

TURBO-DW OWNER'S MANUAL

BY

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IMPORTANT

**DO NOT OR REMOVE TURBO FROM PACKAGE BEFORE READING
INSTALATION INSTRUCTIONS. DO NOT TOUCH TURBO BOARD UNTIL
YOU ARE READY TO INSTALL IT !!!**

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Turbo Copyright 1989, James Fellows

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Important Installation Instruction !!!

1.)

It is very Important that you observe the following precaution in addition to the regular instructions in the TURBO manual.

It is easy to crack the soldered joints attach the extension pins which connect TURBO to the DW 8000. this error is more common among experienced installers than among those with absolutely no experience. The reason is probably a more scrupulous attention to the instruction manual and greater caution on the part of the inexperienced. Be sure to never apply any force to the TURBO board itself. Hold it by its edges when aligning pins for insertion, but only apply downward pressure in the following way: use the EPROM chip on the TURBO board (it is directly above the DW's socket) as a point of leverage and use your thumb to apply gentle downward pressure from that point only. **DO NOT USE MUCH FORCE !**

Although TURBO's Extension pins are long (they are designed to hold TURBO above the DW components!)

The actual amount of insertion is quite small. Look at the socket first to remind yourself of this! Use a flashlight so that you can observe the extension feet during the entire insertion process. Push down gently, slowly, a bit at a time. if you feel a need to apply Force STOP. Think, and proceed gently.

The TURBO Board is fully installed when it is nearly one-eighth inch from the socket. It is almost universal among technicians to attempt to apply more force long after TURBO is fully installed. This will inevitably result in cracking the pin connection, usually at #15. This can be repaired by a wire jumper to bridge the cracked joint. But this is not the way we want our boards installed. Do not attempt to wiggle the board into place. Make sure each pin is correctly aligned before applying downward pressure. TURBO will fit quite snugly, to prevent accidental slippage, but the installation must be done gently, only by pressing down directly on the EPROM

TAKE YOUR TIME.

2.)

SELF ADHESIVE INDEX LABEL

This is designed to attach directly to the right of the BLUE DW 8000 logo. It will cover the smaller "programmable waveform" text. Test the location, then remove only a tiny piece of the backing corresponding to the yellow border on the left. do this by cutting off that amount of backing with a pair of scissors, and then jacking the rest of the backing back over the adhesive. Once the adhesive touches the plastic, it will not be possible to remove or adjust. Attach this corner and check alignment. Then gradually peel off and attach the label slowly, working towards the right end. Be sure to avoid wrinkles and air bubbles by attaching only a bit at a time. replacement labels are available for \$1.00 each.

: INSTALATION :

Important !!!

DO NOT TOUCH TURBO OR REMOVE IT FROM THE PACKAGE UNTIL YOU READING INSTALATION INSTRUCTIONS!!!

The installation of TURBO is surprisingly simple, and that is one of its beauties.

There are no special skills or tools required, although an EBROM extractor, which is available from Radio Shack type stores for a few dollars is helpful. A Phillips head screwdriver is required to pry out any EPROM, since it is magnetised and destroys the EPROM.

The main thing to be cautious of is static electricity. If a discharge of static electricity makes contact with turbo or any of the internal components of your DW8000 it could cause serious damage. In order to avoid please read the following carefully.

Static electricity is less likely to build up in a humid environment. It is most likely in dry environments caused by winter heating when cold air from outside is heated inside the home and needs far more moisture to maintain its relative humidity levels than it did outside. If you experience static electricity discharges in your home you will certainly need to take precautions. Fortunately these are all quite simple. Humidify your work area by water until condensation forms on the windows avoid wool and other static materials. Avoid carpeted areas. Do not wear a sweater! If static is still a problem you will need to ground yourself before working inside the DW or touching TURBO. In no case ground yourself if you will be touching anything remotely connected first and do not touch anything connected to electricity. Better yet, use the safety grounding straps available at Radio Shack, which only ground the small type of discharges associated with static electricity. If you feel unsure about your working environment, let a more experienced technician do the installation for you. Since it only takes a few minutes it should not cost very much.

1)

Make a backup copy of your sounds on tape. Sounds will not normally be erased when installing TURBO, but it could happen accidentally.

2)

Disconnect all cables and power cords from the DW. Make sure it is cool. If it has recently been used, wait until it cools down.

3)

On a clear work surface, turn the DW upside down but be careful not to break the joystick. Have the front (key side) towards you so that the joystick is now on your right, face down.

4)

Note the positions of the five large screws on the raised portion of the back panel and note the two sizes used all the round edge. Before removing five large screws and the two types of

screws around the edge, please note their locations with tape or pencil so that you will know which screws go where when you replace them. Remove these screws. Do not remove the rubber feet or the 4 smaller screws located to the left and right of the left rubber foot

5)

grasp the DW at the right end and hold the top and bottom halves together while turning it back right side up. Let it rest on the table on its rubber feet so that the keyboard is facing towards you.

6)

Lift up the top half, contacting the keyboard and control panel and observe that it is connected by cables to the lower half. Stand it vertically, so that the rear portion of the synthesizer which has all of the MIDI and connecting jacks is resting on the table. Then gently lower it face down on the table, again being careful not to break the joystick. The lower half is now facing you and exposed for the installation of TURBO.

7)

you will observe a large green component board at the left, another similar one in the center and three smaller components at the right. All of the following pertain only to the green component board in the center.

8)

Note the round lithium battery in the center of the board. Between this and the right edge you will see that there is one IC chip that is different than the rest. It is in a socket instead of being directly connected to the board. This is the ROM chip which is designed to be replaceable. This is the chip that you will remove, and you will install Turbo in its socket.

9)

remove the ROM and be careful not to damage its delicate feet in case you wish to use it in the future. For the moment, place it feet on a clean non-conducting, non-static surface. Do not touch the feet with your fingers, since the oil left behind can cause corrosion. If you don't have an IC extractor, carefully pry up the chip from either end with the plastic prong on a bic pen cap. Try not to damage this chip or its feet.

10)

When the ROM chip is successfully removed, you are ready to install the turbo board. You may carefully remove it from its package, but don't yet remove the protective covering on its feet. Hold the TURBO board by this protective material, and avoid touching the components on the board. Do not break the jumper cable of plastic plunger pin. Hold the board so that the battery and battery socket are at the forward left side. This is the position it will have when plugged into the ROM socket.

11)

Hold TURBO by its edges and remove protective material covering its two rows of 14 feet. Save this material! Carefully line up the fourteen feet each row with the socket. Do not touch the feet! Make sure all teeth are aligned before pressing them into the socket. Use the plastic cap to make delicate adjustments if necessary. Slowly press the board down into place, a bit at a time, watching the feet to make sure all are aligned and do not bend or get crushed. Once they are all correctly seated you may use gentle pressure with your index finger or thumb in a downward direction, using Turbo's own ROM as a pressure point, since it is directly aligned with DW socket. Be gentle in installing the board in the socket. Relax and take as much time as you need.

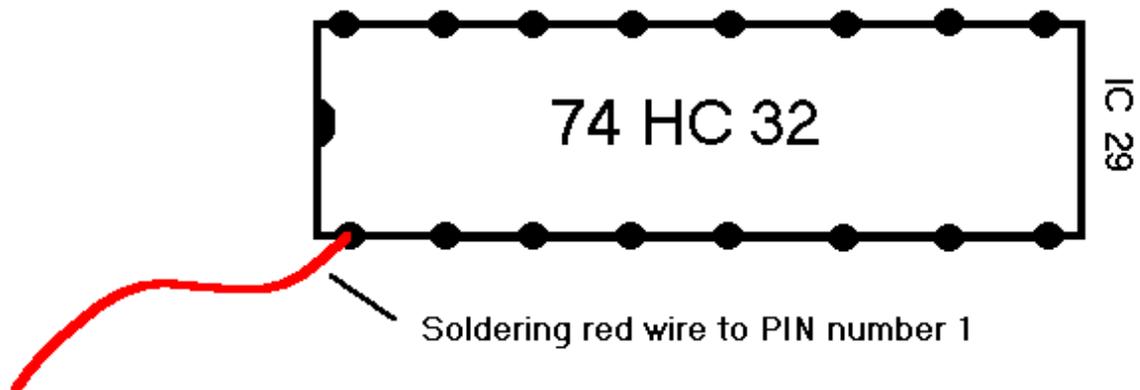
12)

Make sure TURBO is fully inserted into the socket. It should not wiggle or seem loose in any way. The Turbo board should come about sixteenth of an inch from the top of the DW socket. Don't use a ruler to measure it, just eyeball it! You'll know when it's all the way in.

13)

Now locate the point of connection for the address bus clip. Observe a large chip with many feet that is directly behind the center of the TURBO board. To the left of that component you will see 6 smaller chips that are very similar to each other and arranged in two rows of three each. Some of these 14 feet others have 16. The one you are looking for is in the rear center and has 14 feet, white printing on the circuit board identifies it as IC number 29 ("IC29"). It may have the following identification printed directly on it: SN74HC32N This is the chip you are looking for. Observe the foot closest to you and the right side. Solder now the red wire from the TURBO board on this chip to PIN number 1 (See picture 1 below).

Picture 1:



15)

Before closing the DW8000, make sure that you have securely connected everything to its correct location and that everything is in order. Re assemble the DW8000.

16)

Turn on the DW8000 and Make sure the message 8008 appears in the display. If not turn it off immediately and check your work for errors. If everything is OK you are now ready to load your TURBO sounds into the DW8000. Be sure to read the entire section on memory before loading sounds into the DW8000 ! I strongly suggest taking an hour to read the entire manual before beginning to use the Turbo-charged DW8000. Congratulations, you are now the owner of a unique and wonderful synthesizer !

17)

Use the protective material from the TURBO board to protect the feet of the DW8000 Rom Chip and store it in a protected place where it will not be exposed to light, heat, electricity, moisture, etc.

PROGRAMABLE TURBO-DW FEATURES

Please read the entire selection, since many of the features are interactive with each other. For convenience, instructions for each feature are listed under a separate heading. Features are listed in the best suited to the tutorial from of this manual, rather than numerical order.

Parameters **18, 27, 28, 36, 37, 61** are stored independently for every patch, allowing you to configure these TURBO features individually for every patch.

PARAMETER:37 (RANGE 0-63) This parameter determines where the keyboard split will be located, defining an upper and lower zone. If the value is set to 0, the split will not effect the DW's keyboard, since it will be located to the left of the bottom note. Similarly, if set to 63, it will be one note above the highest note, and will not effect the keyboard. The default value is 0. You may choose to include a split point here, even though you do not use split mode in this patch, for reasons explained under "MIDI".

PARAMETER:36 (RANGE 1-8) this parameter determines which TURBO MODE this sound will use. The eight ZORBO modes are:

- 1) Normal DW – 8000 operation (Except arpeggiator: see that section.)
- 2) Split: Normal operation above the split, local of below the split this means that the lower keyboard will send on MIDI but will not play the DW sound, which is useful when using the DW to control other synthesizers/modules.
- 3) Split: the same as above but with the upper keyboard turned off and normal operation on the lower zone.
- 4) Split: the split point is active for MIDI transmission on one or two channels, but neither zone plays the DW sounds. Particularly useful when working with sequences.
- 5) Split: sound A in the lower zone and sound B in the upper zone. Sound A is the regular DW sound at this memory location. Sound B is a second DW sound, stored at some other location, but addressed through 18 at this location.
- 6) Split: the opposite of 5 : sound A is in the upper zone and sound B in the lower zone.
- 7) LAYER: both sound A & B played simultaneously in the lower zone. Set the split point accordingly if you wish to use the keyboard. Part of it, or just the first or last note.
- 8) LAYER: the same as 7, but the sounds are active in the upper zone. In either case, the other zone can be used to control other modules.

PARAMETER:18 Here you select a second program from the current bank of 46 patches. (RANGE=11-88) the up and down buttons control the selection. The edit slider gives quicker access, in larger increments and decrements. The patch selected here will always be referred to as "Sound B". Although sound A is a normal DW 8000 patch, sound B is different. It derives some of its parameter settings from sound A. This is due to the internal architecture of the DW8000 and the way that TURBO DW manages to interpose itself into that architecture. So, sound B will not necessarily sound the same as it would if called at its own location. These are the parameters determined by A: Digital Delay (P71-P76), LFO or MG modulation (P61-65 and 81), resonance (P32), noise (P26) and oscillator mix amounts (P13, P23).

In addition to these "hard" limitations, there is a flexible type of limitation imposed: the selection of waveforms for sound B is partially determined by A follows: The 16 waveforms are divided into two groups upper and lower. The lower group contains waveforms 1-8 and the upper contains 9-16. as in normal DW operation, each sound contains independent waveform for each of its

two oscillators. However sound B waveforms must be from groups the corresponding oscillator in A. EXAMPLES A=waveform 3 and 14. then B can have its first waveform from 1-8 and its second from 9-16. if A=waves 5 and 5 then both of B's must be in the lower group 1-8, etc. so there are now four types of situations:

Upper / upper

Lower / lower

Upper / lower

Lower / upper

In the last two cases, the waveforms can be easily exchanged between oscillators, so there are actually only three types of groups. (Be sure to remember to reset applicable oscillator-specific parameters **P11, P21, P14, P13, P23, P25** when necessary.) you will quickly find this option allows you many benefits as well as its limitations. This is because turbo automatically resets waveforms when the selected sound B does not line up with A's waveforms. Thus you will find many cases where really good and useful sounds are available as sound B that do not exist elsewhere in your Bank the Angel City audio volume 9 contains several examples of this. since the essential envelope and filter settings remain in effect, and all of extras (modulation, digital dealeay, etc.)

Assume the aspect of sound A, switching waveforms is more likely to produce interesting results than one might first suspect. When programming with TURBO, I usually try all available sounds in A Bank for suggestions, by toggling the parameter 18 setting. Then I reverse the waveforms of A, when applicable, and see what turns up in the B sounds. If you are already very familiar with DW programming you will find that you quickly develop an intuitive and rather exciting grasp of the inherent possibilities for complex layers and splittings using the TURBO features ANGEL CITY AUDIO volume 9 is designed both as a starter set of programming and as a tutorial in TURBO programming.

Parameter 38: (range 1-7) this adjusts the balance between A and B. The volume are equal when set 4. lower values decrease the volume of B and higher values decrease the volume of A.

Parameter 28: (range 0-6) Similar to p25, this adjusts detuning.

However, the detuning is between A and B rather than between oscillators of A. this combined with p25 setting of both A and B. particularly useful in layers, this works well when a sound is layered to itself, giving the effect of mode, but remaining polyphonic.

Parameter 27: (range 0-12) transposition amount. This allows TURBO to automatically transpose the pitch of sound A from what you play on the keyboard in semi tone increments up to a full octave. Sound B assumes the transposition value assigned to it at its own location. Besides being useful for playing songs in different keys you are accustomed to, it allows for octave shifts in layers and one finger chords in conjunction with p11, and p21 for both A and B. if you layer a sound with itself, sound B will assume the settings already written to memory and sound A will reflect the edits currently in the buffer. Transposition merely effects the patch to which it is programmed and not transmitted via MIDI. When receiving, remember that transposition amounts are added to any incoming MIDI transpositions.

PARAMETER 61: (new range 0-4) TURBO DW adds a fifth value to the types of modulation available. It is selected as value 4 and is a random (sample/hold) modulation nearly identical to that found in the DX7 in available, intense and quality. The beauty of this is best demonstrated 87 and 88 Angel City volume 9.

SUSTAIN PEDAL OPERATION IN MODE 5 AND 6

The only bug I have found in the sustain pedal when in mode 5 or 6. If a note is played in one zone, sustained by the pedal, and the fingers removed from the keys, the voice will be cut short as soon as a note has played in the other zone. If two notes are sustained, and one note is played in the other zone only one of the two voices will be silenced. In short, as many voices as are played in a given zone, that may will be cancelled in the other zone if they merely being sustained by the pedal. This applies even though there may be plenty of voice free, a fact which can be verified by duplicating the situation while holding the notes down. In this case, operation will be normal.

EPROM REVISIONS AND NEW FEATURES

Oliver Schwarz, the creator of TURBO DW is interested in expanding and improving the features of his device. He has generously offered to provide new EPROMS at a very modest cost of about \$15 each when new versions are available. So please send suggestions to me at Angel City Audio so that I can assess them and pass them on to Oliver. THANKS!

MEMORY ARCHITECTURE AND USE

BUFFER it is important understand the buffer concept in order to understand PATCH and BANK memory operation. A buffer is an active memory area, which if not stored to a permanent memory location will be lost when new information enters the buffer. PERMANENT memory is accessible only through WRITE operations.

BLANK BUFFER: when sounds are loaded in the bank buffer memory, this is secure only until another group of sounds is loaded into it, which will cause the erasure of the previous occupants. Battery power maintains the volatility of this data while the DW is turned off. Turbo allows the saving of bank data to 8 permanent locations, also protected by battery back-up.

TO SAVE BUFFER (CURRENT) BANK TO SECURE BANK:

Press the write button (write protect which must be off) and when the display flashes, press the bank hold button. Display will now show: Save Bank _____. This means "save to bank(b) _____." Use the keypad to enter a number from 1-8. As soon as you press this button, you will have copied the entire bank into storage location, erasing any previous contents. The bank will continue remain in the buffer memory until some other sounds are loaded. Be sure to keep a list of which bank have sounds in them so that you will not accidentally over-write them in the future. Continue to save banks to tape for secure storage outside the DW. Also: remember write your patch edit into the bank buffer before saving the buffer memory to bank storage memory.

ABROT: You may abort the write the memory procedure by pressing the parameter button at anytime the display is flashing.

CAUTION: You will activate the load operation when using the bank hold switch for its normal functions. It is very important that you do not use the buffer memory as the only storage as only storage location for any sounds or bank of sounds until you are familiar with turbo. You may inadvertently load a bank in to bank buffer memory while attempting to exit the bank hold function. Beware this happens every time I create or edit a patch to avoid accidentally losing programs. In all cases: if you enter the load bank procedure, and do not wish load new bank, stop and think before proceeding beyond display!!!! Always press the bank hold button again to exit before doing anything else. Once you get accustomed to this you will be the likely to make mistakes.

Current Patch (Edit/Play) Memory: 64 Patch locations are available in each bank. The programming for these sounds will be drawn from the current set of programming in the BANK BUFFER memory. If you call up sound 11, then the programming data for that sound will enter the patch buffer, where it can be played or edited. As in normal DW operation, calling a new sound into the CURRENT PATCH buffer will erase previous edits. It's a good idea to copy the current bank to a bank storage location (1-8) at the same time that you write a new edit to a memory location.

COMPARE TO EDIT FUNCTION: Turbo now allows you to compare the current edit in the patch buffer memory to the original patch stored at that location. Do this by pressing Program and parameter simultaneously with two fingers. A "c" appears in place of PROGRAM NO. to indicate that you are now the original sound at the current rather than the contents of the buffer memory. Repeat the procedure to return to the buffer memory. When you become familiar with the concepts of Sound A and Sound B in the programmable features section of this manual, you will note that the Sound B is not part of the patch buffer, but is simply addressed through this buffer. So if a sound is layered to itself and is thus Sound A and B, changes made in the edit buffer will not effect Sound B until it is written to memory. When layering a sound with itself, it is easy to become confused, especially when the compare function is being used. Be sure to check the result after writing the new edit to memory by clearing the buffer with a new sound, and then returning to the stored edit to make sure it was stored the way you thought. Sometimes it may be necessary to store the edit at a location different than the original one in order to layer it to itself while making some changes, and the attempt to store it at location 11: the result will not be a layer of 11 at the original octave +11 and octave higher. In this case you would store the edit 12, or set p27 to appear in the Display when sound 11 was called up, and then use the edit slider to adjust to the octave transposition. Once the concept of BUFFER and PERMANENT STORAGE are differentiated and clearly understood these operations will become obvious.

PATCH BUFFER: Transfer sounds between banks

When you load a new bank of sounds into the buffer memory, you will not clear the patch buffer memory. This allows you to write the current sound to a location within the new bank. However, once you select a new sound, the contents of the patch buffer will be erased. Remember to rewrite the bank to its permanent storage location after writing a new sound into it. Otherwise the new addition will be lost the first time you reload the bank buffer memory. So, to move sound 21 in the bank 3 to location 11 in the bank 1: load3. call sound 21. load bank 1, write to location 11. write bank to bank 1 to store new bank arrangement. Then go to other banks to collect other sounds for storage in bank 1.

OTHER TURBO MEMORY FEATURES:

Parameter 86: Turbo will remember the current setting, even when the DW is shut off.

Last patch: The last patch used will return to the patch buffer after the DW has been repowered. However, edit data will not be restored unless it was written to memory.

The new turbo parameters that are not part of each patch (p78 and p88) will be retained even when power is shut off.

Last bank: When performing operations involving the 8 storage banks, the display will tell you the number of the last storage bank from which sounds were taken which sounds were restored.

Memory to TAPE and MIDI interfaces: you can save all new turbo features to tape. You can reload from tapes. All operations are identical as in the past, except new parameters are included. You may load non-turbo tapes, and you may load turbo tapes into non-turbo DW's except that the new parameters will not be used by the non-turbo DW. Remember, loading sounds in the bank memory buffer is not the same as storing them in a parameter storage bank location. Be sure to store before the buffer with new sounds!

All editing and librarian software designed to work with the DW will operate as if the DW did not have turbo upgrade. This is because parameter (sys ex) data specific to turbo does not leave the DW. This insures compatibility with all software, but makes the development of turbo-oriented software impossible. This was a decision of the developer which I feel was the correct choice. This means that your turbo programming can be stored either on tape or in the 8 internal banks. Only normal DW parameters will be accessed via sys.ex communication, as in the past.

Polyphony, voice allocation: Turbo does not change the polyphony of the DW, it allows you to allocate it more flexibly. You still have a maximum of eight-note polyphony. When you are in split mode it does not matter where you play the keyboard, since the eight available voices are dynamically allocated whatever combination of sounds you happen to be playing at that moment. You can play up to a total of eight notes at one time, regardless of what side of the split are on.

Layer mode: in these modes each key on the DW keyboard actually plays two notes, one of Sound A and one of the Sound B. so , eight voice polyphony is reached when four keys are depressed.

Unison mode: Both DW unison modes are still available as in the past. They can also be used in conjunction with modes that employ a split keyboard with local off. You can not use unison modes when using either a split or layer, since either voices needed to play a single note in unison mode.

MIDI operation with Turbo DW:

Sending and receiving

There are two new MIDI parameters. P78 selects MIDI mode and p88 sets the second MIDI channel when you wish to have two MIDI channels. These new parameters are global and will affect all patches.

Fortunately, much more is possible with Turbo than would be guessed from the addition of only two MIDI parameters. This is because they interact with other parameters, specifically p36 (mode) and p36 (omni on/off). The trade-off for the many options that are possible interface using these few control parameters. You will probably need to refer to this manual when using MIDI transmit and receive functions. The layout of this section reflects this need for continual reference.

Original MIDI Parameters:

84: MIDI Channel select #1 (1-16)

85: Transmit note or all data

86: Receive in Omni Mode (on/off) – (P86 value retained by battery)

TRANSMIT SETUPS:

The #1 Channel sends either note data or all data, depending on the setting of P85.

This is the same as without TURBO.

The #2 Channel only sends note data.

RECEIVE SETUPS:

When P86 (OMNI) is turned on, incoming MIDI data will play sound B regardless of TURBO MODE, SPLIT POINT, ETC.

So, generally OMNI should be “off”.

Turbo Additions:

88: MIDI Channel select #2 (1-16)

78: MIDI Mode:

1: All keys transmit on the #1 channel selected at p84.

2: Upper keys transmit on #1 channel (P84) and lower keys transmit on #2 channel (P88)

3: Upper on #2, lower on #1.

WITH DW 8000 SET TO OMNI OFF

INCOMING MIDI DATA IN OMNI ON MODE: Turbo will use the split point in the currently selected patch to determine whether sound A or B plays a given MIDI note.

INCOMING MIDI DATA WITH CHANNEL ASSIGNMENT: TURBO will assign the incoming data to the sound presently associated with that channel via P78 and P36. Split point will be ignored, thankfully, and the incoming data will have access to the entire MIDI range. In this case, two entirely independent parts, on separate MIDI channels can be played by TURBO using Sound A and Sound B without regard to split points. The only limitation is the eight voice polyphony.

ARPEGGIATOR

The arpeggiator has many new operating modes, depending on the combined settings of P78 and P36. In all cases the arpeggiator now accepts velocity information. However, this information is utilized in an unusual way: all arpeggiated notes are played with the same velocity, but this velocity is determined by the last note played, so that it can constantly update the velocity value as new notes are played on the keyboard. The full implication of this will be realized when examining the following possibilities.

1) Parameter 78 set to 1: Parameter 36 set to:

1= normal operation with velocity.

2= normal operation with sound A. Note entry from upper keyboard only. Lower keyboard can effect velocity.

3= same as 2, but from lower keyboard. Upper effects velocity.

4= no operation

5= operates and recognizes split point as determined by P37

6= same

7= operates with A and B in layer. Lower keyboards and upper keyboard active. Lower keyboard normal, upper keyboard adds silent notes and velocity

8= same as 7, upper keyboard normal, lower keyboard adds silent notes and velocity.

2) Parameter 78 set to 2: Similar to above, but only A or B will play, not both. Which one plays depends solely on which was the last one used before the arpeggiator was turned on.

3) Parameter 78 set to 3: same as in 2.