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FB-01
FM TONE MODULE

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From The Editor

THREE IN A ROW! This issue, we present the third (and final) installment in our initial series of Evatone disks. You will find this month's offering bound between pages 6 and 7, complete with an introduction to the music it contains.

This time out, we are featuring the FB-01 FM tone module, a new unit with complete 8-voice multi-timbral capability. To find out what the FB-01 can do, just give a listen to the four musical compositions on our Sound Disk; and to find out *how* it does what it does, check out Michael A. Huisman's introductory article beginning on page 10.

So, our cover story and feature article focus on the *new*; but that doesn't mean we've forgotten our earlier X series products. Many of you have written in asking for voices and tips on using the DX9, Yamaha's first 4-operator FM digital synthesizer. A few of these letters have been pretty wistful, with an "I-know-you-won't-do-this-but-how-about . . ." tone to them. Some of you assumed that the DX9 was simply buried under the weight of the DX7s out there, and that we had no desire to present information on the "forgotten" DX9.

Well, I'm happy to say that you were wrong! This month we are offering *three* DX9 patches submitted by readers, and we also plan to answer some questions we have received from DX9 owners in the months to come.

Remember, AfterTouch is a *users* newsletter. The proliferation of DX7 patches in the issues so far have been a direct result of the mail we have received—and the DX9 patches in this issue are also a direct result of that mail. Your feedback is important, because it tells us what kinds of information you want.

Speaking of feedback, we have also received a lot of requests for more coverage of 4-operator synthesizers in general. Happy to oblige: Next issue will feature voices for the DX100 (which will of course be compatible with the DX21, DX27, and DX27S). We also have some articles on 6-operator to 4-operator conversion in the works, so that you DX100 owners can translate some of our AfterTouch DX7 voices to your instruments.

In closing, a few words (again) about your mail to us. 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 product information must be sent to Yamaha [Yamaha International Corp., P.O. Box 6600, Buena Park, CA 90622].

More importantly, if you have a complaint or suggestion about the *design* of a particular Yamaha product or product line, that correspondence should also be sent to Yamaha. And, if have a comment about Yamaha's advertising, marketing, or corporate policies, those should go to Yamaha as well. The staff of AfterTouch works *only* on AfterTouch. We are happy to hear your thoughts on these subjects; but, if you want your thoughts to reach the decision makers, you should send them to Yamaha.

—*TD*

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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 AFTERTOUCH to suit your musical needs.

To receive AFTER-TOUCH every month, absolutely free, just put your name and address on the enclosed card and mail it to us.

MEP4

Diatonic Harmony & Counterpoint With The MEP4. By John McEnary.

THROUGH THE MAGIC OF MIDI, it is possible to program the MEP4 so that it will generate a diatonic harmony line to a solo part in any key. The harmony part will always be inverted—that is, when the solo line goes up in pitch, the harmony part generated by the MEP4 goes down. It is also possible to create interesting quasi-Baroque counterpoint by further programming the MEP4 to delay the inverted harmony part.

All you will need to try out this technique is a simple MIDI system that includes one MIDI keyboard synthesizer (such as the DX7), one MIDI tone generator (such as the TX7), and the MEP4 MIDI Event Processor. Connect the MIDI OUT of the keyboard synthesizer to the MIDI IN of the MEP4, and connect the MIDI OUT #1 of the MEP4 to the MIDI IN of the tone generator (see the accompanying diagram).

To program an MEP4 setup that will create the harmony part, first enter the DATA MODIFIER and select MESSAGE as follows:

0:MSG:9n.xx.yy

This means that the Note On data will be modified.

Next, Modify the data using REVERSE by setting Step 1 as follows:

1:REV:xx, FIX=40

This means that note number "xx" will be modified, around the fixed note 40.

Finally, set Step 2 to OFFSET; then set the OFFSET value for the key you will be playing in, according to this chart:

Major Key	OFFSET Value
C	-3
Db	-1
D	1
Eb	3
E	5
F	-5
Gb	-3
G	-1
Ab	1
A	3
Bb	5
B	-5

So, for the key of C major, you would set Step 2 as follows:

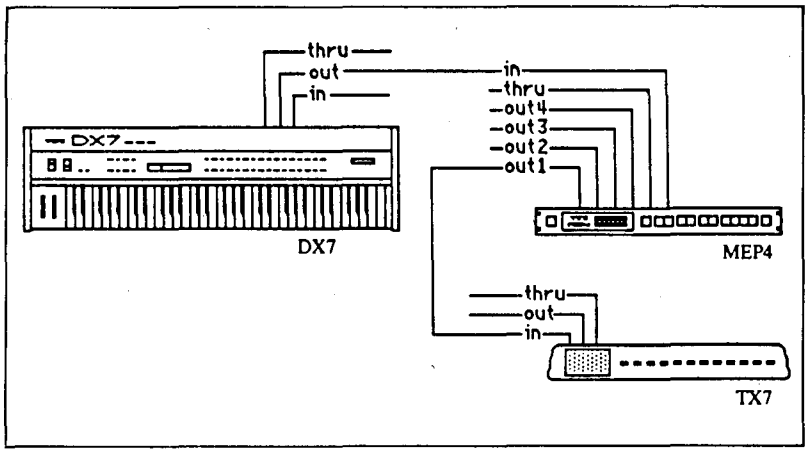
2:OFS:xx, V= -3

Relative minor keys, modes, and pentatonic scales also work well with this setup. For example, using an OFFSET value of -3, you can harmonize your melodies in *A* minor, *D* dorian minor, and *A* and *D* pentatonic (minor form), as well as several keys related to Gb Major (*F#* Major). I feel the blues scale works best around the dorian minor OFFSET key. So, for simplicity, play the blues scale one step higher than the Major Key OFFSET setting you have chosen.

It is often advantageous to add 12 or 24 to your OFFSET Value. This raises the harmony part one or two octaves. Another nice touch is to lower the dynamic level of the harmony part by adding an OFFSET Value of about -24 to the second data byte "yy"—which in this case is key velocity. For example, set Step 3 as follows:

3:OFS:yy, V= -24

Now, to add a quasi-Baroque counterpoint to your melodies, simply set the DELAY PROCESSOR to a relatively long time setting such as 600 milliseconds. If you are using several MIDI tone generators, you may wish to set some of them up for unison or octave doubling of the melody, and others for the inverted harmony part. Experiment with different delay settings on different tone generators. As long as you play in the key(s) you have chosen in your MEP4 setup, all of your harmony and counterpoint lines will be diatonic.



This basic MIDI system, using a DX7 and a TX7 with the MEP4, is all that's needed to take advantage of the MEP4 techniques described in this article (and featured in the MEP4 setup on page 5).

MEP4

"Baroque G." A New MEP4 Setup By John McEnary.

PROCESSOR 1				PROCESSOR 2				PROCESSOR 3				PROCESSOR 4			
DATA PRESETTER				DATA PRESETTER				DATA PRESETTER				DATA PRESETTER			
PROGRAM	OFF			PROGRAM	OFF			PROGRAM	(ON / OFF)			PROGRAM	(ON / OFF)		
PITCH	OFF			PITCH	OFF			PITCH	(ON / OFF)			PITCH	(ON / OFF)		
CONTROL 1	OFF			CONTROL 1	OFF			CONTROL 1	(ON / OFF)			CONTROL 1	(ON / OFF)		
CONTROL 2	OFF			CONTROL 2	OFF			CONTROL 2	(ON / OFF)			CONTROL 2	(ON / OFF)		
CHANNEL FILTER				CHANNEL FILTER				CHANNEL FILTER				CHANNEL FILTER			
OMNI : ON				OMNI : ON				OMNI : ON/OFF				OMNI : ON/OFF			
1 2 3 4 5 6 7 8				1 2 3 4 5 6 7 8				1 2 3 4 5 6 7 8				1 2 3 4 5 6 7 8			
9 10 11 12 13 14 15 16				9 10 11 12 13 14 15 16				9 10 11 12 13 14 15 16				9 10 11 12 13 14 15 16			
MESSAGE FILTER				MESSAGE FILTER				MESSAGE FILTER				MESSAGE FILTER			
NOTE OFF	ON			NOTE OFF	ON			NOTE OFF	ON / OFF			NOTE OFF	ON / OFF		
NOTE ON	ON			NOTE ON	ON			NOTE ON	ON / OFF			NOTE ON	ON / OFF		
POLY A. TOUCH		OFF		POLY A. TOUCH		OFF		POLY A. TOUCH	ON / OFF			POLY A. TOUCH	ON / OFF		
CONTROL NO.				CONTROL NO.				CONTROL NO.	ALL /			CONTROL NO.	ALL /		
PROGRAM CHANGE		OFF		PROGRAM CHANGE		OFF		PROGRAM CHANGE	ON / OFF			PROGRAM CHANGE	ON / OFF		
CH A. TOUCH		OFF		CH A. TOUCH		OFF		CH A. TOUCH	ON / OFF			CH A. TOUCH	ON / OFF		
PITCH BEND		OFF		PITCH BEND		OFF		PITCH BEND	ON / OFF			PITCH BEND	ON / OFF		
CH MODE MES.		OFF		CH MODE MES.		OFF		CH MODE MES.	ON / OFF			CH MODE MES.	ON / OFF		
SYSTEM MES.		OFF		SYSTEM MES.		OFF		SYSTEM MES.	ON / OFF			SYSTEM MES.	ON / OFF		
DATA MODIFIER				DATA MODIFIER				DATA MODIFIER				DATA MODIFIER			
0	**MSG : 9n.xx.yy**			0	**MSG : 9n.xx.yy**			0	MSG :			0	MSG :		
1	**REV : xx, FIX=40**			1	**OFS : xx,V= -12**			1	:			1	:		
2	**OFS : xx, V= -1**			2	**OFS : YY,V= -24**			2	:			2	:		
3	**OFS : yy,V= -24**			3	:			3	:			3	:		
4	:			4	:			4	:			4	:		
DELAY PROCESSOR				DELAY PROCESSOR				DELAY PROCESSOR				DELAY PROCESSOR			
DELAY TIME	**600**			DELAY TIME	**600**			DELAY TIME				DELAY TIME			
OUTPUT ASSIGNER				OUTPUT ASSIGNER				OUTPUT ASSIGNER				OUTPUT ASSIGNER			
OUT-CH ASSIGN	**1**			OUT-CH ASSIGN	**1**			OUT-CH ASSIGN				OUT-CH ASSIGN			
OUT-CH OFFSET	**0**			OUT-CH OFFSET	**0**			OUT-CH OFFSET				OUT-CH OFFSET			
OUTPORT ASSIGN	**1**			OUTPORT ASSIGN	**1**			OUTPORT ASSIGN				OUTPORT ASSIGN			

Notes:

This setup creates a quasi-Baroque counterpoint part (in diatonic harmony) when used with a solo line played in the key of G. For information on the principles used in creating this setup, see the accompanying article on page 4.

FB-01 Sound Disk

An Introduction To Our Third Evatone Disk. By Tom Darter.

THIS MONTH'S FREE DISK, the third one in our AfterTouch series, showcases the FB-01 FM tone module. In order to give you an idea of what this new unit can do, we have devoted the entire disk to musical performances this time around.

Side 1

Both pieces on side one were composed by Michael A. Huisman. Each piece was composed and performed with a *single* FB-01, using factory supplied preset voices.

Both pieces were sequenced using a Macintosh Plus computer (with an Opcode Mac+ MIDI interface) and the *Performer* software by Mark Of The Unicorn . Some digital effects are heard on both pieces: stereo digital chorusing and stereo digital reverb, accomplished using two Yamaha SPX90 digital multi-effects processors.

There were *no* overdubs made during the actual recording of the pieces. Volume changes were accomplished by MIDI Volume Control (MIDI controller #7)—the controller data changes were recorded into the actual sequence data.

Track 1: "L.A. Tin"

This piece showcases the Stereo Panning capabilities of the FB-01. Stereo Pan has recently been adopted into the MIDI standard as a controller (In the MIDI spec, Stereo Pan is referred to as "Balance").

The main rhythmic element in the arrangement of "L.A. Tin" is a sixteen-note marimba patch which was affected using this new controller. To enhance the spatial content of the arrangement, the velocities of each Note On event of the marimba track were converted using a Yamaha MEP4 (MIDI Event Processor) into Balance controller data (MIDI controller # 10). The Balance controller data was then recorded on a separate track of the sequencer. When the sequence is played, the controller data causes the notes played with more velocity to focus to the right side of the program material, while those notes played with less velocity focus to the left side of the program material. Notes with medium velocity appear in the middle of the program material.

A similar approach was taken for the steel drum voice in this piece to take advantage of the FB-01's stereo capabilities. The top two notes of chords were panned to the right side of the program material, while the lower two notes were panned to the left side of the program material.

Factory preset (ROM) voices that were used in "L.A. Tin" Include the following: Marimba, SynBas3, SteelDr, PanFlt, LoString, HuffSyn, HandDr, and Sax2.

Track 2: "Let's Play Outside"

This piece begins with a single voice across the range of the keyboard, changing occasionally to show several of the FB-01's factory preset voices. Starting at the bridge, the FB-01 is used with 3 different voices playing different parts. These parts were distributed as follows:

- 1 note on MIDI channel 1 is assigned to a bass voice
- 3 notes on MIDI channel 2 are assigned to a "comping" voice
- 4 notes on MIDI channel 3 are assigned to melody voices

Factory preset (ROM) voices used on "Let's Play Outside" include the following: LPiano2, EGrand, COrgan1, JOrgan1, Synbas3, PercPf, EPiano3, Clav, Windbel, Pfbell, Zither2, EPBrass, and NewEP.

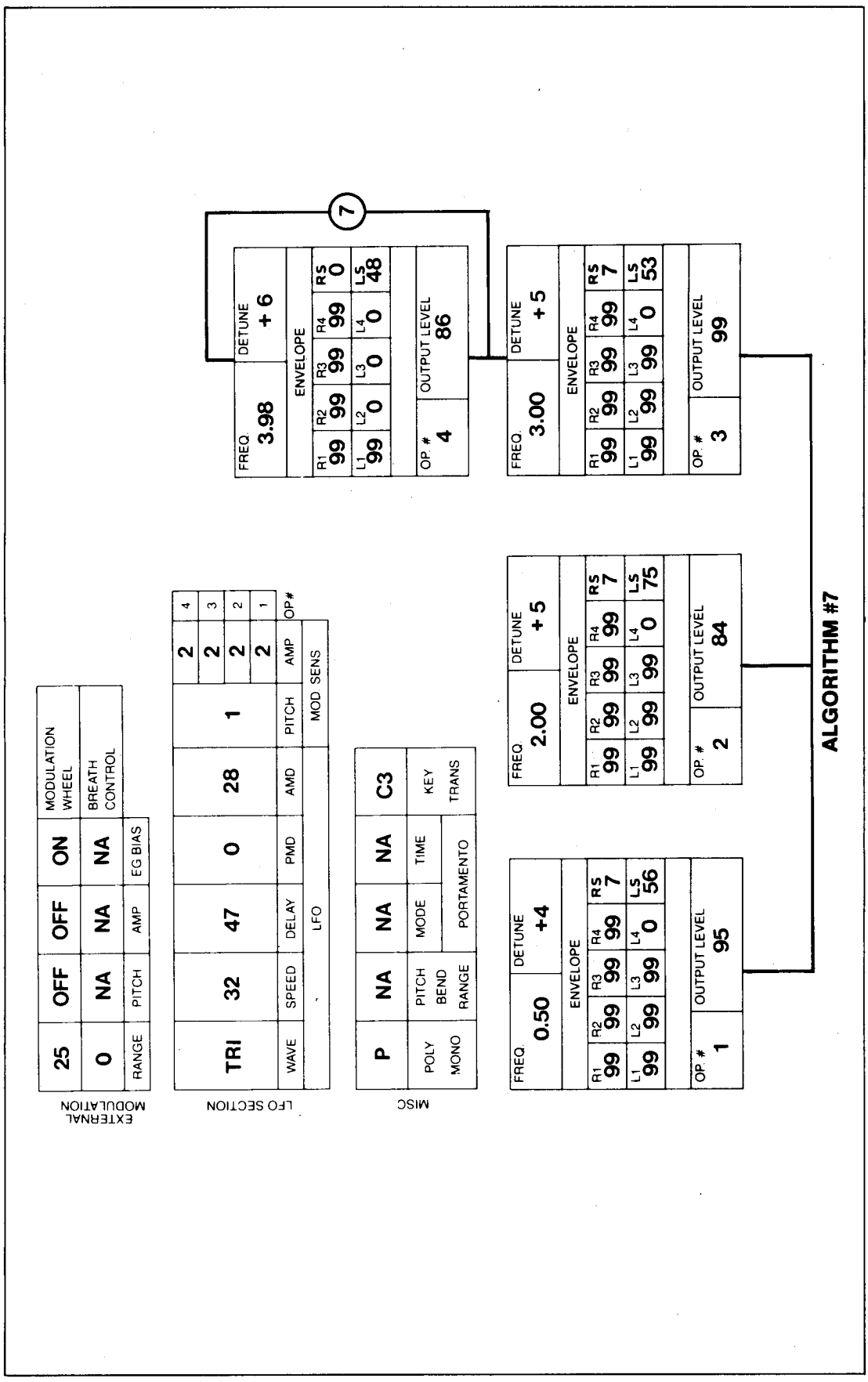
Side 2

The pieces on side two were composed by Austin Kelly. Both pieces were sequenced using a CX5M music computer equipped with the MIDI Recorder Program cartridge (YRM301). A second CX5M was used in conjunction with the RX Editor Program cartridge (YRM302) to drive an RX11 drum machine. The two CX5Ms were synced, and the CX5M/MIDI Recorder unit was used to drive the FB-01 modules.

There were *NO* overdubs made during the actual recording process. All of the tone generation modules (the FB-01s and the RX11) were driven in real time by the two CX5Ms and their related software. Digital reverb was used in the recording of both pieces, generated by the SPX90. The SPX90's Pitch Bend setting was also used to create a chorus effect.

Continued on page 20

"Organ B3." A New DX9 Voice By Gary Sharum.



Notes:

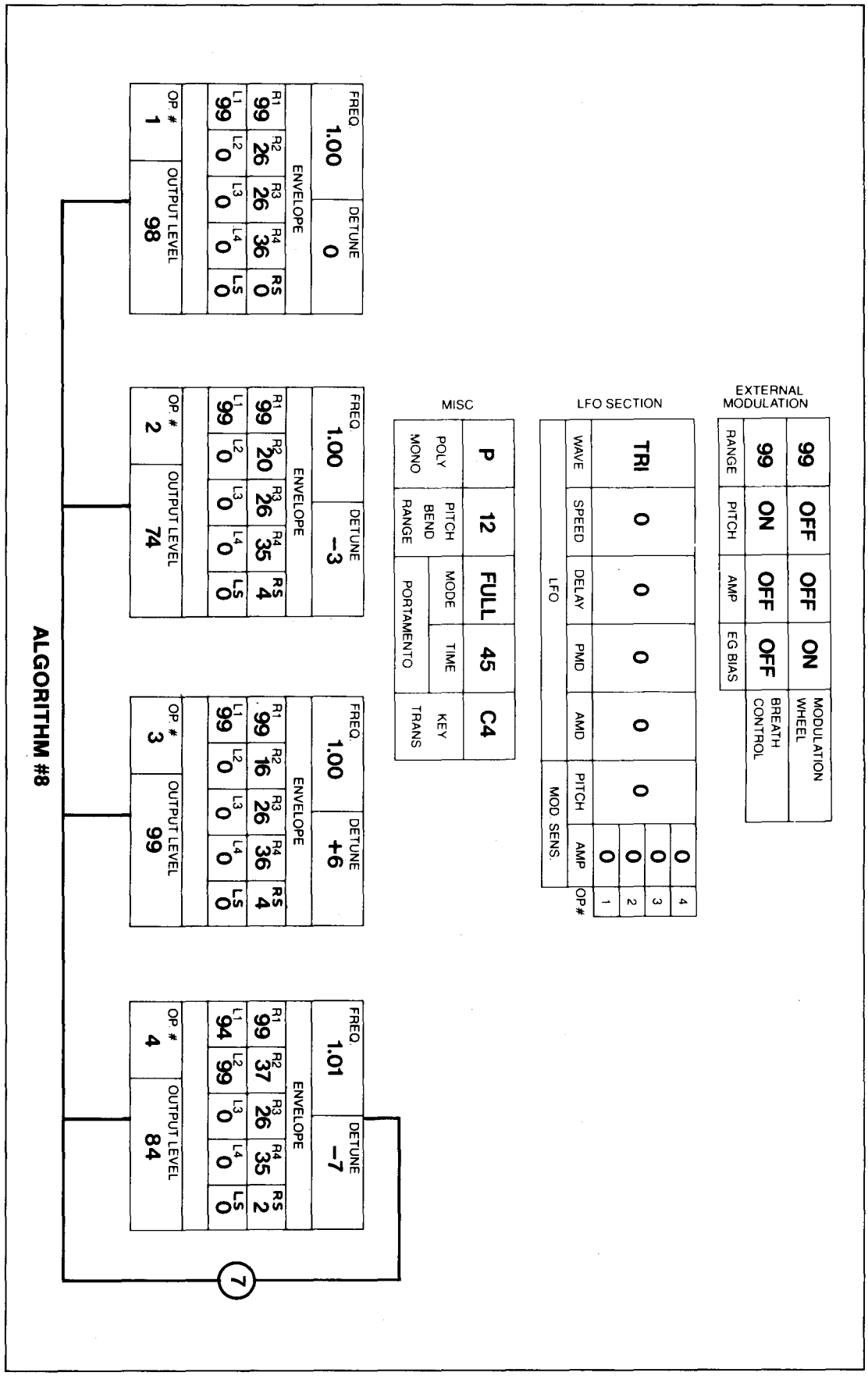
This patch features a good key click and rich low tones. It sounds good on its own, but a chorus unit will add to the dynamics.

Both algorithm #7 and algorithm #8 will work, but there is a more pronounced click with #7.

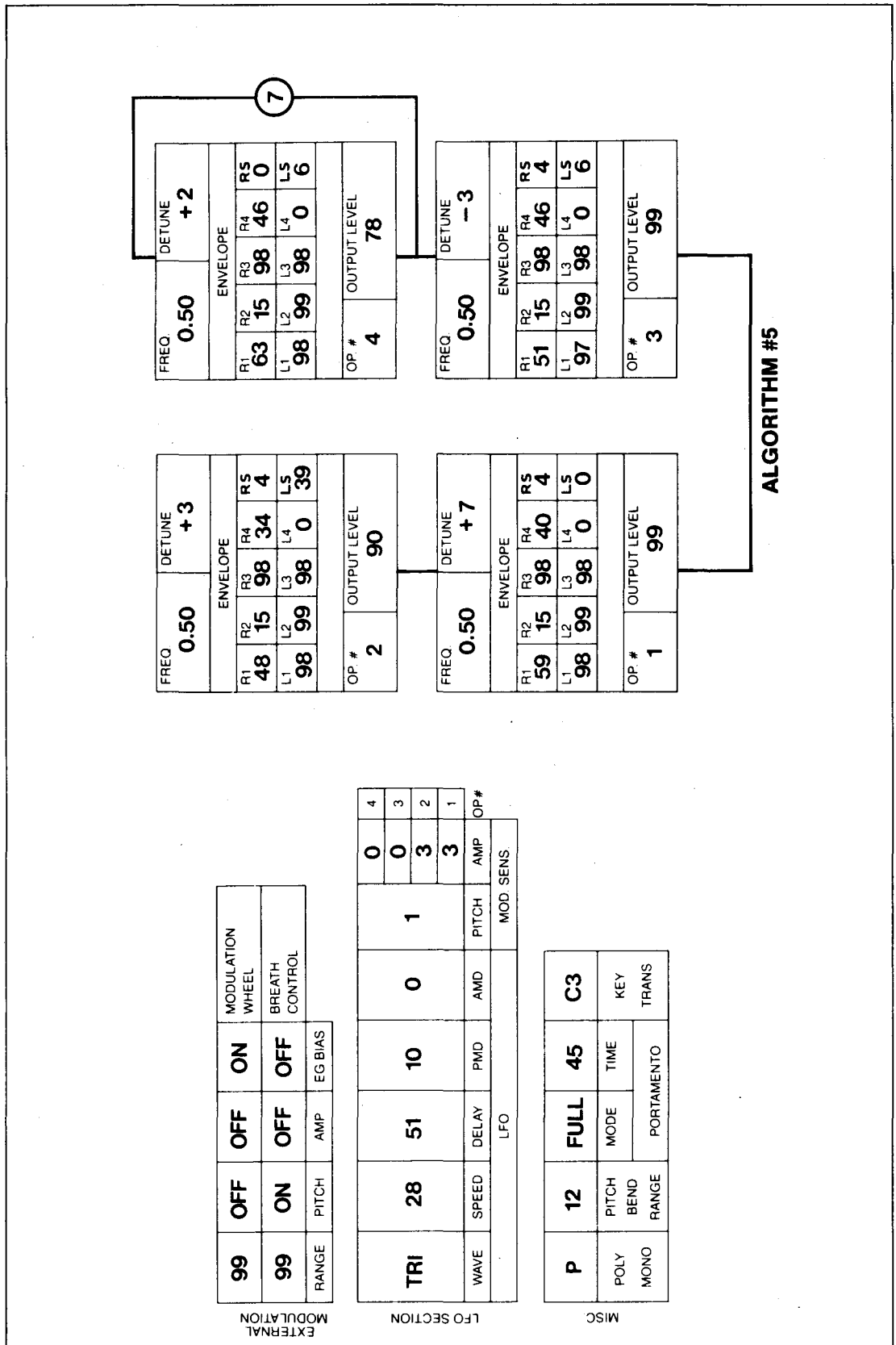
"Twinkle Piano." A New DX9 Voice By Brian William Niles.

Notes:

This patch has a very shy and twinkly sound, as its name implys.



"21st Century Organ." A new DX9 Voice By Brian William Niles.



Notes:

Use this sound with a stereo chorus set very wide and very slow.

FB-01

Introducing Yamaha's Multi-Timbral, Multi-MIDI-Channel FM Tone Module. By Michael A. Huisman.

FB-01 FM tone module.

THE FB-01 IS A 4-OPERATOR, 8-algorithm FM tone generator that can produce up to 8 notes simultaneously. The FB-01 can be used as a MIDI expander tone module in a MIDI system or as the main FM tone generation source for those who have not yet added FM tone synthesis to their keyboard setup.

The FB-01 features 240 preset FM voices arranged in five ROM (Read Only Memory) banks of 48 voices each. Piano voices, contemporary keyboard sounds, and orchestral voices such as brass, strings, and woodwinds are provided. Synth, bass, percussion, plucked string sounds, and exciting sound effects are included as well. (For a list of the 240 voices supplied with the FB-01 in its ROM memory, see the accompanying chart).

The FB-01 also features two RAM (Random Access Memory) banks which hold 48 voices each, for a total of 96 voices. These RAM banks can be used to store either modified versions of the preset voices or completely original user-created voices (that can be created through the use of an external computer-aided voicing program.

Each of the voices has a set of voice functions that can be altered at any time. These include portamento time, playing mode (poly/mono), and pitch bend range. Also, each voice can be set to receive modulation changes from an external MIDI device's modulation wheel, foot controller, breath controller, or keyboard aftertouch.

The FB-01 features a very comprehensive implementation of the MIDI specification. The FB-01 can receive System Exclusive event list messages to recognize and produce microtonal intervals or non-standard temperament, as well as many System Exclusive messages for loading and saving voice and configuration memory data.

What Does "Multi-Timbral" Mean?

Multi-timbral is a term used to describe a tone generator that is capable of producing more than one sound (timbre) at a time. The FB-01 is multi-timbral. The FB-01 allows you to have as many as eight different sounds (timbres) playing simultaneously.

The FB-01 uses the term "instrument" to describe a voice—or several voices—that use a particular sound or patch. This is easy to remember—just think of eight musicians in a band. In this band, however, all eight musicians can play any instrument that you give them! You can give (assign) one of them a bass, one of them a trumpet, and give the remaining six

#	ROM3	ROM4	ROM5	ROM6	ROM7
1	Brass	UpPiano	Horn2	FnkSyn2	JOrgan1
2	Horn	Spiano	Horn3	FnkSYn3	HOrgan2
3	Trumpet	Piano2	Horns	SynOrgn	COrgan1
4	LoString	Piano3	Flugelh	SynFeed	COrgan2
5	Strings	Piano4	Trombon	SynHarm	EOrgan3
6	Piano	Piano5	Trumpt2	SynClar	EOrgan4
7	NewEP	PhGrand	Brass2	SynLead	EOrgan5
8	EGrand	Grand	Brass3	HuffTak	EOrgan6
9	Jazz Gt	DpGrand	HardBr1	SoHeavy	EOrgan7
10	EBass	LPiano1	HardBr2	Hollow	EOrgan8
11	WodBass	LPiano2	HardBr3	Schmooh	SmlPipe
12	EOrgan1	EGrand2	HardBr4	MonoSyn	MidPipe
13	EOrgan2	Honkey1	HuffBrs	Cheeky	BigPipe
14	POrgan1	Honkey2	PercBr1	SynBell	SftPipe
15	POrgan2	Pfbell	PercBr2	SynPluk	Organ
16	Flute	PfVibe	String1	CBass3	Guitar
17	Picolo	NewEP2	String2	RubBass	Folk Gt
18	Oboe	NewEP3	String3	SolBass	PluckGt
19	Clarine	NewEP4	String4	PlukBas	BriteGt
20	Glocken	NewEP5	SoloVio	UprtBas	Fuzz Gt
21	Vibes	EPiano1	RichSt1	Fretles	Zither2
22	Xylophn	EPiano2	RichSt2	FlapBs	Lute
23	Koto	EPiano3	RichSt3	MonoBas	Banjo
24	Zither	EPiano4	RichSt4	SynBas1	SftHarp
25	Clav	EPiano5	Cello1	SynBas2	Harp2
26	Harpsic	HighTIn	Cello2	SynBas3	Harp3
27	Bells	HardTin	LoStrg3	SynBas4	SftKoto
28	Harp	PercPf	LoStrg4	SynBas5	HitKoto
29	SmadSyn	WoodPf	LoStrg5	SynBas6	Sitar1
30	Harmoni	EPStrng	Orchest	SynBas7	Sitar2
31	SteelDr	EPBrass	5th Str	Marimb2	HuffSyn
32	Timpani	Clav2	Pizzic1	Marimb3	Fantasy
33	LoStrg2	Clav3	Pizzic2	Xyloph2	Synvoic
34	Horn Lo	Clav4	Flute2	Vibe2	M.Voice
35	Whistle	FuzzClv	Flute3	Vibe3	VSAR
36	zingPlp	MuteClv	Flute4	Glockn2	Racing
37	Metal	MuteCl2	Pan Flt	TubeBe1	Water
38	Heavy	SynClv1	SlowFlt	TubeBe2	WildWar
39	FunkSyn	SynClv2	5th Flt	Bells 2	Ghostie
40	Voices	SynClv3	Oboe2	TempleG	Wave
41	Marimba	SynClv4	Bassoon	SteelDr	Space1
42	EBass2	Harpsi2	Reed	ElectDr	SpChime
43	SnareDr	Harpsi3	Harmon2	HandDr	SpTalk
44	RD Cymb	Harpsi4	Harmon3	SynTimp	Winds
45	Tom Tom	Harpsi5	Harmon4	clock	Smash
46	Mars to	Circust	MonoSax	Heifer	Alarm
47	Storm	Celeste	Sax 1	SnareD2	Helicop
48	Windbel	Squeeze	Sax 2	SnareD3	SineWav

This chart shows the 240 preset voices supplied with the FB-01 in its ROM memory. Banks 3 through 7 contain the ROM voices, while Banks 1 and 2 consist of RAM memory that is user-programmable.

FB-01 *Continued*

Configuration Number		20	Name	Dual							
Voice Function Combine		ON	Key-Code Number Receive Mode				ALL				
Instrument Number			1	2	3	4	5	6	7	8
Inst Assign	MIDI Channel		1	1	.	.	.	.	.	.
	Number Of Notes		4	4	.	.	.	.	.	.
	Key Number Limit/L		C3	C-2	.	.	.	.	.	.
	Key Number Limit/H		G8	B2	.	.	.	.	.	.
Voice Select	Voice Bank Number		3	3	.	.	.	.	.	.
	Voice Number		1	1	.	.	.	.	.	.
Inst Function	Output Level		127	127	.	.	.	.	.	.
	Octave Transpose		0	0	.	.	.	.	.	.
	Detune		0	0	.	.	.	.	.	.
	Stereo		L+R	L+R	.	.	.	.	.	.
	LFO Enable		ON	ON	.	.	.	.	.	.
Voice Function	Pitchbender Range		2	2	.	.	.	.	.	.
	Portamento Time		0	0	.	.	.	.	.	.
	Poly/Mono		POLY	POLY	.	.	.	.	.	.
	Input Controller(PMD)		WHEEL	WHEEL	.	.	.	.	.	.

This chart shows one of the Configuration Memory presets supplied with the FB-01 in its ROM memory. There are 4 such presets; the other 16 Configuration Memory locations can be used to store user-created configurations.

musicians piccolos if you want. If all six of the piccoloists are playing different notes, you will hear six piccolos, but they are all playing the same instrument—a piccolo.

The FB-01 works in a very similar fashion. You can assign each of the eight notes to play a different instrument or patch. Of course, you can operate the FB-01 in the traditional way—using all eight voices to play the same patch polyphonically.

What Does "Multi-MIDI-Channel" Mean?

The phrase Multi-MIDI channel refers to MIDI devices that are capable of "listening" to more than one MIDI channel at a time. Since the FB-01's instruments are capable of playing more than one timbre at a time, it is useful to have independent control of each of those instruments. Since MIDI has 16 channels, we can place each instrument on different MIDI channels as needed. This proves especially useful when controlling the FB-01 from a MIDI sequencer or a multi-MIDI channel keyboard controller such as the KX88/76.

Independent Control Of The 8 Instruments

The FB-01 has a variety of useful instrument functions that may be edited and saved. Each instrument's level can be set for accurate balancing of voices. Octave transposition allows for transposing each instrument plus or minus one or two octaves. Also included for each instrument is a fine detune function, a stereo placement function, and an LFO on/off function.

As stated above, the FB-01 is capable of playing 8 notes simultaneously, with up to 8 different sounds. How you allocate the 8 notes is entirely up to you. For example, you could assign 1 note to a bass voice, 5 notes to a jazz guitar voice, 1 note to a jazz flute voice, and 1 note to a sax voice, for a total of 8 notes. With this setup, you could have a small jazz combo of sounds, all from a single FB-01.

Configuration Memory

The configuration of the entire FB-01 (all settings for each instrument, MIDI channels, voice numbers, and so on) can be stored in Configuration Memory.

For each instrument, you have complete control over the following items:

- MIDI channel
- number of notes assigned to the instrument
- low note limit
- high note limit
- instrument output level (volume)
- octave transposition
- detune amount
- stereo panning position
- LFO on/off switching
- pitch bend amount

- portamento time
- poly/mono mode
- pitch modulation source device
- which voice (timbre) to play

The FB-01 has 20 configuration memory locations, 16 of which are RAM configurations where you can store your own configurations, plus 4 more ROM configurations that are set at the factory. (For a complete listing of the contents of one of the FB-01's configurations in ROM memory, see the accompanying diagram.)

"I Was A 6-Op Snob . . . ."—Are *You* Still?

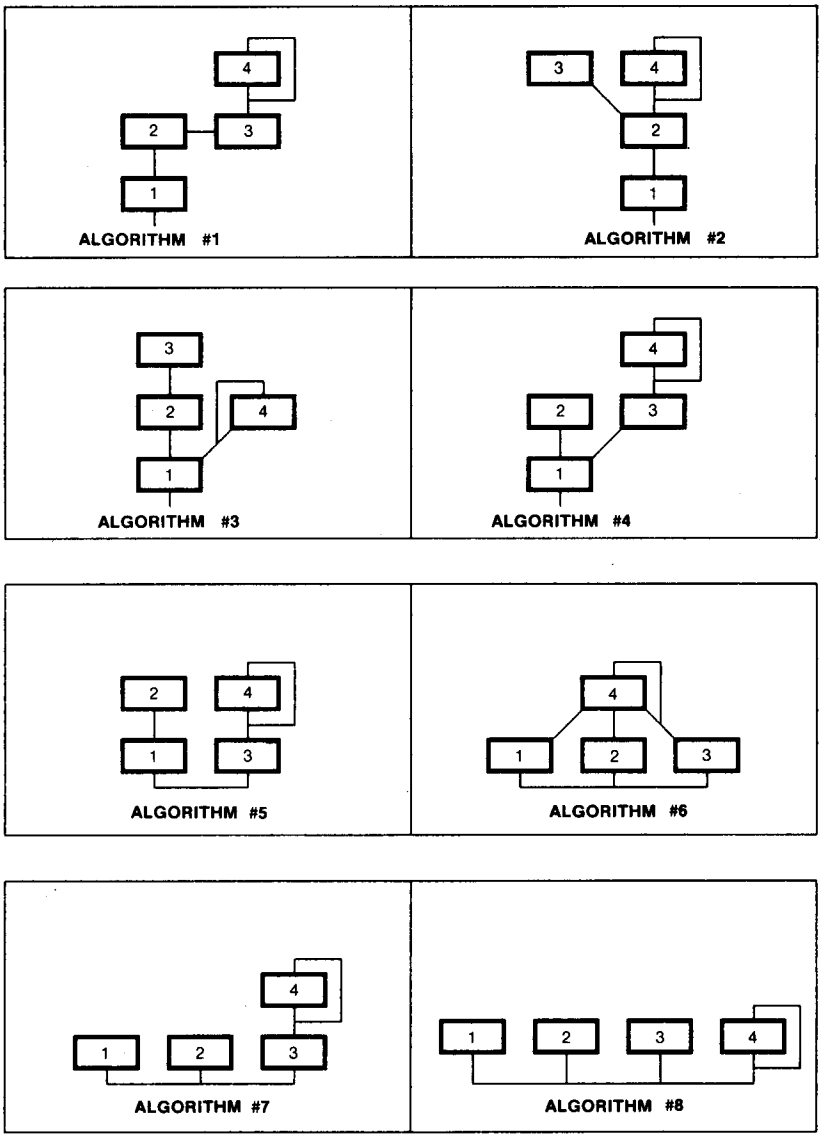
What is a six-op snob? In a musical world dominated by the sounds of the DX7, TX816, TX7, DX5, and DX1, it is easy to ignore the capabilities of the 4-operator instruments. This is an oversight that many of us have been guilty of for quite some time. For example, there are a number of L.A.-area electronic musicians who have been raving about a particular DX7 brass patch. It turns out that this brass patch (yes, it is pretty good) uses only 2 out of the 6 operators available on the DX7! The moral of the story is that FM synthesis packs quite a lot of power and that whether we are talking about 6-operator or 4-operator FM, it is worth our time to make the most of what's available.

CAV: Computer-Aided Voicing

The FB-01 has the ability to voice new patches using its extensive MIDI capabilities—but not by editing from the front panel. For musicians interested in creating their own voices, the FB-01 can be voiced by using an external computer and FB-01 voicing software. This concept is not new: Many of us have used the CX5M program, the DX-PRO for the Apple II, or other similar FM computer-aided voicing programs, and most musicians prefer this method of creating and editing voices.

One such FB-01 voicing program is available for the CX5M computer. Yamaha's FB-01 Voicing Program cartridge (YRM506) allows you to create voices or edit configurations that are displayed on the screen.

Another FB-01 voicing program, FB-PRO, written by Digital Music Services (the same company who wrote and now distributes DX-PRO), is designed for the Apple Macintosh computer. It was used to voice the two FB-01 voices that appear in this issue of AfterTouch. There will undoubtedly be similar FB-01 voicing programs for other computers as well. See your authorized Yamaha dealer, and watch the pages of AfterTouch regarding the availability of CAV programs for your particular computer.

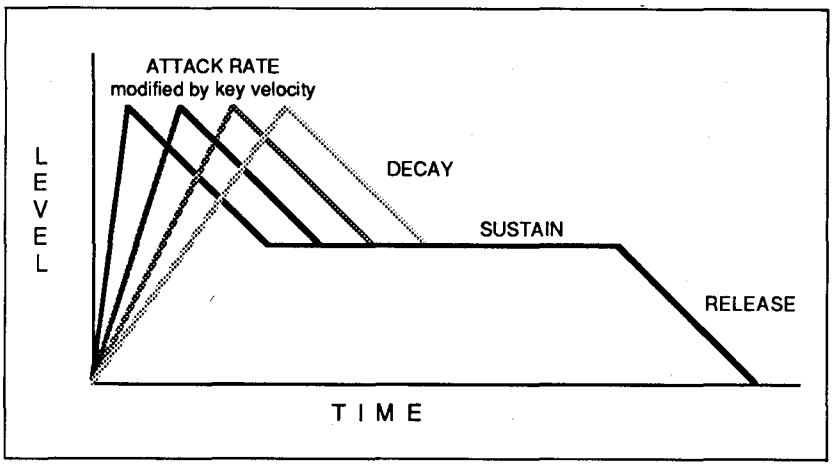


Here are the eight algorithm forms used in the FB-01 FM tone module. These same algorithms are used in the DX21, DX27, DX27S, DX100, and DX9 synthesizers.

Why Should You Be Interested In Voicing The FB-01?

As mentioned before, the 4-operator instruments have quite a bit of untapped potential. The FB-01 has at least *two* capabilities (we're still finding more) that the 6-operator units do not include. [*Note: To try these two examples, you will need to have a CAV program to use with your FB-01 tone module.*] Here are two

FB-01 *Continued*



This diagram, although not drawn at true scale, illustrates the concept of modulating the attack rate of an envelope with key velocity: the greater the velocity, the faster the attack rate.

quick voicing experiments you can try to explore these new capabilities:

Experiment 1: Noise Generation. Noise is a principal part of many musical sounds. The initial sound of a pick on a guitar string, the hit of a stick on a drum head, the breath of a flute, and the breath of a voice (a very popular sampled sound) are all examples of noise in a sound. The FB-01 can produce noise because it's LFO (low-frequency oscillator) can turn so fast that the result is noise. (This principal also works on most of the other 4-operator FM synthesizers available from Yamaha, such as the DX21, DX27, DX27S, and the DX100.) To try one experiment with noise generation, follow these steps:

1. Set the LFO waveform to S/HOLD.
2. Set the LFO speed to its fastest setting (255 on the FB-01).
3. Set the PMD pitch modulation depth all the way up (127 on the FB-01).
4. Adjust the PMD sensitivity to taste (try 6 or 7 on the FB-01).

Experiment 2: Modulating The Attack Rate With Velocity. Sounds intimidating? It isn't. This is the ability to speed up the attack rate (time) of an envelope by how hard you play the note. This effect is common on many instruments. For example, a brass section can swell notes up to their full intensity (a slow attack rate), or bite into notes from the very beginning (a fast attack rate). With many synthesizers, FM or analog, to play both types of attacks would require two different sounds; one with the fast attack rate, and one with the slower rate. This is not necessary with the FB-01. You can voice the FB-01 so that a note played with light velocity will swell, yet a note that is played with a heavy velocity will sound immediately. (To get an idea of how this concept works, see the accompanying diagram).

How Can You Use The FB-01 In Your MIDI System?

While the number of ways that an FB-01 can be used in your system is limited only by your needs and imagination, let's see how the FB-01 can be used in a simple system with a DX7. For this basic example, we will add a string sound from the FB-01 to an electric piano part played from the DX7.

Start by connecting the audio outputs of the DX7 and the FB-01 to a suitable mixer/amplifier/speaker system. Then connect the MIDI OUT of the DX7 to the MIDI IN of the FB-01. Now turn both instruments ON, and follow these steps:

1. On the FB-01, use the DATA ENTRY/+1 and DATA ENTRY/-1 keys until the display reads as follows:

   #1 [17] single

2. On the FB-01, press VOICE SELECT once, and then press DATA ENTRY/+1 4 times. This will select bank 3, voice 5, which is named "Strings."
3. Call up an electric piano voice on your DX7 and begin playing. Adjust volumes to taste.

This is a basic example of how to create layered sounds via MIDI using just two sound-generating units and one MIDI cable.

A Final Note: FB-01 Expansion

With the optional RFB-01 rack mount adaptor (featured on the cover of this issue of AfterTouch), two FB-01s can easily be mounted side-by-side in a standard equipment rack. Two FB-01s, with one set to receive only even MIDI note numbers and the other set to receive only odd MIDI note numbers, can be made to function as a 16-voice tone generator.

As you can see, the FB-01 FM tone module can be a powerful addition to your MIDI music system!

FB-01

Voice Name: Flt&Blk					algorithm 5 feedback 7				
FUNCTION	transpose	C3			LFO	speed	197	sync	OFF
	mode	POLY				waveform	TRIANGLE		
	porta speed	0				load enable	ON		
	input control pmd	WHEEL				amp mod depth	0	sens	0
	pitch bender range	4				pitch mod depth	71	sens	3
LEVELS	op1	op2	op3	op4	PITCH	op1	op2	op3	op4
on/off	ON	ON	ON	ON	inharmonic	0	0	2	1
output level	108	93	121	96	freq ratio	1	2	4	3
vel sens	7	4	3	5	detune	3	7	3	7
					frequency	0.5	2.0	6.3	4.3
ENVELOPES					SCALING				
attack rate	14	30	31	27	type	OFF	OFF	OFF	OFF
decay 1 rate	0	0	0	0	level depth	0	5	0	5
sustain level	0	0	6	0	adj for t1	0	0	0	0
decay 2 rate	31	20	20	18	rate depth	1	0	0	1
release rate	15	14	7	13					
velocity mod	8	5	6	9					

"Flt&Blk." A New FB-01 Voice By Michael A. Huisman.

FB-01

Voice Name: digilog					algorithm 2 feedback 7				
FUNCTION	transpose	C2			LFO	speed	205	sync	OFF
	mode	POLY				waveform	TRIANGLE		
	porta speed	0				load enable	ON		
	input control pmd	WHEEL				amp mod depth	0	sens	0
	pitch bender range	4				pitch mod depth	0	sens	5
LEVELS	op1	op2	op3	op4	PITCH	op1	op2	op3	op4
on/off	ON	ON	ON	ON	inharmonic	0	0	0	0
output level	127	98	123	127	freq ratio	1	1	10	3
vel sens	2	2	1	2	detune	7	0	7	0
					frequency	1.0	1.0	10.0	3.0
ENVELOPES					SCALING				
attack rate	31	31	31	31	type	OFF	OFF	OFF	OFF
decay 1 rate	0	0	0	0	level depth	0	3	4	4
sustain level	14	13	13	12	adj for t1	0	0	0	0
decay 2 rate	11	15	18	12	rate depth	2	0	0	1
release rate	8	2	14	5					
velocity mod	6	5	6	6					

"digilog." A New FB-01 Voice By Michael A. Huisman.

Final Touch

Hot Tips For The QX1, RX11, TX816, And MEP4.

Using The QX1 As A Teaching Tool

By Steve Berg

As piano teachers, my wife and I are constantly searching for new ways of teaching that will help students master the various skills necessary in music. Originally, we purchased a QX1 sequencer, a DX7 synthesizer, and various modules including a TX216 strictly for performance use. However, this setup has also proven to be helpful in teaching, both as a motivator and as a way to develop important music skills.

Our technique is to give a student each part of a piece, either classical or pop, which we have scored for our configuration of instruments. When the student learns all of the parts, we make a recording of the entire piece into the QX1.

The first step is to select an appropriate piece of music. Piano duets work nicely—just record each hand separately and you have a four-track arrangement which can be voiced to your taste. For more advanced students, I like the Arganbright *Three Baroque Pieces*. Bach Inventions and Fugues would also adapt easily, though fugue parts should be written out separately or highlighted with different colored pens or pencils.

Popular music will usually have to be arranged by the teacher. Start with sheet music. Then write out parts for each "instrument," dividing the piece into melody, bass, and accompaniment lines. It helps to listen to a recording and try to hear what instruments were used to play each part. The complexity of your arrangement will depend on both your equipment and the level of the students who will be playing it. Keep your arrangements simple, as they will probably prove to be harder than you think. After all, a three-part piece is still big time stuff for an eight year old! To save time, arrange pieces everyone will like ("Chariots Of Fire" is a sure winner), and never give out your original score unless you happen to like copying music over.

While your students are learning the parts, do your own QX1 recording of the piece and write down your procedure step by step. Knowing which part goes on which track and which voices to use will greatly enhance the quality of your future recording sessions with students.

When the student has learned each part and can play them on the piano with a metronome, move to the DX7 and begin recording. I handle the QX1 while the student plays the various parts, starting with whichever part seems to be the most logical first track. A piano type of sound probably works best for recording, since it is what the student is used to hearing and it has a precise attack. Once recorded, the modules can be set to any voice desired, and the teacher can write them into the recording with the Program function.

As the piece builds up, the students are amazed as they hear how the parts fit together. Also, there is a real satisfaction with the finished product for the student, because they know that they did the entire thing. If time permits, different voicings might be tried—this might be used as the subject of a class lesson. The students will learn much about orchestration, ensemble playing, balance, and the importance of counting accurately. And they will do it in an enjoyable and challenging way.

* * * *

Adding "Feel" To RX11-Composed Songs

By Thomas F. Sheehan, Jr.

I've found that by introducing slight tempo changes periodically during a song programmed on the RX11, I can get a better "live" feel to the drum track.

As with any other "trick," moderation is the key here. I start by mapping out the song (the patterns, repeats, breaks, and so on); then, every so often, I alter the tempo as I am step-programming the patterns into songs. I say "every so often" because I don't want to imply that there is a fixed formula. It's more of a "pinch of this and a dash of that" type of thing.

Also, the tempo changes should never be radical. Let's assume that the baseline tempo is 96 beats per minute (with a basic 4/4 time signature). To get more of a "live" feel, I might alter the tempo randomly between 94 and 98 beats per minute. The difference in tempo is ever so slight, but it is there—and you don't want it to stick out like a sore thumb, so be tasteful.

* * * *

Tuning The TX816 With The Aid Of A QX1

By Gerry Olszowy

An easy way to tune your TX816 is to set up a "tune" Bank for your QX1. On track 1, set up a measure of A-440 quarter-notes; make sure to include Pitch Bend OFF and Modulation OFF commands.

Copy this measure several hundred times, and then copy track 1 to all of the other tracks.

When you want to tune your TX816, plug your tuner into the headphone send of your mixer and PLAY your QX1 "tune" Bank. You can now solo any one of the TX816's modules for tuning without having to play notes on your keyboard controller.

* * * *

Use The MEP4 To Convert Aftertouch Data To Breath Controller Data, For Recording On The QX1

By Tom Darter

As you QX1 owners know, the unit is incapable of recording Aftertouch data. Using the MEP4 MIDI Event Processor, it is possible to convert Aftertouch data to Breath Controller data, which the QX1 can record. To achieve this effect, program the MEP4 as follows:

1. Find a blank memory position on the MEP4.
2. Press the UTILITY button to enter Utility mode.
3. Press and hold GROUP SELECT, then use the right and left cursor keys until the display reads as follows:

   ED-BUFFER INIT

4. Press the INC ("yes") button twice. You have now initialized the edit buffer.
5. Enter Edit mode by pressing the EDIT key.
6. Press and hold the GROUP SELECT button, then use the right and left cursor keys until the display reads as follows:

   MESSAGE FILTER

7. Now press the right cursor key until you see this display:

   CH A.TOUCH = OFF

8. Press the INC button. The display will now read:

   CH A.TOUCH = ON

9. Press and hold the GROUP SELECT button, then press the right cursor key until the display reads as follows:

   DATA MODIFIER

When you release the GROUP SELECT button, you will see this display:

0:MSG:**

10. Press the INC button until the display reads as follows:

    0:MSG:Dn.xx

11. Now press the right cursor key until you see this:

    4:***:

Also, make sure that the cursor is positioned over the right asterisk ("*").

12. Press the INC button until the display reads as follows:

    4:CNV:→Bn.xx.yy

13. Press the right cursor key once; then press INC until the display reads as follows:

    4:CNV:→Bn.02.yy

14. Press the right cursor key once; then press DEC once. The display should now read:

    4:CNV:→Bn.02.xx

At this point, the setup is programmed, and all you need to do is name it and store it into memory by following the instructions in the MEP4 owners manual.

DX7

Program Your Mod Wheel To Be A Tone Control. By John McEnary.

THERE IS A CONVENIENT way to set up your DX7 voices so that the Modulation Wheel (or Foot Controller) acts as an interactive tone control. This allows you to adjust and set the timbre of a voice without going into the EDIT mode. Voices set up this way in the TX7 or TX816 can also be adjusted to a desired tone setting without the use of a computer.

Setting up your voices this way also allows you to use the Modulation Wheel, Foot Controller, Breath Controller, or Aftertouch to subtly vary the timbre of a voice as you perform. This allows a great deal of expressive control, especially when combined with velocity sensitivity and vibrato.

As an example, take the BRASSHORNS voice from the factory ROM #A Cartridge (Voice #5). Set the Modulation Wheel function parameters as follows:

MODULATION WHEEL

RANGE	=	99
PITCH	=	OFF
AMPLITUDE	=	OFF
EG BIAS	=	ON

You will notice that the Modulation Wheel no longer controls vibrato. This can be added later. As an alternative, you could use the Foot Controller to control timbre by setting the Foot Control function parameters exactly like the Modulation Wheel function parameters listed above.

At this point, the Modulation Wheel (or Foot Controller) has no effect on the sound. In order to achieve the desired effect, we must now raise the amplitude modulation sensitivity (AMS) on some of the operators. To see which operators should be raised (and how much), we need to examine the algorithm that is being used for the voice. Press EDIT—for the BRASSHORNS voice, the upper left corner of the display will show Algorithm 18. Looking at the algorithm chart on the front panel, we can see that algorithm #18 uses operator #1 as its carrier; operators #2-#4 form a row of modulators, with feedback on operator #3. Operators #5 and #6 form a short modulating stack modulating operator #4. Now, raise the amplitude modulation sensitivity (AMS) as follows on the six operators (all are being changed except operator #1):

OP #	AMS
1	0
2	2
3	3
4	3
5	1
6	1

Notice that the modulators that have the greatest effect on the overall timbre (#3 and #4) are raised the most. This helps give your new tone control a smooth, natural feel. Experiment now, using the Modulation Wheel as a tone control.

When the Modulation Wheel is at its highest position, the timbre is identical to the original voice. As the Modulation Wheel is lowered, the sound mellows. At this point, in order to control a wider range of timbre, I usually brighten the voice. This can easily be done by raising the output levels of the modulators. As an example, raise the Operator Output Level of each modulator by a value of 4 to the following levels (there is, of course, no change in the output of operator #1, which is the only carrier):

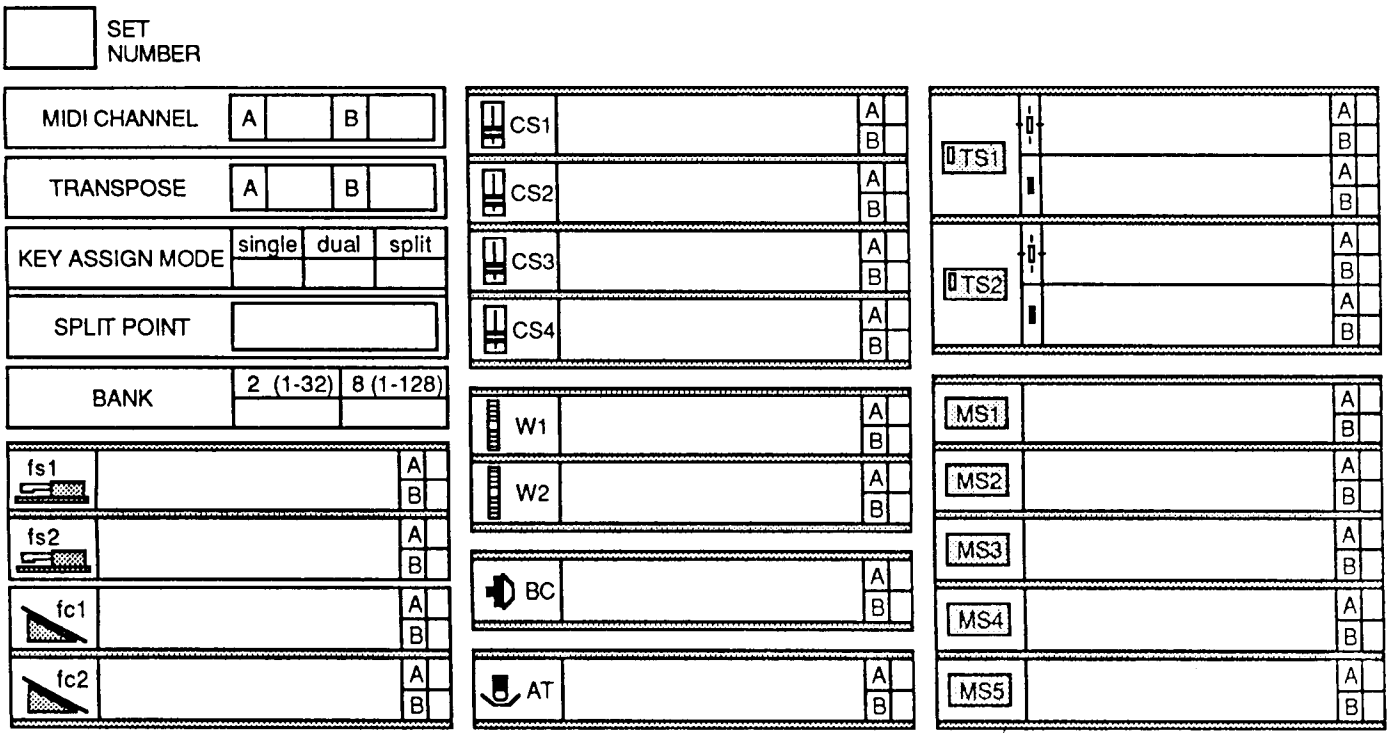
OP #	OUTPUT
1	99
2	71
3	83
4	83
5	74
6	83

Changing modulator output levels is a simple and dramatic way to edit the timbre of any voice. Individual experimentation is necessary to create the most pleasing tone.

Now, let's add the vibrato we lost when we turned off the Modulation Wheel's Pitch function parameter at the beginning of this example. Increase the Pitch Modulation Sensitivity to 4. For a more natural sound (similar to adding vibrato with the Modulation Wheel), increase the LFO Delay to 45. An alternative to changing the Pitch Modulation and LFO Delay would be to use Aftertouch to bring in the vibrato: Set the Afterouch RANGE to 36 with PITCH ON.)

This completes the example. The Modulation Wheel is now set up to vary the timbre of the voice and to let the performer create subtle variations in articulation and phrasing.

KX Series



Use this blank table to keep records of your KX88 or KX76 controller assignment programs.

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FB-01 Sound Disk

Continued from page 6

Track 1: "Sonic Rise"

Two FB-01 tone modules were used for this piece. The dominant sound on the track is the SynBell preset. All of the FB-01 voices heard here are factory supplied preset voices.

Track 2: "Mass Transit"

A total of four FB-01 tone modules were used on this recording. Given the luxury of four tone generators, the basic approach was to use a single timbre from each unit (instead of relying on each module's multi-timbral capability). The lead sound here is the MonoSax preset. All of the FB-01 voices heard here are part of the instrument's permanent preset (ROM) library.