THIRD EDITION

DMX

OWNER'S MANUAL

DMX OWNER'S MANUAL

By

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Third Edition June 1982

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Oberheim Electronics, Inc.
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Los Angeles, California 90064 USA

CAUTION:
To prevent fire or shock hazard do not expose this appliance to rain or moisture. Do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

WARNING:
This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the instruction manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.
Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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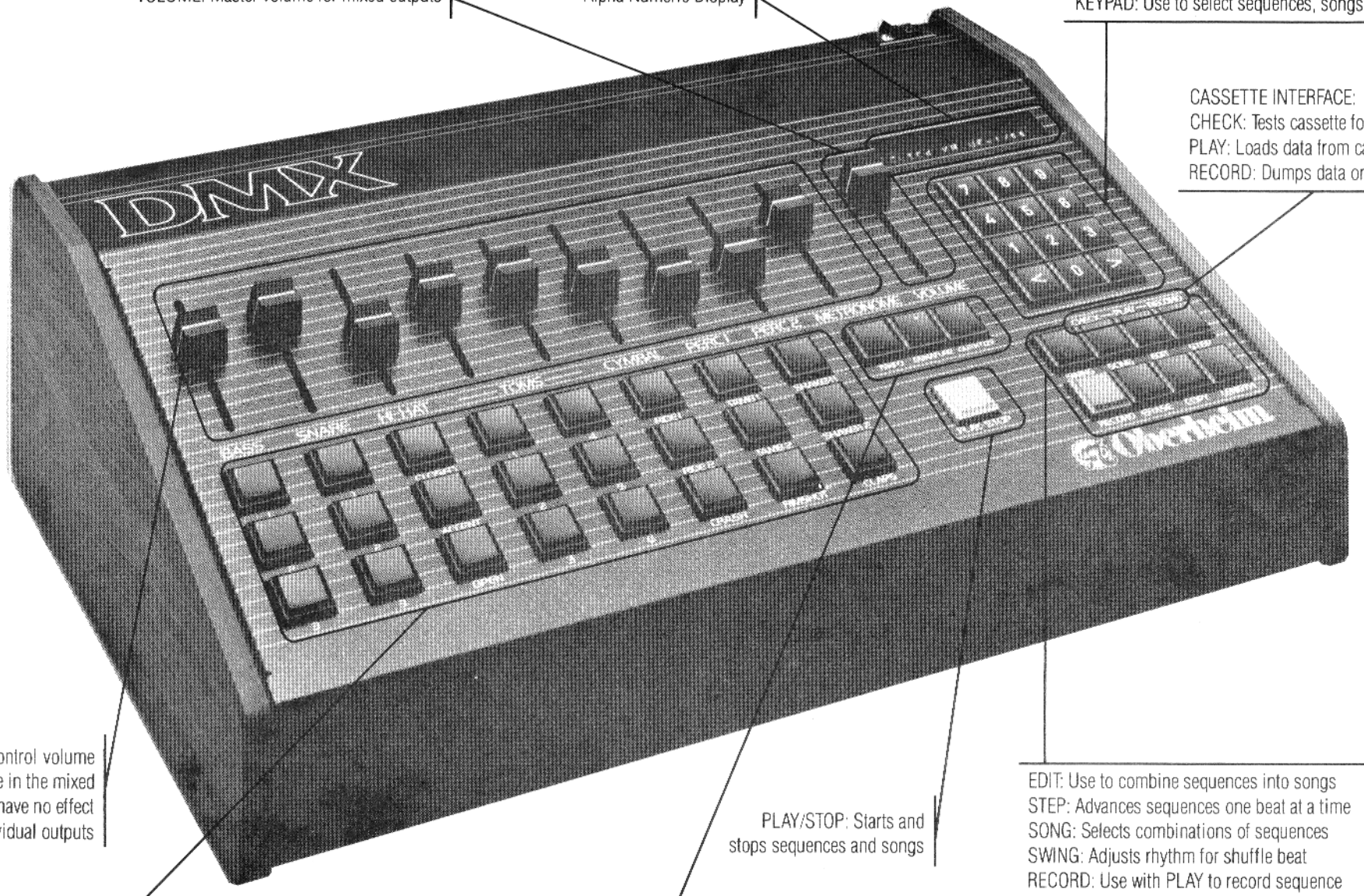
CONGRATULATIONS!

You have just purchased a most powerful tool for synthesizer composition and performance. The Oberheim DMX programmable Digital Drum Machine represents a new concept in electronic sound. The DMX has been designed by the Oberheim staff with the idea of giving you better sound, and more intimate control of it, than has been previously available in a percussion synthesizer.

The DMX generates the sounds of real drums. Recordings of real drums are digitized, stored in computer memory, and are made available at the touch of a button. A drumbeat may be recorded in realtime at any speed, remembered, and edited to make any beat of any length, tempo, or style—in short, any drum beat that you hear in your head, you can create on the DMX. After you have created your drumbeats, you can save them on tape for future use. The DMX even has a battery to keep the memory on when the power is off.

The DMX operates like a tape recorder: press RECORD and Record your rhythms; then press PLAY and hear it back. But there's more to it than that. There are many more features that are incorporated into the DMX to actually give you much more control over your music than a tape recorder gives you.

And isn't more control what synthesizers are all about?



VOLUME: Master volume for mixed outputs

Alpha Numeric Display

KEYPAD: Use to select sequences, songs, tempo, etc.

CASSETTE INTERFACE:
CHECK: Tests cassette for errors
PLAY: Loads data from cassette
RECORD: Dumps data onto cassette

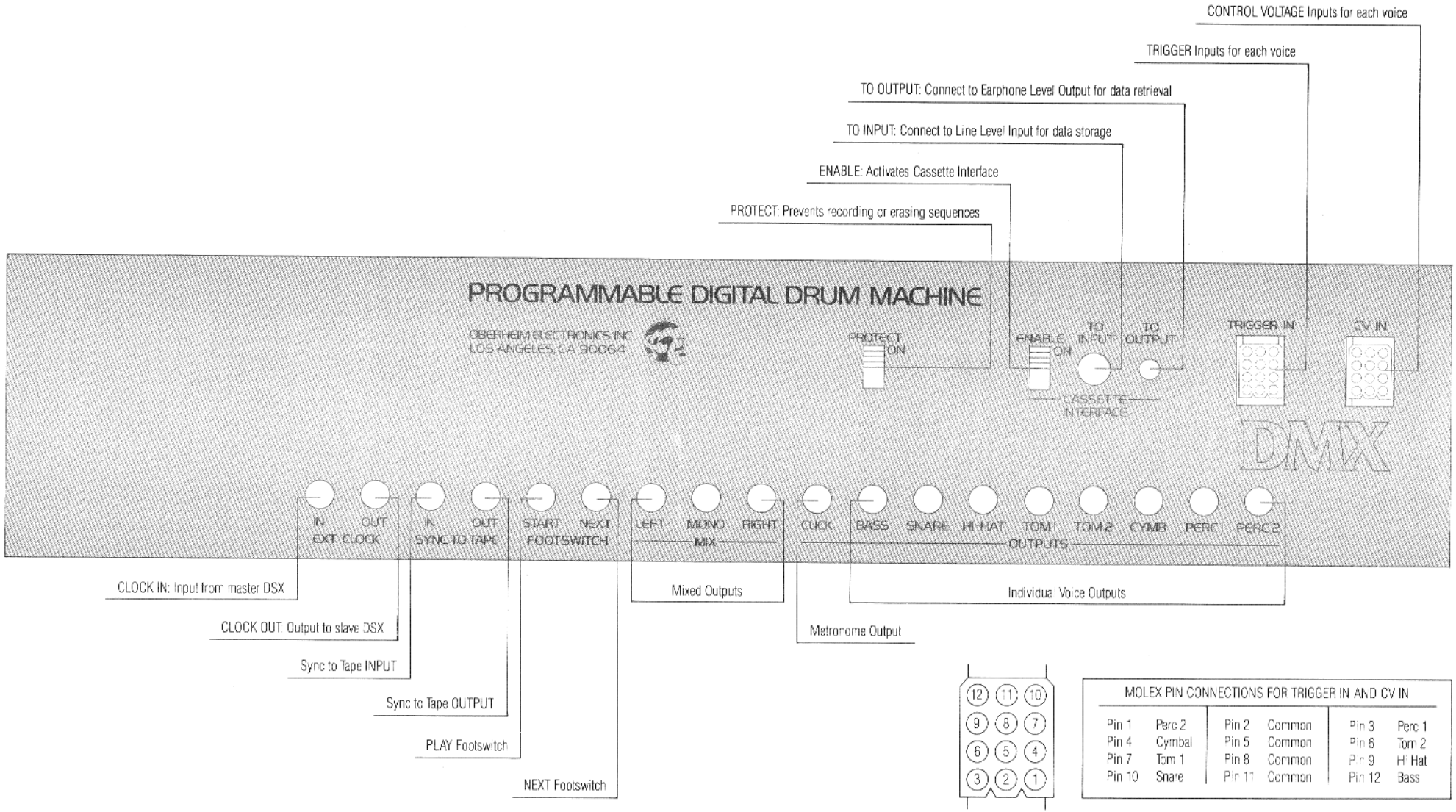
FADERS: Control volume of each voice in the mixed outputs. They have no effect on the individual outputs

DRUM BUTTONS: Play the individual drums, cymbals and percussion

PLAY/STOP: Starts and stops sequences and songs

TEMPO: Selects tempo marking
SIGNATURE: Selects time signature and metronome value
QUANTIZE: Selects correction value

EDIT: Use to combine sequences into songs
STEP: Advances sequences one beat at a time
SONG: Selects combinations of sequences
SWING: Adjusts rhythm for shuffle beat
RECORD: Use with PLAY to record sequence
Use with ERASE to erase sequence
Use with EDIT to insert a sequence into song
ERASE: Erases sequences, songs or individual notes
COPY: Copies or appends one sequence to another
LENGTH: Selects length of sequence



MOLEX PIN CONNECTIONS FOR TRIGGER IN AND CV IN

Pin 1	Perc 2	Pin 2	Common	Pin 3	Perc 1
Pin 4	Cymbal	Pin 5	Common	Pin 6	Tom 2
Pin 7	Tom 1	Pin 8	Common	Pin 9	Hi Hat
Pin 10	Snare	Pin 11	Common	Pin 12	Bass

POWER

The DMX comes from the factory set to operate on 115 Volts. If the local power is 220-240 Volts, you will need to change the power selection switch inside the DMX. Remove the two screws at the front of the chassis and then lift up the front panel. You will find the power selection switch on the right side, behind the transformer.

For 100-120 Volt operation, switch it to "115". For 220-240 Volt operation, set the switch to "230". Close the lid and replace the screws.

SIGNAL

Connect either the LEFT and RIGHT, or the MONO outputs to your amplifier or mixer. The slide pots on the front panel control the relative volumes of each drum voice in the mixed outputs. Each voice has its own output as well; these are useful if you are connecting the DMX to an external mixer. The volume controls have no effect on the level of the individual outputs, so it is possible to use the SNARE and BASS individual outputs, for example, and the mixed outputs for the other voices (turning the SNARE and BASS VOLUME controls to minimum to remove them from the mixed outputs).

SELECTING A SEQUENCE

The DMX can store up to 100 drum sequences, numbered 00 thru 99. Select one by pressing two numbers. The display will show you which sequence you have selected.

PLAYING A SEQUENCE

Press PLAY. The sequence will play over and over until you press STOP. You may also select another sequence while playing and the DMX will play it immediately after the first sequence has finished.

RECORDING A SEQUENCE

There are two ways to record on the DMX: REALTIME and SINGLE STEP. In REALTIME, the sequence plays over and over and you simply press the buttons where you want the drums to sound. In SINGLE STEP, the sequence advances one beat each time you press a button for a note or a rest, which allows you to record your drum beat very slowly. The REALTIME mode of recording is explained below. The SINGLE STEP mode of recording is explained in the section entitled STEP.

Press and hold RECORD and then press PLAY. The Metronome will click in eighth notes and the DMX will record over and over on two measures (you can change the length of the sequence—see "LENGTH"). In RECORD, the DMX does not ERASE, so you can build your drumbeat as it loops over, playing the cymbal first, the bass drum, then the snare, etc., until you are finished. Then press STOP.

** NOTE **

The DMX will not enter RECORD, ERASE, COPY, or STEP modes if the MEMORY PROTECT switch on the rear panel is ON. The display will read "MEM. PROTECTED" and the unit will "beep". In addition, the length or time signature of a sequence may not be changed although they may be examined.

Example 1: Recording on Sequence 00

OPERATION	PRESS	DISPLAY READS
Select Sequence 00	00	SELECT SEQ 00
Start Recording	RECORD (hold)	SELECT SEQ 00
	PLAY	* RECORD SEQ 00
(the "*" flashes at the beginning of the sequence)		
	(play drums)	
Stop Recording	STOP	SELECT SEQ 00

OVERDUBBING

Overdubbing is the process of recording more parts in synchronization with parts already played. With the DMX, overdubbing is the same as normal recording. Whenever you press RECORD and PLAY, the DMX simply adds whatever you play to what has already been recorded. In RECORD, the DMX does not erase. ERASE is a separate process.

ERASING

If you have made a mistake, or would like to record over again, press and hold ERASE and while holding ERASE press RECORD. Your previous recording will be erased, and you may record again from scratch. The DMX will "beep" when the erasure actually takes place. The volume of the beep is controlled by the metronome volume control.

Example 2: Erasing Sequence 00

OPERATION	PRESS	DISPLAY READS
Erase Sequence 00	ERASE (hold)	ERASE SEQ 00
	RECORD	ERASE SEQ 00
The DMX will "beep" and then display:		SELECT SEQ 00

There are several other Erase Modes:

You can erase any single drum (or cymbal) from the entire sequence. Hold ERASE and then press the drum you wish to erase.

Example 3: Erasing Crash Cymbal from Sequence 00

OPERATION	PRESS	DISPLAY READS
Erase Crash Cymbal	ERASE (hold)	ERASE SEQ 00
	CRASH	ERASE SEQ 00
The DMX will "Beep" and then display:		SELECT SEQ 00

You can erase individual notes "on-the-fly" while in RECORD: pressing any drum button while holding ERASE will remove that drum note from the sequence. The drum button must be played in time with the note you wish to erase.

It is also possible to erase individual notes while in the STEP mode (See "STEP").

If you want to erase all of the sequences and songs, press ERASE and while holding ERASE, press both of the ARROW buttons simultaneously.

TEMPO

The DMX defaults to a tempo of 80 Beats per Minute, but can be varied within a range of 25 to 250 Beats per Minute. You can change the tempo at any time by entering the tempo mode. Press TEMPO. The display will show the tempo currently selected. You can change the tempo by pressing the buttons with the arrows to increase or decrease the tempo, or you can enter the desired Beats per Minute on the keypad. To exit the tempo mode press TEMPO once again.

When recording a sequence, the DMX will store the tempo with the sequence. Whenever that sequence is recalled, the DMX will recall the tempo as well. You may change the tempo, but it will only update the programmed tempo when the tempo is changed in record.

Example 4: Setting the Tempo to 105 Beats per Minute

OPERATION	PRESS	DISPLAY READS
Enter Tempo Mode	TEMPO	TEMPO = 080
Set 105 Beats per Minute	105	TEMPO = 105
Exit Tempo Mode	TEMPO	SELECT SEQ 00

** NOTE: **

Not every tempo marking between 25 and 250 Beats per Minute can be played. Near the high end of this range the tempo steps are larger than one Beat per Minute. If you enter a tempo which cannot be played, the display will show an exclamation point ("!") to inform you that the DMX is playing the nearest valid tempo to the one which you entered. Also, if you try to RECORD an invalid tempo, the DMX will actually record the nearest valid one.

If you enter a number that is out of the tempo range, a question mark ("?") will appear on the display. You must set the tempo to be in range before you can exit from the tempo mode.

The arrow buttons will always step between valid tempos.

METRONOME

The metronome can be set to click in any note value between quarter notes and thirty-second notes. The metronome defaults to eighth notes and varies in speed according to the tempo. To change the value of the metronome clicks, see SIGNATURE.

The METRONOME is heard through the mixed outputs of the DMX while in RECORD, and is accented on each downbeat. At the beginning of the sequence, an asterisk "^" will flash on the left side of the display, and on subsequent downbeats, the bar number will flash.

The METRONOME also appears at the CLICK OUT jack on the rear panel while in RECORD or PLAY and may be routed through an external mixer. The output of the CLICK OUT jack is not accented and has been designed to be used to clock analog sequencers and other devices as well. See SYNCHRONIZING THE DMX AND OTHER SEQUENCERS.

LENGTH

A sequence can be any length from 1 to 99 measures. The DMX sets a length of 2 measures for each sequence unless you set it differently by accessing LENGTH. You can then set the desired number of measures with the arrows or directly on the keypad. LENGTH also displays the amount of memory space left.

Example 5: Setting the Sequence Length to 16 Bars

OPERATION	PRESS	DISPLAY READS
Enter Length Mode	LENGTH	2 BARS-85% LEFT
Set Length to 16 Bars	16	16 BARS-83% LEFT
Exit Length Mode	LENGTH	SELECT SEQ 00

If you have recorded a sequence and then shorten the length, you will lose the measures you have cut. If you lengthen a sequence you have recorded, rests will appear at the end.

The length of a bar is set by SIGNATURE.

SIGNATURE

SIGNATURE has two functions. The first is to change the click value of the metronome. The second is to change the time signature.

You can set the DMX to play in most any time signature. There can be between 1 and 99 beats per measure, and between a quarter note and a thirty-second note can receive one beat.

Press SIGNATURE. The current metronome click value will appear on the display. The click value can be set to any standard note value by pressing the arrow buttons. After you have set the desired click value, you may exit by pressing STOP or you may continue on to the time signature.

Press SIGNATURE once more. Now the current time signature will appear on the display. If you press SIGNATURE once more, the display will show the current beats per measure. You can use the arrows to increase or decrease either the beats per measure or the beat value (as with the click value), or you can enter the desired value with the keypad (beats per measure only).

When the time signature is changed, the length of the sequence is affected, so before you can exit the time signature mode you must pass through LENGTH to set the length of the sequence.

NOTE: You can only change the time signature if the selected sequence is empty. If the sequence contains any drum beats you will not be able to access beats per measure or beat value.

Example 6: Setting the Metronome to Quarter Notes and the Time Signature to 3/4

OPERATION	PRESS	DISPLAY READS
Access Signature Mode	SIGNATURE	CLICK VALUE=1/08
Change Metronome to 1/4 Notes	<	CLICK VALUE=1/06
	<	CLICK VALUE=1/04
Access Time Signature	SIGNATURE	TIME= 4/4
Access Beat per Bar	SIGNATURE	BEATS/BAR: 04
Choose 3 Beats per Bar	03	BEATS/BAR: 03
Access Beat Value	SIGNATURE	BEAT VALUE=1/04
Exit time signature	SIGNATURE	LENGTH= 2 BARS
Maintain length at 2 bars	SIGNATURE	SELECT SEQ 00

QUANTIZE

Quantizing automatically corrects your playing to the nearest beat. The quantizing value also establishes the smallest beat that can be recorded and is also used for establishing the value of a "Beat" as used in STEP and SWING.

The DMX is normally set to quantize to a sixteenth note. To change the quantizing, press QUANTIZE. The display will show the value of quantizing currently set. You can now enter the note value that the DMX will round off to by using the arrows to increase or decrease the number in the display. The quantize values are;

04	Quarter Note
06	Quarter Note Triplet
08	Eighth Note
12	Eighth Note Triplet
16	Sixteenth Note
24	Sixteenth Note Triplet
32	Thirty-Second Note
48	Thirty-Second Note Triplet
OFF	Quantize Defeated (1/192 note resolution)

Example 8: Set Quantizing to Eighth Notes

OPERATION	PRESS	DISPLAY READS
Access Quantize Mode	QUANTIZE	QUANTIZE 1/16
Set Eighth Notes	<	QUANTIZE 1/12
	<	QUANTIZE 1/08
Exit Quantize Mode	QUANTIZE	SELECT SEQ 00

Quantize is a record function. That is, it only corrects what you are recording. This enables you to record over and over on the same sequence in different quantize modes. Quantizing is also independent of the metronome. It is possible to quantize to the nearest quarter note, even though the metronome is clicking in sixteenth notes.

STEP

STEP allows you to record one beat at a time. Normally the beat is set to a sixteenth note (this can be changed—see QUANTIZING). From stop, pressing STEP places you at the beginning of the sequence. Every time a drum is pressed, the sequence advances one beat. To program a rest, press the forward arrow. To stop, press STEP once again. If you press STEP while in PLAY or RECORD, the sequence will step from its present location and go back to play or record when STEP is pressed again.

While in STEP, you can erase any of the drums one beat at a time. Pressing ERASE and the desired DRUM erases only that drum on that beat.

Example 7: Recording and Erasing in STEP

OPERATION	PRESS	DISPLAY READS
Access Step Mode	STEP	BAR 1 + BEAT 00
Step to beat 4	>	BAR 1 + BEAT 01
	>	BAR 1 + BEAT 02
	>	BAR 1 + BEAT 03
	>	BAR 1 + BEAT 04
Record Snare on beat 5	SNARE	BAR 1 + BEAT 05
Step to beat 7	>	BAR 1 + BEAT 06
	>	BAR 1 + BEAT 07
Erase Crash on beat 7	ERASE (hold)	BAR 1 + BEAT 07
	CRASH	BAR 1 + BEAT 07
	(the DMX will "beep")	
Exit Step Mode	STEP	SELECT SEQ 00

SWING

SWING is similar to QUANTIZE in that it corrects the timing of your recordings, however SWING will alter the time so that the first half of the beat gets more than half of the time, creating a "shuffle" feel.

Press SWING. The display will show the current swing value which is normally set to 50% (the first half of the beat gets 50% of the time). To change the swing value, press the arrows to increase or decrease the percentage (between 50% and 71% in six steps). SWING is a RECORD function. That is, it will record your playing corrected to the swing value you have selected.

Example 9: Setting Swing Value to 66%

OPERATION	PRESS	DISPLAY READS
Access Swing Mode	SWING	SWING 50%
Increase Swing to 66%	>	SWING 54%
	>	SWING 58%
	>	SWING 62%
	>	SWING 66%
Exit Swing Mode	SWING	SELECT SEQ 00

You can swing in either eighth or sixteenth notes by selecting eighth or sixteenth note quantizing. If QUANTIZE is set to a value other than eighths of sixteenths, the display will read;

"WRONG QUANT"

COPYING SEQUENCES

It is possible to copy one sequence to another. Press COPY. The display will ask you to specify which sequence to copy to which location:

Example 10: Copy Sequence 25 to Sequence 01

OPERATION	PRESS	DISPLAY READS
Access Copy Mode	COPY	COPY FROM SEQ 00
Select Sequence 25	25	COPY FROM SEQ 25
	COPY	COPY TO SEQ 00
Select Sequence 01	01	COPY TO SEQ 01
Execute the copy	COPY	
(DMX "Beeps" and then exits Copy Mode)		SELECT SEQ 01

APPENDING SEQUENCES

There are two ways to join sequences together. One is by playing one sequence after another in a SONG (see COMBINING SEQUENCES INTO SONGS, below); the other is to APPEND several existing sequences into one larger sequence. Appending sequences is useful when the same set of rhythms is to be played over and over, for example in a composition having 3 bars of 4/4 followed by 1 bar of 7/8 as a basic phrase element. By making a sequence of 3 bars of 4/4, another of 1 bar of 7/8, and then appending the 7/8 onto the end of the 4/4, you have quickly created your basic phase element, which can then be repeated over and over, and combined with other sequences as part of a song.

Appending sequences is similar to copying them except that while COPY REPLACES the old sequence with the new one, APPEND ADDS the new sequence to the end of the old one. The process is the same except that you must press RECORD while pressing COPY to execute.

Example 11: Append Sequence 25 to Sequence 01

OPERATION	PRESS	DISPLAY READS
Access Copy Mode	COPY	COPY FROM SEQ 00
Select Sequence 25	25	COPY FROM SEQ 25
	COPY	COPY TO SEQ 00
Select Sequence 01	01	COPY TO SEQ 01
Access Append Mode	RECORD (hold)	APPEND TO SEQ 01
Execute Appended Copy	COPY	APPEND TO SEQ 01
(DMX "Beeps" and then exits Copy Mode)		SELECT SEQ 01

It is possible to append a sequence to itself. This effectively doubles the length of the sequence. It is also possible to append several sequences, one after another, to one sequence. Appended sequences may be of any time signature or length, however the tempo of the first part of the sequence will be applied to the rest of the sequence as well. If sequences of different time signatures are appended together, the length may not equal an exact number of measures and this will be reflected by a "+" in the length of the sequence. For example, appending a 7/8 sequence to a 4/4 sequence (each of 1 bar length) will cause the display to read:

"1+ BARS-85% LEFT"

because the length of the new sequence is not quite 2 bars of 4/4.

SONGS

One prominent feature of music is that it is organized into sections that repeat and alternate with each other. A SONG allows you to record each section of a piece as a separate sequence and then combine sequences into a complete composition, saving a lot of memory space, not to mention time and effort.

A song then, is a combination of sequences. In addition to the 100 sequences, the DMX also contains 50 songs, numbered 00 thru 49. Unlike a sequence (appended or otherwise), a song does not remember the notes, only the order of sequences that you wish to play. There can be as many as 255 sequences contained within a song, and each sequence within a song can have its own tempo, length, or time signature.

PLAYING A SONG

To enter the song mode, press SONG. The DMX will select the song last selected.

Example 12: Play song 00

OPERATION:	PRESS:	DISPLAY READS:
Access song mode	SONG	SELECT SONG 00
Play song 00	PLAY	PART 1= SEQ 01

As the song plays through the different sequences in it, the sequence number on the display will change to reflect the actual sequence presently being played. Each sequence in the song is given an ascending PART number that reflects its order in the song. When the song reaches its conclusion the display will read:

"SONG 00 -END-"

To exit the song mode, press SONG again.

RECORDING A SONG

Recording a song is different than recording a sequence, because you are not playing any notes, just making a list of sequences. Actually you don't "record" a song, you "edit" a song.

To edit a song press SONG, then EDIT. Once you enter SONG EDIT mode, the DMX will ask you to select the sequences that will make up the song; the SONG LIST.

Example 13: Recording Song 00

OPERATION:	PRESS:	DISPLAY READS:
Access Song Mode	SONG	SELECT SONG 00
Access Edit Mode	EDIT	PART 1= SEQ **
(If there is a number rather than asterisks after "SEQ", the song is not empty and should be erased before recording; see ERASING A SONG)		
Start Song with Sequence 01	01	PART 1= SEQ 01
(The DMX will "beep" whenever you insert or delete a sequence)		
Advance to Part 2	>	PART 2== SEQ **
Continue with Sequence 02	02	PART 2= SEQ 02
Advance to Part 3	>	PART 5= SEQ **
Continue with Sequence 01	01	PART 3= SEQ 01
Advance to Part 4	>	PART 4= SEQ **
Continue with Sequence 00	00	PART 4= SEQ 00
Advance to Part 5	>	PART 5= SEQ **
Repeat Sequence 00	00	PART 5= SEQ 00
Finish	EDIT	SELECT SONG 00

To play the song you have just created, press PLAY.

You can revise the listing in a song by repeating the steps in example 13. If there are already sequences contained in the song the display will display the sequence contained in the first part. You may move through the song list by using the forward and reverse arrows to get to the part of the song that you wish to revise. You have three editing options:

REPLACE

You can REPLACE any sequence currently displayed with another simply by entering the new sequence number.

INSERT

By pressing RECORD and EDIT, the DMX will insert sequence 00 into the song list before the sequence previously displayed. You can then REPLACE sequence 00 with the desired sequence by entering its number.

ERASE

By pressing ERASE and EDIT, the DMX will remove the displayed sequence from the song list.

Example 14: Re-editing Song 00

OPERATION:	PRESS:	DISPLAY READS:
Access Song Mode	SONG	SELECT SONG 00
Access Edit Mode	EDIT	PART 1= SEQ 01
Advance to the next Part	>	PART 2= SEQ 02
Advance to the next Part	>	PART 3= SEQ 01
Replace Sequence 01 with Sequence	05	PART 3= SEQ 05
Advance to the next Part	>	PART 4= SEQ 00
Advance to the next Part	>	PART 5= SEQ 00

continued

OPERATION:	PRESS:	DISPLAY READS:
Erase Sequence 00	ERASE (hold)	PART 5= SEQ 00
	EDIT	PART 5= SEQ **
	("beep")	
	(You just removed the last sequence in the song so you are now at the end)	
Rewind back	<	PART 4= SEQ 00
Rewind back	<	PART 3= SEQ 05
Insert a sequence	RECORD (hold)	
	EDIT	PART 3= SEQ 00
	("beep") (Remember, you just inserted a sequence, so all the sequences after get moved back accordingly.)	
Replace Sequence 00 with Sequence 26	26	PART 3= SEQ 26
Finish Editing	EDIT	SELECT SONG 00

ERASING A SONG

You may erase an entire song by holding ERASE and pressing SONG. Individual sequences within a song may be erased in the edit song mode (see RECORDING A SONG).

SONG TEMPO

Each sequence within a song will play at its programmed tempo, allowing tempo changes within a song. When in song mode, changing the tempo changes all of the tempos by a proportional amount, and the display will show the original tempo plus the percent change i.e., "TEMPO = 120 + 10%".

A WORD ABOUT THE UTILIZATION OF MEMORY

The total memory capacity of the DMX is 2000 events. There are many ways this capacity can be divided amongst sequences. For instance, the DMX can accommodate one sequence of 2000 notes, or 100 sequences of 20 notes each. In general, it is best to take advantage of the repetitive nature of music by constructing songs from short sequences.

Each part of a song requires one-third as much memory as a single event in a sequence! A song consisting of one bar repeated eight times uses only one fifth the memory of an eight bar sequence. Therefore, the most efficient use of memory is achieved by using the SONG mode whenever possible.

ABOUT THE DMX VOICES

The DMX contains eight sets of voices. Each voice has three variations, and some of the voices contain two completely different sounds. The sound of each voice is contained on one or several memory chips.

THE SOUNDS

The DMX comes from the factory with the following voices and these variations:

BASS	Bass drum, with three volume levels.
SNARE	Snare drum, with three volume levels.
HIHAT	A hihat, with a closed and an accented sound, plus a longer "open" sound.
TOM 1	A tom-tom, with three individual pitches.
TOM 2	A tom-tom, lower in pitch than TOM 1, again with three pitches.
CYMBAL	This voice contains two sounds, a ride cymbal which can be played accented or unaccented, as well as a crash cymbal.
PERC 1	This voice also contains two sounds, a tambourine with accent, as well as a rimshot.
PERC 2	two sounds, a shaker with accent, plus hand claps.

TUNING

The pitch of each of the voices can be tuned up or down half an octave by adjusting the pitch controls located inside the DMX on the top rear of each of the voice cards. The voice cards can be accessed by removing the two screws at the front of the unit, and then lifting up the front panel.

Additionally, the pitch of each voice may be controlled with pedals or control voltages connected to the CV IN connector on the rear panel of the unit (see CONTROLLING THE DMX WITH EXTERNAL CVS AND GATES).

CASSETTE INTERFACE

The DMX is equipped with a Cassette Interface which allows programs contained in the program memory to be stored externally on an audio cassette. All that is required to use the Cassette Interface feature is an audio cassette recorder with reasonable frequency response and a pair of mini-plug to mini-plug audio connecting cables. The cassette player must have an earphone or ext. speaker output.

CASSETTE INTERFACE CONNECTIONS

See the diagram in the "REAR PANEL CONNECTIONS" section of the manual. Connect the Earphone or Speaker output of your cassette recorder (a Line output will not work) to the jack labeled "TO OUTPUT" on the rear of the DMX. Connect the "TO INPUT" jack on the rear panel of the DMX to the Line or Aux input of your cassette recorder.

** NOTE **

To reduce hum, remove the cables to the cassette recorder when not using the Cassette Interface.

TRANSFERRING DATA

TO RECORD PROGRAMS ONTO TAPE:

1) Connect the Cassette Recorder to the Cassette Interface Jacks on the rear panel of the DMX as described in "CASSETTE INTERFACE CONNECTIONS", above.

2) Enable the Cassette Interface by throwing the switch on the rear panel.

3) Press the RECORD switch on the tape recorder. You should now hear a steady tone through the MIXED OUTPUTS of the DMX. The volume of the tone is controlled by the Metronome control.

4) Press the CASSETTE RECORD switch on the DMX (it shares a button with the STEP switch). After the RECORD switch is pressed, ten seconds of the steady "leader" tone will be sent out followed by the actual memory information. During this time, the display will read "RECORDING DATA". After all of the memory information has been transferred, the display will read "DATA COMPLETED".

TO PLAY PROGRAMS FROM TAPE INTO THE DMX:

1) Connect the Cassette Recorder to the Cassette Interface Jacks on the rear panel of the DMX as described in "CASSETTE INTERFACE CONNECTIONS", above.

2) Set the playback volume on the tape recorder to 3/4 of maximum.

3) Enable the Cassette Interface by throwing the switch on the rear panel.

4) Press the PLAY switch on the tape recorder. You will now be able to monitor the tape through the MIXED OUTPUTS of the DMX

5) As soon as the "leader" tone is heard, press the CASSETTE PLAY switch on the DMX (it shares a button with the EDIT switch). At least three seconds of the "leader" tone must come between pressing PLAY and the rough sound of the memory information. The display will read "PLAYING DATA" from the time the switch is pressed until the information transfer has been completed. The display will then read "DATA COMPLETED".

6) If an error is detected, the display will read "ERROR IN DATA".

*** NOTES ***

If the MEMORY PROTECT SWITCH on the rear panel of the DMX is switched ON, the display will read "MEM. PROTECTED" and the DMX will "beep".

Some cassette recorders invert the phase of the signal in the process of recording and playing back. If your cassette recorder NEVER plays data properly, the inverted phase may be the problem. The software version 2.10 (released in June 1982) enables inverted data to be read properly by the DMX Cassette Interface. To set the DMX to read inverted data, hold the "0" button while pressing PLAY. The first digit of the display will show a "!", indicating that the DMX is expecting inverted data.

TO CHECK TAPES;

The CHECK function of the Cassette Interface enables verification of the data on a tape without actually transferring the data into the DMX's memory. A tape should always be checked after recording.

1) Connect the Cassette Recorder to the Cassette Interface Jacks on the rear panel of the DMX as described in "CASSETTE INTERFACE CONNECTIONS", above.

2) Enable the Cassette Interface by throwing the switch on the rear panel.

3) Press the PLAY switch on the tape recorder. You will now be able to monitor the tape through the MIXED OUTPUTS of the DMX.

4) As soon as the "leader" tone is heard, press the CASSETTE CHECK switch on the DMX (it shares a button with the SONG switch). At least three seconds of the "leader" tone must come between pressing CHECK and the rough sound of the memory information. The display will read "CHECKING DATA" from the time the switch is pressed until the data check has been completed. The display will then read "DATA COMPLETED".

5) If an error is detected, the display will read "ERROR IN DATA".

** NOTES **

Once the leader tone has started the cassette interface must complete its cycle.

Some cassette recorders invert the phase of the signal in the process of recording and playing back. If your cassette recorder NEVER checks data properly, the inverted phase may be the problem. The software version 2.10 (released in June 1982) enables inverted data to be read properly by the DMX Cassette Interface. To set the DMX to read inverted data, hold the "0" button while pressing CHECK. The first digit of the display will show a "!", indicating that the DMX is expecting inverted data.

POSSIBLE CAUSES OF TAPE TRANSFER ERRORS

If errors are found during the play or check process, the display will read "ERROR IN DATA". If this happens, one of the following reasons might be responsible:

A) The playback volume is too high or too low. Some trial and error may be required. Generally the best level is as high as possible before distortion occurs (approximately 3/4 of the way up). If the playback volume is very low, the DMX will not acknowledge the data at all.

B) The leader tone is too short. At least three seconds of the "leader" tone must come between pressing PLAY and the rough sound of the memory information.

C) The tone control may be set improperly. It is important that the tone control(s) be set so that neither the high nor the low frequencies are attenuated.

D) Some cassette recorders invert the phase of the signal in the process of recording and playing back. If your cassette recorder NEVER checks or plays data properly, the inverted phase may be the problem. The software version 2.10 (released in June 1982) enables inverted data to be read properly by the DMX Cassette Interface. To set the DMX to read inverted data, hold the "0" button while pressing CHECK or PLAY. The first digit of the display will show a "!", indicating that the DMX is expecting inverted data.

E) The playback head azimuth of the tape recorder may be out of alignment. This will only affect recordings made on other tape recorders.

F) Tapes recorded on older DMX's (software version 1.00) will not play on newer units and vice versa (see DMX SOFTWARE REVISIONS, next page).

G) The Batteries in the cassette machine are too weak.

H) There is a bad spot on the tape.

I) Sometimes tape errors are caused by poor recordings. Set the recording level manually if possible, and use a LINE or AUX input if available.

The Cassette Interface is designed to work with portable cassette recorders having an "Earphone", "Speaker", or "Monitor" output. The Interface is not designed to work with tape recorders having only a line level output.

The Cassette Interface (and other functions) in the DMX have undergone several revisions since the DMX was first introduced. These revisions are noted here.

DMX 1.00 - This is the original software release, shipped in units starting in November 1981.

DMX 2.00 - The DMX software Revision 2.00 (shipped in units starting with serial numbers B20801) contains a new cassette interface. This interface is much more tolerant of the data played back into it, and the volume setting does not have to be set as high as with the original software (DMX 1.00), although an speaker or earphone level output is still required.
Note that tapes recorded on the original DMX software (1.00) cannot be played into newer DMX's (2.00 and 2.10) and vice versa.

DMX 2.10 - Many tape recorders invert the phase of the signal during the recording process, causing problems during data transfers. This software version (shipped in units starting with serial number B22505) enables inverted data to be read properly by the DMX Cassette Interface. To set the DMX to read inverted data, hold the "0" button while pressing CHECK or PLAY. The first digit of the display will show a "!", indicating that the DMX is expecting inverted data.

To display the software version contained in the DMX, press "3", "5", and "7" simultaneously.

Any DMX may be retrofitted with new software by bringing the unit to one of Oberheim’s authorized service centers.

BATTERY BACKUP

The DMX contains a rechargeable battery that maintains power to the memory even when the DMX is unplugged. This way you can turn off the power and/not lose your sequences, much like the battery backup in the OB-Xa Polyphonic Synthesizer. However, the memory in the DMX is much larger, and as a result a rechargeable Nickel-Cadmium battery is used.

With normal use the battery will rarely be drained completely, since the battery is able to maintain power to the memory for several weeks, when fully charged. However, if the battery does become completely discharged, leave the DMX plugged in and turned on for 14 hours to fully recharge the battery.

As a safeguard, you should record important sequences onto cassette, using the Cassette Interface.

SYNCHRONIZING THE DMX AND THE DSX DIGITAL POLYPHONIC SEQUENCER

The DMX and the DSX have been designed to operate in sync with each other. When the DMX runs in tandem with a DSX or another DMX, one unit must be the master and the other the slave.

HOOKUP

Using a cable with a mono or stereo 1/4" phone plug at each end, connect the CLOCK OUT jack on the rear panel of the unit to be the master to the CLOCK IN jack on the rear panel of the unit to be the slave.

OPERATION

Each unit will operate the same as before with the following exceptions:

The TEMPO is controlled by the master. Increasing the tempo on the master will increase the tempo on the slave as well. The DMX and DSX have the same TEMPO programming. Recordings may be made separately and synchronized later.

To Record, press RECORD and PLAY as before. The only difference here is that recording on the slave will not start until the master is playing.

SYNCHRONIZATION TRICKS

The synchronization between the DMX and the DSX is the EXTERNAL CLOCK, which is a subdivision of the metronome. The tempo of the master unit will control the tempo of the slave. Sequences may be any length on either machine. When the master starts, the interrupt clock will start the slave at the same time (the slave must be in PLAY or RECORD). When the master sequence stops, the interrupt clock from the master will stop and consequently, so will the slave, even if it has not finished its sequence or if it finished and started over. The same with songs. The sequences within a song will play one after the other until the end of the master song.

SYNC TO TAPE

The DMX has been designed to sync to tape as well. Sync to tape is achieved by recording a sync tone from the SYNC OUT jack on the rear panel on to a track of a tape recorder, and then playing it back into the SYNC IN jack.

RECORDING THE TONE

The DMX will output the sync tone only while in RECORD or PLAY. In STOP or other modes, the output will be a leader tone like the cassette interface. Make sure the tempo that is set on the DMX is the proper tempo, because the tempo will be governed by the sync tone when playing back. As a result, the DMX will respond to changes in the tape speed within a range of about 20% up or down.

Start recording the leader tone on your tape recorder. To reduce crosstalk between the tone and other tracks, you may wish to record the tone at a reduced level, but not below -10VU. Press PLAY on the DMX at the point you wish the sequence to start. The leader tone will give way to a chattering sound much like the sound of the cassette data. When the DMX stops playing, either by pressing STOP or at the end of a SONG, the leader tone will return.

PLAYING BACK THE SYNC TONE

Start the tape recorder and then press PLAY on the DMX. The DMX will wait to start playing until the chattering sound starts. The DMX will continue to play until the chattering sound stops.

RECORDING WHILE SYNCHRONIZED TO TAPE

Recording onto the DMX while syncing to tape is much the same as normal recording. Start the tape recorder, then press RECORD and PLAY on the DMX. The DMX will wait to record until the sync tone on the tape starts. The DMX will not record beyond where the sync tone stops.

HINT:
If you are going to be recording on the DMX while synchronized to tape, you might consider recording sync longer than you need just to be safe. The DMX will stop at the end of a song even if the sync tone continues.

SYNCHRONIZING BOTH THE DMX AND THE DSX TO TAPE

The sync to tape tones generated by the DMX and DSX Digital Polyphonic Sequencer are compatible, allowing a sync tone recorded by the DMX to be played back into the DSX, and vice versa. The DMX can generate a sync tone and slave a DSX at the same time. Similarly, the DMX can generate a sync tone while it is being slaved to a DSX. However, the DMX will not slave the DSX (via the CLOCK OUT) while the DMX itself is synchronizing to a tape tone.

There are several methods to synchronize both the DSX and the DMX to tape (after the tone is recorded on tape):

1) "Y" the sync tone from the tape into the SYNC TO TAPE INPUTS on both machines;

2) Play the sync tone from the tape into the DSX (SYNC TO TAPE INPUT) and then out of the DSX (CLOCK OUT) to the DMX (CLOCK IN). This is the most reliable way;

3) Play the sync tone from the tape into the DMX (SYNC TO TAPE IN) and then out of the DMX (SYNC TO TAPE OUT) into the DSX (SYNC TO TAPE IN).

SYNCHRONIZING THE DMX AND OTHER SEQUENCERS

The DMX has been designed to slave other sequencers as well, digital or analog, using the metronome output to clock the sequencer. The CLICK OUT outputs the metronome at all times for this reason. The tempo of the DMX will control the tempo at which both units play, and the metric relationship of the external sequencer relative to the DMX may be changed by changing the CLICK VALUE of the metronome (see SIGNATURE).

CONTROLLING THE DMX WITH EXTERNAL TRIGGERS AND CVS

Each of the eight drum voices in the DMX has a connection for external triggering as well as external voltage control of pitch. These trigger and CV inputs provide additional means to control the DMX. For example, you might place contact microphones on the heads of a drum kit and play the drums to control the DMX. Another possibility would be to wire a foot pedal to a drum voice control voltage and control the pitch with the pedal (something like electronic tympani). Still another would be to use a sequencer with CVs and GATEs out (like the Oberheim DSX) to trigger the drums.

The TRIGGERS IN on the DMX act essentially the same as pressing any of the bottom row of buttons on the front panel. When in record, triggering any of the voices externally will cause them to be recorded subject to the same correction schemes (QUANTIZE and SWING) that would apply to the buttons on the front panel. Any signal of +1 Volt or more will trigger the drums.

The CONTROL VOLTAGES IN on the DMX are essentially wired in parallel with the pitch controls on each of the voice cards. For maximum range, tune the drums to the lowest pitch.The voltage input range is 0 to +6 Volts. An increase in the voltage applied to the CV inputs causes a decrease in the pitch of the drum. Unlike the trigger inputs, the control voltage inputs are not recorded.

The picture of the rear panel contains a diagram of the Molex pin connections for the CVs and GATEs.

FOOTSWITCHES AND PEDALS

On the rear panel are two jacks for footswitches. These inputs are designed to be used with switches with a MOMENTARY CLOSED configuration such as those available from Oberheim.

START FOOTSWITCH

When in sequence mode (display reads "SELECT SEQUENCE 00") pressing the START footswitch will play the sequence from the beginning. Pressing the footswitch will stop it. Pressing it again will restart the sequence from the beginning.

When in song mode (display reads "SELECT SONG 00") the switch works a bit differently. From STOP, pressing the footswitch starts the song from the beginning. Pressing it again will stop it. If the footswitch is pressed once more, the song will continue from where it stopped.

NEXT FOOTSWITCH

When in sequence mode (display reads "SELECT SEQUENCE 00") pressing the NEXT footswitch advances the DMX to the next sequence. When playing a sequence, the DMX will wait until the sequence currently being played is finished before starting the next sequence.

When in song mode (display reads "SELECT SONG 00") the switch works a bit differently. From STOP, pressing the footswitch advances the DMX to the next song. While playing a song, if the NEXT footswitch is held down at the end of a sequence, the DMX will "vamp", that is, repeat the current sequence, and NOT advance to the next sequence in the song. Releasing the switch will allow the song to continue.

PEDALS

Foot pedals may be used to control the pitch of individual voices by connecting them to the CV IN Molex connector on the rear panel. Use a pedal of 50K Ohms with an audio taper potentiometer for full range. The Oberheim P-OBX pedal will work but since it uses a potentiometer with a linear taper, you will find that most of the control range is at one end of the pedal.

The pin connections on the Molex connectors are detailed in the rear panel diagram.

The Oberheim DMX Digital Drum Machine comes with a set of stock sequences recorded on cassette. These sequences may be used as-is so that you can start using your DMX right away, or they can be edited and modified to suit your needs.

The 78 sequences are organized into groups of four: Each group consists of an "A" version, a "B" version (essentially two variations of the same beat), and an "A" and a "B" fill. These four parts are designed to go together for maximum ease in constructing songs. For instance, the "A" part may be used as a verse of a song,- and the "B" variation may be used as a chorus or bridge. The "A" and "B" fills are designed to provide smooth transitions from "A" to "B" and back again. Of course it is possible to freely intermix any of the sequences and fills, and this is done in some of the example songs. Sequence 77 is a single beat that can be used as a simple ending for many of the possible songs. Sequence 00 is intended as a brief demonstration of the kinds of things it is possible to program with the DMX.

The factory tape also comes with 19 songs, which are not complete songs, but are intended as examples of how typical songs can be constructed using the stock sequences. As with the sequences, these songs may be edited to suit your needs. Song 00 is esentialy a "directory" of all the stock sequences: It simply plays all of the 76 rhythms in order, to provide a quick & easy way to audition the stock beats.

The factory sequences consume about 5/4 of the DMX's memory capacity. If you want to program your own rhythms and songs, it is best to erase any or all of the stock sequences you do not intend to use. Save the factory cassette, so that you can re-load the factory stocks whenever you want.

LIST OF PROGRAMMED SEQUENCES

0. Demonstration

1. Rock 1A
2. Rock 1A Fill
3. Rock 1B
4. Rock 1B Fill

5. Rock 2A
6. Rock 2A Fill
7. Rock 2B
8. Rock 2B Fill

9. Rock 3A
10. Rock 3A Fill
11. Rock 3B
12. Rock 3B Fill

13. Rock 4A
14. Rock 4A Fill
15. Rock 4B
16. Rock 4B Fill

17. Rock 5A
18. Rock 5A Fill
19. Rock 5B
20. Rock 5B Fill

21. Shuffle A
22. Shuffle A Fill
23. Shuffle B
24. Shuffle B Fill

25. Honky-Tonk A
26. Honky-Tonk A Fill
27. Honky-Tonk B
28. Honky-Tonk B Fill

29. Boogie A
30. Boogie A Fill
31. Boogie B
32. Boogie B Fill

33. Swing A
34. Swing A Fill
35. Swing B
36. Swing B Fill

37. Country A
38. Country A Fill
39. Country B
40. Country B Fill

41. Disco A
42. Disco A Fill
43. Disco B
44. Disco B Fill

45. Funk A
46. Funk A Fill
47. Funk B
48. Funk B Fill

49. Polka A
50. Polka A Fill
51. Polka B
52. Polka B Fill

53. Samba A
54. Samba A Fill
55. Samba B
56. Samba B Fill

57. Bossa A
58. Bossa A Fill
59. Bossa B
60. Bossa B Fill

61. Mambo A
62. Mambo A Fill
63. Mambo B
64. Mambo B Fill

65. Waltz A
66. Waltz A Fill
67. Waltz B
68. Waltz B Fill

69. Reggae A
70. Reggae A Fill
71. Reggae B
72. Reggae B Fill

73. 7/4 Rock A
74. 7/4 Rock A Fill
75. 7/4 Rock B
76. 7/4 Rock B Fill

77. End

LIST OF PROGRAMMED SONGS

0.	Directory	10.	Country
1.	Hard Rock 1	11.	Disco
2.	Hard Rock 2	12.	Funk
3.	Rock Ballad	13.	Polka
4.	Old-time Rock	14.	Samba
5.	Slow Rock	15.	Bossa Nova
6.	Shuffle	16.	Mambo
7.	Honky-Tonk Rock	17.	Waltz
8.	Boogie	18.	Reggae
9.	Swing	19.	7/4 Rock

A WORD ABOUT DIGITAL AUDIO

The DMX is not a Synthesizer. It does not synthesize sound. What it does is play back sounds from its memory. These sounds are stored as numbers, inside special integrated circuits called EPROMs (Erasable Programmable Read Only Memory) which are programmed at the factory.

Before explaining how digital audio works, let's digress for a minute and discuss how regular analog audio works:

Sound, as far as your ears are concerned, is caused by very small but regular changes in atmospheric pressure. The air moves back and forth, over and over, alternately pushing and pulling on your eardrums and the rest of your body. When these waves of air occur between 20 and 20,000 times per second, your brain perceives them as sound. So anything that makes noise ultimately must disturb the air in this sort of regular way. Look at the low frequency speaker in your sound system. If you turn the volume way up (don't damage your speakers, though!) you will see the speaker (and feel the air near it) moving in and out, in exactly this sort of regular movement.

So what any analog audio system does, then, is provide a pattern of regular movement (Oscillation) for the speaker to move in, so that you feel the air moving in this same pattern so that your brain can translate all this into sound and you can HEAR! Look at a phonograph record very closely and you will see the same repeating wiggles that are amplified by your amplifier to move your speakers.

Digital audio stores, not the oscillations that move your speakers, but a series of numbers that represents those oscillations. Take the groove from that phonograph record and, in your mind, stretch it out in a straight line and place it on a piece of graph paper. Now if you went from the left end of the graph to the right, and every centimeter wrote down a number that represented how far that phonograph wiggle moved up and down, you would become a recorder of digital audio. Now, if you took another piece of graph paper and plotted all those numbers that you just wrote down, you would do what a digital audio recorder does to play back.

So what is programmed inside an EPROM in the DMX is a series of numbers (lots of numbers!) that represents the sound of a snare drum. Another one has the representation of the sound that a cymbal makes, and so on, for all of the sounds.

This Glossary contains definitions of terms as used in the DMX Manual.

BEAT VALUE
: The note value of the time signature. In a time signature of 3/4, the BEAT VALUE is equal to a quarter note, and there are three quarter notes per measure.

CLICK VALUE
: The note value of the metronome click. The CLICK VALUE may be the same or different than the BEAT VALUE.

CONTROL VOLTAGE
: An electrical signal which can be used as an input to Voltage Controllable devices such as Oscillators, Filters, Amplifiers, etc.

DATA
: DATA is the information that is processed by the MICROPROCESSOR. It is stored in an ADDRESS.

DEFAULT
: The result of not making decisions concerning parameters in the DMX. If you do not specify how long a sequence is to be for example, the DMX will DEFAULT and specify that the length is to be two bars.

EPROM
: This acronym stands for Erasable Programmable Read Only Memory, which is exactly what it is, a memory chip that is programmed at the factory with a computer program. Once programmed, the memory can only be read by the MICROPROCESSOR, and can not be written into like the Random Access Memories (RAM).

EVENT
: Any number of drums that are played on the same beat. The DMX has the capacity to store 2000 EVENTS, each of which may contain between 1 and 8 notes.

GATE
: An electrical signal which can be used to trigger Envelope Generators and other time dependent devices.

SONG
: A combination of sequences.

MICROPROCESSOR

The MICROPROCESSOR is the "brain" of the computer. It looks at the SOFTWARE instructions and then carries them out, reading DATA from the proper ADDRESSES, performing the instructed function, and then writing the result in the proper ADDRESS.

PART

In the DMX the term PART refers to a segment of a Song. Each Sequence recorded in a Song adds another PART to the Song. There is no set limit to the number of PARTS that a song may contain, however each PART can only be one of the one hundred sequences.

PROMPT

A statement which appears on the display when the DMX needs information from you; for example, which sequence to play, what tempo to play at, etc.

QUANTIZE

A process of Founding off, in the case of the DMX the rhythms that are played, to the closest specified increment. In the DMX, your recordings can be QUANTIZED to the nearest Quarter note, Eighth note, or other smaller subdivisions down to a Forty-Eighth note.

RANDOM ACCESS MEMORY (RAM)

Random Access Memory acts like a piece of scratch paper for the MICROPROCESSOR. Unlike Read Only Memory (ROM, PROM, or EPROM), RAM can be read from AND written into by the MICROPROCESSOR. RAM is usually used in a computer system to store information that is constantly changing. In the case of the DMX, that includes notes, tempos, sequences, etc.

SEQUENCE

A succession of events stored in the DMX as numbers. The DMX will remember the events as played and then will repeat them upon command.

SOFTWARE

The computer program or instructions that the computer follows to do its assigned task. In the DMX and X-series synthesizers, the SOFTWARE is stored in EPROMS located on the circuit boards.

NUMBER OF SOUNDS: 24

FREQUENCY RESPONSE: 10-16,000 Hz
(varies among voices and is dependent upon tuning)

DYNAMIC RANGE: 80 Db

MAXIMUM NUMBER OF NOTES: 2000 Events, each of which may contain as many as eight notes occurring simultaneously

NUMBER OF SEQUENCES: 100

NUMBER OF SONGS: 50

MAXIMUM TYPICAL SEQUENCE LENGTH: 6 Minutes of 1/8 Notes at 80 Beats/Minute

MAXIMUM SEQUENCE LENGTH: Over 5 Hours at 25 Beats/Minute

MAXIMUM SONG LENGTH: 255 Sequences

TEMPO RANGE: 25-250 Beats per Minute (programmable with each sequence and song)

RECORDING MODES:

REAL TIME: Records rhythm as buttons are pressed. Selectable Quantize Mode rounds off rhythms from 1/32 notes to 1/4 notes.

STEP: Notes and rests are programmed separately, one beat at a time. Value of beat may be between 1/4 note and 1/32 note.

INPUTS:
TRIGGER (one for each voice): Level: 1 Volt or greater
Impedance: >4.7 K
CONTROL VOLTAGE (one for each voice): Level: 0-+6 Volts
Impedance: >500 Ohms
Approx. -2.5 Volts/Octave
EXTERNAL CLOCK INPUT; 5 Volt positive pulse, TTL compatible
SYNC TO TAPE INPUT: 550 mV RMS
FOOTSWITCHES: Start/Stop, Next Sequence; contact closure to ground

OUTPUTS:
SIGNALS: Stereo and Mono mixed outputs, individual voice outputs
Level: +4dBm (nominal)
Impedance: 50 Ohms, unbalanced
METRONOME: +10V Pulse
EXTERNAL CLOCK: TTL compatible
SYNC TO TAPE: 350mV rms

POWER: 95-130 or 190-260 Volts AC, 30 Watts

DIMENSIONS: 18"L X 11.8"W X 5"H (45.7cm.L X 30.Ocm.W X 12.7cm.H)

WEIGHT: 12 Lbs. (5.4 Kg)