increments of one semitone.

Set the Amount of Pitch Bend

You can control the pitch bend from your MIDI controller's pitch bend wheel. To specify the amount of effect from the pitch bend wheel, do the following:

1 Select P BEND RANGE = XX SEMITONES (**P**).

2 Set the amount of pitch bend to 0 for no pitch bend or to anywhere from 1 to 12 semitones . To help you set the right amount of pitch bend, turn the pitch bend wheel while adjusting the amount of pitch bend on the V3.

Editing the Patch Name

All of the V3's 128 patches come preset from the factory with a unique patch name. Since all of the V3's patches are programmable, they can also be renamed using up to 10 characters per name. To rename an old patch or to name a new one, do the following:

1 Select EDIT PATCH NAME (**P**).

2 The cursor will appear under the the left most or right most character of the patch name depending on which direction the cursor knob is being turned. Select the desired character for each character position with the DATA/PRESET control knob. You can use up to 10 characters per name. Note that when you scroll through the menu, the cursor passes through each character in the name before advancing to the next menu item.

Create Drawbar Settings

One of the most powerful features of the V3 is the ability to create any combination of drawbar settings. There are nine "soft" drawbars in the V3, each of which can bet set from 0 to 8. A drawbar setting consists on any combination of the nine drawbars. Each patch contains two drawbar settings, the Main Drawbar Setting and the Auxiliary Drawbar Setting. Drawbars are represented either graphically or numerically on the V3's LCD display. Refer to **Selecting how the Drawbar Settings are Displayed** discussed earlier for more information on the drawbar display. To program your own drawbar setting in a V3 patch, do the following:

1 Select DRAWBAR SETTING (**P**) to program a main drawbar setting or AUX SETTING (**P**) to program an auxiliary drawbar setting.

2 Move the cursor under the individual drawbar settings you wish to modify and set the value of each drawbar by turning the DATA/PRESET control knob.

Morphing Between two Drawbar Settings

On the model B-3 tone wheel organ it is possible to have two drawbar settings per manual. Pressing a preset key on the B-3's switches from one setting to the other. Keeping in line with tradition, the V3 also offers this feature but takes it a step further. In addition to letting you switch between drawbar settings, the V3 also lets you morph between drawbar settings. You can assign a MIDI control such as the MOD wheel on your MIDI controller to the V3's morphing feature. To access the V3's morph function, do the following:

1 Select parameter DRAWBAR MORPH CONTROL (**C**).

2 Assign the MIDI controller number for your MIDI controller to the drawbar morph function. Note that in order to get the morphing effect, the controller assigned to the morph function must be a a continuous controller such as a MOD Wheel. If the controller assigned to the morph function is an ON/OFF type MIDI controller, then the morphing effect is lost since the two drawbar settings will simply switch instantly one or the other.

Select One of the Three Organ Types

The V3 is capable of simulating three types of organ: Tone Wheel Organ such as the B-3, and two types of electronic organ; Continental, and Compact. Almost all of the factory patched are Tone Wheel Organ type. To switch to another organ type, do the following:

1 Select parameter ORGAN TYPE (**P**).

2 Select the desired organ type by turning the PRESET/DATA control knob.

Adjust the Amount of Tone Generator Leakage

Tone generator leakage is basically the crosstalk between the tone generators of a Tone Wheel organ. This is actually a flaw in the original tone wheel organs but eventually people got used to it and it became part of the "B-3" sound. The V3 allows you to add generator leakage to any of its patches. The amount of leakage can be adjusted to taste. To add or remove generator leakage to a patch, do the following:

1 Select the parameter GENERATOR LEAKAGE (**P**).

2 Adjust the amount of leakage from 0% for no leakage to 99% for lots of leakage. You ,may want to play some notes on your keyboard as you adjust the amount of leakage.

Enable/Disable the Low Octave Harmonic Foldback Feature

On the lowest octave of a B-3 tone wheel organ, the lowest drawbar (16') is assigned to the same harmonics as it is in the next highest octave. This repetition is called Foldback and the user has the option of turning it ON or OFF. By turning Foldback off, you can allow the notes of the lowest octave to play as they normally would with out foldback, i.e., the pitch gets lower. To disable or enable Lowest Octave Harmonic Foldback, do the following:

1 Select the parameter LOWEST OCTAVE FOLDBACK (**P**).

2 Set FOLDBACK to ON or OFF as desired.

Adjust the Bass and Treble

The V3 comes with built in EQ allowing you to adjust the Bass and Treble frequencies. The V3's bass and treble can be adjusted differently on each of its 128 patches. To adjust the bass and treble, do the following:

1 Select the parameter BASS EQUALIZATION (**P**) if you which to adjust the amount of Bass or select TREBLE EQUALIZATION (**P**) if you which to adjust the amount of Treble.

2 Turn the DATA/PRESET control knob to adjust the amount of Bass or Treble by +/- 12 dB. While making the adjustment, play some notes on your keyboard and adjust to taste.

Adjust the Overdrive to Clean Signal Ratio

The V3 contains circuitry to simulate an overdriven vacuum tube amplifier. The ratio of the clean to distorted signal can be programmed on a patch by patch basis by performing the following steps:

1 Select the parameter OVERDRIVE MIX RATIO XXX % (**P**).

2 Turn the DATA/PRESET control knob to adjust the amount of overdriven signal to clean signal (0 - 100 %, 100% = all overdriven signal).

Controlling Expression Using a Foot Pedal

As with most traditional tone wheel organs, the V3 makes use of Expression, which is a combination of volume and brightness. The V3's expression function can be controlled via MIDI or with a potentiometer type pedal, such as a volume pedal. To control Expression via MIDI, you need to assign a continuous MIDI controller to Expression. To control Expression using the V3's rear panel pedal input, you must assign the pedal input to Expression for a particular patch or patches.

To control Expression via MIDI, do the Following:

1 Select the parameter MIDI EXPRESSION CONTROL (**C**).

2 Assign the MIDI controller number for the MIDI controller you will be using to control Expression.

To control expression via the rear panel pedal input, do the following:
Note: See sidebar for Expression Pedal specifications.

1 Select the parameter PEDAL INPUT ASSIGN (**P**).

2 Turn the DATA/PRESET control and select EXPRESSION.

Expression Pedal Specification
A potentiometer or control voltage foot pedal can be connected to this input to control Expression. This 1/4" stereo jack conforms to the following specification: Tip=control voltage input, Ring=510 ohm resistor connected to 5 volts, Sleeve=ground. For a control voltage foot pedal use positive 0 to 5 volts connected to the Tip and the Sleeve is grounded.

When using the rear panel pedal input for controlling expression, keep in mind that the V3 comes pre-calibrated from the factory to work with a variety of expression pedals. Depending on the brand of pedal being used for controlling expression, it may be necessary to calibrate the V3 to work for you particular pedal. If the action of your expression pedal sounds irregular, i.e., transition between soft and loud is too sudden, then it may be that the V3 has to be calibrated for your pedal.

To calibrate the V3's expression pedal input for a particular pedal, do the following:

1 Select the parameter PEDAL IN RANGE MIN XXX MAX XXX (**P**).

2 With your pedal plugged into the V3's pedal input jack, set the MAX value to 254. Press the pedal all the way down and play a constant note. Start decreasing the MAX value until you just start hearing the output level start to decrease, then back off just a bit. Try to leave the MAX value at the point just before the level begins to drop. Now you have to set the MIN value. While still paying a constant note, let go of the pedal until its all the way up. Set the MIN value to 0. Then, start increasing the MIN value just until the level starts to increase then, back off just a bit. Try to leave the MIN value at the point just before the level begins to increase.

Controlling the V3's Overdrive using a Foot Pedal

The V3 is able to simulate the effect of an overdriven vacuum tube power amp. The V3's overdrive effect can be controlled via MIDI or with a potentiometer type pedal, such as a volume pedal. To control Overdrive via MIDI, you need to assign the a continuous MIDI controller to Overdrive. To control Overdrive using the V3's rear panel pedal input, you must assign the pedal input to Overdrive for a particular patch or patches.

To control Overdrive via MIDI, do the Following:

1 Select the parameter OVERDRIVE MIDI CONTROL (**C**).

2 Assign the MIDI controller number for the MIDI controller you will be using to control Overdrive.

To control Overdrive via the rear panel pedal input, do the following:

1 Select the parameter PEDAL INPUT ASSIGN (**P**).

2 Turn the DATA/PRESET control and select OVERDRIVE.

Set the Chorus and Vibrato Effects Level

The Chorus and Vibrato effect can be enabled for individual patches. In addition, just like in the B-3 tone wheel organ, you have a choice of three levels of chorus or vibrato to choose from. To set the level of the chorus or vibrato effect, do the following:

1 Select the parameter CHORUS/VIBRATO SELECT (**P**).

2 Turn the DATA/PRESET control and select your choice of CHORUS levels (C1,C2,C3) or VIBRATO levels (V1, V2, V3) or OFF for no effect.

Using Note Velocity with the V3 Percussion Effect

1 Select the parameter PERCUSSION VELOCITY CURVE XXX (**P**).

2 Turn the DATA/PRESET control and select your choice of OFF (no velocity sensetivity or 1-3 different curve sensitivities.

Using After-touch with the V3

Referring to the parameter chart it may be seen that most of the MIDI controller assignments can alternately be assigned to aftertouch. If a function which normally uses a continuous controller is assigned aftertouch, the functions value will increase proportionally with both note and channel pressure. It the function assigned to after-touch is an on/off type, Aftertouch pressure will toggle the function.

Transmit SYSEX Patch Dump to External MIDI Devices

To transmit a bulk dump of all non-volatile parameters stored on the V3 perform the following:

1 Select the parameter XMIT SYSX PATCH DUMP (**U**) located in the Utilities menu section.

2 Turn the DATA/PRESET control clockwise. Dump is performed within 6 seconds.

Re-initialize the V3's Program Memory to Factory Settings

The V3 comes pre-programmed with 128 factory patches. These patches can be overwritten with your own patches and if necessary, you can restore or re-initialize to factory settings any time afterwards. To restore factory settings, do the following:

Set XX to 50 to begin initialization.

1 Select the parameter RE-INITIALIZE MEMORY (**U**).

2 Turn the DATA/PRESET control and set the value to 50. The V3 will begin the Re-Initialization procedure and after approximately 10 seconds will return you to the normal menu on patch #1.

Copy Patch Settings from one Patch to Another

It is possible to copy the information from one patch to another patch. For example, you may want to organize your patches in such a way that it becomes necessary to copy patch # 45, the source patch, to patch # 62, destination patch. The information in the destination patch will be overwritten by the information in the source patch. To copy from one patch to another, do the following:

Menu 1

Menu 2

Menu 3

1 Select parameter COPY FROM PATCH # to PATCH # (**U**). The LCD display will read as shown in Menu 1 where A is the source patch and B is the destination patch.

2 Move the cursor to the source patch # on the left hand side of the display and select the source patch number. Then, move the cursor to the destination patch number on the right hand side of the display and select the destination patch number.

3 Move the cursor once more to the right, the display should now read as shown in Menu 2. Turn the DATA/PRESET control and set to [choice] to YES, the display will now read as shown on Menu 3. You have just copied the source patch to the destination patch.

USING THE PERCUSSION EFFECT

The Percussion Effect is an integral part of the B-3 tone wheel organ sound. The Percussion Effect adds a transient while a note is played that is harmonically related to the organ's fundamental tone by either the second or third harmonic. This effect is a single trigger effect, meaning that it will not re-trigger when playing more than one note at a time. And, when playing one note at a time, it will not sound on a second note until you let go of the first note. The V3 provides full control over the Percussion Effect on a patch by patch basis, allowing you to program a different Percussion Effect setting for each patch. The character of the Percussion Effect is determined by; the Percussion Volume, Decay Time, which harmonic of the fundamental it occurs at, and note velocity. When using note velocity you can select different velocity curves which specify how loud the Percussion Effect will sound depending on how hard you strike a key. In addition, you can define different variations of Percussion Volume and Decay Time from which to chose from within a particular patch. For example; you can define the Percussion Volume NORMAL and SOFT within a patch then switch between the two settings by sending the appropriate MIDI control changes. The following procedures show how to use the various parameters associated with the Percussion Effect to create your own Percussion Effect settings.

Enabling the Percussion Effect

The Percussion Effect can be enabled on a patch by patch basis. To enable the Percussion Effect for a certain patch, do the following:

1 Select the parameter PERCUSSION ON/OFF (**P**).

2 Select ON or OFF as desired.

Adjusting the Percussion Decay Time

The Percussion Decay Time can be set to either SLOW or FAST decay on a patch by patch basis. To set the Percussion Decay Time, do the following:

1 Select the parameter PERCUSSION DECAY TIME (**P**).
2 Select SLOW or FAST as desired.
3 Select the parameter PERCUSSION DECAY SLOW POSITION (**P**).
4 Adjust the value for the SLOW position level.
5 Select the parameter PERCUSSION DECAY FAST POSITION (**P**).
6 Adjust the value for the FAST position level.

Percussion Volume Settings and Adjustments

Adjusting the Percussion Volume consist of selecting either the NORMAL or SOFT volume setting for a particular patch, then setting the what level you want the NORMAL and SOFT position to be. To adjust Percussion Volume do the following:

1 Select the parameter PERCUSSION VOLUME (**P**).
2 Select either the NORMAL or SOFT setting.
3 Select the parameter PERCUSSION VOLUME NORMAL POSITION (**P**).
4 Adjust the value for the NORMAL position level.
5 Select the parameter PERCUSSION VOLUME SOFT POSITION (**P**).

6 Adjust the value of the SOFT position level.

Note: To help make your adjustments, try playing some notes on your keyboard while performing steps 4 and 6 above.

Selecting Percussion 2nd or 3rd Harmonic

Each V3 patch can be assigned a default Percussion Harmonic setting, either 2nd or 3rd harmonic. To assign the Percussion Harmonic setting, do the following:

1 Select the parameter PERCUSSION HARMONIC X (**P**).

2 Set the value (X) to either 2 for 2nd harmonic or 3 for 3rd harmonic.

Using Velocity to Control Percussion

The V3 allows you to use MIDI Note Velocity to control the Percussion Volume. This is accomplished by assigning one of three velocity curves which determine the Percussion volume depending on how hard you strike a key. This allows you to play similarly to the way you would play a piano where the harder you strike a key, the louder it will sound. Without Percussion Velocity, the Percussion volume will always be at the default setting regardless of how hard you strike a key. To use the Percussion Velocity feature, do the following:

1 Select the parameter PERCUSSION VELOCITY CURVE XXX (**P**).

2 Set the value (XXX) to 1, 2, 3 for one of the three velocity curves. Setting the value to OFF will disable Percussion Velocity, forcing the Percussion volume to the default setting.

Controlling Percussion through MIDI

The V3 allows you to control the Percussion Effect through external MIDI controllers. Specifically, you can use a MIDI ON/OFF of switch to select between the NORMAL and SOFT Percussion Volume settings, to switch between 2nd and 3rd Percussion Harmonic, to switch the Percussion Effect on or off, and to switch between SLOW and FAST Percussion Decay time. To control the various Percussion Effect parameter via MIDI, do the following:

1 Select the MIDI controller map parameter you which to control via MIDI; PERCUSSION ON/OFF SWITCH CONTROL, PERCUSSION VOLUME SWITCH CONTROL, PERCUSSION HARMONIC SWITCH CONTROL, or PERCUSSION DECAY SWITCH CONTROL (**C**).

2 Assign the MIDI control number of each MIDI ON/OFF controller for each of the above Percussion parameters you which to control.

USING THE ROTARY SPEAKER EFFECT

The rotary speaker effect is an integral part of the "B-3 sound". No B-3 tone wheel organ simulation would be complete without this effect. The V3 provides a rotary speaker effects that simulates the rotary speaker setups typically used with the B-3 tone wheel organ. These consist of "miked" up stock and modified rotary speakers. The V3 comes with ten factory programmed rotary speaker setups which can be modified by the user. There is enough space in the V3's program memory for ten additional setups which can be created by the user, providing a total of twenty setups. Any of these rotary speaker setups can be assigned to any of the V3's 128 patches. A rotary speaker setup consists of variations in parameters that affect such things as rotor balance, microphone distance and angle, rotor pitch modulation, acceleration and deceleration rates, rotor terminal velocity and brake rates. These parameters allow you to create custom setups that were not even possible to create with real rotary speakers. Refer to the procedures listed below to create and modify rotary speaker setups.

Assigning a Rotary Speaker Setup to a Patch

To assign one of the 20 rotary speaker setups to any of the V3's 128 patches first make sure you are editing the patch where you want to make the assignment, then do the following:

1 Select parameter ROTARY SPEAKER TYPE (**R**).

2 Select the rotary speaker type number (XX), the name of the particular rotary speaker setup will be displayed as you select the rotary speaker number.

Naming Rotary Speaker Setup

You can give a unique name to any of the 20 rotary speaker setups. To name a rotary speaker setup, do the following:

1 Select parameter EDIT ROTARY SPEAKER NAME (**R**).

2 The cursor will fall under the left-most or right-most character position, depending on which direction you were turning the cursor knob. Select a letter for each character position by turning the DATA/PRESET control knob. You can use up to 10 characters per name.

Adjusting the Rotor Balance

You can adjust the relative volume level between the upper and lower rotor, or rotor balance. To adjust the rotor balance, do the following:

1 Select parameter ROTOR BAL UPPER TO LOWER XXX dB (**R**).

2 Adjust the value (XXX) expressed in decibel (dB) by +/- 12 dB. It may be helpful to play some notes on you keyboard while making this adjustment.

Setting the Upper/Lower Rotor Microphone Distance

In the recording studio, the character of a rotary speaker's sound can vary dramatically depending on how it is "miked". This parameter can be used to simulate a close-"miked" sound, with deep amplitude modulation, or a far-"miked" sound, with much less amplitude modulation. To adjust the mike distance of either the upper or lower rotor, do the following:

1 Select parameter UPPER ROTOR MIC DISTANCE XXXX Ft. OR LOWER ROTOR MIC DISTANCE XXX Ft. (**R**)

2 Set the mike distance in in increments of 0.1 feet,from 0.1 to 12.7Feet for either the upper or lower rotor.

Setting the Upper/Lower Rotor Pitch Modulation

The spinning effect of either the upper or lower rotor of a rotary speaker system will affect the pitch of the fundamental of the audio signal being generated. Because the V3's rotary speaker effect is programmable, you have the option of adjusting the amount of pitch modulation caused by the spinning rotor. To adjust pitch modulation, do the following:

1 Select parameter UPPER ROTOR PITCH MOD XXX% or LOWER ROTOR PITCH MOD XXX% (**R**).

2 Set the amount of pitch modulation of either the lower rotor or upper rotor to taste. while making this adjustment, play some notes on you're keyboard with the rotary speaker effect on and listen to the effect of the changes in pitch modulation.

Setting Upper/Lower Rotor Slow/Fast Rate

In a real rotary speaker, the final rotation velocity at either the slow or fast rate, is determined by a mechanical system consisting of belts and pulleys. The terminal velocity limited to three fixed rates which can be adjusted by setting the belts to one of three different pulley positions. Rather than limiting you to three fixed rates, the V3's rotary speaker effect terminal velocity can be adjusted incrementally between 0.3 to 9.3 Hz for the fast rate and between 0.0 to 9.3 Hz for the slow rate, This provides a way of making finer adjustments, thus allowing for more customization. To adjust the upper or lower rotor terminal velocity for either the slow or fast speed, do the following:

1 Determine which terminal velocity you which to adjust and select the corresponding parameter, either UPPER ROTOR FAST RATE XXX SEC, or UPPER ROTOR SLOW RATE XXX SEC, or LOWER ROTOR SLOW RATE XXX SEC, or LOWER ROTOR FAST RATE XXX SEC (**R**).

2 Set the rate (XXX) to the desired frequency in increment of 0.1 Hz. Although the increments are 0.1 Hz, the changes in frequency are not really noticeable until you change it by at least 0.3 Hz. Play some notes on you keyboard with the rotary speaker effect turned set at whatever speed you are adjusting (SLOW or FAST) and listen to the change in rotor velocity. Adjust to taste. Repeat this step for each rotor, and rotor velocity you wish to adjust.

Adjusting the Upper/Lower Rotor Acceleration/Deceleration Rate

A real rotary speaker is an electro-mechanical system consisting of two rotating horns for the treble frequencies and a rotating drum for the lower frequencies. The rotation comes from a series of belts and pulleys driven by four motors, two for each rotor (one for the fast rate and one for the slow rate). Because the rotors have a mass associated with them, when you change speeds from SLOW to FAST or vice versa, the change in speed is not instantaneous, rather there is a time lag or delay otherwise known as the speed-up time or the slow-down time, which is directly related to the acceleration rate. Additionally, since the lower rotor or drum has more mass the upper rotor, it takes more time to speed-up or slow down that the upper rotor. Also, a real rotary speaker, the acceleration rate is fixed for each combination of belt and pulley settings and may vary only depending on the imperfections and age of the internal components of the rotary speaker system. The V3 provides a way of adjusting the acceleration and deceleration rates of the upper and lower rotors independently by allowing you to specify the speed-up time and the slow-down time from 0.3 - 24.4 seconds. To adjust the rotor acceleration/deceleration rates, do the following:

1 Select the parameter corresponding to which rotor you want to adjust the acceleration or deceleration rate, i.e. UPPER ROTOR ACCL RATE XXXX SEC, or UPPER ROTOR DECL RATE XXXX SEC, or LOWER ROTOR ACCL RATE XXXX SEC, or LOWER ROTOR ACCL RATE XXXX SEC (**R**).

2 Set the rotor speed-up time (XXXX) for acceleration rate adjustments to the desired delay time. Set the slow-down time (XXXX) for deceleration rate adjustments to the desired delay time. Play some notes on you keyboard with the rotary speaker effect turned on and listen to the change in speed-up time and slow-down time as you switch between SLOW and FAST rotor velocity. Adjust to taste. Repeat this step for each rotor, and rotor acceleration and deceleration setting you which to adjust.

Setting Upper/Lower Rotor Brake Rate

The brake function on a rotary speaker allows you to stop the rotation of the upper and lower rotor. Although the rotors will no longer be spinning when the brake is on, sound will still be emanating from the rotary speaker system. When the brake is on, the rotary speaker does not simply stop instantaneously, rather is comes to rest gradually. Additionally, since the lower rotor or drum has more mass the upper rotor, it takes more time to come to rest that the upper rotor. The time it takes for the rotors to come to rest is known as the brake delay time and is determined by the brake rate. The V3 allows you to adjust the brake delay time for the upper and lower rotors independently. To adjust the upper or lower rotor brake delay time, do the following:

1 Select the parameter corresponding to which rotor you want to adjust the brake rate, i.e. UPPER ROTOR BRAKE RATE XXXX SEC, or LOWER ROTOR BRAKE RATE XXXX SEC (**R**).

2 Set the rotor wind-down time (XXXX) for the brake rate. Play some notes on your keyboard with the rotary speaker effect turned on and listen to the change in slow-down time as you switch between BRAKE and SPIN functions. Adjust to taste. Repeat this step for each rotor.

Setting Upper/Lower Rotor Microphone Angle

The V3's rotary speaker affect simulates a stereo "miked" rotor. You can adjust the angle between the microphones around the rotor, for both the upper and lower rotors. This essentially varies the amount of stereo separation. To adjust the upper or lower rotor microphone angle, do the following:

1 Select parameter UPPER ROTOR MIC ANGLE XXX DEG (**R**) or LOWER ROTOR MIC ANGLE XXX DEG (**R**), depending on which rotor microphone angle you which to adjust.

2 Set the upper rotor or lower rotor microphone angle (XXX) (in degrees) from 0° (no stereo separation) to 180° (maximum stereo separation). Play some notes on you keyboard with the rotary speaker effect turned on as you adjust the microphone angle, adjust to taste.

Controlling the Rotary Speaker Effect through MIDI

The V3's rotating speaker effect can be controlled through MIDI giving you full access to control many of its features from a remote MIDI controller. This has many important implications because it opens up a many possibilities for real time control of the rotary speaker effect during live performance, recording sessions, MIDI sequences, etc. Most of the parameters associated with the V3's rotary speaker effect can be controlled via MIDI. These parameters are listed in the ROTATING SPEAKER PARAMETERS section. The following is a list of all of the V3's rotary speaker functions that can be controlled via MIDI:

Rotary Speaker Bypass
Rotary Speaker SLOW/FAST
Rotary Speaker Brake
Rotor Balance
Upper and Lower Rotor Microphone Distance
Upper and Lower Rotor Pitch Modulation
Upper and Lower Rotor Fast Speed
Upper and Lower Rotor Slow Speed
Upper and Lower Rotor Acceleration
Upper and Lower Rotor Deceleration
Upper and Lower Rotor Brake Rate
Upper and Lower Rotor Microphone Angle

To control any of the above rotary speaker functions via MIDI, simply assign the MIDI controller number to the corresponding MIDI controller parameter listed in the MIDI CONTROLLER PARAMETERS section.

Since there are a multitude of ways to use MIDI to control the rotary speaker effect and since everyone has different requirements, each dictated by his or her particular application and the limitations of their MIDI equipment, it is beyond the scope of this manual to cover every possible combination, configuration and application of MIDI control over the V3's rotary speaker effect. Instead, we have chosen a few examples that cover typical applications which will help you in creating your own MIDI setups.

Example #1: Controlling Rotor Velocity with the MOD Wheel

Select parameter ROTATING SPEAKER FAST/SLOW CONTROL (C) and assign your MIDI keyboard's MOD wheel MIDI control number (usually control #1) to this parameter. Since the MOD wheel is a continuous controller, it will output a control value of 0 through 127 depending on what position it is set to. To select the FAST rate simply flip the MOD wheel all the way up (on most keyboards up means away from you) or all the way down (towards you) for the SLOW rate. The rotating speaker simulation will begin changing speed after the MOD wheel crosses the midway point (when the control value switches between 63 and 64).

Example # 2: Controlling Rotor Velocity with Aftertouch

1 Select parameter ROTATING SPEAKER FAST/SLOW CONTROL(C)and assign to it Aftertouch (AFT).

2 Now when you play a note and on a keyboard that transmit Aftertouch, the upper rotor and lower rotor velocity will will toggle between FAST and SLOW as you press hard on the keys.

Example # 3: Using a Continuous Controller to Adjust the Rotor Fast Speed

1 Select parameter UPPER ROTOR FAST CONTROL (C) and assign to it the MIDI controller number (XXX) for the MIDI controller you which to use. This could be the MIDI control number of a MIDI slider in a keyboard or other MIDI control device.

2 Select parameter LOWER ROTOR FAST CONTROL (C).

3 Since we want to control the speed of both rotors simultaneously, select the same MIDI control number for the lower rotor fast control. This allows for real-time control of the rotor speed which can be used instead of the normal acceleration/deceleration function.

Note that in this example, one MIDI controller was assigned to two parameters. We could have also assigned a different controller to each parameter. However there are cases where having too many controllers becomes impractical which is where having the ability to assign one controller to more than one parameter becomes very useful.

Example #4: Using a MIDI ON/OFF Push Button Controller to Bypass the Rotary Speaker

1 Select parameter ROTARY SPEAKER BYPASS CONTROL (C) and assign to it the MIDI control number of the ON/OFF controller in your MIDI keyboard or other MIDI controller device.

2 To bypass the rotary speaker effect, simply press the MIDI ON/OFF push button. When the MIDI ON/OFF controller transmits a value between 0 and 63, the rotary speaker effect will be bypassed. When the value is between 64 and 127, the bypass will be removed and the rotary speaker effect will be enabled.

Programming Rotary Speaker Setups Using External MIDI Controllers

One of the many useful features of having MIDI control over the rotary speaker parameters is in programming your own rotary speaker setups. For example: Using one of the many universal MIDI controllers available today, you can assign a MIDI controller to as any or all of the rotating speaker simulations parameters. In this way you can "tweak" more than one parameter at a time without having to go into edit mode. This makes the creation process a lot easier and less tedious. Once you have the right combination of settings for a particular setup, you can then save the edit buffers settings to the rotating speaker setup used by the current patch:

In order to access a rotary speaker setup you need to either know what patch uses the rotary speaker setup or you have to enter an arbitrary patch and select the particular rotary speaker setup from the 20 available setups. If the latter case is true performs steps 1 through 3 below otherwise, select the patch with the rotary speaker setup you want to edit and skip step 1.

1 Enter EDIT MODE then select parameter ROTARY SPEAKER TYPE (**P**) and select the rotary speaker setup you want to edit. Save your changes and exit.

2 Tweak the rotary speaker parameters by making adjustments through you external MIDI controller.

3 Once you are satisfied with your settings, enter EDIT MODE (press the EDIT button), the press the EDIT button again, save and exit.

Now all the changes you made through your MIDI controller are saved in the rotary speaker setup you selected above.

Editing More than one Rotary Speaker Setup During an Edit Session

At some point you may want to edit one or more rotary speaker setups without leaving EDIT MODE. Since you may not know off hand which rotary speaker setups are assigned to which patches, it's a good idea to use one patch as a dummy patch to edit as many rotary speaker setups as you like. To edit more than one rotary speaker setup at a time, do the following:

1 Select an arbitrary patch then write down the rotary speaker setup assigned to it.

2 Select the rotary speaker setup you which to edit, make you changes and save.

Repeat steps 1 and 2 for each rotary speaker setup you which to edit. Then reassign the rotary speaker setup you wrote down previously to the dummy patch. This is necessary since each time you save the changes you made while editing the rotary speaker setups, you overwrite the previous rotary speaker setup assignments.

Using foot switches to control the Rotary Speaker Effect.

The V3 provides two foot switch inputs on the rear panel to control two rotary speaker effect functions; one labeled BRAKE FT SW to control the rotor BRAKE and another labeled S/F FT SW to switch between SLOW and FAST velocity. Both of these switches are momentary type. Pressing the foot switches will toggle between SLOW and FAST or cause the rotors to BRAKE, depending on which one is pressed. When either of these rotary speaker functions are controlled via foot switches, the LED indicator on the front panel for the corresponding front panel control will indicate the state of the functions. The S/F FT SW also controls the model 122 speaker output.

EDITING AND CUSTOMIZING MIDI CONTROLLER MAPS

MIDI controllers are capable of controlling many parameters and features of the V3. There are ten global MIDI CONTROLLER MAPs available for assignment to a particular patch. These maps allow assignment of various V3 functions to a MIDI controller of MIDI Aftertouch. Each map may be customized (edited) to suit either the functions of different MIDI environments such as different keyboards or to make the greatest use of a keyboard with a limit MIDI controller implementation. For example, a keyboard may only send a control for its Modulation Wheel: The Modulation Wheel can be used for different functions on different patches by utilizing different MIDI CONTROLLER MAPs programmed appropriately. The following paragraphs include some examples of how to use the MIDI Controller Maps.

Assigning a MIDI Controller Map to a Patch

To assign one of the ten global MIDI Controller Maps to any of the V3's 128 patches first make sure you are editing the patch where you want to make the assignment, then do the following:

1 Select parameter CONTROL MAP #X (**C**).

2 Select the MIDI CONTROLLER MAP number (XX). The name of the MIDI CONTROLLER MAP will be displayed as you select the MIDI CONTROLLER MAP number.

Naming MIDI CONTROLLER MAP

You can give a unique name to any of the ten MIDI CONTROLLER MAP. To name a MIDI CONTROLLER MAP, do the following:

1 Select parameter EDIT CONTROLLER MAP NAME (**C**).

2 The cursor will fall under the left-most or right-most character position, depending on which direction you were turning the cursor knob. Select a letter for each character position by turning the DATA/PRESET control knob. You can use up to 10 characters per name.

Assigning a MIDI Controller for Main Drawbar Control

You can assign any MIDI continuous controller or aftertouch to adjust the main drawbar setting for the V3. Like all MIDI controller assignments, any one controller can control more than one V3 function. It's possible to assign one MIDI controller to change all or some of the V3's drawbar settings. To make this assignment:

1 Select menu item YY' DRAWBAR CTRL NUMBER XXX (**C**).
(YY = 16',5-1/3',8',4',2-2/3',2',1-3/5',1-1/3',1')

2 Set the value (XXX) to be the control desired control number (0-121), off, or aftertouch. The off (OFF) setting allows to V3 to ignore all MIDI controls for the specified function. Aftertouch (AFT) assigns the function to MIDI aftertouch.

Assigning a MIDI Controller for Auxiliary Drawbar Control

You can assign any MIDI continuous controller or aftertouch to adjust the auxiliary drawbar setting for the V3. The auxiliary drawbar setting is the one which the V3 will morph to when using the MIDI morph function. Like all MIDI controller assignments, any one controller can control more than one V3 function. It's possible to assign one MIDI controller to change all or some of the V3's auxiliary drawbar settings. To make this assignment:

1 Select menu item AUX YY' DRAWBAR CTRL NUMBER XXX (**C**)
(YY = 16',5-1/3',8',4',2-2/3',2',1-3/5',1-1/3',1')

2 Set the value (XXX) to be the control desired control number (0-121), off, or aftertouch. The off (OFF) setting allows the V3 to ignore all MIDI controls for the specified function. Aftertouch (AFT) assigns the function to MIDI aftertouch.

Assigning a MIDI Controller to the Drawbar Morph Function

The V3's MIDI morph function allow the player to change smoothly from the main drawbar setting (referred to in this manual as drawbar setting) to an auxiliary drawbar setting. To assign a MIDI continuous controller or aftertouch assigned to perform this function, do the following:

1 Select menu item DRAWBAR MORPH CTRL NUMBER XXX (**C**).

2 Set the value (XXX) to be the control desired control number (0-121), off, or aftertouch. The off (OFF) setting allows the V3 to ignore all MIDI controls for the specified function. Aftertouch (AFT) assigns the function to MIDI aftertouch.

Assigning MIDI Controller to Toggle the Rotating Speaker's Speed

Beside the front panel push-button and rear panel foot-switch input, the V3's rotating speaker speed can be toggled by a MIDI controller of aftertouch. An assigned MIDI controller will change rotating speaker's speed after passing through the halfway point of its travel. When this function is assigned to aftertouch, aftertouch will toggle the speed alternately rather just setting the rotating speaker to fast of slow depending on pressure. To assign this function:

1 Select menu item R SPKR SL/FAST CTRL NUMBER XXX (**C**).

2 Set the value (XXX) to be the control desired control number (0-121), off, or aftertouch. The off (OFF) setting allows the V3 to ignore all MIDI controls for the specified function. Aftertouch (AFT) assigns the function to MIDI aftertouch.

Assigning a MIDI Controller to the Expression Function

The V3's expression level (similar to a loudness control) can be controlled from an analog pedal plugged into the rear of the unit or by MIDI continuous controller. To assign a MIDI controller for this function do the following:

1 Select menu item MIDI EXPRESSION CTRL NUMBER XXX (**C**).

2 Set the value (XXX) to be the control desired control number (0-121), off, or aftertouch. The off (OFF) setting allows the V3 to ignore all MIDI controls for the specified function. Aftertouch (AFT) assigns the function to MIDI aftertouch.

Summary of MIDI Functions

The following is a summary of the V3's functions which can be controlled by MIDI controllers and references to the suitability of controller types:

List of V3's MIDI functions	Functions Best Suited for Continuous Controllers	Functions Best Suited for On/Off Controllers	Functions which cannot be controlled by aftertouch.
Main Drawbars	X		
Aux Drawbars	X		
Drawbar Morph	X		
MIDI Volume	X		
MIDI Expression	X		
Percussion On/Off		X	
Percussion Volume Normal/Soft		X	
Percussion Decay Slow/Fast		X	
Percussion Harmonic 2/3		X	
Chorus/Vibrato On/Off		X	
Chorus/Vibrato Select	X		X
Rotary Speaker Bypass		X	X
Rotary Speaker Slow/Fast		X	X
Rotary Speaker Brake On/Off		X	X
Overdrive Mix	X		
Keyclick Level	X		
Generator Leakage Level	X		
Upper and Lower Rotor Microphone	X		
Distance	X		
Upper and Lower Rotor Pitch	X		
Modulation	X		
Upper and Lower Rotor Fast Speed	X		
Upper and Lower Rotor Slow Speed	X		
Upper and Lower Rotor	X		
Acceleration	X		
Upper and Lower Rotor	X		
Deceleration	X		
Upper and Lower Rotor Brake Rate	X		
Rotor Balance	X		
Remote Save	X	X	X
Sustain Pedal	X	X	X

When functions which are normally controlled by On/Off controllers are assigned to aftertouch, their state toggles when keyboard pressure is applied rather than turning on when pressure is applied and then back to an off state when pressure is released.

HISTORICAL BACKGROUND OF THE TONE WHEEL ORGAN

This section is provided by Bradley Baker and is extracted from the Internet FAQ on tone wheel organs. It is provided for reference only and does not imply specific V3 implementations. We hope you find this section informative.

The following is an outline of the subjects covered by this section:

The Tone Wheel Organ

What Are Drawbars?
Information On Organ Registration
What is tone wheel Percussion?
What is key click?
What is tone wheel Vibrato?

The Rotating Speaker Tone Cabinet "Pipe Voice of the Electric Organ"

What the heck is in that thing? (The basic configuration).
The Treble Rotor
The Bass Rotor
Amplification, etc.

THE TONE WHEEL ORGAN

The tone wheel organ, first introduced in April 1935, is the one against which all contenders are measured. For this reason its technology is outlined below.

A tone wheel console organ includes two 61-key manuals; the lower, or Great, and upper, or Swell, and a pedal board consisting of 25 keys. The concert models have a 32-key pedalboard.

The secret of the tone wheel organ lies in its method of tone production. The tone generator assembly consists of an AC synchronous motor connected to a geartrain which drives a series of tone wheels, each of which rotates adjacent to a magnet and coil assembly. The number of bumps on each wheel in combination with the rotational speed determines the pitch produced by a particular tone wheel assembly. The pitches approximate even-tempered tuning, (it's done with integer math after all).

A note on the organ consists of the fundamental and a number of harmonics, or multiples of that frequency. In the tone wheel organ the fundamental and up to nine harmonics are available and are controlled by means of drawbars and preset keys or buttons. The setting at any particular time is applicable to one manual, either Great or Swell. (Harmonic content adjustment is provided for each manual independently.) The tone wheel organ creates its tone colors through additive synthesis.

What are Drawbars?

Tone wheel organs use drawbars in a way which is analogous to the faders of a graphic equalizer. While a graphic equalizer modifies the timbre of a sound, drawbar synthesis creates timbres. This is actually a form of additive synthesis. Harmonic levels are increased by pulling drawbars out and decreased by pushing them in. As with a graphic equalizer, drawbars are also arranged with ascending frequencies from left to right. The 2nd drawbar from the left is an exception to this arrangement rule (see the Organ Registration section).

For example, if the leftmost drawbar is the only drawbar pulled out, the sound produced will be a low-frequency sine wave. A sine wave has no harmonic overtones. This makes sense; there is no other drawbar pulled out.

Information on Organ Registration

Organ registration conventions have developed over many centuries. Referring to the MIDI Drawbar unit pictured in the setup diagram on page 3.4, you will notice pipe footages associated with the drawbars. This notation is a throw-back to the days of pipe organs.

Pipe organs produce sound by introducing noise (turbulent air) into tuned resonators (pipes). An organ flute pipe sounds like a flute and is the most pure sounding (free of harmonics) type of organ pipe. This is the type of sound produced by playing a note on a tone-wheel organ with a single drawbar pulled out.

A flute pipe's frequency is roughly dependent on its length. The longer the pipe, the lower its frequency. Notice that the footages decrease for drawbars going from left to right. This agrees with the graphic equalizer analogy: The frequencies get higher going from left to right. If the pipe footages for the drawbars are divided into the first drawbar footage (16'), the relationship between the drawbar's harmonic frequencies can be seen. This relationship is shown in the diagram on page 2 below the footages.

Notice that the white drawbars have harmonic frequency relationships which are powers of two (2, 4, 8, and 16). This type of harmonic relationship is one in which the tones are related by octaves. The octave relationship is considered to be a "pure" relationship and that is why the white color is used to denote these drawbars. Drawbar harmonics which are not an octave apart from the white drawbars are indicated by their black-colored handles.

Many people wonder why the first drawbar (16') is not white and why the second drawbar appears to violate the low to high harmonic arrangement. Traditionally the 8' stop (drawbar) is thought of as the fundamental tone, therefore all harmonic frequencies below the fundamental tone or less than an octave above the fundamental are known as sub-harmonics. These subharmonic drawbars are designated by a brown-colored handle.

What is Tone Wheel Percussion?

Tone wheel Percussion is the name given to a circuit that changes the attack characteristic of a note. It does this by adding an additional tone, the Percussion signal, to the note that is depressed. The envelope of the Percussion signal is controlled to have a specific decay characteristic. The frequency of the Percussion signal is selectable to be either the 2nd or 3rd harmonic of the depressed note. The audible effect of this is that there is a chirp or ping at the attack of the note.

In modern keyboard parlance the tone wheel Percussion would be called “single triggered”. The Percussion envelope amplifier is triggered only when a note is depressed from an all-keys-up state. After it has been triggered and as long as any upper manual keys remain depressed, no Percussion effect will be heard when additional notes are depressed. Thus to hear the percussion effect for every note of a run requires a technique that fully releases the currently pressed key prior to depressing the next one in the run.

What is Key Click?

The sound produced by early tone wheel organs differed from pipe organs in one characteristic way. There was an attack transient that sounded like a click or pop when a key was pressed. This was considered a defect. Considerable design efforts were made to reduce it but it could never be eliminated. Later rock and blues players found the key click characteristic to be desirable. Some jazz organists consider it to be essential. Many tone wheel organ simulators include a key click control to reproduce this characteristic.

What is Tone Wheel Vibrato?

Provided on the tone wheel organs so equipped are vibrato and chorus settings V1,V2,V3 and C1,C2,C3, Vibrato is the periodic raising and lowering of the pitch, and is thus fundamentally different from tremolo which is a variation in only the loudness of the pitch. The tone wheel vibrato is implemented using a tapped delay line, really a low-pass filter. The signal is applied to the delay line and a rotating scanner, attached to one end of the tone generator assembly, picks the signal off of the delay line at the tap points. The scanner, a single-pole 16-throw air-dielectric capacitor switch, is wired so that the tap point will traverse the entire delay line twice,

once up the delay line and once back down, for each scanner rotation. As the delay line is traversed phase is added-to and then subtracted-from the signal.

The chorus signal is produced by adding non-pitch-shifted signal to the pitch-shifted signal. The three settings each of vibrato and chorus correspond to different amounts of total delay thus different amounts of total pitch shift.

In addition to the pitch shifting function, the vibrato, as implemented in the tone wheel organ, also acts as a sweeping low-pass filter. There is some frequency response and amplitude variation as the tap point of the filter is swept.

THE ROTATING SPEAKER TONE CABINET "Pipe Voice of the Electric Organ"

The rotating speaker is designed as a sound modification device, not a hi-fi speaker. The pairing of the rotating speaker with another device, usually a tone wheel organ, constitutes a musical instrument. It operates on a simple principle; a directional sound source rotates at constant (or variable) speed around a fixed pivot point. The effect at the listening location, some distance removed, is quite pronounced. The characterization of a rotating speaker in an acoustically reflective listening area is a complicated proposition at best but at least four effects are in operation: amplitude modulation, frequency modulation, timbre shift, and apparent motion of the sound.

Since the sound source is directional, the intensity of the sound to the listener (or microphone) is dependent upon, at least, the angular position of the rotating sound source. The intensity varies as the sound source rotates and the listener perceives a periodic modulation of the sound as a function of the rotational speed. This is the amplitude modulation (AM) component of the sound and when the listening position or microphone is placed closer to the sound source it will, in general, increase the AM component of the sound. The sound source when rotating is periodically accelerating toward and decelerating away from the position of the listener. This imparts a Doppler shift on the source material and thus a frequency modulation (FM) to the sound. As in other Doppler induced pitch shifts the pitch is perceived to rise as the source moves toward the listener and fall when the source moves away from the listener.

The directional pattern of the rotating component is frequency dependent. High frequencies exhibit more beaming than do lower frequencies, which are emanated in a more omni-directional pattern. A shift in timbre is perceived as the angular position of the sound source changes. The treble component is generally strongest when the rotating component is pointed at the listener and weakest when it is pointed away.
Finally, due to the multiple reflections of the listening area and the rotating sound source, the sound appears to emanate from multiple locations imparting a sense of motion to the sound.

The Basic Configuration

Rotating speakers were produced in many configurations. Models came with reverberation, two-piece cabinets, tube and solid-state amplifiers, and more. The most popular model is probably the 122. The models 122, 142, 145, and 147 all share a similar configuration. A 40-Watt monophonic amplifier drives two transducers, a 15" woofer and a ¾" throat diameter Jensen compression driver, through a 16 ohm, 800 Hz passive crossover. The stationary compression driver fires upward into a rotating horn assembly and the stationary woofer fires downward into a rotating drum-like reflector. The rotating assemblies are mechanically belt driven by AC induction motors. In general, two speeds are available, fast and slow.

The usual cabinet has three compartments. The upper compartment houses the rotating treble horn assembly. The middle compartment behaves as a vented enclosure for the woofer, contains the crossover, both drivers, and motors for both rotating assemblies. The lower compartment houses the amplifier and the rotating drum. Louvres are located on the three finished sides for upper and lower compartments.

The Treble Rotor

The treble rotor is primarily responsible for the rotating speaker's sound characteristic. Some organists think that the slower accelera-

tion of the lower drum detracts from the sound and disconnect power to the motors driving the drum.

The compression driver fires into a vertical tube that acts as a thrust bearing for the horn, a twin-bell, conical device molded of black plastic. The horn starts vertically and flares horizontally. It is belt-driven by a two-speed, AC induction motor, (actually two motors; one for slow, one for fast). Three drive pulley diameters are provided to vary the rotational speed and an idler pulley is used to maintain belt tension. The treble horn, while appearing to be bi-conical, actually has only one operating side. The other side is plugged and exists to provide dynamic balancing to reduce bearing loads and prevent wobble during operation.

A conical diffuser is located at the mouth of the horn. The diffuser plays a large role in defining the sound of the treble horn assembly; the dispersion pattern of the horn is changed from a single, highly directive lobe, to a more omni-directional, multi-lobed pattern. This complicates the Doppler pattern and with internal reflections of the cabinet considered, provides a more characteristic sound.

In addition to changing the dispersal pattern, the diffuser performs another function. With the diffuser absent, the distance of the apparent sound source from the rotation center varies inversely with frequency. That is, as the frequency goes up, the emanation point of the sound appears to travel back down the horn toward the throat. The effect of this is that the Doppler shift becomes less as the frequency rises and thus there is less FM effect. With the diffuser in, the emanation point for all frequencies is much closer to the same rotational radius. A trade-off can be made between a higher FM component with the diffuser in, and a higher AM component (especially at high frequencies due to the single-lobed beaming), with the diffuser removed. Removing the diffuser is a common modification.

The Bass Rotor

The lower compartment contains a rotating wooden drum beneath the downward-firing woofer. The drum has an open top, straight sides, and a scoop that starts vertically at the top and rear of the drum and ends up horizontal at the bottom and front of the drum. A shaft runs vertically through the drum's rotational axis. The shaft is supported by a lower bearing beneath the drum that is mounted in the bottom of the cabinet. The upper bearing is mounted in a cross member that is held in place by the secured 15" woofer. The pulley is mounted at the upper end of the shaft between the drum and the woofer.

The primary effect of the bass rotor is to impart AM to the signal. There is very little phase shift of frequencies below 200 Hz due to their wavelength, though some phase shift may occur up around the crossover point of 800 Hz. The result is a low-frequency pulsation or throb that is very effective when used at the slow or chorale speed.

Amplification, Etc.

The typical unit consists of a 40-Watt monophonic tube amplifier driving the above described components through a 12dB/octave, 800 Hz, 16 ohm crossover. The amplifier uses a pair of 6550s as final amplifiers. The motors that drive each rotor actually consist of a pair of motors, thus four motors exist, each with a pair of wires that plug into the amplifier chassis.

MIDI IMPLEMENTATION CHART

SYSTEM EXCLUSIVE INFORMATION

SYSTEM EXCLUSIVE FORMAT

```
0F0H        ; START OF SYSX
0           ; VOCE ID BYTE 1
0           ; VOCE ID BYTE 2
31H         ; VOCE ID BYTE 3
42H         ; V3 ID BYTE 1
0           ; V3 ID BYTE 3
XX          ; >= 40H MEANS WRITE INTO V3; <40H MEANS READ OUT OF V3
            ; 0=BULK DUMP ALL REQUEST, 40H=BULK DUMP ALL
            ; 1=REQ. TO DUMP ONE PARAMETER FROM AN ADDRESS
            ; 41h=DUMP ONE PARAMETER TO AN ADDRESS
```

THE FOLLOWING BYTES ARE USED FOR NON-BULK DUMPS ONLY

```
YY          ; LSB FOR PARAMETER DUMP/REQ (NOT USED FOR BULK DUMP)
ZZ          ; MSB FOR PARAMETER DUMP/REQ (NOT USED FOR BULK DUMP)
DL          ; LSB DATA (ONLY PRESENT ON DUMP - NOT REQ.)
DH          ; MSB DATA (ONLY PRESENT ON DUMP - NOT REQ.)
```

```
0F7H        ; EOX IS ALWAYS USED FOR THE END OF A SYSX MESSAGE
```

EXAMPLES (All data in Hexadecimal format)

F0, 0, 0, 31, 42, 0, 0, F7		BULK DUMP REQUEST
F0, 0, 0, 31, 42, 0, 40, - 16K BYTES OF LSB MSB DATA - ,F7		BULK DUMP
F0, 0, 0, 31, 42, 0, 1, 4, 0, F7	ZONE 1	REQUEST PARAMETER @ 4
F0, 0, 0, 31, 42, 0, 41, 4, 0, 64, 0, F7	ZONE 1	DUMP OF PARAMETER @ 4=64
F0, 0, 0, 31, 42, 0, 2, 6D, 3F, F7	ZONE 2	REQUEST PARAMETER @ 1FED
F0, 0, 0, 31, 42, 0, 42, 6D, 3F, 1, 0, F7	ZONE 2	DUMP OF PARAMETER @ 1FED=1

SPECIFICATIONS

Mechanical	Standard 19" rack width aluminum cabinet, 19" X 1.72" X 8", 6lbs.
Tone Generator Architecture	Full polyphony (2 manuals - 61 notes each plus 1 manual - 25 notes), 91 Digital Tone Wheels (oscillators)
Organ Sounds Produced	Tone Wheel Organ, Electronic Combo Organs
Presets	128 user presets. All pre-programmed from the factory
Effects	Vibrato/Chorus, Rotating Speaker, Percussion, Key Click, Tone wheel Leakage and Overdrive. All user programmable.
Front Panel Controls	Volume; Overdrive; Percussion: Volume, Decay, push-button control for ON/OFF and 2nd/3rd Harmonic select; Rotating Speaker push-button controls for: ON/OFF, Slow/Fast, Spin/Brake; Vibrato/Chorus push button controls for: Level 1,2 & 3 selects, ON/OFF; Normal/Edit mode push-button control, Cursor control; Data/Preset control; Power ON/OFF switch.
Front Panel Outputs	Head Phone Output Jack
Rear Panel Inputs/Output	AC mains connector jack; Model 122 Rotating Speaker Connector Jack, MIDI: IN, OUT, THRU; Expression Pedal input jack; Rotating Speaker Brake Foot Switch input jack; Rotating Speaker Slow/Fast input jack, Effects Loop IN/OUT jacks; Channel 1 & 2 Audio Output jacks.
MIDI	Three Part Multitimbrel on any three MIDI channels; user definable MIDI Control Numbers; user selectable MIDI channel numbers for upper manual, lower manual and bass pedals; The following can be controlled via MIDI control changes: Volume; Vibrato/Chorus; Percussion; Rotating Speaker ON/OFF, SLOW/FAST, SPIN/BRAKE, Overdrive, Expression; Drawbar changes via continuous MIDI controller changes.
Power	120/240VAC, 50-60Hz, 25W

WARRANTY

VOCE INC. warrants this product to be free from defects in material and workmanship under the following terms:

HOW LONG IS THE WARRANTY AND WHO IS PROTECTED?

Labor (except removal and installation charges) and parts are warranted for one year. This warranty may be enforced only by the first consumer purchaser.

WHAT IS COVERED AND WHAT IS NOT COVERED?

Except as specified below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1 Any product which is not registered via a product registration card.
2 Any product on which the serial number has been defaced, modified or removed.
3 Damage, deterioration, or malfunction resulting from:
   a) Accident, misuse, abuse, neglect, fire, water (or other liquids), static electricity, lightning, or other acts of nature, or failure to follow instructions supplied with the product.
   b) Repair or attempted repair by anyone not authorized by Voce Inc.
   c) Any shipment of the product (claims must be presented to the carrier).
   d) Any cause which does not relate to a product defect.

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2 ANY OTHER DAMAGES, WHETHER INCIDENTAL, CONSEQUENTIAL, OR OTHERWISE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS AND/OR DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS AND EXCLUSIONS MAY NOT APPLY TO YOU.

HOW STATE LAW RELATES TO THE WARRANTY

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HOW YOU CAN GET WARRANTY SERVICE

To obtain warranty service on this product:

1 Take or ship the product to an authorized dealer or Voce Inc.
2 Do not ship the product to Voce Inc. without authorization obtained via a phone call or letter.
3 A dated sales receipt must be included as proof of warranty coverage.

VOCE

The information contained in this manual is subject to change without notice to incorporate improvements made on the product.

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