



FS1R

■ TONE GENERATOR ■ FORMANT SHAPING / FM SYNTHESIS



New Sounds for the New Millenium

Yamaha FM synthesis is back with more musical depth and expressive power than ever before! The FS1R Formant Shaping/FM Synthesis Tone Generator is a perfect example of how a classic tone generation system can evolve to become the music tool of choice for a new generation of artists. While sample-based tone generators merely reproduce a recorded waveform — with added envelopes, filtering, and effects for variety — the FS1R actually creates sound, and therefore offers total control right down to the waveform level. It also includes innovative Formant Shaping technology for even greater sonic scope. The overall result is unmatched musicality and expressive depth ... and after all, that's what music is all about.

Formant Shaping + FM Synthesis

The FS1R's FS (Formant Shaping) tone generator offers totally new sound creation capability while maintaining all the benefits of FM synthesis. While keeping the operator + algorithm structure of FM tone generators, FS synthesis adds the concept of "formants" — the timbral building blocks of just about every sound in the universe — for unprecedented tonal flexibility and control. FS synthesis offers a type of unprecedented expressive depth and musical freedom that PCM tone generators can't even approach.

An Extensive Range of Preset Voices

Although you can program the FS1R yourself to create totally new sounds, it comes with an extraordinary range of 1,408 preset voices (in 11 banks of 128 voices each) that can be used individually as is, or combined in performance setups as described in the following section. The presets include a vast selection of original DX7 voices, a range of new voices ideally suited for dance, trance, and other innovative musical genres. In addition to the 11 banks of preset voices, one internal 128-voice memory bank is also provided for original voices.

4-part Performance Setups

When you select a "program" or "patch" on the FS1R you are actually selecting a performance setup consisting of from one to four voices. The main FS1R play mode provides a range of parameters which affect the entire performance setup (e.g. volume, pan, effect send and return, note shift), and others which affect each voice individually. The ability to combine voices in this way makes it possible to create a range of exceptionally "thick," expressive sounds. Naturally, each of the performance parts can be assigned to a different MIDI channel, making the FS1R a versatile 4-part multi-timbre tone generator.

The FS1R comes pre-programmed with three banks of 128 preset performance

setups (384 total), and one internal 128-performance bank in which you can store your original creations. Since the FS1R is an ideal match for the Yamaha G50 Guitar MIDI Controller as well as keyboards, sequencers, and other MIDI controllers, the third preset performance bank includes a range of performance setups specifically created for use with the G50.

Easy Voice/Performance Selection

Preset performance bank A contains a range of voices which make full use of the advanced voicing capabilities of FS synthesis; bank B includes a stunning selection of the very latest FM voices, and bank C offers a range of voices designed for use with a guitar MIDI controller such as the Yamaha G50.

The FS1R's unique Category Search function makes locating voices and performances within the extensive selection provided fast and easy.

Unparalleled Real-time Control

In addition to recognizing the full range of MIDI control change assignments — e.g. pitch bend wheel, modulation wheel, breath control, foot controller, and many more — the FS1R features four Controller Knobs which can be assigned to a wide range of parameters for extraordinarily versatile, expressive realtime performance control. The knobs also function as data entry controls while editing for fast, efficient operation.

Another important feature of the FS1R control system is that a total of 8 "voice

control sets" (VC1-VC8) can be created for each performance setup, with total assignment freedom: e.g. different controllers can be assigned to totally different parameters, a single controller can be assigned to several parameters, multiple controllers can control a single parameter, or just about any combination of the above.

Analog Physical Modeling Filters

The FS1R filters employ the same physical modeling technology as the remarkable Yamaha AN1x Analog Physical Modeling Control Synthesizer. What this means is that the filters have the characteristics and controllability of filters used in traditional analog synthesizers, for superior musical depth and control range.

Effects & EQ

The FS1R includes a top-quality digital signal processing system which is capable of producing effects rivalling and even exceeding those of many separate component effect units in quality. In fact, effect programming is an integral and important part of voice programming, and the ability to control specific effect parameters in real time makes them indispensable for expressive control as well.

In addition to 16 reverb, 28 variation, and 40 insertion effects, the FS1R provides a versatile 3-band equalizer that can be used simultaneously with the effects.



- New synthesis technology — FS Synthesis (Formant shaping / FM synthesis) — creates sound with characteristics and flexibility similar to the human voice for extraordinary sonic depth and expressive control.
- Upward compatible with voices from the "classic" FM synthesizers and tone generators, such as the Yamaha DX and TX series.
- Formant Sequences — "Fseqs" — produce other-worldly vocal phrases, rhythm loops, and more.
- Assignable control knobs for extended real-time sonic control as well as easy programming.
- A huge selection of 1408 preset voices, including the best from the original DX and TX series.

Figure-1: LCD



Figure-2: Category Search

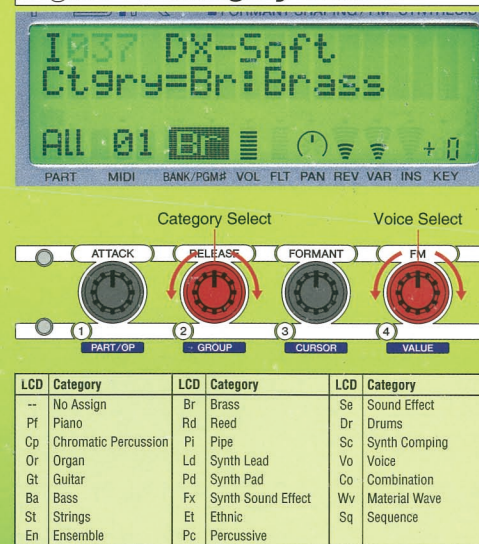
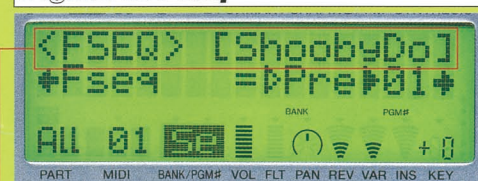


Figure-3: Fseq



No.	Fseq name	No.	Fseq name	No.	Fseq name
1	ShoobyDo	31	18BarBeat	61	ChowaiUu
2	2BarBeat	32	18rBeat2	62	Everybd2
3	D&B	33	Undo	63	Dodidowa
4	D&B Fill	34	RndArp4	64	Check123
5	4BarBeat	35	VocRim2	65	BranNewY
6	YouCanG	36	Relyowha	66	BoomBoom
7	ESSyHey	37	RndArp5	67	Hi-Woo
8	RimSynth	38	VocalArp	68	FreeForm
9	VocalRim	39	CanYouGi	69	FreePad
10	WooWaPa	40	Pu-Yo	70	YouKnow
11	Uoolha	41	Yaof	71	OldTech
12	FemRim	42	MyaOh	72	B/M
13	ByonRole	43	ChuckRim	73	MiniJingl
14	WowYeah	44	ILoveYou	74	EveryB-S
15	ListenVo	45	Jan-On	75	IYaan
16	YAMAHAFS	46	Welcome	76	Yeah
17	Laugh	47	One-Two	77	ThankYou
18	Laugh2	48	Edokko	78	Yes-No
19	AreYouR	49	Everybdy	79	UnWaEDon
20	Oiya	50	Uwau	80	MouthPop
21	Oiaio	51	YEEAAH	81	Fire
22	UuWaUu	52	4-3-2-1	82	TBLLine
23	Wao	53	Test123	83	China
24	RndArp1	54	CheckSnd	84	Aelou
25	FltrArp	55	ShavaDo	85	YaYeYiYo
26	RndArp2	56	R-M-H-R	86	C7Seq
27	TechArp	57	HiSchool	87	SoundLib
28	RndArp3	58	M.Blastr	88	IYaan2
29	Voco-Seq	59	L&G Mayl	89	Relax
30	PopTech	60	Hellow	90	PSYAMAHA

Figure-4: Algorithm

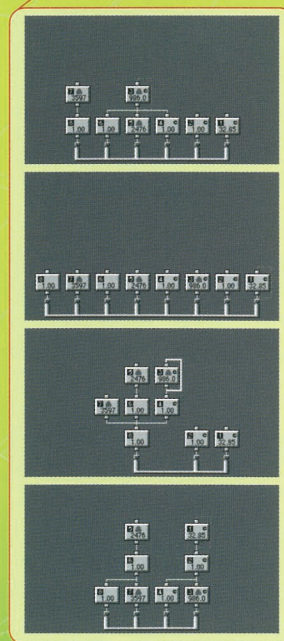
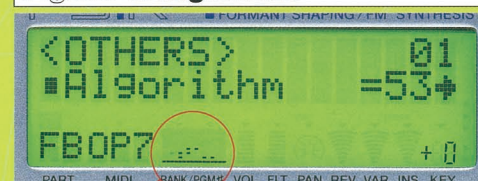
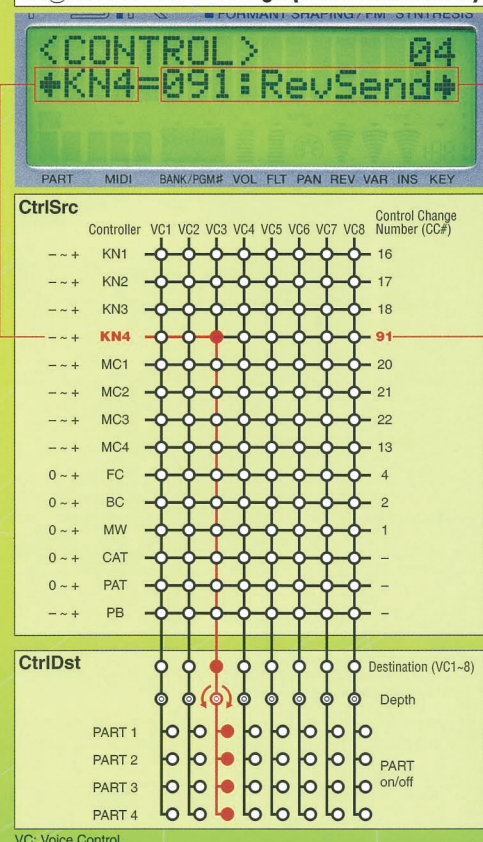


Figure-5: Knob Assign (Controller Matrix)



VC: Voice Control

Figure-6: Filter

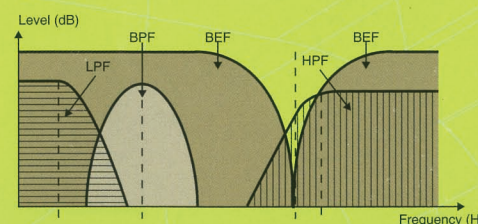
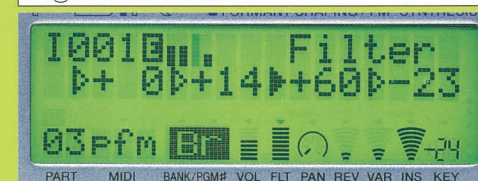


Figure-7: EG

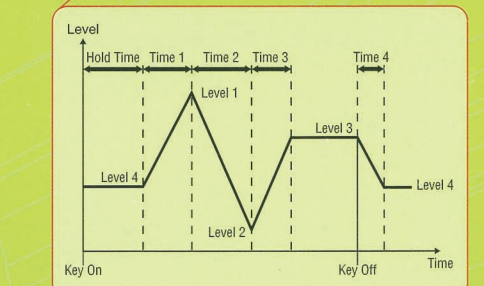
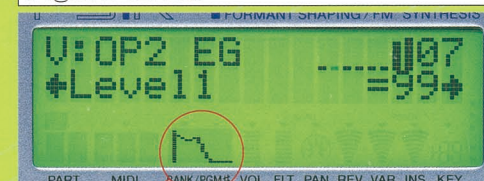
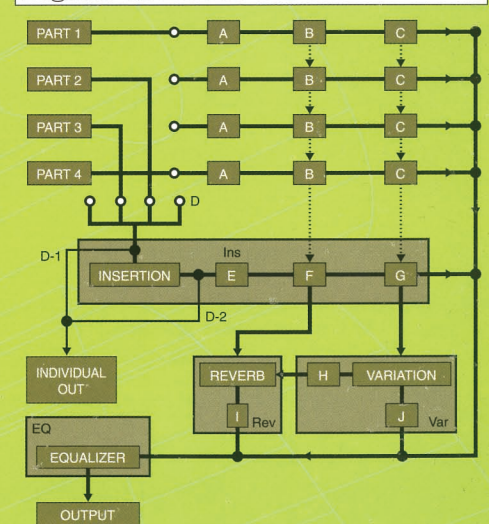


Figure-8: Effect Block



Formant Shaping + FM Synthesis

The FS1R integrates two tone generation concepts for extraordinarily broad voicing versatility. In addition to the latest FM synthesis technology — based on the type introduced in the legendary Yamaha DX-series synthesizers and TX-series tone generators — Formant Shaping synthesis gives musicians unprecedented capability to produce and control sounds with characteristics and flexibility similar to that of the human voice. It can also produce instrument voices that have the response and rich pitch-dependent timbral variations — in short, the “musicality” — of natural acoustic instruments. And, of course, the ability to combine FM with Formant Shaping opens up a whole new universe of musical possibilities. The FS1R can create anything from classic DX electric piano voices to totally new simulations of human vocal sounds ... and anything in between.

■ FS Synthesis

The term “formant” refers to the distinct spectral patterns which define the recognizable sounds of human speech, such as the vowels “a” or “i.” In traditional speech synthesis systems this is simulated by using an oscillator to perform the function of the vocal cords, and a series of controllable bandpass filters to create the required formant shapes. Consonant sounds such as “k” or “t,” and fricatives such as “f,” are based on slightly different principles, requiring a noise generator rather than an oscillator. Formants play an important role in defining the sound of many acoustic musical instruments as well as the human voice.

Rather than a cumbersome system of oscillators and filters to synthesize the effect of formants, the FS1R employs 16 formant “operators” — 8 “voiced” operators, and 8 “unvoiced” operators (3 to 5 formants are generally considered to be more than enough to synthesize speech). Each operator digitally simulates the effect of both the driving source (oscillator) and filter in one easily manageable unit. The voiced operators produced pitched sounds which can be played on a musical scale via a MIDI keyboard or other MIDI controller. The unvoiced operators can be used to produce noise components of speech-like sound, or they can be used in much the same way as noise generators in more orthodox synthesis systems (e.g. to produce percussive sounds or sound effects).

Each formant operator has a range of parameters which determine its shape and therefore contribute to the overall sound: center frequency, level, width, and skirt (the shape of the “flare” at the bottom of the formant’s bell-shaped response curve). All of these are programmable, and independent envelope generators are provided for the center frequency and level parameters of each operator. The envelope generators make it possible to produce a wide range of time-based timbral variation, such as smoothly shifting from an “a” to an “i” type sound. Also, any of the available controllers can be assigned to the formant parameters — the control knobs, a modulation wheel, foot controller, etc. — to allow realtime variation while playing.

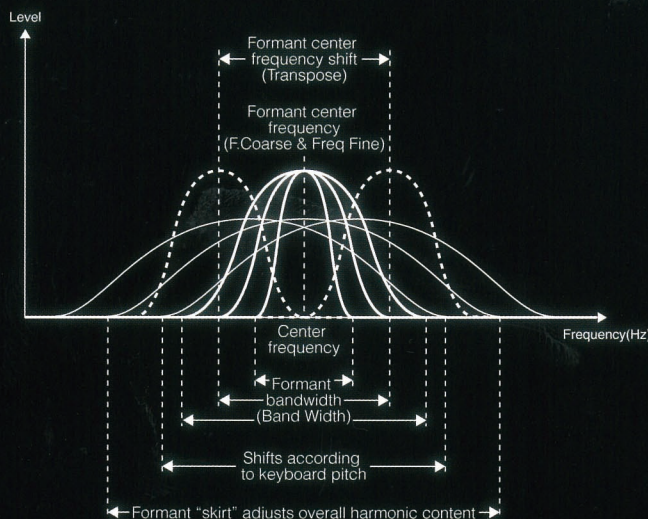
■ Formant Sequences

The FS1R features a range of 90 preset FSeqs (Formant Sequences) which can be used to “sequence” the formants to produce voice-like phrases, rhythm loops, and more. FSeq playback speed can be set at a fixed value, controlled via a MIDI clock signal, varied by note velocity (e.g. keyboard dynamics) or varied manually. And since the sound of formants is not pitch dependent, Fseq playback speed and pitch can be varied over an extremely wide range without altering the basic timbre of the sound (something that even the best samplers cannot do).

■ FM Synthesis

The FS1R’s operator-based architecture is what allows it to integrate both FM and Formant Shaping tone generation in one compact, easy-to-use module. To create FM (Frequency Modulation) voices, the operators are rearranged into a variety of “algorithms” with carrier/modulator relationships between certain operators. This basic architecture means that the FS1R is fully capable of producing the same type of FM sounds that placed the Yamaha DX-series synthesizers and TX-series tone generators firmly at the forefront of music production throughout the 1980’s — and makes them an indispensable part of the musical arsenal of so many discerning artists and production professionals even today. In fact, the FS1R actually comes with a complete set of 1152 original DX voices pre-programmed in preset memory! If you have other DX voices you have programmed yourself or obtained from other sources, they can be loaded into the FS1R too, and used with virtually no change in sound.

The FS1R actually takes FM synthesis to new levels of musical versatility and control. Unlike Yamaha’s original FM synthesizers and tone generators, the FS1R provides a choice of 8 different waveforms for each oscillator, thus significantly expanding the range of sound which can be produced.



Rear Panel

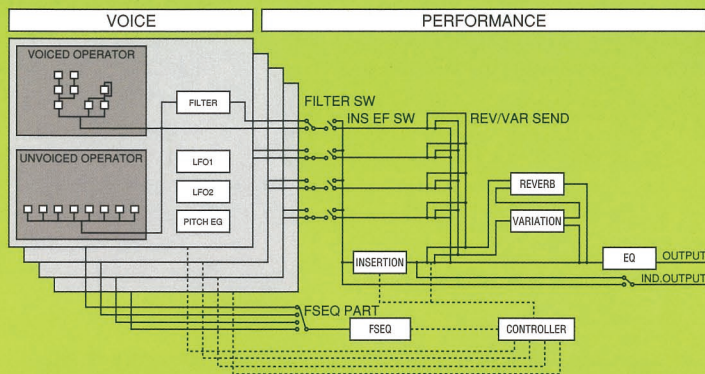


Specifications

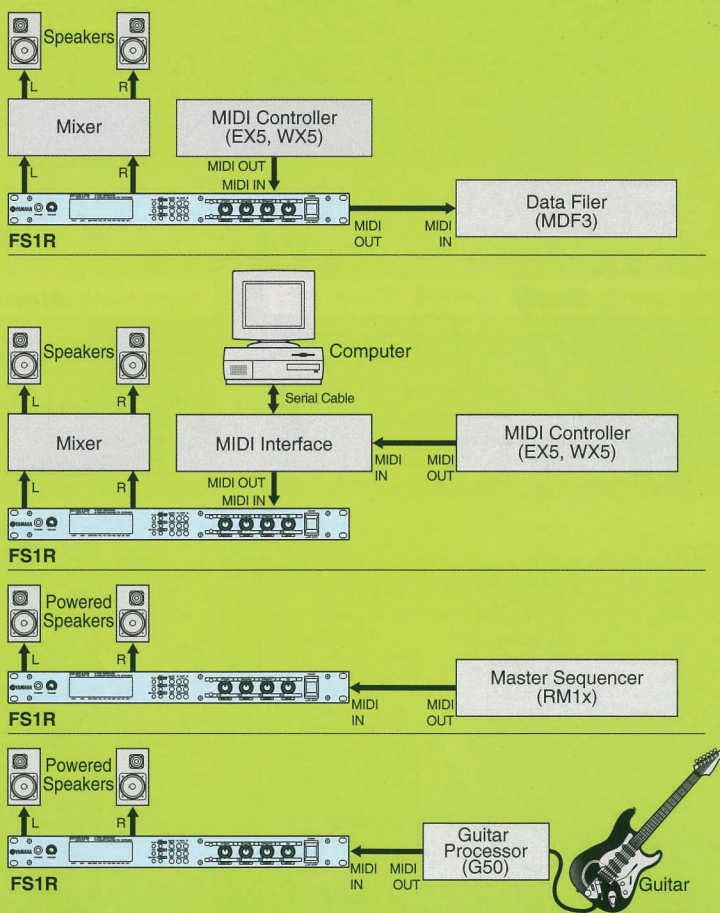
Tone Generation System	Tone Generators Multi-Timbres Polyphony	Formant Shaping / FM Synthesis 4 Parts (16 MIDI Channel Multi-Timbre) 32 notes (DVA)
DEMO Songs	15	
Number of Voices	Performance Preset 384 (128 x 3 banks) Internal 128 Voice Preset 1408 (128 x 11 banks) Internal 128 / 64 (Internal Fseq) Fseq (Formant Sequence) Preset 90 Internal 6 (max)	
Components	Performance 4 Parts (4 Voices) Fseq (Formant Sequence) Voice Controller (Source / Destination Assignable Matrix) Effects Reverb 16 types Variation 28 types Insertion 40 types Equalizer Voice 16 Operators (Voiced x 8, Unvoiced x 8) 88 Algorithms LFO1 LFO2 Dynamic Filter Pitch EG	
Controls	POWER Switch Main Volume x 1 Sound Control Knob x 4 (Absolute / Relative) Mode x 6 (PLAY, EDIT [PERFORM], EDIT [EFFECT], EDIT [VOICE], UTIL, SEARCH) Data x 9 (MUTE/SOLO, ENTER, EXIT, PART, CURSOR, VALUE, Knob Select x 2 (ATTACK, RELEASE, FORMANT, FM / KN1-4))	
Display	LCD (Backlit) LED Mode x 6 Green Knob Select x 2 Red	
Terminals	Front panel	Phones
	Rear panel	Output L(MONO), R Individual Out L, R MIDI IN/OUT/THRU
Dimensions	480(W) x 235(D) x 44(H) mm	
Weight	2.6Kg	
Power Consumption	USA 120V (60Hz)	12.0 Watts
	Europe 240V (50Hz)	12.0 Watts
Included Accessories	Owner's Manual x 1 Data List x 1 AC Power Cord x 1	

Descriptions and photographs in this brochure are for information purposes only, and specifications are subject to change without notice.
Since options may not be the same in every region, please check with your Yamaha dealer.

Block Diagram



System



For details please contact:



ISO9001
JQA-1868



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