WERSI

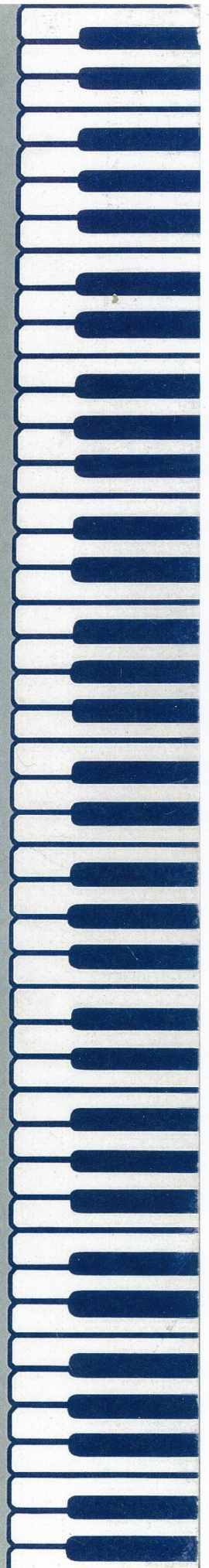## MK 1

USER'S GUIDE

AM 3161   First Edition

THE DIGITAL SOUND SENSATION

MK 1

USER'S GUIDE

AM 3161   First Edition

TABLE OF CONTENTS

INTRODUCTION

Dear Music Friends:

We congratulate you on your selection of one of the finest instruments available today.

It is our sincere desire to have you use it to its fullest extent so that the excitement of owning a WERSI will never stop.

To be assured of this, a team of musicians and engineers have collaborated on the User's Manual which we have enclosed for you. It is important for you to understand the concept behind this User's Manual:
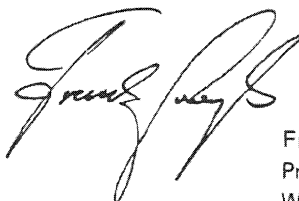
1. In the beginning chapters, we will explain the most important groups and features such as the Total Presets and other Presets. This will enable you to get the very best sounds from your MK 1 quickly. This will allow you to enjoy it from the beginning.

2. After the Total Presets and other Presets have been explained, we will guide you through some of the most interesting features, step by step, giving you concrete examples of how to use them.

3. Finally, we will touch on the technical and programming aspects of your MK 1. These are features you will come to fully appreciate after you have become more familiar with your instrument.

This manual has been written in a way that requires you to work through it, chapter by chapter in order to fully understand the principles of operation by trying out the examples suggested.

This step by step process was made necessary because your MK 1 now offers many features introduced for the first time. You may never discover these features if you do not take some time in the beginning to work through this manual. After you have done this, you will be able to preset and program your instrument exactly the way you like it. After that, you can concentrate on playing and enjoying it. It will be unlike any other instrument you have ever played.

Your MK 1's potential is unlimited and we will only touch briefly on what it can do. Therefore, look at mastering your instrument and its features first. Your playing will become much simpler if you have the correct voices and presets. We wish you many enjoyable and memorable hours with your new MK 1 keyboard.

Sincerely yours,

Frank Gross
President
WERSI USA
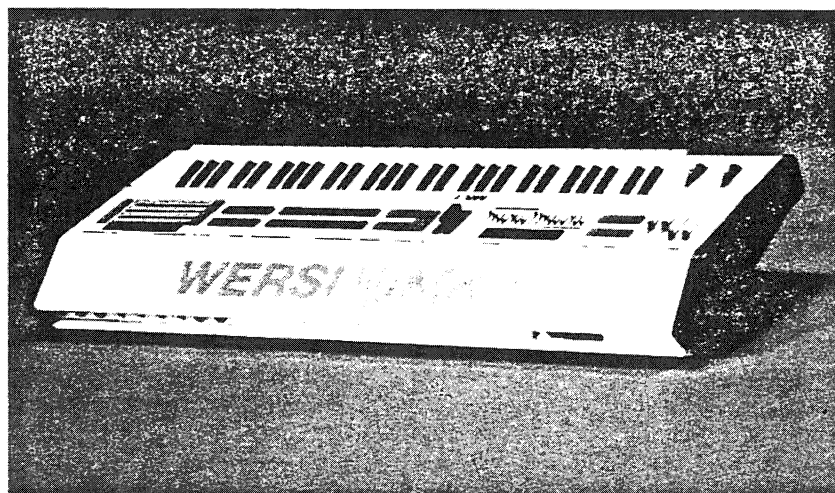
GETTING TO KNOW THE MK 1

A. VOICES AND SOUNDS

The easiest way to understand the complex sound system of the MK 1 is to think of it as being eight synthesizers combined into one unit — or as a MIDI Keyboard with seven expander units (rack system.)

As a result, the player is able to layer four different distinguishable voices to the right hand and another four separate sounds to the left hand. Thus when playing with even just one finger on the left hand and one finger on the right hand, the player already has all of the eight synthesizers occupied — each one providing him with a different sound. No wonder the MK uses up to 20 note polyphonic — especially once one understands the completely new way in which WERSI is using the layering of multi sounds.

B. THE NEW WAVE

The way of layering sounds described above is used on the MK 1 not only to produce more component brass and string sounds, but also to reproduce, for instance, a natural piano, guitar or any other acoustic sound.

In general, the MK 1 uses at least two voices (completely independent sounds) for each sound Preset or DMS Instrument (Factory Presets.)

On the operating panel you will find a "Control" section (on the right hand side, next to the cartridge slot). The upper five switches are labelled as shown in Fig. 1:
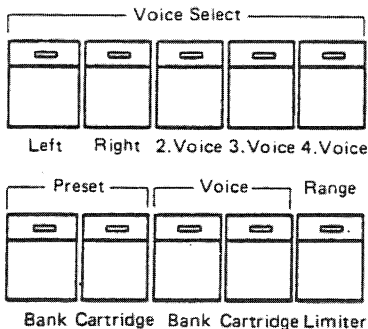
Fig. 1

When the switch marked "Right" is "on," (the LED above the switch "Right" lights) any of the DMS Instrument or the CV Voices can be selected to the right hand.

When the switch "left" is "on," any of the DMS In-

struments or CV Voices can be selected to the left hand. This latter function, however, requires that the keyboard split be "set" and "on," otherwise the right hand selection will be responsible for the entire keyboard.

IMPORTANT!

Note: As mentioned before, the MK 1, in general, uses a 2, 3 or 4 component "voicing."

You will find when selecting a "DMS Instrument," or a "CV Panel," that two, three or four voices have already been selected. (Switch on "2nd Voice" in the Control Section, and watch the display. It will show whether the second voice is the same or different from the first voice, or whether it does not yet exist.) Also try the third and fourth voices and you will find that the DMS piano, for example, has three components and the DMS Syn Brass has four components.

When the second voice selector is turned on, and a different "DMS Instrument" or a different "CV Preset" is selected, the new voice will momentarily override the already selected component.

Take a few moments to try what you have learned thus far, and we will briefly repeat the most important points:

1. Repeating Basic Functions

VOICES AND SOUNDS

The MK 1's operation compares with up to eight independent synthesizers.

Up to four voices each for either the right hand or the left hand can be selected.

Each voice is entirely independent from other voices. Each voice has its own "wave," "pitch envelope," "amplitude envelope," "routing," "volume," etc.

The MK 1 is capable of playing up to 20 polyphonic notes on each key. Up to four different sounds can be played simultaneously.

The MK 1 has the capability of layering sounds, not only for combining different sounds for full brass and string combinations, but also for reproducing the most realistic piano, guitar or other solo sounds.

All DMS or CV presets normally have two voices in their memory. A single voice, or up to a total of four voices can be memorized on each DMS or CV preset.

By using the Control Section (Left, Right, 2, 3, 4), Voices can be selected, existing ones overridden, or simply selected to be shown on the display to identify the voice by name.

"Right" is for right hand selection (plus right – 2nd voice, 3rd voice, 4th voice.)

"Left" is for left hand selection (plus Left – 2nd voice, 3rd voice, 4th voice.)

Make sure the keyboard split is "set" and "on" before selecting the left hand.

Before selecting a completely new sound for "right" or "left," make certain that no (2nd, 3rd, 4th) Voice Controls are on — otherwise only those voices will change. "Right" or "Left" must be on also.

Some presets have up to four voices (DMS Instruments) in their memory. CV Presets have only two voices in their memory, but can be connected with another CV Preset by using the "connecting" feature. You may find some CV Presets don't sound when selected because they are actually part of a connected CV Preset. (You will usually find these "connected" CV Presets on a cartridge.)

C. PRESETS

There are three groups of Presets on the MK 1:

The factory Sound Presets called:

1. DMS INSTRUMENTS

The User Sound Presets called:

2. CV PRESETS (Computer Voices)

and the Total Keyboard Presets, called simply:

3. PRESETS

How many Presets does the MK 1 have?

The answer to this question has to be: "Unlimited!" If you consider any preset can be re-loaded or changed or modified at any time.

So the question really should be: How many Presets are available at any one time (during performance, for instance.)

1. The twenty DMS Instruments can be doubled through ROM Cartridges giving you a total of fourty. (Select Cartridge as shown in Fig. 2 for twenty additional DMS Instruments after you have inserted the ROM Cartridge.)

Fig. 2   Left   Right 2.Voice 3.Voice 4.Voice

Bank Cartridge Bank Cartridge Limiter
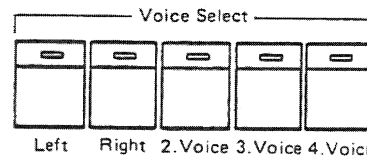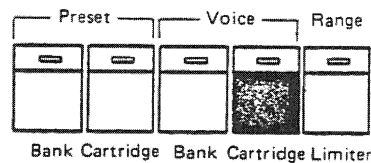
2. The ten CV Presets can be doubled through Bank and tripled with the help of the RAM Cartridge. This provides a total of thirty CV Presets.

Select "Bank" or "Cartridge" as shown below, making certain a RAM Cartridge is in the slot.

Fig. 3

Bank Cartridge Bank Cartridge Limiter
              /   \
          Bank   or   Cartridge
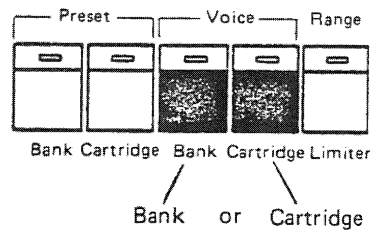
3. The eight "Presets" (Total Instrument Presets) can also be doubled with the help of "Bank" or tripled through "Cartridge" (RAM). This provides up to 24 choices.

Fig. 4

Bank Cartridge Bank Cartridge Limiter
   /   \
doubled   or   tripled
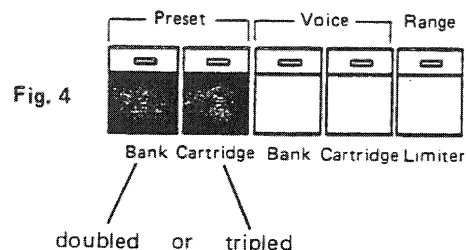
So — depending on whether you have

a) no cartridge
b) a ROM Cartridge
c) a RAM Cartridge

you will have the following amounts of presets available to you:

a) (no cartridge)	16 Presets	20 DMS Instruments	20 CV Presets
b) (ROM cartridge)	16 Presets	40 DMS Instruments	20 CV Presets
c) (RAM cartridge)	24 Presets	20 DMS Instruments	30 CV Presets

MK 1 FEATURES

What are those Presets for?

1. DMS Instruments
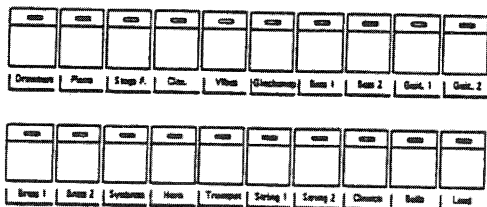
Fig. 5

These are your "factory" sounds. They provide a selection of sounds and the corresponding sound components (parameters), which can later be used to create your own voices and sounds.

Of course these voices from the DMS group can be changed and modified. However, if you would like to memorize your changes and modifications into the MK 1's memory, you will need to go to the CV group or the Presets. Because the DMS Instruments are on a ROM Chip (Read Only Memory), you cannot store anything on the DMS Instruments.

2. CV Presets
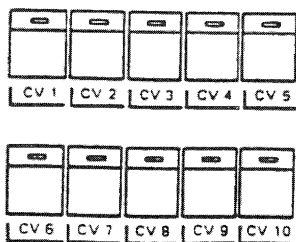
Fig. 6

These are your custom presets. The Random Access Memory (RAM) of the CV group allows memorization of new sounds, or memorization of voice modifications you have made.

CV Presets can be loaded from the cartridge into the MK 1's memory, or newly created sounds or modified sounds can be stored on the cartridge.

(Refer to chapter on "Cartridge and Copy Functions" as well.)

The ability to memorize and store is the only dif-

ference between the cartridge CV Presets and the Factory DMS Instruments. Aside from the ability to memorize and store, you can select and play/change/modify CV Presets in the same way you do the DMS Instruments.

3. Presets (Total Keyboard Instruments)
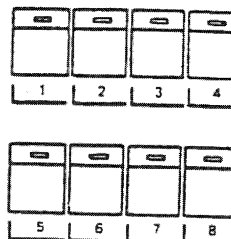
Fig. 7

Live performers have been dreaming of this feature for a long time:

The "Presets" allow you not only to memorize certain voice combinations (1, 2, 3 and 4 voices on the left hand plus the same for the right hand), but also allow you to preset the volume for each voice; assign a specific function to either of the two wheels and the two footswitches as well as the expression pedal; determine if and where you would like to split the keyboard; which voice is selected with dynamics and what kind of dynamics as well as hundreds of additional choices. All these functions can be memorized on any of the 24 Presets.

We call it "Total Control at the Touch of One Button," and we're convinced you'll be calling it "simply GREAT."

D. MK 1 FEATURES

Assuming your MK 1 is complete with all available hardware, here are ten of the most important features you should be aware of:

20 Voice polyphonic Synthesizer.

61-note keyboard, with key dynamics (velocity sensitive), variable keyboard split and After Touch Functions for Vibrato, VCF and Pitch.

TECHNICAL PREPARATION

MK 1 sounds have up to four voice components with additional functions such as After Touch, Wheels, Tuning, etc.

Direct access of forty sounds can be expanded through use of a cartridge.

Newly created sounds can be memorized in the MK 1's own memory, or on a cartridge.

The two wheels come with many different, programmable functions.

Any sound can be selected for the stereo output, left, right or both channels.

The two footswitches and expression pedal also have many programmable functions.

The MK 1 gives you access to eight MIDI channels which can send and receive in any mode, as well as being assigned MIDI IN, OUT and THROUGH.

The MK 1 introduces the unique feature of Fourier synthesis.

II. TECHNICAL PREPARATION

Before you can start playing on your new instrument, you will need to make the following connections.

FOR YOUR OWN SAFETY, PLEASE PAY CLOSE ATTENTION TO THE FOLLOWING INSTRUCTIONS

A. AC CONNECTOR

Check Voltage Rate: Factory assembled instruments have the voltage selector set to the prevailing line voltage and a fuse with the appropriate rating is inserted. (The voltage selector is also the fuse holder box.) Check the voltage selector and change it and the fuse, if necessary.

Note that the arrow on the selector housing must point towards the line voltage selected.

Insert the AC line cord into the panel plug on the MK 1, as well as into a grounded AC outlet.
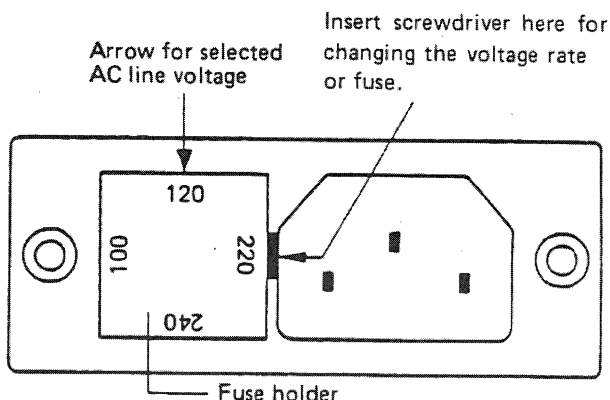
Fig. 8

WARNING

UNPLUG THE LINE CORD before changing the line voltage selector or the fuse. The components behind the AC panel carry hazardous voltage. Never plug in the line cord without the AC panel securely fastened to the cabinet. Never attempt to inspect or work in the areas of the AC panel plug or AC transformer without first unplugging the AC line cord from the outlet.

If you transport your MK 1, cold weather can cause condensation on the electrical circuitry. Please wait a while until the instrument has adjusted to room temperature.

B. AUDIO CONNECTIONS

The MK 1 can not be directly connected to speakers, since it does not include power amps. Active speaker systems, (that is, speakers which include amplifiers, such as the WERSI T 210 active, T 410, TS 5010 active or TS 5100) can be used.

The MK 1 has a stereo and a mono output for mono or stereo phono plugs.

You have three choices, depending upon which audio system you would like to hook up to:

a) Mono — use "Mono/R".

b) Stereo — plug into stereo phono jack at "Stereo/L".
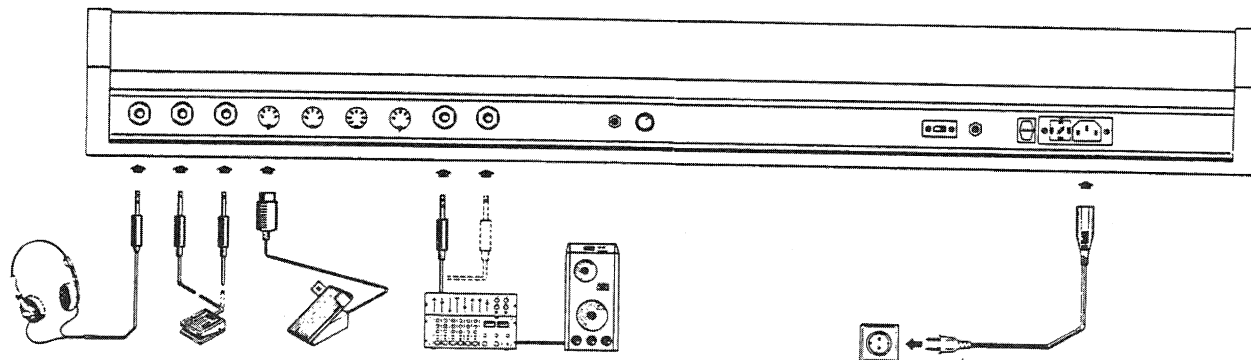
Fig. 9

c) Stereo — plug in two mono phono jacks — the first one in "Mono/R" for right channel and "Stereo/L" for left channel.

C. EARPHONES

(Low or high impedance) — use "Headphone" jack.

D. EXPRESSION PEDAL

The expression pedal (swell shoe) is optional equipment and is not required for operation.

Use "Volume Control" jack to hook up the expression pedal.

E. FOOTSWITCH 1/2

Two footswitch options are available for connecting standard phono jacks into outlets "Footswitch 1" and "Footswitch 2."

F. MIDI

MIDI IN: MK 1 receives MIDI data
MIDI OUT: MK 1 sends MIDI data
MIDI THROUGH: MK 1 puts received MIDI data through

(You will find detailed information on MIDI in the chapter titled MIDI.)

OPERATION

A. STARTING THE OPERATION

After the technical preparations have been made and the power and audio connections are complete, locate the ON/OFF switch located in the rear of the MK 1.

Switch the unit "ON" and the MK 1 will perform an automatic self-test called "Startcheck." The light indicators will flash on and off and the display will read:

WERSI – MK 1 – V. . . .   (V. . . = Software Version)
plus. . 20 VOICES = 20   (20 Computer Voices –
                                            and a numeral up to 20 de-
                                            pending on the number of
                                            voices available.)

In order to stop the STARTCHECK and start playing, depress any of the DMS Instrument Switches (i.e. Piano) and start playing. The STARTCHECK will stop and the display will now show the voice selected.

Before we proceed with more about the operation of the MK 1, we will describe the operation of the "Reset" switch.

B. RESET

On the rear panel of the MK 1 you find a small push button labeled "Reset." Depressing this button will immediately revert the MK 1 to the "Startcheck" mode. This button can be used at any time in the operation of the MK 1 (for instance, if you become confused while programming a sound) to immediately start over again from the beginning of the operation.

C. WRITE PROTECT

Directly beside the Reset switch you will find the "WRITE-PROTECT" switch.
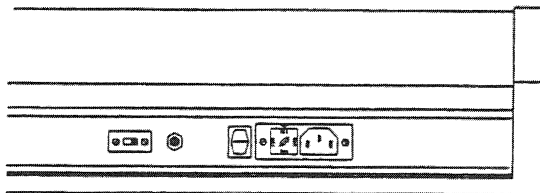
Fig. 10

When the Write-Protect switch is "ON" the "Memory" (CV Presets, Presets, etc.) are protected. This prevents erasing or changing any voice or preset accidentally.

Be certain the "Write-Protect" switch is "Off" when loading new voices from the cartridge into the internal memory, or when programming or changing a voice permanently.

D. OPERATING PANEL

1. THE MK 1 SOUND-VOICE SYSTEM

The MK 1 is a 20-note polyphonic keyboard. This means, that you can play up to 20 voices (sounds) simultaneously!

The MK 1's Sound-Voice-System (SVS) is generated from a 5 cm x 16 cm voice-processing circuit board. The SVS is a plug-in module that connects with the mother-board MK 1.

One SVS generates 2 voices at maximum. The MK 1 may have up to 10 SVS at its highest option level, which can generate 20 voices polyphonically.

Frequency level, pitch, envelope parameters and characteristical components of a voice are calculated from a complex processor system. All information is given to the SVS which then generates the voice individually.

You may create up to 4 different voices on one key, but some voices may use 2 or even up to four "components" (individual sounds, envelopes, parameters etc.) to create an especially good and realistic sound.

The DIGITAL DISPLAY will give you a constant readout of the many voices you have remaining.

2. VOLUME PEDAL (swell-pedal)

The player can vary the total volume with the swell-pedal. The MASTER volume control still has priority and can limit the range of all other volume controls.

The Volume or Swell-Pedal is programmable for many other functions! In the beginning or at RESET position, the swell-pedal automatically retains its VOLUME FUNCTION.

Volume — Presets — Function Display — Cartridge — Control —

Voice Control Functions FV

Fourier Synthesis

Voice select

Left Right 2.Voice 3.Voice 4.Voice

Preset — Voice — Range

Bank Cartridge Bank Cartridge Limiter

CONTROL

Wheel 1 — Wheel 2

MK 1
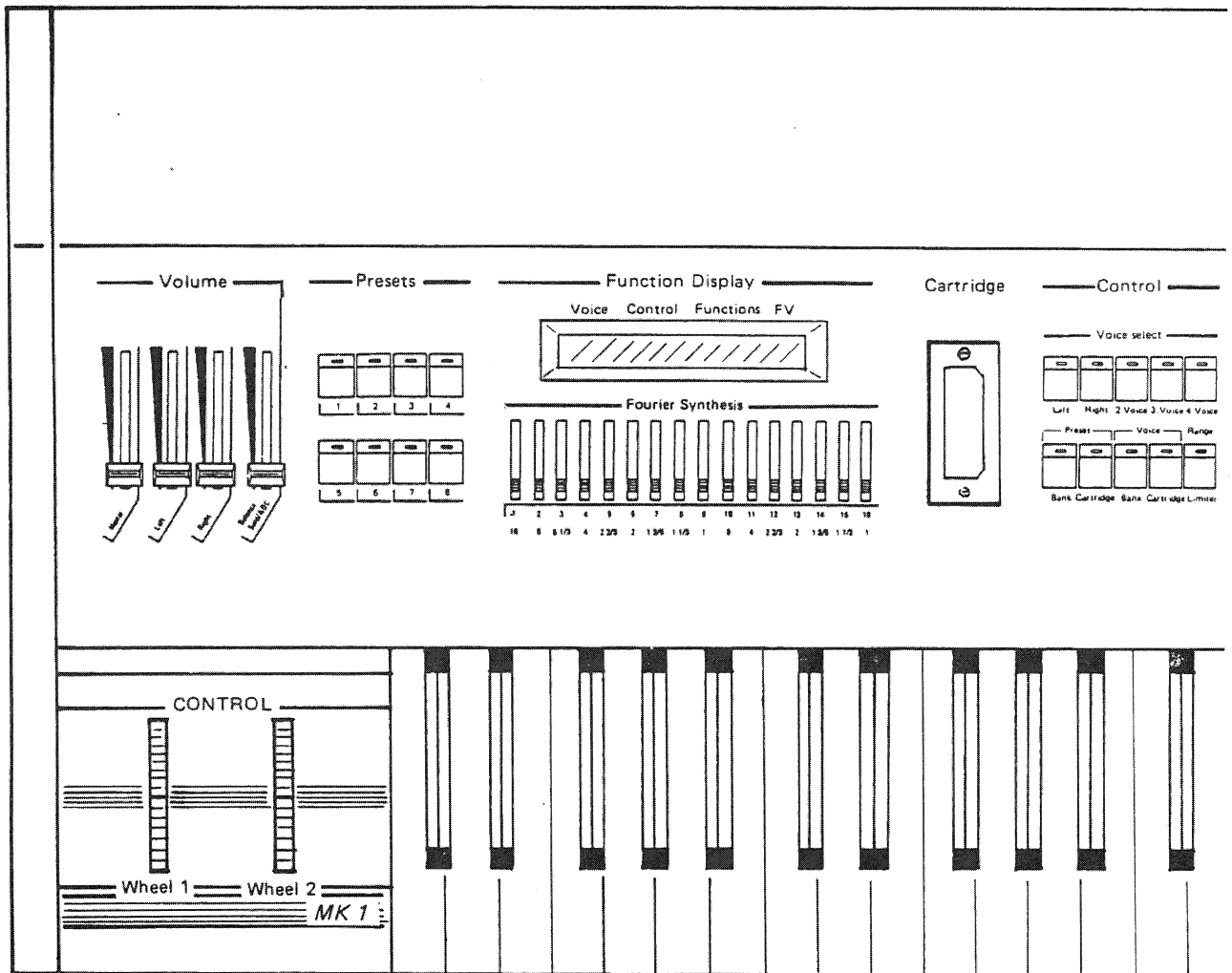
Operating Panel MK 1

DMS Instruments — CV Instruments — Function Control Matrix

VOLUME CONTROLS

3. CHANGING VOICES

Select any voice from the DMS voices and hold a note. While holding the key depressed, select another sound! You will notice no change at first, since the key has memorized this voice. You will hear your new voice after releasing the key and depressing it a second time. Try different voices.

This technology is possible because each key is using an independent voice-processor for each selected voice. This enables the player to make quick and easy sound changes without having to worry about his fingering.

E. MK 1 VOLUME CONTROLS

On the left hand side of the operating panel, you will find four slide controls for the volume.

── Volume ──

1. 2. 3. 4.
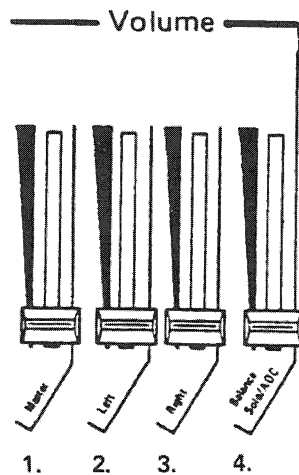
1. Master Control

With the master control, maximum output level can be determined. Just as with the master controls on a mixer, you can regulate which maximum signal is to go to the amps, if left/right controls are all the way up and the swell pedal (if hooked up) is set to full power.

After you have set this maximum volume level, you can then balance everything on the following controls and use the expression pedal pushed "up all the way."

2. & 3. Left and Right

Don't get these controls confused! They do not mean left and right channel, but rather "left hand" and "right hand."

If your keyboard is not split, only the "right" control will have an impact on volume, since there is no "left hand" sound.

After you have "set" the keyboard split and turned "split on" you can then balance the volume between the left and right hand. (i.e. right hand all the way up and left hand set to half the volume.)

4. Balance, Solo, AOC

WERSI could have used ten different controls to do what this slide control does by itself. Instead, since the MK 1 is able to memorize and remember any volume setting, we have used one control and "balance" the voices one at a time.

On the "main" and first level of your "function control matrix" you will find the balance function under "A-2."

You need to understand that any sound selected to the right or left hand can consist of 1, 2, 3 or even four voices. Select the piano, and make certain that the "control right" is on. (Instead of 2nd, 3rd or 4th, we are referring here to the five upper switches you will find to the right of the cartridge slot.)

Be sure that control "right" (right hand) is on, and "Piano" (DMS Voice) is selected. Now depress "A-2" on the "Function Control Matrix" and then move your "Balance Slide Control" down to the bottom.

You will hear that there is not much left of your Piano sound, other than some characteristic overtones. If you look at the display, you will see that the "Piano 1" has been faded out by the balance control.

Move the "Balance" slide control back up while continuing to hold down a chord or key until you hear the full bodied piano sound returning.

Now switch to "2nd Voice" on the controls and

PRESETS

again select "A-2" on the Control Matrix and set the "Balance" slide control down to the bottom. You will hear (while playing) that some of the characteristic overtones of the piano have been removed.

However, the piano sound consists of three voices. Therefore, keep the "Balance" slide control down and switch to "3rd Voice" right hand. Switch on "A-2" (Balance) on the Function Control Matrix. Since the "Balance" Slide Control is still at the bottom setting, and has now become activated, the third piano sound component (characteristic overtones) have also been faded out.

At this point, your three component Piano sound is set as follows:

Piano 1 — Right Hand — 1st Voice = full volume
Piano 2 — Right Hand — 2nd Voice = zero volume
Piano 2 — Right Hand — 3rd Voice = zero volume

The result is a rather mellow piano sound on the keyboard. By again following the same procedure as above, you can set (and you could have done so in the first place) the second and third voices to any level between zero and the maximum for a brighter or more mellow piano sound. This is a primary example of the operation of the Balance Control.

Here is another important item. In order to memorize your voice balance permanently, you would have to program it into a Total Preset. (Switch on A-7 and then depress the Total Preset you will program, then turn on the "Preset Volume" switch.) Make sure "Write Protect" A-3 is tuned off. Note: If you do not memorize your newly created voice balance on a Total Preset, it will be only a temporary change and will be lost as soon as you select another function. In order to understand what happens, follow our above example and then switch back to "Control Right" (1st Voice right hand.) If you now select the Piano (DMS Instrument) again, the original Piano Sound will return and your temporarily made volume changes for 2nd and 3rd voices are gone.

There are millions of possibilities in working with this sound balancing feature. Just try some of them!

SOLO/AOC BALANCE — Your MK 1 has a solo and an AOC (Automatic Chord Feature.) These features can be selected with the Function Control Switches. (See Function Control main level explanations.) Depress A-6 for solo mode.

In both modes (Solo/AOC) the "Balance" Slide Control is important.

SOLO actually means that you can switch to a mode (right hand only) which will cause only the highest note of a chord played (on your right hand) to sound, as long as the "Balance" Slide Control is pulled all the way down. If you move the "Balance" Slide Control back up, the chord will sound, but at a lesser volume than the solo note. By bringing the "Balance" Slide Control all the way back up to maximum, the two volumes will merge. At the maximum "Balance" Slide Control setting, the SOLO mode is no longer effective, and all notes of your chord will have the same volume level.

AOC can be used after the keyboard is split. Depress A-4 to activate keyboard split. Select "AOC" on the Function Control Matrix (Main Level.) Depress A-5 and 6. Play and hold a chord on the left hand, now play a melody note on your right hand. You will notice that a chord sounds along with the melody note. The right hand also still retains its own sound, and you can balance the volume of the background chord by again using the "Balance" Slide Control. (You can find more information about Solo and AOC under the Function Control Matrix Main Level instructions.)

F. PRESETS (TOTAL INSTRUMENT PRESETS)

The eight switches located between the volume slide
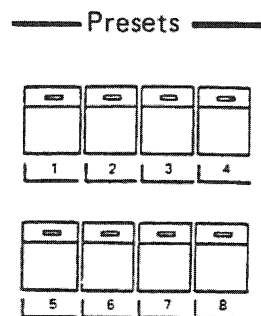
—— Presets ——

Fig. 11

PRESETS

controls and the display with the Fourier and drawbar controls beneath them are simply named "Presets."

A better name to use for these "Presets," however, would be "Total Presets" or "Performance Presets" since they can memorize even the most complex set ups.

Here is a listing of all of the options you can memorize into each one of the up to 24 Total Presets:

Right Hand	1st Voice plus volume balance
Right Hand	2nd Voice plus volume balance
Right Hand	3rd Voice plus volume balance
Right Hand	4th Voice plus volume balance

Keyboard Split pinpoint the key at which split is set.
Keyboard Split — turned on.

Left Hand	1st Voice plus volume balance
Left Hand	2nd Voice plus volume balance
Left Hand	3rd Voice plus volume balance
Left Hand	4th Voice plus volume balance

Wheel 1	Function (Limiter)
Wheel 2	Function (Limiter)

After Touch	Function (Limiter)

Key Dynamics   (Intensity - low/high selector)

Routing for each Voice
Tuning for each Voice
Doubling, Solo, AOC
WERSIvoice Mode
MIDI mode
and so on.

The importance of these Total Presets cannot be stressed enough, considering that the unlimited flexibility of the MK 1 becomes useful only by being able to memorize complex registrations and then later recall them by pushing simply one single preset button.

1. How Do You Program A Total Preset?

If you have assembled the MK 1 yourself from a kit, you will have to first program or load your Total Presets.

If you have purchased an assembled MK 1, your

Total Presets will already have the factory entered memory.

Each of the eight Total Preset switches can control up to three different presets. The Preset control bank and cartridge will determine which level you are calling for:
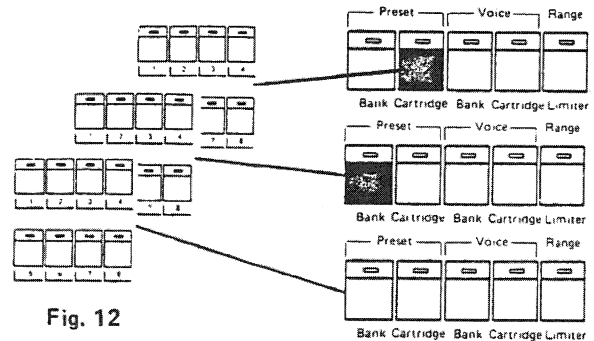
Fig. 12

Let's say you have selected Preset No. 1. Now select "Bank." (Make certain that you select "Bank" for the Total Presets, and not for the CV Voices.) Now push Preset One again in order to select the information memorized on the "Bank" Level.

The "Cartridge" Level will only work if a RAM (not ROM) Cartridge is inserted in the slot. (On a RAM Cartridge, you can also save your Total Presets.)

2. Important Item To Remember:

In order to step out of a Total Preset either switch to another Total Preset or simply override the Total Preset by selecting new sounds or turning the Keyboard Split off, etc. To return to the original Total Preset, simply depress the Total Preset button again. Another option is to replace the Total Preset (you may have saved it on a RAM Cartridge) with a new set up by programming a new Total Preset into the memory slot.

3. How Do You Program A New Total Preset?

Make certain you decide which Total Preset and at which Level (1st or Bank) you are going to program.

Let's say you have set up a registration, including functions for wheels and footswitches, and would now like to program it onto a Total Preset. (Make

DRAWBARS – CARTRIDGE

certain the "Write Protect Switch is off at the back of the MK 1.)

Go to the Function Control Matrix and select A-7 (Set Preset). Now depress the Preset Switch on which you would like to save your program. That's it! Turn the "Write Protect" switch on at the back of the MK 1, so that nothing can be accidentally changed and you now have your very first own Total Preset.

TIP: If you select a Total Preset and don't remember exactly how it was set, your keyboard may do things you don't understand. Go through the Controls and the Function Control Matrix step by step, and you will find the functions that are set on this particular Total Preset.

G. DRAWBARS (DMS Instrument)

The selector "DRAWBARS" activates the original sine-wave sound. The sine-wave sound has no actual harmonic structure in itself, but can be selected and combined using 9 different footages (based on pipe-organ measurements).

Unlimited combinations of the 9 drawbars can be accomplished and representing the famous "organ-drawbar" sound.

The selector "DRAWBARS" also activates the 16 slide controls (Fourier Synthesis).

Below each slide control are numbers 1 through 16 and below these numbers are the different footages used in the Drawbar-mode:

Even numbers represent the even footages:
16'   8'   4'   2'   1'

Odd numbers and the fractions:
5-1/3'   2-2/3'   1-3/5'   1-1/3'

– Push the "Drawbars" selector switch.

– Slide the different slide controls upward and play the keys.

The sound changes will appear only after repeatedly hitting the keyboard again, not while holding a chord or note.
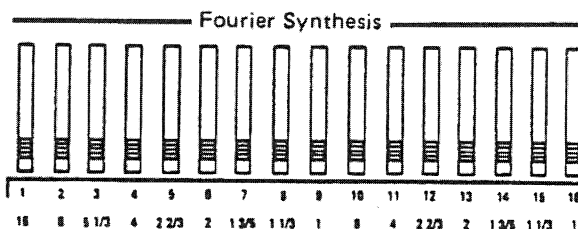
Fig. 13

The DRAWBARS using the footage 1-3/5' and higher will repeat in the upper octave of the keyboard. Beginning with the highest C# key, the voices will sound an octave lower again. The Human Ear would not be able to hear these high frequencies.

The first 9 slide controls are the fundamental drawbar voices.

The upper controls (10 through 16) are activated as the famous PERCUSSIVE voices. Use these together with the fundamental drawbars.

EXAMPLE: DRAWBAR Slide controls 16', 8' and 5-1/3' plus PERCUSSION Slide control 2-2/3'.

Using the Selector "DRAWBARS", automatically activates the function "CLICK" (noise or key-click). This effect can be cancelled of course.

H. CARTRIDGE

As mentioned previously, the Cartridge gives the capability (depending on which type of Cartridge) to add an additional 20 DMS Voices (via ROM Cartridge) or to add an additonal 10 CV's and 8 Presets (via RAM Cartridge). CVs and Presets can also be stored on RAM Cartridges so after CVs and Presets are created they can be stored for future use.
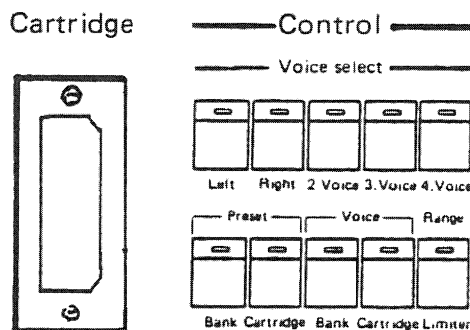
Fig. 14

I. CONTROL

The "Control" area of the MK 1 allows total programming of sounds, including "Fourier Synthesis" (creating wave forms from scratch). Functions can be assigned to the Wheels, all voices can be individually programmed as to channeling, VCF, Vibrato, Envelope; etc. The "Control" Matrix of the MK 1 is a central master brain center for the MK 1.

J. DMS INSTRUMENTS

There are 20 DMS instruments in the memory of the MK 1. As mentioned previously, an additional 20 DMS Instruments can be made available through the use of a ROM Cartridge. DMS voices are factory preset and cannot be changed unless they are moved to the CV section of the MK 1.

K. CV PRESETS

CV Presets are programmable voices of the MK 1. There are 20 CVs available in the memory of the MK 1. 10 on the regular switches, and an additional 10 on "Bank". Another 10 CVs can be made available through use of a RAM Cartridge. This brings the total amount available to 30. Any new sound created can be stored on the CV voices. Any sound already available on the CVs can be altered as desired.

COMPUTER VOICE INSTRUMENTS

The CV Presets are two component voice presets. How to program these presets will be covered under the section "Set CV/Pres." on page 23.

When programming a four voice DMS instrument in a CV Preset the following voice possibilities have to be considered. With the Voice Select Switch "Right" activated (LED on) at the time of programming, Voice 1. and Voice 2. will be programmed onto the CV Preset. If Voice 2. is activated (LED on) at the time of programming, Voice 2. and Voice 3. will be entered into memory of the CV Preset. (Voice 1. and Voice 4. will now be absent.) If Voice 3. is activated (LED on) at the time of programming, Voice 3. and Voice 4. will be entered onto the CV Preset. (Voice 1. and Voice 2. will be absent.)

After programming, the CVs can be recalled and used to build more complex sounds as we find in the DMS Instruments.

Along with the voice combinations, the following list of functions can be also programmed into the CVs:

— Routing	See Page 24
— WV-Mode	See Page 33
— Voice Shift (without "All")	See Page 30
— Voice Pitch (without "All")	See Page 30
— Octave (Position)	See Page 29
— Voice-Volume-Dynamic	See Page 27
— VCF-Mode & Envelope	See Page 39
— Voice Balances	See Page 21

PRESETS

Complete Keyboard Programming for all functions of the MK 1 can be stored in the 16 Presets. Instructions on programming these are described under "Set CV/Pres." on Page 23.

- Depress Matrix Switches "A", "7".
- Depress one of the "Presets" (1 to 8) or if necessary (activate "Preset Bank" — LED on). Make sure "Write Protect" is off.

Since there are many functions that can be programmed into "Preset", it is a good idea to use a checklist system to eliminate the possibility of missing an important function.

The following is a Checklist guide:

— All options as available in a CV	CV-Instr.
— Manual Split	See Page 21
— Complete instrumentation Left/Right	See Page 21
— Solo-Function including Solo Delay, AOC, Doubling	See Page 22
— Voice (Volume) Dynamic	See Page 27

FUNCTION CONTROL MATRIX

— Volume Balancing "Left/   See Page 21
Right", "Balance/Solo/AOC

— Touch-Control including   See Page 27
"Range Limiter"

— Wheel-Control (Wheel 1   See Page 36
with "Range Limiter")

— Swell-Shoe including   See Page 27
"Range Limiter"

— Footswitch-Control 1/2   See Page 42

— MIDI-Out-Channels   See Page 64

It is not necessary to include all of these options in a "Preset". This is simply a check-list to guide you when programming so that you do not miss an important item necessary for the best performance of the Preset you are programming.

— Select any Preset — if you choose, depress "Preset Bank".

When "Preset Volume" ("A", "3") is acti-vated (LED on), all of the Volume-Balance controls, Left/Right, AOC/Solo, etc. are controlled by the "Preset".

The manual controls at this point are non-functioning.

IV. FUNCTION CONTROL MATRIX

If you were to try to locate a city on a map, the direct-ory at the bottom of the map would give you a letter and numeral (for instance "A-4" or "B-5" to corollate the location). The same principal is used in the Function

Control Matrix of the MK 1. In this manner with only "8 x 8" switches, we are able to achieve several hundred functions!

As you see in our example, the Main level (called Play level) provides 64 functions. In order to obtain more functions we've added "E", "F", "G" and "H" as level selectors.

In order to see the additional levels on the Function Control Matrix, lay the Function Booklet over the Func-tion Control Matrix. The last page is a magnet foil that attaches the overlay guide to the MK 1. This page dupli-cates the Play Level Functions printed on the MK 1 itself.

When using the additional levels of the Function Con-trol Matrix, you will find small square boxes located close to "E", "F", "G" and "H" switches. If the box is filled in, the switch should be on. If the box is empty, the switch should be off.

Example: If you would like to select MIDI Functions switches "F" and "H" would be selected first, then you would refer to the Function Control Matrix Overlay (MIDI level) and select "B-7" in order to activate "MIDI IN — Instrument Changes".

On the following pages we will explain the functions of each level. However, to fully understand these controls, you not only have to practice using these functions, but you must understand some functions and controls directly affect other functions. For instance, if you choose a certain VCF function, but if VCF is not turned on for that voice there will be no effect.

Also remember that most functions can be memorized

	1	2	3	4	5	6	7	8	
A	A1/E1	A2/E2	A3/E3	A4/E4	A5/E5	A6/E6	A7/E7	A8/E8	E
B	B1/F1	B2/F2	B3/F3	B4/F4	B5/F5	B6/F6	B7/F7	B8/F8	F
C	C1/G1	C2/G2	C3/G3	C4/G4	C5/G5	C6/G6	C7/G7	C8/G8	G
D	D1/H1	D2/H2	D3/H3	D4/H4	D5/H5	D6/H6	D7/H7	D8/H8	H

```
A1 — A8 =  8        E1 — E8 =  8
B1 — B8 =  8        F1 — F8 =  8
C1 — C8 =  8        G1 — G8 =  8
D1 — D8 =  8        H1 — H8 =  8
          ——                  ——
          32                  32
              \        /
               [ 64 ]
```
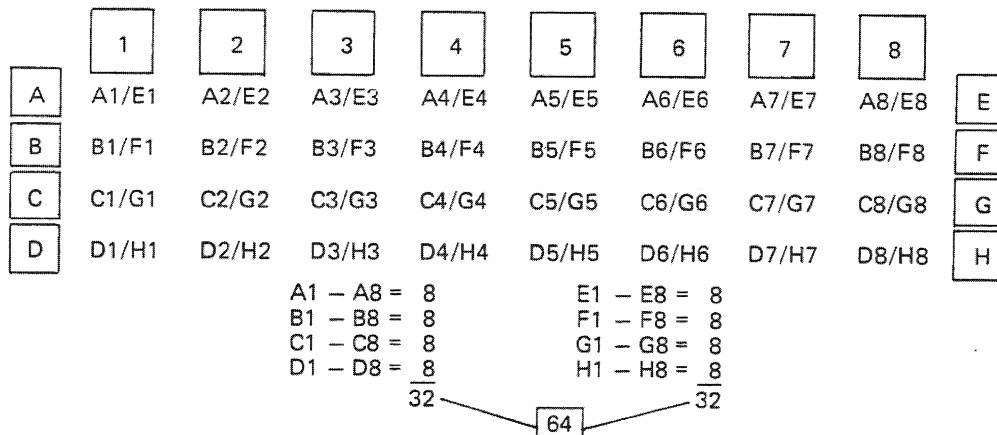
Fig. 15
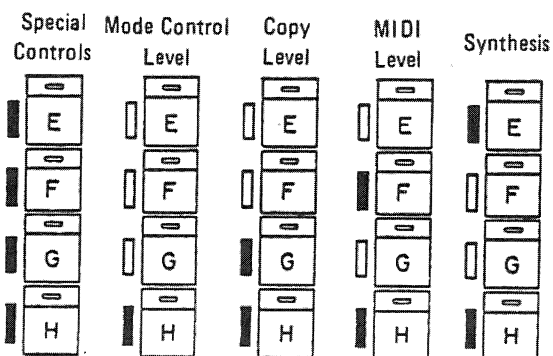
Fig. 16

in the Total Presets, the DMS voices, or the CV Presets. Remember, most voices can be memorized in the Total Presets. So, when changing to a new voice, some of the functions that you selected first may change again.

A. USING THE FUNCTION CONTROL MATRIX

The function control matrix on the right side of the keyboard allows all other features to be set or activated.

— Sound changes

— Programming commands

— Keyboard functions

— All assignments

— All parameter copy functions

The Control Matrix is the heart of your instrument and controls all functions of the keyboard in all levels.

The control Matrix has different levels, which are easily accessed using the users overlay.

B. THE PLAY LEVEL

The MK 1 has the PLAY LEVEL directly printed on the matrix and is divided into to main colors: blue and red.

You can easily define the controls "A"-"D" within the red rows and the controls "E"-"G" within the blue rows.

(Row "H" belongs to the first sub-level of the matrix.)

The selectors "1" — "8" define the 8 different fields within each row. Each field will command a different function.

The matrix allows the performer to command every function within the play level by activating 2 selectors at maximum.

Fig. 17

20

MATRIX ROW "A"

	Sub. Voice	Voice	Preset	Split	Doubling	Solo	Set	
A	Off	Balance	Volume	On	AOC		CV/Pres.	Split
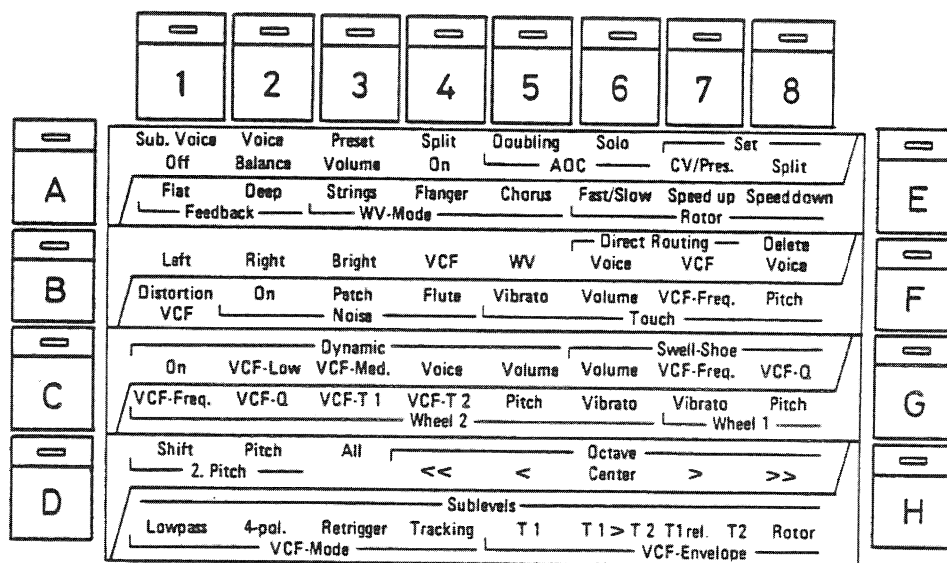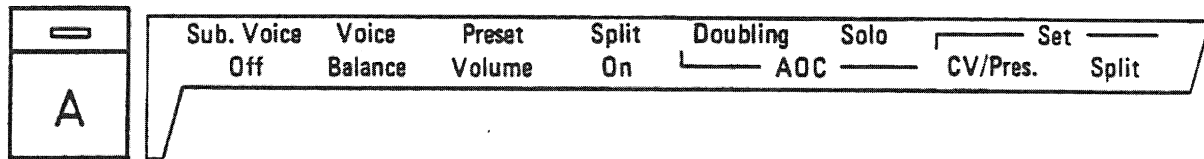
The LEDs of the activated selectors allow easy and instant reading of the function position and their controls.

1. Row "A" = Control

SUB VOICE OFF

Temporarily cancels individual or groups of sub-voices used in complex sounds.

EXAMPLE:

— Depress "Right" in "Control" section then "Guit. 2" (2 components)

— Depress "3. Voice" in "Control" section then "Strings" (1 component)

— Depress "4. Voice" in "Control" section then "Horn" (1 component)

YOU HAVE A 4-COMPONENT SOUND.

We can temporarily cancel the 3rd and 4th voice by activating the "SUB VOICE OFF" function:

— Depress "3. Voice" in "Control" and "A" "1" (subvoice-off) LED = on) in the Matrix.

All sub voices, including 3 and 4 have been cancelled. You only hear the Guitar (2 components).

Let's reverse the function:

— Depress Matrix Switch "1" (sub-voice-off LED = off).

You have all 4 components again, as previously selected.

You may choose to cancel any amount of components, including the selected position:

When you select "2. Voice" — "A" "1", you cancel 2 + 3 + 4th components.

When you select "3. Voice" — "A" "1", you cancel 3 + 4th components.

When you select "4. Voice" — "A" "1", you cancel 4th component.

VOICE BALANCE

Each individual selected voice or component within a multi complex sound can be independently balanced in volume.

When "VOICE BALANCE" is activated, we can set volume of each component with the "BALANCE/SOLO/AOC" slide control:

EXAMPLE:

— Depress "Right" — "Guit. 1" — "3. Voice" — "String 1"

Slide control "BALANCE/SOLO/AOC" at bottom position = 0.

— Depress "3. Voice" (LED = on)

— Depress Matrix Switches "A" "2" (Voice-Balance LED = on)

Balance the 3rd component voice (Strings) with the volume of the Guitar by sliding the "BALANCE/SOLO/AOC" control until the volume is at the level you prefer.

The volume balance is set whenever the "VOICE BALANCE" function is activated.

Try setting up 4 components, one at a time.

SET SPLIT

The MK 1 automatically defaults to MANUAL SPLIT when turned on and the LEDs in the matrix "A"-"4" should be on.

If not, activate the manual split by selecting "A"-"4". Now the Keyboard can be split within any desired position and divided into the "LEFT" and "RIGHT" manual.

CHOOSING THE DESIRED SPLIT POSITION:

- Be sure that LED "A"-"4" = Split On is activated.

- Press down a key at the desired split point.

- Depress Matrix Switches "A"-"8" (LED does not light up).

Now your keyboard is split:

LEFT = the range left of your split point.

RIGHT = the right of your split point INCLUD-ING the depressed key. The split point key is the lowest note of the right manual.

You can select all voices for LEFT and RIGHT individually:

As you had previously used the "RIGHT" se-lector (now = right hand) you can use the "LEFT" selector for the left hand.

THE LEFT manual can also use up to 4 voices or components as previously selected.

VOLUME balance between "LEFT" and "RIGHT" are now individually adjustable with the volume controls (left/right).

CANCEL the Keyboard-Split: "A"-"4" (LED = off) and the whole keyboard responds to the "RIGHT" selected voices, but your split point is still in the memory!

To activate the split again: "A"-"4" and the previously set split point is activated.

TO CANCEL THE SPLIT POINT

Set the Split-Point (as described above) using the lowest key of the manual.

Even though the MK 1 will default to the split function, the split-point is still the lowest key. Select a new split point as described above.

SOLO

The SOLO function allows only the highest note to sound even when playing a full chord. This effect is similar to a monophonic synthesizer.

Since all sounds and voices on the MK 1 are full polyphonic, we can use the SOLO function to either cancel voices played below the highest note played in a chord or gradually blend or balance their loudness compared to the highest note.

The "BALANCE/SOLO/AOC" slide control will balance the lower voices against the solo voice within the chord.

When using more than 1 voice (RIGHT -1. +2. +3. etc), the highest voice will always have the priority and effects only the 1. "RIGHT" voice.

EXAMPLE:

- Depress "RIGHT" - "PIANO"

- Depress Matrix selector switches "A"-"6"

The SOLO function is activated.

Play a chord and balance the lower notes against the solo voice using the "BALANCE/SOLO/AOC" slide control.

- Depress Matrix switch "6" to cancel the SOLO function.

Try the same again, but use:

- "RIGHT" - "PIANO"

- "3. voice" - "STRING"

Note: The SOLO function responds only within the "RIGHT" manual and does not function on the "LEFT" (when split).

DOUBLING

Any selected voice can be doubled when using this function. Doubled voices can be detuned within each other (see tuning).

22

EXAMPLE:

— Depress "RIGHT" — "STRING" (DMS Instrument).

— Depress Matrix switches "A"-"5" to double the voice.

The Strings are doubled = 4 voices, but the 3. and 4. voice in the bank are not occupied (check display).

Note: Although the 3. and 4. components are not used, you are using twice as many voices which may decrease the polyphonic capability (see display).

AOC

AOC is a term used for automatic chord features; allows a chord played in the left hand to play along with a single note of the right hand. "AOC" functions only with keyboard split.

EXAMPLE

— Activate Manual-Split

— Depress "RIGHT" — "TRUMPET"

— Depress "LEFT" — "PIANO"

— Depress Matrix switches "A"-"5" and "6"

AOC is now activated.

Play a chord with the left hand: C-E-G, and play a few scales with the right hand.

You can balance the "AOC"-sounds using the "BALANCE/SOLO/AOC" slide control.

SET CV/PRESET

1. The "CV" (custom voice) banks can be programmed with any combination of any 2 components. (Voice Creating; see chapter "CV-Instruments").

2. The "PRESETS" (performance presets) can contain all complex registrations, splits, functions and balance controls in its memory

bank. Each "TOTAL PRESET" can maintain individual user-parameters and settings. (See chapter "PRESETS")

EXAMPLES:

SET "CV":

— Depress "RIGHT" — "GLOCKENSP"

— Depress "3. Voice" — "VIBES"

— Depress "RIGHT"

— Depress Matrix switches "A"-"7" (activate SET-CV)

— Select a CV-switch: Depress "CV 1"

You have just saved the first two components into the CV 1 bank. The first two components are:

Voice-1 = Glockenspiel (first component)
Voice-2 = Glockenspiel (second component)

CV 1 = GLOCKENSP. (vibes are not effected because they are in the 3. and 4. component.

Each CV bank can store 2 components. The 10 CV banks can store up to 20 individual components.

In the second level (VOICE BANK) in the "Control" section another 10 CVs are available. In total, we can store 40 individual components.

Lets store two individual components in one CV:

— Depress "2. VOICE"

— Depress Matrix switches "A"-"7" (SET CV)

— Select a CV-bank: Depress "CV 2"

You have just saved two individual components into a CV bank. The two components are:

2. component "GLOCKENSP" (2. Voice)
1. component "VIBES"   (3. Voice)

MATRIX ROW "B"

"CV 2" now = a new voice consisting of two individual components of other voices.

Try out more and save them in other CV banks.

EXAMPLES:

"SET PRESET"

1. Set up any combination of voices of your choice.

    — Split the manual and set split position.

    — Set up Bank "LEFT" & "RIGHT".

    — Set the voice volume balance.

    — Activate "SOLO" function.

— Balance SOLO Volume.

After you have the selected registration and settings of your choice, you can save (freeze) this complex setting into one TOTAL "PRESET" of your choice:

— Depress Matrix switches "A"-"7" = "SET PRESET"

— (PRESET 1-8 of your choice). "PRESET 1"

When you activate Matrix Switches "A"-"3" (PRESET VOLUME), all volume and balance controls previously selected for PRESET-1 are retained.

— Even after you "RESET" or turn off your instrument, all memory remains in the PRESETS and CVs.

---

2. Row "B" = Routing

	Left	Right	Bright	VCF	WV	Direct Routing Voice	VCF	Delete Voice
B								
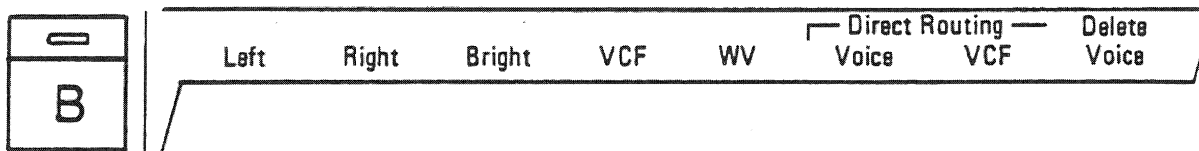
ROUTING allows you to determine the path of each component through different effects and channels:

The voices can be routed through the following different channels and effects:

EFFECTS

"BRIGHT"
"VCF" (voice controlled filter)
"WV" = WERSIVOICE (Leslie-effect)

CHANNELS

"LEFT"
"RIGHT"

"LEFT + RIGHT" = MIDDLE

The "ROUTING" functions are activated in the

"B" level of the matrix (B 1-8) in the RED-field.

Each component of a voice can be routed individually:

EXAMPLES:

— Load "Drawbars" into "RIGHT" (two components -1+2)

— Depress "2. Voice" (LED on)

— Depress Matrix Switches

"B",
"1", LEFT
"2", RIGHT
"3", BRIGHT
"4", VCF
"5", WV (LEDs on)

The "2. Voice" (component) is routed from —

BRIGHT — VCF — WV — LEFT and RIGHT
channel = MIDDLE —

The "ROUTING" will always effect the "Selected Voice" (here it is the 2. Voice) and all others beyond.

DIRECT ROUTING

Direct Routing makes the distribution of either VOICE or VCF through multiple channels possisible;

= Additive Distributing
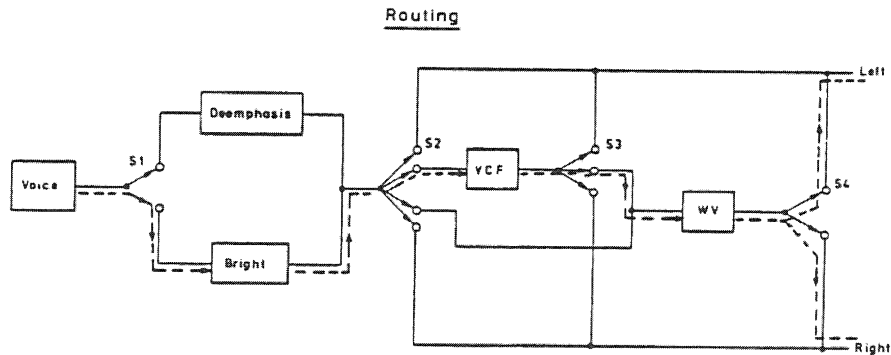
Fig. 18

Lets check the routing of the first voice in this example —

— Depress "RIGHT"

— Depress Matrix Switch "B"

The LEDs (matrix 1-8) of the B-level will show:

"LEFT"   "1" — LED on
"RIGHT"   "2" — LED on
"WV"   "5" — LED on

The 1. VOICE (component) is routed: —

DE-EMPHASIS (no brightness) — WV — LEFT
and RIGHT —

The following multiple routing combinations are possible:

DIRECT ROUTING "VOICE" Matrix Switch ("6" LED on)

— LEFT
  RIGHT

— LEFT and RIGHT

— VCF
— WV

— VCF and WV

— VCF and RIGHT
— WV and LEFT

Fig. 19

25
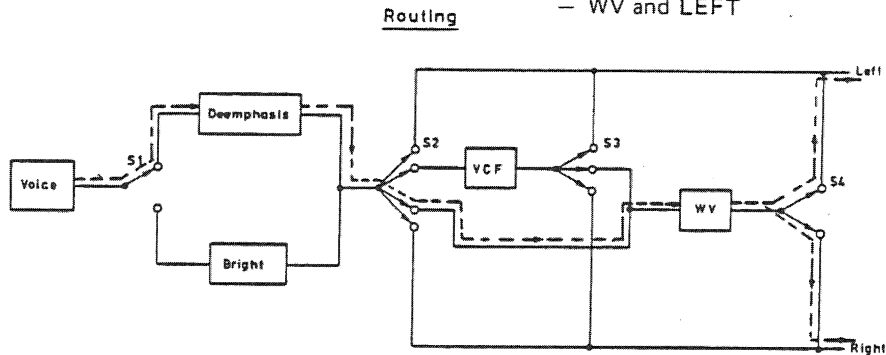
DIRECT ROUTING "VCF" Matrix Switch ("7" LED on)

- Any combinations of LEFT/RIGHT/WV are possible.

See Diagram:

Distributer "S2" = "DIRECT VOICE" (when active)

Distributer "S3" = "DIRECT VCF" (when active)

EXAMPLES: "DIRECT ROUTING"

A Voice should be routed through the following channels and effects:

of the 1. Voice will have priority. This means that all following voices will have the same VCF Envelope of the 1. Voice.

The VCF priority will follow the following path:

1. VOICE (RIGHT) — 2. Voice — 3. Voice — 4. Voice — 1. Voice (Left) — 2. Voice — 3. Voice — 4. Voice

"DIRECT VOICE" can assign VCF Priority to any selected voice:

EXAMPLE:

1. Matrix Switches "DIRECT VOICE" function active "6 LED on".

Routing

Switch "Direct Voice"   Switch "Direct VCF"
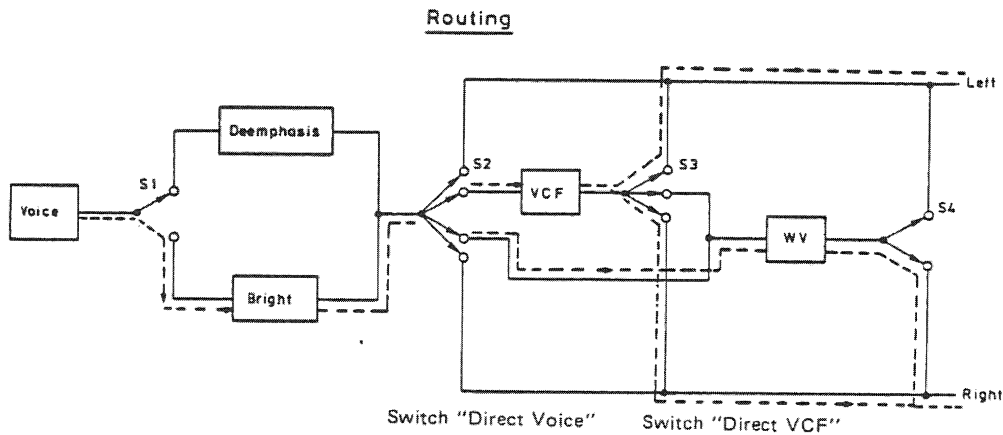
Fig. 20

To achieve this routing, follow these steps:

- Depress Matrix Switches:

  1. "B" (matrix)
  2. "5" WV
  3. "2" RIGHT
  4. "6" — "4" — "5" (DIRECT VOICE — VCF — WV)
  5. "7" — "1" — "2" (DIRECT VCF — LEFT — RIGHT)

REMARKS TO VCF ROUTING

When using multi sounds in combination (1 to 4 voices or 2-component voices = 2 voices 1 + 2 and 3 + 4 components etc.) the VCF Envelope

After assigning the Routing for the selected voice, and if "DIRECT VOICE" STAYS ACTIVE; this will result to:

* This voice will route through VCF if any of the other voices in the bank have VCF.

* No VCF-priority assignment; this means that even though a new voice is loaded into the bank, the VCF remains the same (new voice may contain other VCF).

2. Matrix Switches "DIRECT VOICE" function "OFF" "6 LED off".

After assigning the Routing for the selected voice, and if "DIRECT VOICE" NOT AC-

MATRIX ROW "C"

TIVE; this will result to:

* The voice routes through VCF only if it has VCF-priority.

* The voice is loaded into the bank with its specified VCF envelope.

DELETE VOICE

To delete individual components of a multi-timbre voices:

EXAMPLE:

— Structure a 4-component voice.

— Select the component to be deleted (VOICE SELECT).

— Depress "3. VOICE".

— Depress Matrix Switches "B"-"8" (matrix).

The 3. Voice or 3rd component is deleted.
The 4. Voice (component) takes its place.

NOTE: The 1. VOICE (RIGHT) and 2. VOICE (LEFT) cannot be deleted.

---

3. Row "C" = Loudness/Dynamics and Volume

		Dynamic			Swell-Shoe		
On	VCF-Low	VCF-Med.	Voice	Volume	Volume	VCF-Freq.	VCF-Q
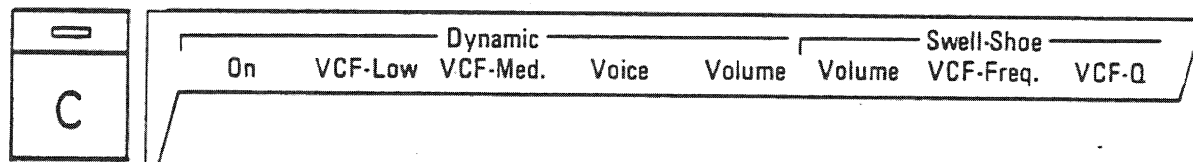
SWELL-PEDAL

The Swell Pedal can control several functions other than volume. The Matrix Level C lets you select each function individually:

— VOLUME Matrix Switches "C"-"6"

The volume level from the pedal is within the range of the master volume control on the keyboard.

— VCF FREQUENCY Matrix Switches "C"-"7"

The VCF Frequency Range can be controlled by the swell pedal. Only functional when the selected voice uses VCF (see routing).

— VCF QUALITY Matrix Switches "C"-"8"

The VCF filter quality can be modulated.

RANGE-LIMITER

ALL SWELL PEDAL FUNCTIONS can be limited within a specific range. The range limits are programmable with the "RANGE-LIMITER" in the "CONTROL" area.

EXAMPLE for volume limiting:

— Activate volume function. Depress "C"-"6".

— Use swell Pedal to adjust volume level.

— When adjusted level is reached, activate "RANGE LIMITER".

Your volume range is now limited. The RANGE LIMITER also limits touch and wheel functions; all programmable in the PRESETS (see Presets).

DYNAMIC

The keyboard is VELOCITY SENSITIVE. THE

dynamic controls several functions:

VOLUME-DYNAMIC and VCF DYNAMIC are programmed on the Matrix: Row "C".

ON

To activate DYNAMIC ON, depress Matrix Switches "C" and "1".

The VCF Dynamic can be selected in three different modes:

— VCF-LOW Switch "C"–"2" = low intensity.

— VCF-MEDIUM "Switch "C"–"3".

— VCF-STRONG Switches "C"–"2+3".

If none of the LEDs ("2" or "3") are activated: no VCF Dynamic is generated.

VOLUME

— Depress "C"–"1" (Dynamic ON).

— Depress "C"–"5" (select VOLUME DYNAMIC as function).

— Try out the dynamic on the PIANO voice. Hit the keys soft = less volume; hit the keys harder = more volume.

The velocity dynamics on some voices will be more or less strong as they may be already preset. It is possible to program specific dynamics into each voice!

See chapter "MODE CONTROL".

VOICE

The VOICE-DYNAMIC functions are related to the ENVELOPE of the selected voice.

The following DYNAMICS are controllable:

— ATTACK TIME
— RELEASE TIME

— VIBRATO
— ATTACK VALUE
— PITCH (DETUNING)

28

MATRIX ROW "D"

4. Row "D" = Tunning

Shift   Pitch   All   Octave

    2. Pitch   <<   <   Center   >   >>

D
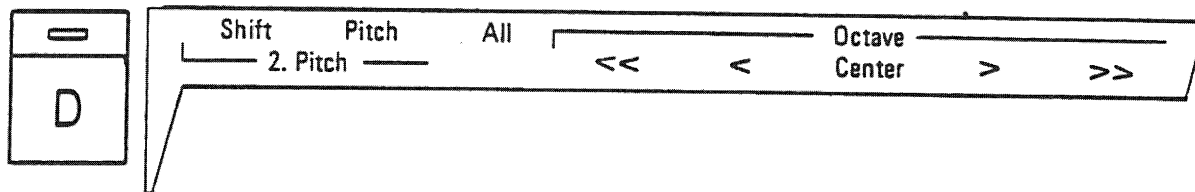
With the function controls in the fourth row (colored red) of the "Function Control Matrix", you can control the Octave range and Transposition of all voices in Banks 1 through 4 in both the Left and Right sides of the keyboard.

a) Octave Center

— Load piano into "Right".

— Depress Function Control Matrix "D" (LED on).

The LED over "Octave Center" comes on ("6") indicating that the DMS Instrument "Piano" is in the normal octave range. (Middle "C" of the MK 1 is Middle "C" of the Piano voice.) In the "Functions" field of the display the Octave selection will read "+0" indicate standard octave pitch.

— Depress Matrix Switch "7" (LED on).

This will shift the Piano pitch one octave higher. Middle "C" will sound an octave higher than standard pitch. The Display will now read "+12" in the Functions field.

— Depress Matrix Switch "8" (LED on).

The Functions field in the Display will now read "+24" and the Piano voice will now play two octaves higher.

— Depress Matrix Switch "6" to return the piano to standard pitch.

— Now depress Matrix Switch "5" (LED on).

The Piano voice will now sound one octave lower than standard pitch, and the Functions field in the Display will read "-12".

— Depress Matrix Switch "4" (LED on).

The Piano voice will play 2 octaves below standard pitch, and the display will now read "-24".

On the highest and lowest extremes of Octave shift, the last octaves will repeat.

The Octave Shift can be used to shift only some components of a voice and the other components can remain at standard pitch.

Example:

— Load "Stage Piano" onto "Right". This will occupy voice 1 and 2.

— Load "Stage Piano" onto "Voice 3". This will occupy voice 3 and 4.

— Depress Matrix Switch "D" (LED on) — the LED in Switch "6" (for Octave Center) will come on also.

— Depress "Voice 3" (LED on) and Switch "7" also.

The Stage Piano voice 1 and 2 will remain and standard Octave "+0", and Stage Piano voice 3 and 4 will sound one octave higher "+12".

b) Shift and All

The Function Matrix keys "Shift" plus "All" enables Transposing up or down in either 1/2 steps or full steps.

— Depress Matrix Switch "D", "1" (LEDs on).

At the same time the Function "All" will be activated (Switch "3" LED on).

With the Matrix Switches "5" and "7", you can now raise and lower the pitch of the MK 1 by 1/2 step at a time.

With the Matrix Switches "4" and "8", the pitch of the MK 1 can be raised and lowered one full step at a time.

— Repeatedly depress Middle "C" while depressing Matrix Switches' "4" (full step lower), and "5" (half step lower), and "7" (half step higher) and "8" (full step higher) and watch the Display which will change to indicate the transposition steps by showing the following readings:

1. The MK 1 can be transposed to "-6" on the display. Middle "C" on the keyboards will then sound F#.

2. The transposition up is to a reading of "+5" on the display. Middle "C" will sound "F" above middle "C".

3. To return to normal pitch, depress Switch "6" for Octave Center and the display will read "+0".

c) **Shift**

With the "All" Selector Switch off (LED off) it is possible to program intervals between the main voice and component voices.

Example: Two Guitars with a third interval.

— Load "Guit. 2" on right voice selector.

— Load "Guit. 2" onto Voice 3 selector.

At this point all four voices in the "Right" Bank are utilized.

To program the interval:

— Depress Matrix Switch "D", "1" for the "Shift" function (LEDs on).

Since we do not want to transpose Voice 1 and 2, the "All" Selector Switch may not be activated.

— Depress Switch "3" (LED off).

Make sure Voice 3 is turned on, as Voice three and four are the voices we are going to transpose.

— Depress Matrix Selector "7" four times (LED on). The Display will read "+4".

The Guitar voices 3 and 4 will now play a third higher than Guitar voice 1 and 2.

d) **Pitch and All**

The MK 1 operates at the standard pitch of A = 440. When the Matrix Selector Switches "Pitch" and "All" are activated, it is possible to raise and lower the pitch of the MK 1 one half tone in 32 step increments. This allows you, for instance, to tune the MK 1 to another instruments.

— Depress Matrix Switch "D", "2" (Pitch), "3" (All) (LEDs on).

— In order to raise and lower the pitch use Matrix Selector Switches "4", "5", "7", "8".

The Display under the Functions will read:

1/2 tone lower	Normal Pitch	1/2 tone higher
-32	+0	+32

Depressing the Switch "6" will return the MK 1 to standard A = 440 Pitch.

e) **Pitch**

When "Pitch" is activated it is possible to set the amount of detuning (interference, or beats) of the selected instrument.

Example: Stereo "Horns" (slightly detuned).

1. Loading DMS Instrument "Horn".

   — Load "Horn" into "Right" (Voice 1) and into "3. Voice".

   The "Horn" now occupies all four component voices.

2. Selecting and programming routing.

— Depress Switch "B" (LED on).

If you now press the selector buttons, "Right", 1st, 2nd, 3rd and 4th voice one after the other, you can watch the routing of the DMS instrument "Horn" by watching the LEDs on the matrix buttons 1–7:

In this example, one component of "Horn" each, (1st and 3rd voice) will run directly to the "Left". "Left" and "Right" will indicate equal sound from both sides, and the other two components (2nd and 4th voices) will run over "Bright" to "Left" and "Right".

One component each of this double horn will go to the right channel, and one to the left.

— Select 2nd voice (LED on).

— Depress Matrix Switch 1 (for "Left") LED off.

The second component of our (first) horn — and all following voices — will now run over "Bright" to "Right".

— Select 3rd voice (LED on).

— Depress Matrix Switch 1 (for left) LED on.

The sound of the 3rd voice (first component of the second horn), now runs over "Bright" to "Left" and "Right".

— Depress Matrix Switch 3 ("Bright") LED off, since the first component of the second horn should run to the "Left" and "Right" without "Bright" (just like the first "Horn").

— Select 4th voice (LED on).

— Depress Matrix Switch 2 (for "Right") LED off and Matrix Switch 3 (for "Bright") LED on.

The 4th voice now runs over bright to the "Left" channel.

3. Programming De-Tuning

In order to achieve the "De-tuning" of the total sound, the second components of the Horn — that is, the second and fourth voices, are de-tuned.

To select tuning:

— Depress Matrix Switch "D" (LED on).

— Depress "2nd Voice" (LED on).

— Depress Matrix Switch "2" (for pitch) (LED on).

We are now in the pitch mode. In this mode, the second voice, as well as the following voices can be de-tuned.

— Depress Matrix Switch "7" one time and you will see that you have programmed a tuning of "+1" in the Display.

— Depress "3rd Voice" (LED on).

The pitch mode must again be activated:

— Depress Matrix Switch "2" (LED on).

In the display, the previously shown de-tuning of the second voice will be shown. Since the 3rd Voice is supposed to sound without de-tuning:

— Depress Matrix Switch "6" (the Display will read "+0".

— Depress "4th Voice" (LED on).

Activate Pitch Mode:

— Depress Matrix Switch "2" (LED on) and in the Display you'll see "+0".

With Matrix Switch "5" a de-tuning of –1 can be programmed by depressing Switch "5" one time. The Display will read "–1".

This brings us to the end of programming the stereo, de-tuned "Horn" sound.

f) 2. Pitch

By using "2. Pitch" you can program de-tuning of "Doubling" or "AOC" (also see the chapter on "MIDI").

Example of De-tuning for "Doubling".

— Load "Brass 1" of the DMS Instruments onto "Right".

— Depress Matrix Switch "A", "5" (LEDs on).

"Brass 1" is a two component voice. (Voice 1 and 2 are now occupied). Since "Doubling" is already activated, each voice is already doubled, and voice 3 and 4 remain free.

— Depress Matrix Switch "D", "2", "1" (LEDs on).

"2. Pitch" is activated.

— Use Matrix Switch "5" to lower pitch and "7" to raise pitch of the de-tuning.

Example: Detuning the AOC.

Splitting the Manual:

— Depress Matrix Switch "A" (LED on). ; the

— Switch "4" (LED on).

— Hold any note on the manual (let's use Middle "C") and depress Matrix Switch "8" while holding the note.

This activates the point of the split on the manual. The MK 1 is now controlled with "Left" = voices for the left side of the split; and "Right" = voices for the right side of the split. Now load "Left" and "Right" with the following registrations:

— Load "Vibes" onto "Right".

— Load a voice of your own choosing onto "Left".

— Depress selector A "5", "6" to activate AOC.

— Depress selector switch "Right" again (LED on).

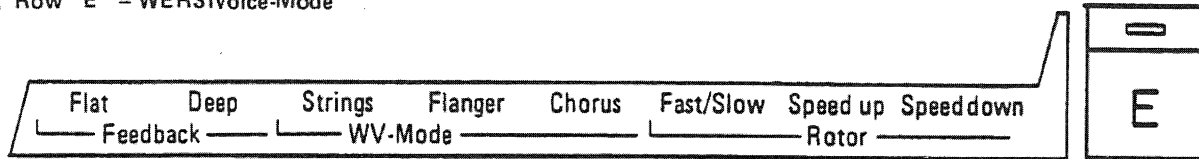— Depress Matrix Switch "D", "2", "1" (LEDs on).

"2. Pitch" is now activated.

— Depress Switch "5" to lower pitch, and Switch "7" to raise pitch of de-tuning.

— In the left side of the manual play the chord C-E-G and hold, while on the right side of the manual split play a single note melody. The AOC will be de-tuned from the lead note according to the amount of de-tuning you have set with switches "5" and "7".

MATRIX ROW "E"

5. Row "E" = WERSIvoice-Mode

| Flat | Deep | Strings | Flanger | Chorus | Fast/Slow | Speed up | Speed down | E |
| Feedback | WV-Mode | Rotor |

The Wersivoice offers two major functions:

1. A Phase Vibrato for the rotating speaker effect, (which in the past was done mechanically with a mechanical moving speaker) giving you the typical "Drawbar" sound associated with the moving speaker effect.

2. An Orchestra-Effect, which takes an individual voice and multiplies the sound giving the impression of a group of voices. For instance, a "Trumpet" will sound like a trumpet ensemble.

As you know from "Routing", it is possible to run any of the voices (or components) through the Bank of Wersivoice functions. The top line of the "E" section of the Function Control Matrix (marked in blue) will give all the Wersivoice function choices. They are as follows:

a) **Rotor Fast/Slow:** Phase vibrato Fast/Slow.

b) **Chorus:** Diminished Rotor effect.

c) **Flanger:** Extremely slow, but very intense Phase Vibrato.

d) **Strings:** Layering of multiple Phase Vibratos of various Amplitudes and Frequencies.

We will explore the first Wersivoice mode using the "Drawbars":

— Load "Drawbars" on "Right" (1. Voice) and set the Drawbars as you desire. (Note: You must have a Drawbar setting registered in order to obtain sound.)

— Depress Matrix Selector Switch "B" (LED on):

As you can see, the routing for the Drawbars is already programmed through Wersivoice.

— Depress Matrix Switch "E" (LED on).

The "Wersivoice-Mode" Matrix line is now selected: If none of the LEDs for "Strings", (3), "Flanger" (4), or "Chorus" (5) light, the "Rotor" mode is activated.

| Fast/Slow | Speed up | Speed down |
| Rotor |
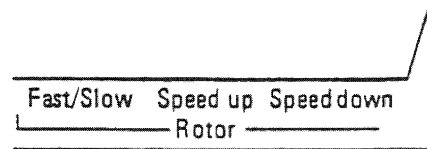
— Now hold a chord on the keyboard using the selected "Drawbar" sound and depress Matrix Switch "Fast/Slow" (6): (LED on): the "Rotor" will be in the fast mode.

— Depress Matrix Switch "6" again (while still holding the chord) and you will hear the rotor change to the slow mode.

You will also hear the "speeding up" and "slowing down" of the rotor when changing from fast to slow on the Wersivoice (while holding a chord). Either one of these (Speed up) or (Slow down) effects can be eliminated (or both) so that the Wersivoice changes immediately from fast to slow or slow to fast without the interim effects. This is accomplished with the two Matrix Switches "7" and "8".

— Depress Matrix Switch "7" (Speed up) (LED off):

The Wersivoice will now go directly from Slow to Fast without the "speeding up" effect.

— Depress Matrix Switch "8" (Speed down) and the Wersivoice will switch immediately from Fast to Slow without the "slowing down" effect.

The Wersivoice effects "Chorus", "Flanger" and "Strings" (Switches "5" through "7") will cancel each other when the next mode is selected. Also, when choosing one of these modes the LED in the Rotor will go off. If you now want to select the

MATRIX ROW "F"

"Rotor" mode, depress the Fast/Slow Matrix Selector Switch "6" (LED on) and the Rotor mode will be activated in the fast mode.

— Depress Matrix Switch "6" again (LED off) to activate Rotor Slow.

The 4 Wersivoice modes cancel each other when switching from on to the next. The "Feedback" can be assigned to any Wersivoice mode:

```
/  Flat      Deep
└──── Feedback ────
```
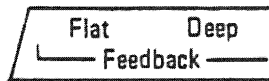
"Flat (Matrix Switch "1") = Wersivoice diminished (shallow)

"Deep" (Matrix Switch "2") = Wersivoice intense

"Deep" and "Flat" ("1" & "2") = Wersivoice extremely intense

Try the Wersivoice "Strings" mode with the DMS Instruments "Strings 1" and "Strings 2" and with the DMS Instruments "Brass 1" and "Brass 2"!

Switch to Matrix row "B" to make sure the voice is routed through Wersivoice.

6. Row "F" = Effects

```
/  Distortion   On      Patch    Flute   Vibrato   Volume   VCF-Freq.   Pitch      ┌────┐
   VCF      └────── Noise ──────    └────────── Touch ──────────────     │  F  │
                                                                          └────┘
```
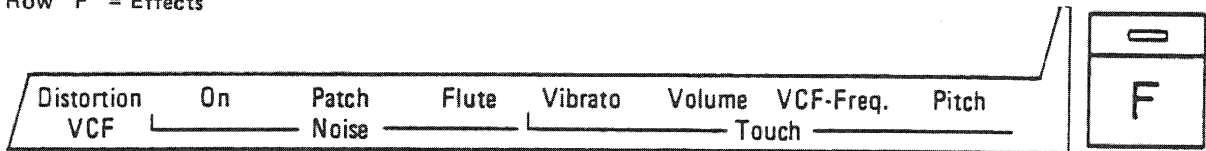
In the second blue function field of the Matrix Function Control are the controls for the "Effects" section — additional effects — which can be used in conjunction with any voice.

The "Effects" for each voice will automatically be switched to obtain the proper effects for the sound being used.

DISTORTION VCF

Voices which are run through the VCF can be purposely "distorted" to obtain certain effects.

Example:

— Load "Guit. 2" onto "Right.

— Depress Matrix Switch "F" (LED on).

— Depress Matrix Switch "1" for Distortion VCF (LED on). The Guitar sound now is run through the Distortion effect.

NOISE ON

```
   On      Patch    Flute
└────── Noise ──────
```
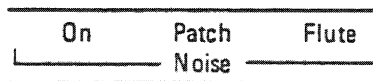
With Matrix Selector Switch "2" we can activate "Noise".

Note: We can only assign the VCF functions "Distortion" and "Noise" to the "Left Voice Select" if they are not used in the "Right Voice Select". "Right" has priority.

Example 1:

— Load "Drawbars" onto "Right".

— Depress Matrix Switch "F" (LED on).

When we select "Drawbars" Matrix Switch "2" and "3" ("Patch") is selected automatically because it is programmed into the "Drawbar" voice. When used with the "Drawbars" the "Patch" will produce the key "click" associated with the "Drawbar" sound.

34

Example 2:

— Load "Lead" onto "Right".

Matrix Switch "F" is still active, but "Noise On" has to be turned on again:

— Depress Matrix Switch "2" (LED on).

WIND

— Depress any key repeatedly and the "Wind" effect can be heard.

PATCH

— Depress Matrix Switch "3" (LED on): the key "click" will now be activated.

FLUTE

— Depress Matrix Switch "3" again (LED off) and Switch "4" (LED on): for the Flute vibrato and wind or "air" effect.

PATCH & FLUTE

— Depress Matrix Switches "3" & "4" (LEDs' on):

The amplitude vibrato will be taken out of the voice that has VCF priority.

TOUCH

| Vibrato | Volume | VCF-Freq. | Pitch |
| Touch |
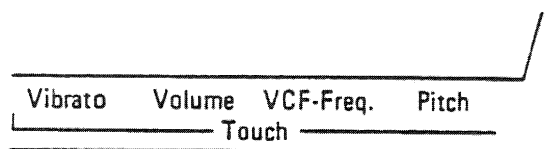
With the "Touch" function you can control the Modulation Effects by the amount of pressure placed on the key. With the keyboard split activated, the right hand side of the split will be affected.

The following modulation effects are possible:

1. Vibrato — Matrix Switch "5" (LED on).
   The amount of Vibrato can now be controlled by the amount of pressure placed on the key. When using Wheel 1 with Touch only the frequency vibrato can be affected by the Wheel 1 control. (Normally Wheel 1 controls frequency and amplitude vibrato.) The maximum amount of Vibrato available is pre-determined by "System Constants".

2. Volume — Switch "6" (LED on).
   The volume can be controlled also by the amount of pressure applied to the key being played. The harder the key is depressed, the louder the volume (unless the "Right"-Volume is already set to the maximum).

3. VCF-Frequency — Switch "7" (LED on).
   The amount of pressure on the key can shift the VCF-Frequency band upward. (Load "Trumpet" onto Right-"Trumpet" contains VCF.)

4. Pitch-Switch "8" (LED on).
   With this switch the amount of Pitch change on the "Right" can be controlled by the degree of pressure on the keys. The maximum amount of pitch change is pre-determined under "Systems Constants".

Example:

— Load "Trumpet" onto "Right".

— Depress Matrix Selector Switch "F" and depress any key.

— While holding the key on the manual depress Matrix Switches "5" through "8" one at a time and gradually increase pressure on the key and you'll clearly hear the effect.

You can control the amount of Volume or Modulation effect on the keyboard with the "Range Limiter". (The "Range Limiter" Selector Switch is located in the "Control" area of the MK 1.
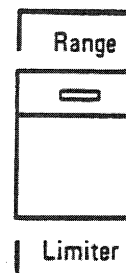
Range

Limiter

MATRIX ROW "G"

Example: for setting Volume-Touch-Limiting:

— Depress any key on the MK 1 keyboard hard enough to obtain the amount of Volume-Touch you desire.

— While holding the key depressed at the de-

sired Touch level depress "Range Limiter" (LED on).

After setting the "Range Limiter" you can now depress the key as hard as desired, but the amount of change will only be to the degree set in the memory of the "Range Limiter". Turn off all LEDs in Row "F".

---

7. Row "G" = Wheels

VCF-Freq.	VCF-Q	VCF-T 1	VCF-T 2	Pitch	Vibrato	Vibrato	Pitch	G
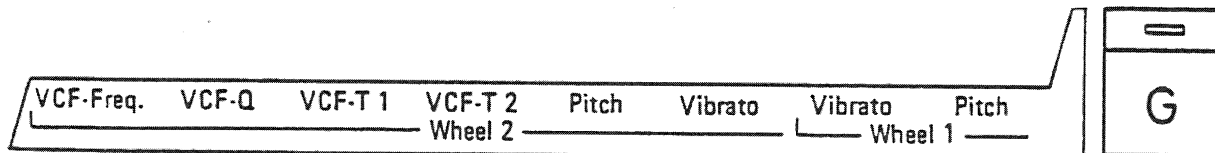
— Wheel 2 — — Wheel 1 —

Wheel 1 and Wheel 2 on the MK 1 are programmable. The Functions for the Wheels are in the third blue field of the Function Control Matrix.

The Wheels are only active on the "Right" Bank (1.-4. Voice), so if the manual is split, the Wheels only control the right side of the split.

The Modulation affects all the voices in the Bank (1.-4. Voice), no matter where the Selector is set:

— Depress Matrix Switch "G" (LED on).

The MK 1 is now in the Wheel-Mode. While in this mode, all the Tone-Modulation functions for the Wheels can be programmed.

WHEEL 1

Vibrato	Pitch
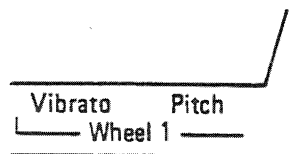
— Wheel 1 —

Wheel 1 can be programmed with Vibrato or Pitch modulation.

a) Vibrato

— Depress Matrix Switch "7" (LED on).

Push Wheel up for frequency vibrato

Wheel Functions

Push Wheel down for amplitude vibrato

b) Pitch

— Depress Matrix Switch "7" (LED off).

— Depress Matrix Switch "8" (LED on).

By operating the Wheel 1 in the Pitch mode, it is possible to modulate the pitch + or – one Octave.

With the "Range Limiter" the amount of vibrato and the amount of Tone Modulation can be programmed with the "Range Limiter" as follows:

Example Pitch:

— Depress and hold a key on the MK 1 manual and Wheel 1 to obtain the desired maximum level of pitch change. Hold Wheel at this point and at the same time depress "Range Limiter" (LED on).

When Wheel 1 is used with the "Range Limiter" the Pitch change will only change to the maximum amount previously set no matter how far the Wheel is moved.

WHEEL 2

VCF-Freq.	VCF-Q	VCF-T 1	VCF-T 2	Pitch	Vibrato
		Wheel 2			

Wheel 2 can affect the Modulation of the VCF as well as the Pitch and Vibrato functions explained on Wheel 1.

— Depress Matrix Selector Switch "1" (LED on).

The VCF-Frequency can be raised up to a maximum of 28 half steps (using the Wheel) achieving the Wah-Wah Effect.

NOTE: Depressing any of the Matrix Selector Switches "1" through "5" a second time after setting the desired effect (LED off) will lock in the last value set on the Wheel.

— Depress Matrix Switch "2" (LED on):

Now the VCF-Quality filter band becomes narrower:

This emphasizes the Wah-Wah-Effect — see figure on page 41.

— Depress Matrix Switch "3" (LED on):

The timing for Phase 1 of the VCF can now be controlled with the Wheel.

— Depress Matrix Switch "4" (LED on):

The timing of Phase 2 of the VCF can now be controlled with the Wheel.

— Depress Matrix Switch "5" (LED on):

The pitch of the MK 1 can now be raised "+" or "–" one octave.

REMEMBER: All switches "1" through "5" can be controlled with Wheel 2 either individually or combined depending whether the LEDs are on or off. In order to retain a certain setting for each function, the Matrix Switch must be turned off after the setting for that particular function has been made. Otherwise it will change along with the Wheel settings for any other Switch function whose LED is switched on.

— Depress Matrix Switch "6" (LED on):

= Frequency vibrato. When Frequency Vibrato is programmed on Wheel 2, then Wheel 1 can also only control Frequency Vibrato. (No Amplitude Vibrato on Wheel 1).

The maximum vibrato degrees are programmed in "Special Controls" found on page 82.

Line "G" is the last line of the PLAY LEVEL.

Line "H" starts the first section of the Sub-Level "MODE-CONTROL".

MATRIX SWITCH "H" Mode Control

C. MODE-CONTROL LEVEL

				Sublevels					
Lowpass	4-pol.	Retrigger	Tracking		T 1	T 1 > T 2	T1 rel.	T2	Rotor
	VCF-Mode						VCF-Envelope		

H
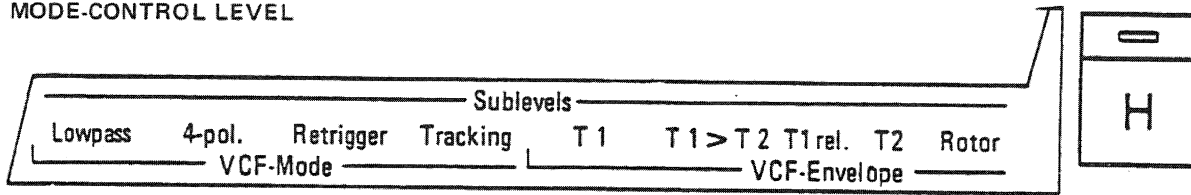
·The sub-level functions are accessed through the use of Matrix Selector Switches "E" through "H". Then individual function lines (now there are 4) are accessed through selector switches "A" through "D". Individual modes within those lines are then activated with Matrix Switches "1" through "8".

— Place the Matrix Mask over the Matrix Function field. (The mask will stay in place on the Matrix Field even while playing because the bottom overlay is a magnetic card.) Open the Mask to the "MODE-CONTROL" overlay.

The vertical solid box printed on the "MODE-CONTROL" Matrix Switch is there to indicate the activation of Switch "H" in order to access "MODE-CONTROL" level.

— Depress Matrix Switch "H" (LED on).

When "H" is activated row "A" is automatically selected also. Row "A" and Switches "1" through "8" allow access to the first set of functions under "MODE-CONTROL".

FUNCTION CONTROL MATRIX

	1	2	3	4	5	6	7	8	
	VCF-Mode				VCF-Envelope				
A	Lowpass/ Bandpass	4-Pol.	Retrigger	Tracking	T 1	T 1→T 2	T 1 Release T 2	Rotor	E
	VCF - T 1		VCF - T 2						
B	Freq. 1	Freq. 2 Equal	Freq. 3	Freq. 4	<<	<	>	>>	F
	Footswitch Left		Left & Right		Footswitch Right				
C	WV	Piano Pedal	Hawaii	Transposer	Preset	WV	Piano Pedal	Hawaii	G
	Dynamic								
D	Medium	Strong	Medium	Strong	Low Sel.	High Sel.	Solo Delay	Voice Overlap	H
	Key		Voice						
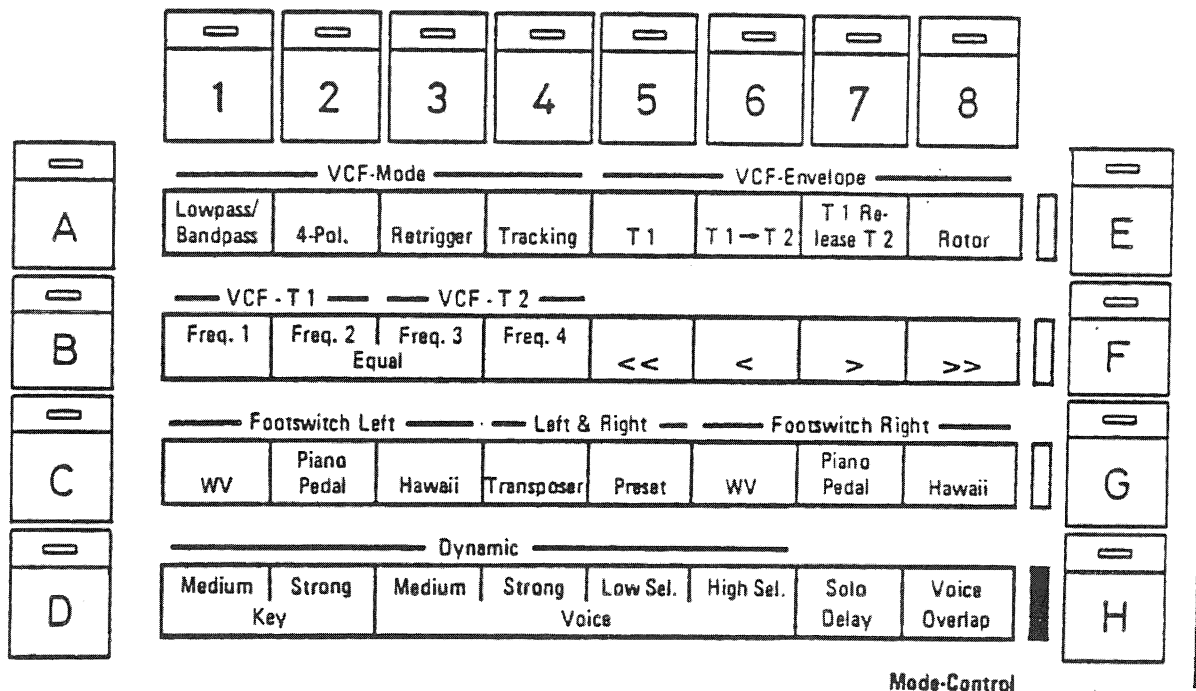
Mode-Control

"H", "A" – VCF Mode

1. "A" VCF-Mode

──────── VCF-Mode ────────				──────── VCF-Envelope ────────				
Lowpass/ Bandpass	4-Pol.	Retrigger	Tracking	T 1	T 1 → T 2	T 1 Re- lease T 2	Rotor	

VCF = Voltage Controlled Filter.

> **Lowpass/ Bandpass**

Filters change signals by singling out certain frequencies and either emphasizing or de-emphasizing those frequencies.

The Bandpass Filter supresses high and low frequencies and permits only a narrow frequency area between the high end and the low end to pass through.

Bandpass filter:
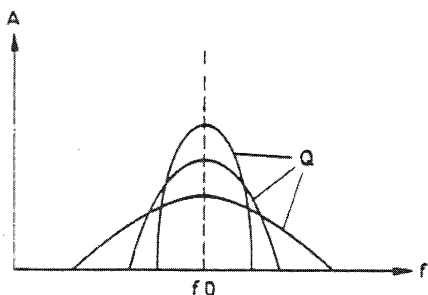
"Q" = Quality (VCF filter quality)
"A" = Amplitude
"F" = Frequency

The "Lowpass" Filter supresses high frequencies and allows only low-end frequencies to pass.

Lowpass filter
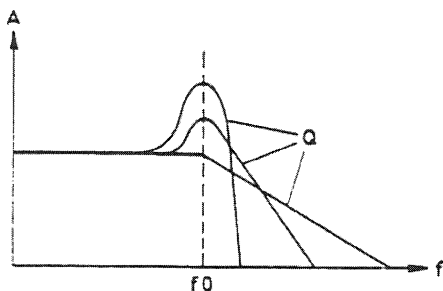
On the Bandpass filter the frequency area strongly emphasized around "f 0" is the middle frequency area, while on the Lowpass filter the frequency area strongly emphasized at "f 0" is the low-end frequencies.

The Quality (or width) or frequency band affected is controlled by Wheel 2.

Example: "Trumpet"

— Load "Trumpet onto "Right".

— Open the Matrix overlay to the "PLAY LEVEL" for "Routing".

— Depress Matrix Switch "H" (LED off): You are now in "Play Level" mode.

— Depress Matrix Switch "B" (LED on): The "Routing" mode is now activated.

As you can see, the "Trumpet" uses the VCF Mode (Switch "4" – LED on); we can now select the VCF-Mode as follows:

— Depress Matrix Function Switch "H" for Sublevel "MODE-CONTROL" LED on):

At the same time the LEDs in Switches "A", "1" and "6" come on:

For "Trumpet" the VCF Lowpass filter is selected (Switch "1" – LED on).

— While continually pressing and releasing any key on the MK 1 manual turn Matrix Switch "1" on and then off. Listen to the difference the Bandpass and Lowpass filters have on the "Trumpet" voice.

4-Pol.

When "4-Pol." is activated (Switch "2" – LED on), the VCF function is now under the influence of a "4-Pol." filter. The VCF frequency band is narrowed (Quality) and the VCF function intensified in a narrower spectrum. With the Matrix Switch "2" off (LED off) the VCF is now controlled by a "2-Pol." filter.

Retrigger

"Retrigger" is activated by Switch "3" (LED on).

The VCF function will now be triggered when keys are depressed, but it will now start over at the beginning of its function every time a new key is depressed. Therefore, if you are holding notes on the keyboard and a new note is added, the VCF will be retriggered.

With the "Retrigger" off (Switch "3" – LED off):

Now, in order to retrigger the VCF, all notes on the keyboard have to be released and a new note or notes restruck.

(to trigger = to start)

Tracking

Tracking is activated with Matrix Switch "4" (LED on).

The offset on VCF-Frequency (the filter Frequency is raised):

On VCF Frequency = 220 Hz, the frequency is raised a third above the note being played.

Briefly, the VCF has a center frequency (they are of preferred harmonics) that can be shifted over a wide spectrum. Its resonance (the degree of preference for certain frequencies can be varied from "shallow" to "sharp". The center frequency can be shifted back and forth over an adjustable range (amplitude) at an adjustable speed.

Normally, the center frequency of the VCF is determined by the setting of the control "Frequency". In the "VCF Tracking" mode, this center frequency is pulled towards the highest key being played.

VCF ENVELOPE

The VCF-Frequency is controlled by an envelope that is a frequency curve (the Lowpass emphasizes the Low end frequencies, and the Bandpass emphasizes the Mid-Range frequencies. The VCF is divided into two phases. The starting and ending frequencies can be programmed, as well as the time span in which each of these phases take place. (See PLAY-LEVEL-Wheel 2, Page 37.)
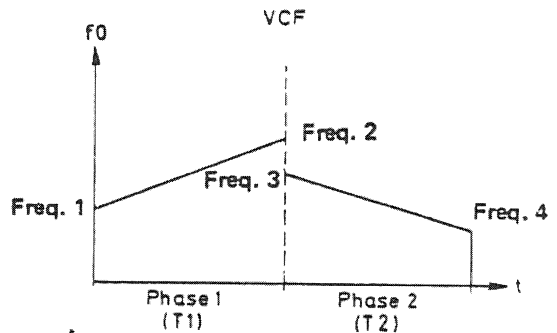
On the 1st line of MODE-CONTROL you'll find the controls for the VCF timing sequence. (Envelope) (See above figure)

T 1	("5" – LED on) only Phase 1 will be activated.
T 1 → T 2	("6" – LED on) Phase 2 will follow Phase 1.
T 1 Release T 2	("7" – LED on) Depress key for Phase 1 release for Ph. 2.
Rotor	("8" – LED on) Phase 1 followed by Phase 2, then Phase 1, Phase 2 etc.

"H", "B" – VCF Frequency

Switches "5" through "8" (LEDs off): fixed VCF frequency, no sequence (T 1 or T 2). The VCF frequency will be the same start frequency as T 1.

Try these effects using VCF Mode using "Synbrass" and "Trumpet".

---

2. "B" VCF-Frequency

── VCF - T 1 ──	── VCF - T 2 ──					
Freq. 1	Freq. 2 ┊ Freq. 3	Freq. 4	<<	<	>	>>
	Equal					
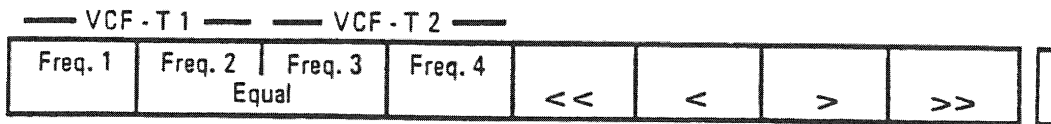
In the second line of "MODE-CONTROL" you can program the Starting and Ending frequencies for both Phases of VCF-Sequence – T 1 and T 2.

– Depress Matrix Switch "H" and "B" (LEDs on).

You can select the Start and End frequencies for T 1 and T 2 using the following switches:

VCF T 1

Freq. 1	=

Starting Freq. for T 1   Switch "1" LED on

Freq. 2	=

Ending Freq. for T 1   Switch "2" LED on

VCF T 2

Freq. 3	=

Starting Freq. for T 2   Switch "3" LED on

Freq. 4	=

Ending Freq. for T 2   Switch "4" LED on

The Display will show the "Function" currently selected. With the Switches "5" and "6" this VCF frequency can be lowered to a maximum of 220 Hz

"5"	"6"
<<	<
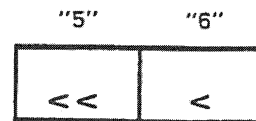
and with Switches "7" and "8" the frequency can be raised to a maximum of 9000 Hz.

"7"	"8"
>	>>
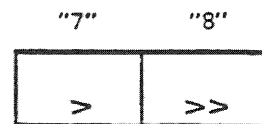
To set Frequency 2 = to Frequency 3 (end Freq. of T 1 = to the start Freq. of T 2):

– Depress Switches "2" and "3" (LEDs on).

When the highest VCF-Frequency spectrum is exceeded (9000 Hz on the high end) the VCF will "jump" to the lowest frequency (220 Hz) then continue upward to the highest setting (9000 Hz) and if exceeded will again "jump" back to the low frequency.

You can hear this very clearly; in the Display "Function" will read – SWAP.

Try this VCF-Sequence using "Synbrass" and "Trumpet"!

You can program all of the above VCF-Sequences in memory, in the Computer Voices or the Presets, for each voice individually.

"H", "C" – Footswitch

3. "C" Footswitch Left/Right

——— Footswitch Left ———			— Left & Right —		——— Footswitch Right ———			
WV	Piano Pedal	Hawaii	Transposer	Preset	WV	Piano Pedal	Hawaii	

The third line of MODE-CONTROL controls the Programming possibilities for the two footswitches, located on the left and right-hand sides of the MK 1 swell pedal. These functions can be assigned to either footswitch or divided between the two:

```
WV
```

— Switch "1" (LED on) for Left Footswitch

— Switch "6" (LED on) for Right Footswitch

This Footswitch function switches Wersivoice – Rotor from Fast to Slow each time the switch is activated.

(In order for this function to operate, "Wersivoice" has to be programmed in "Routing"!).

```
Piano
Pedal
```

— Switch "2" (LED on) for Left Footswitch

— Switch "7" for Right Footswitch

This function adds "Piano" sustain to percussive voices, and sustains standard instrument voices (such as "Brass") to sustain as long as the footswitch is held. (Releasing the footswitch will end the sustain mode).

```
Hawaii
```

— Switch "3" (LED on) for Left Footswitch

— Switch "8" (LED on) for Right Footswitch

With the "Hawaii" function, when the footswitch is pressed the sound of the key or keys being played is lowered one half tone, and then automatically "glides" back to normal pitch of the key being held.
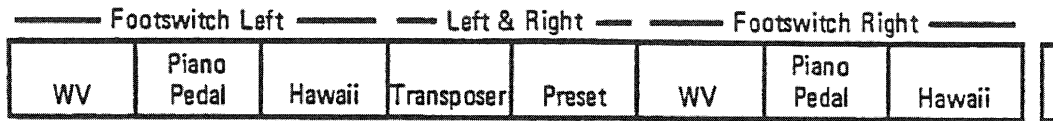
Experiment with "Guitar 1 and 2"!

```
Transposer
```

— Switch "4" (LED on) for Footswitch Left and Right!

In this mode, the pitch of the MK 1 can be raised and lowered in half tones. Each time the left switch is pressed, the pitch will be lowered one half step. Each time the right switch is pressed, the pitch will be raised one half step (also see: PLAY LEVEL-Tuning).

```
Preset
```

— Switch "5" (LED on) for Left and Right Footswitch!

Each time the footswitch is pressed in this function, the MK 1 will change to either the next higher Preset (right footswitch) or the next lower Preset (left footswitch). In order for this function to operate on all Presets, it will have to be programmed into each Preset (1 through 8). Otherwise the function will cease to operate when you depress either footswitch one time!

"H", "D" – Dynamic

4. "D" Dynamic

Medium	Strong	Medium	Strong	Low Sel.	High Sel.	Solo	Voice
Key		Voice				Delay	Overlap

Dynamic

The fourth line of the "MODE-CONTROL" permits choice of the Dynamic effects for the MK 1.

In order to set Dynamics, you must understand the difference between "Key-Dynamic" and "Voice-Dynamic". "Key-Dynamic" sets the Dynamic for the entire MK 1. "Voice-Dynamic" sets the Dynamic for individual voices of the MK 1.

In order to use "Key-Dynamic", the volume dynamic setting must be turned on in Level "F".

a) Key-Dynamic

The "Key-Dynamic" Switch permit-setting dynamics for the entire instrument as follows:

Medium	Strong
Key	

Medium (Switch "1" – LED on) : 30 dB

Strong (Switch "2" – LED on) : 40 dB

Medium and Strong (Switches 1 & 2 LED on) : 50 dB

Both off (LEDs off) : 20 dB

The "Key-Dynamic" cannot be memorized in the CVs or the Presets. The last selected Key Dynamic will remain in memory even if the MK 1 is turned off and then later turned back on.

Test these settings with "Piano".

— Load "Piano" onto "Right".

Select Loudness on the PLAY LEVEL and activate Volume-Dynamic: (Matrix Switch "H" must be off – so if LED is on, depress again to turn LED off).

— Depress Switch "C", and "5" (LEDs on).

— "C", "1" also needs to be on.

In MODE-CONTROL-LEVEL Dynamic:

— Depress Matrix Switches "H" and "D" (LEDs on).

Switches "1" and "2" LEDs off = 20 dB.

— Hit any key repeatedly from hard to easy touch while at the same time select "Medium" ("1"), then "Strong" ("2"), then "Medium" & "Strong" ("1" & "2") together: the result is that the higher the Key-Dynamic, the more quietly you can play the keyboard!

b) Voice-Dynamic

Medium	Strong	Low Sel.	High Sel.
Voice			

In the Loudness section of this PLAY LEVEL it is possible by the use of Switch "5" to set the Volume-Dynamic for the entire keyboard.

In the fourth line of the MODE-CONTROL-LEVEL we will look at the possibilities of assigning and controlling the dynamic for each individual voice.

Medium & Strong (Switches "3" & "4" – LED on)	: Full Dynamic
Strong (Switch "4" – LED on)	: Voice initially loud
Medium (Switch "3" – LED on)	: Voice instantly loud

Both off (Switches "3" & "4" — LEDs off)	:	Voice full volume, no dynamic
Low Select (Switch "5" — LED on)	:	Voice audible only on low dynamic setting
High Select (Switch "6" — LED on)	:	Voice audible only high dynamic setting
Both off	:	No dynamics — "Medium" & "Strong" will now only control relative volume

Medium   — 50%
Strong   — 25%
Medium & Strong — 12.5%

Experiment with these effects on the following examples:

1. Trumpet

 — Load "Trumpet" on "Right" (1-component voice).

 In the PLAY LEVEL "Volume-Dynamic":

 — Depress Matrix Switches "C", "1" and "5" (LEDs on).

 If the LED for Switch "H" is on, depress "H" a second time. The LED for "H" must be OFF!

 In the MODE-CONTROL-LEVEL Dynamic:

 — Depress Switches "H" and "D" (LEDs on)

 In the "Voice-Dynamic" section Switches "3" through "6" are inactive (LEDs off) because the "Trumpet" is internally programmed without dynamics. We can now change this:

 Note: Later software changes in the MK 1 may cause changes in the way the "Trumpet" is programmed regarding dynamics.

 — Activate Medium ("3") and Strong ("4"), Low Sel. ("5") and High Sel. ("6").

 — Hit any key repeatedly from light to hard touch. The "Trumpet" is now playable with full Dynamic!

 — Turn off High Sel. ("6" — LED off):

You are now able to hear the "Trumpet" only when playing softly (= Low Sel.).

 — Depress Switch "6" (High Sel. — LED on) and Switch "5" (Low Sel. — LED off):

The "Trumpet" is now audible only when the keys are depressed hard.

2. "Piano"

 — Load "Piano" on "Right" (3-component sound).

 Voice 1. ("Right") is programmed with Medium-Dynamic, Low-Select and High-Select (Switches "3", "5", "6" LEDs on).

 — Select Voice 2. in the "Voice Select" area (LED on).

 Voice 2. on "Piano" is programmed with Strong-Dynamic, Low Select and High Select (Switches "4", "5", "6" — LEDs on).

 — Select Voice 3. in the "Voice Select" area (LED on):

 Voice 3. is programmed with full Dynamic Low and High Select (Switches "3", "4", "5", "6" — LEDs on).

 Looking at voice usage in the Display to see how many voices are completely necessary for a particular sound, can be an advantage if

when using certain sound combinations on the MK 1 you are using many voices on each note. Seeing how the components are used allows you to eliminate any component that would not greatly alter the sound, in order to free up those voices to give you more to work with for adding for instance another multiple voice instrument.

— Depending how many voices are available in your MK 1 (up to 20 notes polyphonic) play a multiple voices chord. First, play the chord with soft touch and then hard touch. Watch the Display in the "FV" (Free Voice) area. You will see that when the chord is played softly 2 voices per chord note are used, and when playing hard 3 voices per chord note are used.

3. Multisound with Low Select, High Select

— Load "Trumpet" on "Right" (1-component sound).

Program Voice Volume Dynamic:

— Depress Matrix Switch "H", "D", (LEDs on): MODE-CONTROL LEVEL-Dynamic

— Activate Switches "Medium" (3), and "Strong" (4) and "High Select" (6) (LEDs on).

— Select "2. Voice" in the "Voice select" area (LED on) and load "Lead" onto "2. Voice" (2-component sound).

The 1st component of "Lead" (1. Voice) has no dynamic, and the second component of "Lead" (2. Voice) has full dynamic." "Lead" is programmed with "Low Select" and "High Select". Make sure that "On" (1) and "Volume" (5) are activated (LEDs on) in the Play Level Loudness Line, and then hit any key repeatedly from light to hard:

— Play with a soft touch and you will hear only "Lead".

— Play with a hard touch and you will hear both "Lead" and "Trumpet".

Now try several combinations with dynamic.

Note: The Voice-Volume-Dynamic can be programmed in the Computer Voices and Presets.

```
Solo
Delay
```

This Function makes possible various Solo-Modes which are activated in the top line of PLAY LEVEL with Switch "6" Solo:

If "Solo-Delay" is programmed, the lower notes of the chord will sound at the time the chord is depressed, but will then decrease in volume after a slight delay, to the volume level which is programmed using the "Balance/Solo/AOC" slide control.

Example:

— Load "Lead" onto "Right".

In the "Solo" PLAY LEVEL activate slider Switches "A", "6" (LEDs on).

— Play a chord and with the volume slider "Balance/Solo/AOC" set the desired level for the lower notes of the chord.

In MODE-CONTROL-LEVEL activate the "Solo Delay" function as follows:

— Depress Matrix Switches "H", "D", "7" (LEDs on).

Now when a chord is played, all notes except the top note of the chord will fade to a lower volume level after a short delay. The notes will fade to the volume which was preset with the "Balance/Solo/AOC" control.

This function can be programmed into the presets.

CARTRIDGE

```
┌──────────┐
│  Voice   │
│ Overlap  │
└──────────┘
```

Voice Overlap not activated ("8" – LED off)

If you play a new tone of the same pitch before the previous one has completely died away, the older tone will immediately be terminated.

Voice Overlap activated ("8" – LED on)

Now a new tone can be started while the older tone of the same pitch is still sounding.

Example:

– Load "String 1" onto "Right".

– Rapidly hit any note or chord:

In the Display you will see that only two voices per note are ever in use at one time ("Church" is a two-component sound).

Activate "Voice Overlap":

– Depress Switches "H", "D", "8" (LEDs on).

– Again, hit any note or chord in rapid succession:

In the Display you will now see more voices being used, because voices are being used by the tones that are still decaying.

D. CARTRIDGE

For the management and expansion of sound the MK 1 offers WERSI ROM and RAM Cartridges. These cartridges are inserted into the "Cartridge Slot" (which is located to the left of the "Control" section of the MK 1) with the contact strip side of the cartridge being inserted into the slot.

ROM-Cartridge

(ROM: Read Only Memory)
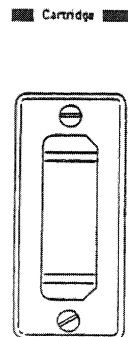
The MK 1 contains 20 DMS Instrument voices in its internal memory.

After inserting the ROM-Cartridge the MK 1 has an additional 20 DMS Instruments available using the same DMS Instrument switches.

Insert cartridge in slot:

– In the "Control" area depress the "Voice Cartridge" switch (LED on).

By using the 20 "DMS-Instruments" switches you can now access the 20 external Cartridge Sounds.

In order to identify the voice positions on the DMS switches, each ROM Cartridge will be supplied with magnetic label strips. These strips can be placed over the original DMS instrument voice labels.

These 20 Cartridge voices can now be used exactly as the original DMS Instruments.

New ROM-Cartridges with new voices will be periodically available for limitless voice possibilities. We will inform all customers as these new products are introduced.

RAM-Cartridge

(RAM: Random Access Memory = Programmable Memory that can be used and re-programmed as often as necessary).

You can create new sounds, CVs, Presets, etc. and load them into the RAM Cartridge, then recall those combinations at any time.

One RAM-Cartridge holds 10 CVs and 8 Presets.

Write Protection

With several RAM-Cartridges you can create your own customized sound library.

Note: With each RAM-Cartridge 4 blank Magnetic Label strips will be supplied, so you can make labels for names of the newly created voices.

Two important characteristics of the RAM Cartridge need to be discussed here:

— Memory Buffer Battery

Each RAM Cartridge has a battery (buffer to protect against memory loss. When a new RAM-Cartridge is used for the first time it should be inserted into the MK 1. The MK 1 should then be turned on, for a period of 24 hours to allow the buffer battery to be fully charged.

When fully charged, this buffer in the RAM-Cartridge will retain the memory for 5 to 6 months without re-charging. If the cartridge is not used for a length of time, it needs to be re-charged every 5 to 6 months to retain the memory. The cartridge should be recharged for the same 24 hour period as was done initially. If the cartridge is used frequently, this charge period can be shortened or, if used frequently enough, eliminated completely.

If a cartridge is inserted into an unpowered MK 1 for any length of time, the "Wr. Prot." (Write Protect) switch should be turned on to prevent the battery in the RAM Cartridge from being drained, an ultimately loss of memory.

WRITE PROTECTION

The "Wr. Prot." switch can be accessed through a small slit in the cartridge housing. In the "Wr. Prot." setting (= write protection, which is printed on the cartridge) the cartridge is protected against inadvertent overwriting and subsequent memory loss.

If you *desire* to overwrite, or change the cartridge, the position of the "Wr. Prot." switch has to be changed.

To load the RAM with new memory, insert a small screwdriver into white notched area of the switch and change the position by sliding to "on" of

"off". In addition, in order to load the RAM, the position of the "Wr. Prot." switch in the read panel of the MK 1 also has to be changed to the opposite position of the way the arrow is pointing. Once the new memory is loaded into the RAM, be sure to change both switches back to their original positions, to be sure that the contents of the RAM are not inadvertently erased. (Once both switches are changed back, the display will show a horizontal line located before MIDI.)

There are two options for data transfer between the internal RAM (CV's and Presets) and the external RAM cartridge:

1. You can copy a CV or Preset onto a specified memory space on either the internal or external RAM with the "Set CV/Pres." command,

   (This allows changing the composition of the sounds in your internal or external memory RAM.) — OR —

2. You can copy up to a total of 10 CVs and 8 Presets into the RAM-Cartridge from the internal RAM with the switch "Down Load/Up Load" in the copy level, or copy the reverse direction (Cartridge to internal RAM).

At this time you now have instant access to a totally new set of 10 CVs and 8 new Presets.

The functions "Down Load/Up Load" will be described in the section COPY LEVEL under the heading "Copy Cartridge".

Example 1:

To copy any selected preset from the internal RAM onto any desired memory space of the cartridge.

— Insert RAM Cartridge into slot (be sure not to chip/or to insert sideways!)

— Select Preset to be copied (LED on).

— Depress Matrix Switches "A", "7"–"Set/CV Pres." (LEDs on).

— Depress Selector Switches "Preset Cartridge" in the Control section (LED on).

— Depress the desired memory space on Presets 1 to 8 (LED on).

The selected preset is now memorized in the selected memory space on the Cartridge (Preset 1 to 8).

Example 2:

Copying any selected preset from the cartridge onto any selected internal RAM memory space.

— Insert RAM Cartridge into Cartridge Slot — Be sure to insert straight, not sideways or on an angle to prevent chipping.

— Depress "Right" in the Voice select section — for first voice (LED on).

— Depress "Preset Cartridge" (LED on). The Preset selector switches 1 through 8 are now switched over to cartridge selector switches.

— Select desired Preset on switches 1 through 8.

— Depress "Set CV/Pres." Matrix Switches "A", "7" (LEDs on).

— Depress "Preset Cartridge" (LED off). The Preset selector switches are now switched back to the internal Preset selector switches.

— Depress any Preset Switch (1 through 8) you would like to use. (If Preset bank is activated, Presets 9 through 16 can be selected.)

The cartridge preset selected is now copied onto the internal preset memory space.

Example 3:

Copying CV from internal memory to any desired CV memory on cartridge.

— Insert RAM cartridge into cartridge slot — be sure to insert carefully to prevent damage.

— Depress "Right" in the "Voice Select" section for Voice 1. ("Right" LED on).

— Select desired CV with Switches 1 through 10, or with "Bank" activated (LED on) CVs 11 through 20.

— Depress Matrix Switches "A", "7" — "Set CV/Pres." (LEDs on).

— Depress "Voice Cartridge" switch (LED on) — the CV selectors are now switched to Cartridge CV voice selectors.

— Select Cartridge memory space by using CV selectors 1 through 10.

— The selected CV instrument from internal memory is now copied onto the selected Cartridge memory space.

Example 4:

Copying a selected CV cartridge memory space (CV switches 1 through 10) to the selected internal RAM memory space.

— Insert RAM cartridge into the Cartridge slot — Insert the cartridge carefully to prevent damage.

— Depress "Right" (LED on) in the "Voice Select" for Voice 1.

— Depress "Voice Cartridge" (LED on) — CV selector switches 1 through 10 are now Cartridge CV selector switches.

— Select desired CV on the Cartridge CV selector switches (LED on).

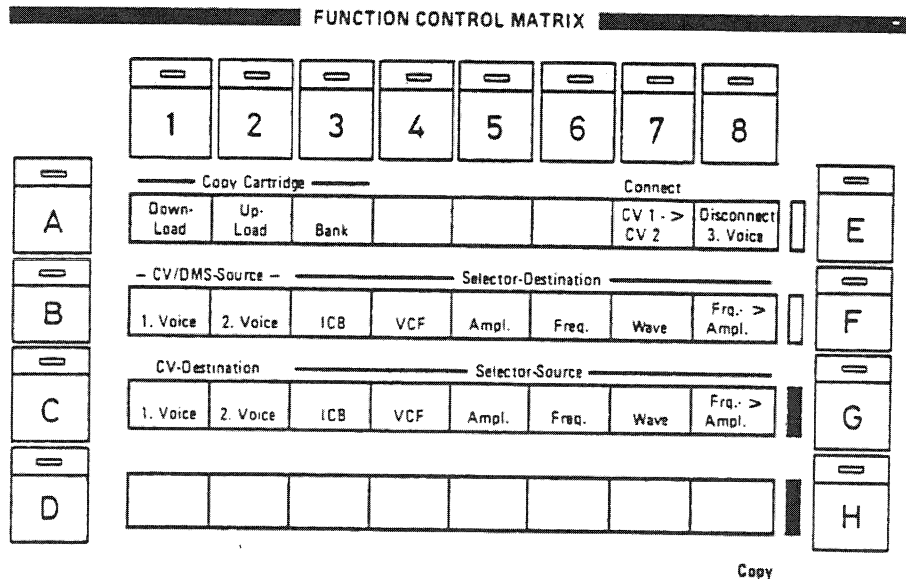— Depress Matrix switches "A", "7" ("Set CV/Pres.") (LEDs ON).

— Depress "Voice Cartridge" switch (LED off) — CV selector switches are now internal CV memory switches.

— Depress desired CV selector switch 1 through 10 (if "Bank" activated then 11 through 20 are activated).

The selected CV cartridge voice is now copied onto the internal CV memory space.

COPY LEVEL "H","G","A" – Global Copy

E. COPY LEVEL

```
████████████████████  FUNCTION CONTROL MATRIX  ████████████████████
```

	1	2	3	4	5	6	7	8	
A	Copy Cartridge						Connect		**E**
	Down-Load	Up-Load	Bank				CV 1 -> CV 2	Disconnect 3. Voice	
B	– CV/DMS-Source –			Selector-Destination					**F**
	1. Voice	2. Voice	ICB	VCF	Ampl.	Freq.	Wave	Frq.-> Ampl.	
C	CV-Destination			Selector-Source					**G**
	1. Voice	2. Voice	ICB	VCF	Ampl.	Freq.	Wave	Frq.-> Ampl.	
D									**H**

Copy

Open the Matrix Overlay to the copy level; to select the Copy Level activate Matrix Switches "H" and "G".

The Copy Level provides the following functions:

enables copying 8 Presets and 10 CVs from the internal RAM onto the RAM Cartridge (and vice versa) with one command.

permits combining 2 CVs so that they can both be activated with one switch as a four component sound.

allows specific sound changes of CVs or DMS instruments by copying individual parameters such as VCF or amplitude envelopes from another CV or DMS instrument.

When the Copy Level is activated, line A is automatically selected, just as on other Matrix levels.

---

1. Global Copy

	Copy Cartridge						Connect		
A	Down-Load	Up-Load	Bank				CV 1 -> CV 2	Disconnect 3. Voice	
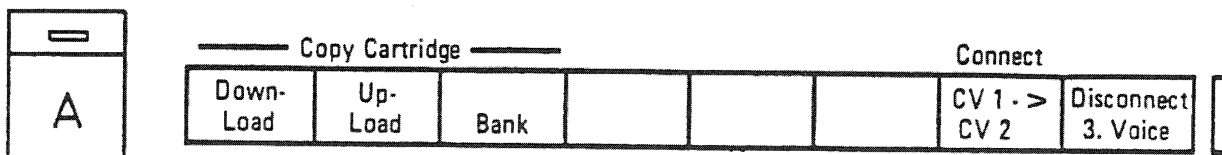
On selector line "A" you will find the commands for copying the cartridge and for chaining two CVs together.

a) Copy Cartridge

Use of the "Down-Load" function permits copying of the complete contents (memory) of a RAM cartridge (10 CVs and 8 Presets) to the internal RAM memory spaces CV 1 through 10 and Presets 1 through 8.

By activating the "Bank" switch, (Matrix Switch "3", LED on) the contents of the cartridge can now be copied onto the internal memory spaces CV 11 through 20 and Presets 9 through 16.

49

When the "UP-Load" function is activated (Matrix Switch "2" LED on) the contents of the RAM memory spaces CV 1 through 10 and Presets 1 through 8 can be copied onto the cartridge.

With the "Bank" switch also activated (Matrix switch "3" LED on) the contents of the internal RAM memory spaces CV 11 through 20 and Presets 9 through 16 are copied onto the cartridge.

Down-Load

- Insert Cartridge into Cartridge slot (insert carefully to avoid damage).

- Select Copy Level by depressing Matrix Switches "H" and "G" (LEDs on) — line A is automatically selected.

- Select "Bank" if desired by depressing Matrix Switch "3" (LED on).

- Depress Matrix Switch "1" to activate "Down-Load" (LED will stay on until the copy process is complete — approx. one second).

The 10 CVs and 8 Presets of the cartridge RAM are now copied onto the internal RAM (or Bank RAM).

NOTE: Please be sure to check the "Overwrite Protection" switches on both the RAM Cartridge and the rear panel of the MK 1. Overwrite Protection switches are described in detail in the Write Protection Chapter on page 47.

Up-Load

- Insert Cartridge into Cartridge slot (insert carefully to avoid damage).

- Select Copy Level by depressing Matrix Switches "H" and "G" (LEDs on) — line A is automatically selected.

- Select "Bank" if desired by depressing Matrix Switch "3" (LED on).

- Depress Matrix Switch "2" to activate "UP-Load" (LED will stay on until the copy process is complete — approx. one second).

The 10 CVs and 8 Presets of the internal RAM (or Bank-RAM) are now copied onto the cartridge.

NOTE: Please be sure to check the "Overwrite Protection" switches on both the RAM cartridge and the rear panel of the MK 1. Overwrite Protection switches are described in detail in the RAM Cartridge Chapter on page 47.

If you mistakenly insert a ROM cartridge (instead of RAM) in the Cartridge Slot, the MK 1 will show an "Error" message. The LED on Matrix Switch "A" will blink. In order to leave this mode, depress the Matrix Switch "A" again (LED off).

b) Connect

This function allow connecting and recalling any two CV instrument selectors by depressing only one selector switch.

.Connecting two CVs make possible storing and recalling four component sounds in the CV section as well as in the DMS instrument section. This programming will remain in the memory of the MK 1 even when the power is turned off, and can also be memorized in the Presets.

Connect

CV 1 . >
CV 2

When this function is activated, two CV switches must be selected. The voices in the first CV are then connected to the voices in the second CV.

Note: If a DMS instrument is inadvertently selected instead of a CV or the same CV is

selected twice, the MK 1 will give an error message — LED on switch "A", "1" will blink.

To exit this mode, depress selector switch "A", "1" a second time (LED off).

Example:

— Copy DMS instrument "Lead" onto CV 5.

— Copy DMS instrument "Bells" onto CV 6.

— Depress Matrix Switches "H" and "G" (LEDs on) for Copy Level, line "A" is automatically selected.

— Depress Matrix Switch "7" (LED on) to activate "Connect CV 1 and CV 2".

— Select the CV Switches you want to connect — Depress CV 5 (LED off) then CV 6 (LED on CV 5 on, LED in switch "7" goes off).

— Since we started the program sequence with the LED in CV 5 off, the second CV selected, in this case CV 6, will be attached to CV 5 and come on when CV 5 is selected. If we were to start the pro-

gramming sequence with CV 6, then CV 5 would be attached to CV 6 and come on automatically when CV 6 was activated.

A four component sound ("Lead" and "Bells") is now selected whenever CV 5 is activated (see display).

```
Disconnect
3. Voice
```

The function switch "Disconnect 3. Voice" erases the connection between the two CVs.

When "Disconnect 3. Voice" is activated select the CV voice that is to be disconnected and the CVs are once again separated.

Example:

— Program CV 5 and CV 6 as described above.

— Activate "Disconnect 3. Voice" — (LED on) then depress "CV 5" (LED in switch "8" goes off).

You now have the original two component sound of "Lead" on CV 5 and the DMS instrument "Bells" remains on CV 1.

2. Copy DMS/CV To Selector
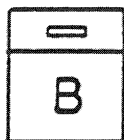
B	— CV/DMS-Source —				Selector-Destination			
	1. Voice	2. Voice	ICB	VCF	Ampl.	Freq.	.Wave	Frq. > Ampl.

— Copying individual sound parameter such as VCF or amplitude curves/envelopes from the 1st or 2nd voice of a DMS or CV instrument onto the selected 1st or 2nd voice of a DMS/CV instrument loaded onto "Bank", "Right".

The MK 1 computer is capable of copying instrumental characteristics from any DMS/CV instrument to another DMS/CV instrument.

By using the copy commands located on the Ma-

trix lines B and C, you can quickly and precisely create entirely new sounds.

FROM THEORY TO PRACTICE

As you can hear, every instrument on the MK 1 is assembled from a complex sound structure.

A variety of sound parameters assure that the "Trumpet" (DMS voice) sounds like a trumpet, and that the same note (for example A = 440 Hz)

of a violin and a clarinet sound differently from each other retaining the characteristics of their respective instruments.

To achieve this voicing, each instrument was analyzed and transcribed into a "recipe of digitalization".

The MK 1 stores these digital recipes and recalls them precisely. New "dishes" can be made by using the individual recipe components as you select them. The Copy Level will give you the information necessary to accomplish this (concoct your own recipes/dishes).

In order to understand the copy commands of lines B and C more clearly, we will now explore and break down the various components of a sound.

Wave

The typical sound "picture" is set by the basic vibrations/oscillations and overtones unique to the instrument being duplicated — see also Synthesis, page 75. Both are dependent on the type of tone source being used to produce the particular instrumental sound (String, lips, reed, tongue, metal plate, etc.), the shape of the instrument (formants, resonance boards, etc.), the basic vibration plus the overtones/notes. These items make up the characteristic basic sound color = Wave.

Ampl.

A note, of course, is not immediately just "there". Some notes will start quietly and then "build up" (contraction), while others start immediately at full volume and then taper off (percussion). The volume changes from the beginning of the note to the end of the note is called "amplitude envelope".

Freq.

The "Frequency envelope" controls the progression of pitch of an instrument sound from the beginning of the note to the end of the note. A note of a trumpet or saxaphone will hover around the desired pitch at the moment when the note is first blown on the instrument. However, that pitch will change slightly during the duration of the note. It is therefore not a "clean" note. This same variance in pitch is desirable in the reproduction for the accurate duplication of the instrument.

Periodic frequency swings around the middle value are called frequency vibrato (as on the mandolin). (Another example should be used here, maybe violin or cello.)

VCF

Additional sound changes can be made (on electronic instruments) through an electronic/ voltage controlled filter VCF.

The chapter "Wheel 2," page 37, VCF mode, page 39 and VCF frequency, page 41 will explain the VCF programming progressions for each DMS/CV instrument in more detail.

The four sound parameters named in the above paragraph can be copied from one DMS/CV instrument to another DMS/CV instrument which has been loaded onto "Bank" "Right".

In addition to the standard copy commands, there are two additional commands for these four sound parameters:

ICB = Instrument Control Block.

The ICB stores the logic numbers of the frequency and amplitude envelopes as well as the wave and VCF:

When using "ICB" all parameters of a DMS/CV voice are copied onto a selected voice — therefore the name of the copied voice appears in the display!

```
┌─────────┐
│ Frq.- > │
│ Ampl.   │
└─────────┘
```

This copy command allows copying the frequency envelope from the DMS/CV voice into the amplitude envelope of the selected voice.

NOTE: Filters will change the sound color of a sound signal by emphasizing certain frequency areas and suppresssing others.

PROGRAMMING SEQUENCE FOR COPYING DMS/CV-TO-SELECTOR

The copy process uses the following format:

1. Destination instrument (Target instrument) is loaded into the "Bank Right", and the Voice onto which we are going to copy is selected (1. Voice, 2. Voice).

   Destination instrument is the CV or DMS instrument onto which the parameter is to be copied!

2. Determine Selector destination (Destination = Target)

Selector-Destination					
ICB	VCF	Ampl.	Freq.	Wave	Frq.- > Ampl.

Through the use of Matrix Switches "3" through "8", the parmater, which is to be copied onto the selected voice can be chosen. The LED of the selected parameter will light.

3. Select CV/DMS Source

— CV/DMS-Source —	
1. Voice	2. Voice

By using Matrix Selector Switch "B", "1" (or "2") you select whether the desired parameter of the first or the second voice of a CV/DMS instrument is to be copied:

If from the first voice depress Matrix Switch "1" (LED on).

If from the second voice depress Matrix Switch "2" (LED on).

4. Select Source Instrument

   Source instrument is the CV/DMS instrument *from* which the desired parameter is to be copied.

After this last program step, the copying process is finished, and the selected parameter is now copied on the selected voice of the Target/Destination instrument.

The following detailed example will take you through the copy process step by step.

— **Depress Matrix Switches "H", "G" and "B".**

Example:

The amplitude envelope of the "Vibes" and the frequency envelope of the "Trumpet" is to be copied (both components each) onto the DMS instrument "String 1".

1. Copying Amplitude Envelope

— Load "String 1" onto "Right" (2-component sound).

   In the Voice Select section depress "String 1" and "Right" (1st Voice) (LEDs on) — "String 1" will appear in the display.

— Depress Matrix Switches "1. Voice", (1), "Ampl." (5), (DMS-Instr.) "Vibes".

   In Voice Select section depress "2. Voice" (2. Voice LED on) and "MIDI" will appear in the Display.

— Depress Matrix Switches "2. Voice", (2), "Ampl." (5), "Vibes".

2. Copying Frequency Envelope

   In the Voice Select section depress "1. Voice" and make sure "Right" LED is on.

— Depress Matrix Switches "1. Voice" (1), "Freq." (6) and "Trumpet".

— In the Voice Select section depress "2. Voice" and make sure the LED for "2. Voice" is on.

— Depress Matrix Switches "1. Voice" (1), "Freq." (6) and "Trumpet".

You now have a 2-component "String" sound with the Amplitude Envelope from the "Vibes" and the Frequency Envelope of the "Trumpet".

You can now move this newly created sound onto a memory space in the CV Instrument switches:

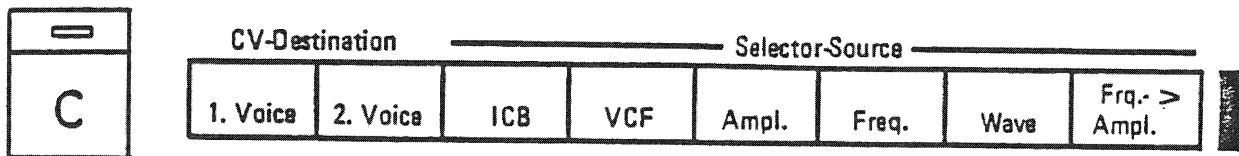— Depress Switches "G"–"H" (LEDs off) to activate PLAY LEVEL

Activate "Set CV".

— Depress "A", "7" (LEDs on).

Select a CV memory space:

— Depress CV Switch "CV 2" for example (LED on, LED in "7" off). The new sound is now stored in CV 2.

---

3. Copy-Selector-To-CV

C	CV-Destination				Selector-Source			
	1. Voice	2. Voice	ICB	VCF	Ampl.	Freq.	Wave	Frq.- > Ampl.

The Copy Function of Line C allows us to copy the already established sound parameters (from line B) (see above) from a CV/DMS instrument in the CV memory space.
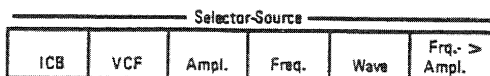
PROGRAMMING SEQUENCE "COPY-SELECTOR-TO-CV"

The Copy Program follows this format:

1. Load the source instrument onto Bank "Right" and select the voice (LED on) from which the parameter is to be copied.
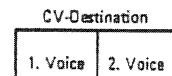
   Source instrument is the CV/DMS instrument *from* which the desired parameter is to be copied.

2. Choose Selector source:

Selector-Source					
ICB	VCF	Ampl.	Freq.	Wave	Frq.- > Ampl.

Using Matrix Selector Switches "3" through "8". Pick sound parameter to be copied from the selected voice (LED of selected parameter will light).

3. Select CV destination:

CV-Destination	
1. Voice	2. Voice

Depressing Matrix Switches "1" or "2" enables copying the desired parameter to the 1st or 2nd voice of a CV instrument.

— Depress "1. Voice" (LED on) parameter copied into 1st voice.

— Depress "2. Voice" (LED on) parameter copied into 2nd voice.

4. Select Destination Instrument

   Destination instrument is the CV instrument (CV memory spaces 1 through 20) into which the selected sound parameter is to be copied.

NOTE: When the "Drawbars" are copied, using the ICB on line "C" ("copy Selector to CV") the position of the individual drawbars is not memorized, so the drawbars remain variable even when copied to the new target switch.

This enables the further influencing/changing of

this CV instrument with the use of the sinus drawbars. It is also now possible to copy the parameters of other CV/DMS instruments onto these variable drawbars (but not other waves).

For example, you can now create a piano sound with variable drawbars.

(If the "Drawbars" are currently memorized onto the CV with the command "Set CV/Pres.", then the current drawbar setting will also be copied. At this point the drawbars will no longer influence the instrument voice when it is recalled.)

Example: Variable "Drawbars" with amplitude and frequency envelope from piano.

1. Copy Instrument-Control-Block (ICB) "Drawbars" onto "CV 6".

   — Depress Matrix Switches "H", "G", "C" (LEDs on) to activate "Copy-Selector-to-CV".

   — Load "Drawbars" into Bank "Right" ("Right" LED on).

   — Depress Matrix Switches "3", "1" (LEDs on to copy the ICB of "1. Voice" (= 1st component of the Drawbars) into "1. Voice" of "CV 6". When "CV 6" is depressed the LED will not go on, but the LEDs in "3" and "1" will go off.

   — Depress "2. Voice" in voice select "Right" (LEDs on) and Matrix Switches "3" and "2" (LEDs on) to copy ICB of "2. Voice" of the Drawbars to "2. Voice" of "CV 6". Depress "CV 6", the LED will not go on, but the LEDs in "3" and "2" will go off.

2. Copying the Amplitude and Frequency of "Piano" onto "CV 6".

   — Load "Piano" onto "Right" (LED on).

   — Depress Matrix Switches "5", "6", "1" (LEDs on) to copy the Amplitude and Frequency envelope from "1. Voice"

"Piano" to the "1. Voice" in "CV 6". Depress "CV 6", LED will not go on, LEDs in "5", "6" and "1" will go off.

   — Depress "2. Voice" in Bank "Right" (LED on) and Matrix Switches "5", "6", "2" (LEDs on) to copy the Amplitude and Frequency envelope from "2. Voice" "Piano" into "2. Voice" of "CV 6". Depress "CV 6", the LED will not go on, but the LEDs in "5", "6" and "2" will go off.

To listen to the resulting sound, load CV 6 onto Bank "Right".

This concludes the Programming Section. On CV 6 you now have variable "Drawbars" with the frequency and amplitude envelopes of the "Piano".

As has been illustrated, there are two possibilities for copying a sound parameter from one instrument onto another:

By using the Copy Function on Line B you can copy any CV/DMS instrument onto Bank "Right"; with the copy function on Line C you can copy from Bank "Right" onto a CV memory space.

In practice, you will probably prefer to work with the copy commands on Line B, because the sound change made by the copied parameters can immediately be heard. It is then possible to continue programming with a specific goal in mind.

We would like to encourage you to make as much use as possible of the copy programming possibilities, and make up your own "sound recipes". You'll be surprised at how simple it is to create impressive new sounds by change in only single parameters.

Through the use of the Copy Function you will quickly learn the importance and the combinations of the individual parameters and discover how sounds are assembled.

MIDI LEVEL

F. MIDI LEVEL

The MK 1 can communicate with a chain of other digital keyboards or instruments.

The rear side of the MK 1 has the following MIDI Ports:

MIDI IN — allows the instrument to receive MIDI data.

MIDI OUT — allows the instrument to send MIDI data.

MIDI THRU — immediately processes received data onward to other MIDI equipped peripherals.

1. Introduction to MK 1 and MIDI

MIDI stands for Musical Instrument Digital Interface.

MIDI was especially developed by the music industry and allows MIDI equipped instruments to communicate with each other; regardless of make or brand.

MIDI is a standard norm-interface, which sends/receives defined information to other instruments, computers or peripherals.

The information sent or received is strictly "DATA" (not audio sound) based on binary codes. The binary code "message" received from a sending instrument or peripheral is read and directly transferred to the electronics of the re-ceiving instrument in order to fulfill the assigned function; i.e.: activate a specific sound, voice or effect.

To say it in simple words, you can play a note on your keyboard, MIDI will transfer the informa-tion to other instruments and play the same note from its electronics:

You play on one keyboard and all connected additional instruments will be activated to do the same.

2. Basic MIDI Uses

If you are the owner of a MIDI equipped instru-ment (organ, synthesizer, electronic piano, etc.) you are able to play, through the use of MIDI, the MK 1 from your instrument keyboard. You are also able to play you MIDI equipped instru-ment from the MK 1.

If you own a MIDI equipped organ, different sounds are assignable from the MK 1 to each key-board and the pedals of your instrument. While you are using the MK 1 from your organ console, it is possible for someone else to play the MK 1 keyboard using entirely different sounds. You will find an example of this on the last two pages of the MIDI section of this manual.

Another use for MIDI, is the ability to use MIDI "internally" to allow voice utilization of up to 8 components. This is a powerful tool when creating multi-voice sounds. (In normal opera-tion of the MK 1 only a four component voice is possible.)

Example: By loading a second voice in the "Double Right" channel, we are able to make a 6 component voice.

— PLAY LEVEL "A"	Set Key Split "A-4 (8)"
— LOAD "RIGHT"	"STRING 1" + "Voice 3" Load Bells
— MIDI LEVEL "D"	Depress "H" "F" "D"
— "SELECT/INST"	Depress "D-2" (LED ON)
— LOAD "LEFT"	"HORN"
— COUPLE MANUAL RIGHT with DOUBLE RIGHT-3	Depress "D-4" (LED flashes instantaneously)

The RIGHT MANUAL is now loaded with three voices:

STRING 1	= RIGHT (0)	2 components
BELLS	= RIGHT (0)	2 components
HORN	= DOUBLE RIGHT (3)	2 components

Further examples of using the internal functions of MIDI will be addressed in the MIDI section for "Row D".

These two examples are mainly to give the user ideas on how to: 1) communicate with other instruments, thus enabling the user to control and play two instruments from one, and 2) how to use MIDI for other internal functions involving only one instrument for multi-voice utilization, etc.

The following pages contain detailed information on how MIDI actually operates with other instruments and how using MIDI internally is actually accomplished by using the "Internal Manuals" of the MK 1.

We have already said in the first part of our explanation on MIDI that we can play other instruments connected via MIDI and that MIDI will transfer information from one instrument to another. At this point we will resume the primary introduction to our MIDI section and continue into the more detailed operation of MIDI.

MIDI can transfer more than one message simultaneously on different channels.

SYSTEM MESSAGES: System messages can be sent to all participating peripherals.

They include information on TUNING and SYNCHRONIZATION.

*Exceptions are made on SYSTEM-EXCLUSIVE-MESSAGES; they may include special functions and messages designed to accept messages only with products of the same manufacturer.

The MK 1 is also equipped with this mode; it sends and receives SYSTEM EXCLUSIVE mesasages on all activated MIDI channels.

CHANNEL MESSAGES: Channel messages are transferred to all participating peripherals within the MIDI link.

MIDI has 16 available channels. Keyboards can only communicate with one another when they are assigned to the same channel. Channel 1 cannot be received on channel 2.

EXAMPLE:

You are the owner of a hotel with sixteen rooms. Your office has a com-system with 16 channels; one for each room. If you want to communicate with room number 5, you must select channel 5 on your system. ONLY room number 5 will be paged and receive your message.

MIDI can send out data on all 16 channels simultaneously, whereas the receiving instrument will only receive data on its assigned channel. Drum units are usually assigned to receive and send on channel 16.

Therefore, any information sent from channel 16 will be routed to or from a drum unit.

Some drum units can be addressed to other MIDI channels (such as the WERSI DRUM COMPOSER CX 5). Refer to the owners manual of your drum unit.

3. Mode Messages (MIDI IN / MIDI OUT)

The MK 1 receives MIDI data in different modes. They are defined specifically when sending or receiving MIDI information.

The modes are defined with the configuration of terms-OMNI, POLY and MONO.

Let us clarify their definitions first in order to get a better understanding of their purpose:

OMNI   is a Latin term and means "ALL".

POLY   is the abbreviation for polyphonic and means, in our specific term, the ability to play multiple keys simultaneously.

MONO   Just the opposite of poly! In our term, it means the ability to play only a single note, although multiple keys are being

depressed. Most common, the highest note will have priority; otherwise the lowest.

OMNI is an on/off function whereas POLY/ MONO is the defined present status. Combinations of the mode and selected status is possible:

With information transmitted on 16 distinct channels, there are in total 4 ways to respond to the signals:

1. OMNI-ON/POLY MODE / 2. OMNI-ON/MONO MODE

A keyboard RESPONDS to information FROM ANY OF THE 16 INCOMING CHANNELS.

Regardless on what channel the keyboard is set on, IT WILL READ (or send) ALL CHANNELS.

EXAMPLE:

If a keyboard is sending MIDI information on channel 7, the receiving keyboard in OMNI ON mode will read the incoming data on channel 1, or on any other channel it is momentarily defined to.

3. OMNI-OFF/POLY MODE

The keyboard RESPONDS ONLY TO A DE-SIGNATED CHANNEL.

In this mode, channel 1 will only respond to information sent from channel 1. All other channels are ignored. Therefore, several keyboards linked together can each be assigned to respond on individually designated channels.

EXAMPLE:

Keyboard B receives all information on channel 2 which plays the bass line. Keyboard C receives information on channel 3 which plays the strings etc.

4. OMNI OFF/MONO MODE

In general only applicable to keyboards with multi-timbral capability (such as the MK 1).

Multi-timbral refers to the capability of being able to generate two or more distinct timbres simultaneously. (MK 1 = 8 timbres).

In this mode, the individual voices of a specific keyboard can be programmed to respond to a different incoming channel. (See INTERNAL MANUALS – Row "D" – MIDI LEVEL.)

The MK 1 has FULL IMPLEMENTATION of ALL MIDI MODES.

OMNI MODE is an ON/OFF function whereas either one of the POLY/MONO modes are selected interactively.

The MK 1 can receive (MIDI IN) in the following modes:

OMNI OFF/POLY	The MK 1 receives on distinct channels individually. The 8 INTERNAL MANUALS of the MK 1 can handle the incoming data from 8 separate MIDI channels simultaneously!
OMNI ON/POLY	The MK 1 receives all MIDI messages from all incoming MIDI channels. All information is interpreted and processed on it's BASIS channel.

MIDI IN data is ALWAYS received in POLY MODE and designated to the MK 1 "BASIS CHANNEL". Mono mode information will not be accepted.

All wheels, swell pedal and touch information is received only on the defined "BASIC CHAN-NEL". The Mode and Voice data is processed on the assigned (BASIS) "RIGHT" MANUAL of the MK 1. (See Rows "B" and "C" MIDI LEVEL.)

The MK 1 can send data (MIDI OUT) in the following modes:

    OMNI OFF/POLY
    OMNI ON/POLY
    OMNI OFF/Mono
    OMNI ON/Mono

The MK 1 consists of 8 INTERNAL KEY-BOARDS; equivalent to 8 polyphonic synthe-

sizers! Whereas all 8 keyboards can be addressed to receive MIDI-IN data, the MK 1 allows 5 of the INTERNAL KEYBOARDS to be used to send data (MIDI OUT) in OMNI ON/POLY MODE.

This means, that the MK 1 has the ability to send as 5 separate synthesizers!

4. Voice Messages

Additional information sent to transfer specific voice or sound data such as parameter, modulation and frequency data.

The following VOICE MESSAGES can be transmitted or received by the MK 1:

Tone ON/OFF Events (pitch, envelope and velocity dynamics).

Modulation Events (wheel 1 and 2, pedal and touch controls).

Registration changes

5. MIDI Specifications of the MK 1

The MK 1 is equivalent to 8 keyboards in one unit! Other than most common keyboards, it allows the player to assign a voice to 8 individual MIDI channels simultaneously.

This means eight voices can be individually controlled per MIDI data.

The 8 keyboards contained in the MK 1 are defined as INTERNAL MANUALS.

5 of the INTERNAL MANUALS can be accessed in real time. In addition, 8 MIDI channels can be addressed to altogether 8 INTERNAL MANUALS using selected, pre-programmed voices!

6. The Internal Manuals of the MK 1

The 61-note keyboard of the MK 1 is the main manual. The voice selections or registrations made in real time are explained in the PLAY LEVEL of this users guide. Voice selections are referred to the MANUAL "RIGHT" and when the function Key-Split is activated, voice selections are referred to the MANUAL "LEFT".

In the Play Level, you have been able to select further voices to the non-visible manuals such as DOUBLING and AOC etc. (INTERNAL MANUALS).

Each of the INTERNAL MANUALS can be used in the MIDI mode. The MK 1 has 8 INTERNAL MANUALS. In order to define the internal manuals, each manual is assigned an individual number from 0 to 7 = 8 manuals.

MANUAL RIGHT = INTERNAL MANUAL No. 0	all voices are selected from the "RIGHT" Control Section.

The Internal Manual "RIGHT' 0" is also referred to as the "BASIS MANUAL".

It processes MIDI data from the BASIS CHANNEL in OMNI mode.

MANUAL LEFT = INTERNAL MANUAL No. 1	when the function keyboard split is activated, all voices are selected from the "LEFT" Control Section.

Besides the "realistic" keyboards "LEFT" and "RIGHT", there are 3 additional, "invisible" keyboards available: (see description in LEVEL "A").

MANUAL DOUBLE RIGHT = INTERNAL MANUAL No. 3	When "DOUBLE" is activated on the PLAY LEVEL of the matrix, the selected voice is doubled.
	The MIDI LEVEL on the matrix also makes voice registration for the doubled voice possible.
	Registration of the doubled voice is possible not only with MIDI, but also when MIDI is not in use (see coupling).
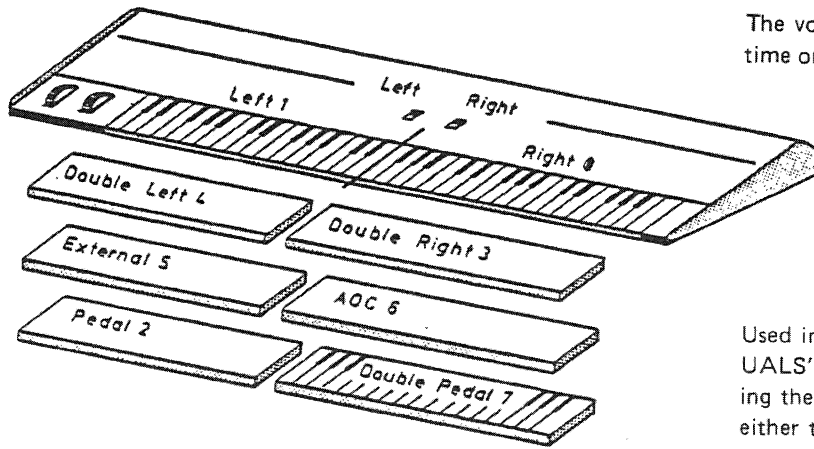
The voices can be assigned and used either in real time or in transmitting MIDI data.

Used in real time, the above "INTERNAL MANUALS" are activated in LEVEL "A" by depressing the "DOUBLE" function in conjunction with either the "RIGHT" or "LEFT" keyboard, or by using the function "AOC". The voices can be selected accordingly in the MIDI LEVEL of the matrix (see coupling).

In use with MIDI-IN, the incoming MIDI CHANNEL can be addressed directly to one of the INTERNAL MANUALS by using its INTERNAL MANUAL number (0 through 7).

As the above INTERNAL MANUALS can be used either in real time or MIDI mode, the following INTERNAL MANUALS can ONLY BE ACCESSED THROUGH MIDI-IN:

MANUAL PEDAL =
INTERNAL MANUAL No. 2

MANUAL DOUBLE PEDAL =
INTERNAL MANUAL No. 7

MANUAL EXTERNAL =
INTERNAL MANUAL No. 5

Voice assignment to the INTERNAL MANUALS, Numbers 2, 7, and 5, can be accessed from the MIDI LEVEL (see row "D").

7. **MIDI-IN Specifications of the MK 1**

The concept of 8 INTERNAL MANUALS makes it possible to address the MK 1 as 8 polyphonic synthesizers!

This means: In OMNI-ON/POLY MODE; 8 different, maximum 4 component voices, can be loaded simultaneously, controlled from the keyboard of the sending MIDI keyboard!

MANUAL DOUBLE LEFT = INTERNAL MANUAL No. 4	When "DOUBLE" is activated on the PLAY LEVEL of the matrix, the selected voice is doubled.

The MIDI LEVEL on the matrix also makes voice registration for the doubled voice possible.

Registration of the doubled voice is possible not only with MIDI, but also when MIDI is not in use (see (coupling). |
| MANUAL AOC = INTERNAL MANUAL No. 6 | The "AOC" voices can be selected from the MIDI LEVEL of the matrix.

Registration of the "AOC" voice is possible not only with MIDI, but also when MIDI is not in use (see coupling). |

All five "INTERNAL MANUALS" can be accessed through the MIDI LEVEL in order to select a registration of any DMS or CV voice.

"H","F" – MIDI Level

8. MIDI-OUT Specifications of the MK 1

MIDI information can be sent from the INTERNAL MANUALS

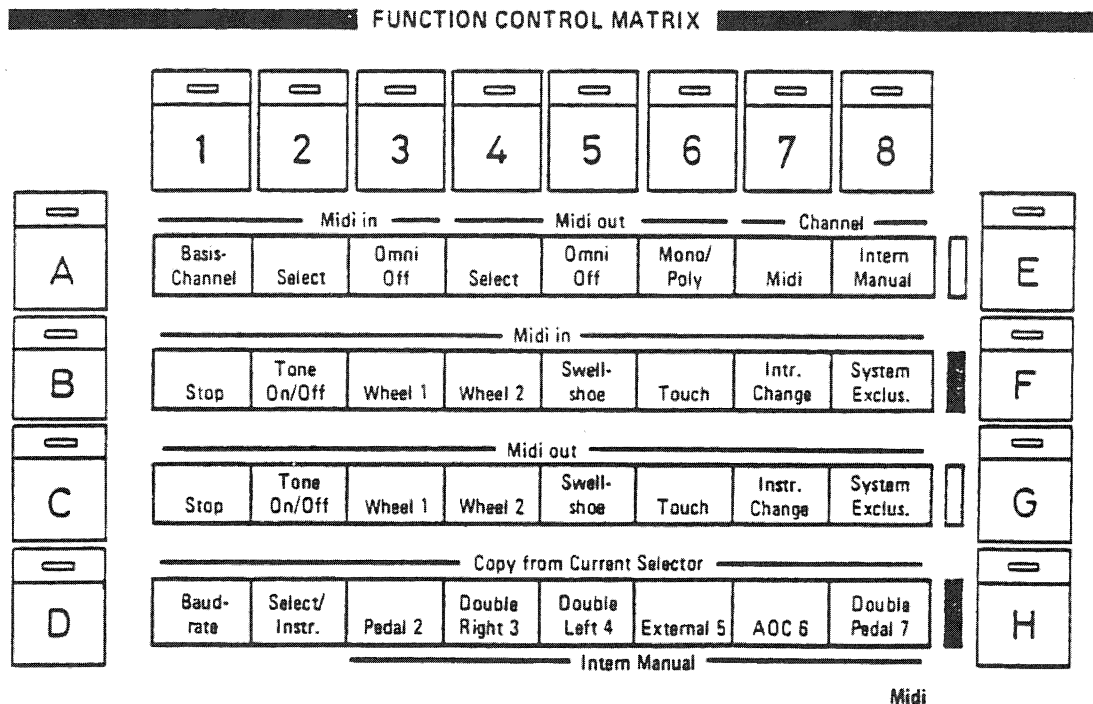|	
RIGHT	= 0 (INTERNAL MANUAL NUMBER)
LEFT	= 1
DOUBLE RIGHT	= 3
DOUBLE LEFT	= 4
AOC	= 6

The above INTERNAL MANUALS can be assigned to send information on individually addressed MIDI channels (1 through 16).
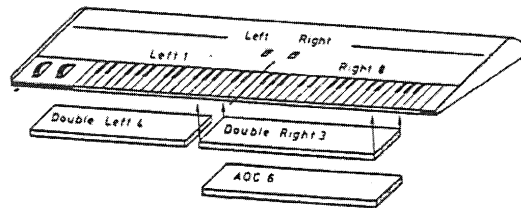
The sounds of one or more linked MIDI keyboards can be controlled and registered through the INTERNAL MANUALS of the MK 1.

The Manuals LEFT-1 and RIGHT-0 are played directly on the MK 1 whereas the INTERNAL MANUALS "DOUBLE-RIGHT-3", "DOUBLE-LEFT-1" and "AOC-6" are activated when coupled with the LEFT and RIGHT CONTROLS (see coupling).

9. The MIDI Level Operation Matrix

FUNCTION CONTROL MATRIX

	1	2	3	4	5	6	7	8	
	—— Midi in ——			—— Midi out ——		—— Channel ——			
A	Basis-Channel	Select	Omni Off	Select	Omni Off	Mono/Poly	Midi	Intern Manual	E
B	Stop	Tone On/Off	Wheel 1	Wheel 2	Swell-shoe	Touch	Intr. Change	System Exclus.	F
C	Stop	Tone On/Off	Wheel 1	Wheel 2	Swell-shoe	Touch	Instr. Change	System Exclus.	G
D	Baud-rate	Select/Instr.	Pedal 2	Double Right 3	Double Left 4	External 5	AOC 6	Double Pedal 7	H

Row B: —— Midi in ——
Row C: —— Midi out ——
Row D: —— Copy from Current Selector —— / —— Intern Manual ——

Midi

Switch to the MIDI LEVEL Operation Matrix by depressing MATRIX-"H" and MATRIX-"F".

The MIDI LEVEL has a total of 32 operation assignments on the Matrix.

ROW "A"   MODE MESSAGES / CHANNEL
          MESSAGES — MIDI IN
                     MIDI OUT

Coordination of MIDI channels and

their assignments to the Internal Manuals are selected in row "A". In addition, the MIDI MODE can be set.

ROW "B" VOICE MESSAGES – MIDI-IN

Voice messages can be activated to the incoming (MIDI IN) information in Row "B".

ROW "C" VOICE MESSAGES – MIDI-OUT

Voice messages can be activated to the outgoing (MIDI-OUT) information in ROW "C".

ROW "D" allows selection of voices for the Internal Manuals 2 through 7. In addition the Baud-Rate (speed of information flow) can be selected.

MIDI LEVEL MATRIX

ROW "A" MIDI CHANNEL & MIDI MODE

1. ——————— MIDI IN ——————

The MK 1 must be activated to receive data from a peripheral or when another keyboard is assigned to play the voices of the MK 1:

— Connect the MIDI cable (5-pin DIN) from either peripheral or other keyboard (MIDI OUT) to the MIDI-IN socket of the MK 1.

— Select MIDI LEVEL on Matrix "H" "F".

The LED automatically defaults to ROW "A" when the MIDI LEVEL of the Matrix ʾ("H" is selected.

Each of the 8 INTERNAL MANUALS can be coordinated with a MIDI-IN channel of your choice:
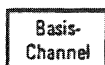
| Basis-Channel |

MIDI MODE INFORMATION and the MIDI VOICE MESSAGES (Wheel/Touch etc.) can only be received on the selected BASIS MIDI CHANNEL!
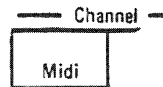
MIDI-IN Information is always POLY-MODE; MONO MODE is not accepted.

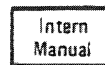— Depress "A – 1" = LED on.

The Matrix Display LED's (1 through 8) will display the present functions of the BASIS CHANNEL.

Choose your BASIS CHANNEL and define a INTERNAL MANUAL accordingly.

The coordination between the BASIS CHANNEL and the INTERNAL MANUAL can be assigned:
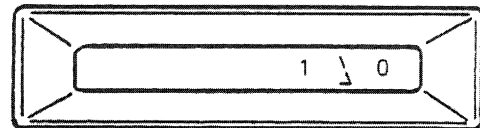
| —— Channel —— |
| Midi |

— The BASIS CHANNEL is selected by depressing the button "7" repeatedly (—CHANNEL—/ MIDI).

| Intern Manual |

— The INTERNAL MANUAL is selected by depressing the button "8" repeatedly (—CHANNEL—/INTERN MANUAL) and assigned to the selected BASIS CHANNEL.

EXAMPLE

| 1 \ 0 |

The selected BASIS CHANNEL is MIDI channel 1.

All mode and Voice Messages received apply for the BASIS MANUAL-RIGHT-0 (*).

*The BASIS MANUAL on the MK 1 is "RIGHT-0".

MIDI-IN   SELECTING MORE CHANNELS

| Select | . . . . Depress "A-2" = LED on.

All other MIDI CHANNELS can be assigned to an INTERNAL MANUAL.

(WITH EXCEPTION OF THE BASIS CHANNEL previously selected.)

The MIDI-CHANNELS are selected by depressing the button "7" repeatedly (—CHANNEL—/MIDI)

The INTERNAL MANUAL is selected by depressing the button "8" repeatedly (—CHANNEL—/INTERN MANUAL) and assigned to each of the selected MIDI-CHANNELS accordingly.

EXAMPLE:


```
2  \  1
```
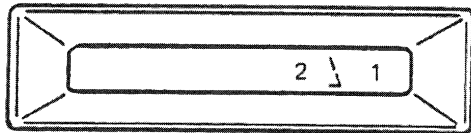
The selected MIDI CHANNEL is MIDI channel 2.

All MIDI Events received apply for the MANUAL-LEFT 1. MIDI CHANNEL 2 will play the selected voice of MANUAL-LEFT 1.

Use button "7" and proceed as above to assign up to 16 MIDI channels (including Basis Channel)

16 incoming channels can be received. It is possible, to assign a INTERNAL MANUAL more than one time. i.e.: 1 ⟍ 2   5 ⟍ 2 etc.

MIDI CHANNELS NOT IN USE, can be turned off by inserting a "blank" instead of a manual; i.e.: 12   . . .

The registrations for the INTERNAL MANUALS

are described in ROW "D" (copy from current selector).

All channel assignments and their Manual coordinations will remain in the MK 1 memory; even after power is shut off.

As described previously, the MK 1 always RECEIVES MIDI information (MIDI IN) in POLY MODE.

The OMNI-MODE can be selected either as ONMI-ON or OMNI-OFF.

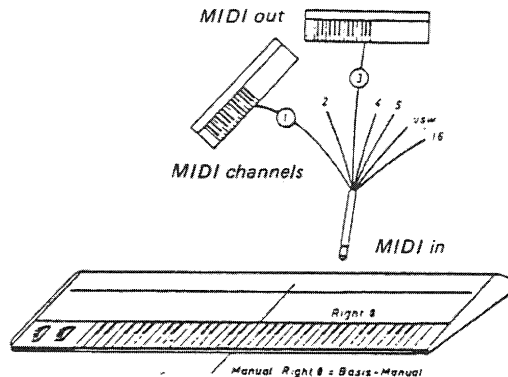Use button "A-3" to select preferred OMNI MODE:

———————— MIDI IN ————————

OMNI
ON. . . . . "A-3" = LED OFF!

OMNI
OFF . . . . Depress "A-3" = LED ON!

OMNI-
ON/POLY
MODE

= ONLY THE BASIS CHANNEL IS ACTIVATED!

The BASIS MANUAL = "RIGHT-0" RECEIVES data FROM ALL 16 MIDI CHANNELS.

MIDI out

MIDI channels

MIDI in

Manual Right 0 = Basis-Manual

OMNI-OFF/POLY MODE = ALL 8 INTERNAL MANUALS ARE ACTIVATED!

EACH INTERNAL MANUAL RECEIVES its distinct MIDI CHANNELS INDIVIDUALLY.

MIDI out

MIDI channels

MIDI in

Left 1

Right 3

Double Left 4

Double Right 3

External 5 1

AOC 6

Pedal 2

Double Pedal 7
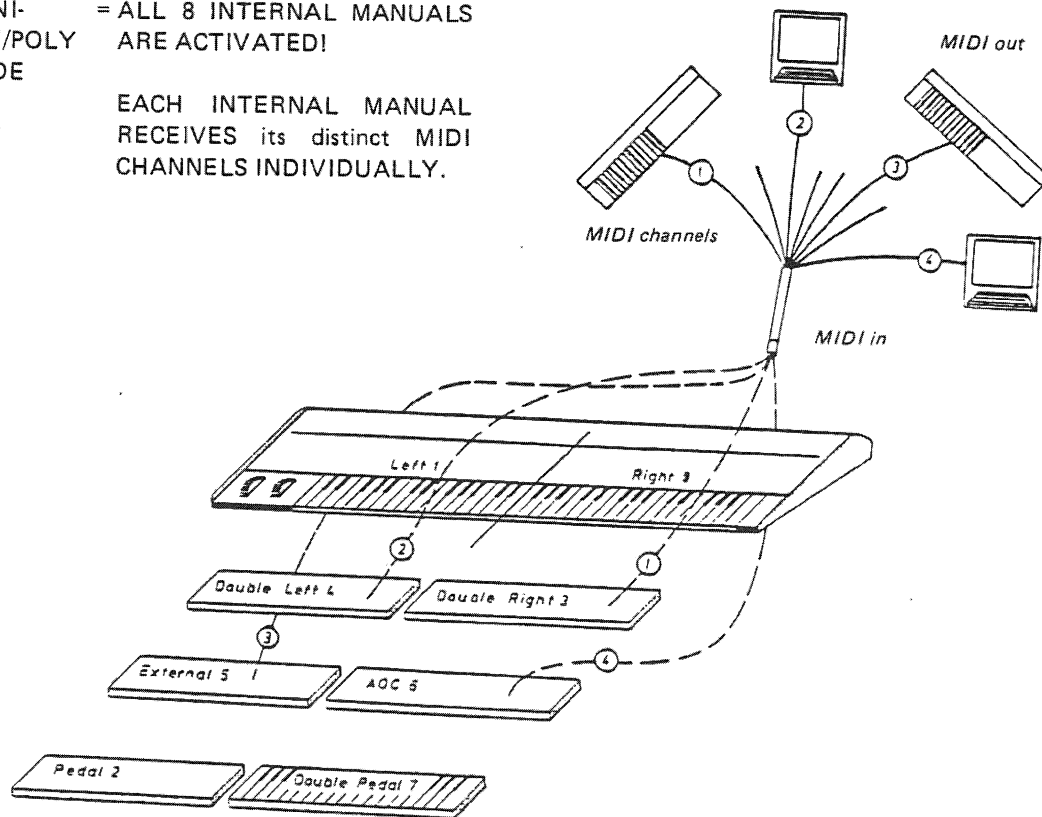
------ MIDI OUT ------

The MK 1 must be activated to transmit (send) data to a peripheral, or when a linked keyboard is assigned to play its voices from the manual of the MK 1.

The registration changes can be controlled from the Internal Manuals of the MK 1.

— Connect the MIDI cable (5-pin DIN) from the MK 1 MIDI-OUT socket to the MIDI IN port of the peripheral or to the MIDI-chain linked keyboard.

5 INTERNAL MANUALS can be coordinated to send on a designated MIDI CHANNEL: (Manuals 0, 1, 3, 4 and 6).

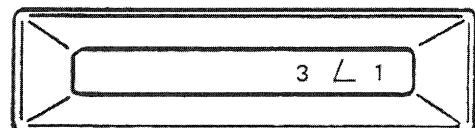MIDI-OUT

| Select | . . . . . . Depress "A-4" = LED on. |

| Intern Manual |

The INTERNAL MANUALS are selected by depressing button "8" repeatedly (—CHANNEL—INTERN MANUAL).

| Midi |

The MIDI CHANNEL is selected by depressing the button "7" repeatedly (—CHANNEL—/ MIDI) and assigned to the selected INTERNAL MANUAL.

EXAMPLE:

| 3 ∟ 1 |

The selected INTERNAL MANUAL IS 1 (MANUAL LEFT 1).

All MIDI Events sent apply from the MANUAL–LEFT 1.

The MIDI channel is 3 and will play the selected voice of the peripheral or keyboard assigned to MIDI CHANNEL 3.

Use button "8" and proceed as above to assign all 5 INTERNAL MANUALS.

(MIDI-OUT DOES NOT INCLUDE A BASIS CHANNEL).

THE COORDINATION AND ASSIGNMENTS OF THE INTERNAL MANUALS AND MIDI CHANNELS CAN BE SAVED IN THE MEMORY OF THE TOTAL PRESETS (Performance Presets) and also saved on RAM cartridge.

Setting the MIDI-OUT Channels to Send MIDI Mode Messages:

After coordinating the MIDI channels with the internal manuals as described before, EACH of the selected MIDI CHANNELS can send specified MIDI MODE information to the receiving keyboards or peripherals.

SETTING THE MIDI MODES FOR MIDI-OUT CHANNELS:

The MIDI MODE can be selected and set with the buttons "A-5" (OMNI MODE) and its status with "A-6" (POLY/MONO MODE).

Omni Off	Mono/ Poly

Since the OMNI MODE is an "ON" "OFF" function and the POLY/MONO MODE is a retroactive function, the combination thereof results in 4 different modes:

OMNI OFF/POLY = "A-5" LED ON / "A-6"
MODE   LED OFF

OMNI OFF/MONO = "A-5" LED ON / "A-6"
MODE   LED ON

OMNI ON/POLY = "A-5" LED OFF / "A-6"
MODE   LED OFF

OMNI ON/POLY = "A-5" LED OFF / "A-6"
MODE   LED ON

EXAMPLE:

— Coordinate Manual 0 with   "A-8" / "A-7"
  Channel 1

— Display should read: 1 ∠ 0

— Activate OMNI ON/POLY   "A-5" LED OFF
  mode:

The receiving keyboard or peripheral on channel 1 will receive in OMNI-ON/POLY Mode:

OMNI-ON = The receiving keyboard on channel
          1 is defined to perform in OMNI-
          ON MODE.

POLY   = will perform all keying information
          from the (MK 1) polyphonically
          (multiple keys)

EXAMPLE:

— Coordinate Manual 1 with   "A-8" / "A-7"
  Channel 2

— Display should read: 2 ∠ 1

— Activate OMNI ON/MONO   "A-5" LED OFF
  Mode:

The receiving keyboard or peripheral on channel 2 will receive in OMNI-ON/MONO Mode:

OMNI-ON = the receiving keyboard on channel 2
          is defined to perform in OMNI-ON
          Mode.

MONO   = will perform all keying information
          from the (MK 1) monophonically
          (single key only).

If polyphonic keying information is received, priority is given either on highest note (most common); or eventually lowest note; depending on make or brand of the receiving keyboard or peripheral.

Select the MODES and status for the Manuals 3, 4 and 6 as described above.
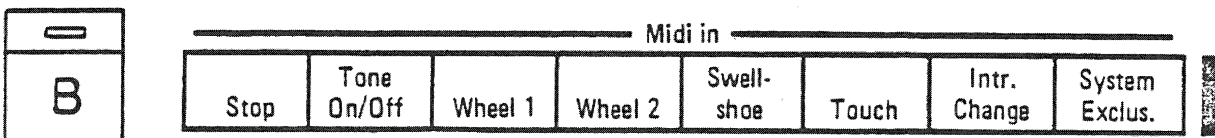
MIDI LEVEL MATRIX

ROW "B" . . . . MIDI IN VOICE MESSAGES

Row "B" on the MIDI-LEVEL MATRIX de-fines all VOICE MESSAGES received on the MIDI-IN channels.

All incoming VOICE MESSAGES can be assigned and specified by activating the matrix controls 1 through 8 in row "B".

B		Midi in							
	Stop	Tone On/Off	Wheel 1	Wheel 2	Swell-shoe	Touch	Intr. Change	System Exclus.	

1. **Stop** — "B-1" LED ON will stop the MK 1 from receiving MIDI information. The MIDI-IN function is silent.

   The display will read "R STOP" (R=receive).

   Depress "1" again (LED OFF) will activate MIDI IN function immediately.

2. **Tone On/Off** — "B-2" LED ON, MIDI ON-OFF-EVENTS are received:

   Keying range events
   Keying duration events
   Volume including dynamics events

3. **Wheel 1** = "B-3" LED ON MIDI-Pitch-Bender (RECEIVED ONLY ON BASIS CHANNEL)

4. **Wheel 2** = "B-4" LED ON MIDI CONTROLLER 1 (RECEIVED ONLY ON BASIS CHANNEL)

5. **Swell-shoe** = "B-5" LED ON MIDI CONTROLLER 3 (RECEIVED ONLY ON BASIS CHANNEL)

6. **Touch** — "B-6" LED ON MIDI CHANNEL PRESSURE (RECEIVED ONLY ON BASIS CHANNEL)

7. **Intr. Change** = "B-7" LED ON[1]

---

[1] Voice changes (registration changes) can be received on all selected MIDI channels.

It is also possible to make registration changes from any master keyboard; even of other brands.

Although different keyboards have different operation panels, they can still communicate through "INSTRUMENT PROGRAM CODES" to select the specified registration stops.

THE PROGRAM CODES FOR THE MK 1 are:

DMS voices 1–20 = PROGRAM CODE 0–19

CV voices 1–10 = PROGRAM CODE 20–29

CV bank 1–10   = PROGRAM CODE 30–39

DMS cartr. 1–20 = PROGRAM CODE 40–59

CV cartr. 1–10 = PROGRAM CODE 60–69

SYSTEM EXCLUS. "B-8" LED ON SYSTEM EXCLUSIVE MODE

| System Exclus. | = |

System Exclusive consists of specified VOICE DATA etc.

SYSTEM EXCLUSIVE Information is not coordinated with MIDI channels.

The channels are always received when MIDI-IN is activated.

As previously noted, SYSTEM EXCLUSIVE Information is reserved mainly for internal use or for peripherals used especially designated to the product.

MIDI LEVEL MATRIX

C		Midi out							
	Stop	Tone On/Off	Wheel 1	Wheel 2	Swell-shoe	Touch	Instr. Change	System Exclus.
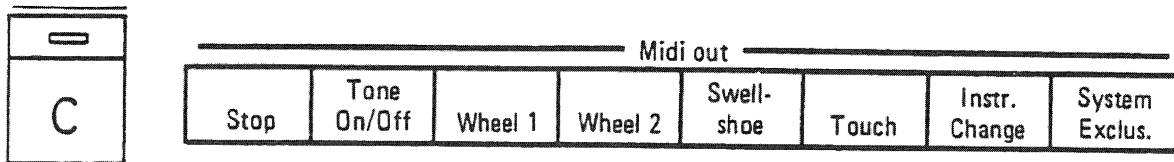
ROW "C" .... MIDI OUT VOICE MESSAGES

Row "C" on the MIDI-LEVEL MATRIX defines all VOICE MESSAGES transmitted on the MIDI-OUT channels.

All transmitted VOICE MESSAGES can be assigned and specified by activating the matrix controls 1 through 8 in row "C".

1. | Stop | = "C-1" LED ON will stop the MK 1 from sending MIDI information. The MIDI-OUT function is interrupted.

   Depress "1" again (LED OFF) will activate MIDI OUT function immediately.

2. | Tone On/Off | * = "C-2" LED ON — MIDI ON-OFF-EVENTS are transmitted:

   Keying range events
   Keying duration events
   Volume including dynamics events

*OVERFLOW-MODE

If the TONE-ON/OFF function is not activated; = LED OFF the MK 1 defaults in OVERFLOW-MODE.

This means that: Only the VOICES THAT CAN NOT BE HANDLED BY THE MK 1's 20-note polyphonic CAPACITY ARE TRANSMITTED.

With use of the WERSI EX-20 Expander Module,

the MK 1 can perform as a 40-note polyphonic synthesizer!

If "HIGH/LOW SELECT" (see mode-control level "D-2"; Voice-Dynamic) IS NOT ACTIVATED, the MK 1 TRANSMITS VOLUME MESSAGES.

DYNAMIC MESSAGES can also be transmitted if "HIGH SELECT" and, or "LOW SELECT" ARE ACTIVATED.

3. Wheel 1	= "C-3" LED ON — MIDI-Pitch-Bender	(BASIS MANUAL RIGHT-0 ONLY)
4. Wheel 2	= "C-4" LED ON — MIDI CONTROLLER 1	(BASIS MANUAL RIGHT-0 ONLY)
5. Swell-shoe	= "C-5" LED ON — MIDI CONTROLLER 3	(BASIS MANUAL RIGHT-0 ONLY)
6. Touch	= "C-6" LED ON — MIDI CHANNEL PRESSURE	(BASIS MANUAL RIGHT-0 ONLY)
7. Intr. Change	= "C-7" LED ON	

Voice changes (registration changes) can be transmitted on all selected MIDI channels.

It is also possible to send registration changes to any linked keyboards; even of other brands.

This may require the use of the PROGRAM CODES (see MIDI LEVEL ROW "B-7".

System Exclus. = "C-8" LED ON SYSTEM EXCLUSIVE MODE

System Exclusive Data is always transmitted on all MIDI channels and does not require coordination or assignment.

As previously noted, SYSTEM EXCLUSIVE Information is reserved mainly for internal use or for peripherals used especially designated to the product.

MIDI LEVEL MATRIX

D	Copy from Current Selector							
	Baud-rate	Select/ Instr.	Pedal 2	Double Right 3	Double Left 4	External 5	AOC 6	Double Pedal 7

Intern Manual
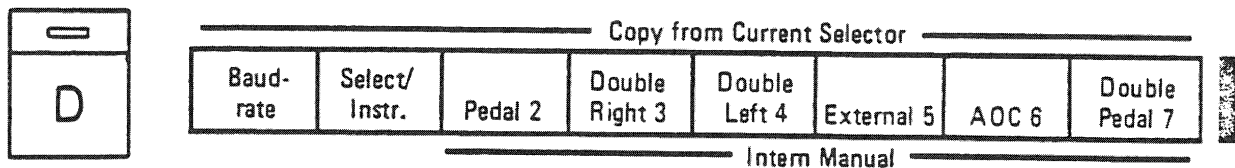
ROW "D" COPY FROM CURRENT SELECTOR

Baud-rate

1. SETTING THE BAUD RATE "D-1" LED ON

When the MK 1 is turned on, it automatically defaults to the standard MIDI Baud Rate of 32.25 kBAUD.

The MK 1 has three possible BAUD RATE SETTINGS:

— 32.25 kBAUD = MIDI

— 65.5 kBAUD = DOUBLE MIDI

— 9.6 kBAUD = PERIPHERAL etc.

To change the Baud Rate, depress button "D-1". The display will read out the current BAUD RATE; depress again, it will step through the three possible rates.

2. — COPY FROM CURRENT SELECTOR —

Copy from Current Selector					
Pedal 2	Double Right 3	Double Left 4	External 5	AOC 6	Double Pedal 7
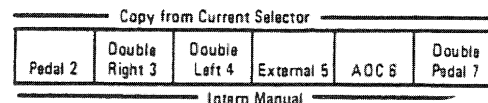
Intern Manual

Beside the "USER's KEYBOARDS RIGHT=0 and LEFT=1 (split) there are 6 additional "INTERNAL KEYBOARDS" available.

IN MIDI IN MODE the user can load selected voices out of the DMS or CV into any of the 6 INTERNAL MANUALS. MIDI IN will control up to 8 voices simultaneously!

The INTERNAL MANUALS are controlled from a master keyboard or peripheral.

Using the Row "D", it is possible to load voices into each of the INTERNAL MANUALS 2 through 7:

EXAMPLE: LOADING "PIANO" into INTERNAL MANUAL "PEDAL-2":

— Load DMS instrument "PIANO" in the "RIGHT" bank:

"RIGHT" LED-ON
"PIANO" LED-ON

— ACCESS THE MIDI LEVEL   "H" "F" (matrix)

— SELECT ROW "D"   "D" (matrix)

IMPORTANT NOTE: "SELECT INST" ("D-2") is not used in MIDI MODE! THE LED MUST BE OFF!

— "PEDAL 2" (LED flashes instantly) "D-3".

The DMS voice "PIANO" is now preset for the INTERNAL MANUAL "PEDAL 2" and can be accessed through MIDI.

The "PEDAL 2" INTERNAL MANUAL must receive on the same channel as the sending peripheral or keyboard.

Use the same procedure to load INTERNAL MANUALS 3, 4, 5, 6 and 7.

(MANUALS 0 and 1 are loaded directly from the "RIGHT" and "LEFT" controls.)

COUPLING : USING THE INTERNAL MANUALS IN REAL TIME

3. COUPLING THE DOUBLE INTERNAL MANUALS WITH THE KEYBOARD

— SELECT/INSTR   "D-2"   LED-ON

The "SELECT/INSTR ("D-2") function allows the user to load the "DOUBLED" voices additionally — WHEN THEY ARE COUPLED TO THE MAIN KEYBOARDS (LEFT and RIGHT).

First lets go back to PLAY LEVEL "A" again

Omni Off (LED A, 3 On)
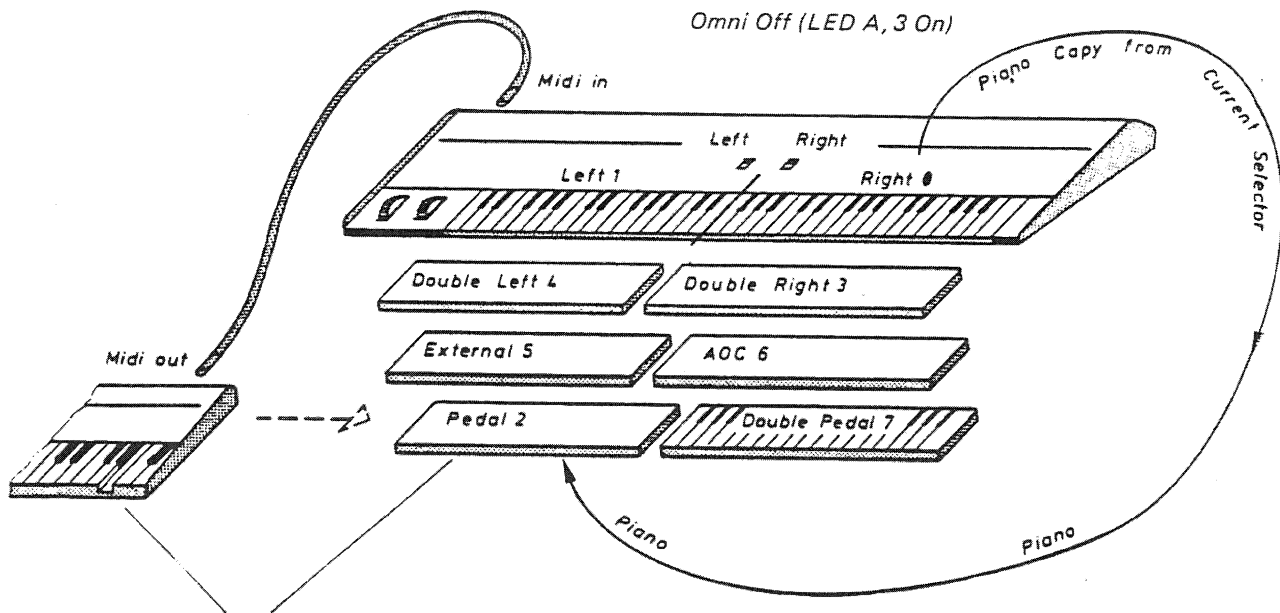
to get acquainted with the operation of the "DOUBLE" voices one more time.

The voices that can be doubled are:

RIGHT + DOUBLE

LEFT + DOUBLE (when manual is split)

AOC (when manual is split)

Using the operations in LEVEL "A", the loaded voices of LEFT and RIGHT are simply doubled (two of the same voices).

When coupled with the main keyboards LEFT and RIGHT, the INTERNAL MANUALS 3, 4 and 6 can be accessed directly, in real time.

The DOUBLE voices can be loaded with individual voices from ROW "D" in the MIDI MATRIX LEVEL. Using "SELECT/INSTR "D-2" allows the use of the INTERNAL KEYBOARDS in real time and make voice registrations.

This expands the power of the MK 1 effectively: playing one key, it is possible to achieve 3 voices consisting of 6 components, or 2 voices consisting of 8 components!

3 voices (6 components) = STRING 1 + BASS 2 + GLOCKENSP

2 voices (8 components) = SYNBRASS + STRING 2

Other variations are possible.

THE FOLLOWING MANUALS CAN BE COUPLED:

MANUAL DOUBLE RIGHT   3   with   MANUAL DOUBLE RIGHT   0

MANUAL DOUBLE LEFT   4   with   MANUAL DOUBLE LEFT   1

MANUAL AOC   6   with   RIGHT   0

EXAMPLE: No. 1 . . . . LOADING A SECOND VOICE IN DOUBLE RIGHT:

— PLAY LEVEL "A"   Set Key Split "A-4 (8)"

— LOAD "RIGHT"   "STRING 1" + "GLOCKENSP"

— MIDI LEVEL "D"   "H" "F" "D"

— "SELECT/INST"   "D-2" (LED ON)

— LOAD "LEFT"   "BASS 2"

— COUPLE MANUAL RIGHT   "D-4"
   with DOUBLE RIGHT-3   (LED flashes instantly)

The RIGHT MANUAL is now loaded with three voices:

STRING 1   = RIGHT (0)   2 components

GLOCKENSP = RIGHT (0)   2 components

BASS 2   = DOUBLE RIGHT (3)   2 components

When loading the (DOUBLED) Voice in the "DOUBLE-RIGHT 3" MANUAL, we must switch to the "LEFT" (voice select) to load its bank. If "RIGHT" were still activated, we would load the new voice into the RIGHT "0" bank instead into "3".

THE DOUBLED VOICE WILL AUTOMATIC—ALLY CHANGE WITH THE "LEFT" MANUAL (1) REGISTRATION AND COPIED INTO "DOUBLE RIGHT 3"!

To select a DOUBLED VOICE for the "LEFT"

keyboard (must be split mode) do just the opposite as above:

Couple with "D-2", depress "RIGHT" in voice select. Choose your preferred voice and load to "DOUBLE LEFT 4" by depressing "D-5".

The balance of the DOUBLED VOICES can be adjusted in volume — LEVEL "A-2" (VOICE BALANCE). Adjust balance with slide control "BALANCE/SOLO/AOC".

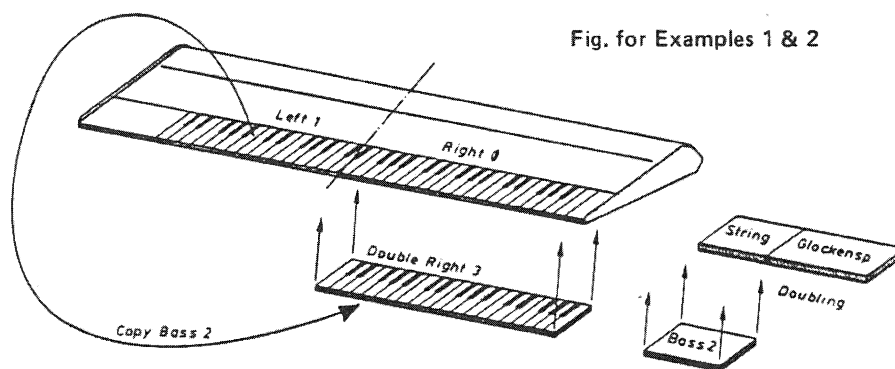It is possible to slightly detune the coupled manuals; (see Play Level 2. PITCH)

Fig. for Examples 1 & 2

EXAMPLE: No. 2 . . . . DOUBLE RIGHT 3

— Set Key Split	"Play Level ROW "A"
— Load Manual "RIGHT 0"	"STRING 1" + "GLOCKENSP"
— Load Manual "LEFT 1"	"BASS 2"
— ACTIVATE "DOUBLE" for RIGHT MANUAL 0	"RIGHT" LED = ON "A-5" LED = ON
— ACTIVATE MIDI LEVEL	"H" "F" "D"
— "SELECT/INST"	LED = OFF

COPY "LEFT" Registration to manual "DOUBLE RIGHT 3".

| — "LEFT" LED = ON | |
| — "D-4" | DOUBLE RIGHT 3 LED flashes instantaneously. |

Play the MANUAL RIGHT; You hear:

"STRING 1"

"GLOCKENSP"

"BASS 2"

The difference between the first example:

A REGISTRATION CHANGE MADE FROM THE "LEFT 1" MANUAL WILL NOT AUTO-MATICALLY COPY INTO COUPLED MANUAL "DOUBLE RIGHT 3"!

If so preferred, activate the COPY FROM CURRENT SELECTOR procedure again;

— MIDI LEVEL ROW "D-4"

DE-COUPLE: Depress "D-4" (DOUBLE RIGHT 3) again.

EXAMPLE No. 3: AOC

— Set Key Split   Play Level

— LOAD RIGHT   "RIGHT", "TRUMPET"
  MANUAL

— Activate "AOC"   Play Level "A-5" + "A-6"

Hold a chord in the LEFT MANUAL and play a single note on the RIGHT MANUAL.

You will hear the "AOC" effect = single note harmony, referring to the chord played with the left hand.

The registrations of the "AOC" chords are the same as for manual RIGHT-0.

LOADING VOICES TO "AOC":

— Proceed to MIDI   "H" "F" "D"
  LEVEL

— Load "LEFT 1"   "LEFT" LED = ON
  "CHURCH"   "CHURCH"

— COUPLE LEFT   (LED "LEFT" still on)
  VOICE INTO IN-   "D-7" LED flashes
  TERNAL MANUAL   instantaneously.
  AOC-6

Hold a chord in the LEFT-1 Manual and play single notes on the RIGHT-0 Manual.

Under the TRUMPET registration of the RIGHT-0 Manual, you will hear the AOC Chords of the coupled AOC-6 INTERNAL MANUAL.

The LEFT-1 MANUAL voice registrations will not effect the AOC coupled Internal Manual (6).

If a new voice is preferred in "AOC-6"; repeat the COPY FROM CURRENT SELECTOR procedure:

— "D-7"

The present LEFT-1 voice is copied into the AOC-6 bank.

The volume balance can be controlled with the functions "VOICE BALANCE" (see Play Level).

Detuning with "2. PITCH" (Play Level).

Cancel AOC function in the Play Level: "A-5 + A-6".

MIDI CONFIGURATIONS

Example 1

In this example we will connect the MK 1 via MIDI to play from the upper manual of the DX-4/500.

1. Connect the MIDI CABLE from the MK 1 MIDI IN to the DX-4/500 MIDI OUT.

2. Connect the audio cable from the output of the MK 1 to the "Tape Input" on the DX-4/500.

3. On the MK 1 set "Basis Manual" to send on MIDI channel one. Display will show "1 ∠0."

4. On the DX-4/500 enter MIDI code to receive information: Depress "Interface," "R," "S," "I," "Compute." (Note: for additional controls information and variation consult the MIDI table in the DX4/500 User's Guide.

5. Set MK 1 to send:

   Activate OMNI ON/POLY   "A-5" LED ON

6. Any voice you desire to hear on the DX-4/500 you can now load onto the "RIGHT" selector on the MK 1. That voice will now play on the upper keyboard of the DX-4/500 along with any other voices you have selected on the upper manual of the DX-4/500.

Registration changes on the MK 1 can also be accomplished from the DX-4/500 by setting the proper codes on the MK 1 and the DX-4/500. (See MIDI LEVEL Row "C-7": Instrument change.)

Registration Change codes for:

— MK 1, Depress "B-7".

— DX-4/500, Depress "Compute" "W," "E," "S," "compute."

Example 2 — MK 1 : DX-4/500

Our Example will connect the MK 1 to the WERSI DX-4/500 Instrument via MIDI using all the channels below:

DX-4/500	MIDI OUT	MIDI IN	MK 1
UPPER MANUAL	ch 1		*RIGHT-0
LOWER MANUAL	ch 2		*LEFT—1
PEDAL	ch 3		*PEDAL-2
ACC. SOLO	ch 6		*EXTER-5
ACC. CHORD	ch 7		*AOC—6
ACC. BASS	ch 8		*DOUBLE PEDAL-7

*are to be activated to use the voice registrations of the MK 1.

1. Connect MIDI CABLE from DX-4/500 MIDI OUT to MK 1 MIDI IN.

2. On the DX-4/500; enter MIDI CODE to SEND INFORMATION: "INTERFACE" "S" "I" "COMPUTE".

The DX-4/500 already has Channel assignment on the manuals as of the following:

UM=1 ; LM=2 ; PED=3 ; ORCH=4 ; AOC=5 ; ACC/SOLO=6 ; ACC/CHORD=7 and ACC/BASS=8.

Channels 9 through 15 are not assigned and channel 16 = is assigned to the Rhythm Unit CX-4.

The Upper and Lower manual functions "DYNAMICS" can be activated on the DX-4/500 and transmitted from the MK1.

REGISTRATION CHANGES of the UPPER / LOWER and PEDALS made from the DX-500 can be transmitted via the "PROGRAM CHANGE CODES".

3. MK 1:

The MK 1 has the ability to assign BASIS MANUAL and INTERNAL MANUALS to transmit on assigned MIDI Channels.

The coordination of manuals and channels is performed on the matrix; MIDI LEVEL , Row "A"!

MIDI CHANNEL   INTERNAL MANUAL

— "BASIS CHANNEL" — 1   0 (BASIS
                                      MANUAL)

— "SELECT" (MIDI IN)─ 2   1
                            3 ─── 2
                            6   5
                            7   6
                            8   7

— LOAD preferred voices into INTERNAL MANUALS (see COPY FROM CURRENT SELECTOR).

— DEFINE MIDI MODE:

ROW "A-3" LED must be ON: = OMNI-OFF/ POLY MODE (*)

In this mode (OMNI/OFF/POLY) all activated INTERNAL MANUALS will receive and read the data sent on their distinct MIDI Channel;

*IF you select OMNI-ON/POLY (LED OFF), ALL DATA WILL ONLY BE RECEIVED ON THE BASIS MANUAL!

Try it and see for yourself!

DEFINE THE MIDI MESSAGES IN ROW "B"

— "B-1" (STOP)   LED = OFF;
otherwise the MK 1 will not receive MIDI data.

— "B-2" (TONE ON/OFF) = LED ON

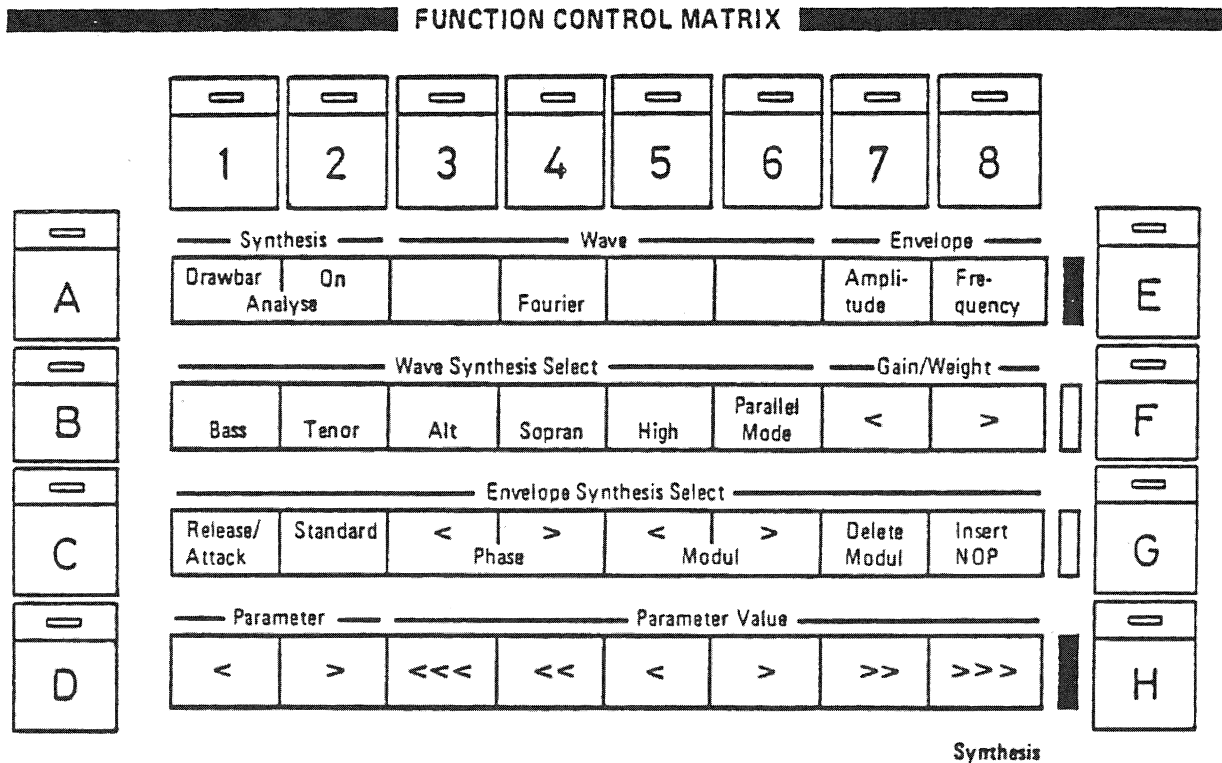— "B-3" through "B-8" can be activated as preferred.

Refer to your CODE PROGRAMMING TABLE on the DX-4/500 to set volume-data or Registration commands.

If you prefer only to hear the voices of the MK 1 through the ACCOMPANIMENT Channels; you must load "DUMMYS" into the "SOLO/CHORD and BASS" section of the DX-4/500.

To load a "DUMMY", simply save a DRAWBAR Registration (with no drawbars pulled out = no voice) into a "CV".

SYNTHESIS LEVEL – "H","E"

G. SYNTHESIS LEVEL

FUNCTION CONTROL MATRIX

1	2	3	4	5	6	7	8

——— Synthesis ———		——————— Wave ———————				——— Envelope ———	
Drawbar | On Analyse			Fourier			Amplitude	Frequency

———————— Wave Synthesis Select ————————						———Gain/Weight———	
Bass	Tenor	Alt	Sopran	High	Parallel Mode	<	>

——————— Envelope Synthesis Select ———————							
Release/Attack	Standard	<	>	<	>	Delete Modul	Insert NOP
			Phase	Modul			

——— Parameter ———		——————— Parameter Value ———————					
<	>	<<<	<<	<	>	>>	>>>

A B C D (left column) E F G H (right column)

Synthesis

You have already learned about working with and changing DMS and CV voices on several different levels.

— In the PLAY LEVEL: Multi-Sound Creating, Doubling, Routing & Tuning

— In the MODE-CONTROL LEVEL: VCF & DYNAMIC

— In the COPY LEVEL: Copying different sound parameters such as VCF & Wave.

This is by no means the end of the sound creating capabilities on your MK 1.

The SYNTHESIS LEVEL allows you to create your own sounds and sound parameters.

You can create: — the Wave
— the Amplitude Envelope
— the Frequency Envelope

for a component sound from scratch. (Synthesize!)

To accomplish this voice or sound creating, you have all DMS and CV instruments at your disposal.

THEORY OF SYNTHESIS ... WAVE ... FOURIER-SYNTHESIS .. WAVE

Wave is the term used to describe movement of a vibration through a medium, such as air. The vibration which reaches our ear as a sound triggers a sensation of a particular sound color in our brain through its waveform (Wave).
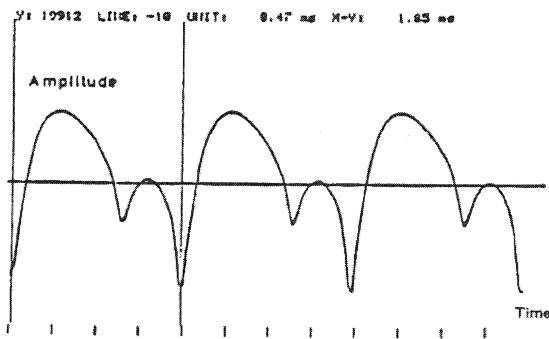
The typical waveform of each instrument, or any sound, can be made visible through an oscilliscope.

Here are two diagrams of waveforms or Strings and Bass to demonstrate how different they appear.

Strings
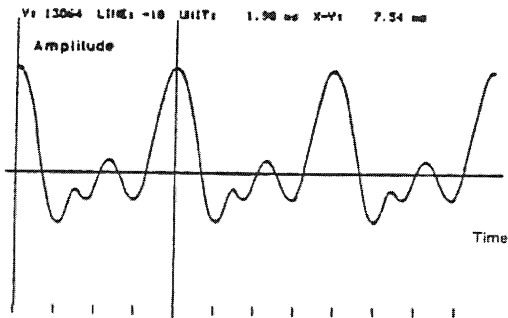
Bass

Horizontal measurement shows time lapse, while vertical measurement shows Amplitude (or volume).

1. Fourier-Synthesis

At the beginning of the 19th Century, Baron I.B. de Fourier discovered that complex sound structures (such as the above examples) can be broken down into sectioned sinewave form.
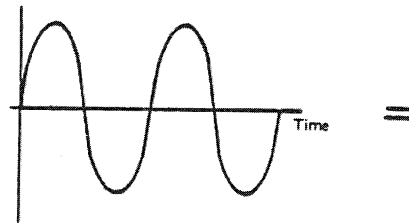
SINE WAVES

Sine wave is the term used for the periodic vibration whose waveform shows a sine curve on the oscilliscope.

SINE

The sound spectrum of the sine wave displays only a single partial note that is the note cre-
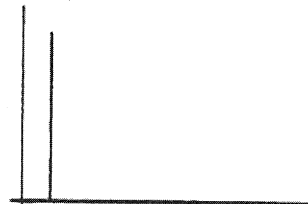
One Part of a Harmonic Tone

ated by the basic vibration with a certain frequency pitch.

The Sine Note has no overtones!

Such pure notes (or tones) practically never occur in nature. They can, however be electronically generated: each sine-drawbar control of your MK 1 generates a pure sine note without overtones/notes.

Whenever an instrument is blown into, plucked or made to sound in any other manner, many overtones, along with the basic tone/note, which sets the pitch of the sound, will sound. These "Overtones", as the name already implies, all lie above the basic tone/note in sound frequency spectrum, and have a fixed relationship to the basic tone/note:

The first overtone, for example, will sound one octave higher than the basic tone/note. The second overtone will sound one octave plus one fourth octave higher. An exact overview of the sound spectrum in notation form as a row of overtones is as follows:

Note name	A	a^0	e^1	a^1	$c^{\#2}$	e^2	g^2	a^2	b^2	$c^{\#3}$	$d^{\#3}$	e^3	$f^{\#3}$	g^3	$g^{\#3}$	a^3
Harmonic	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Frequency	110	220	330	440	550	660	770	880	990	1100	1210	1320	1430	1540	1650	1760

Here the basic tone/note, which is the note depressed on the keyboard, is two octaves below A = 440 Hz, and the overtones, which are the notes that sound along with the basic tone are numbered in this graphic as harmonic partial tones with differentiating amplitudes.

The basic note then depicts the first harmonic!

For the sake of a clearer picture, we have restricted our diagram to the first 16 harmonics. Of course, the amount and volume level of the harmonics (partial tones) are not the same on every sound, otherwise all instruments would sound exactly the same.

It is the numerical amount and volume level relationship of the harmonics to each other that gives each instrument its own characteristic sound.

The factors influencing the frequency spectrum and amplitude of the harmonics are separate and additive to the form and materials used in the sound source (strings, wood, metal, etc.) as well as the resonance body of the sound (guitar body, trumpet, etc.).

Violin
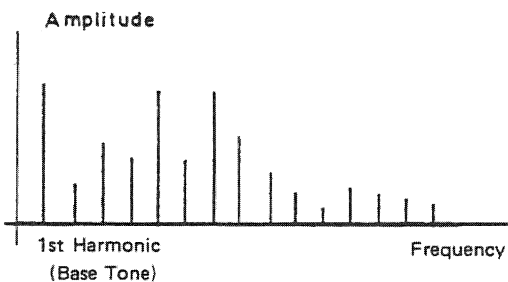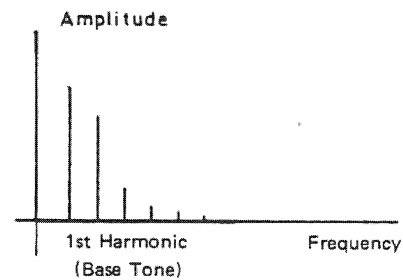
For the purpose of simplification, we have restricted the overtone spectrum shown to that of the first overtones; note particularly the extreme differences in the amplitudes of the overtones!

Since, according to Fourier, each complex waveform, results from the numerical and volume relationship and existence of harmonics and can be seen as the sum of sine-formed partial oscillations, any desired sound structure can be put together by the addition of individual sinewaves (=harmonics), which have a specific frequency and amplitude.

In the PLAY LEVEL, you have already learned the basic principle of how this works through the drawbar synthesis: Each individual drawbar sets a sine tone of a specific frequency and amplitude. (The higher the drawbar is pushed up, the higher the amplitude.)

The individual sine notes of differing volume levels mix together. This combination of sine notes our ear perceives as one specific total sound.

Of course there is a maximum total of 9 harmo-

Brass

77

nics available to you in the drawbar synthesis, the seven drawbars in the read area generate identical harmonics with percussive sound.

In contrast, Fourier Synthesis (SYNTHESIS LEVEL) allows you to synthesize/generate a musical sound via the drawbar sine wave controls with 16 or 32 harmonics!
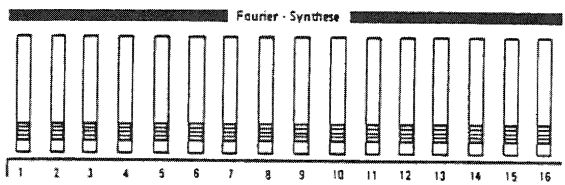
In Fourier Synthesis, you keep adding sine notes (sinewaves) of varying/different frequencies, until you have created the sound structure, (Wave) with the harmonic partial tones you desire. The relative volumes of the harmonic partial tones give your sound structure its characteristic sound.

FORMANTS

Through the individual overtone structure of the wave, specific frequency area are emphasized.

You could use as a comparison the wall of a house containing opened windows. Specific overtones areas reach our ear clearly (tones directed through the open windows), while other overtones are subdued (blocked by the wall).

These frequency areas are called formants. Since these formants are always in the same distance relationship to the basic frequency, (no matter which key on the keyboard is played, the distance between the basic frequency and first harmonic remains the same) they are also called "Tracking" formants.

Since the same overtone characteristic does not necessarily appear on a particular sound as it is played across the entire keyboard, a maximum of four wave types for differing pitch areas can be set:

WAVE	TONE
Bass Wave	$C\,2 - c''$
Tenor Wave	$c\# - c''$
Alto Wave	$c\#'' - c'''$
Soprano Wave	$c\#''' - c''''$

On the MK 1, you can set all four wave types either individually or in the parallel mode (up to four waves at one time).

C2   Bass   c'   c#   Tenor   c''   c#   Alt   c'''   Soprano   c''''
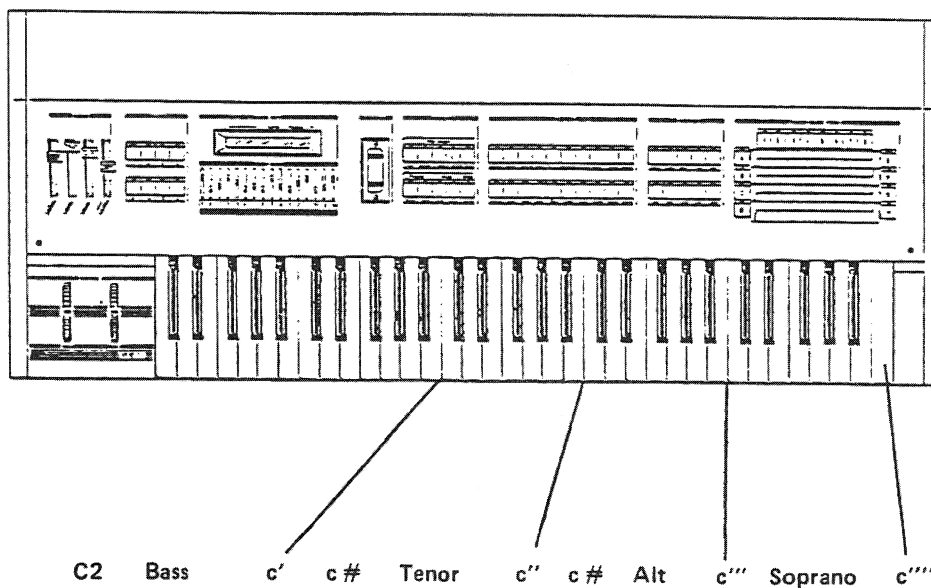
"H","E","B" – Wave Synthesis

The 16 sine wave drawbars represent the first 16 harmonics for all four waves. For bass and tenor wave however, there are a total of 32 harmonics. After switching to "High" wave, the 16 drawbar controls now represent the 17th through the 32nd harmonics.

For the purpose of synthesizing/creating a wave, all DMS instruments and CV instruments can be used as source and orientation sounds. Once a certain instrument has been loaded into Bank "Right", the first and second voices of the existing voice can be altered/changed in any way you please. Of course, if you wish to create a new piano sound, you wouldn't select a trumpet sound, but rather would choose a DMS/CV instrument, which is already close to the one you wish to create.

Then, once you have synthesized the new wave to the sound you desire, you can add a new amplitude and frequency envelope to this new sound.

You can also memorize/store it onto one of the CV memory spaces for later modification.

To create the wave for a 2 component sound, follow these steps:

1. Load DMS/CV instrument, whose WAVE is to be newly generated onto Bank "Right", for example "Lead".

   You can proceed through wave synthesis for first and second voice (one after the other); third and fourth voices can be deleted with the "delete voice" function (as per the example on "Strings 2".)

   NOTE: The second voice must be silenced with the "Sub Voice Off" function, otherwise it will sound along with the synthesis of the first voice.

2. Select the SYNTHESIS LEVEL – Matrix Switches "H", and "E" (LEDs on). Once you have selected "Synthesis Level", drawbar synthesis automatically comes on. Switch "A", "1" (LEDs on). The display will show "Drawbar Mode".
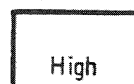
3. Select Wave Synthesis: Select Line "B" (LED on).

B	Wave Synthesis Select			
	Bass	Tenor	Alt	Sopran
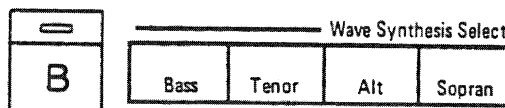
Since there are four wave tables for the various pitch areas, you can now select the wave you would like to modify/create. (With selected wave, LED comes on.).
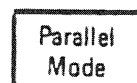
Parallel Mode

In the parallel mode you can create up to four wave forms at the same time. (Switch "6", LED on).

High

This function works for only bass and tenor wave.

Bass and Tenor waves have 32 harmonics. When "High" is activated, the 16 drawbars are set to be the 17th through 32nd harmonics. Switch "5", LED on.

If "High" is not activated – 1st through 16th harmonic (as on alto and soprano) Switch "6" (LED off).

Once you have selected Wave(s):

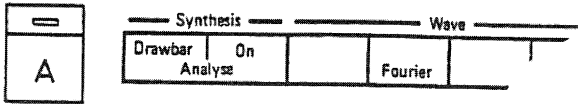4. Activate Fourier Synthesis:

   Depress Switch "A" (LED on).

   Switch "4" (LED on).

   Display shows "Analysis Mode".

Depress Switch "2" (LED on).

Display Shows "Synthesis Mode".

|	——— Synthesis ———		Wave ———	
Drawbar	On Analyse		Fourier	

(Box labeled A to the left)

Note that the present settings of the 16 sine wave drawbar wave charts are the ones in effect for the selected pitch area (the old ones were erased!) You can now mix/add each one of the 16 harmonics to a new sound with the help of the controls and also set the amplitude (volume) of the harmonics by the setting of the controls.

(When "High" is activated, the controls/draw-bars are assigned to the 17th through 32nd harmonics.)

For a rough setting of the amplitude, the information we have just given will be sufficient. You can however, set the amplitude value of each of up to a maximum of 32 harmonics very precisely and then read them in the display.

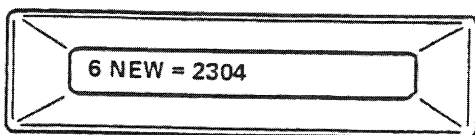First, Select Line "D"   Switch "D" (LED on)

	——— Parameter ———			——— Parameter Value ———				
D	<	>	<<<	<<	<	>	>>	>>>
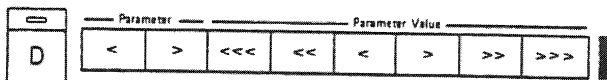
Parameters are the 16 (or 32) harmonic partial tones, which can all be selected by the use of Matrix Switches "1" or "2":
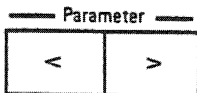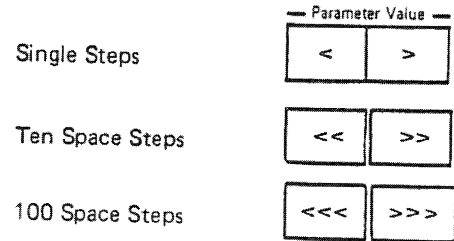
——— Parameter ———	
<	>

In the left side of the Display, the selected parameter (partial tone) will show; to the right in front of it will be the new parameter value.

For example:

6 NEW = 2304

The parameter value can now be set with Matrix Switches "3" through "8" in:

	——— Parameter Value ———	
Single Steps	<	>
Ten Space Steps	<<	>>
100 Space Steps	<<<	>>>

either upwards or downwards between 0 and 4095. 0 = minimal amplitude (volume) and 4095 = maximum amplitude (volume).
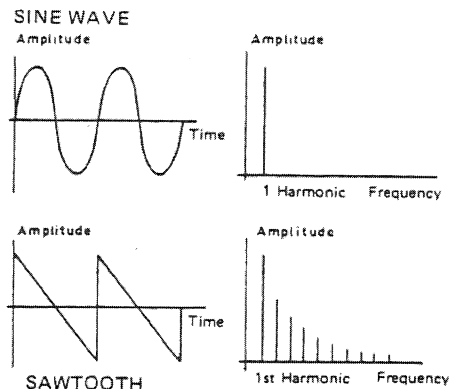
First set an approximate, rough setting, with the drawbars and then use Switches "3" through "8" to exactly set the parameter value — amplitude of the partial tone.
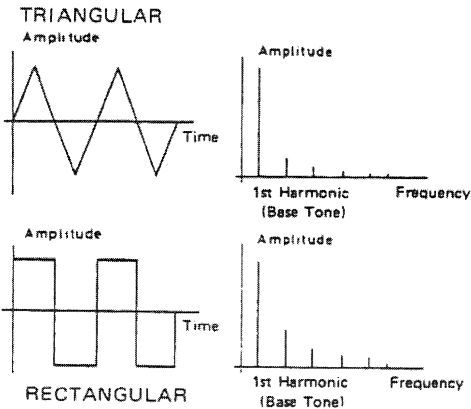
NOTE: By using Switches "1" and "2" all 32 harmonic partial tones can be accessed and then modified with the Matrix Switches "3" through "8". (See Display).

For setting of the Sine Drawbars you need to pay particular attention to the "High" selector Switch which affect the switchover from the 1st through the 16th harmonic to the 17th through the 32nd harmonic in Line "B".

Many synthesizer players orient themselves by using the pure sawtooth-rectangle and triangle oscillations in creating new sounds, and then modify these sawtooth/rectangle/triangles endlessly.

The following chart shows the amplitude values of all 32 partial tones (base note plus the overtone) of the above mentioned wave forms.

SINE WAVE

SAWTOOTH

80

TRIANGULAR

Amplitude

Amplitude

Time

1st Harmonic (Base Tone)   Frequency

Amplitude

Amplitude

Time

RECTANGULAR

1st Harmonic (Base Tone)   Frequency

HARMONIC	WAVEFORM		
	Sawtooth	Rectangular	Triangular
1	4095	4095	4094
2	2048	0	0
3	1365	1365	455
4	1024	0	0
5	819	819	164
6	683	0	0
7	585	585	84
8	512	0	0
9	455	455	51
10	410	0	0
11	372	372	34
12	341	0	0
13	315	315	24
14	293	0	0
15	273	273	18
16	256	0	0
17	241	241	14
18	228	0	0
19	216	216	11
20	205	0	0
21	195	195	9
22	186	0	0
23	178	178	8
24	171	0	0
25	164	164	7
26	158	0	0
27	152	152	6
28	146	0	0
29	141	141	5
30	137	0	0
31	132	132	4
32	128	0	0

If you now have the Bass Wave as you would like it to be, you can now create the tenor, alto, and soprano waves in addition.

Depress Matrix Switches "B" (LED on) and Tenor "2", Alto "3" or Soprano "4" (LEDs on)

NOTE: If you have already set the wave for several pitch areas in the parallel mode, then this is of course undesirable.

NOTE: After the selection of a new wave, the MK 1 leaves the Synthesis Mode and moves to the Analysis Mode: Therefore select Line "A" (LED on) and Function "On" (2) (LED on). The Fourier Synthesis is now activated once again.

In this way you can synthesize the waves for Bass, Tenor, Alto, and Soprano, one after the other.

Once the sound for the first voice is satisfactory, the wave for the second voice can be synthesized:

— Select PLAY LEVEL and 2. Voice (Bank Right, 2. Voice LEDs on).

— Turn off the Function "Sub Voice Off" — Select line "A" (LED on), depress Switch "1", (LED off).

— Select SYNTHESIS LEVEL — Depress Matrix Switches "H" and "E" (LEDs on).

Now you can create a new wave for the 2. Voice (the selector is set to 2. Voice, remember?) and the 1. Voice will sound along with the 2. Voice.

Once you have arrived at the intended sound, turn off the SYNTHESIS MODE:

— Select Line "A", (LED on) and Depress Switch "2" (LED off).

The Display will now read "ANALYSIS MODE".

At this point you can now set the voice balance between 1. and 2. Voice (Voice Balance = Volume Balance) in Line "B" by using the "Gain" Function.

"H","G","F","E" – Special Controls

— First select 1. Voice: Voice Select "Right" (LED on).

Set Gain: Select Line "B" (LED on) with the Switches "7" and "8". (Gain/Weight). The "Gain" can now be set in the area of 0 through 99 (see Display). The last selected value will be memorized.

```
━━━ Gain/Weight ━━━
┌──────┬──────┐
│  <   │  >   │
└──────┴──────┘
```
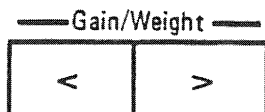
— Select 2. Voice: Voice Select 2. Voice (LED will go on as described above).

— Set "Gain"

This fixed voice balance will now be memorized with the CV's.

The new sound can now be entered onto a CV memory space:

— Select PLAY LEVEL

— Activate "Set CV"

— Select CV memory space, and you are finished.

H. SPECIAL CONTROLS

On Level VI of the Matrix area in Line "A" you will find the "Special Controls" for setting and modifying internal MK 1 "System Constants". These "System Constants" influence the Vibrato and Touch Functions as well as the test functions in line "D" for setting of the Wheels and turning off defective slaves.

— First, Select SPECIAL CONTROLS:

— Depress Matrix Switches "H", "G", "F", "E" (in this exact sequence) — LEDs on.

1. Vibrato and Touch

On Line "A" the function values for vibrato and touch can be modified.

FUNCTION CONTROL MATRIX

1	2	3	4	5	6	7	8

	Vibrato			Touch				
A	Freq.	Frq.-Vib. Gain	Amp.-Vib. Gain	Offset	Gain	Pitch Range	<	>	**E**
B									**F**
C									**G**
	Controls Display			Free Voice Edit			Errors		
D	Wheel 1	Wheel 2	Touch	Display	Next	Delete	Display	Next	**H**
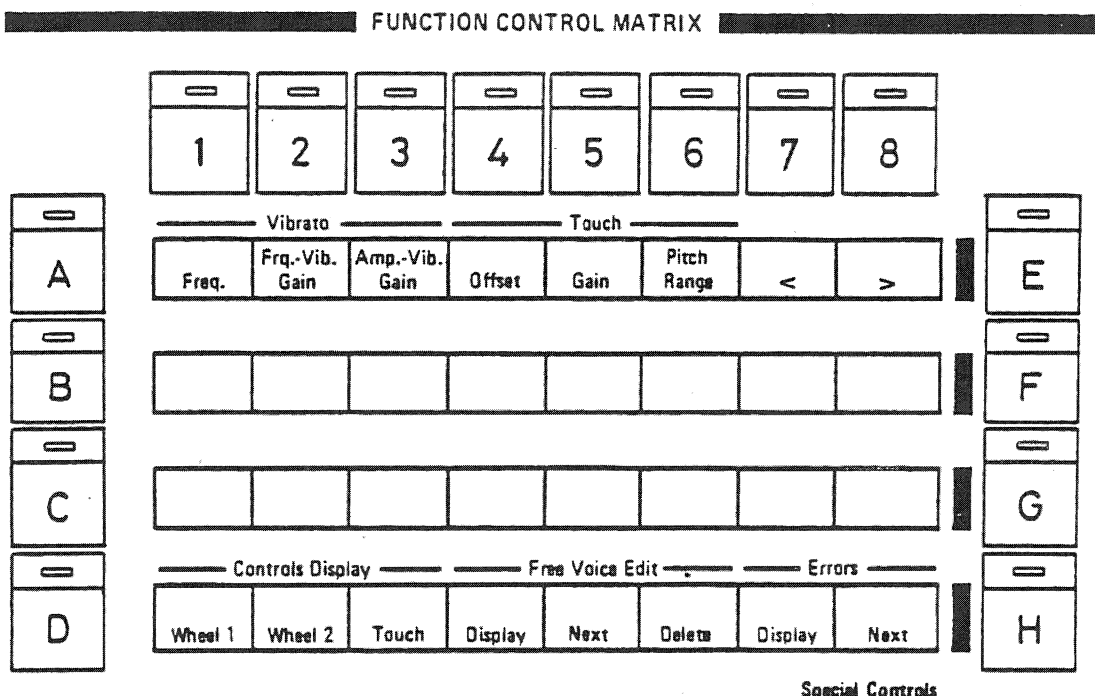
Special Controls

"H","G","F","E","A" – Vibrato

(Once you have selected the sub level "Special Controls", Line "A" is automatically selected, LED on.)

|	Vibrato			Touch			
A	Freq.	Frq.-Vib. Gain	Amp.-Vib. Gain	Offset	Gain	Pitch Range	<	>
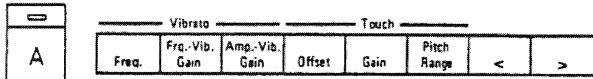
a) Vibrato

As described on Page 36 in the PLAY LEVEL, you can program the modulation of frequency and amplitude vibrato for Wheel 1; the Modulation and Frequency Vibrato can also follow Wheel 2 and Touch if you so desire.

The following vibrato constants can now be changed in the "SPECIAL CONTROLS" Level:

(First of all, you should program Wheel 1 and/or Touch-Vibrato, so that you can also acoustically control the changes being made.)
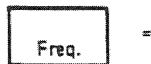
Freq.	=

Frequency = speed of Switch "1" (LED on) Frequency and Amplitude Vibrato.

Frq.-Vib. Gain	=
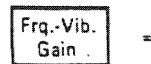
Amplitude of the frequency vibrato, Switch "1" (LED on) (distance between the highest and lowest frequency value for the frequency vibrato).

Amp.-Vib. Gain	=

Amplitude of the amplitude Vibrato, Switch "3" (LED on) (distance between the highest and lowest volume value for the amplitude vibrato).

If you have selected one of the above constants (corresponding LED is on) you can now change the preset constant value in the range from 0 through 99 by using Switches "7" and "8".

<	>

The current value will be shown in the functions area of the Display. To accoustically hear the vibrato changes, depress any key repeatedly while adjusting Switches "7" and "8". The last selected value will remain in the MK 1's memory even after turning it off and then on again and resetting, until you program a new value.
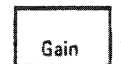
b) Touch

On Page 35 you will find the modulation effects for touch. Now you can change the touch constants to your liking in the SPECIAL CONTROLS level:

(Once again – program a touch function in the PLAY LEVEL first, so the changes can be accoustically controlled.)

Offset	=
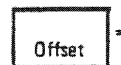
sets the touch sensitivity of the keyboard – Switch "4" (LED on) controls how hard a manual key must be pressed to start the touch function. (Display: 0 = maximum, 99 = minimum).

Gain	=

sets the hardness of the touch function – Switch "5" (LED on) controls how quickly the maximum touch value is reached as for an example pitch. How fast is the programmed pitch bend reached after the touch function is activated on the key?

Pitch Range	=
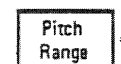
sets the maximum possible pitch bend (upwards or downwards) once touch is programmed with pitch:

Maximum: = or – six half tones

Example: f#   c   f#

Display shows: 0   50   99

If one of the above constants is selected (corresponding LED is on) then through the use of Switches "7" and "8" the preset constant value

can be changed within the 0 through 99 range. The display will show the current value selected in the functions area.

To accoustically hear the touch changes, depress any key repeatedly while adjusting with the Switches. The last selected value will remain in the MK 1's memory even after turning the MK 1 off and then on again and resetting, until a new value is programmed.

The following list will show you the factory preset vibrato and touch constant values:

Vibrato

Frequency	3
Frequency-Vibrato Gain	11
Amplitude-Vibrato Gain	99

Touch

Offset	20
Gain	1
Pitch Range	82

2. Test Functions

Line "D" holds the test function for controlling Wheels and Touch, turning off defective slaves and displaying current errors.

a) Control Display

Shows the middle setting of Wheel 1 in the Display. The middle setting must lie in range + or − 9 − Switch "1" (LED on).

You can leave this test mode by depressing Switch "2" a second time.

Shows the setting/justification of Wheel 2 in the Display. (Below: 0, above 99) − Switch "2" (LED on).

Shows the values for the setting/justification of touch: Switch "3" (LED on).

Switch not depressed: − 50
Switch depressed hard: + 28

You can exit this test mode only by depressing Switch "3" a second time.

For all three tests you should consult the AM or WERSI service staff if there is an error in the setting/justification.
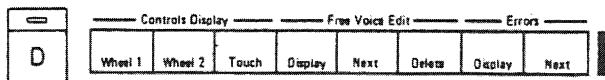
b) Free Voice Edit

This function allows you to identify defective voices and temporarily turn/switch them off.

As you know, there are 2 voices on each sound voice system. The voices are numbered from left to right on the base PC boards:
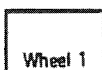
1.   SVS left outer   − Voice 0 below

                                 − Voice 1 above

                                 − Voice 2 below

                                 − Voice 3 above

      etc. until last −

10.   SVS right outer   − Voice 18 below

                                   − Voice 19 above

| Display |

The first free voice will show in the functions area. Switch "4" (LED on). Only this voice can be played.

| Next |

By using Switch "5" you can display all the following free voices in the display one after the other.

(Switch "5") Check each voice briefly by depressing several keys.

| Delete |

Once you have identified the defective voice, you can delete it with Switch "6". Once you

have depressed Switch "6", the next following free voice will show in the display. Now you can continue playing the MK 1, without the disturbance of the defective voice.

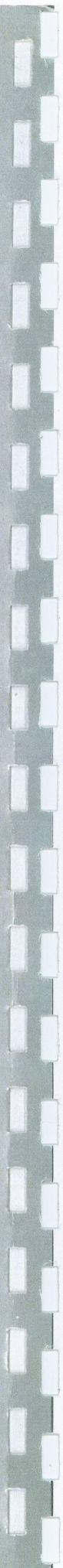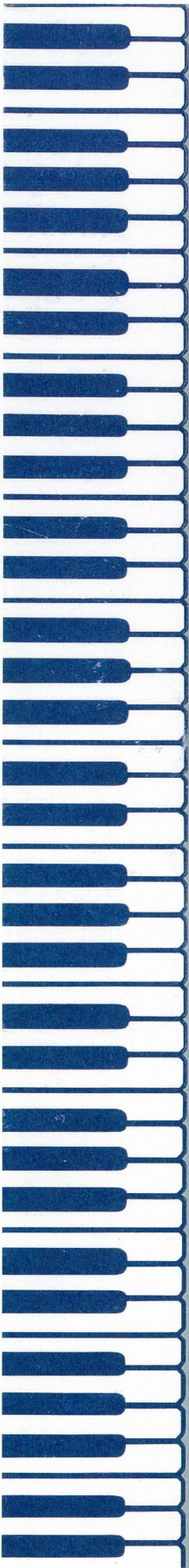If all voices are deleted, then the Display will show "empty".

Once you have turned the instrument off an and then on again, the deleting of voices you have done will be reversed!

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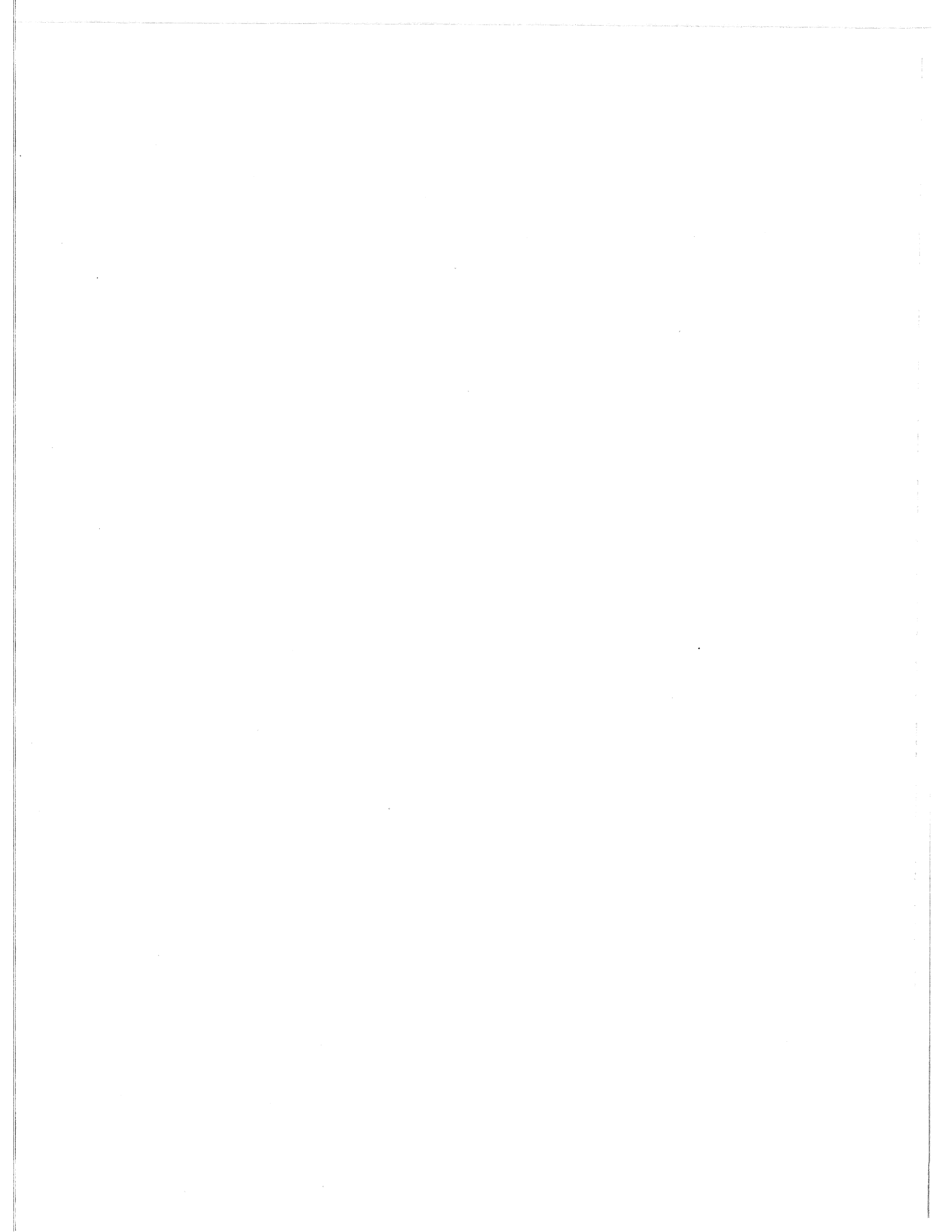
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