

A U D I O D Y N A M I C S

**DMI**

***Dual MIDI Interface***

***MANUAL***



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## ***Disclaimer***

Audio Dynamics cannot accept responsibility for any damage occurring to machines resulting from installation or use of Audio Dynamics products.

While every effort has been made to make the installation instructions as clear as possible the responsibility of installation lies with the user and not the supplier of the product.

**If in doubt, seek expert advice.**



## *The DMI Range*

The **DMI 30** is a Dual MIDI Interface and parallel user port on a single mini expansion card for the Acorn A3000, 3010, 3020, and 4000 computers

The **DMI 50** is a Dual MIDI Interface on a single half width expansion card for the Acorn A3000, 300, 400, 500, 5000 and Risc PC computers.

Both Dual MIDI Interfaces provide a total of 32 MIDI channels across 2 independent ports.

They are fully compatible with all Acorn RISC OS MIDI software and hardware, and are directly upgradable to the Audio Dynamics PowerWAVE/XG 16-bit wave table synthesiser. In addition the DMI50 can be further upgraded to incorporate a 16-bit sampler.

**NB. Before attempting installation of any kind please read the *Installation and Variations* sections fully.**

## *MIDI Connections (Important Note)*

Connections are made to the MIDI interlace using MIDI leads.

These have a 5-pin DIN plug at each end and look similar to some of the more old-fashioned hi-fi leads except that the connecting cable has only two cores and a screen, instead of four cores and a screen.



**Under no circumstances should the MIDI cables be connected to your hi-fi system.**

MIDI sockets carry digital information which is completely incompatible with any type of hi-fi input or output and connection between the interface and audio equipment is likely to result in damage to either or both systems.



### *Installation*

Installation of the DMI 30 should preferably be carried out by suitably qualified or experienced personnel.

Installation of the DMI 50 can be carried out by the user.

If you are fitting the card yourself be sure to follow the instructions given in the ***Expansion card installation instructions*** in your machine's manual. In the event of uncertainty or difficulty, always contact your nearest Acorn dealer.

### *6 points to remember :*

1.. **Always** disconnect all power from the computer **before** removing any part of the case.

2.. **Always** try to minimise handling the expansion card prior to installation, and where possible earth yourself to a suitable ground point. ie. A radiator or central heating / water pipe.  
The metal chassis of the computer can be used, providing the mains plug is still plugged in **but the wall outlet is switched OFF!**

3.. **Ensure** that all the connector pins are aligned with the mating sockets **before** pressing the card into its expansion slot.

4.. **Never** try to force any of the connectors into the sockets.

5.. **Be sure** to secure the back panel of the DMI to the computer's back panel using the screws provided.

If this is not done earth continuity is not maintained across the back of the machine.

In addition to this, damage is likely to occur to the card or the host machine if there is any movement in the expansion card.

6.. **Don't** exceed the power limitations of your particular machine.

When fitting any expansion device into an A3010, 3020 or 4000 machine, special attention should be paid to the capacity of your machine's power supply and the power requirements of the



## Section I - Installation & Hardware

expansion device. Be especially careful if you already have memory upgrades etc.

Placing too much load on your power supply can result in over - heating inside the case or a drop in supply voltage, either of which can cause intermittent or complete failure of the machine and / or its peripherals.

(Power supply specifications can be found in the owners manual)

The DMI 30 requires 100mA current consumption. (500mW)

The PowerWAVE 30 requires 300mA current consumption. (1.5W)

### *Variations*

The way your DMI main PCB is populated will depend on which version of the card you have purchased and what level of upgrade you have fitted.

The upgradable nature of the DMI cards means there are a variety of connectors and links relating to each of the possible card **variations**.

The following section describes the DMI30 & DMI50 cards in detail along with all possible upgrade variations/connections.



### The DMI30

The DMI30 is a dual MIDI interface designed for the A30x0 & A4000 Acorn RISC OS machines.

It is a standard Acorn "mini-expansion" card and fits internally.

### Variations

There are currently two variations :

#### ① DMI30

☞ Dual MIDI interface

#### ② PowerWAVE30 XG

☞ Dual MIDI interface + Yamaha Wave table Synthesis

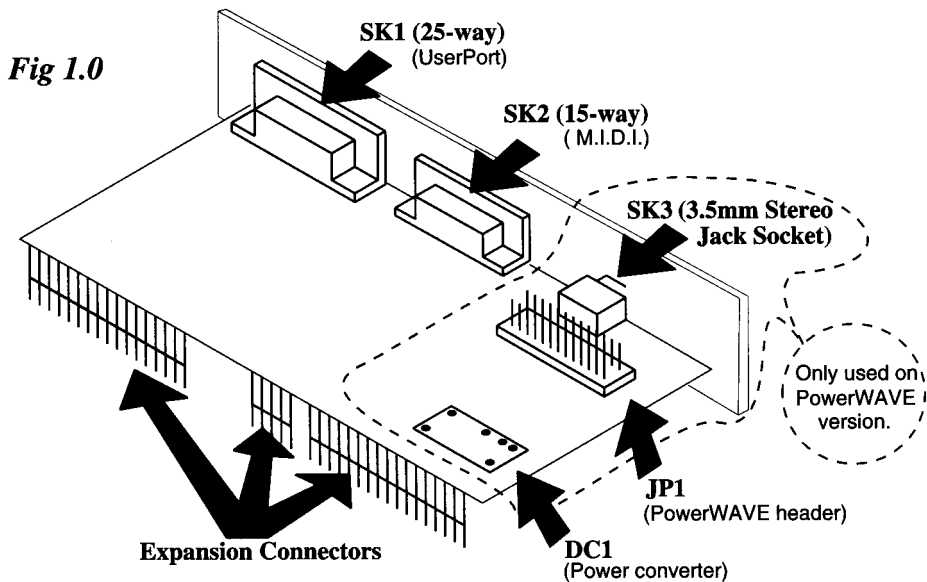


Fig 1.0 shows the DMI card and all of its sockets/connections.



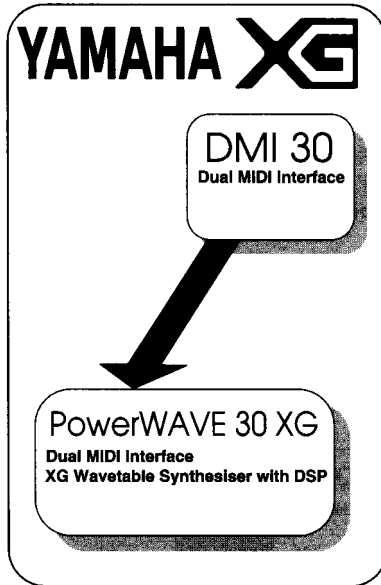
## Section II - DMI30

If you have purchased the PowerWAVE30 XG then you should also have:

- ☞ a daughterboard (mounted on JP1)
- ☞ a power converter (fitted to DC1)

### *Upgrades*

If you own the basic DMI then you can upgrade to the full PowerWAVE XG.



The upgrade requires no tools or specialist knowledge to fit and consists of :

- ☞ a daughterboard (to be mounted on JP1)
- ☞ a power converter (to be fitted to DC1)
- ☞ software and PowerWAVE XG manual



## Connections

**MIDI (SK2) :** to connect your DMI /PowerWAVE interface to external MIDI equipment all you need to do is plug your MIDI connection cable into SK2, and then your external MIDI equipment into the In/Out(s) on your MIDI connection cable.

**Audio (SK3) :** if you have purchased a PowerWAVE/XG card then SK3 and the audio phonos (supplied as part of the MIDI connection cable) become active as Audio Output for connection to an amplifier or headphones.

**User Port (SK1) :** the (optional) adapter cable converts the 25-way D-connector (SK1 ) to a 20-way IDC socket. The IDC socket can then be connected to a concept keyboard for example.

(NB. The standard User Port 20-way iDC socket can no longer be fitted to expansion cards because it does not comply to new EMC regulations)

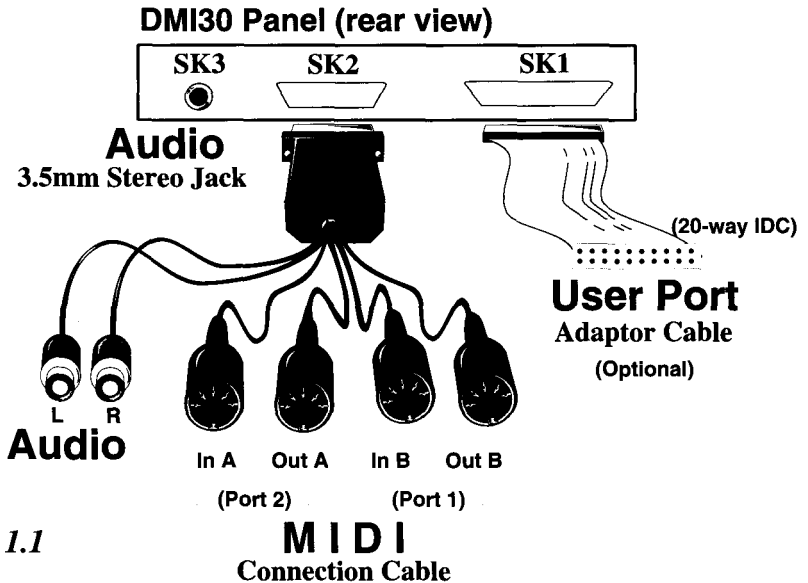


Fig 1.1

**MIDI**  
Connection Cable





### *The DMI 50*

The DMI 50 is a dual MIDI interface designed for the Acorn A5000 & Risc PC RISC OS machines. It is a standard Acorn expansion card and fits internally. In addition to MIDI the DMI 50 also offers 16 Bit CD-Quality sampling capabilities.

### *Variations*

There are currently five variations :

#### ❶ DMI 50

☞ Dual MIDI interface

#### ❷ PowerWAVE 50 XG

☞ Dual MIDI interface + Yamaha Wave table Synthesis

#### ❸ DMI 50-S

☞ Dual MIDI interface + 16 Bit sampling & mixing

#### ❹ PowerWAVE 50 XG-S

☞ Dual MIDI interface + Yamaha Wave table Synthesis

☞ + 16 Bit sampling & mixing

#### ❺ Control Sampler

☞ 16 Bit sampling & mixing

**Fig 2.0 (over page)** shows the DMI card and all relevant sockets/connections.

If you have purchased the PowerWAVE 50 XG (2 or 4 above) then you should also have :

☞ a daughterboard (mounted on JP1)

☞ DC1

☞ RL1

## Section III - DMI50

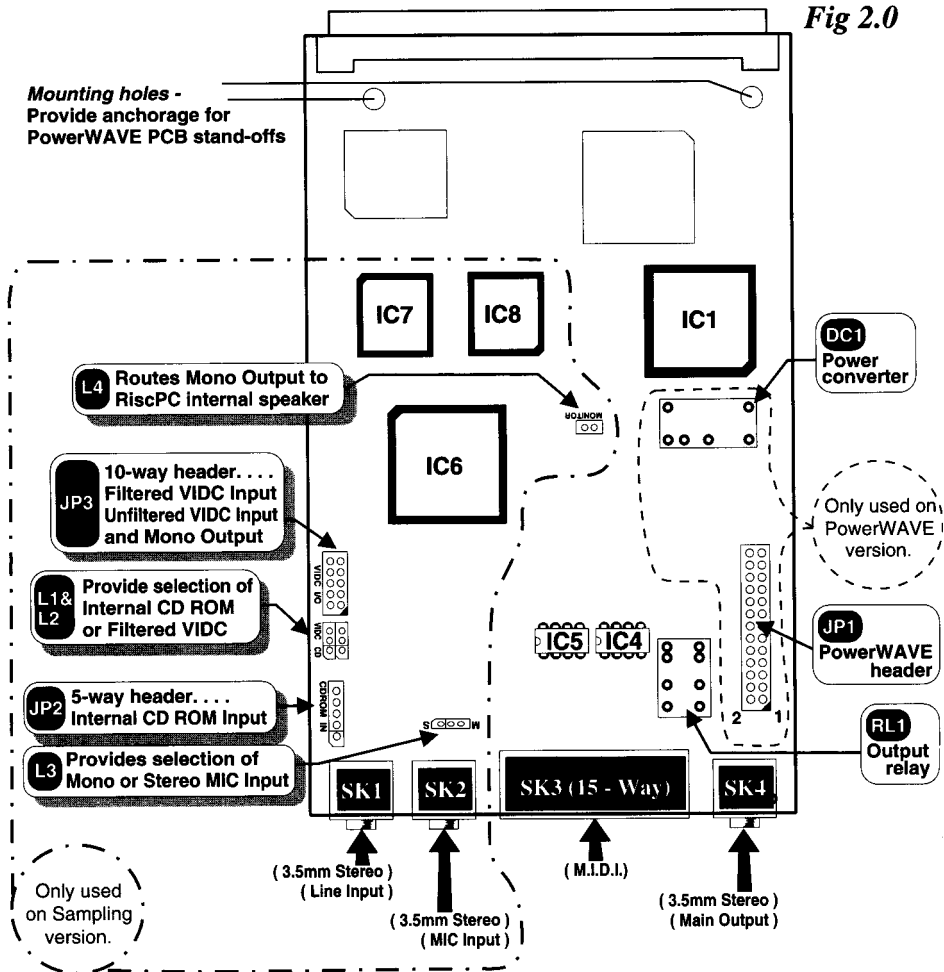


If you have purchased one of the sampling variations (3, 4 or 5 on previous page) then you should also have :

- ☞ IC7 & IC8
- ☞ IC6
- ☞ RL1

The non-MIDI "Control" sampling variation (5) has :

- ☞ No IC1
- ☞ No IC5 & IC4



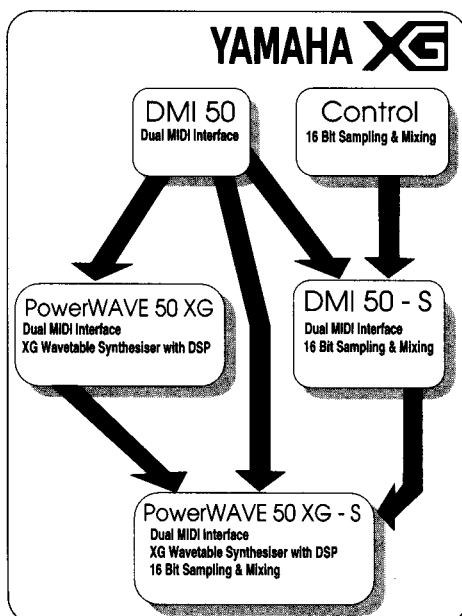


## Section III - DMI50

The PowerWAVE 50 XG-S is the only version to have a fully populated main PCB.

### *Upgrades*

All variations of the DMI 50 can be upgraded to the full PowerWAVE 50 XG-S.



**Synthesis :** If you own the basic DMI then you can upgrade to the full PowerWAVE XG.

The upgrade requires no tools or specialist knowledge to fit,

It consists of :

- ☞ a daughterboard (to be mounted on JP1)
- ☞ DC1      ☞ RL1
- ☞ software and PowerWAVE XG manual

If you own the non-MIDI Control sampling card then you also need :

- ☞ IC1
- ☞ IC4 & 5
- ☞ a MIDI Connection Cable

## Section III - DMI50



If you own an early Ensoniq PowerWAVE synthesiser you can upgrade to the full Yamaha PowerWAVE XG card.

**Sampling** : If you own the basic DMI then you can upgrade to the DMI 50-S. this consists of :

☞ IC7 & IC8

☞ IC6

☞ RL1

☞ !Control software application

If you own the PowerWAVE XG then you can upgrade to the PowerWAVE XG-S. The upgrade is the same as the DMI 50-S without RL1 which is already fitted.

Contact your dealer for more information about the various upgrades available.

### Connections

**MIDI (SK3)** : to connect your DMI /PowerWAVE interface to external MIDI equipment all you need to do is plug your MIDI connection cable into SK3, and then your external MIDI equipment into the In/Out(s) on your MIDI connection cable.

**Audio Output (SK4)** : if you have purchased a PowerWAVE XG or sampling card then SK4 and the audio phonos (supplied as part of the MIDI connection cable) become active as Audio

Output for connection to an amplifier or headphones.

**Audio Inputs (SK1 & SK2)** : if you have purchased a sampling card then SK1 & SK2 become active as Audio Inputs for connection to external Line-level and Microphone inputs.

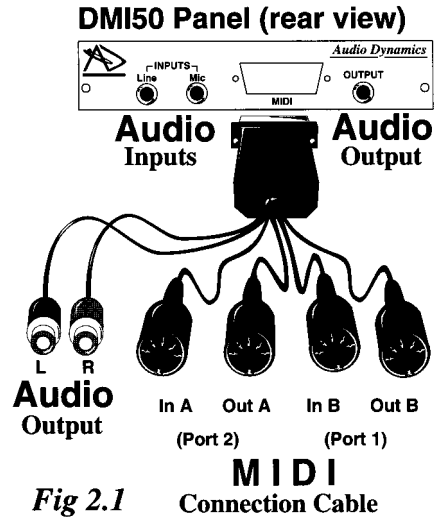


Fig 2.1



## Section IV - Connecting your MIDI System

### Connecting your MIDI system

Connection to and from each MIDI device is made using MIDI leads. MIDI leads can vary in length, the maximum lead length as defined by the MIDI Manufacturers Association is 15 metres (about 50 feet) but problems can be encountered when introducing cables of this length.

The golden rule is, try to keep the leads as short as is practical and avoid running them close to other electrical equipment.



A MIDI interface can vary in the number of connections it provides, though most interfaces have IN, OUT & THRU. The simplest connection therefore is one from your computer straight to one other MIDI device.

The "Out" from the computer is connected to the "In" of the external instrument and vice-versa.



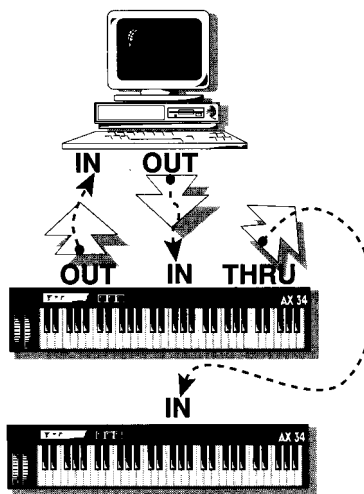
To connect more than one instrument the "Thru" of the first instrument can be linked to the "In" of the second one.

This has the effect of passing-on the MIDI information from the computer so that it can be seen by all the instruments in the chain.

Using this method of connection only one MIDI port is used even though there are two instruments connected to it.

From this it might appear that it would be possible to construct an indefinitely long chain of instruments simply by linking the "Thru" of each one to the following "In".

In reality however this is not the case as a small delay is put into the chain by



## Section IV - Connecting your MIDI System



each instrument, and by the fourth or fifth instrument in the chain this delay may become audible.

The amount of delay introduced will depend on how each individual instrument performs its Thru function. If the Thru is purely an electronic one, passing the MIDI "In" data straight on, then the delay will be very small. However some instruments use software to derive a "Thru" function and this usually takes much longer.

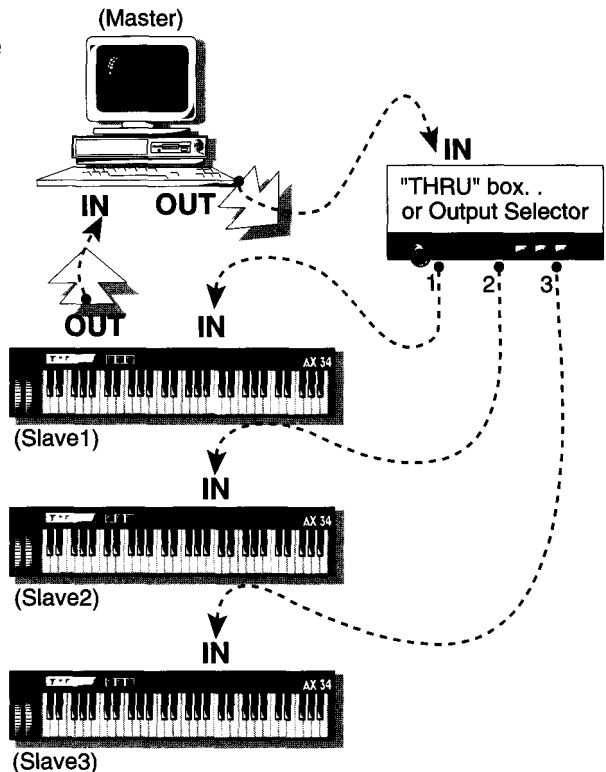
Experimentation with the instruments at your disposal is the best way to discover your systems limits.

One solution to this problem is to use a MIDI Thru box.

MIDI Thru boxes pass-on information from the Master (the first instrument supplying the MIDI data) to all the Slaves (the instruments receiving the MIDI data) at the same time.

This has the effect of placing only one small delay in the chain for all the instruments that are connected.

It is worth remembering though, that the DMI has two independent MIDI ports, giving you twice the capabilities of a single MIDI interface!





### *RISC OS MIDI*

As the DMI is a dual MIDI interface it is capable of transmitting and receiving across two completely independent ports. Each port contains sixteen MIDI channels giving a total of thirty two.

This significantly increases the number of instruments which can be incorporated into arrangements, and allows greater flexibility in the range of options available.

For instance, the internal PowerWAVE XG synthesiser card is capable of responding to all sixteen MIDI channels on a single port. The DMI goes on to provide a second port, which can then be connected to further external music equipment ie. keyboards, modules etc.

Most RISC OS music software applications cater for this, however some of the earlier programs assume a single MIDI port.

On the DMI, the PowerWAVE synthesiser card always occupies the lower port (Port 1), meaning it will respond to single MIDI port applications.



### *An introduction to MIDI*

**MIDI** is an abbreviation of **Musical Instrument Digital Interface**. It is a standard which allows several electronic instruments, such as synthesisers and drum machines to be connected together so that they can interact and be controlled from a common source, providing they all have a MIDI interface.

The MIDI interface usually consists of a transmitter and receiver (OUTPUT and INPUT respectively) and sometimes a thru, although some keyboards or modules will only have either an output or an input depending on their intended purpose.

For example a controller keyboard cannot produce any sounds of its own so it has no MIDI in. Conversely a sound module has no keyboard from which to send control information, so has no MIDI out, although it could be fitted with a thru to allow it to "pass-on" the MIDI information being sent to its IN.

MIDI signals consist of standard codes which contain information about which keys have been pressed, released, which MIDI channel(s) are being used, which instrument or sound to play, and a whole host of controllers which can be used if the receiver has the ability to understand them.

Because of the digital nature of MIDI, and the fact that all MIDI communication must comply to a standard, the information can be stored and edited by a computer fitted with a MIDI interface. Using the power of the computer, the user can play and control several different musical parts on several instruments at the same time.

The facilities the computer provides will depend on the application software used. There are a variety of programs available ranging from simple "one note at a time" playback using pictures to represent tunes, to full real-time capture applications which allow you to "record" several sections of music in turn from a MIDI keyboard, and then reproduce all the parts together, not only audibly but also in the form of a high-quality printed music score.

Your Acorn Dealer should be able to show you a range of music software and help you decide which application best suits your





## Appendix (An introduction to MIDI)

individual needs.

There are also regular articles, reviews and advertisements in the Acorn press for music related software.

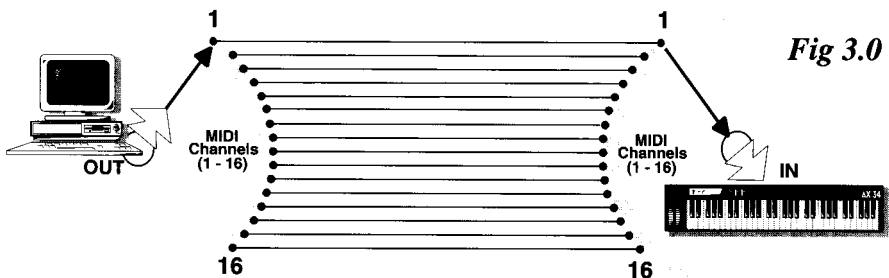
### **MIDI Instruments**

Each MIDI port actually contains 16 separate MIDI channels. Each channel can control any one of the sounds provided by the Synthesiser to which it is connected, and could play (potentially!) up to 128 notes at any one time, although this would probably not sound very pleasant!

In reality this would be restricted by the number of notes playable simultaneously by the synthesiser (the polyphony), as synthesisers vary enormously in their specifications depending on their price and age.

Lower cost or older MIDI synthesisers will be able to play fewer notes simultaneously (typically 8) and may only be able to use one MIDI channel at a time (*fig 3.0*). It is therefore important to check, if this is the case, that the synthesiser is set to the same MIDI channel number as the one you are using on the computer or other MIDI device, otherwise no communication will take place.

Always read the MIDI section of your synthesiser's manual fully before attempting any MIDI connections.



**Fig 3.0**

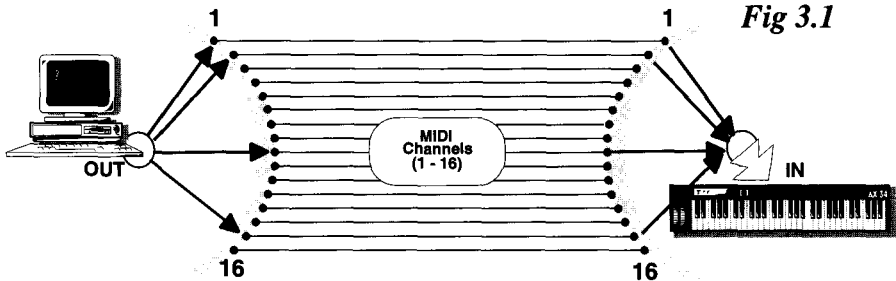
Synthesisers which can receive information on more than one MIDI channel at a time and play the required instruments simultaneously are known as **multi-timbral** (*fig 3.1*).

This is one of the requirements if a particular synthesiser is to comply with the standard known as **General MIDI**.



## General MIDI

General MIDI was created in order to provide a standard to which



synthesiser manufacturers and users could comply in order to maintain compatibility with each other.

The General MIDI specification outlines a minimum MIDI configuration of a "General MIDI System".

The General MIDI (or GM) system provides a high degree of compatibility between MIDI synthesisers, and adds the ability to play songs (in the form of MIDI data) created for any given synthesiser that follows this specification.

For example the GM specification states that patch number 1 will always be an acoustic grand piano, and continues through the list specifying all 128 patches. This means that a composition created on one GM instrument will still select the correct sounds when played on another. The quality of each sound however, will depend on the individual instrument.

It describes a minimum number of voices, sound locations, drum note mapping, octave registration, pitch bend range, and controller usage, thereby defining a given set of capabilities to expect in a given synthesiser.

The GM level 1 performance requirements are listed in the appendix.



### *GM Sound Generator*

#### **Synthesis / Playback Technology (Sound Source Type)**

le. Subtractive, Additive, FM, Wave table. - Up to the Manufacturer.

#### **Number of Voices**

A minimum of :

24 fully dynamically allocated voices available simultaneously for both melodic and percussive sounds.

Or:

16 dynamically allocated voices for melody plus 8 for percussion.

#### **MIDI Channels Supported**

All 16 MIDI channels

Each channel can play a variable number of voices (polyphony)

Each channel can play a different instrument (timbre) Key based percussion is always on channel 10

#### **Instruments**

A minimum of 128 presets for instruments (MIDI program numbers), conforming to the GM sound set.

A minimum of 47 preset percussion sounds conforming to the GM percussion map.

**NB.** The **PowerWAVE** synthesiser is a 16-bit wave table type

It has 32 note polyphony (voices) and can receive information on all 16 MIDI channels simultaneously.

It has 128 instruments and 47 percussion sounds all conforming to the GM map.

It plugs directly on to the DMI without the need for any external MIDI leads and reads the MIDI information from one of the ports without interrupting that port's output.



## *GM Protocol Implementation*

### **Note on / Note off**

Octave registration : Middle C = MIDI key 60 (3CH)

All voices, including percussion, respond to velocity

Voices dynamically allocated (notes / drums can re-attack using free voices)

### **Controller changes**

#### ***Controller No.***

#### ***Description***

1	Modulation
7	Volume
10	Pan
11	Expression
64	Sustain
121	Reset all controllers
123	All notes off

#### ***Registered parameter No.***

0	Pitch bend sensitivity
1	Fine tuning
2	Coarse tuning

### **Channel messages**

Channel pressure (Aftertouch)

Pitch bend (Default range = 2 semitones)

### **Default settings**

Bend = "0", Volume = "100" (0 - 127), Controllers "normal"

*Note* : GM specifies that channel 10 is reserved for percussion. When accessing channel 10 the individual percussion sounds are played using different keys on the MIDI instrument and not by selecting patch numbers.



### Problem

### Possible Solution

**Nothing happens when I play from the computer. (No MIDI Output)**

Ensure all cables are firmly connected.

Remember, the OUT connectors are

mapped :

DMI's OUT A = Port2

DMI's OUT B = Port1

And so, your software will probably default to Port1 which is in fact OUT B, so connect your keyboard's IN to OUT B.

Your software may have a MIDI option which should be selected.

**Nothing happens when I play from the keyboard. (No MIDI Input)**

Ensure all cables are firmly connected.

Remember, the IN connectors are mapped

DMI's IN A = Port2

DMI's IN B = Port1

And so, your software will probably default to Port1 which is in fact IN B, so connect your keyboard's OUT to IN B.

Ensure your software is in a record mode.



*Notes*



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*Why cause ripples . . . . when you can make waves !!!*

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