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TELEWORD™ MODULE



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 **YAMAHA®**



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Tom Darter

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Cheryl Matthews
Joyce Phillips

*A product of
GPI Editorial Services
Tom Darter, Director
P.O. Box 2338, North-
ridge, CA 91323-2338*

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From The Editor

WELCOME TO ISSUE #5 of AfterTouch! As promised in my last column, this issue is being mailed just a few weeks after the previous issue, and the next issue will be mailed shortly after this one. Our information system is well-oiled, the mailing system is up and running, and AfterTouch is completely on track.

Following the format started last month, this issue includes a number of DX7 patches sent in by readers, plus a large selection of answers to reader questions. Also, Ken Lievers (who was the first reader to contribute a published article) returns with more information on DX7 to CX5M voice conversion.

As you can see from the above, input from readers is one of the things that makes AfterTouch possible, so please consider contributing. Read the information on page 19 for details on how to contribute a story, hot tip, program, or patch to AfterTouch. We want to hear from you!

From the mail that we have been receiving so far, though, it is obvious that I need to add more emphasis to one point of procedure, so here goes: *If you want unused material returned to you, you must enclose a self-addressed, stamped envelope with your material!* Due to the volume of mail we have been receiving and the administrative costs involved, we simply cannot return articles and other material unless a self-addressed, stamped envelope is included.

Also, many of you who write in to request a subscription have also requested back issues or

other information in the same letter. When multiple requests are sent in together, the potential for delays or confusion is very great, because the different inquiries do not necessarily involve the same group of people.

For example, all requests for AfterTouch subscriptions must go to our Mailing List input service. After they are entered, the letters are normally kept on file, in keeping with various postal regulations. If a request for back issues is included with this subscription request, chances are it will not be fulfilled. To be absolutely sure that you receive any available back issues, *make back issue requests separately*, and include the indication "ATTN: Back Issues" on the envelope.

In addition, all requests for specific product literature must go directly to Yamaha [Yamaha International Corp., P.O. Box 6600, Buena Park, CA 90622]. We at AfterTouch are happy to receive specific questions concerning the use of Yamaha professional music products, and we will answer as many of them as we can in the Questions column; however, requests for general information on products or product lines must be sent to Yamaha.

We are very happy to offer AfterTouch as a free informational service. In order to make sure that we can serve your needs (and continue to offer these various services *free*), we must ask you to help us by sending different things in different envelopes. Thanks.

—TD

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After you have filled in the relevant information, put a stamp on the postcard and mail it to us. When we receive the card, we'll put you on our permanent mailing list, and you will receive twelve issues of AFTERTOUCHE absolutely free! There is absolutely no obligation, and no other strings are attached.

(By the way, if you received *this* issue in the mail, you are already on our permanent mailing list, so you don't need to send in another card.)

Also, don't limit yourself to just sending in your address. Let us know what kind of articles you want to read. The more input we receive, the more we will be able to tailor the information in AFTERTOUCHE to suit your musical needs.



Use Your DX7 To Duplicate Drawbar Organ Sounds. By Lance Armstrong.

This first section of this chart shows the voltage outputs for the drawbars of the Porta-B organ, measured at each C of the keyboard. The second section of the chart translates these levels into the 0-99 output range of the DX7's operators.

HERE IS A WAY to make a DX7 sound exactly like your Hammond drawbar organ. The secret lies in understanding the different amplitude rolloff rates for each drawbar, which can be duplicated using the DX7's KEYBOARD LEVEL SCALING. All you need to discover these amplitude rolloff rates is an AC voltmeter (preferably a digital voltmeter).

The output signal from a Hammond, with one drawbar pulled out and one key pressed, looks like a regular old sine wave, except that it's doing the boogie a little bit. This is probably caused by some vibrational modes of the tone wheel shaft, or by the vibrato scanner. The output amplitude will decrease as you play a chromatic scale up the keyboard. A plot of the output amplitude versus frequency, for one drawbar pulled out, reveals a certain rolloff rate.

The keyboard level scaling on the DX7 is perfect for imitating the different rolloff rates for each drawbar, since each operator in the DX7 can have its own rolloff rate. With the 6 operators of the DX7, 6 of the drawbars can be duplicated. With another DX7 or a TX7, all 9 drawbars and percussion can be duplicated.

(DX7 software programs that graphically display the keyboard level scaling curves are a perfect tool for programming these rolloffs.)

To find out what the breakpoints, curves, and levels were, I hooked an AC digital voltmeter up to the output of the preamp inside my Hammond. Then, with one drawbar pulled out at a time, I recorded the voltage for each C.

On my Porta-B, the top three drawbars did not sound all the way up to highest C, so in those cases I recorded the output for each C and for the highest note. On my Hammond B3, C1 through B1 repeats C2 through B2 with the lowest drawbar pulled out. It takes two operators to imitate this effect, which reduces one DX7's capability to 5 drawbars.

After I had gathered the voltage outputs, I generated a graph for each drawbar, using Appleplot, which revealed the rolloff curves. These curves proved to be a good visual tool for choosing the breakpoints and the curve type (linear or exponential). I wound up using VisiCalc on my Apple to scale all of the voltages so that the highest voltage level corresponded to the DX7's highest output level of 99. See the accompanying charts for a complete listing of these various levels.

To program all of this into the DX7, I hooked the AC voltmeter up to the DX7's output. Algorithm #32 was used, and the pitch of each operator was programmed to match the drawbar ratios. The keyboard level scaling and output level were adjusted for each operator until the voltages across the keyboard came close to those measured from the Hammond. Without using any DX7 programming software, this process took about an hour.

The PORTA-B voice on the page 5 reproduces the sound of a Hammond Porta-B with 6 of the drawbars pulled all the way out. To create other drawbar mixtures, you will need to change the relative output levels of the operators; and, if you want to emulate a different grouping of 6 drawbars, you will need to program in the relevant pitch, keyboard level scaling, and output levels for the drawbars you are reproducing. Use the charts as a guide.

For me, the final test of this patch was to pipe the DX7 through a Leslie, via the input on the Hammond preamp, play the Hammond and then the DX7, and try to notice any difference. My big brother, who is a Jimmy Smith fan, couldn't tell the difference. He though the DX was the Hammond!

PORTA-B OUTPUT LEVELS

DRWBR	F1 53	C3 60	C4 72	F4 76	C5 84	F5 88	C6 96	— KEY —MIDI #
16	96	84	72	--	56	--	63	
5.33	66	58	57	--	56	35	19	
8	77	76	57	--	60	45	38	
4	60	47	51	--	32	23	14	
2	56	61	38	--	16.6	11.2	0	
2.66	38	42	40	--	13.2	11.8	7	
1.66	58	63	29	--	10.2	0	0	
1.33	25	24	8	--	4.3	0	0	
1	35	30	13.8	9.4	0	0	0	

NORMALIZED TO 99 FOR THE DX7

16	99	87	74	--	58	0	66
5.33	68	60	59	--	58	36	20
8	79	78	59	--	62	46	40
4	62	48	53	--	33	24	15
2	58	63	39	--	17	12	0
2.66	39	43	41	--	14	12	7
1.66	60	65	30	--	11	0	0
1.33	26	25	8	--	4	0	0
1	36	31	14	10	0	0	0



SPACE- MUSIC. A New DX7 Voice By Doug Cooper.

FUNCTIONS					
POLY/MONO	RANGE	STEP	MODE	CLASSIC/O	PORTAMENTO
POLY	0	0	NA	0	0
(CONTROLLER)					
MOD WHEEL	NA	OFF	OFF	AMPLITUDE	EQ BAL
FOOT CONTROL	NA	OFF	OFF	OFF	OFF
BREATH CONTROL	NA	OFF	OFF	OFF	OFF
AFTERTOUCH	NA	OFF	OFF	OFF	OFF

WAVE	NA	NA	NA	0	0	NA	0
SPEED	NA	NA	DELAY	LFO	PAID	AMD	SYNC
R1	99	99	99	99	99	99	99
L1	50	50	50	50	50	50	50
R2							
L2							
R3							
L3							
R4							
L4							
PITCH ENVELOPE							
C3							
NET TRANSPOSE							
OFF							
OSC SYNC							

FREQUENCY	DEFINE	AMS
1.00	+4	0
ENVEL. OPE. DATA		
R1	R2	R3
75	23	7
L1	L2	L3
99	88	0
L4		
KEYBOARD SCALING		
CURVE BREAKPOINT DEPTH		
L	+L	L
R	-L	A-1
OP#	4	92
OUTPUT LEVEL		2
VELOCITY		10

FREQUENCY	DEFINE	AMS
5.00	+6	0
ENVEL. OPE. DATA		
R1	R2	R3
75	21	15
L1	L2	L3
99	88	0
L4		
KEYBOARD SCALING		
CURVE BREAKPOINT DEPTH		
L	+L	F3
R	-L	R
OP#	5	71
OUTPUT LEVEL		2
VELOCITY		29

FREQUENCY	DEFINE	AMS
21.00	+	0
ENVEL. OPE. DATA		
R1	R2	R3
75	20	7
L1	L2	L3
99	88	0
L4		
KEYBOARD SCALING		
CURVE BREAKPOINT DEPTH		
L	+L	C1
R	-L	R
OP#	6	52
OUTPUT LEVEL		2
VELOCITY		52

FREQUENCY	DEFINE	AMS
14.28	+4	0
ENVEL. OPE. DATA		
R1	R2	R3
90	85	22
L1	L2	L3
99	75	0
L4		
KEYBOARD SCALING		
CURVE BREAKPOINT DEPTH		
L	+L	F2
R	-L	R
OP#	2	96
OUTPUT LEVEL		3
VELOCITY		53

FREQUENCY	DEFINE	AMS
1.00	-1	0
ENVEL. OPE. DATA		
R1	R2	R3
75	22	13
L1	L2	L3
99	91	0
L4		
KEYBOARD SCALING		
CURVE BREAKPOINT DEPTH		
L	+L	L
R	-L	R
OP#	3	98
OUTPUT LEVEL		3
VELOCITY		0

FREQUENCY	DEFINE	AMS
1.00	-6	0
ENVEL. OPE. DATA		
R1	R2	R3
73	33	9
L1	L2	L3
99	0	0
L4		
KEYBOARD SCALING		
CURVE BREAKPOINT DEPTH		
L	+L	C3
R	-L	R
OP#	1	98
OUTPUT LEVEL		3
VELOCITY		5

ALGORITHM #13

Notes:

This patch produces a mellow chordal sound with a shimmering metallic edge. Hold sustained chords will to engage the repeating metallic overtone effect (which is caused by the delayed sample-and-hold LFO).

To increase the depth of the metallic overtone sound, engage the MOD wheel.



**ELEC
GRAND. A
New DX7
Voice By
Gregory
Emler.**

S/H	38	86	0	99	ON	0
WAVE	SPEED	DELAY	PMO	AMO	SYNC	PMS
LFO						
R1	R2	R3	R4	C3		
99	99	99	99	KEY TRANSPOSE		
L1	L2	L3	L4	ON		
50	50	50	50	OSC SYNC		
PITCH ENVELOPE						

FUNCTIONS					
POLY	12	0	NA	OFF	0
POLY/MONO	RANGE	STEP	MODE	GLISSANDO	TIME
PITCH BEND			PORTAMENTO		
(CONTROLLER)	RANGE	PITCH	AMPLITUDE	EG BIAS	
MOD WHEEL	50	ON	OFF	OFF	
FOOT CONTROL	NA	NA	NA	NA	
BREATH CONTROL	NA	NA	NA	NA	
AFTERTOUCH	NA	NA	NA	NA	

FREQUENCY	1.00	DETUNE	-1	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	R6
99	99	99	36	0	0
L1	L2	L3	L4		
99	99	99	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	A-1	L	0	
R	-L		R	0	
OP#	6	OUTPUT LEVEL	69	VELOCITY	0

FREQUENCY	1.00	DETUNE	+1	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	R6
99	99	99	35	0	0
L1	L2	L3	L4		
99	99	99	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	A-1	L	0	
R	-L		R	0	
OP#	5	OUTPUT LEVEL	50	VELOCITY	0

FREQUENCY	12.00	DETUNE	+7	AMS	3
ENVELOPE DATA					
R1	R2	R3	R4	R5	R6
99	99	99	99	0	0
L1	L2	L3	L4		
99	99	99	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	A-1	L	0	
R	-L		R	0	
OP#	2	OUTPUT LEVEL	61	VELOCITY	0

FREQUENCY	1.01	DETUNE	+3	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	R6
99	99	99	46	0	0
L1	L2	L3	L4		
99	99	99	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	A-1	L	0	
R	-L		R	0	
OP#	4	OUTPUT LEVEL	57	VELOCITY	0

FREQUENCY	16.00	DETUNE	+2	AMS	3
ENVELOPE DATA					
R1	R2	R3	R4	R5	R6
39	48	57	50	0	0
L1	L2	L3	L4		
99	48	97	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	B4	L	22	
R	+E		R	0	
OP#	1	OUTPUT LEVEL	69	VELOCITY	0

FREQUENCY	1.00	DETUNE	0	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	R6
40	31	48	35	0	0
L1	L2	L3	L4		
55	99	81	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	A-1	L	0	
R	-L		R	0	
OP#	3	OUTPUT LEVEL	99	VELOCITY	0

ALGORITHM #1

These DX7 voices can also be loaded into all the other Yamaha 6-operator FM digital synthesizers and tone generators, including the DX1, DX5, TX7, TX216, TX816, and TF1.



BASSTR-VIBE. A New DX7 Voice By Kevin M. Bevins.

TR1	26	0	0	0	ON	1
WAVE	SPEED	DELAY	PMD	AMD	SYNC	PMS
LFO						
R1	R2	R3	R4	C3 KEY TRANSPOSE		
99	99	99	99			
L1	L2	L3	L4	ON OSC SYNC		
50	50	50	50			
PITCH ENVELOPE						

FREQUENCY	4.00	DETUNE	-5	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	0
72	76	10	32		
L1	L2	L3	L4	L5	0
99	92	0	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	+L	B2	L	L	0
R	-L		R	R	0
OP#	3	OUTPUT LEVEL	80	VELOCITY	2

FUNCTIONS					
POLY	0	0	NA	0	0
POLY/MONO	RANGE	STEP	MODE	GLISSANDO	TIME
PITCH BEND			PORTAMENTO		
(CONTROLLER)					
MOD WHEEL	RANGE	PITCH	AMPLITUDE	EG BIAS	
MOD WHEEL	NA	OFF	OFF	OFF	
FOOT CONTROL	NA	OFF	OFF	OFF	
BREATH CONTROL	NA	OFF	OFF	OFF	
AFTERTOUCH	NA	OFF	OFF	OFF	

FREQUENCY	1.00	DETUNE	-6	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	0
49	74	10	32		
L1	L2	L3	L4	L5	0
98	98	98	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	+L	B2	L	L	0
R	-L		R	R	99
OP#	2	OUTPUT LEVEL	72	VELOCITY	2

FREQUENCY	14.00	DETUNE	0	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	5
99	48	99	50		
L1	L2	L3	L4	L5	0
99	32	0	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	D4	L	L	99
R	+L		R	R	12
OP#	6	OUTPUT LEVEL	62	VELOCITY	7

5

FREQUENCY	1.00	DETUNE	+7	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	0
11	15	10	47		
L1	L2	L3	L4	L5	0
99	86	86	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	+L	B2	L	L	0
R	-L		R	R	99
OP#	1	OUTPUT LEVEL	99	VELOCITY	1

FREQUENCY	1.00	DETUNE	+6	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	3
80	85	24	50		
L1	L2	L3	L4	L5	0
99	90	0	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	D4	L	L	99
R	+L		R	R	99
OP#	4	OUTPUT LEVEL	99	VELOCITY	3

FREQUENCY	1.00	DETUNE	+7	AMS	0
ENVELOPE DATA					
R1	R2	R3	R4	R5	3
80	85	24	50		
L1	L2	L3	L4	L5	0
99	90	96	0		
KEYBOARD SCALING					
CURVE BREAKPOINT DEPTH					
L	-L	D4	L	L	99
R	-E		R	R	0
OP#	5	OUTPUT LEVEL	99	VELOCITY	5

ALGORITHM #19

Notes:

*This patch and the one on page 9 were inspired by Jan Hammer's music for two episodes of Miami Vice featuring an old girlfriend of Tubbs.
The patch is a split voice, with bass strings on the left and vibes with sustain on the right.*

TeleWord

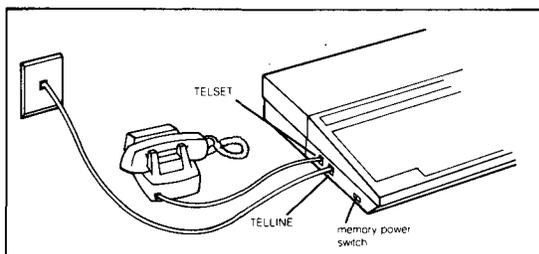
Turn Your CX5M Into A Complete Word-Processing & Phone-Modem System. By David Lourik.

THE CX5M MUSIC computer has been designed to function as a music-processing system, so most of the programs that Yamaha has created for the CX5M are designed to enhance the user's ability to create music. Even so, the CX5M is a general-purpose computer, capable of dealing with any task for which it has been programmed.

Since most musicians have needs that involve dealing with words as well as music, a new CX5M package has been created—the STC01 TeleWord module—which turns the CX5M music computer into a complete word-processing/phone-modem system. Using TeleWord, you will be able to create documents, print them out (using the PN101 printer or a compatible unit), store them on a Micro Floppy Disk (via the FD03 or FD05 Micro Floppy Disk Drives), and send them over a phone line to other musicians equipped with a similar computer setup.

Setting Up Your TeleWord System

Before making *any* changes to your CX5M computer setup, make sure that all components



This diagram shows how to connect your telephone and telephone line to the STC01 TeleWord module.

of your system are turned OFF.

In order to install the TeleWord module into your CX5M, you first need to remove the SFG05 FM tone module from the unit's slide slot. Turn your CX5M over and remove the locking screw and washer located in the center of the module. Slide the SFG05 module away from the computer carefully.

Now, with the computer still turned over, insert the STC01 TeleWord module into the computer, with the CAUTION label facing up and the modular phone connections facing outward. Slide the unit into the computer until it snaps into place. Then install and tighten the locking screw and washer in the center hole. (See the accompanying diagram.)

Now return your computer to its normal upright position, and connect your phone system to the module. Plug your telephone cable

(modular type) into the TELSET jack, and plug another cable from your telephone line wall jack to the TELLINE jack on the TeleWord module. (See the accompanying diagram.) Once you have made these connections, your telephone will still operate normally, except when the computer is in the TELCOM "MODEM" mode.

Finally, turn on the module's Memory Power Switch, which is located next to the TELLINE jack and is recessed within the module. To turn the switch on, you need to use a ballpoint pen or a small screwdriver. Once the memory power switch is turned on, the module will retain all of your program parameter settings and Phone Directory listings—even when the computer is turned off or the module is removed.

Once you have plugged in the TeleWord module, connected your phone line, and hooked up your other computer equipment to the CX5M, you have a complete word-processor/phone-modem system at your fingertips, all ready to go. To get started, all you need to do is turn the computer on; then type `__TW` to access the TeleWord main menu.

Word-Processing/Phone-Modem Options

TeleWord offers three basic modes of operation, each of which is accessed by one of the function keys:

F1 calls up the word processing functions.

F2 accesses the directory.

F3 calls up the telecommunication options.

If you are new to the concept of "word processing," you should understand that the CX5M TeleWord module opens up many options that are not available with even the most advanced typewriters. Since all documents are created within the computer's memory, they can be changed any number of times before they are finalized in printed form (via a device like the PN101 printer).

TeleWord allows you to correct typing and spelling errors, rewrite sentences or paragraphs, "cut and paste" entire sections of your writing, and specify the way in which your words will be printed out.

No longer will your words be fixed as you write them. Instead of composing on typing paper, you will be composing into the RAM

(random-access memory) of your computer, and will therefore be able to change your text as many times as you like.

Also, since you are dealing with a computer, you can change the spelling of a single word *throughout the text* of a document, by engaging a simple locate/change function. Similar computer functions will allow you to locate and rewrite specific segments of your text, and design the final printed output to suit your needs.

Function keys F2 and F3 bring you into the world of computer telecommunications—they allow you to use your telephone line to transfer or receive information directly to or from another computer-equipped musician. Any document you create with TeleWord's word-processing capabilities can be transferred to *any* other location equipped with a similar computer/modem setup.

The TeleWord directory (accessed via the F2 key) stores up to 50 phone numbers that can be accessed automatically through the TeleWord module. Once the memory power switch is turned on, your directory numbers will be retained, even when you turn off the computer or remove the TeleWord module.

The telecommunications options (accessed via the F3 key) enable you and your computer to reach any other user equipped with a similar computer system. In other words, the TeleWord module turns your phone line into a data-transfer conduit—an open door to the world of electronic communications.

The TeleWord module also opens up options far beyond the basic transfer of document files—it allows you to access electronic bulletin boards and other information services, all with a few simple computer keystrokes.

The TWE01 Word Processor Cartridge

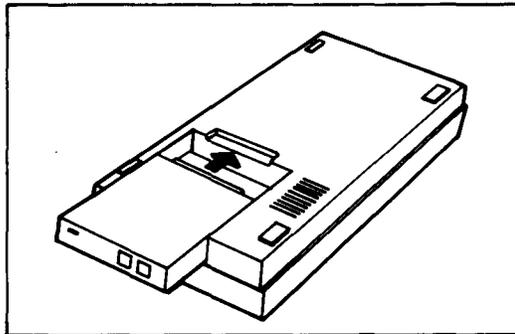
For access to even more flexibility for your computer system, watch for the CX5M Word Processor/TeleWord Enhancer (TWE01, formerly called the TeleWord Enhancer cartridge). Scheduled for release by mid-'86, the TWE01 cartridge will offer significant enhancements to the basic package provided by the TeleWord module. Even without the TeleWord module, the TWE01 Word Processor cartridge will provide CX5M users with a basic word-processing

printed (using the Yamaha PN101 printer) or stored on a variety of devices, including Yamaha Micro Floppy Disc Drives (FD03 or FD05) or any standard cassette tape recorder.

In addition, the TWE01 cartridge is MIDI-compatible. It allows you to store and retrieve voice data from any Yamaha X-series musical product!

When used in conjunction with the TeleWord module, the Word Processor cartridge upgrades the TeleWord module's basic telecommunications with these additional features:

- 1) Xmodem protocol for error-free transmission of binary files (music data files).
- 2) Direct transfer to disk of any files you receive by modem.
- 3) Keystroke-saving "macro" feature for automatic logging on to information services and electronic bulletin boards.
- 4) Ability to return to the "Talk" mode for telephone conversations following file transfers.



This diagram shows how to install the STC01 TeleWord module.

The Word Processor cartridge will also upgrade TeleWord's word-processing capabilities with the se additional features:

- 1) Daisy wheel printer support.
- 2) Programmable tab stops.
- 3) Tabs and margins that can be stored indefinitely in the TeleWord module (until changed by the user).
- 4) Storing-retrieving of specific blocks of text.
- 5) Merging of text files into currently displayed documents.
- 6) Compatibility with the international standard paper size (8.5 inches by 12 inches).

As you can see, the STC01 TeleWord package and the TWE01 Word Processor cartridge add a whole new dimension to the capabilities of the CX5M music computer.

QX1

Using The QX1 To Manipulate MIDI Control Codes. By Gary Leuenberger.

ONE OF THE MOST powerful resources of the QX1 digital sequence recorder is its ability to give musicians precise control over MIDI control codes. If properly understood, this detailed control will in turn give musicians access to an incredible range of expressive nuance in their music.

It is far beyond the scope of one article to explain (or even describe) all of the possibilities that the QX1 and MIDI make available. What I have tried to do here is outline a number of ways in which the QX1's affinity for MIDI control-code manipulations can be put to good musical use. Think of this potpourri of suggestions as a group stepping stones—initial steps for your own explorations into the land of MIDI control via the QX1.

Starting Out Fresh On the QX1—The Control Bank Concept

As a general rule, it is a good idea to INITIALIZE basic MIDI control codes at the beginning of a BANK or CHAIN. If this is not done, surprises usually pop up when you least expect them. These include such disasters as SUSTAIN ON, missed PROGRAM CHANGES, PITCH BENDs left on, VOLUME

- a) CTRL 001 = 000 (sets the MOD WHEEL to OFF)
- b) CTRL 064 = 000 (sets the SUSTAIN PEDAL to OFF)
- c) CTRL 007 = 120 (sets the overall VOLUME range/level of each track)
- d) PITCH BEND = 000 (sets PITCH BEND to ZERO)
- e) PROGRAM CHANGE = 000 (sets the program number—input the number of the program you want to start with)
- f) CTRL 004 = 127 (sets the FOOT CONTROL to ON)

Setting VOLUME at 120 will save much editing work in the long run. This basically sets you up for a "digital mixdown." Since the MIDI volume range is 000-127, setting tracks at 120 gives you somewhere to go. For example, when a piece is completed, you may find that the lead line is too soft. Simply edit that track by changing CTRL 007 from 120 to 127. This is fast! If all tracks were at CTRL 007=127, then to bring out a line you would have to edit seven tracks instead of just one.

Since many TX816 factory presets rely on a foot controller to "turn on" the voice, inserting the FOOT CTRL "ON" makes life much easier. How often have you recorded a QX1 track and found that, during playback, nothing is there because the FOOT CTRL information was missed at the top of the track?

The benefits of the above procedures can save hours of EDITING/EXECUTING NOW time. Why? Because all of the MIDI setup info is in one very, very short BANK. Therefore, when it comes to editing volume or program changes (which are most common), it takes a few minutes, not a few hours!

To streamline this process even further, I have created a UTILITY DISK which contains one BANK with the above settings already done. When I start a new piece, I simply do a BANK BACKUP from the utility disk to the new disk and my SET CTRL bank is ready to go.

Fade Ins And Fade Outs With The QX1

Psychoacoustic fact: If there are less than

QX1 digital sequence recorder.



levels too low or too high, MOD WHEEL effects such as vibrato popping in, and so on.

Here is my technique: Create a new BANK called "SET CTRL" and enter the opening TEMPO and TIME SIGNATURE for the composition. Then go to the EDIT mode and INSERT the following:

four discrete volume changes (steps) within a measure, the listener will perceive them as separate volume events. However, four or more discrete (but small) volume changes within a measure will result in a very smooth-sounding "fade in" or "fade out."

This is easily achieved on the QX1. If, for example, you wish to fade in a piece over a six-measure period, INSERT CTRL CHANGES 007 gradually increasing from 000 to 127 over the six-measure period. Here is one possible approach:

Measure 1: Step 1—007=000

Step 2—007=005

Step 3—007=010

Step 4—007=015

Measure 2: Step 1—007=020

Step 2—007=025

Step 3—007=030

Step 4—007=035

Measure 3: Step 1—007=040

Step 2—007=045

Step 3—007=050

Step 4—007=055

Measure 4: Step 1—007=060

Step 2—007=065

Step 3—007=070

Step 4—007=075

Measure 5: Step 1—007=080

Step 2—007=085

Step 3—007=090

Step 4—007=095

Measure 6: Step 1—007=100

Step 2—007=105

Step 3—007=110

Step 4—007=115

Going up in steps of 5 gives a very long and smooth fade in. Obviously, fade outs are accomplished by doing the reverse of the above. You must experiment with the *time of the fade* and how many *steps up or down per measure* to achieve the best effect for each situation.

String Bowing Effects—Articulation

To make sound, a violinist must move the bow in two directions—up and down. This alternation between Up Bow and Down Bow generally results in timbral and dynamic changes in any musical passage. These kinds of effects can be accomplished on the QX1 quite effectively. Here is a basic musical passage

consisting of sixteenth-notes:

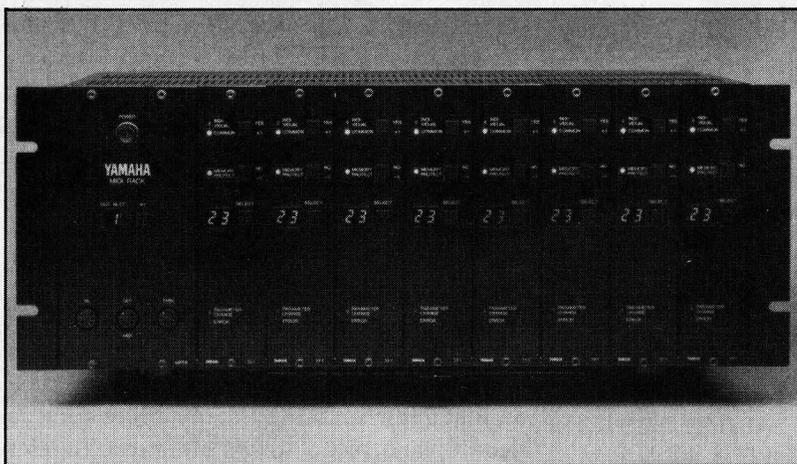


When a violinist plays this passage, the bow would most likely be moving up and down on every other note, creating a subtle alternation between loud/soft/loud and bright/mellow/bright.

On the QX1, if the TX816 voice is programmed with velocity sensitivity (which the majority are), the job is easy. Simply EDIT the individual notes with the dynamic marking keys as follows:



Each "f" command will cause the violin sound to be louder and brighter, and each "mf" command will cause the violin sound to be softer and mellower. Hence, a very subtle (but effective) "bowing" results.



Various dynamic markings from "ppp" to "fff" must be tried for the most suitable effect, depending on the musical phrase, tempo, and voice used.

TX816 rack-mount FM digital tone generator system.

Using Velocity Modify For Overall Dynamic Changes

There are two methods for controlling "overall volume" utilizing the QX1. The first is MIDI CTRL 001 as mentioned above. The

second way, using VELOCITY MODIFY, is often a bit more musical. When an acoustic instrument plays softly, not only is there a change in amplitude, but generally also a change in timbre. Rather than just being softer in quality, the change in timbre seem to also add a feeling of distance—the voice sounds “mixed back in the track,” so to speak. By using VELOCITY MODIFY (in the EDIT MODE), the voice is generally altered in volume and timbre (if it was programmed with velocity sensitivity) and a very nice dynamic change occurs. Of course, in this mode you can “bring out” the track using the +VEL. SENS. or “bring down” the track using the -VEL. SENS.

How To Get Rid Of Clicks In Sustained Voices

It is a fact of life that when a voice (such as a piano sound) is played on DX/TX systems and the sustain pedal is held down so that more than 16 notes “stack up,” a clicking noise results. When the QX1 is used as a controller, this can easily be eliminated. You can duplicate the effect of pushing down and releasing the sustain pedal (as any trained pianist would do) by INSERTING sustain ONs and OFFs in the suspected track. Go into EDIT MODE and INSERT a CTRL OFF-ON every 15-16 notes (064=000, 064=127).

How To Make Smooth Transitions Between Banks In Chain Mode

In the CHAIN mode, you may often hear abrupt “breaks” between banks. To smooth out the changeover, INSERT SUSTAIN ON commands at the end of the BANK causing the break. This can be done on all tracks, or maybe on just a few sustained-type voices such as electric piano, piano, strings, and so on. To reset this in the next BANK, make sure to INSERT SUSTAIN OFFs at the TOP OF THE TRACKS.

New Techniques Using Clock Buildups With RX

You can create some wonderful effects controlling the RX series of rhythm controllers with the QX1 by speeding up and slowing down clocks. The end result can only be described as toms, hi hats, cowbells, and the like turning into

digital zippers! Or giant *creaking doors!* This wonderful new area can only be explored in the EDIT MODE. Here is the technique:

First, pick a sound on the RX and find the MIDI note number so that the QX1 is actually playing the RX in real time (not just clocking it). For instance, the factory-assigned note number for TOMS on the RX is 53 (F2). INSERT notes into a measure gradually spacing the clocks closer and closer together and then back apart. Here is one example of possible specific clock numbers:

STEP 1: 000, 192, 256, 288, 318, 346, 372
 STEP 2: 012, 034, 054, 072, 088, 102, 114,
 124, 132, 139, 145, 150, 154, 157,
 159, 160, 161, 162, 163, 164, 165,
 166, 167, 169, 173, 181, 197, 229,
 293
 etc., etc., etc.

An echo effect might be achieved in a similar way, but dynamics must also be added, and the notes must speed up as they die away. Here is one short example:

Clocks: 000, 192, 256, 288, 318, 348, 372
 Dynamics: ff f mf mp p pp ppp

Try experimenting with these techniques. I am sure that they will open up a whole new world of sounds and effects.

“Beefing Up” A QX1 Track Via Clock Move—MIDI Delay Processing

A quick way to “beef up” a track or even create a slight “doubling” type effect, while only using one track or one module is to utilize the CLOCK MOVE function in the QX1. Copy the original track to another track and execute a CLOCK MOVE (maybe + or - 5 to 20) on the new track. Now we have two identical tracks, but the second is slightly ahead or behind the other. Now mix the new track to the original and erase the clock-moved track. The mixed track is now, in effect, doubled.

I have found that tighter clock moves (5 to 10) make the sound increase in volume, timbre, and harmonic content. Longer clock moves tend to double the sound a bit (like a digital delay). Exaggerated clock moves can create echo/delay effects. As always, time and experimentation are the key.

CX5M

HERE ARE SOME further conversion factors and hints for programming DX7 voices into the CX5M's internal FM synthesizer. Although I dealt with most of the conversion factors involved in my first article [AFTERTOUCH, Vol. 1 No. 3, Dec. '85], a few of them still needed attention. For example, I hadn't figured out how to adjust the operator output level on the CX5M if the relevant DX7 operator had an envelope generator Level 1 of less than 99—until yesterday. Now that I have figured out these additional elements, I want to share them with other AFTERTOUCH readers.

To determine the correct output level for a CX5M operator if the relevant DX7 operator has an envelope generator Level 1 of less than 99, use the following procedures:

- 1) If the DX7's EG value for Level 1 is *higher* than its overall output level for that operator, then *add* the difference between the two values to the converted CX5M output for the relevant operator.
- 2) If the DX7's EG value for Level 1 is *lower* than its overall output level for that operator, then *subtract* the difference between the two values from the converted CX5M output for the relevant operator.



To understand this process better, let's follow one such calculation from beginning to end, using a DX7 operator with an EG Level 1 value of 82, and an overall output level of 93.

- 1) First, figure the CX5M's basic operator output level (using the conversion factors from the Dec. '85 article), which would be 121 [93+28=121].
- 2) Next, determine the difference between

Additional Conversion Factors And Hints For Programming DX7 Voices Into The CX5M. By Ken Leivers.

CX5M music computer.

the EG Level 1 [82] and the overall output level [93], which would be 11 [93-82=11].

- 3) Finally, since the EG level is lower than the overall output level, *subtract* the difference from the CX5M's original operator output level to get the *corrected* output level of 110 [121-11=110].

Although the CX5M does not have a pitch envelope, certain values on the CX5M's LFO will create a sound effect that is similar to some



of the pitch-envelope effects available on the DX7. For example, set the CX5M's LFO to the following values:

LFO = 1
SYN = 0
Wf = 0
Spd = 90-120
PMD = 127
PMS = 7

When these values are added to a voice, they will create a slow pitch rise on each note.

When you are dealing with a DX7 voice that uses fixed frequency values for one or more operators, you need to translate those values into a frequency ratio before they can be programmed into a CX5M voice. The easiest way to translate is to use a DX7:

- 1) In EDIT mode, find the operator (or operators) that have fixed frequency settings by cycling through the coarse frequency values (using the COARSE FREQUENCY and OPERATOR SELECT buttons).
- 2) Once you have found an operator with a fixed frequency value, press the MODE/SYNC button. The display will read "FIXED FREQ. (Hz.)"

Continued on page 20

Questions

I have heard that Yamaha RAM-1 cartridges have a limited number of write cycles and that, once that number has been reached, the cartridge will no longer transmit and store data reliably. Is this true?

No. There is no pre-programmed limit to the number of times you can write data onto a Yamaha RAM-1 cartridge. The RAM-1 contains EPROM memory, which does not require batteries. It should perform correctly for the duration of the life of the product; however, electronic failure is always a possibility. The odds of EPROM failure after many years are exactly the same as after a few uses.

Also, remember that some RAM-1 cartridges have software compatibility problems with some DX7's if the Memory Protect switch is ON! To avoid this potential problem, simply leave the cartridge's Memory Protect switch OFF at all times.



DX9 FM digital synthesizer.

I am currently the proud owner of one of the first of the DX series of FM digital synthesizers, namely the DX9. I am having a very hard time locating any persons or companies who can supply me with additional sounds or patches. All I have is the original cassette voicings (which were included with the purchased unit). Any suggestions?

Yes. If you purchased your DX9 from an authorized Yamaha dealer, you are entitled to receive a second voice data tape for your DX9. Called Voice Data Tape #2, this item contains 420 voices. It is available from your Yamaha dealer for free. Make sure to specify Voice Data Tape #2.

We have tried to store bulk MIDI information from our RX11 to our IBM XT computer using Jim Miller's Personal Composer program. We seem to be successful in loading information from the RX to the computer, but we can't seem to load in-

Two Pages Of Questions From Readers.

formation from the computer back into the RX11. We have made sure that the RX is in OMNI mode, still with no results.

In addition, our local dealers have tried to store bulk information from the RX to the QX1. Once again, they seem to be successful in storing the information into the QX1, but this can't be verified since the information will not reload into the RX11. Can you offer any solutions to these problems?

Although we have no idea how Jim Miller's program operates, we know that the program has to contain the RX11 System Exclusive format in order to receive and send the data. Check with the manufacturer for details.

As for the QX1, we know that RX11 bulk MIDI data can be stored to and retrieved from the unit. Please visit your dealer again, and have them call Yamaha's Service Division while you are there for step-by-step instructions on using the MIDI bulk load functions with the QX1 and RX11. If there is still a problem, your RX11 may need service.

My CX5M music computer is an early model, and therefore has the original SFG01 tone generator module—the one that cannot be used as a MIDI expander. Do I have to buy the new SFG05 module to get this capability, or is there some way to modify the unit I already own?

Eddy Reynolds Keyboard Service has been authorized by Yamaha to update or exchange SFG01 units from existing CX5M customers, so that they can have the SFG05 functions without having to purchase the unit outright. This service will cost \$55.00, including shipping and owner's manual. For further information, write to: Eddy Reynolds Keyboard Service, 4274 Kraft Ave., Studio City, CA 91604; or call 818-508-7983.

CX5M music computer.



In November's MIDI article, you suggest using MIDI THRU connections to link several tone generators together in a system. I have recently purchased a TX216,

and plan to expand to a system with five tone generators in a rack. If I connect these tone generators in a daisychain fashion, won't I be introducing a great deal of noise and signal delay into the last unit of the system? I read in *Keyboard* magazine that this would be so. Should I use a MIDI splitter box, or has Yamaha done something to avoid these problems in the TX modules? The delays introduced by MIDI THRU's are in the microsecond range. Still, it is generally not considered wise to go beyond three MIDI THRU's in a daisy chain, as the delay factor may cause errors in the system. Since MIDI is not an audio signal path, you won't be introducing any noise into the signal at all.

In any case, the TX modules operate off of an internal MIDI buss, so signals entering the rack's common MIDI IN are sent directly to each module in the system.

I read in a newsletter from a regional users group that non-Yamaha RAM cartridges for the DX7 tend to wear off the gold on the internal contacts, leading to costly repairs. Is this true of all non-Yamaha cartridges? If so, which ones are safe to use?

Yamaha's Service Division has nothing on record that suggests that this is a problem. Still, if you are concerned about this possibility, contact the manufacturer or vendor carrying the cartridge and ask for a guarantee.

I have owned a QX1 for almost a year now. Recently, a saw one displayed in a store, and the front panel had a list of Job Commands that was much longer than the list on my unit. Is the QX1 in the store a new product? Do these new Job Commands operate on my older unit? What's the story?

Since its introduction, the QX1 has undergone a number of software revisions. The most recent of these, called Version 6, is implemented in the newest units. Version 6 software contains a number of new Job Commands, which are listed on the front panels of the newer units.

The basic operating software for the QX1 resides in four ROM chips. To update your unit to software version 6, you just have to purchase the new chips and have them installed by an authorized Service Center. Contact your Yamaha dealer for details.

QX1 digital sequence recorder.



This Job Command list includes all of the Job Command functions offered in the Version 6 software of the QX1.

A complete listing of the Job Commands found in the QX1's Version 6 software is given below.

QX1 Job Command Table

Play Mode

- 01 Disk Change
- 02 ★ Status/Switch
- 03 ★ Output Assign

Record Mode

- 01 Disk Change
- 02 ★ Status/Switch
- 03 ★ Output Assign
- 04 ★ Receive Condition
- 05 ★ Record Cancel

Edit Mode

- 01 Disk Change
- 02 Status/Switch
- 03 ★ Output Assign
- 04 ★ Receive Condition
- 05 ★ Gate Time Ratio
- 06 ★ Steps Per Measure
- 07 ■ Copy Measure
- 08 ■ Transpose Measure
- 09 ■ Time Quantizing
- 10 ■ Clock Move
- 11 ■ Gate Time Modify
- 12 ■ Velocity Modify
- 13 ■ Note Length Set
- 14 ■ Bend Delete
- 15 ■ Control Delete
- 16 ■ Edit Cancel
- 17 ■ Measure Erase

Utility Mode

- 01 ★ Disk Change
- 02 ★ Status
- 03 ★ Chain Edit
- 04 ★ Chain Name Change
- 05 ★ Chain Directory
- 06 ★ Chain Delete
- 07 ★ Bank Name Change
- 08 ★ Bank Backup
- 09 ★ Bank Copy
- 10 ★ Bank Delete
- 11 ★ Disk Initialize
- 12 ★ Disk ID Set
- 13 ★ Disk Backup
- 14 ★ Track Mix
- 15 ★ Track Delete
- 16 ★ Data In
- 17 ★ Data Out
- 18 ★ Time Display
- 19 ★ Measure Insert
- 20 ★ Measure Delete
- 21 ★ Bulk In
- 22 ★ Bulk Out
- 23 ★ Bulk Directory
- 24 ★ Bulk Delete
- 25 ★ TX Voice In
- 26 ★ TX Voice Out
- 27 ★ Time Sign Modify

- ★ = All modes
- = Play mode, Record mode, Edit mode
- = Edit "Inceasable Space" mode

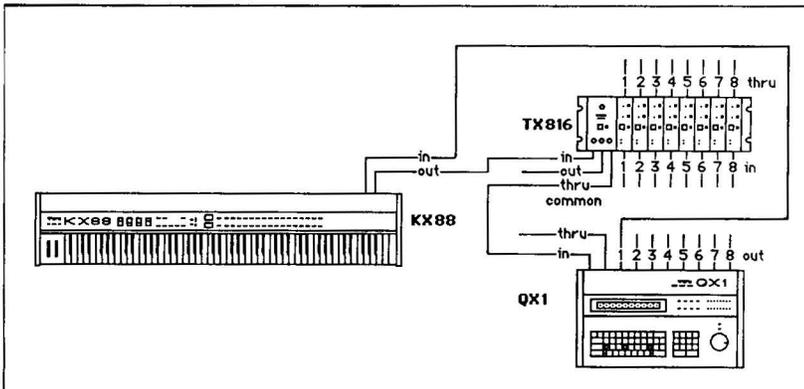
Final Touch

Using MIDI Merge On The KX88 For Overdubbing Function Data On The QX1.

By Gary Leuenberger & David Bristow.

Sometimes you might find it useful to record the notes of a track on the QX1, and then add other performance (function) data later. For instance, you record the basic notes on the first pass, and then add PITCH BEND or VOLUME data as an overdub. This is quite easy to do with the KX88 or KX76, because their MIDI OUT ports contain an automatic MIDI merge.

Here is the basic MIDI hookup: Connect the MIDI OUT of the KX88 (or KX76) to the common MIDI IN of your TX816, and connect the MIDI THRU of the TX816 to the MIDI IN of the QX1. Finally, connect the MIDI OUT slot 1 of the QX1 to the MIDI IN of the KX. (See the accompanying diagram.)



The original music performance is coming out of the QX1 terminal, and goes into the KX, where it is mixed with MIDI data generated by the KX and sent to the TX816 via the KX's MIDI OUT. In other words, the note data is

Hot Tips On Using The KX88's Merge Function, Controlling TX216 Volume From A DX7, And On Voicing The TX816.

QX1 digital sequence recorder.

Basic MIDI connections utilizing the KX88's MIDI merge capability to overdub function data on an existing performance with the QX1.

coming from the QX1, and you can add performance data from the KX while the original track is playing. The TX816 will receive both sets of information. The output from the TX816's MIDI THRU should be assigned to Track 2 in the QX1.



Now you have your original note performance on Track 1, and the new performance, complete with performance (function) data, on Track 2. If you are satisfied with the combination, ERASE Track 1, and TRACK MIX Track 2 onto Track 1. If you are not happy with the performance, ERASE Track 2 and try again. Using this technique, you can concentrate on one aspect of your performance at a time, and have more control over the final result.

* * * *

Controlling TX216 Volume With A DX7.

By Charlie Foege.

Soon after I purchased my TX216 and began using it along with my DX7 in live performance, I found that I had to have my keyboard mixer real close to adjust the volume for the individual modules. I wondered why Yamaha hadn't equipped the TX216 with a volume pedal control.

After some experimentation, however, I found a great way to control the TX216's individual module volume directly from my DX7, using the MOD wheel and a second Foot Pedal Controller (plugged into the MOD jack).

First of all, make sure that the MOD SENSITIVITY for each operator in the TX216 voices is at the maximum of 3. Then, to use the MOD foot controller to control volume, assign the Foot Control Range to maximum value, with Pitch and Amplitude OFF and EG Bias ON. To control volume with the MOD wheel,

KX88 MIDI keyboard controller.



assign the Mod Wheel Range to maximum value, with Pitch and Amplitude OFF and EG Bias ON. In this way, you can control the volume of one module with the MOD wheel, and control the volume of the other module with the MOD foot controller.

At present, I have three modules, and control 1 and 2 with the Mod wheel and 3 with the MOD foot controller. I now have complete control of the overall mix without having to move my hands away from the DX7.

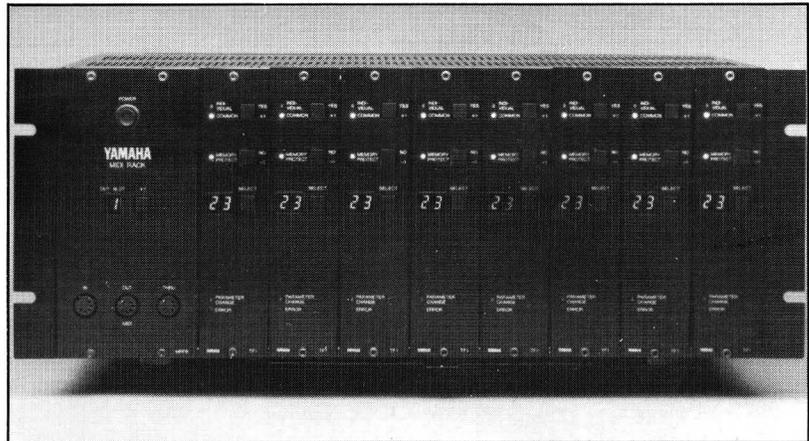
* * * *

A Basic TX816 Voicing Concept.

By John Chowning, As Told To Gary Leuenberger.

When voicing a system as dense as the TX816, it is not enough to visualize eight DX7s layered together. In fact, the TX816 can sound thinner than *one* DX7 if some acoustic realities are not taken into consideration.

If two signals are mixed together and are out of phase, phase cancellation can occur, which greatly diminishes the impact of the sound. If



eight identical sounds are layered on the TX816, phase cancellation can be a real problem, due to slight MIDI delays and (if key SYNC is OFF) different waveform start-up points.

Therefore, when building up a layered sound, take care to use a variety of algorithms, frequency ratios, detunings, and the like, so that each module contributes to the whole in a different way. A good model of this type of voicing is program #2 for the TX816, the STRINGS voice. The string sound on each module has its own quality, and each offers its own unique contribution to the whole.

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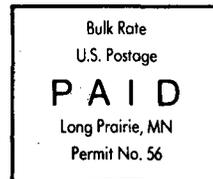
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The logo for the CX5M synthesizer. The 'C' is a stylized oval with horizontal lines. The 'X' is a bold, blocky letter with horizontal lines. The '5' is a bold, blocky letter with a horizontal line through the middle. The 'M' is a bold, blocky letter.

Continued from page 15

3) Now press the NO/-1 data entry button. The display will now read "FREQUENCY (RATIO)."

4) Finally, press the FREQUENCY COARSE button. You will now see a frequency ratio value. In many cases, this value will have to be divided in half to get a value low enough for use in the CX5M.

Here is an example of how this process works. If you start with a fixed frequency value of 3236 Hz on a DX7 operator and follow the steps outlined above, the DX7 will give you a frequency ratio value of 46.81. If you halve this value, you get 23.40, a value that can be closely

approximated on the CX5M. (For information on how to approximate this and other ratio values, see the table called "Frequency Ratio Determined By F And IF Settings" in the FM Voicing Program owners manual.)

By the way, if it is necessary for you to divide one or more of these converted ratios before programming them on the CX5M, you *must divide all* of the ratio values in the same way (so that their relationship will remain the same).

One final conversion. The CX5M's velocity sensitivity (Vs) via MIDI relates to the DX7's velocity sensitivity as follows: A value of 1 on the DX7 is equal to a Vs value of 4 on the CX5M, and a value of 2 on the DX7 is equal to a Vs value of 7 on the CX5M.