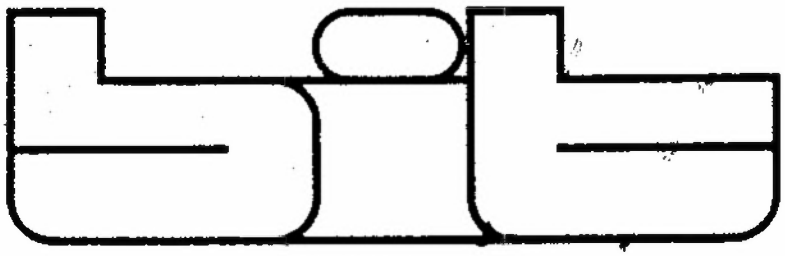


MIDI MASTER KEYBOARD

OWNER'S MANUAL

CONTENTS

by Abi Bassmann and Michel Isler

Version 1.0, March 1986

Congratulations on your new BIT MASTER KEYBOARD! Your choice of this fine instrument clearly shows that you have read the writing on the wall (spelling "MIDI"), and that you have a fair idea of state-of-the-art musical instruments and their implications/applications. All the same, we strongly advise you to read this Users Manual carefully so that you can take full advantage of the advanced features the BIT MASTER KEYBOARD has to offer.

Any instrument equipped with as many features as the BIT MASTER KEYBOARD, and dealing with a subject as complex as MIDI might create a bit of initial confusion for the new user. To help avoid this, the manual introduces each feature in turn and allows "hands on" learning. If you work through the instructions step-by-step, you should have a pretty good grasp of how things work by the time you reach the last page. Along the way we'll be pointing out some potential problem areas concerning 'slaves' or the MASTER KEYBOARD itself and - of course - providing hints on how to circumvent them. In fact, quite a bit of MIDI problem solving is built right into the instrument's hard and software. Whenever the BIT MASTER KEYBOARD recognizes a problem, the display will show you an error code. (A complete listing of these codes is included in an Appendix at the back of this manual).

For the sake of clarity, we won't elaborate on MIDI terminology in the main text, so if you're unfamiliar with such esoteric goodies as "ALL OMNI OFF" and other MIDI commands, you might find it helpful to consult a general text on MIDI, or at least browse through the glossary to catch up with some of the jargon.

We took great care in writing this here manual (instead of lying on the beach and watching the - er - waves, which we would have preferred). If anything has sneaked in that leaves you absolutely confused, we'd like to know about it, so we can correct it in future versions and updates! If you have any suggestions for improvements, additions, deletions, fancy applications or weirdly-wonderful uses of this instrument that even we didn't think of, don't hesitate to drop us a line and tell us all about it. (Please!) Other users might just love you for it!

Have you filled out your warranty registration card yet? If not, you should do so, have your dealer stamp it and mail it presto.

WARNING

HOW NOT TO ENDANGER YOURSELF OR THE MASTER KEYBOARD ....

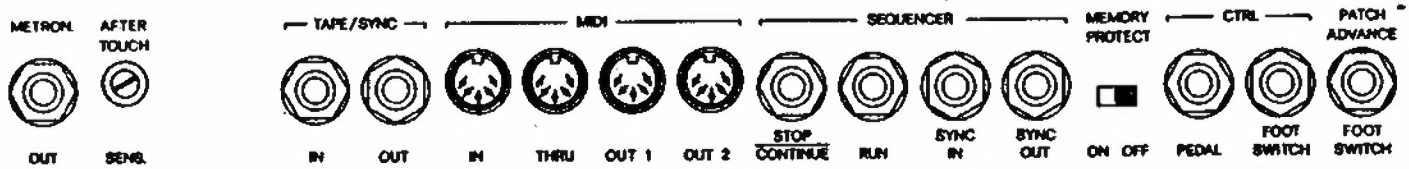
We are convinced that you've read this a million times before, but before you plug in your new instrument, do check the label at the back to make sure that the unit is set to the correct line voltage.

The BIT MASTER KEYBOARD has been designed and manufactured with great care, to assure your safety. Improper use can result in potential electric shock or fire hazards. You too can do your part: never use any electrical instrument in extreme humidity or when wet! All functions are accessible from the outside; there are no user servicable parts inside. Refer all servicing to authorized personnel. Any unauthorized tampering will void your warranty! See the warranty card for more detailed information.

SPECIAL NOTE: EXTERNAL SEQUENCER CONNECTION

We can fully understand - and sympathize - if you have itchy fingers and want to start exploring your new keyboard right away. Well, DON'T! We suggest you read a little further first. While you can't actually damage the internal circuits if an external sequencer or computer is hooked up wrongly, you can still cause havoc! So it is vital to read the special section "External Sequencer Connection" BEFORE plugging in an external sequencer unit!

MIDI AND CONTROL CONNECTIONS



The BIT MASTER KEYBOARD is - as its name suggests - the control center for your entire MIDI universe. It lets you control synthesizers, drum machines, expanders, computers, effects and what-have-you. It also brings a great tidying effect to any stage setup: this one keyboard is all you will ever need on stage. The rest of the MIDI units (the ones which actually produce the sounds) can be stashed away somewhere out of sight, quietly and efficiently controlled by the MASTER KEYBOARD, all linked simply by MIDI cables (standard 5pin DIN cable).

And while we're making life simpler, why stop at clearing the jungle of cables from your stage set-up: when we say it was designed as the 'heart' (and brain!) of your MIDI system, we really mean it! The MASTER KEYBOARD lets you change Sound Programs and control features such as Split Point or Pitch Transpose plus loads of other synthesizer control information (like Key Velocity and After Touch values, Release Pedal or Modulation Bend info, to name just a few).

What's the big deal? Well, while changing settings on a host of keyboards without rushing all over the stage might save energy, there is far more to the BIT MASTER KEYBOARD than that! Like no more racking your brains trying to remember all the complex codes to run your MIDI set-up in hectic situations. Just take a few quiet moments at home to put the relevant info into the memory banks and let the BIT MASTER KEYBOARD take the heat! There are 64 'Patches' to hold your pre-set data, and reproduce it at the flick of a switch. Saves your nerves in rehearsal rooms and at live gigs; and just think of the time you'll save in the studio.... where, as we all know, time equals money, money, money!

MIDI control flow and cables: the basics

MIDI instruments are plugged into one of the MASTER KEYBOARD's MIDI-Out connectors, using a standard 5pin DIN cable connected to the MIDI-In socket of the MIDI instrument. If your set-up includes more than two MIDI units, MIDI-Thru of the first instrument in each chain is connected to MIDI-In of the next instrument, MIDI-Thru of that instrument is connected to MIDI-In of the next unit and so on. You needn't worry about following any particular sequence when connecting instruments: as you will see later on in this manual, MIDI provides a means of properly identifying and addressing instruments hooked up anywhere in the chain, regardless of their position. (NOTE: If you have any trouble getting the MASTER KEYBOARD to 'play' your other units when first setting up, check out the section on "MIDI CHANNELS" on Page 17).

5pin DIN cables of various lengths are readily available at your local music store or radio dealer. Although current MIDI standards suggest a maximum cable length of 15 meters (approx. 50ft), we strongly recommend not exceeding 5 meters (approx. 15ft) in cable length to ensure trouble-free operation.

WHAT YOU'LL FIND ON THE BACK PANEL....

What, no audio ?!?

That's right - strange though it might seem - there are no audio connections to make: the **MASTER KEYBOARD** does not generate any sound itself. Instead, it sends MIDI information (data) to the connected units, which in turn will use this MIDI data to play notes and change program settings, to start/stop in the case of sequencers and drum machines and to perform various "housekeeping" tasks etc.

"Daisy-Chains" and timing: let's avoid problems.

If you have a nice large MIDI setup with many instruments, you should try to avoid connecting more than four MIDI units in series (what they call a "daisy-chain" configuration: hooking up MIDI-Out on the **MASTER KEYBOARD** to MIDI-In on the first unit, patching its MIDI-Thru to MIDI-In of the next instrument etc. as described above). BIT MIDI circuitry is of high quality and uses extremely fast components. However, depending on the quality and speed of certain electronic components used by other manufacturers for their instruments' MIDI circuitry (Optocouplers, for any electronics freaks out there), small time delays could occur, and these might accumulate to cause an audible delay as MIDI data is passed through a chain of instruments. An elegant and tidy way of coming to grips with large setups is to use one or several "MIDI Thru-Boxes" (a.k.a. "MIDI Split Box" or "MIDI Parallel Box"), a number of which are commercially available.

MIDI-In and MIDI-Thru on a MASTER KEYBOARD? Yes, sure!

You might have wondered why the **MASTER KEYBOARD** is equipped with a MIDI-In connector. There are two good reasons: firstly, the keyboard is designed so that it can be "played" (or rather: controlled) by a remote keyboard. The second reason is that the **MASTER KEYBOARD**'s built-in microprocessors are capable of filtering and/or otherwise modifying MIDI data input from a computer or sequencer for advanced operation. This "customized" MIDI data is then available at the MIDI-Out connectors, whereas the unaltered data is always routed to the MIDI-Thru connector. But more about this later ...

You might want to use pedals, too ...

The CONTROL/PEDAL socket on the back panel lets you connect a volume pedal. Internal circuitry translates pedal action into MIDI data, which can then be assigned to a number of different functions (such as Vibrato or Volume etc.), depending on the particular capabilities of your MIDI instruments. The FOOT SWITCH socket is used to connect (surprise!) foot switches, such as a sustain foot switch.

Another pedal you might find useful with your **MASTER KEYBOARD** is the PATCH ADVANCE pedal. Just tap your foot to step through chains of programs, without ever taking your fingers off the keyboard.

Go - Stop - Go

Did we say you need never take your fingers off the keyboard? Quite right! You can plug a foot pedal into the RUN socket, and use it to start a sequence stored in the internal sequencer. A pedal linked to the STOP/CONTINUE socket lets you stop a sequence in mid-flight, and restart it from the same position later on.

The (Multi)-Tape Connection

What we have here are two sockets that serve several purposes. For one, you can save and load Patches (settings from the MASTER KEYBOARD's program memory) to and from a cassette tape. They are also used to save and load Sequences (i.e. your personal symphonies composed with or stored in the built-in sequencer). Yet another option: these very same connectors let you synchronize the built-in sequencer with a multitrack machine, using a FSK-signal. That's what they mean when they say multi-purpose! And yes, we'll be telling you all about these wonderful things a bit later, too. But let's look at a couple more features on the back panel first.

Synchronization is the name of the game...

Making sure the BIT MASTER KEYBOARD stays in sync with external sequencers or drum machines is easy with clock pulses transmitted via the SYNC-IN and SYNC-OUT sockets, and avoids such disasters as the drum beat running away from the rest of the band! Though technology hasn't found a way of hooking real live drummers into MIDI yet...

Play it safe!

You can't always stop curious people from pressing buttons on your precious hardware (known as the nose-pressed-on-the-Ferrari-window syndrome, or eat your heart out...), but you can stop them from creating a mess with your patches and sequences: throw the MEMORY PROTECT switch at the back to the ON position, and there's no way anybody can change any of your stored settings! It's always a good idea to play it safe, and keep the switch in the ON position unless you actually want to change or program something. MEMORY PROTECT doesn't affect cassette interface operation or the loading of data by means of a MIDI dump: patches and/or sequencer memory can be loaded regardless of the switch's setting.

Hitting that perfect beat....

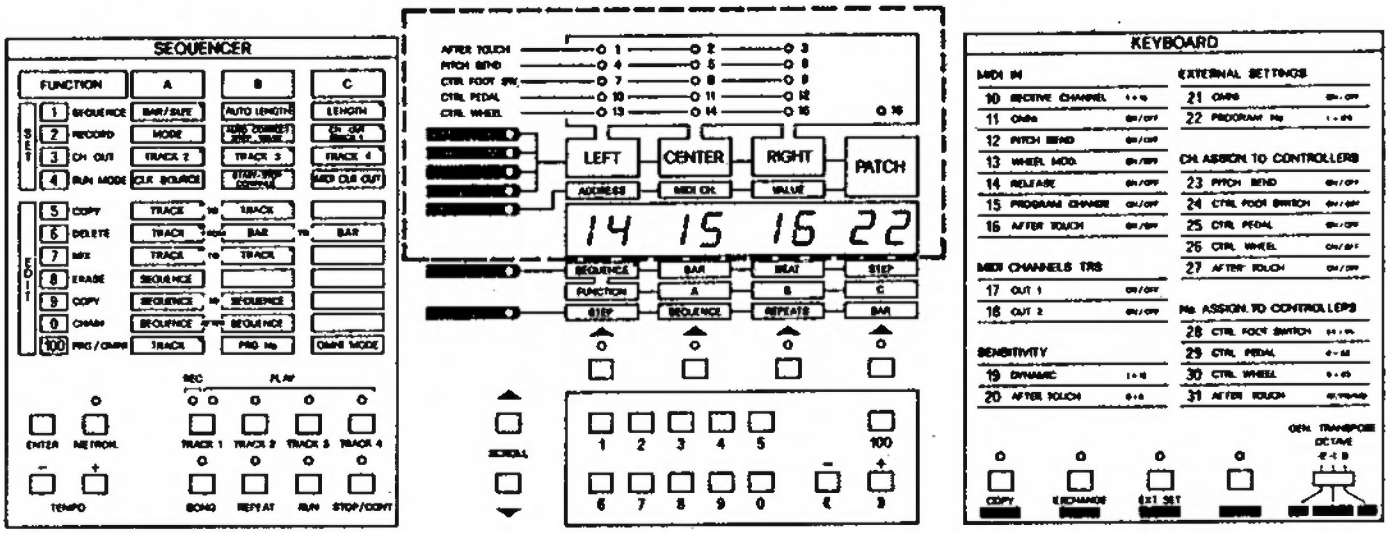
The METRONOME OUT socket lets you send a signal from the integrated metronome speaker to an external amplifier or mixer, when the sound of this built in 'pacemaker' goes under in the symphony you're creating!

Now that you've read all this ...

BIT MASTER KEYBOARD OPERATION

Getting in gear

"Make it a rule to always switch on all your MIDI instruments first, then set them to receive on the MIDI channel of your choice, and only then power the MASTER KEYBOARD up. Why? When first switched on (and also when a new Patch is called up), the MASTER KEYBOARD sends out data to all your slaved MIDI units - so any not switched on will miss out on this information! The last active Patch will automatically be recalled (i.e. the one you were using when you turned the power off).



After turning the power on, the MASTER KEYBOARD will briefly flash "88'88'88" in the LED display. This marks the initialization of the microprocessors, and at the same time gives you a visual check that all LED segments are working. The display will then change to whatever it was showing when the power was last turned off, giving you an overview of the status of various parameters. Depending on the current mode - shown by the LEDs above the SCROLL buttons (MIDI CHannel, PROGRAM, SPLIT, TRANSPOSE), different LEDs in the LED Matrix (upper part of the display) will light. With the LED lit for KBD MAP, some LEDs in the Matrix might blink. Don't worry: that's just fine. We'll be explaining the mysteries of all these glowing lights as we come to the functions they show, just a bit further on... After that quick overview of the display, let's move on to pressing some buttons!

Programming first patches!

As we mentioned a bit earlier, you can control a huge number of MIDI devices with the **MASTER KEYBOARD**. But let's not go overboard to start off with: for simplicity's sake we'll assume that you'll be working with three MIDI synthesizers or expanders (we'll call them MIDI units), all of which are capable of supporting the MIDI OMNI ON and OMNI OFF modes. If in doubt about which modes your instruments can handle, check out their Users Manuals and look for the "MIDI Implementation" section, which should provide you with the neccessary information. If you can't seem to locate it, you should consult your friendly dealer.

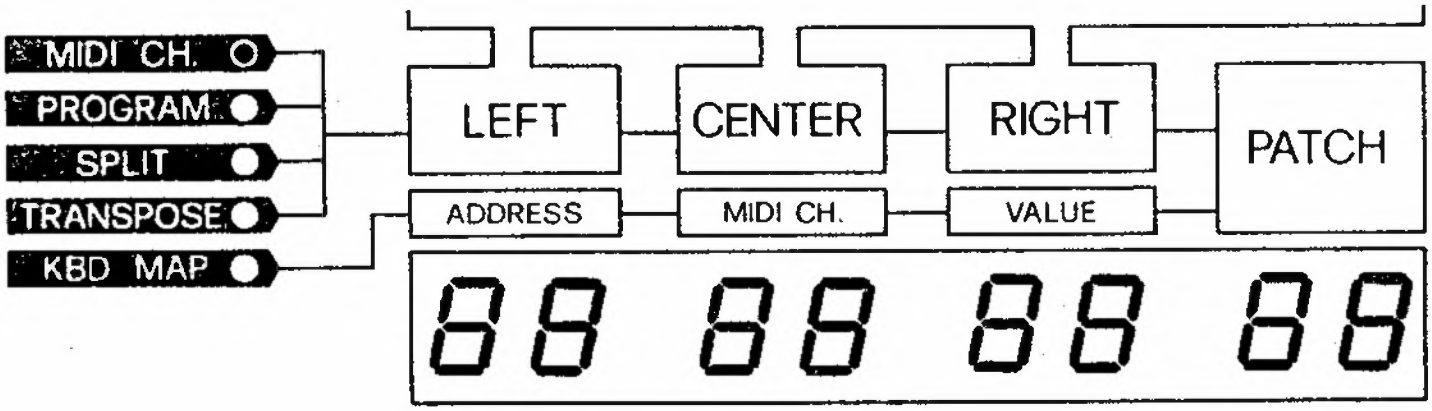
Our first MIDI Channel Patch

Right then, let's get started. We'll begin by programming what is known as a MIDI Channel Patch - sounds sophisticated already, but don't panic, it's going to be painless .... and I know that's what the dentist always said, but this time it's true, promise! While the confusing range of words commonly used to describe the 'sets' of data stored in synthesizers, expanders, sequencers etc. is more or less freely interchangeable, we're going to be using the word 'Patch' when referring to the information stored in the **MASTER KEYBOARD**'s memory; this lets us save the word 'Program' to describe voice data in other MIDI units - which ought to cut down on the confusion!

A MIDI Channel Patch lets you divide the keyboard into three zones. Each of the zones can span whatever key range you like, and the three ranges can even overlap. You can send data for each zone (keystrokes, program change etc. etc.) out on a different MIDI channel, so that three MIDI units can be played completely independently. In that case, of course, the MIDI units must previously have been set to receive on the selected MIDI channels.

This is how data entry works.

The LED for MIDI CH should be lit, showing that the keyboard is in MIDI CHANNEL mode. If it isn't, you have to press a "SCROLL" button (possibly several times) until it comes on. By turning to MIDI CH mode, you have at the same time changed all the other displays to show you information pertaining to MIDI channels. That's how the MASTER KEYBOARD works: it always displays the settings for the current mode, indicated by the LEDs in the labels above the SCROLL buttons.



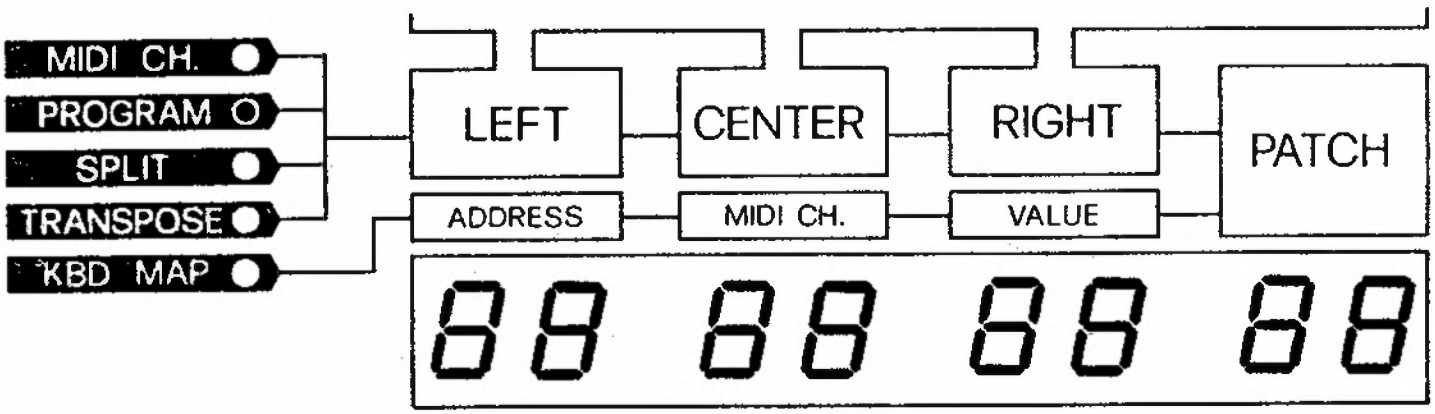
The numeric LED displays show four one or two-digit numbers. The rightmost display shows the MIDI Patch Number. There are 64 MIDI Channel Patches (numbered 1-64) at your disposal. So let's go ahead and program Patch number 1: press the white key under the rightmost display (the PATCH LED should now come on). Now you can enter the Patch number using the numeric keypad. Note that when entering one-digit numbers you MUST type a leading zero, though the zero will not appear in the display. Alternatively, you can use the +/- keys to step the number in the display up or down. Whichever you choose, the display should now show "1".

Don't touch the white key under the rightmost display again for the moment. If you were to change the MIDI Patch Number at this point in time, all the values previously programmed for this patch will be restored, and all the new information entered for the MIDI Channel Patch will be lost, simply because the MASTER KEYBOARD would assume that you wanted to start programming a different MIDI Channel Patch. Pressing the "EXT. SET" or "TAPE" buttons has the same effect. Only after entering all neccessary data for this new Channel Patch will you tell the MASTER KEYBOARD to store it into permanent memory. (For details see under SAVING, COPYING AND EXCHANGING PATCHES, Page 28).

Next you'll instruct the MASTER KEYBOARD to use certain MIDI channels for the different zones. The channels programmed for each zone are shown in the three LED displays to the left of the PATCH display. If two horizontal lines are shown in any of these displays, that zone is inactive and cannot be programmed. (We'll be giving details on how to activate zones and assign them to the keyboard in the SPLIT section on Page 12 below).

You have 16 MIDI channels to choose from (values 1 - 16), but let's use MIDI channels 2, 4 and 6 for the left, center and right zone respectively. Press the white key under the leftmost display (LEFT ZONE). Now enter the MIDI channel number for that zone ("02"), again using either the numeric pad or the +/- keys. Don't forget to punch in the leading zero if you're using the keypad. Next, press the key under the second display from the left (CENTER ZONE) and enter MIDI channel number "04". Now press the key under the third display from the left (RIGHT ZONE) and enter its MIDI channel number "06". You have now instructed the MASTER KEYBOARD to send MIDI data for the three zones to separate (individual) MIDI channels. What you haven't programmed yet is the sound program numbers for the receiving MIDI units, or a key range for each of the zones, so now for a look at that.

ASSIGNING SOUND PROGRAMS



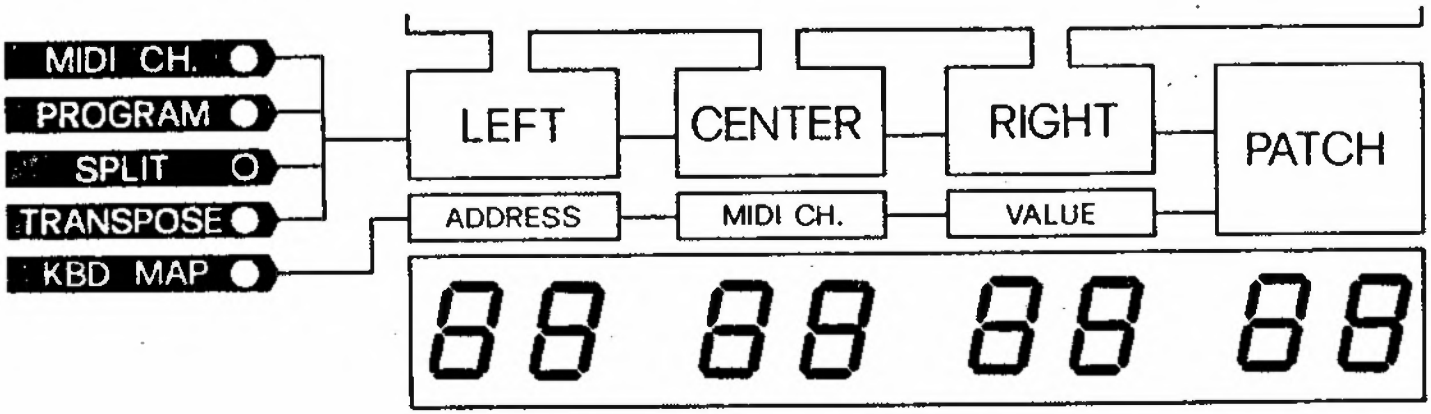
This part of the BIT MASTER KEYBOARD Patch assigns a SOUND PROGRAM number to be transmitted to each MIDI unit, to select a specific sound from the program memory of the receiving synthesizer.

First select PROGRAM mode, by pressing the SCROLL button until the PROGRAM LED is lit. The display will now show which sound programs are active for each active zone in this Patch ("1" in our example). Using the numeric pad or the +/- button enter the program numbers (from 1 - 128) for each zone (as before, first selecting the current zone using the white button).

NOTE: to enter numbers over 100, first press the 100 button and then enter the other figures e.g. 125 = 100, 2, 5. The display will show a dot in the upper left hand corner next to the 25 ("'25").

PROGRAMMING SPLITS

Dividing the keyboard into separate zones or splits is something you'll have encountered before, what might be new - and exciting - in the BIT MASTER KEYBOARD is having three zones to play with, plus the extended opportunities offered by overlapping zones and double sounds!



We'll start with a simple split with three zones: first put the MASTER KEYBOARD into Split Mode by pressing the SCROLL button until the SPLIT LED lights. The LED displays now show the pre-programmed split data - don't worry if there are letters in the CENTER LED, we'll be explaining that in just a moment.

You enter the Split Point like PROGRAM or MIDI data, first pressing the white button to select the zone and entering the key number (counting from the left on the keyboard), using the numeric pad or the +/- buttons.

To save you the chore of counting keys, the BIT MASTER KEYBOARD will also let you enter the Split Point by hitting the note you want on the keyboard, while pressing and holding the white zone button. The numeric value for the key chosen as Split Point will then be shown in the display.

So, to program our straightforward three zone split first press and hold the white button under the LEFT ZONE display and play "C3" (the third C from the bottom) on the keyboard. The display will show "25", telling you that your first split point is set to the 25th key. Follow the same procedure for the RIGHT ZONE, this time playing "C5" on the keyboard. The display will confirm with "49", showing the second split point set to the 49th key. (The defined Split Points are the last note in the LEFT ZONE, and the first note of the RIGHT ZONE). But what about the center zone, you ask? A glance at the display will find two 'brackets', showing that the center zone has been defined automatically by setting the left and right zones. You can check this out by playing a few notes in each zone: you'll find each instrument responds according to the zone/channel number assigned. Before we go on to a more complicated Split we should mention that each zone can be transposed individually, details in the TRANSPOSE section below!

OVERLAPPING ZONES AND DOUBLE SOUNDS

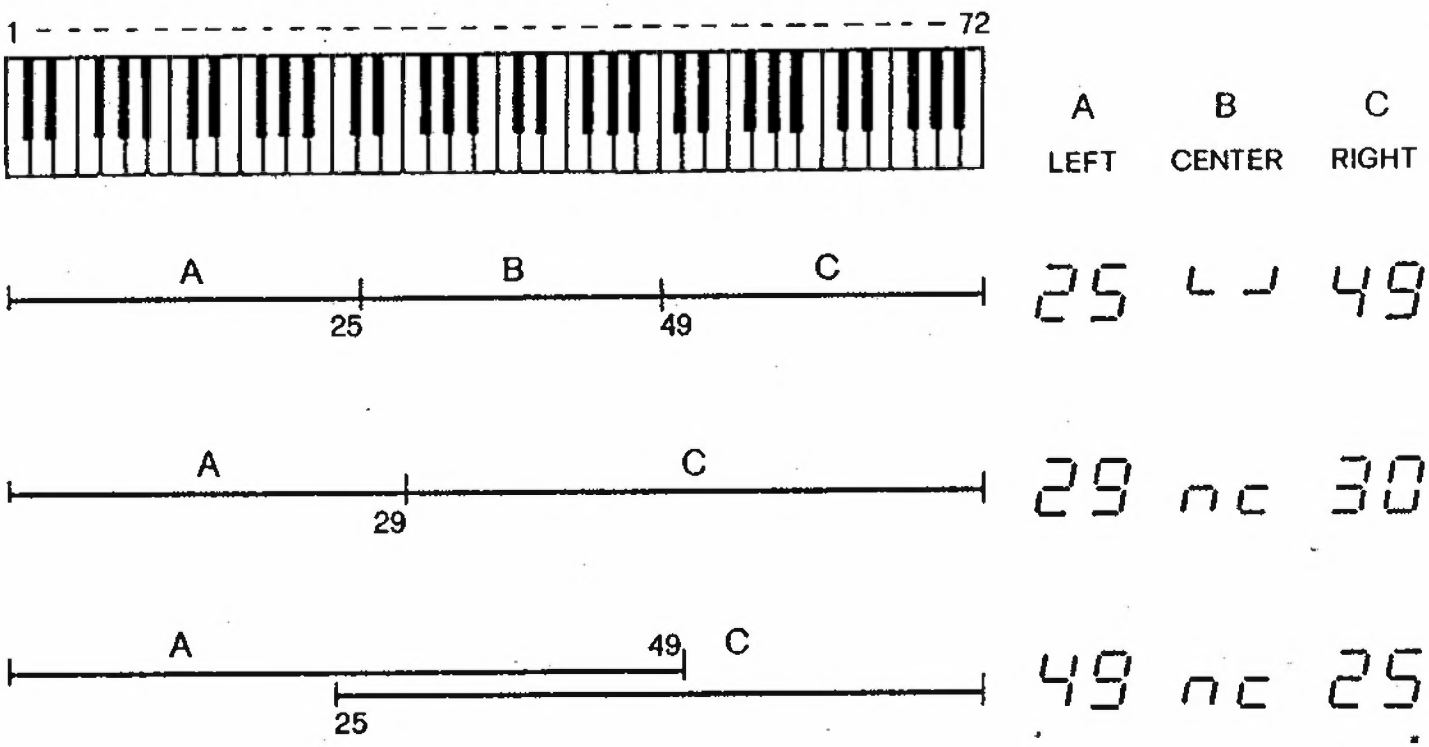
As we said, you can define your split point so as to create overlapping zones or double sounds. If you reverse the settings in the above example, allocating split point "49" to the LEFT ZONE and split point "25" to the RIGHT ZONE, you get an overlap in the center zone. This appears in the CENTER ZONE display as "LC", showing that the center zone has been assigned to the left zone. But what does this all mean?

Well, the easiest way of understanding it is to go ahead and play! Playing at the bottom of the keyboard you have the instruments assigned to both LEFT and CENTER ZONES, moving upward past "C3" (or key 25) those in the RIGHT ZONE join in, while above "C5" (key 49) only those assigned to the RIGHT ZONE are heard. It isn't as complicated as it might look here - try it out!

Of course, that is just a single example. Instead of assigning the CENTER ZONE to the LEFT ZONE, you can link it with the RIGHT ZONE; or even disable it entirely, (by pressing the white button under CENTER ZONE, then using the +/- button to select "rc" or "nc" respectively). To disable the LEFT or RIGHT ZONE press the white button and enter the value "0" using the numeric pad.

So programming overlapping split zones gives us double and split settings simultaneously; for 'pure' double sounds set the split point for the LEFT ZONE to the highest note (by pressing that key or entering the value "72") and the RIGHT ZONE to the lowest note (value "1"). The CENTER ZONE can be ignored here (or disabled if you prefer - set value to "nc"), because the left and right zones are spread over the whole keyboard. Another way of programming double or multiple sounds is to use the "OMNI" setting, described below under Parameter (21).

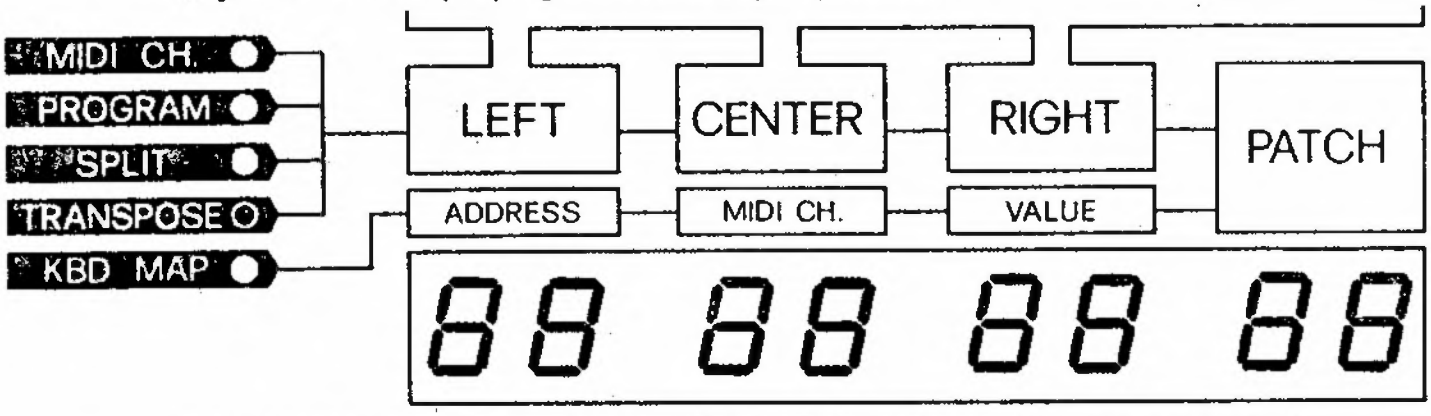
SOME SPLIT EXAMPLES



TRANSPOSE FUNCTIONS

Flexibility is the name of the game here too: you'll find the "GENERAL TRANSPOSE" switch (lower right corner of the Keyboard Table on the front panel) useful for standardized pitch adjustments. It lets you transpose the pitch of the whole keyboard down by one or two octaves. More sophisticated demands are met using the TRANSPOSE function, which allows individual adjustment of pitch in semi-tone steps for each of your programmed Split Zones.

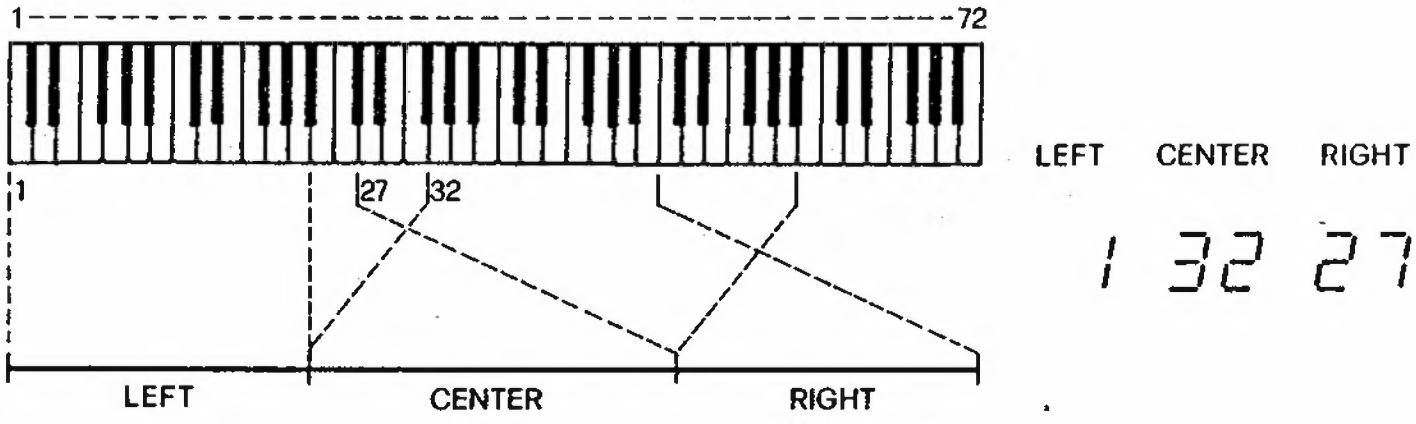
If you tried our earlier example for programming Split Zones (with Split Points set to C3 and C5), you probably found chords played in the left zone sounded too low. We can now use the TRANSPOSE function to fix that. (TRANSPOSE will also take care of any MIDI units that might have been playing in the wrong key so far!)



You should have the general idea behind setting these parameters by now, and this is no exception: first go into TRANSPOSE mode by pressing the "SCROLL" key until the "TRANSPOSE" LED comes on. Select the zone you want to transpose by pressing the white key under the appropriate display, which will show the current value of the lowest note in the zone. Then enter a new value: either by typing the key number on the numeric pad, using the +/-buttons, or by playing the note you want on the keyboard while holding the white button down. In our example after selecting LEFT ZONE, the display will show "1" (which tells you that the current value for C1, the lowest key in this zone, is set to "1" - the first key on the keyboard, or bottom C). You can then transpose to a more harmonious pitch!

The TRANSPOSE function will also operate in overlapping Split Zones - clever, isn't it?

TRANSPOSE EXAMPLE



TROUBLESHOOTING:

If you are now reaching the point of tearing your hair, climbing the walls or throwing yourself and/or the BIT MASTER KEYBOARD out of the nearest window because nothing works... don't despair, help is at hand!

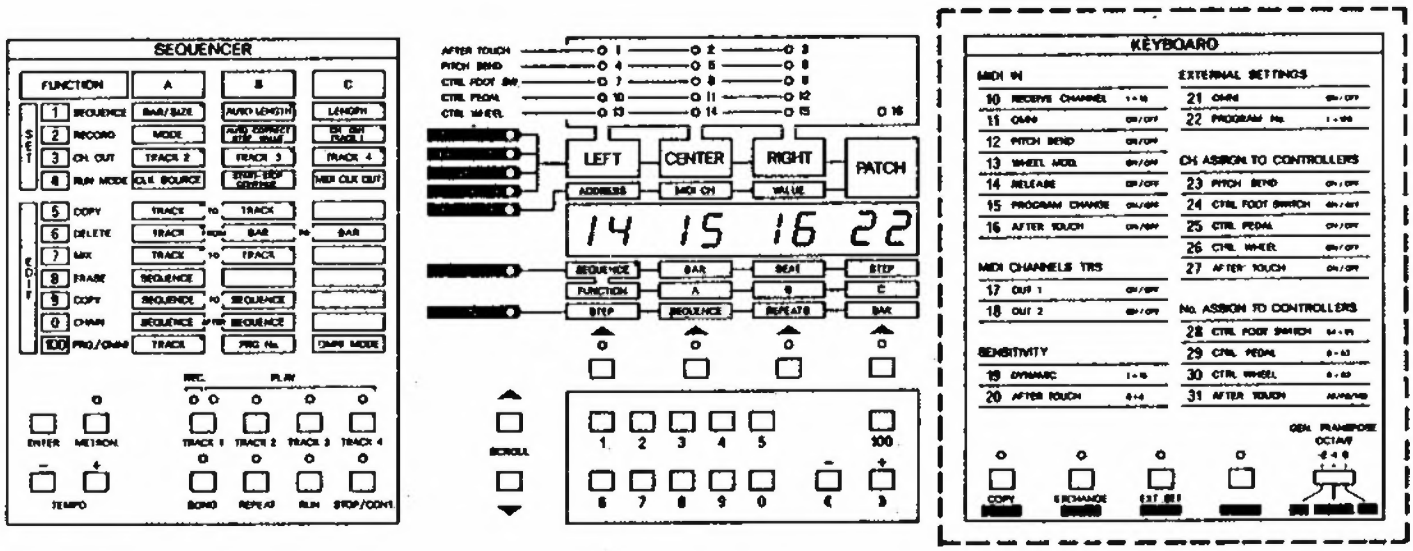
The following section on the KEYBOARD MAP will take care of problems originating in disabled (turned off) MIDI channels, but first a few hints of things to check before going completely crazy. (We know that most of this stuff sounds hopelessly basic and impossible to forget, but don't think we're insulting your intellect: you'd be amazed to hear how many people trek all the way to the store to complain and then discover that they never got round to plugging the machine in!) The check-list only takes a couple of minutes, but may save you hours...

- Are all units connected to the power supply and turned on?
- Are all connections 'clean': check cables/jacks/sockets.
- Are MIDI units hooked up in the right way? (MASTER KEYBOARD MIDI OUT to MIDI IN on unit 1; MIDI THRU on unit 1 to MIDI IN on unit 2 etc.)
- Are the MIDI units set to the correct RECEIVE CHANNEL - i.e. the same MIDI channel you programmed in the MASTER KEYBOARD Patch?

Everything OK so far? The MIDI CH TRS section of the KEYBOARD MAP which follows contains more hints on troubleshooting for those of you who're still stuck with obstinately silent instruments; plus info and guidelines on how to make these features work for you instead...

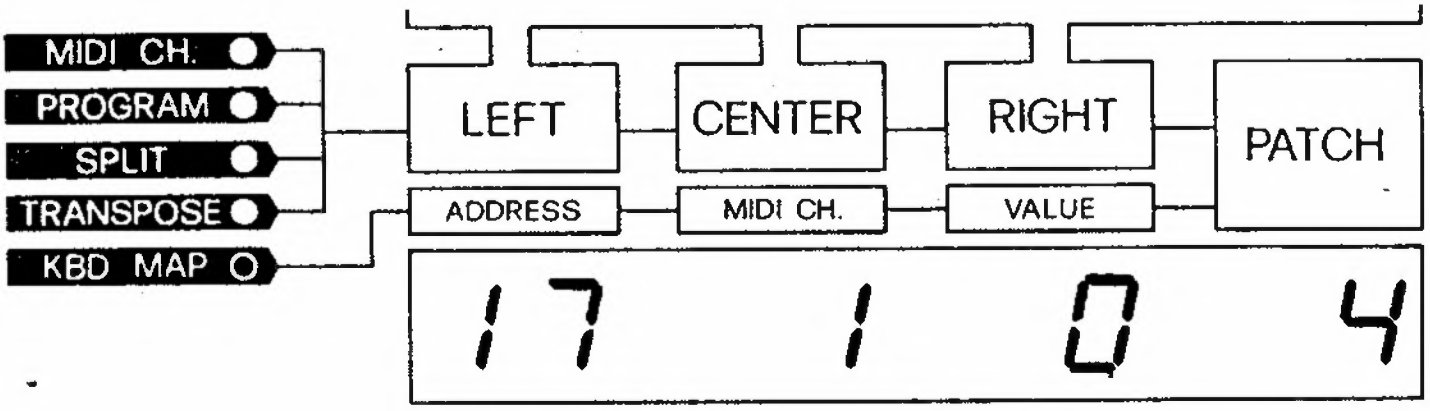
THE KEYBOARD MAP

Those familiar "SCROLL" buttons will step you through to KEYBOARD MAP mode, shown by the KBD MAP LED - along with a veritable Christmas tree of LEDs above the display. The map and matrix provide information on the status of various parameters, as they are shown in the Keyboard Table on the front panel.



The display shows the current Patch number (rightmost LED); the address number currently accessed (LEFT LED); the current value of the parameter (RIGHT LED); MIDI CHANNEL information (where relevant) is shown in the CENTER LED and the numbered LEDs in the matrix.

The first time you enter KBD MAP mode after powering the MASTER KEYBOARD up will automatically access ADDRESS "17", MIDI CHANNEL TRS. (If you have already used KBD MAP mode, and another address, the MASTER KEYBOARD will return to the last address accessed instead). We're going to deal with parameters "17" and "18", showing which MIDI channels are active in the current Patch, first.



MIDI CHANNEL TRS

MIDI CHANNELS TRS		
17	OUT 1	ON/OFF
18	OUT 2	ON/OFF

■ **MIDI OUT 1 (17) & MIDI OUT 2 (18)**

The light-show generated by this parameter is not just a pretty effect: the blinking LEDs in the matrix show at a glance which MIDI channels are active in the current patch. (In case you hadn't guessed, the blinking ones are "ON" and the dark ones "OFF"). When the **MASTER KEYBOARD** leaves the factory, all MIDI channels are active and routed to both MIDI OUTs, so that at parameters (17) & (18) all LEDs in the matrix should blink. If they don't, it's a simple matter to activate them yourself, and might also explain any trouble you had with 'deaf and dumb' MIDI units!

Activating 'silent' MIDI channels works on the exact same lines we've used so far: access KBD MAP mode (using "SCROLL" buttons); then select ADDRESS "17" (press the leftmost white button, enter "17" using numeric pad or +/- keys). Check the matrix LEDs for inactive channels; select the appropriate MIDI CHANNEL (by pressing MIDI CH white button, then entering channel number using numeric pad or +/- keys); the VALUE display will show the current value for this channel ("0" = OFF; "1" = ON). This can now be changed (again using either numeric pad or +/- keys). The matrix LED will immediately change to show the new status.

Parameters "17" and "18" work in exactly the same way, so those with MIDI units hooked up to both MIDI OUT 1 and MIDI OUT 2 should check out both parameters!

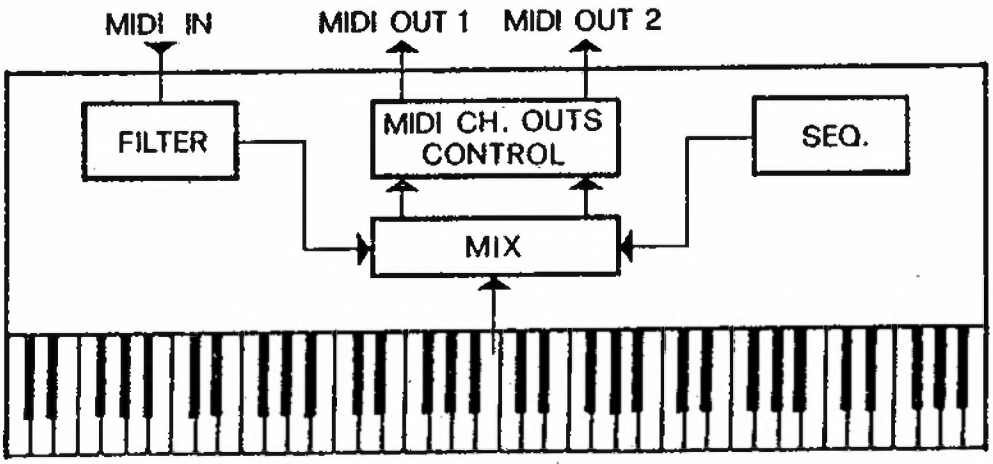
NOTE: when controlling a large MIDI set-up, it makes good sense to send data out over both MIDI OUT connections. MIDI THRU circuitry might be incredibly fast, but you can save up to 50% transmission time in this way.

MIDI IN

MIDI IN		
10	RECEIVE CHANNEL	1 ÷ 16
11	OMNI	ON/OFF
12	PITCH BEND	ON/OFF
13	WHEEL MOD.	ON/OFF
14	RELEASE	ON/OFF
15	PROGRAM CHANGE	ON/OFF
16	AFTER TOUCH	ON/OFF

As we said in the Intro, you can hook up another MIDI source to the BIT MASTER KEYBOARD, be it a remote keyboard or a sequencer or computer. (But in the latter case please check out the special section "EXTERNAL SEQUENCER CONNECTION" beforehand). Input from another instrument can be processed in a variety of ways, you may want to ignore or 'filter out' certain commands while passing others on.

The features in this part of the KEYBOARD MAP are standard MIDI control parameters, so those of you familiar with MIDI instruments can skip this section! They are entered and stored in Patches just like the data we've dealt with so far. To program parameters governing MIDI IN put the MASTER KEYBOARD in K8D MAP mode (as usual, using the "SCROLL" buttons); choose the address for the parameter you want to change (pressing the white button under the ADDRESS LED, then entering the parameter number). Enter the appropriate value (pressing the white button under the "VALUE" LED, then enter the value using the numeric pad or +/- buttons). The MIDI CH LED is inactive and will show two horizontal lines during these operations.



■ RECEIVE CHANNEL (10)

If you have programmed a "0" value in the OMNI MODE (Parameter 11), i.e. OMNI OFF, you can now determine which of the incoming MIDI channels 1 - 16 contains control data for the BIT MASTER KEYBOARD. The source instrument must obviously transmit the data over the appropriate channel, for the MASTER KEYBOARD to act on it!

■ OMNI (11)

Here you can choose whether or not the BIT MASTER KEYBOARD should respond to all incoming MIDI control data (OMNI ON, value "1"), regardless of which channel; or only process data from one particular channel (OMNI OFF, value "0"), that you previously selected in parameter (10).

■ PITCH BEND (12)

This parameter determines whether pitch bend information from the source instrument will be processed ("1") or ignored ("0") by the MASTER KEYBOARD. When the value "1" is set, data of pitch wheel movement on the transmitting instrument will be passed on by the MASTER KEYBOARD, changing the pitch of notes played by the receiving instrument.

■ WHEEL MODULATION (13)

The same applies to modulation wheel information: the BIT MASTER KEYBOARD will pass on the information when this parameter is set to "1", and ignore it if the value is set to "0".

■ RELEASE (14)

Here you can select whether release pedal information from the source instrument should be passed on by the MASTER KEYBOARD ("1") or ignored ("0").

■ PROGRAM CHANGE (15)

You want the MASTER KEYBOARD to pass on program changes originating in the source instrument? Set this value to "1"; if you'd rather ignore the data enter "0".

■ AFTER TOUCH (16)

And the same goes for After Touch info - "1" to pass it on, "0" to ignore it!

SENSITIVITY

We have to start by pointing out that only synthesizers that already are velocity and/or after touch sensitive will be able to process such data from your MASTER KEYBOARD. MIDI systems manage to do a lot, but miracles are still out of reach! A synthesizer without touch sensitivity can receive such MIDI data, but will simply ignore it while cheerfully acting on the rest. However, the MASTER KEYBOARD comes equipped with a special feature which lets you convert After Touch information to other formats, such as Pitch Bend or Wheel Modulation. But again: more about this later.

Unlike many synthesizers, the BIT MASTER KEYBOARD utilises the full dynamic range provided under MIDI specifications (i.e. 0...127), so you'll find that synthesizers with a limited dynamic range come alive when 'fed' with such rich fare! This however, may prove to be too much of a good thing for units not normally utilizing the full dynamic range. Some synthesizers, Yamaha(TM)'s X-range in particular, will begin to 'distort' sounds when receiving data with a high dynamic value. Parameter (19) below allows you to 'compress' this range to fit your receiving unit's requirements.

SENSITIVITY

19	DYNAMIC	1÷16
20	AFTER TOUCH	0÷6

■ DYNAMIC (19)

Here you can store 16 different dynamics value for each Patch of the MASTER KEYBOARD. N.B. The values that go from 1 to 8 transmitt the full dynamic range provided under MIDI specification (i.e. 0...127).
The values that go from c1 to c8 instead, transmitt the dynamic range from 0 to 102.
All the value are entered in the usual fashion: select Patch number; enter VALUE by pressing the white button and using numeric

All the values are entered in the usual faschion: select Patch number; in KBD MAP mode select parameter DYNAMIC (19) in the ADDRESS field; enter VALUE by pressing the white button and using numeric pad +:- keys. Sound too complicated?

A few examples ought to clear that up: if you set this parameter (19) to a value of "1", key velocity variations are practically eliminated from the data transmitted to your slaves. The beginners among you should stick to the lower values, where any irregularities in playing technique are smoothed out, and thus not so obvious. Values around "c3" or "c4" are best suited for the aforementioned Yamaha (TM) ranges, and will avoid excessively blaring trumpets dor example! All the expert's fine nuances of style - from feather-light touch to ultra-ffff - will be heard to full advantage at the high values.

■ AFTER TOUCH (20)

You have the option of disabling the After Touch (a.k.a After Pressure) feature entirely (by programming a "0" value). With After Touch active, six steps of sensitivity are available here, not to change the 'feel' of the keyboard itself, but allowing you to determine how sensitive the keyboard should be to pressure applied after you first hit the key - After Touch.

Activating After Touch for single Split Zones or programming After Touch ON/OFF for single MIDI channels is dealt with later under parameter (27); and converting After Touch information into other data suitable for non-Touch sensitive synthesizers under parameter (31).

EXTERNAL SETTINGS		
21	OMNI	ON/OFF
22	PROGRAM No.	1 ÷ 128

■ OMNI (21)

Here the blinking LEDs in the matrix show at a glance which MIDI channels will be sent an "OMNI ON" command when switching to the current patch. Those that stay dark will receive an "OMNI OFF" command. You should of course check the MIDI implementation chart for your slaves, as not all synthesizers and MIDI units are capable of switching to OMNI OFF mode.

Changing values follows the well known route: in KBD MAP mode select parameter (21); enter the MIDI CH you want to change (press white MIDI CH button and use numeric pad or +/- buttons to enter number); change VALUE ("1" = OMNI ON, "0" = OMNI OFF).

What difference does it make? You remember our example using three Split Zones with a MIDI channel assigned to each? Well, if you have a fourth synthesizer, you can make it use a different MIDI channel (i.e. not "2", "4" or "6", which were assigned to the three Split Zones in our example). Now you can give it the freedom to play all the notes pressed on the MASTER KEYBOARD by programming "OMNI ON" for this fourth channel. After making sure that that channel is active (see parameters (17) and (18)), and that the synth is receiving on the right channel - as if you'd ever forget a little detail like that!

■ PROGRAM NO (22)

When setting up the Split Zones earlier, we selected a Sound Program number for the MIDI channels assigned to each zone. That was fine, as far as it goes - but it didn't go too far... well, now parameter (22) goes all the way!

Here you can assign an individual sound program change for each and every MIDI channel in all the 64 Patches you have at your disposal! The display shows you "21" under ADDRESS; then the MIDI CH number; and under VALUE you can enter your SOUND PROGRAM (numbered 1 - 128). (Anyone who still can't remember which buttons to press can check out an earlier section: I refuse to type it all out again! And folks, you must admit, it ain't that difficult...).

People who know a bit about MIDI already will now be sitting back saying "That won't work, my 'slave' is in MIDI OMNI mode, so how on earth can I send an individual program change??". Well, this is just one of the (not so little) details that make the BIT MASTER KEYBOARD a true state-of-the art instrument! Our R & D department aren't sitting in some ivory tower, but are genuinely concerned with building a keyboard that musicians will love to work with! So the operating system in the MASTER KEYBOARD is carefully programmed to meet real needs - independent sound program changes being one of them. Here's the way it works: whenever the MASTER KEYBOARD should send a program change over a MIDI channel that is in OMNI ON mode, it prefaces that message with a "OMNI OFF" command. Then it sends off the required sound program change data, followed by an "OMNI ON" command to return things to their original status. Neat and - given the speed of the electrons in the microprocessor - very fast indeed.

CH. ASSIGN. TO CONTROLLERS		
23	PITCH BEND	ON/OFF
24	CTRL FOOT SWITCH	ON/OFF
25	CTRL PEDAL	ON/OFF
26	CTRL WHEEL	ON/OFF
27	AFTER TOUCH	ON/OFF

The following set of parameters lets you decide exactly which of your slaved units should receive control data, right down to the smallest detail. But remember, only units that 'understand' this information will be able to act on it. The synthesizers must both have the feature you assign and be programmed to carry out the particular instructions: you'd like an example? OK: After Touch data sent to a unit without this feature will be ignored; it will also be disregarded by a unit with the feature, if the slave was not instructed to implement this info (e.g. if the relevant control parameters in its own sound program are set to OFF).

We can instruct the **MASTER KEYBOARD** to output control data for the following parameters in different ways. ON/OFF values may be assigned to one of the pre-defined Split Zones or alternatively to a single MIDI channel. (In which case, the CH. ASSIGN TO CONTROLLERS values for all Split Zones will automatically be set to "0" = OFF).

You should also remember that any MIDI units set to OMNI ON mode will react to all MIDI data sent out by the MASTER KEYBOARD; this means that instruments with OMNI ON will act on the following control instructions even if you are sending this data to a special MIDI channel. This allows you some extra flexibility, but if you really want just one single unit to respond to AFTER TOUCH data (for example) you'll have to make sure that other units are set to OMNI OFF! As mentioned before, this will only work with MIDI units which can be set to OMNI OFF mode in the first place.

Programming these parameters follows familiar lines, with one small exception. After selecting KBD MAP mode and a parameter number (23 - 27), the current MIDI channel number is shown in the center display and you can press the white button and enter a new MIDI channel number. But what if I want a Zone instead, you shout! That's the exception: you'll find these lurking behind the 16 MIDI channel numbers in positions 17 thru 19. To select LEFT ZONE enter "17" and you'll see "LF" in the display; CENTER ZONE is found under value "18" and shown as "CE" in the display; while RIGHT ZONE hides behind value "19" and appears in the display as "rC". (As usual, the numeric pad and the +/- keys get you to the same place in the end!).

■ PITCH BEND (23)

Setting a value of "1" activates the Pitch Bend wheel on the BIT **MASTER KEYBOARD** itself, while a "0" value disables the wheel; the MIDI CH or ZONE set determines which instrument(s) will 'read' the info. (Unlike parameter (12), where data from the Pitch Bend wheel of another control unit is accepted or ignored).

■ CTRL FOOT SWITCH (24)

Here you can decide whether to activate the RELEASE PEDAL of the MASTER KEYBOARD, and where the data should go ("1" = ON, "0" = OFF; MIDI CH/ZONE for data destination).

■ CTRL PEDAL (25)

To use data from the volume pedal you connected, you'll need to set this parameter to "1". A "0" value lets elephants dance on the pedal without affecting your sound - though it might affect the pedal!

■ CTRL WHEEL (26)

As for Pitch Bend at parameter (23), here you can activate the modulation wheel on the BIT MASTER KEYBOARD and decide where to send the information. ("1" = ON, "0" = OFF; MIDI CH/ZONE for data destination).

■ AFTER TOUCH (27)

Providing that you haven't inactivated AFTER TOUCH for the whole keyboard (by setting parameter (20) to "0"); you can now use parameter (27) to activate this feature for a particular MIDI channel or Split Zone.

NO. ASSIGN TO CONTROLLERS

No.	ASSIGN. TO CONTROLLERS	
28	CTRL FOOT SWITCH	64÷121
29	CTRL PEDAL	0÷63
30	CTRL WHEEL	0÷63
31	AFTER TOUCH	AF/PB/MD

This section of the KEYBOARD MAP lets you assign a specific destination, or 'label', to the control data sent out by the BIT MASTER KEYBOARD. When the MIDI specifications were first set up, no binding definition was established governing Controller Numbers (like the Modulation Wheel, Portamento feature etc.). This left synthesizer manufacturers free to assign their own Controller Numbers - which has resulted in some confusion! In the meantime, some general consensus has emerged, and in the following sections we mention some of the more commonly used Controller Numbers. You should, however, check the MIDI implementation chart for your instruments to find out just which Controller Numbers they accept, and how they interpret them.

This feature is also especially useful with After Touch data, for by re-routing this information you may find a way of 'translating' it for a slave that doesn't 'speak' After Touch!

■ CTRL FOOT SWITCH (28)

In parameter (28) you can assign a 'label' to the control information coming from the BIT MASTER KEYBOARD's FOOT SWITCH: values from "64" to "121" are available. Controller Number "64" usually identifies a Sustain Switch, while "65" lets you use the MASTER KEYBOARD FOOT SWITCH to activate the Portamento feature on many synthesizers. MIDI units with a Data Entry Foot Switch may use a Controller Number "96" to identify the "+" button, and "97" for the Data Entry "-" Switch. (i.e. current Data Entry plus/minus 1).

■ CTRL PEDAL (29), CTRL WHEEL (30)

You can normally inactivate these Controllers, by setting a value of "0"; and set values between "1" and "63" to assign a Controller Number understood by your slave units. "1" is commonly assigned to the Modulation Wheel; those of you owning synthesizers with Breath Controllers acting on certain Voice Program settings should be delighted to find that assigning a value of "2" blows those horns! "3" is often used to identify a Foot Control Pedal; "5" labels this info as Portamento data, while "7" will deliver Volume Control Pedal data.

As we said above, these ID numbers are examples, and not universally applicable: check your MIDI units implementation charts. If you hate reading charts, you can also sit down and try out various values to see what your slaves 'do' with different numbers assigned to the MASTER KEYBOARD's volume pedal or modulation wheel data!

■ AFTER TOUCH (31)

If you have searched in vain for the AFTER TOUCH feature on your MIDI units, and skipped those sections of this manual in disgust, you might have acted too soon! The BIT MASTER KEYBOARD takes such lower forms of synthesizer (sorry, sorry) into account, and will convert the data internally to a format your slave is willing to swallow! You can choose to transmit AFTER TOUCH data as Pitch Bend or Modulation Wheel information so that key after pressure has the same effect as using those features. Your slave unit will cheerfully consume this disguised data as if it were the real thing - always providing that it 'understands' Pitch Bend and/or Control Wheel commands. As most newer synthesizers and expanders etc. are equipped with these features - unlike the more exotic After Touch - you stand a good chance of being able to use that AT data after all!

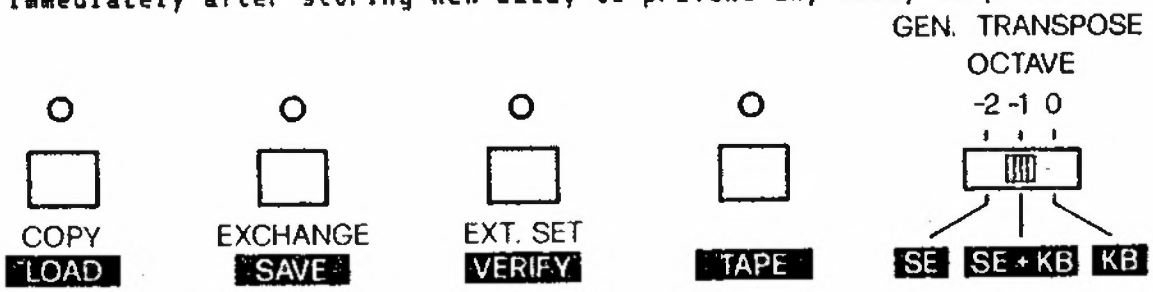
How to do it? If you select parameter (31) the VALUE display will show the current setting. If your slaves understand AFTER TOUCH use the standard setting, which will be shown as "AF" in the RIGHT display. (If it shows something else use the +/- keys or enter "01" on the numeric pad to return to standard AFTER TOUCH). To convert to PITCH BEND format enter value "02", shown in the display as "Pb"; or enter "03" to transmit data in MODULATION WHEEL format, "Md" in the display. You can also step through these values using the +/- keys.

SAVING AND COPYING PATCHES

The control buttons in the lower section of the Keyboard Table on the front panel all serve dual purposes. You already encountered the 3-step General Transpose switch in an earlier section, and we also mentioned the general reset function you get by pressing the TAPE button twice; these are both also used for operations in Tape Mode. The other three buttons control operations on Patches: storing, copying and exchanging Patch data both within memory and in conjunction with the cassette interface.

The operations we've described so far have altered parameter values and constructed a new Patch configuration. This data is placed in a temporary 'working storage area' in memory; all changes will be lost as soon as a new Patch is called up by entering a new Patch number. We will now deal with the permanent storage of Patches in the memory of the BIT MASTER KEYBOARD. When storing a Patch at a particular location in memory, you should always remember that the original data at that location will be over-written, i.e. lost.

In an early section we mentioned the MEMORY PROTECT switch on the back panel of the MASTER KEYBOARD: its function being to protect the memory from accidental over-writing or erasure. To store a new or changed Patch, the MEMORY PROTECT switch must be in the "OFF" position (memory not protected) - otherwise you can't write to the memory at all!! We recommend returning the switch to the "ON" position immediately after storing new data, to prevent any nasty surprises!



■ **COPY**

Assuming that you are now finished with changing parameter values in Patch 1 (which was our first example, way back at the start of this manual!), and now want to store this data in memory, this is what you do next:

With the MEMORY PROTECT switch "OFF", first press the white button under the PATCH display (the small LED will light). Then press the black COPY/LOAD button at the lower left of the Keyboard diagram. The display will now show "1 to 1". To store this Patch permanently, press the COPY button again. And that's that! Your first Patch is now programmed and stored in memory. Anyone who forgot to set the MEMORY PROTECT button to "OFF" will be reminded by a "ProtEct" message in the display!

You can also store this newly defined Patch at another location, if you prefer, again using the COPY/LOAD button. (This also explains why the display showed "1 to 1", in case you'd wondered!) First press the white button to activate the PATCH LED. Then the black COPY/LOAD button so that the display shows "1 to 1". You can now enter a new Patch number (using the numeric pad or the +/- buttons), so that the display shows "1 to 64" or whatever destination you chose. Pressing "COPY" a second time executes your command.

EXCHANGING PATCHES WITHIN MEMORY

The COPY procedure described above and the EXCHANGE feature allow you to arrange your Patches in the MASTER KEYBOARD's memory in the order that suits you best; this is especially useful in conjunction with a Patch Advance Foot Pedal to step from one Patch to the next.

■ EXCHANGE

Exchanging Patches is also very simple: let's say we want to swap Patch "1" with the Patch at location "59". First call up the Patch we want to exchange by activating the PATCH LED, then entering "1". Then press the black EXCHANGE/SAVE button - the display will show "1 And 1". Now enter the number of the Patch to exchange, "59" in our example. (As usual, you can use either +/- buttons or numeric pad). When the display shows "1 And 59", press the EXCHANGE button again and you're through!

■ EXT. SET

As we all know, an immense amount of data is transmitted to slave units on each Patch Change command. Data transmission is fast, but it still takes a certain amount of time for instructions to reach all the instruments in a system and to be implemented. When a certain data limit is reached some delay may become audible, leaving the last unit in your MIDI daisychain limping behind on a program change when you're ready to play on. This has nothing to do with the quality of the slave or the MASTER KEYBOARD, but is a matter of the maximum possible speed when transmitting data via MIDI.

The operating system of the BIT MASTER KEYBOARD is programmed to take this into account, and, among other details, will only send a program change command when truly neccessary. If the system notices that the current Patch is transmitting Sound Program "27" over MIDI channel 3, and the next Patch also uses Sound Program "27" on MIDI channel 3, no Program Change command will be sent. This reduces the data flow, and avoids time lags as far as possible.

The EXT. SET button allows you to over-ride the operating software and transmit all data. This feature is useful where front panel settings on a receiving keyboard have been changed during play (e.g. manual filter sweep). Using EXT. SET lets you return these settings to their original status for the next song, in the above example Sound Program "27" will be recalled in its original state.

Pressing "EXT SET" also helps you out when you lose track of things while programming a Patch - it will re-set all parameters in the current Patch to their original state.

■ TAPE

If the operating system of the MASTER KEYBOARD should ever 'crash' (due to power fluctuations, malfunction etc.), pressing the "TAPE" button twice gives you a general re-set and returns all parameters to their 'power up' status.

THE CASSETTE INTERFACE

The BIT MASTER KEYBOARD, like almost every modern microprocessor controlled instrument, is equipped with a cassette interface that allows all stored data (Patches!) to be saved onto a cassette, and re-loaded at a later time. In this way the storage capacity of the MASTER KEYBOARD can be extended almost indefinitely: you program new Patch configurations, store them on cassettes, and end up with a whole library of Patches that can be re-loaded anytime!

The 3-way switch at lower right of the Keyboard Table on the front panel lets you download and/or read in data selectively; set to "KB" for Patch data only; "SE" for sequencer data only; or "SE + KB" to read/store the whole memory at once.

The "TAPE IN" and "TAPE OUT" sockets on the rear panel are used to connect the BIT MASTER KEYBOARD to a cassette recorder. We recommend the use of a simple portable recorder, that has a microphone (or AUX) input and a headphone output (PHONES OUT). HiFi recorders with the usual line levels (-10 dB) are as a rule not suitable; however the MASTER KEYBOARD comes equipped with a very tolerant cassette interface, which can handle considerable level differences.

There are now various 'Data Recorders' from different manufacturers on the market, specially designed for use with Home Computers (and similar machines, like the BIT MASTER KEYBOARD), and usually reasonably priced. Please note that most such machines are designed to use Normal tapes (not the Chrome or Metal types); using the wrong tape can cause data-transmission problems. Talking of cassettes: though the cassette interface does not require HiFi quality (the frequency range required is modest), do use good quality, reliable cassettes, which provide a certain guarantee against tape drop-outs.

You should switch off any noise suppression systems (Dolby, dbx etc., etc.). If the recorder has a tone control (normally a treble cut), this should be fully open. The frequency range of the recorder should be in no way altered. Following these points will ensure trouble-free operation when using the cassette interface.

You should also remember that the MEMORY PROTECT switch on the back panel does not function in TAPE mode, so loading data from cassette will always over-write present memory settings. This also applies to incoming MIDI DUMPS of bulk data (from another MIDI unit, a computer or sequencer etc.), that are transmitted over the MIDI IN socket. Caution is therefore advised with all these operations!

Exiting Tape Mode resets the BIT MASTER KEYBOARD to its power up settings. The "TAPE" button can therefore be used as a 'soft' reset at any time: pressing it twice does the trick!

STORING PROGRAMS ON CASSETTE

Connect the "TAPE IN" socket on the BIT MASTER KEYBOARD with the headphones output of the cassette recorder, and the "TAPE OUT" socket with the microphone or Aux input on the cassette recorder. Use the 3-way switch on the front panel to select the type of data you want to save: "SE" for sequencer data only; "KBD" for keyboard data (Patches!) only; or "SE & KBD" to save the entire memory. Now press the red "TAPE" button on the front panel. The MASTER KEYBOARD is now in Tape Mode, shown by the LED above the "TAPE" button and "tAPE" in the display: you are ready to go!

1) Switch the cassette recorder to record.

2) Press the "SAVE/EXCHANGE" button on the BIT MASTER KEYBOARD. First a sine wave is transmitted, to ensure the correct level in machines with automatic recording level adjustment. Recorders with manual recording level should be adjusted so that the VU meter reads between -5 and 0 VU.

3) After around 20-30 seconds of continuous signal the data will be transmitted.

4) When the data transfer is over, the "SAVE" LED will go out, and the display will confirm completion of the storage process by showing "Good". (Transferring Sequencer data may take up to five minutes, so be patient!). To check your stored data in the verification procedure described in the following section you must remain in TAPE mode. Otherwise, pressing the TAPE button again returns you to normal operating mode and power up status.

VERIFICATION OF DATA STORED TO TAPE

To ensure that the data downloaded to cassette contains neither transmission errors nor drop-outs, the MASTER KEYBOARD allows you to verify this data. For fairly obvious reasons, you should make no changes whatsoever on the MASTER KEYBOARD between the SAVE and VERIFY operations! (Any discrepancy between the Tape and MASTER KEYBOARD data will result in an error message).

1) Check that the cassette recorder TAPE OUT connection is properly hooked up to the MASTER KEYBOARD TAPE IN socket.

2) Rewind the tape to the start.

3) First press the red "TAPE" button ("tAPE" will appear in the display); and then press the "VERIFY/EXT. SET" button (the display will show "verify" briefly).

4) Now press the "PLAY" button on the cassette recorder. The volume control should be around the middle setting.

5) Following the verify procedure (which can also take up to five minutes), the display will show "good" for a successful transfer operation; or if the data comparison shows discrepancies, "nodata", "bad data" or "bad file" will appear. (A full explanation of these display messages can be found in Appendix A).

If after several attempts, including trying different volume settings, you are still getting a "bAD FILE" error message you should try the whole operation again using a new (i.e. unused) cassette until data verification is successful. There is a brief data transfer troubleshooting guide after the following section: check it out before you despair completely!

LOADING DATA FROM CASSETTE

1) Loading data from cassette into the **BIT MASTER KEYBOARD** overwrites the memory: CHECK that the data now in storage has been saved onto cassette itself or is no longer needed!!! Use the switch on the front panel to select which data to load, as described above for data storage. ("KB" for keyboard data only, "SE" for sequencer data only; or "KB & SE" for all data). Press the "TAPE" button; its LED will come on.

2) Press the "LOAD/COPY" button on the **BIT MASTER KEYBOARD**, and the PLAY button on the cassette recorder. The level on the cassette recorder (if under manual control) should be set to about 1/2 of the maximum level. This level varies from machine to machine, so you may have to try several times before finding the ideal level. (Marking this on the cassette recorder saves endless fiddling).

3) At the end of the data transfer the **BIT MASTER KEYBOARD** will inform you if it was successful, as described above under VERIFY.

After a successful transfer press the "TAPE" button again to return the **BIT MASTER KEYBOARD** to its Normal Mode and power up settings, with a memory full of new Patches from the tape! And yes, as you might already have guessed, we are now going to remind you to make sure that the "MEMORY PROTECT" switch is "ON" - protecting all these precious Patches from sundry disasters!

MIDI DUMPS

Bulk transfers of MIDI data can also be accomplished at far greater speeds in MIDI DUMP format; this data is transmitted 'en bloc' over MIDI IN from a sequencer, another synthesizer, computer equipped with the relevant software, or may also be exchanged directly from the memory of another **BIT MASTER KEYBOARD**. More details in the MIDI Appendix at the back of this manual.

DATA TRANSFER TROUBLESHOOTING

If you're having any trouble storing or loading data to/from cassette the following list shows the most common causes of errors in data transfers. (Check the whole list, often a combination of several of these factors is sabotaging your efforts!).

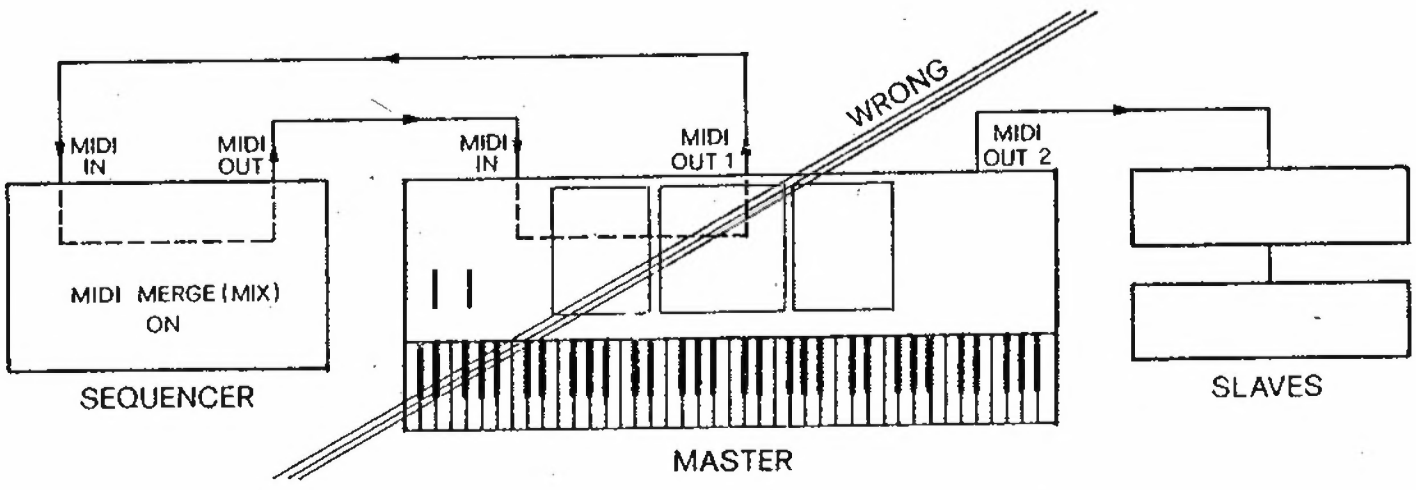
- bad connection: check your connecting cables/jacks/sockets
- noise suppression active (Dolby, dbx etc.); these must be switched off!
- wrong level from recorder
- drop-outs on the cassette.

Errors when reading in data can also be caused by phase problems arising in the cassette recorder. Some recorders designed for use with computers have a phase reverse switch (sometimes just labelled PHASE), to eliminate such problems. As far as possible you should use the same recorder for both recording and re-loading program data; any differences in tape head alignment (Azimuth angle) can cause phase problems, these will be eliminated automatically if the same recorder is used for recording and playback.

CONNECTION OF AN EXTERNAL SEQUENCER

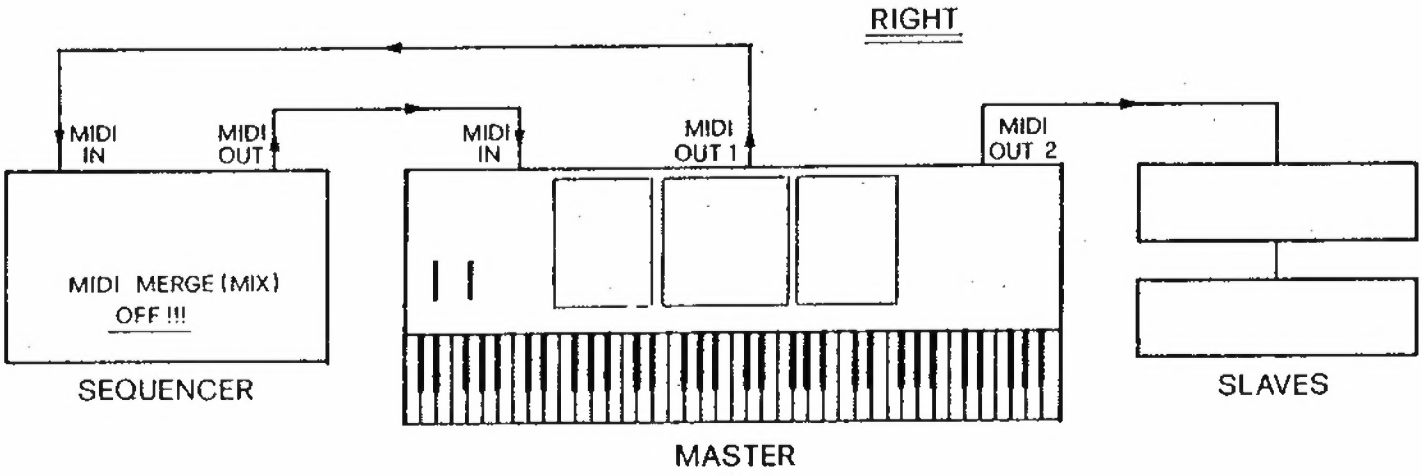
MIDI MERGE and MIDI THRU, far from harmless subjects! Many newer sequencers come equipped with a software feature that allows you to route an incoming MIDI signal directly to the MIDI OUT connection. Fine so far, but - and it's a big but - this can cause catastrophic confusion when wrongly linked. If you thought crossed phone wires were bad, you ain't seen nothing yet!

With an external sequencer that has a MIDI MERGE (MIDI MIX or whatever name your unit uses) function, we can route data coming into it on MIDI channels 2 thru 16 straight through its MIDI OUT. Any MIDI data sent out by the **MASTER KEYBOARD** to one of these channels will therefore reappear at the **MASTER KEYBOARD** MIDI IN in a flash. If we have programmed OMNI ON here (in order to receive data on all incoming MIDI channels), the signal will again be passed on to the MIDI IN of the external sequencer, closing the loop.



This loop is, in fact, the MIDI equivalent of acoustic feedback - or a 'howl round'. When you press a key on the keyboard, the MIDI signal generated will start chasing its own tail through the loop. If you have a synthesizer hooked up to this cycle, you'll hear your note repeated again and again, at an incredible speed. Depending on exactly how much other information is being transmitted, and just how long you can stand it before interrupting the cycle, you'll find that one or more of the MIDI units in your system may go down. You should make sure this never happens - and if it should, reset the **BIT MASTER KEYBOARD** by pressing the TAPE button twice or turning the power off and then on again.

THE RIGHT CONNECTIONS

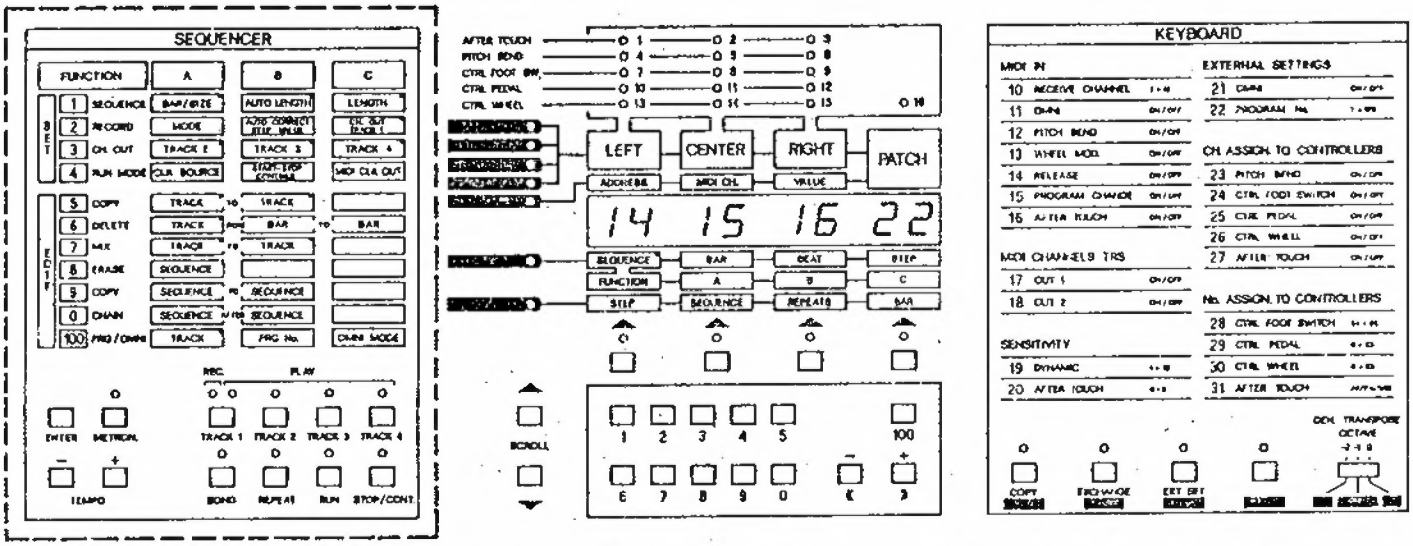


As you know already, we can divide MIDI data between the two MIDI OUT connections. Let's connect the sequencer to MIDI OUT 1 and send data to the slaved units over MIDI OUT 2. In this case, MIDI OUT 1 should be set to transmit on MIDI channel 1 only, while on MIDI OUT 2 all signals are go, and all 16 LEDs in the matrix can blink. (Details on how to activate MIDI channels are in found in the KEYBOARD MAP section, under MIDI CHANNELS TRS, Page 12). In the sequencer you record off MIDI channel 1, and transmit over channels 2 thru 16. This gives you a 'clean' bi-directional connection.

It might be easier to avoid MIDI MERGE problems entirely by connecting the external sequencer to either of the MIDI OUTs, and only linking the slaves directly to the external sequencer, but you would lose out on most of the advantages that the **BIT MASTER KEYBOARD**'s advanced features give you.

DON'T RECORD IN DOUBLE SOUND MODE

Another important point when using an external sequencer: don't record using Patches where you have programmed double or multiple sounds. Why not? Using double sounds lets you have several MIDI units play the same notes; to do this the **MASTER KEYBOARD** sends the same note on/off data several times, for different MIDI channels. When in record mode, the external sequencer disregards incoming MIDI channels, but registers all notes transmitted - and will therefore fill its memory up to three times as fast.



The features we've covered so far make up the keyboard operating system of the BIT MASTER KEYBOARD - and pretty impressive it's been too, you might think. But we're by no means finished yet: the icing on the cake, so to speak, is the MASTER KEYBOARD's on-board sequencer! Pretty tasty icing it is too: not just a poor excuse for the word 'sequencer', like the arpeggiators masquerading as such in some other (nameless) manufacturers' machines. If we weren't so modest (ahem!), we'd say it really qualified as a 'Song Composer'! Four polyphonic tracks, eight completely separate sequences and a 4000 note memory (not even counting repitetions) are all awaiting your disposal. The simple operating procedure will help you link musical themes and fragments into complete songs, in no time. The advantages for the musician - with the band or in Home Recording - are practically unlimited, as you can all easily imagine. A nice 'encore' from BIT, doncha think?

THE SEQUENCER TABLE: PLAYING A SEQUENCE OR SONG

Before actually composing or editing a sequence, let's take a quick look at the way the sequencer is built up. You'll find the special sequencer control buttons at the bottom of the Sequencer Table on the left of the front panel. You might well have been overpowered by curiosity before this, and hit the red "RUN" button - nothing wrong with that, providing the red REC LED was off at the time! If it is lit, it shows that the MASTER KEYBOARD is in RECORD mode, and any notes stored on Track 1 will be erased on pressing the "RUN" button.

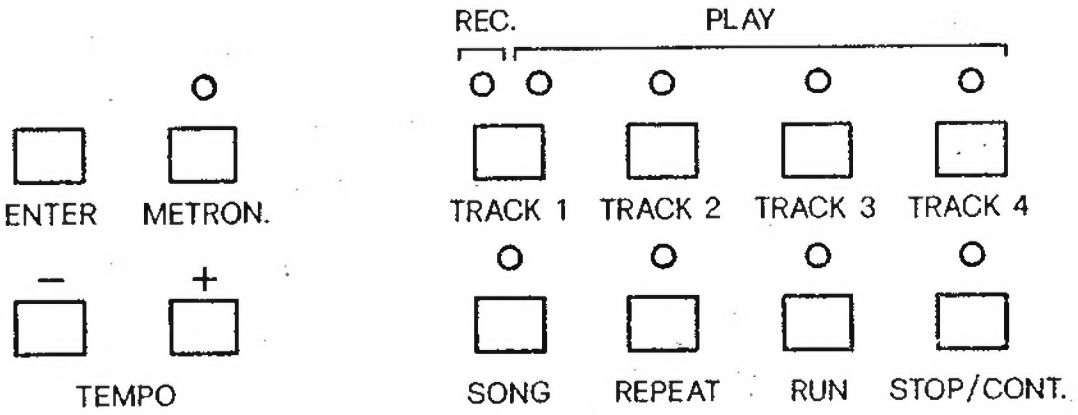
No need to worry though, you always have to activate RECORD mode yourself (by pressing the grey "TRACK 1" button at least once), the MASTER KEYBOARD won't do this independently and mess up your stored sequences! We'll be getting to that in just a moment.

The yellow LEDs above the TRACK buttons show whether or not the sequencer has already stored data in this sequence; the active green LEDs show Tracks that have already been laid down, while Tracks with dark LEDs are presently inactive and may still be free. It is possible to suppress (or inactivate) Tracks that are already laid down, and easy to check whether they are really empty or only disabled: if any (or all) of the green LEDs are dark, try pressing the relevant "TRACK" button(s) one at a time to activate them. If you can't activate any of the four LEDs, Sequence 1 is empty.

You can now press the red "RUN" button to listen to Sequence 1. The display will show "EMPTY" if Sequence 1 has not yet been recorded, but also if all Tracks have been inactivated.

The Tracks are all active; the display fills with flashing lights and numbers, so the sequencer is obviously doing something: but all MIDI units are quiet as the grave .... could be that the sequencer is transmitting on the 'wrong wavelength' (a.k.a channel number)! We'll clear up this problem in a later section, see Page 39.

So, here's a quick overview of the control buttons and their functions:



■ RUN

The red "RUN" button starts the sequencer at the beginning of the current Song or Sequence. When the sequencer is in RECORD mode, it will 'count you in' for eight beats before starting to record; in PLAY mode there is no pause, the sequencer starts immediately.

■ STOP/CONTINUE

You can stop the sequencer at any time (in either SONG or SEQUENCE mode), by hitting the yellow "STOP/CONTINUE" button; to re-start at the same location, press "STOP/CONTINUE" a second time.

■ TRACK 1/2/3/4 [PLAY]

The four "TRACK" buttons serve to activate the separate sequencer tracks. Their current status is shown by the small yellow LEDs within the PLAY bracket above each button. You can suppress individual Tracks in PLAY mode by pressing the corresponding "TRACK" button (yellow LED will go out). The grey TRACK 1 button serves a dual purpose....

■ TRACK 1 [RECORD]

As we already described, pressing "TRACK 1" twice will turn the sequencer to RECORD mode. This is shown by the red REC LED above the grey TRACK 1 button.

■ ENTER

The yellow ENTER button is used to store data, and execute commands typed in in EDIT mode; when you record tracks and sequences using Single-Step mode, this button serves to signal each event you want to record in memory.

■ METRONOME

You find the pace-setting click of the metronome from the BIT MASTER KEYBOARD's built in loudspeaker irritating? Hit the black "METRON." button to turn it off! It will stay silent till you hit "METRON." again, or enter RECORD mode. (If you'd like that bit of extra help with timing, but find the click disappearing in the rest of your sound, the METRONOME OUT socket on the back panel lets you route this signal to an external amplifier or mixing desk).

■ TEMPO

The TEMPO +/- buttons let you adjust the tempo of the sequencer (you'd never have guessed, would you?); one beat per minute (bpm) in either direction each time you hit the button.

You can check the current tempo (in bpm) in the last three figures over in the main display; if you now hold one of the "TEMPO" buttons down, you'll see the beat increase (or decrease) very rapidly. This makes for fast tempo changes, but it's hard to hit just the speed you want - unless you have the incredible reflexes of a dedicated video-game-player! For the rest of us the BIT MASTER KEYBOARD has a simple solution. If you hold the "-" TEMPO button down, you can now increase the tempo by one bpm by pressing the TEMPO "+" button once. (Works in the other direction too, of course, holding the "+" TEMPO button and decreasing one bpm for each hit of the "-" TEMPO button!). So, for initial speed you can zoom off in the right direction and then 'brake', to close in on the Tempo in accurate single steps!

When pressing one of the "TEMPO" buttons, the four left-hand figures in the main display will show the current note capacity remaining free in the sequencer's memory. (In addition to the current tempo appearing in the rightmost three figures, as we described above).

■ SONG

The MASTER KEYBOARD's SONG mode, accessed by pressing the "SONG" button, plays the complete song recorded in the sequencer: that is all the sequences that you have recorded and chained together.

■ REPEAT

The REPEAT function is particularly useful for rehearsal or improvisation; pressing "REPEAT" lets you play the current sequence over and over, as though on a tape loop.

RECORDING SEQUENCES

To record your own works in the sequencer, you first have to tidy up in there: this means erasing the entire sequencer memory. If you'd like to keep the pre-recorded sequence/song you should go back to the "STORING DATA ON CASSETTE" section and save it to tape.

After using the "SCROLL" buttons to call up SEQ/EDIT mode, the values in the main display will show you exactly where you are in the current sequence: reading from left to right, you find the current sequence, bar, beat and step - as shown in the first line of the table below the display! We'll be getting to the second 'layer' in SEQ/EDIT mode - the FUNCTION level in just a moment. We will just quickly point out that if you land in FUNCTION mode (as shown by a preceding "F" in the display) by mistake, you can escape by pressing the yellow "ENTER" button, or one of the "SCROLL" buttons!

While entering sequencer data follows the same lines as earlier parameter values, there is one important difference: in SEQ/EDIT Mode you can only use the +/- buttons to change the values in the display, (and not the numeric pad). The numeric pad is used to access the different FUNCTION levels, as they are shown in the sequencer table. So keep them straight:

+/- buttons to change VALUE
numeric pad to change FUNCTION #

The sequencer works like a tape recorder, in the sense that you can always wind back and forwards to reach a particular location in a sequence or song. The white buttons under the main display, and the +/- buttons, are used to reach a particular location - right to the exact 'step'! (Pressing the "STOP/CONT." button will then re-start the sequencer at that exact spot, while "RUN" always starts you off at the beginning again).

One important point that you should note when recording tracks in the sequencer: data laid down in each track of the sequencer will conform exactly with the programming of the Patch you select. This means that any transpositions, touch sensitivity changes or reassignment of controller numbers etc. etc. in the Patch selected will be reflected in the recorded sequencer data.

SEQUENCE/FUNCTION MODE

You can try this out now, as you prepare to record a sequence: using FUNCTION 8 to erase the current contents of the sequencer's memory. As we mentioned before, you should do this before recording new sequences or songs, because certain functions can no longer be changed once the sequencer has stored data.

We'll follow this one step-by-step, before going on to the descriptions of the other FUNCTION commands:

1) Put the BIT MASTER KEYBOARD in SEQ/EDIT mode, using the "SCROLL" buttons until the LED comes on.

2) Then use the numeric pad call up FUNCTION 8 [ERASE SEQUENCE], by hitting "8"; the leftmost display will show "F8".

3) You can now choose the sequence you want to erase, using the +/- buttons until the relevant details appear in the display.

   To clear the entire contents of the sequencer, you should use the "+" button to step past Sequence 8, till the display shows "PooF": which expresses perfectly what will happen to the contents!

4) When you're ready, you press the yellow "ENTER" button in the Sequencer Table to carry out the command! You now have a clean slate to work on...

The following sequencer control commands follow the pattern laid out in the Sequencer Table on the front panel: each of the 11 FUNCTION levels corresponds to a particular instruction (or sequencer command). These are divided into sub-sections (marked "A", "B" and "C"), according to the specific area you are working in. You will also notice in the Sequencer table that Functions 1 thru 4 set conditions for recording; while 5 thru 9, 0 and 100 are used when editing sequences.

Each FUNCTION is called up and programmed in the same way: use the "SCROLL" buttons to access SEQ/EDIT mode; when the LED is lit, use the numeric pad to enter the Function Number. Next change the current value using the +/- buttons; when you have the correct value in the rightmost VALUE display, press the yellow "ENTER" button to store the command in memory, or execute your instruction.

Unlike programming Keyboard Functions and Parameters, entering SEQ/FUNCTION mode automatically activates the ADDRESS LED, so you can enter the FUNCTION number (using the numeric pad) immediately, without using the white button under the display. The LED under the next entry field will also come on automatically, so this holds for the first value too (which you now change/set using the +/- buttons). To select the subsequent fields, however, you'll have to use the white buttons again!

FUNCTION 1: SEQUENCE PARAMETERS

This first FUNCTION allows you to set parameters determining the basic structure of your sequence, in the three sub-sections: BAR SIZE, AUTO LENGTH and LENGTH. To access FUNCTION 1, you hit "1" on the numeric keypad, and will see "F1" in the ADDRESS display.

■ FUNCTION 1A [BAR/SIZE]

The CENTER display will now show the BAR SIZE programmed for the current sequence. 4/4 time is the default value, which appears in the display as "4˙4". You can now use the +/- keys to set a new value: hitting the "-" key once will give you 3/4 time, shown in the display as "3˙4".

■ FUNCTION 1B [AUTO LENGTH]

The MASTER KEYBOARD's sequencer allows you to choose the length of your sequences in two ways: you can either have your sequence length set automatically after recording your first track, or enter a fixed number of beats per sequence.

If you choose AUTO LENGTH "ON" (by setting a value of "1" in parameter F1B), you can go ahead and record your first track. The sequencer will then automatically take that length as a guide for all other sequences: their length will be fixed precisely (to the exact step, the value of which is set in FUNCTION 2B, see below), when you press the "STOP/CONTINUE" button after a successful recording of your first track. If you prefer to enter a fixed value for your sequence length, you should set AUTO LENGTH "OFF" (value "0").

■ FUNCTION 1C [SEQUENCE LENGTH]

Use this function to enter a fixed value (in beats per sequence) for SEQUENCE LENGTH, (for obvious reasons, this will only work after selecting "AUTO LENGTH OFF" in FUNCTION 1B). You enter a value (between 1 and 99) using the "+/-" buttons, and will see them in the PATCH display.

FUNCTION 2: RECORD PARAMETERS

This function level sets sequencer conditions in RECORD mode: again, select "FUNCTION 2" using the numeric pad (the LEFT display will show "F2"), before entering your values for each sub-section.

■ FUNCTION 2A [RECORD MODE]

The CENTER display will show the current status of this RECORD MODE parameter: "rt" for Real-Time recording, or "St" for Single Step Mode. The "+/-" buttons are used to switch between these modes.

SPECIAL NOTE: SINGLE STEP RECORDING

Real-Time recording should present no problems, even for novices in sequencer operation, but there is an important point concerning Single Step recording. As we mentioned above, the yellow "ENTER" button is used to store each 'step' in memory, before proceeding to the next. It is important that you hold each note, only releasing the key after pressing the "ENTER" button to complete the step. Why? Although pressing and releasing a key within the same step will generate the required "Note On" and "Note Off" commands, they will fall at the exact same point in the sequencer's memory and thus cancel each other out! Not quite what you had in mind, was it? Single Step Mode really means just that: each and every single event must be recorded separately.

■ FUNCTION 2B [AUTO CORRECT/STEP VALUE]

When recording in Real-Time mode ("rt" in the previous parameter), you can have the **MASTER KEYBOARD** correct your timing automatically. (Those of you used to working with Drum Machines will know this AUTO CORRECT function as 'QUANTIZE'). In FUNCTION 2B you set the STEP VALUE that the sequencer will use to correct imprecise timing in real-time recording; this value divides each bar into a given number of 'steps'. Using the AUTO CORRECT function ensures that any notes played a bit early or late while recording will be 'moved' (or 'rounded off') to the nearest step.

The default value here is "16", which rounds off imprecise timing in 16 steps to each bar. Use the "+/-" buttons to change the STEP VALUE (shown in the RIGHT display). Your options are the numeric values "4", "8", "12", "16", "24" and "32"; or to eliminate the quantization effect by selecting free play (shown as "Fr" in the display), which records in 96 steps to the bar and thus makes any rounding inaudible!

The above AUTO CORRECT function only applies to sequences recorded in real-time mode, but the STEP VALUE you choose will also determine the size of each step in single step recording.

FUNCTION 2C/ FUNCTION 3A/B/C : MIDI CHANNEL OUT

The third sub-section of FUNCTION level 2, together with all of FUNCTION 3, lets you choose which MIDI channels the BIT MASTER KEYBOARD's internal sequencer will use to transmit data - sending each Track out on a separate MIDI channel. Those of you with frantically active sequencers and obstinately silent MIDI units will find the solution we promised earlier here!

■ FUNCTION 2C [CH. OUT TRACK 1]

Here you select the MIDI channel number that you want to use to transmit Track 1 of your recorded sequence. The current channel number will appear in the PATCH display, and you use the "+/-" buttons to select a new one.

■ FUNCTION 3A/B/C [CH. OUT TRACK 2/3/4]

After selecting FUNCTION 3 using the numeric pad ("F3" in the LEFT display), the remaining displays will show the MIDI channels currently being used by Tracks 2, 3 and 4. Here again, the "+/-" buttons are used to change values.

FUNCTION 4: RUN MODE PARAMETERS

As would be expected from an up to the minute instrument, the BIT MASTER KEYBOARD's sequencer is versatile, and will happily work in tandem with your other sequencers or drum machines - and also with the computers that are gradually finding their way into many a musician's keyboard set up. The following parameters are used to configure the MASTER KEYBOARD sequencer when working with these machines: we've taken all the pain out of interfacing with the outside world! It's now simple to co-ordinate features like the Clock - for perfect timekeeping - and synchronize START/STOP commands too.

■ FUNCTION 4A [CLK. SOURCE]

In this parameter you tell the sequencer just which clock to watch, or listen for, according to which of the sequencers etc. in your set-up is acting as what you could call 'official time-keeper'.

The default setting for FUNCTION 4A is LOCAL - shown as "Lc" in the CENTER display - where the sequencer remains its own lord and master and uses the internal clock for orientation.

One step up using the "+" button, you'll find the MIDI CLOCK setting ("Md" in the display). This synchronizes the sequencer to an incoming MIDI CLOCK signal, originating in another MIDI unit with MIDI CLOCK capability. You can also synchronize the MASTER KEYBOARD sequencer to incoming timekeeping data arriving at the SYNC-IN or TAPE-SYNC-IN sockets (on the back panel). You'll need to hit the "+" button one more time, so that "SY" appears in the display.

The BIT MASTER KEYBOARD sequencer can also act as time-keeper for other units connected to the SYNC OUT socket. It will transmit a clock signal to Tape Machines, which the MASTER KEYBOARD will later recognize and use for perfect syncronization to your taped recording. This signal should be recorded on a separate Tape Track. As the on-board sequencer is acting as the 'master' here, FUNCTION 4A must be set to "Lc", activating the internal clock. (Note that the "SY" setting is only used when the MASTER KEYBOARD sequencer is receiving synchronization data).

■ FUNCTION 4B [START-STOP CONTINUE]

Co-ordination of the START/STOP and CONTINUE commands with external units works in a similar way: you can tell the sequencer which commands to act on, i.e. which STOP button is relevant. Setting "Lc" here will enable only local commands; if you only want to start or stop the sequencer via MIDI commands from another unit set "Md". For complete flexibility, you can choose the value "bH" - which lets you start the sequencer from either "STOP/START" button! (Choose values using the "+/-" buttons and check the current setting in the RIGHT display).

■ FUNCTION 4C [MIDI CLK OUT]

Here you can choose where to send your MIDI CLOCK signal - or indeed, decide not to send out a MIDI CLOCK signal at all. To send MIDI CLOCK information out over MIDI OUT 1 only, you use the "+/-" buttons to set a value of "1" in this parameter. One step further with the "+" button gives you a value of "2", to send CLOCK data to MIDI OUT 2 only. To synchronize MIDI units hooked up to both your MIDI OUT sockets, choose "bH". Those of you not wanting to transmit any MIDI CLOCK at all can set FUNCTION 4C to "oF" to suppress the data completely. (These values will all appear in the PATCH display, when you're in FUNCTION 4).

FUNCTION 5: COPY [TRACK TO TRACK]

As the BIT MASTER KEYBOARD sequencer will only record on Track 1, you need to be able to copy this to another location before laying down further tracks. Once you've selected FUNCTION 5 (using the numeric pad), the sequencer will ask you which track you want to copy and where to, by showing "F5 .. .." in the display.

Let's say you've just recorded your first Track, and want to copy this from Track 1 over to Track 4, in order free Track 1 for more recording. The CENTER LED under "F5A" is already active, so you can now hit the "+" button (without pressing the white button) to enter "1" - the Track you are copying <u>from</u>. The display will now show you "F5 1 ..". Next press the white button under the RIGHT display to activate "F5B", and use the "+" button to enter "4", or the Track you want to copy <u>to</u>. The display will confirm with "F5 1 4". You can now carry out your COPY operation by pressing the yellow "ENTER" button, and return to SEQUENCE mode. The yellowLED for Track 4 will come on to show that your COPY was successful.

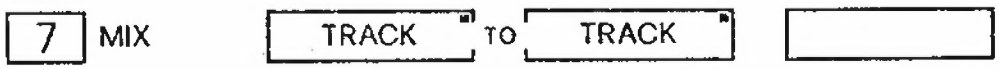
NOTE: This COPY function will always over-write any notes already recorded in your 'destination' Track. To copy Tracks <u>without</u> erasing an existing recording you can use the MIX operation in FUNCTION 7. The MIX operation follows the exact same procedure we've just described here for COPY, with one essential difference: contents of your destination Track are not lost as a result!

■ FUNCTION 6: DELETE [TRACK FROM BAR TO BAR]

We already encountered deleting entire Tracks from the sequencer's memory (using FUNCTION 8), here in FUNCTION 6 you can eliminate single bars from any Track without disturbing the rest of your recording.

Select FUNCTION 6 and the display will show "F6 .. .. ..". As in the above example under COPY, this asks you for information: first, which Track you want to edit, and then details of the particular location you want to delete. You first use the "+" button to select the Track number, and then go to sections "F6B" and "F6C" to enter the bars you want to delete.

Working in Track 4, for example: after you select "4" in "F6A" (CENTER display), the display will show "F6 4 .. ..". To delete the second and third bars on this track you enter "2" in "F6B" (RIGHT display), then "3" in "F6B" (PATCH display). You should have the routine down by now: first pressing the white button to activate each field, then entering your bar numbers/values using the "+" key. The display should show "F6 4 2 3", and you can now tell the sequencer to carry out your DELETE operation by pressing the yellow "ENTER" key. Once you're back in Sequence Mode, hitting the "RUN" button will let you hear the result! You can also delete the entire contents of Track 4, by pressing the yellow "ENTER" key when the display shows "F6 4 .. .." - in the absence of other instructions the sequencer will erase the whole Track.



■ FUNCTION 7: MIX [TRACK TO TRACK]

The MIX function is used to copy data from one Track of the sequencer into another, <u>without</u> erasing any notes already recorded in your destination Track. The MIX function works in the same way as the COPY function described in FUNCTION 5 above, but we'll say it again, to save you flicking pages! You select FUNCTION 6 (using the numeric pad), and the sequencer will ask you which track to mix to which other track - by showing "F7 .. .." in the display.

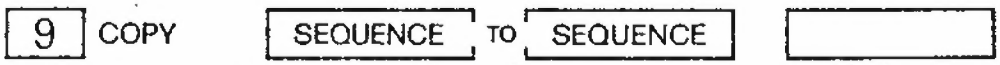
Let's say you want to mix the contents of Track 1 into Track 3: with the CENTER LED under "F7A" active, you use the "+" button to enter "1" (the Track you're copying <u>from</u>). The display will show "F7 1 ..". Next press the white button under the RIGHT display to activate "F7B", and use the "+" button to enter "3" (mix destination Track). The display will confirm with "F7 1 3". You execute this MIX operation by pressing the yellow "ENTER" button, and return to SEQUENCE mode.

The MIX function is particularly useful where you have laid down a track in Single Step Mode, but would also like to include continuous controller data (such as pitch wheel movement). For obvious reasons, such information cannot be recorded in single steps, because the movement of the wheel will normally span several steps. Here you can use the MIX function like an overdub: first you record the single steps and then transfer this data to another track; then record the continuous controller information in Real Time on a separate track. When this recording is complete, you can use FUNCTION 7 to mix the two tracks. You will then have a single track containing both your notes recorded in Single Step Mode and the continuous controller information!

■ FUNCTION 8: ERASE [SEQUENCE]

This ERASE function is used to erase single sequences, or clear the entire sequencer memory. After selecting FUNCTION 8, the LEFT display will show "F8". Choose the sequence you want to erase, using the +/- buttons to enter a sequence number (1-8), the details will appear in the CENTER display. When you're ready, just press the yellow "ENTER" button to carry out the command!

To clear the entire contents of the sequencer, you should use the "+" button to step past Sequence 8, till the display shows "F8 PooF": which expresses perfectly what will happen to the contents! Pressing "ENTER" then gives you a clean slate to work on...



■ FUNCTION 9: COPY [SEQUENCE TO SEQUENCE]

FUNCTION 9 is used when composing songs: to repeat any basic themes, you can simply copy the sequence, instead of recording the whole passage again. This means that only new over-dubs, like additional solos for example, need now be recorded over your original base Track(s).

You should by now be familiar with the procedure for entering the details for the COPY procedure: select FUNCTION 9 (using the numeric pad); enter the sequence you want to copy in field "F9A"; then the number of your destination sequence under "F9B" (activating the fields with the white buttons and using the "+/-" keys to enter values).

■ FUNCTION 0: CHAIN [SEQUENCE AFTER SEQUENCE]

This tenth function level will save you a lot of work in Song Mode: here you can link sequences together to form a 'chain'. You then save programming steps in Song Mode, where you call up the chain rather than each separate sequence.

Say your finished Song is made up of three sequences (1, 2, and 3), which will follow the pattern 1 - 2 - 1 - 2 - 3 - 3 - 1 - 2 - 3; you can see that here sequence 1 is always followed by sequence 2. Using the CHAIN command "F0" lets you tie sequence 1 to sequence 2; so that in Song Mode you'll only need six Song Steps instead of nine. Only a small saving in this simple example, but the CHAIN feature is extremely useful in complex song compositions.

Entering the details follows the same pattern as before: the display shows "F0 .. .."; under "F0A" you enter the first sequence in your CHAIN, then go to "F0B" to enter the second.

■ FUNCTION 100: PRG/OMNI [TRACK - PRG. NO. - OMNI MODE]

The **BIT MASTER KEYBOARD** sequencer allows you to store (Sound) Program Change information for the MIDI units it is controlling - for each Track and at any location!

In SEQ/EDIT Mode, first position the sequencer at the place where you want a Program Change, either letting it 'run' or using Single Step mode to reach that precise point. Now select FUNCTION PRG/OMNI, by pressing the "100" button: the display will show "F. .. .. ..". You can now enter the details for your Program Change (first select each field with the white button, then use the "+/-" buttons to enter values). In the "A" field choose the Track on which you want to transmit a Program Change command; under "B" enter the Sound Program number (1-128). In the "C" field, you can also store an "OMNI MODE" value ("1" = ON, "0" = OFF). When you're through, use the yellow "ENTER" button to store your Program Change! The sequencer will execute Program Changes a millisecond or so before the location you programmed, so that notes played right on the beat don't get strangled!

Recording a second Program Change at the same location (step) will over-write and replace the first Program Change stored.

SONG MODE

Having recorded a handful of sequences, we can now turn to linking them together into a complete Song! There are 32 steps available in the **BIT MASTER KEYBOARD** sequencer's Song Mode, not counting sequences already linked (using FUNCTION 0) or repetitions.

We leave Sequence Function Mode, using the "SCROLL" buttons to step back through Sequence Mode and then on to Song Mode - as shown by the active SONG LED. The display will show "1 1 1 1" (or the position last accessed), and is ready to go!

The LEFT display now shows the current SONG STEP; the CENTER display tells you which sequence is programmed at this location; the RIGHT display contains information on the number of repeats (if any); while way over to the right, the PATCH display tells you which bar you're in at the moment, according to the sequencer's running count. (The Song line of the table below the display should help you keep the fields straight !).

In Song Mode the numeric pad is not used at all, all you're going to need while entering values are those famous "+/-" buttons. Starting with Step 1: first select the sequence number (CENTER display), then enter the number of times you want this sequence repeated (RIGHT display) - as usual, using the white buttons to activate each field in turn. Once you've typed in all the information for Song Step 1, press the yellow "ENTER" key to store the data in the sequencer! You program each step in the song in the same way (and can always check the current bar number in the PATCH display). When your Song is complete, you have to let the sequencer know somehow - and nothing's simpler! After programming your last Song Step, select the next step; then, instead of entering a sequence number, hit the "-" key until "End" appears in the display, then press the "ENTER" key. (Sequence "End" in fact corresponds to the non-existent Sequence number "0").

You gain added flexibility when programming Songs by suppressing certain Tracks of a sequence in one Song Step, but using all Tracks in another. (The data laid down on the inactivated Track is not erased, but only 'muted' at the particular location you've chosen). How it works? Easy: once you've selected a sequence number for the Song Step, you can inactivate (or mute, or suppress) the data on one or several Tracks simply by pressing the relevant "TRACK" button/s (so that the green LED goes out), before pressing the yellow "ENTER" key to store this Song step. You've already programmed a whole Song and now want to get rid of two Tracks in a particular location? No need to start over; just position the sequencer at the Step you want to change, use the "TRACK" buttons to inactivate the relevant LEDs and press "ENTER" - all done! You should note that inactivating a Track in this way will affect only the individual Song Step you just programmed - the Track will remain active where the same sequence is also used in other Song Steps.

The **MASTER KEYBOARD** allows you to program several of the "End" commands described above, in different Steps within Song Mode. This allows you to split this part of the sequencer's memory into several separate sections, which can then be used as up to four individual Songs. (Always with the proviso that there is enough memory capacity free, and that each song doesn't use too many of the eight available sequences!). For easiest access, you should arrange these Songs in the order in which you'll want to use them. Pressing the "RUN" button (with the SONG LED active) will start the first of your songs; the sequencer will pause at the end, and hitting the "STOP/CONTINUE" button starts your second Song. In order to play only those Songs that start at 701ater Song Steps, you will have to position the sequencer to their starting location before pressing "STOP/CONTINUE".

INSERTING AND DELETING SEQUENCES IN SONG MODE

You've put together a Song, and now decide that your composition would sound better if you re-arranged it somewhat? As if we'd forget that kind of musical fine tuning: the **BIT MASTER KEYBOARD** lets you do just that, without entering all the details again! You can delete a single Step from your Song, or insert another, wherever you like.

It's real easy too: just position the sequencer at the Step where you want a change. Press and hold the white "STEP" button (under the LEFT display), and press the "-" key to delete this Step. To insert a Step at this location, you press the "+" key while holding the "STEP" button, then select SEQUENCE (using the white button under the CENTER display) and enter the number of the sequence you want to insert (using the "+/-" keys in the usual way). In both cases, the rest of your recording remains unchanged.

SONG TEMPO

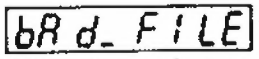
You can also change the tempo of any song as the sequencer is playing, without affecting the programmed tempo that you stored while recording. Simply pressing the "TEMPO" buttons while the SONG LED in the Sequencer Table is active will do the trick!

APPENDIX A: DISPLAY MESSAGES

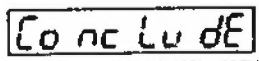
This is a short list of error messages that appear in the BIT MASTER KEYBOARD's display. Not included is information appearing as part of normal operations.

- "BAD DATA" 

Errors in data transmitted over the cassette interface, or in MIDI DUMPS (Tape drop outs, tape hiss etc.).

- "BAD FILE" 

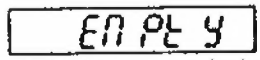
The MASTER KEYBOARD is not receiving the kind of file it expected. Check the position of the "GENERAL TRANSPOSE" switch on the front panel, used to select between "SE", "SE & KBD" or "KBD" data.

- "CONCLUDE" 

A reminder from the MASTER KEYBOARD that your last data entry is incomplete.

- "DELETE" 

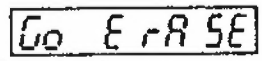
Deletes the current Song Step.

- "EMPTY" 

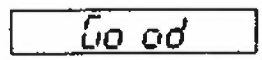
The selected operation cannot be executed, as this Track is either empty or inactive.

- "FULL MEM" 

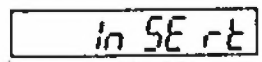
No memory capacity remains free.

- "GO ERASE" 

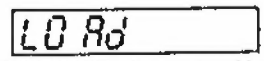
This is a general error message. Example: the LENGTH of the current sequence cannot be changed if the sequence already contains data - you should GO ERASE first!

- "GOOD" 

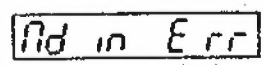
Confirms a successful Tape operation.

- "INSERT" 

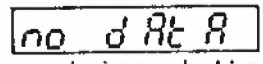
Inserts a new sequence at the current Song Step.

- "LOAD" 

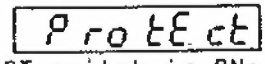
The BIT MASTER KEYBAORD is reading data.

- "MDIN ERR" 

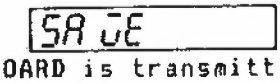
The MIDI IN socket is receiving incomplete (or otherwise erroneous) data.

- "NODATA" 

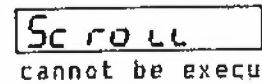
There is no data arriving at the cassette interface.

- "PROTECT" 

The MEMORY PROTECT switch is ON; you cannot write to memory.

- "SAVE" 

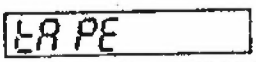
The MASTER KEYBOARD is transmitting data.

- "SCROLL" 

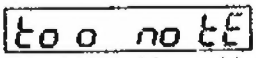
This operation cannot be executed in the current mode: check your SCROLL setting.

■ "SELECT" 

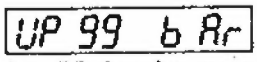
This operation cannot be executed in the current setting: check that the correct LED is active (e.g. PATCH LED for saving/exchanging Patches in memory).

■ "TAPE" 

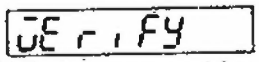
Confirms that the MASTER KEYBOARD is in Tape Mode (after you hit the TAPE button).

■ "TOO NOTE" 

You have programmed more than the allowed 16 notes per Step on one Track.

■ "UP 99" 

You've over-run the 99 beats permitted in one sequence.

■ "VERIFY" 

The MASTER KEYBOARD is currently verifying data.

MIDI EXCLUSIVE CODES

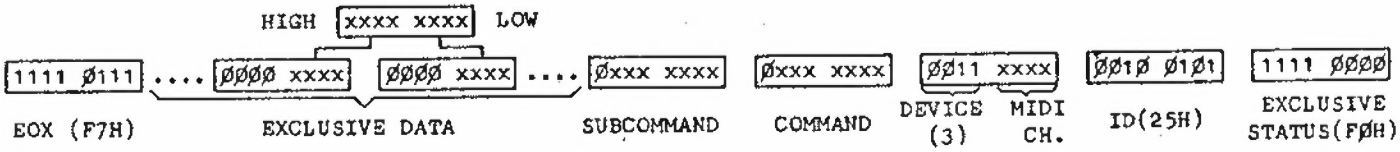
This section is highly technical and intended only for computer freaks and other such fiends planning on writing their own MIDI software. Normal mortals, who become faint when confronted with esoteric codes and are frightened of being bitten by all these bytes, can cheerfully ignore the following, and get on with making music!! Roll over Beethoven!

As for you freaks: before we get down to the dirty details, we have to point out that you'll pass the limits of the MEMORY PROTECT switch as soon as you start such direct manipulation of MIDI data. You're therefore advised to dump all your precious Patch and Sequence data to tape BEFORE entering the wonderful world of MIDI code sequences!

The following text uses the binary representation for MIDI codes and data, where appropriate. Other values are given in hexadecimal; these are identified by a trailing H (e.g. 25H).

MIDI SYSTEM EXCLUSIVE CODES

The **MASTER KEYBOARD** must receive the following Code-String, in order to recognise and execute MIDI System Exclusive Commands.



STATUS	DATA BYTE(S)	DESCRIPTION
1111 0000		MIDI Exlusive Status
	0010 0101 Oiii nnnn	Manufacturer ID (BIT = 25H) Device No. (iii = 011 = MASTER KBD) nnnn = MIDI CHANNEL (REC. CH. in Parameter (10))
	Occc cccc Osss ssss	Command Sub-command
1111 0111		EOX (End System Excl.)

The **BIT MASTER KEYBOARD** uses the following eight MIDI Sytem Exclusive operations:

OPERATION	(#)	COMMAND	(VALUE)	SUB-COMMAND
Dump One Patch	0 =	0000 0000	(0->63) =	0000 0000 -> 0111 1111
Dump all Patches	1 =	0000 0001		0000 0000
Dump Sequencer	2 =	0000 0010		0000 0000
Dump Seq. & Pat.	3 =	0000 0011		0000 0000
Request One Patch	4 =	0000 0100	(0->63) =	0000 0000 -> 0111 1111
Req. All Patches	5 =	0000 0101		0000 0000
Req. Sequencer	6 =	0000 0110		0000 0000
Req. Seq. & Pat.	7 =	0000 0111		0000 0000

The Dump functions (but not the Request functions) described above always cause a complete re-set to power up settings in the **MASTER KEYBOARD.**

Number of Data Bytes:

one Patch	(36*2)	+6 =	78 Bytes
all Patches	(36*2*64)	+6 =	4614 Bytes
Sequencer	(20608*2)	+6 =	41222 Bytes
Seq.+Patches (20608*2) +	(36*2*64)	+6 =	45830 Bytes

MEMORY TRANSFER / MIDI DUMPS

The procedure for transferring the entire memory contents from one **BIT MASTER KEYBOARD** to another via MIDI is very simple:

1) Connect the MIDI OUT socket of the transmitting unit to the MIDI IN socket of the receiving unit. (If you want to VERIFY the data transfer, and avoid all possible problems, you should also connect MIDI IN on the transmitting unit to the receiving unit's MIDI OUT).

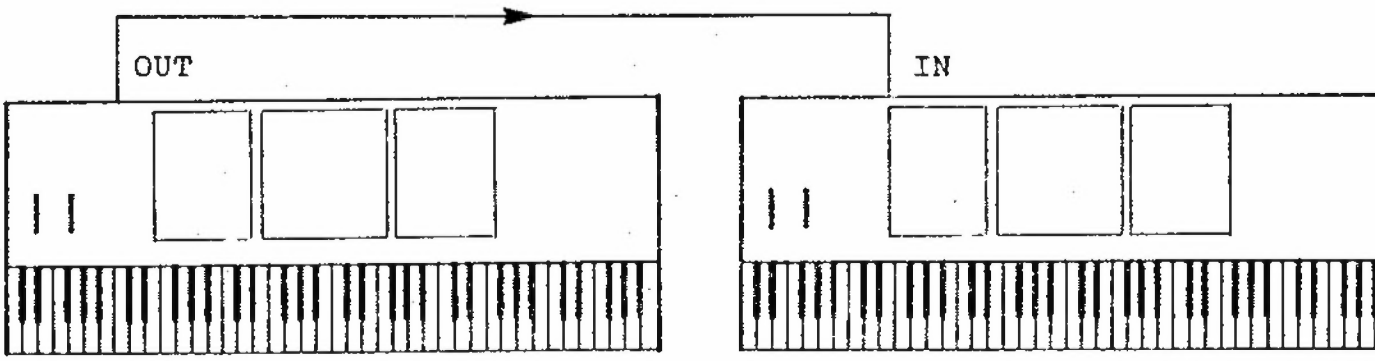
2) The RECEIVE CHANNEL (Parameter 10) of both units must be set to **the same MIDI channel**!

3) Select the type of data (Patches only, Sequencer only or entire memory) that you want to transfer, using the 3-way switch on the front panel of both units.

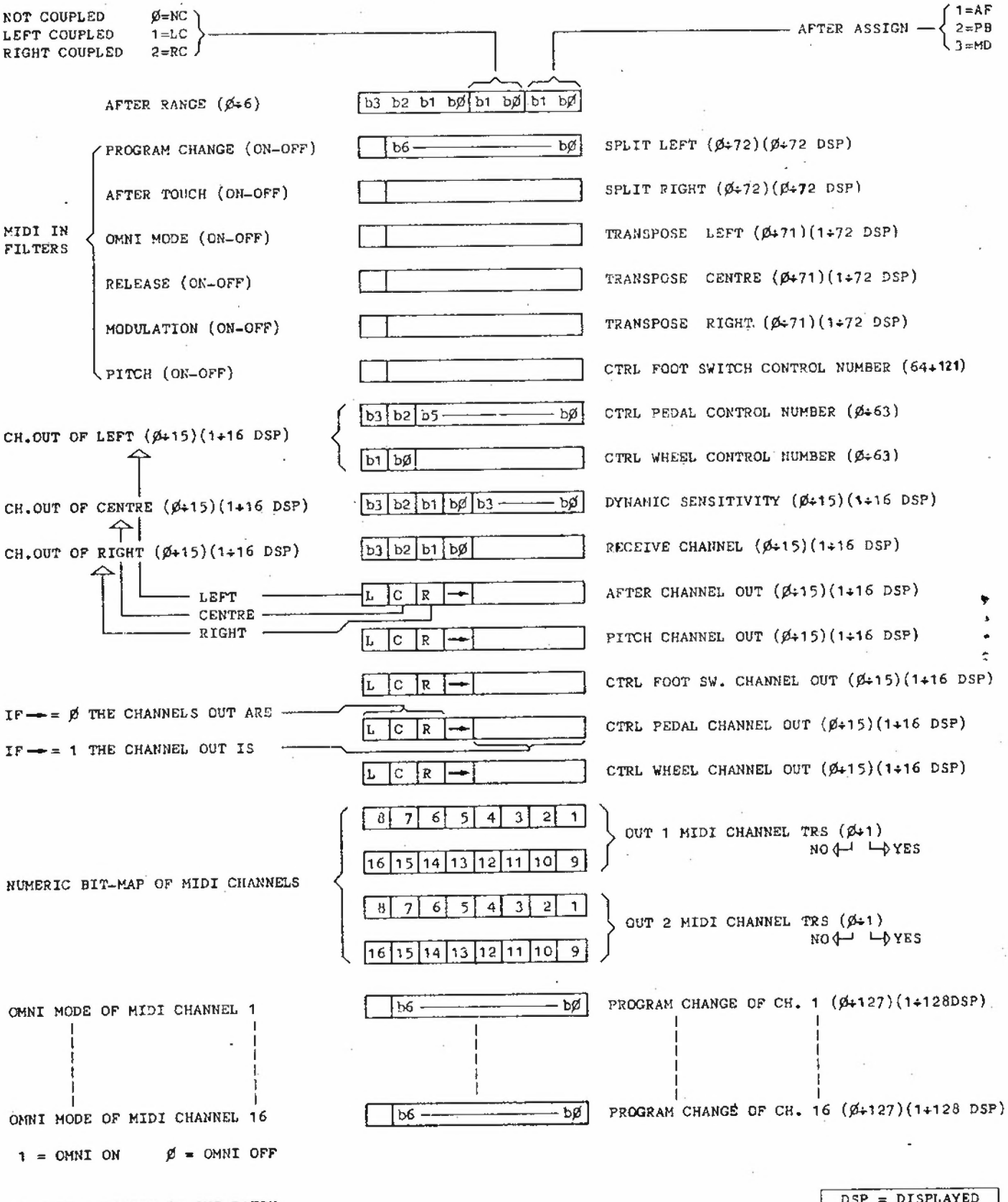
4) Press the "TAPE" button on the transmitting unit: the display will show "tAPE".

5) Then press the "100" key on the numeric pad: the display will now confirm with "DUMP". The data transfer operation takes only a few seconds.

6) A successful Dump operation is confirmed by the re-set to power up status of the receiving instrument.



PATCH-MAP


NOT COUPLED Ø=NC
LEFT COUPLED 1=LC
RIGHT COUPLED 2=RC
AFTER ASSIGN 1=AF 2=PB 3=MD
AFTER RANGE (Ø÷6)
b3 b2 b1 bØ b1 bØ b1 bØ
MIDI IN FILTERS
PROGRAM CHANGE (ON-OFF)
AFTER TOUCH (ON-OFF)
OMNI MODE (ON-OFF)
RELEASE (ON-OFF)
MODULATION (ON-OFF)
PITCH (ON-OFF)
b6 bØ
SPLIT LEFT (Ø÷72)(Ø÷72 DSP)
SPLIT RIGHT (Ø÷72)(Ø÷72 DSP)
TRANSPOSE LEFT (Ø÷71)(1÷72 DSP)
TRANSPOSE CENTRE (Ø÷71)(1÷72 DSP)
TRANSPOSE RIGHT (Ø÷71)(1÷72 DSP)
CTRL FOOT SWITCH CONTROL NUMBER (64÷121)
CH.OUT OF LEFT (Ø÷15)(1÷16 DSP)
CH.OUT OF CENTRE (Ø÷15)(1÷16 DSP)
CH.OUT OF RIGHT (Ø÷15)(1÷16 DSP)
b3 b2 b5 bØ
b1 bØ
CTRL PEDAL CONTROL NUMBER (Ø÷63)
CTRL WHEEL CONTROL NUMBER (Ø÷63)
b3 b2 b1 bØ b3 bØ
DYNAMIC SENSITIVITY (Ø÷15)(1÷16 DSP)
b3 b2 b1 bØ
RECEIVE CHANNEL (Ø÷15)(1÷16 DSP)
LEFT
CENTRE
RIGHT
L C R
AFTER CHANNEL OUT (Ø÷15)(1÷16 DSP)
PITCH CHANNEL OUT (Ø÷15)(1÷16 DSP)
CTRL FOOT SW. CHANNEL OUT (Ø÷15)(1÷16 DSP)
CTRL PEDAL CHANNEL OUT (Ø÷15)(1÷16 DSP)
CTRL WHEEL CHANNEL OUT (Ø÷15)(1÷16 DSP)
IF = Ø THE CHANNELS OUT ARE
IF = 1 THE CHANNEL OUT IS
NUMERIC BIT-MAP OF MIDI CHANNELS
8 7 6 5 4 3 2 1
16 15 14 13 12 11 10 9
OUT 1 MIDI CHANNEL TRS (Ø÷1)
NO YES
OUT 2 MIDI CHANNEL TRS (Ø÷1)
NO YES
OMNI MODE OF MIDI CHANNEL 1
OMNI MODE OF MIDI CHANNEL 16
b6 bØ
PROGRAM CHANGE OF CH. 1 (Ø÷127)(1÷128DSP)
PROGRAM CHANGE OF CH. 16 (Ø÷127)(1÷128 DSP)
1 = OMNI ON Ø = OMNI OFF
36 BYTE = LENGTH OF ONE PATCH
DSP = DISPLAYED