

YAMAHA

MUSIC SYNTHESIZER

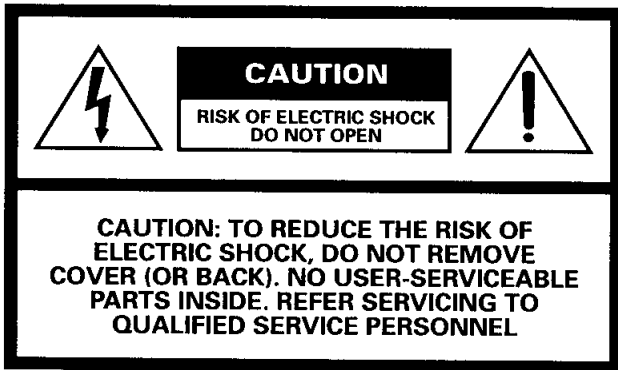
SY99



OPERATING MANUAL

SPECIAL MESSAGE SECTION

PRODUCT SAFETY MARKINGS: Yamaha electronic products will have either labels similar to the graphics shown below or molded/stamped facsimiles of these graphics on the enclosure. The explanation of these graphics appears on this page. Please observe all cautions indicated on this page and those indicated in the safety instruction section.



● Explanation of Graphical Symbols



The exclamation point within the equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.



The lightning flash with arrowhead symbol within the equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock.

IMPORTANT NOTICE: All Yamaha electronic products are tested and approved by an independent safety testing laboratory in order that you may be sure that when it is properly installed and used in its normal and customary manner, all foreseeable risks have been eliminated. **DO NOT** modify this unit or commission others to do so unless specifically authorized by Yamaha. Product performance and/or safety standards may be diminished. Claims filed under the expressed warranty may be denied if the unit is/has been modified. Implied warranties may also be affected.

SPECIFICATIONS SUBJECT TO CHANGE: The information contained in this manual is believed to be correct at the time of printing. However, Yamaha reserves the right to change or modify any of the specifications without notice or obligation to update existing units.

ENVIRONMENTAL ISSUES: Yamaha strives to produce products that are both user safe and environmentally friendly. We sincerely believe that our products and the production

methods used to produce them, meet these goals. In keeping with both the letter and the spirit of the law, we want you to be aware of the following:

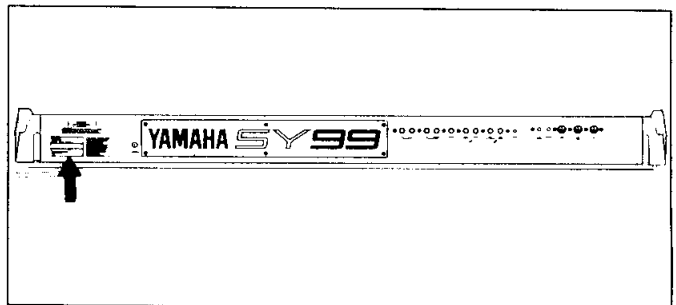
Battery Notice: This product **MAY** contain a small non-rechargeable battery which (if applicable) is soldered in place. The average life span of this type of battery is approximately five years. When replacement becomes necessary, contact a qualified service representative to perform the replacement.

Warning: Do not attempt to recharge, disassemble, or incinerate this type of battery. Keep all batteries away from children. Dispose of used batteries promptly and as regulated by applicable laws. Note: In some areas, the servicer is required by law to return the defective parts. However, you do have the option of having the servicer dispose of these parts for you.

Disposal Notice: Should this product become damaged beyond repair, or for some reason its useful life is considered to be at an end, please observe all local, state, and federal regulations that relate to the disposal of products that contain lead, batteries, plastics, etc.

NOTICE: Service charges incurred due to lack of knowledge relating to how a function or effect works (when the unit is operating as designed) are not covered by the manufacturer's warranty, and are therefore the owners responsibility. Please study this manual carefully and consult your dealer before requesting service.

NAME PLATE LOCATION: The graphic below indicates the location of the name plate. The model number, serial number, power requirements, etc., are located on this plate. You should record the model number, serial number, and the date of purchase in the spaces provided below and retain this manual as a permanent record of your purchase.



Model _____

Serial No. _____

Purchase Date _____

This information on safety is provided to comply with U.S.A. laws, but should be observed by users in all countries.

IMPORTANT SAFETY INSTRUCTIONS

INFORMATION RELATING TO PERSONAL INJURY, ELECTRICAL SHOCK, AND FIRE HAZARD POSSIBILITIES HAS BEEN INCLUDED IN THIS LIST.

WARNING — When using any electrical or electronic product, basic precautions should always be followed. These precautions include, but are not limited to, the following:

1. Read all Safety Instructions, Installation Instructions, Special Message Section items, and any Assembly Instructions found in this manual BEFORE making any connections, including connection to the main supply.
2. **Main Power Supply Verifications:** Yamaha products are manufactured specifically for the supply voltage in the area where they are to be sold. If you should move, or if any doubt exists about the supply voltage in your area, please contact your dealer for supply voltage verification and (if applicable) instructions. The required supply voltage is printed on the name plate. For name plate location, please refer to the graphic found in the Special Message Section of this manual.
3. This product may be equipped with a polarized plug (one blade wider than the other). If you are unable to insert the plug into the outlet, turn the plug over and try again. If the problem persists, contact electrician to have the obsolete outlet replaced. Do NOT defeat the safety purpose of the plug.
4. Some electronic products utilize external power supplies or adapters. DO NOT connect this type of product to any power supply or adapter other than one described in the owners manual, on the name plate, or specifically recommended by Yamaha.
5. **WARNING:** Do not place this product or any other objects on the power cord or place it in a position where anyone could walk on, trip over, or roll anything over power or connecting cords of any kind. The use of an extension cord is not recommended! If you must use an extension cord, the minimum wire size for a 25' cord (or less) is 18 AWG. NOTE: The smaller the AWG number, the larger the current handling capacity. For longer extension cords, consult a local electrician.
6. **Ventilation:** Electronic products, unless specifically designed for enclosed installations, should be placed in locations that do not interfere with proper ventilation. If instructions for enclosed installations are not provided, it must be assumed that unobstructed ventilation is required.
7. **Temperature considerations:** Electronic products should be installed in locations that do not significantly contribute to their operating temperature. Placement of this product close to heat sources such as; radiators, heat registers and other devices that produce heat should be avoided.
8. This product was NOT designed for use in wet/damp locations and should not be used near water or exposed to rain. Examples of wet/damp locations are; near a swimming pool, spa, tub, sink, or wet basement.
9. This product should be used only with the components supplied or; a cart, rack, or stand that is recommended by the manufacturer. If a cart, rack, or stand is used, please observe all safety markings and instructions that accompany the accessory product.
10. The power supply cord (plug) should be disconnected from the outlet when electronic products are to be left unused for extended periods of time. Cords should also be disconnected when there is a high probability of lightning and/or electrical storm activity.
11. Care should be taken that objects do not fall and liquids are not spilled into the enclosure through any openings that may exist.
12. Electrical/electronic products should be serviced by a qualified service person when:
 - a. The power supply cord has been damaged; or
 - b. Objects have fallen, been inserted, or liquids have been spilled into the enclosure through openings; or
 - c. The product has been exposed to rain; or
 - d. The product does not operate, exhibits a marked change in performance; or
 - e. The product has been dropped, or the enclosure of the product has been damaged.
13. Do not attempt to service this product beyond that described in the user-maintenance instructions. All other servicing should be referred to qualified service personnel.
14. This product, either alone or in combination with an amplifier and headphones or speaker/s, may be capable of producing sound levels that could cause permanent hearing loss. DO NOT operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist. IMPORTANT: The louder the sound, the shorter the time period before damage occurs.
15. Some Yamaha products may have benches and/or accessory mounting fixtures that are either supplied as a part of the product or as optional accessories. Some of these items are designed to be dealer assembled or installed. Please make sure that benches are stable and any optional fixtures (where applicable) are well secured BEFORE using. Benches supplied by Yamaha are designed for seating only. No other uses are recommended.

PLEASE KEEP THIS MANUAL

This information on safety is provided to comply with U.S.A. laws, but should be observed by users in all countries.

FCC INFORMATION (U.S.A.)

1. IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT!

This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Yamaha may void your authority, granted by the FCC, to use the product.

2. IMPORTANT: When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product **MUST** be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

3. NOTE: This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class "B" digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in a residential environment will not result in harmful interference with other electronic devices. This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices. Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilize power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to co-axial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorized to distribute this type of product. If you can not locate the appropriate retailer, please contact Yamaha Corporation of America, Electronic Service Division, 6600 Orangethorpe Ave, Buena Park, CA 90620

* This applies only to products distributed by YAMAHA CORPORATION OF AMERICA.

Dette apparat overholder det gældende EF-direktiv vedrørende radiostøj.

Cet appareil est conforme aux prescriptions de la directive communautaire 87/308/CEE.

Diese Geräte entsprechen der EG-Richtlinie 82/499/EWG und/oder 87/308/EWG.

This product complies with the radio frequency interference requirements of the Council Directive 82/499/EEC and/or 87/308/EEC.

Questo apparecchio è conforme al D.M.13 aprile 1989 (Direttiva CEE/87/308) sulla soppressione dei radio-disturbi.

Este producto está de acuerdo con los requisitos sobre interferencias de radio frecuencia fijados por el Consejo Directivo 87/308/CEE.

YAMAHA CORPORATION

IMPORTANT NOTICE FOR THE UNITED KINGDOM

Connecting the Plug and Cord

IMPORTANT
THE WIRES IN MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

Blue: NEUTRAL

Brown: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows: The wire which is coloured **BLUE** must be connected to the terminal which is marked with the letter **N** or coloured **BLACK**. The wire which is coloured **BROWN** must be connected to the terminal which is marked with the letter **L** or coloured **RED**.

Making sure that neither core is connected to the earth terminal of the three pin plug.

CANADA

THIS DIGITAL APPARATUS DOES NOT EXCEED THE "CLASS B" LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFERENCE REGULATION OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA "CLASSE B" PRESCRITES DANS LE REGLEMENT SUR LE BROUILLAGE RADIOELECTRIQUE EDICTE PAR LE MINISTERE DES COMMUNICATIONS DU CANADA.

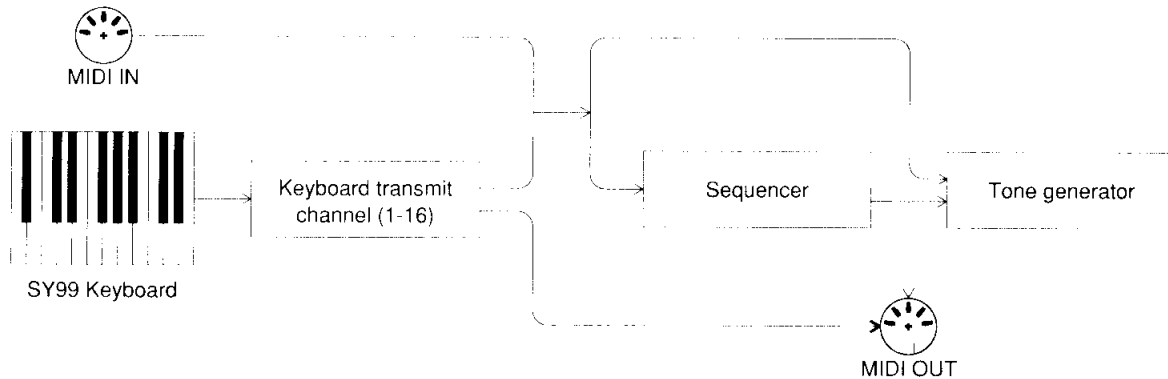
* This applies only to products distributed by YAMAHA CANADA MUSIC LTD.

Litiumbatteri!
Bör endast bytas av servicepersonal.
Explosionsfara vid felaktig hantering.

VAROITUS!
Lithiumparisto, Räjähdyksvaara.
Pariston saa vaihtaa ainoastaan alan ammattimies.

ADVARSEL!
Lithiumbatteri!
Ekspløsningsfare. Udskiftning må kun foretages af en sagkyndig, – og som beskrevet i servicemanualen.

SY99 BASIC CONFIGURATION



The SY99 is composed of a tone generator, a sequencer, and a keyboard. The tone generator is always in either VOICE mode or MULTI mode. The sequencer is always in either SONG mode or PATTERN mode.

INTRODUCTORY SECTION

INTRODUCING THE SY99

HOW TO USE THE SEQUENCER

HOW TO EDIT A VOICE

REFERENCE SECTION

VOICE PLAY MODE

VOICE EDIT MODE

MULTI PLAY MODE

MULTI EDIT MODE

SONG MODE

PATTERN MODE

UTILITY MODE

APPENDIX

Thank you for purchasing the Yamaha SY99 digital synthesizer. The SY99 represents a new generation of Yamaha synthesizers featuring the new Realtime Convolution and Modulation (RCM) hybrid tone generation system, which uses Advanced FM (AFM) tone generation and Advanced Wave Memory (AWM) tone generation in conjunction with realtime digital filtering.

The SY99 can function as up to 16 independent synthesizers with dynamically allocated voices, and includes an on-board 16-track 99-pattern sequencer which can contain up to ten songs at a time. It also features an enhanced effect system, zoned aftertouch, powerful master keyboard functions, a MIDI data recorder function, and the ability to accept MIDI sample dumps.

To take full advantage of the SY99 and enjoy long and trouble-free use, please read this manual carefully.

How to use this manual

This manual is divided into three sections: an introductory section, a reference section, and an appendix.

Introductory section: This section contains the information you need to start using your SY99 right away. (If you are already familiar with the SY77, an earlier member of the Yamaha SY series, you may wish to read *How the SY99 differs from the SY77* on page 308.)

- **Introducing the SY99:** Please be sure to read this section. It will tell you how to play the sounds, about the main features of the SY99, and about basic operation.
- **How to use the sequencer:** This explains how to use the built-in sequencer to record your own songs, each having as many as 16 parts, with the SY99 functioning as up to sixteen independent instruments.
- **How to edit a voice:** Read this when you want to modify a voice or create a completely new voice.

Reference section: This section contains a full explanation of all the SY99's functions. Once you have worked through the introductory section and are comfortable with basic operation, glance through this section to get an idea of the SY99's capabilities. Refer to the details when necessary.

Appendix: This section contains technical information that may be of interest to advanced users or programmers.

Conventions in this manual

In order to present information as clearly as possible, the following conventions are used in this manual.

- The names of front panel buttons and controls are set in small capital type; e.g., press the EDIT button.
- Italics are used mainly when referring to a section in this manual; e.g., for details refer to *AFM element job 5. AFM sensitivity*.
- Most of the LCDs in the SY99 have a unique Page Jump number to which you can jump by pressing JUMP and entering the number. These numbers will be prefixed by a "#" sign; e.g., JUMP #312.
- Function names will be capitalized when they first occur or when necessary for emphasis, but will be uncapitalized in subsequent occurrences; e.g., adjust the LFO Speed ... after adjusting the LFO speed, ...
- The beginning of each two-page subsection in the introductory section contains a short abstract or summary of the entire subsection, printed in bold type.
- Three periods between two numbers are used to indicate that a parameter can be set to any value in this range; e.g., Velocity Sensitivity (-7...+7). Since some parameters can be set to negative values, this avoids the possibility of confusing a dash with a minus sign.

PRECAUTIONS

Location

Avoid placing the SY99 in direct sunlight, or in locations where it will be subjected to temperature extremes, moisture, excessive dust, or heavy vibration.

Data backup

It is possible for data in internal memory to be lost as a result of inappropriate operation or other reasons. We recommend that you keep backups of important voice, multi, system, sequencer, sample, MDR data on a floppy disk or memory card (MCD64). It is also possible for the data in a floppy disk or memory card to be lost as a result of static electricity, magnetic fields, or other causes. For very important data it is always a good idea to make double backups.

Multi Play mode

If many multi-element voices are played simultaneously when in Multi Play mode, note timing may sometimes be slightly delayed. In such cases, select voices that use fewer elements, or reduce the number of notes.

Backup battery

The SY99 contains a backup battery which preserves settings such as for voice and multi data when the power is turned off. The life of this battery is approximately 5 years. However depending on the date of purchase, battery life may be shorter than this.

If the backup battery runs low, a message "Change internal Battery!" will appear in the display when the power is turned on. If the backup battery runs down completely, the voice and multi data will be lost, so when this display appears, immediately store your data to a floppy disk or memory card and contact the dealer where you purchased the SY99 or your nearby Yamaha service center to have the battery replaced. Again, when the battery is replaced, all internal voice data, multi data, and data contained in the MDR/sample RAM area will be lost. Be sure to save the data to a floppy disk or memory card before having the battery replaced.

Third-party Software

Yamaha can not take any responsibility for software produced for this product by third-party manufacturers. Please direct any questions or comments about such software to the manufacturer or their agents.

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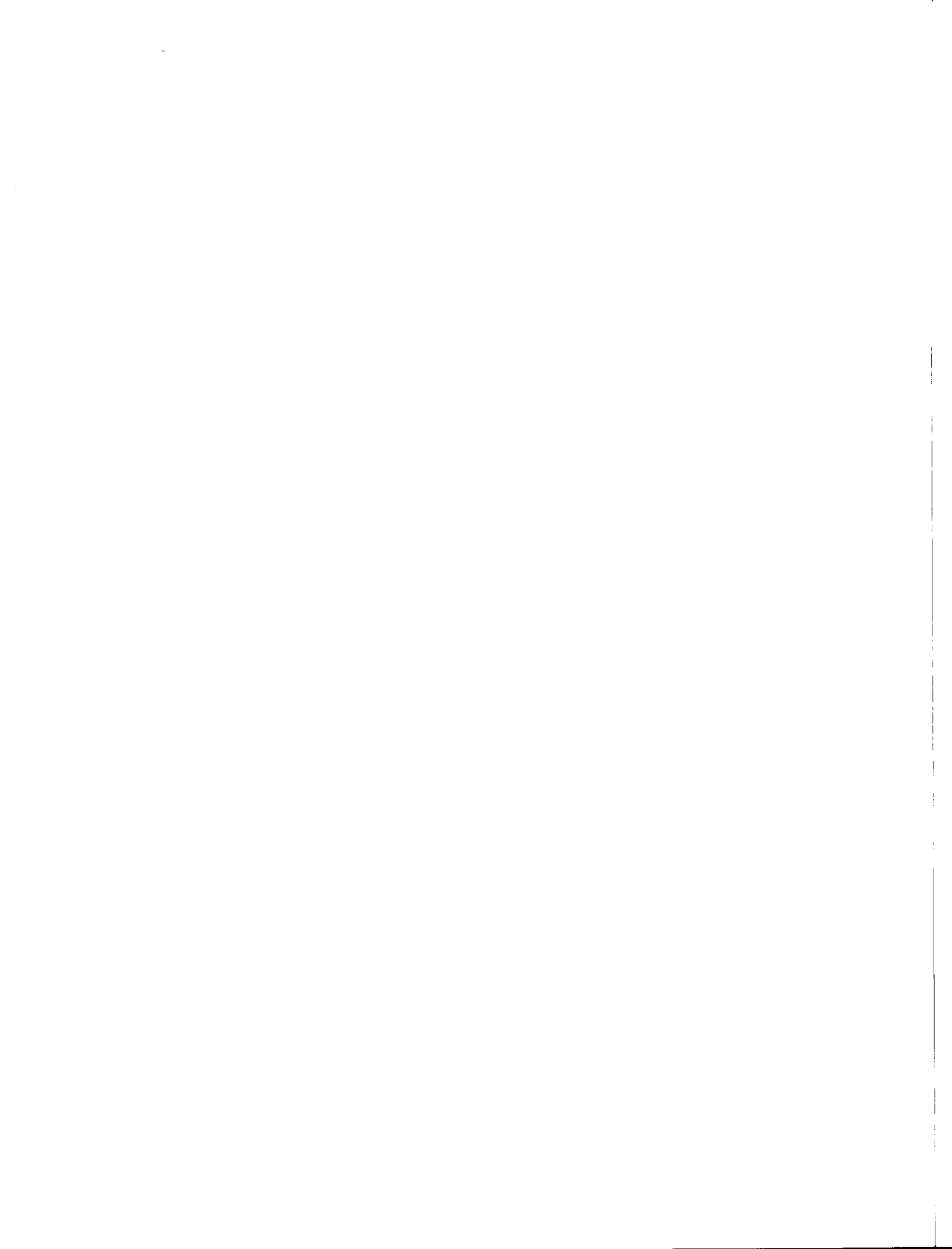
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INTRODUCTORY SECTION



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INTRODUCING THE SY99

This section will tell you how to play the sounds, introduce you to the main features of the SY99, and explain basic operation.

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How to set up and play

The first thing you will probably want to do is play the voices (sounds) of your new SY99. Here's how to select and play the SY99's voices:

Connections

Make sure that your amp/speaker system and the SY99 are switched off. Connect the rear panel output OUTPUT 1/1+2 jacks (L/MONO and R) to the inputs of your amp/speaker system. Or, if you are using a set of stereo headphones, plug them into the rear panel PHONES jack.

Turn the power on

Turn down the SY99's two VOLUME sliders marked OUTPUT 1 and 2, located at the far left. Then turn the power on by pressing the POWER switch located on the rear panel to your right. After displaying a greeting message for about two seconds, a display similar to the following should appear. If the SY99 was in Voice Play mode when the power was last turned off, the upper left of the LCD will read "VOICE".

```
VOICE=P1-A01(01)      Trans.Ch= 1 4000
  AP|Rocks             1AFM01AWM
PARALLEL  EFF1:EQ -> St.Chorus
          EFF2:Rev. Stage 1
Send      Mstr Ctrl Dir
```

If the upper line of the display does not show VOICE then press the VOICE button located at the upper left of the front panel.

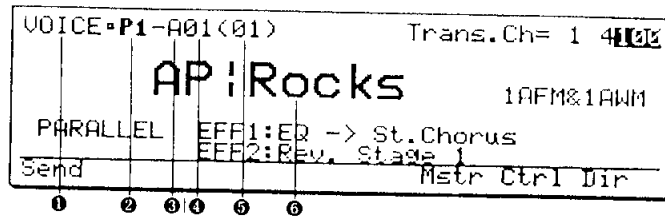
Make sure that the volume of your amp/speaker system is turned down, and turn its power on. Set the volume of your amp/speaker system to an appropriate level, and gradually raise the SY99's OUTPUT 1 and 2 sliders while playing the keyboard. If you don't hear anything, re-check the connections, and make sure that your amp/speaker system is functioning correctly.

How to select and play voices

What you hear when you play the keyboard is defined as a voice. The SY99 has 128 voices that are preset in permanent memory, and 64 others stored in editable internal memory. The 64 internal memory locations can also be used to store your own original voices or voices loaded from a card or disk (the 64 voices originally stored in the internal memory are also provided on disk and can be reloaded if erased*). An optional RAM or ROM card can be inserted into the VOICE card slot to provide 64 more voices.

The preset voices are organized into two locations, PRESET 1 and PRESET 2.

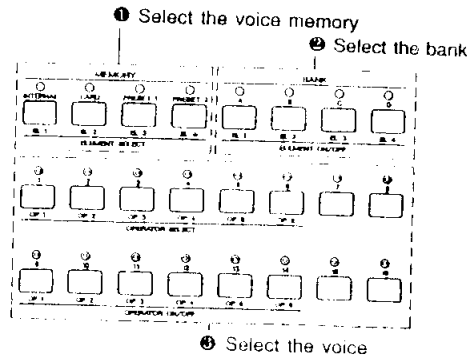
* *The original internal voices can be re-loaded by loading the file named "INTVOICE" from the "Chuck Corea" demo disk. Use the load procedure described on page 6, selecting "02:Synth all" instead of "01:All data" in step 4. Each of these has four banks (A-D) with 16 voices in each. The LCD shows the ten-character voice name, and also tells you which memory the voice is from. The number in parentheses indicates what number the voice would be if you started counting from the beginning of the bank.*



- ① This indicates that you are in Voice Play mode.
- ② Memory PRESET 1.
- ③ Bank A.
- ④ Voice number "1" of 16 in bank A.
- ⑤ Voice number "1" of 64 in Preset 1.
- ⑥ The voice name is "AP:Rocks".

You will learn about the other parts of the display later. For now, here's how to select voices:

1. Select the voice memory: INTERNAL, CARD (only if a card is inserted into the DATA slot), PRESET 1, or PRESET 2. The selected LED will light.
2. Select a bank A, B, C, or D. The selected LED will flash.
3. Select a voice 1–16. The selected LED will light, and the LCD display will show the newly selected voice name.



Notice that the voice does not actually change until you specify the number 1–16. If you want to play a different voice in the same bank, simply specify a different number 1–16. There's no need to re-select the voice memory and the bank each time.

Go ahead and try out each of the preset and internal voices. When you are ready to learn more about the SY99, continue reading.

PRESET 1 (64 voices)

#	Bank A	Bank B	Bank C	Bank D
1	AP:Rocks	SP:Alaska	BR:TrmpSec	ST*Concert
2	AP:CrsRock	SP:SawPad	BR:BigBand	ST*Chestra
3	AP:Concert	SP:Square	BR:JazzTmp	BR*Spitz
4	AP:StgLayr	SP:Elegant	BR: MuteTmp	ME*BigNeck
5	EP:76Stage	SP:DigiPad	BR:FrHorns	PC:Snapper
6	EP:Classic	SP:Lashed	BR:DrkHorn	PC:Marimba
7	EP:NiteHwk	SP:Sweeper	BR:Azen 16	PC: Vibes
8	EP:Belrose	SP:Flash	BR:DaBurbs	PC:MusicBx
9	EP:BelRng	SP:HrpsiPd	BR:Splatz	PC:Tahiti
10	EP:Dxism	SP: Skylane	BR:Pumped	PC:Cloche
11	EP:GrnDual	SP:Arpeggi	BR:StgLayr	PC:Balan
12	EP:VoxLayr	SP:Vecktar	ST:Octaves	PC:Berim
13	KY:Smokey	SP:Crystal	ST:ChorAna	SE:Slither
14	KY:CrsClav	SP:Twinks	ST:Rosin	DR Kits
15	KY:Clavint	SP:Polydor	ST:Quartz	DR Perc
16	KY:ResoClv	SP:WarmJet	ST:Pizza	DR Mixed

PRESET 2 (64 voices)

#	Bank A	Bank B	Bank C	Bank D
1	SC:Heretic	PL:Steel6	BA:Picked	WN:Tenor
2	SC:AeroPno	PL:JazzGtr	BA:Slapped	WN:SaxSect
3	SC:Jupiter	PL:Nylon6	BA:Fingers	WN:Aito
4	SC:RezWhap	PL:112Strng	BA: Fretles	WN:Soprano
5	SC:Plectar	PL: Eko12St	BA: Classic	WN:Clarine
6	SC:Quatar	PL:Echoes6	BA:Upright	WN:PanPipe
7	SC:IPlastiq	PL:Caster	BA:DXSlap	ME*Phantom
8	SC:ITanjeln	PL:SlolLead	BA: Anabass	ME:5thsMan
9	SC:Gizmo	PL:RockAT	BA:ResoSyn	ME*Emperor
10	SC:Healing	SL:SawLead	BA:FatSyn	ME:SlolLoop
11	SC:Angelic	SL: EchoSaw	BA:Imogue	ME*Asia
12	CH:Glasine	SL:Duke	OR:BJazzy	ME:Dreams
13	CH:Itopian	SL:ISync	OR:BookerB	ME:Galaxy
14	CH: Vespers	SL:Square	OR:IDeep	ME:Ilis
15	CH:Nebula	SL: PulseWM	OR:IPurple	ME:IZoZoid
16	CH:Witches	SL:Lyle	OR:BSilica	ME*Thusian

See page 297 for internal voice list.

How to load and play the disk demo songs

The disk included with the SY99 contains demo songs which take advantage of its capabilities. Here's how to load and play the songs:

CAUTION

If the internal memory contains data you wish to keep, be sure to save it before loading the demo.

Load the demo song data from disk

1. Insert one of the demo disk into the disk drive, with the shutter going in first and the label facing up. Push it gently in until it clicks into position.
2. Press UTILITY, and then press F4 (Disk) to get the following display. (If you have been editing voice or multi data, the top line of the LCD will blink "AUTO-STORE". For details on Auto-Store, refer to page 74.)

```
UTILITY (DISK SAVE TYPE=SY99) 816
Disk Utility
01:Disk Status 05:Backup Disk 01
02:Load From Disk 06:Rename File
03:Save To Disk 07>Delete File
04:Format Disk 08:Disk Save Type
Sys MIDI Card Disk Smp1 MDR Mstr 5
```

3. Press ∇ once to move the cursor to 02:Load From Disk, and press ENTER to get the following display.

```
LOAD FROM DISK 817
01:All Data 06:Pan 11:1 Voice 01
02:Synth All 07:Mon Tuning 12:1 Multi
03:Seq All 08:Seq Setup 13:1 Song
04:Syn Setup 09:Song & Ptn 14:Card
05:Uc & Mlt 10:Other seq
```

4. With the cursor located at 01:All Data, press ENTER to get a display like the following. (The filename may be different.)

```
LOAD FROM DISK
Data Type = All Data
01:SEQUENCE 06: ----- 01
02: ----- 07: -----
03: ----- 08: -----
04: ----- 09: -----
05: ----- 10: -----
▲ ▼ Go
```

5. Press F8 (Go). The display will ask "Are you sure". Press YES if you are sure you want to load the data from disk. Loading data from disk will erase any data which was previously held in the SY99's sequencer and internal voice and MDR/Sample memories.
6. While the data is being read from disk, the bottom line of the LCD will show "Now executing".

7. When the data is loaded, the SONG LED will light red, and a display like the following will appear. Press RUN to begin the playback.

```
SONG PLAY           [SONG01 Patricia]
Measure=001 Time= 1/4  J=120 Used= 76%
Next Song = 02      Click      =rec
Next Mode =play     Click Beat=1/4
PRG Select= on     SWnc      =internal
Mute          Job1 Job2 Stup T-Ch Name Dir
```

To listen to the demo songs contained in another demo disk, repeat the above procedure.

Note:

The voices contained in the SY99's internal memory are replaced by other data when you load data from either of the demo song files. You can restore the internal voices by loading the file named "INTVOICE" from the "Chick Corea" demo disk. To do this, use the load procedure described above, selecting 02:Synth all instead of 01:All data in Step 4.

How to record a song

The SY99 can function as 16 independent synthesizers, and also contains a built-in 16 track sequencer. This allows you to create sixteen-part compositions without using any other equipment. This section will explain the simplest way to record a multi-part song.

Clear the sequencer memory

1. Turn the SY99 power off, and all data in the sequencer memory will be cleared.

Select a Multi

In multi mode the SY99 can function as 16 independent synthesizers. The multi settings determine which voices are used.

2. Press MULTI to enter multi mode. The MULTI LED will light red and a display similar to the following will appear.

```
MULTI=I-01                      Trans.Ch= 1 300
Popular Tune
PARALLEL  EFF1:Rev. Hall
Send      EFF2:EQ -> Rev 2      Mstr      Dir
```

3. Press PRESET 1, then press a memory select button 1–16 to select one of the 16 preset Multis. A table of the preset Multis is given on page 299.

Prepare for recording

4. Press SONG. The SONG LED will light red.
5. Press RECORD to get the following display.

```
SONG RECORD [SONG01 Leroy  ]
Measure=001 Time= 4/4  ]=100 Used= 9%
Quantize =1/16      Click =rec
Receive Ch=kbd      Click Beat=1/4
Sync =internal
Real Step Pnch Over RPlc
```

Record the first track

6. Press a program select key to select the track you wish to record. With the default settings, the tracks of the sequencer will transmit on the channel of the corresponding number, and will be played by the corresponding channel of the multi you have selected. For example if you have selected Multi 01 Popular Tune and wish to record the Picked Bass part, press 2. If you select a channel for which the multi does not use a voice, there will be no sound.
7. Press RUN. After a two-measure countdown, recording will begin. Play along with the metronome to record the part. When you are finished, press STOP. Press \leftarrow to return to measure 1.

Record additional tracks

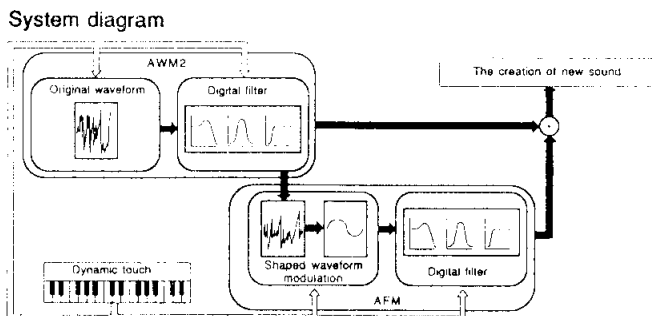
8. As desired, repeat steps 5, 6 and 7 to select and record additional tracks.

Note:

A more complete explanation of using the SY99 sequencer is given in the following section How to use the sequencer, which explains how to set up your own Multi, create rhythm patterns, arrange the rhythm patterns in track 16 (the pattern track), record additional tracks, edit the song, name it, and save the finished song to disk. Refer to page 48 for details regarding the save procedure..

About the SY99: RCM hybrid synthesis

The SY99's RCM hybrid tone generation system fuses the realism of digital samples with the expressive power of FM. It uses Advanced Wave Memory 2 (AWM2) and Advanced Frequency Modulation (AFM) in conjunction with digital filters to allow a wide variety of sound creation techniques.



Advanced Wave Memory 2 (AWM2)

AWM2 uses 16 bit linear sample reproduction with proprietary Yamaha convolution technology (digital filtering) that allows you to emphasize or cut any desired portion of the frequency spectrum with full realtime control.

Advanced Frequency Modulation (AFM)

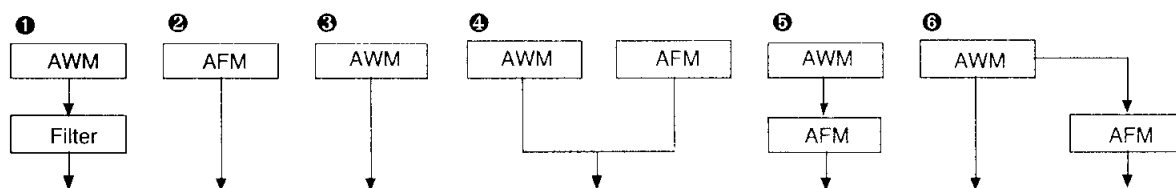
In addition to advancing beyond the FM synthesis capabilities of the DX7 and previous Yamaha synthesizers, AFM allows you to filter and envelope any AWM waveform and use the shaped waveform as part of an FM algorithm to apply frequency modulation, creating partials that were not present in the original AWM waveform. This modulated waveform can be processed by additional digital filtering.

Dynamic touch and control

One of the greatest advantages of RCM hybrid tone generation is that it fuses the realism of digital sampling with the expressive power of FM. Keyboard dynamics and controllers can be used to control nearly any aspect of the sound, allowing great musical expressiveness.

The possibilities of RCM hybrid synthesis

The SY99 allows a wide variety of synthesis techniques to be used, and digital filtering is always provided for each AFM or AWM element. The following diagrams show how the RCM hybrid synthesis system can simulate many of the analog and digital synthesizers of the past.



- Filter style "analog" synthesis: Single cycle AWM waveforms can be enveloped and filtered to simulate analog synthesizers. (Various sawtooth and pulse waves are provided, and the SY99's filters can be configured as 24dB/octave filters with resonance adjustable into oscillation.)

- ② Traditional FM: The AFM tone generator can be used alone to produce any sound that the DX series was capable of, and much more.
- ③ AWM sample playback: The AWM tone generator can be used to play back high quality digital samples from internal AWM memory or an optional waveform card.
- ④ AWM sample playback mixed with FM: The sounds of the AWM and AFM tone generators can be layered.
- ⑤ FM modulated by AWM: AWM digital samples can be used to modulate one or more operators in an FM algorithm, for very complex FM sounds.
- ⑥ AWM sample playback + FM modulated by AWM: In a variation of ⑤, the original sound of the AWM sample can be mixed with the complex AFM sound.

For techniques which use both AWM and AFM (④ ⑤ ⑥) there are two additional possibilities.

- Both AFM and AWM can be used to create sustaining sounds.
- The AFM and AWM tone generators can be used to create different components of the sound, with short transient AWM waveforms used to create an attack and the AFM tone generator used to create the sustain component of the sound (or vice versa).

Since each voice can use one, two, or four AFM or AWM elements, these synthesis strategies can be combined in complex ways.

About the SY99: AFM and AWM voices

The SY99 produces sound using two proprietary Yamaha technologies; Advanced Frequency Modulation (AFM) synthesis and Advanced Wave Memory 2 (AWM2). A special Drum Voice assigns a different AWM percussion sound to each note of the keyboard.

AFM — Advanced Frequency Modulation

Frequency Modulation (FM) is a patented Yamaha technology for producing complex and controllable musical sounds, and was first made famous by the DX7 synthesizer. The SY99's Advanced FM (AFM) takes FM synthesis to new levels of realism, expression, and programmability.

Each of the six FM operators in the SY99 can use one of 16 different waveforms, and be connected to each other in 45 basic algorithms (patterns). In addition, each operator has two inputs which can be modulated by feedback from any other operator, from a noise generator, or from an AWM sample. Compared to previous FM instruments, many parameters have a wider range of control, and the SY99 envelope generators have six segments with looping.

AFM can produce sounds that change dramatically in response to your playing, allowing a wide range of expressiveness.

AWM2 — Advanced Wave Memory 2

Advanced Wave Memory 2 (AWM2) is a patented Yamaha technology for storing and reproducing digital sound. The SY99 contains 4 Mwords (8 Mbytes) of AWM samples in Read Only Memory (ROM), including piano, strings, choir, and percussive sounds among many others. Optional cards can be inserted into the front panel WAVEFORM slot to make additional sounds available. The sounds are sampled in 16-bit linear format with a maximum sampling frequency of 48 kHz.

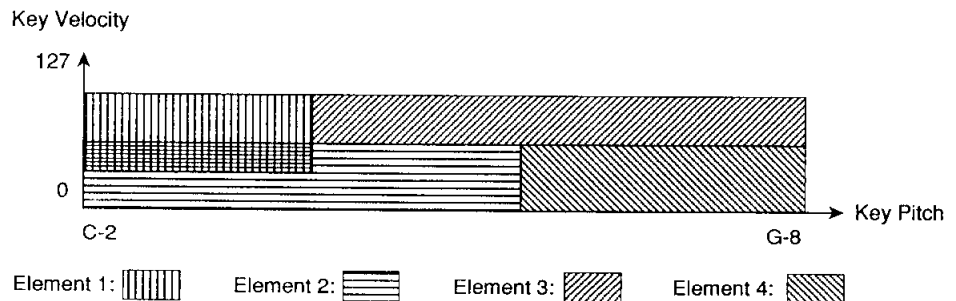
In addition to the AWM samples in ROM and in optional WAVEFORM cards, you can load samples into the SY99 from any sampler that supports the MIDI sample dump standard, or from a disk created by the Yamaha TX16W sampler. These samples can be assigned across the keyboard to create a *waveform*, which can then be used in the same way as preset or card waveform data.

AWM sounds are high-quality digital recordings of actual instruments.

A voice consists of one, two, or four Elements

Each sound that you have been playing from the SY99's keyboard is defined as a voice, and consists of one, two, or four elements. (The drum voice explained below is a special case.) Each of these elements is actually the equivalent of an independent synthesizer; either AFM or AWM.

An element can be set to produce sound for only a specific range of the keyboard, or for a specific range of velocities. This allows you to create a voice which produces different sounds for different ranges of the keyboard, or for loudly or softly played notes.



The one, two, or four elements in a voice can produce many types of keyboard split and layer effects.

On earlier Yamaha synthesizers such as the DX7-II, layers and splits were created by combining two or more Voices into a "Performance". This meant that sometimes you played Voices and other times you played Performances. However on the SY99, layers and splits can be included in a voice, so you can simply select a voice and play without considering whether it contains layers or splits.

Two realtime digital filters for each element

Each AFM or AWM element in a voice includes two 12 dB/octave realtime digital filters, each filter independently controlled by its own envelope generator (EG). One filter is fixed as a Low Pass Filter (LPF) and the other filter can be used either as a LPF or a High Pass Filter (HPF). This allows you to use the two in conjunction to create a 12 dB/octave Band Pass Filter (BPF) or a 24 dB/octave LPF. Veterans of analog synthesizers will be happy to hear that the filter resonance (or "Q") can be adjusted all the way into filter oscillation.

Since a voice can consist of one, two, or four elements, a single voice can use 2, 4 or 8 independent filters.

AFM x AWM x Filtering = the SY99

The SY99 can utilize most of the programming techniques of previous synthesizers; FM, sample playback, and realtime filtering. This means that the SY99 can produce the sounds of the classic 24 dB/octave analog synthesizers of the past, the FM sounds of the DX series, the sampled sounds of many of today's instruments ... and also sounds that have never been heard before.

Play up to 16 AFM notes and 16 AWM notes at once

The SY99 contains two tone generators; an AFM tone generator and an AWM tone generator. The AFM tone generator can produce up to 16 simultaneous notes of FM sound, and the AWM tone generator can produce up to 16 simultaneous notes of digitally sampled sound.

Some voices consist of only one element, some of two elements, and others of four elements. (The Voice mode setting inside each voice determines how many elements are used.) The important thing to remember is that up to a total of 16 notes of AFM sound and 16 notes of AWM sound can be sounding at any time. If a voice plays two or more elements for a single key, the sound will be more complex and richer, but you will be able to play fewer simultaneous notes.

A Drum voice consists of 76 percussive sounds

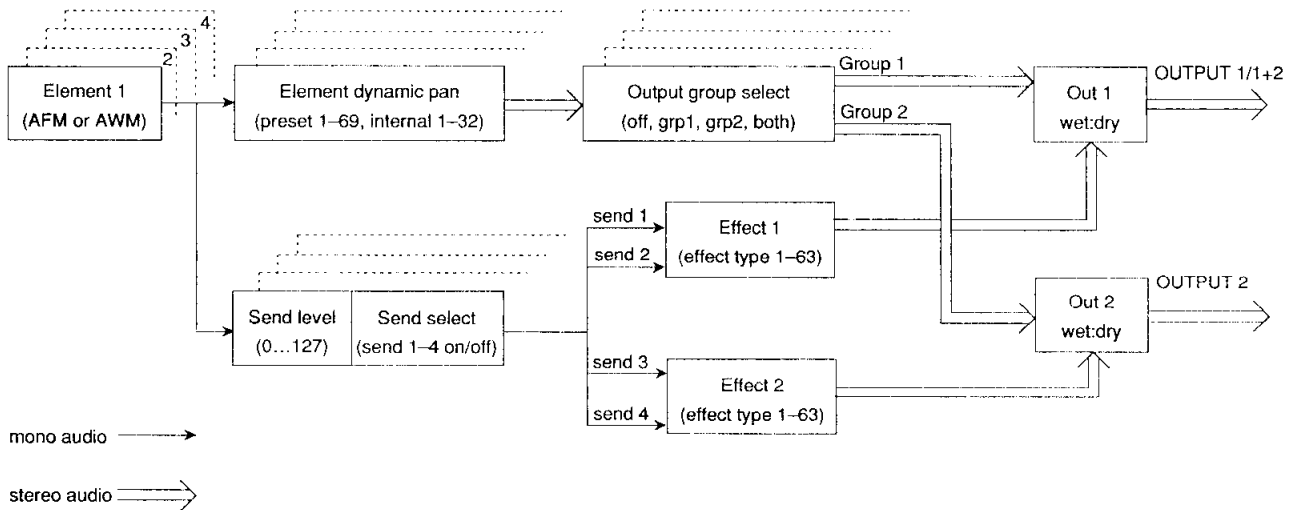
In addition to the "normal" voices explained above which consist of one, two, or four elements, the SY99 provides a special type of voice; the Drum voice. A drum voice has no elements, but consists of a different AWM sample for each of the 76 keys of the SY99 keyboard.

A drum voice can be played from the keyboard just like a normal voice. Usually you will use a sequencer to play a drum voice, providing drums and percussion accompaniment. Either the SY99's internal sequencer or an external MIDI sequencer can be used to play a drum voice.

There is no distinction between normal voice memory and drum voice memory; either type of voice can be stored in any of the voice memories.

About the SY99: pan, effects, and output

Each of the one, two, or four elements in a voice has two independent digital filters, and is sent through its own pan table. The SY99 also has two built-in digital signal processing (DSP) effect systems which can be controlled in realtime, and effect settings are stored as part of each voice.



Dynamic pan table for each element

Each element in a normal voice is sent through a dynamic pan table (64 preset and 32 user pan tables are provided) that determines how the sound will move between the left and right outputs. Each pan table has its own EG, and also allows you to select a pan source (velocity, key note number, or LFO). Another controller can be assigned to further bias the panning movement.

Each of the 76 notes in a drum voice can be panned to a fixed position.

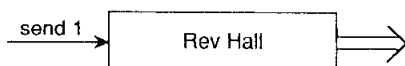
Two DSP effect units

The SY99 contains two high quality DSP effect units. Each effect unit can produce 63 different effects, including reverb, delay, tone control, distortion, rotary speaker, and ring modulator.

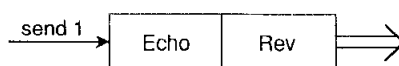
Effect types 1-29 are *single* effects, in which the effect unit creates only one effect. Effect types 29-51 are *cascade* type effects, in which the effect unit functions as two independent units connected in series. Effect types 52-63 are *dual* type effects, in which the effect unit functions as two independent units connected in parallel.

Each effect type has up to 10 parameters which you can adjust.

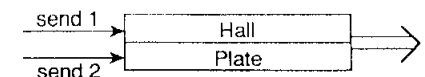
Effect type = 1-29 (single type)
ex., 1. Rev Hall



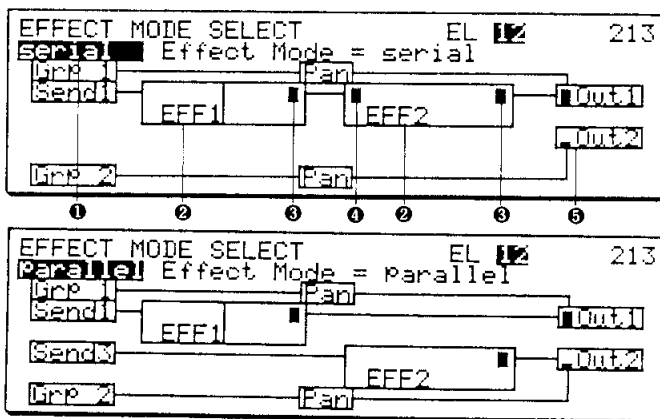
Effect type = 30-51 (cascade type)
ex., 29. Echo→Rev



Effect type = 52-63 (dual type)
ex., 51. Hall&Plate



These two effect units can be arranged in either *serial* or *parallel* mode. (The diagram at the beginning of this section shows the effect units arranged in *parallel* mode.)



Depending on the effect type (single, cascade, or dual), each effect unit is driven by either one or two effect sends. Depending on the effect mode (serial or parallel), the two effect units will be driven by a total of 1–4 effect sends. Each of the one, two, or four elements in a normal voice (and each of the 76 AWM sounds in a drum voice) has its own effect send level adjustment for each of the four effect sends. Velocity and keyboard scaling can also be made to affect the effect send level, for example allowing you to apply a greater amount of reverb (or other effect) for loudly (or softly) played notes, or for high or low notes. This allows you to apply effects to a voice with great precision.

In addition, you can specify any two parameters of the two effect units to be controlled from two assigned control sources (control change messages, after-touch, velocity, key scaling, or the effect LFO).

All effect settings are stored as part of each voice.

Two output groups

The stereo output from the dynamic pan table of each element can be sent to either or both of the two output groups, where it is mixed with the stereo output from each effect unit. The output level of each effect and the “wet:dry” balance for each output group can be set independently.

The final mix is sent from the two stereo pairs of rear panel jacks OUTPUT 1/1+2 and OUTPUT 2.

About the SY99: multi-timbral sequencing

In Multi mode, the SY99 acts as 16 synthesizers, each able to be controlled independently and produce its own sound. The SY99's built-in 16-track sequencer records and plays back musical data. Each track 1-15 contains an independent musical performance; notes, pitch bends, controller movements, and program changes. You can create 99 patterns and place them in track 16 (the pattern track). Using the sequencer together with multi mode lets you use the SY99 to create sixteen-part compositions.

In Multi mode the SY99 is 16 independent synthesizers

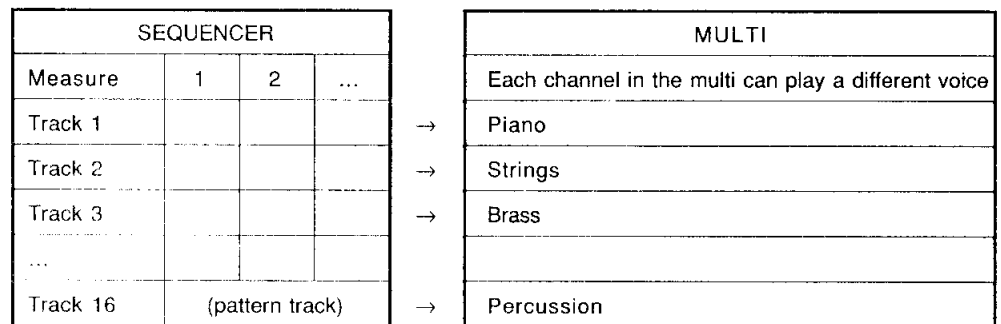
In Voice mode, the SY99 plays a single voice in response to the notes you play and the controllers (wheels, foot pedals, etc.) you move. However in Multi mode, the SY99 acts as 16 completely independent synthesizers, each sounding a different voice and responding independently to notes and controller movements.

Use the sequencer to play a multi

To create multi-part compositions, you will play and record one part at a time using the SY99 sequencer.

A sequencer is a device that records music, but instead of recording the *sound* of a musical performance, a sequencer records the *musical data*; the precise timing of the keys you press, program changes, movements of the sustain pedal, foot controllers, and wheels, etc. When this data is played back, the result is exactly the same as if you were playing the keys and moving the controllers. You can record Tracks (musical parts played by one instrument) one at a time, and then play back all the tracks together.

The SY99 sequencer has 16 tracks, and each track plays the corresponding channel of a Multi. (A multi can also be played by an external sequencer connected to the MIDI IN terminal, and the sequencer can also transmit data from MIDI OUT to control external synthesizers.) For example, you might select a piano voice for channel 1 and record the piano part on track 1, select a strings voice for channel 2 and record the strings part on track 2, and so on for all sixteen tracks and voices.



Three ways to record — realtime, punch-in, and step

The SY99 sequencer lets you record in three ways.

Realtime: In realtime recording, notes and controller movements are recorded with the exact timing that you play them.

Punch-in: Punch-in recording is like realtime recording, except that the data is recorded only for the measures you specify. This is useful for fixing minor mistakes in an otherwise well-recorded track.

Step: Step recording allows you to enter notes and other data one step at a time. This allows you to record complex musical phrases that would be impossible for a human to play, and also can be used to edit individual notes that have already been recorded.

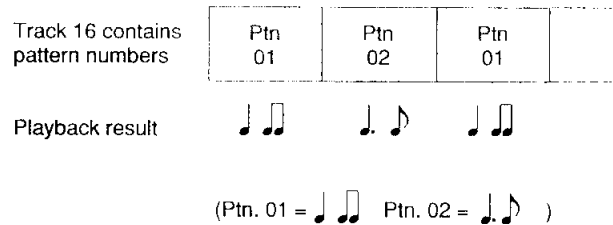
Sequence editing jobs

A wide variety of “sequence editing jobs” are provided to allow you to modify the musical data that has been recorded.

- Tracks can be moved forward or backward in time, mixed, or deleted.
- Measures can be copied, erased, deleted, or created.
- For specified measures you can quantize the data (adjust each note to a specified timing precision), transpose it to a different pitch, adjust the velocity (playing strength), or modify the gate time (note length).

99 Patterns can be used in a song

In Pattern mode you can create up to 99 patterns; short phrases one to thirty-two measures long. Then in Song Edit mode you can edit track 16 (the pattern track), placing pattern numbers and repeat marks to determine which patterns will be played as the song plays back. Patterns are especially suitable for rhythm parts; since the same basic drum pattern may be repeated many times during a song, you can record a single pattern and place it in the pattern track wherever you want it to play back. When song playback reaches that point, the pattern will play back along with tracks 1–15.



Pattern recording — realtime or step

Patterns can be created either by realtime recording or step recording.

Realtime recording: Since patterns are sometimes used for drum and percussion parts, realtime pattern recording has features that make it easy for you to build up complex drum parts. There is no need to play all the rhythm instruments at once. When you record a pattern in realtime, the pattern will continue repeating, and you can add each instrument one by one as the pattern repeats.

Step recording: When step recording a pattern, the LCD will graphically indicate exactly where you are in the pattern. You can move back and forth, entering notes on each subdivision of the beat to build up a pattern of any complexity.

PATTERN RECORD [PATTERN01]			
Measure=01 Time= 4/4 J=120 Used= 0%			
Length	=01	Click	=rec
Quantize	=1/16	Click Beat	=1/4
Receive Ch	=kbd	Sync	=internal
Real	Step	Job	Step Cir

Front panel: left side

In order to understand the rest of this manual and take full advantage of the SY99, you will need to know the names and uses of the controls and other features of the front panel. This page explains the left side of the front panel, including the LCD.

Keyboard:

The 76-note keyboard of the SY99 is sensitive to key-on velocity and to channel aftertouch.

Pitch and modulation wheels:

The PITCH wheel bends the pitch up or down, and is spring-loaded to return to center position. The MODULATION 1 wheel affects the sound as specified by the voice parameters; usually controlling the amount of vibrato or tremolo. The MODULATION 2 wheel also affects the sound as specified by the voice parameters, but is center-detented to help you return it to exactly center position.

Disk drive:

The 3.5" 2DD floppy disk drive can economically store large amounts of the various types of data used by the SY99. The disk drive indicator LED will light when the disk is being read or written. *Never attempt to remove the disk while this LED is lit. Doing so could damage the disk.*

Insert the disk with the label facing up, from the end with the shutter. To remove the disk, press the button at the lower right of the drive.

DATA card slot:

An optional RAM card (MCD64) can be inserted into the DATA slot to store data for the SY99's tone generator.

Waveform card slot:

An optional waveform ROM card can be inserted into the WAVEFORM slot to provide additional AWM sounds.

Volume sliders:

These sliders regulate the output volume from the two pairs of stereo output on the rear panel.

Liquid Crystal Display (LCD):

The 240 x 64 pixel LCD is backlit for readability even in dark locations. Adjust the CONTRAST control on the rear panel to suit your viewing angle.

Mode select keys:

The functions of the SY99 are divided into five modes. Press one of these buttons to select the mode, and the LED above the button will light red to indicate the selected mode.

The SY99's Synthesizer is always in one of two modes; Voice mode or Multi mode. One of the LEDs above these two keys will always be lit (green, if neither Voice nor Multi mode is selected) to indicate which mode the synthesizer is in.

The SY99's Sequencer is always in one of two modes; Song mode or Pattern mode. One of the LEDs above these two keys will always be lit (green, if neither Song nor Pattern mode is selected) to indicate which mode the sequencer is in.

The Utility mode LED is either red (when Utility mode is selected) or off (when a different mode is selected).

Edit/Compare:

Press this button to edit the data of the currently selected Voice, Multi, Sequencer Song, or Sequencer Pattern. In voice edit or multi edit mode, pressing this button allows you to compare the original data with the edited data.

Copy:

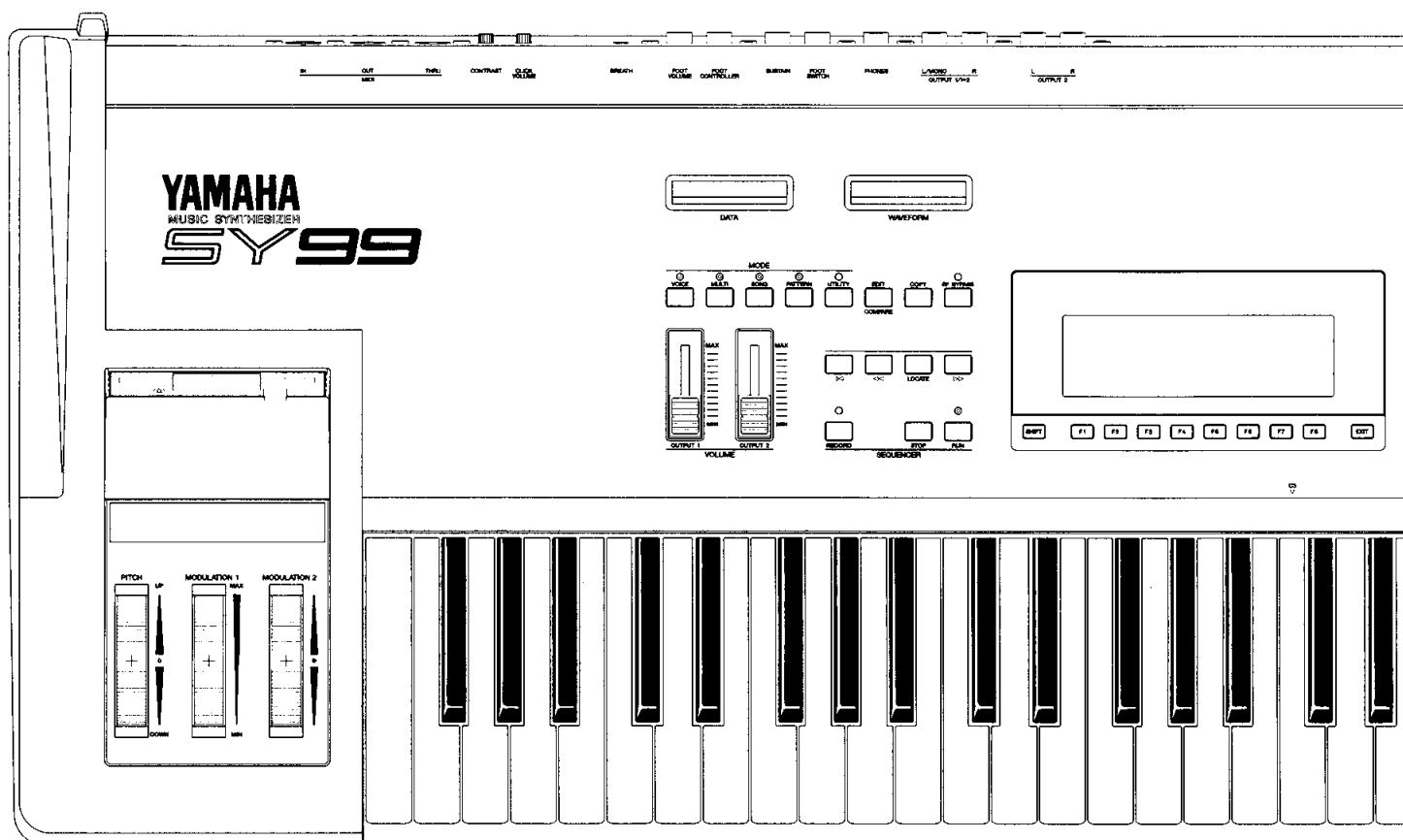
While editing, this button is used to copy various types of data.

Effect Bypass:

At any time, pressing this button will allow you to hear the sound without the DSP effects. The red LED will light to indicate that the effects are bypassed. To defeat effect bypass, press the button again.

Sequencer control:

The SY99 sequencer can be used at any time, even while editing a voice or multi. The data played or recorded will depend on whether the sequencer is in Song or Pattern mode.



- ◀ : Move to the beginning of the song
- ◀◀ : Move back one measure (press and hold to move backward continuously)
- LOCATE : Move to a previously specified location
- ▶▶ : Move forward one measure (press and hold to move forward continuously)
- RECORD : Start recording (during recording, LED lights red)
- STOP : Stop playback or recording
- RUN : Begin playback (blinks green on each beat of the click, and blinks red to indicate the first beat of the measure)

Shift:

While the SHIFT button is held down, the function keys F1–F8 will act as F9–F16. Also, pressing the JUMP key while SHIFT is held down will mark the

current page. Finally, you can press one of the program select keys 1–16 while holding the SHIFT key to change the SY99's transmit channel.

Function keys:

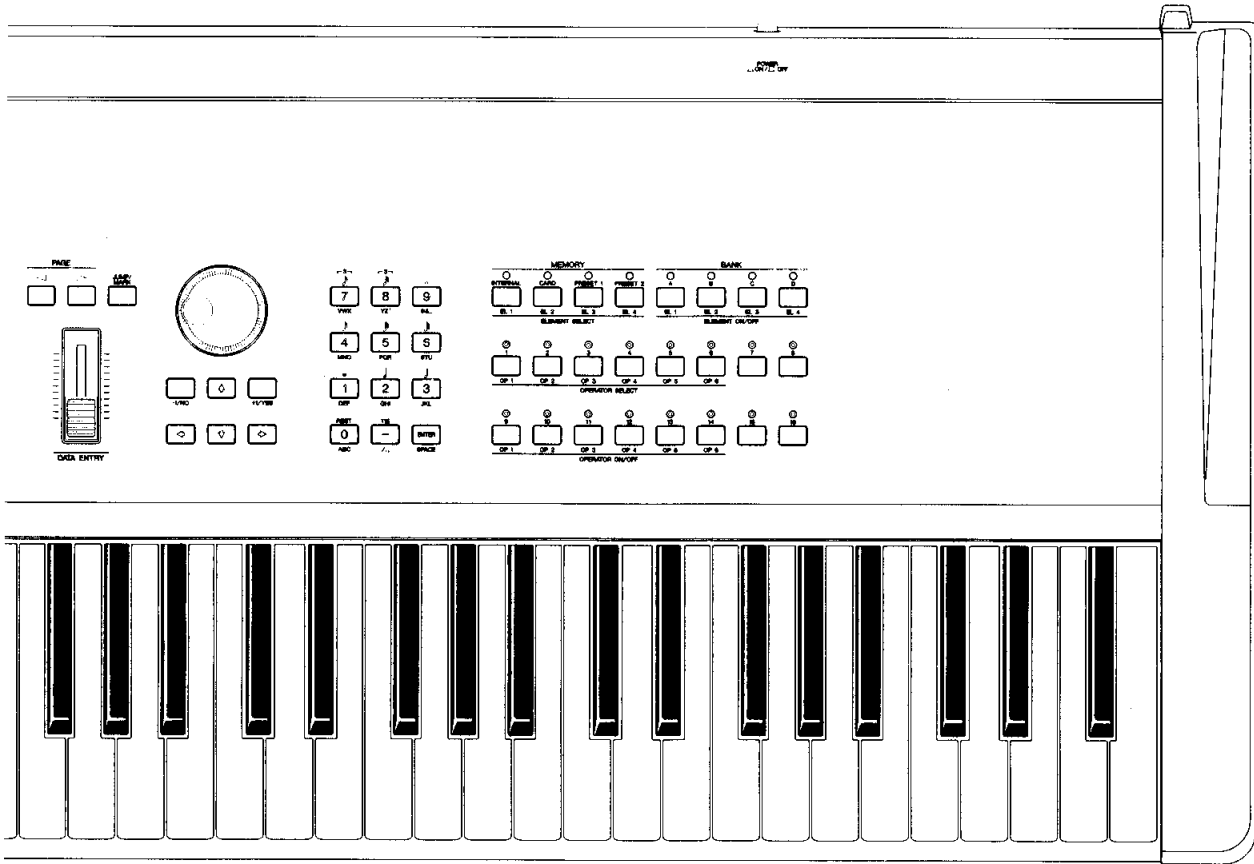
In some jobs, the bottom line of the LCD will display a function for F1–F8 (F9–F16 while the Shift key is held down). These keys are used in various ways, such as selecting menu items shown in the function key display, moving the cursor in the display, or executing a function shown in the function key display.

Exit:

This key moves back to where you last were before entering the level you are now in; i.e., it moves back to the previous branch of the function tree.

Front panel: right side

This page explains the front panel features to the right of the LCD.



Page <D>:

These keys move to the next or previous function within the same level; i.e., they move from branch to branch of the "function tree".

Jump/Mark:

The LCD of each function in the SY99 has a "system page number", which is displayed at the upper right of each LCD. If you know the number of the page to which you want to jump; press JUMP, use the numeric key pad to enter the page number, press ENTER, and you will be taken to the specified page. The page numbers for each function are listed in the REFERENCE section of this manual and on the supplied JOB TABLE card.

You can press MARK while holding SHIFT to mark the current page. A total of five pages can be marked in this manner. To jump to one of these five pages, press JUMP followed by the function key (F1 to F5) which corresponds to the desired page.

Data entry slider, data entry wheel, -1/+1:

The data entry slider, data entry wheel, and -1/+1 keys are all used to modify the data value indicated by the cursor.

When you move the DATA ENTRY slider, the data is directly set to the value corresponding to the slider position.

The data entry wheel can be rotated freely in either direction, and will change the current data value continuously. In job or voice directories it will also move the cursor around the screen.

The -1/+1 buttons will decrease/increase the current data value in steps of one. (These buttons also act as "yes/no" or "on/off" for various functions.)

The data entry wheel and -1/+1 buttons can also be used to select programs (voice or multi).

The slider, wheel, and -1/+1 will not necessarily act in the same way for all functions. Exceptions will be noted when each function is explained.

Cursor keys:

Use these keys to move the cursor in the LCD to select items or data. (Simply moving the cursor will not modify the data.)

Numeric key pad:

Use these keys to enter data as an absolute number.

- to select a voice or multi

- after pressing JUMP to specify the page to which you want to jump
- to directly enter a value for the data indicated by the cursor
- to directly select an item from a directory

When step recording sequencer data, the numeric key pad is used to enter the note values printed above each key. When specifying a voice name etc., the numeric key pad enters the characters printed below each key.

In general to enter a value, use keys 0-9 to specify the value, press +/- to change the sign if necessary, and press ENTER. In some cases, ENTER is not necessary.

Memory source select:

When selecting a memory, press one of these buttons to select the source; INTERNAL (internal user memory), CARD (card memory), and PRESET 1 or 2 (internal ROM preset data). The LED above each button will light to indicate the selected memory.

When in Voice Edit mode, these buttons are also used to directly select elements 1-4.

Bank select:

When selecting a Voice program, press one of these buttons to select the bank; A-D. The LED above each button will light to indicate the selected bank.

When in Voice Edit mode, these buttons are also used to turn elements 1-4 on/off.

Program select:

These keys are normally used to select programs (voice or multi). The selected button will light red. In addition, they have the following special uses.

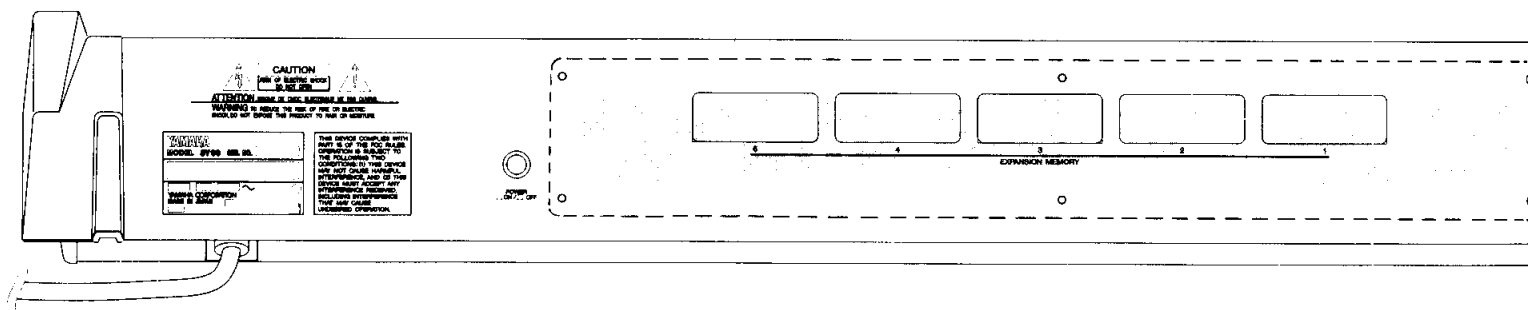
Voice edit mode: While you are editing an AFM element, buttons 1-6 select operators 1-6, and buttons 9-14 turn operators 1-6 on/off.

Sequencer mode: Buttons 1-16 will mute/unmute tracks 1-16 in the play mode or select tracks for recording in the record mode. The LEDs will light green to indicate tracks which contain data. Muted tracks which contain data will blink green during playback. Tracks selected for recording or editing will light red.

At any time, you can hold SHIFT and press a program select button 1-16 to select the channel on which the SY99 will transmit MIDI messages. This also determines which channel of a Multi the keyboard will play.

Rear panel

In order to connect the SY99 to other devices (an amp/speaker system, MIDI equipment, footswitches, etc.), you will need to know the names and uses of the various items on the rear panel.



MIDI IN, OUT, THRU:

Any MIDI device (sequencer, keyboard, WX7/11 wind controller, G10 guitar controller, etc.) can be connected to MIDI IN to play the sounds of the SY99.

Data produced by the SY99 keyboard and the SY99 internal sequencer is transmitted from MIDI OUT. By connecting a tone generator module or synthesizer to this terminal, you can play it from the SY99 keyboard.

The data received at MIDI IN is re-transmitted unchanged from MIDI THRU. Another MIDI device connected to this terminal will receive the same MIDI data that the SY99 receives.

Contrast:

This knob adjusts the contrast of the LCD. Adjust it to suit your viewing angle. (At extreme settings the display will not be readable.)

Breath:

By connecting an optional BC1 or BC2 breath controller to this jack, you can expressively control various aspects of a sound by blowing into the breath controller. For example, a voice might be programmed so that the tone or volume changes in response to breath controller signals. (The effect will depend on the breath control sensitivity parameter settings of each voice.)

Click volume:

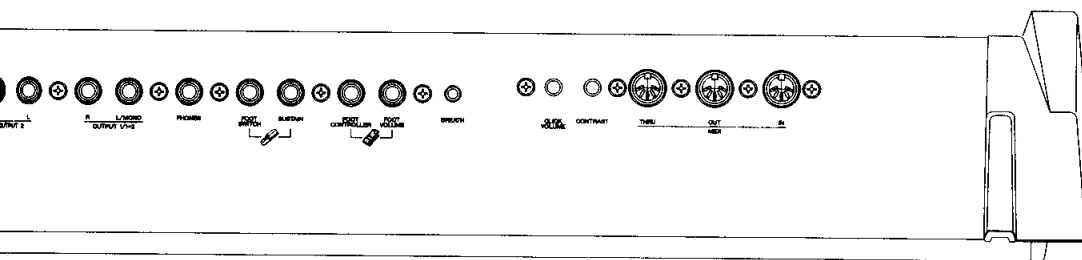
This knob adjusts the volume of the click (metronome) produced by the sequencer.

Foot volume:

An optional foot controller (FC7, FC9, etc.) can be connected here to regulate the overall volume of the SY99.

Foot controller:

An optional foot controller (FC7, FC9, etc.) can be connected here to use in realtime modulation of voice parameters assigned to the foot controller in Voice Edit mode.



- Sustain:** An optional foot switch (FC4, FC5) can be connected here to act as a sustain pedal.
- Foot switch:** An optional foot switch (FC4, FC5, etc.) can be connected here to perform the function (hold on/off, portamento on/off, etc.) determined by the Assignable Foot Switch setting of Utility mode.
- Phones:** A pair of stereo headphones can be connected here to monitor the combined stereo sounds of outputs 1 and 2.
- Output 1/1+2 (L/MONO, R):** If the OUTPUT 2 L/R jacks are not plugged in, these jacks will output the combined stereo signal from output group 1 and group 2. If the OUTPUT 2 L/R jacks are plugged in, these jacks will output the sound from the group 1 stereo output.
If only the L/MONO jack is used, it will carry the combined output of L and R. (Use the L/MONO jack if your mixer/amp system has only one input.)
- Output 2 (L, R):** These jacks output the sound from the group 2 stereo output. If your mixer/amp system has four or more inputs, using both the OUTPUT 1 and the OUTPUT 2 jacks will allow you to treat the two output groups in different ways, perhaps by panning them to different locations, or processing them through different external effect devices.
- Expansion slots:** There are five expansion memory slots behind the YAMAHA SY99 logo plate. You can install optional expansion memory boards (model SYEMB05) in these slots to expand the SY99's MDR/sample memory area to a maximum of 3 Mbytes. For details, refer to *Memory expansion boards* in the appendix (page 325).
- Power switch:** Press to turn the power on or off. The front panel display will light when the power is turned on.
- Power cable:** Plug the power cable into an AC outlet of the correct voltage.

How to move around: job directories

The functions of the SY99 are organized into five main Modes and four editing modes. Some modes have a Job Directory that shows the various jobs (functions) in the mode. Move to the desired function by selecting a job from the job directory.

Five main modes (1)

The SY99 operates in five main modes. Press one of the five mode select buttons to enter the corresponding mode. (A red LED will light to indicate the selected mode.)

Press	to enter	where you can
VOICE	Voice mode	Select and play a Voice.
MULTI	Multi mode	Select and play a Multi.
SONG	Song mode	Playback the song in sequencer memory.
PATTERN	Pattern mode	Select and playback a pattern from sequencer memory.
UTILITY	Utility mode	Make overall settings for the SY99, manage disk and card data, etc.

Play modes and Edit modes (2)

While in voice, multi, song, or pattern mode, press EDIT to move to the corresponding edit mode. For example Voice Edit mode is where you modify the settings that make up a voice, and Song Edit mode is where you modify the data that makes up a song. (There is no "utility edit" mode.)

Press	to enter	then press	where you can
VOICE	Voice mode	EDIT	Voice Edit mode
MULTI	Multi mode	EDIT	Multi Edit mode
SONG	Song mode	EDIT	Song Edit mode
PATTERN	Pattern mode	EDIT	Pattern Edit mode

To leave an edit mode, simply re-select any of the five main modes (or press EXIT from the top level of the edit mode to return to the main mode from which you came).

Select a job from the job directory (3)

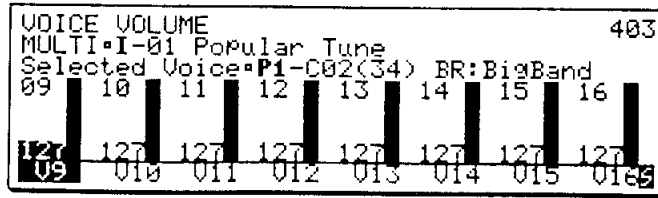
Whenever a mode or function is sub-divided into more than one job, there will be a "job directory" that lists the various items or operations. For example, when you enter Multi Edit mode, the following display will appear.

```

MULTI EDIT                                     400
-I-01 Popular Tune                             01
1:Voice 05:St-Pan 09:----- 13:-----
02:Volume 06:OutSel 10:----- 14:-----
03:Tuning 07:Effect 11:----- 15:Initlz
04:Shift 08:Name 12:----- 16:Recall
01 02 03 04 05 06 07 08 9
    
```

This lists the various parameters that can be adjusted in Multi Edit mode; 1.Voice, 2.Volume, 3.Tuning, etc.

To select an item from a job directory, use the arrow keys to move the cursor to the desired item and press ENTER. For example, if from the above display you press ∇ once to move the cursor to "2.Volume" and press ENTER, the following display will appear.



To return to the job directory, press EXIT.

Function keys (4)

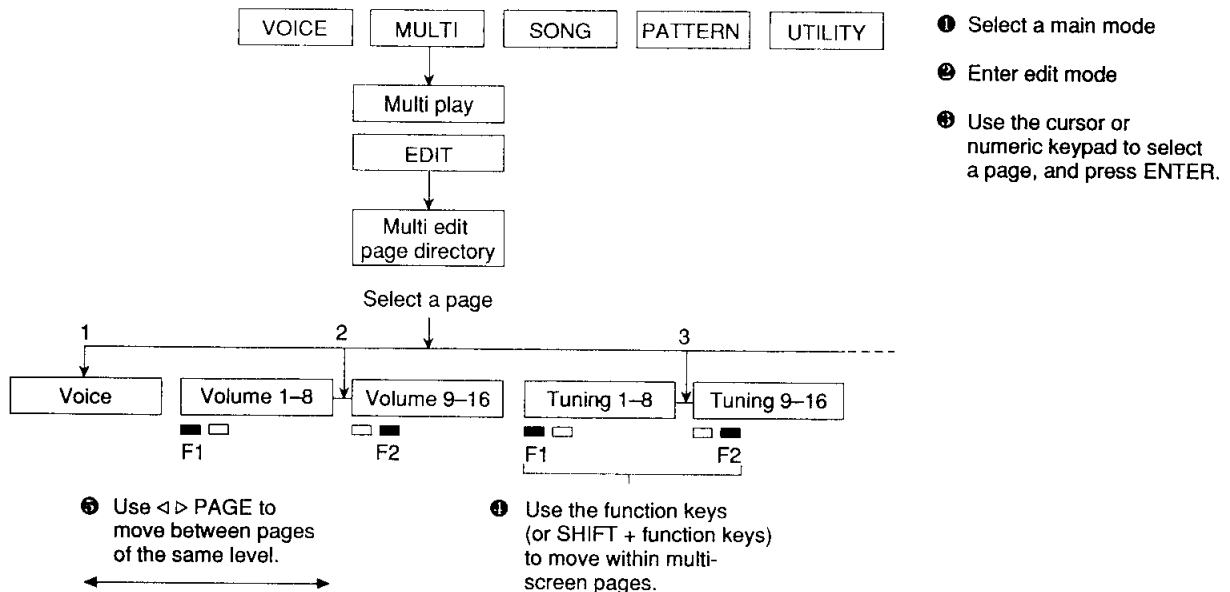
In most screens, you can press the function keys F1–F8 to move the cursor or perform various operations. In the above display for “2.Volume”, pressing F1–F8 will move the cursor to channels 1–8 of the multi

Notice that an inverted “S” is displayed at the bottom right. This means that the function keys will perform additional functions when pressed while holding the SHIFT key. While you press and hold the SHIFT key in this screen, function keys F1 and F2 will switch the screen between channels 1–8 and channels 9–16 of the multi.

Move between jobs using <> (page) (5)

Suppose that you wanted to move from the “2.Volume” job to the “3.Tuning” job. You could press EXIT to return to the job directory, and then press 3 and ENTER to move to “3.Tuning”, but there is a faster way.

To move between jobs of the same level (i.e., inside the same job directory), use the PAGE <> keys. For example if you are now in the “2.Volume” job, pressing PAGE < would take you to the “1.Voice” job, and pressing PAGE > would take you to the “3.Tuning” job. When moving to a nearby job, this is usually faster than returning to the job directory.



How to move around: the jump function

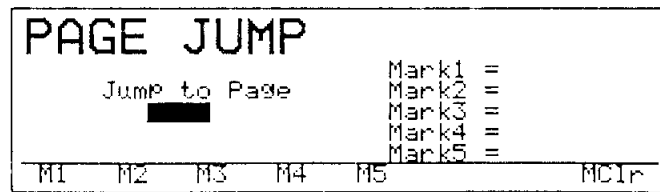
If you already know the exact function you need to use, it is possible to jump directly to a specific page number instead of working your way through the job directories. The jump function also allows you to mark frequently used pages for easy jumping.

Jump to a specified page number

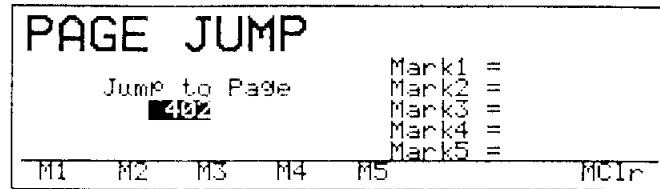
If you need to move to a distant job, it may sometimes be necessary to press EXIT several times, and then move down through two or more job directories. In such cases, it is much faster to jump directly to a specific page.

You may have noticed that most page displays have a unique three-digit number in the upper right corner. This is the Display Page number. For example, "Multi edit 2. Multi Volume" is page #402. If you frequently need to adjust the settings of this page, remember this page number. Then, no matter where you are, you can press JUMP, 4, 0, 2, and ENTER to jump instantly to that page.

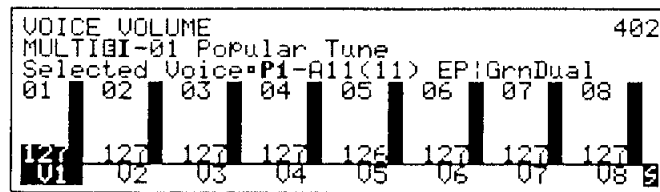
1. Press JUMP.



2. Enter the three digit page number.



3. Press ENTER and you will jump to the specified page.



While you are becoming familiar with the SY99 it will probably be easier for you to select the desired page while viewing a page directory. However as you gain more experience, you may find it convenient to use the JUMP key to go directly to frequently-used pages. The page numbers for each function are listed in the REFERENCE section of this manual and on the supplied JOB TABLE card.

Mark frequently used pages

Practiced programmers may even find the jump function a bit tiresome, since each jump requires five keystrokes. You will be happy to know that there is a solution to this, too: you can mark up to five frequently used pages for easy access with just a couple of keystrokes.

1. To mark a page, press JUMP while holding the SHIFT key down.

```
VOICE•I -A01(01)      Trans.Ch= 1 100
AP!Rocks              1AWM Poly
PARALLEL EFF1:E0 -> St.Chorus
                   EFF2:Rev. Stage 1
Send                 Mstr Ctrl Dir
```

2. The page will be added to the menu of marked pages which appears whenever you press the JUMP key.

```
PAGE JUMP
Jump to Page      Mark1 = 100
  █              Mark2 =
                Mark3 =
                Mark4 =
                Mark5 =
M1 M2 M3 M4 M5 MClr
```

3. To jump to one of the marked pages, simply press the JUMP key followed by the function key corresponding to the page you wish to jump to.

You will notice that newly marked pages are added to the function key menu in sequence, from F1 to F5. Once marked pages have been assigned to each of these five keys, however, new pages are added on a first in/first out basis. This means that whenever a page is marked, it is assigned to function key F5. At the same time, the page that was assigned to F1 becomes unmarked, and the other marked pages (assigned to F2 through F5) shift up to take its place.

You can clear all of the marked pages at once by pressing JUMP followed by F8 (MClr).

Jump and the Auto-Store function

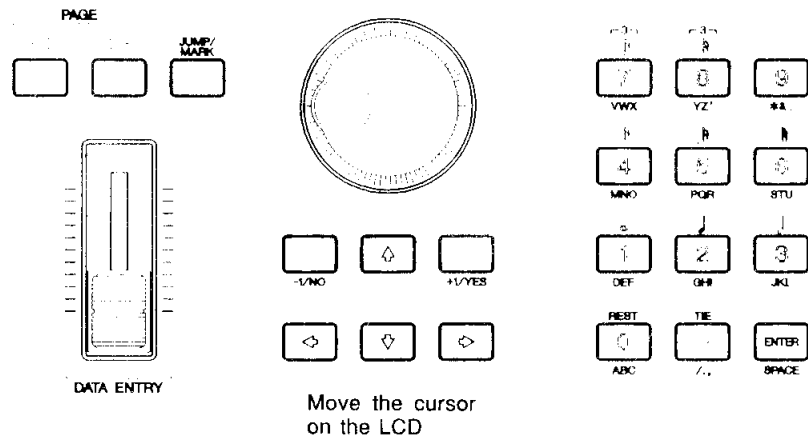
Whenever you leave Multi Edit or Voice Edit mode after modifying the data, whether by pressing EXIT or by using the jump function, the Auto-Store message will appear to ask you whether you want to save your modifications. At this point you must press F6 (Ret) to return to the edit mode, F7 (Quit) to quit without storing the changes, or F8 (Stor) to store the data.

How to enter data

To select a voice, adjust a parameter, or give a name to a newly created setting, you will need to enter various types of data into the SY99. The $-1/+1$ keys, data entry slider, and data entry dial provide various ways to enter data. Use the data entry method that is most appropriate for each situation. (page 30 explains how to use the numeric key pad.)

Select the data to enter

First, use the arrow keys $\triangleleft \triangleright \triangleup \triangleleft$ to move the inverse cursor to the data you want to modify.

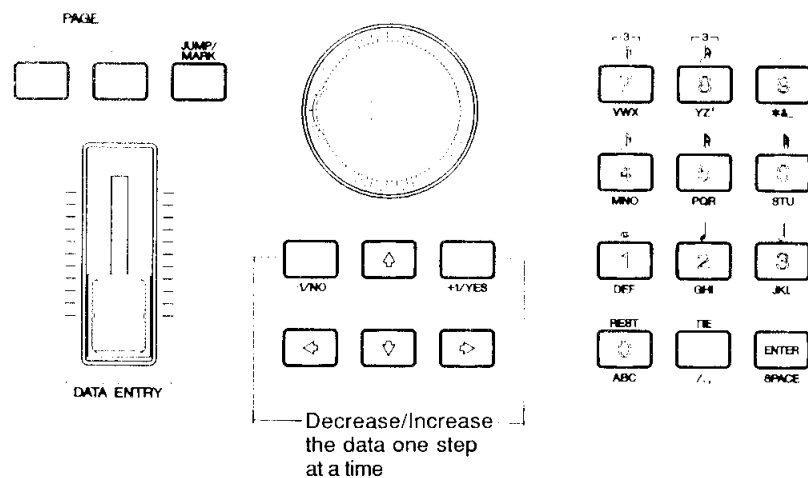


Next you will modify the value using one of the following; $-1/+1$ keys, data entry wheel, data entry slider, or the numeric key pad. The method you use will depend on how you want to modify the data.

$-1/+1$ (no/yes)

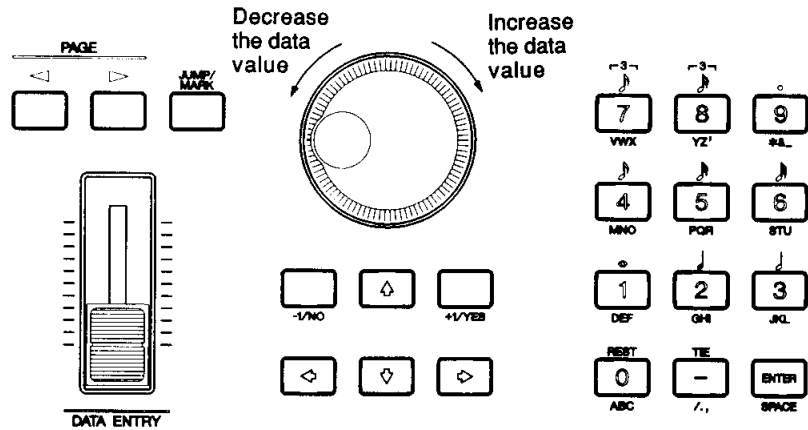
If you want to decrease or increase the existing data value one step at a time, use the $-1/+1$ keys. Each time you press the -1 or $+1$ key, the data will decrease or increase one step. This method allows you to move in precise steps, but can take a long time when you need to make a major change in the value.

Some parameters consist of a "off/on" setting, and sometimes you will be asked to reply "no/yes" to a question (such as "Are you sure?"). In such cases, press -1 to turn something off or to answer "no", and press $+1$ to turn something on or to answer "yes".



Data entry wheel

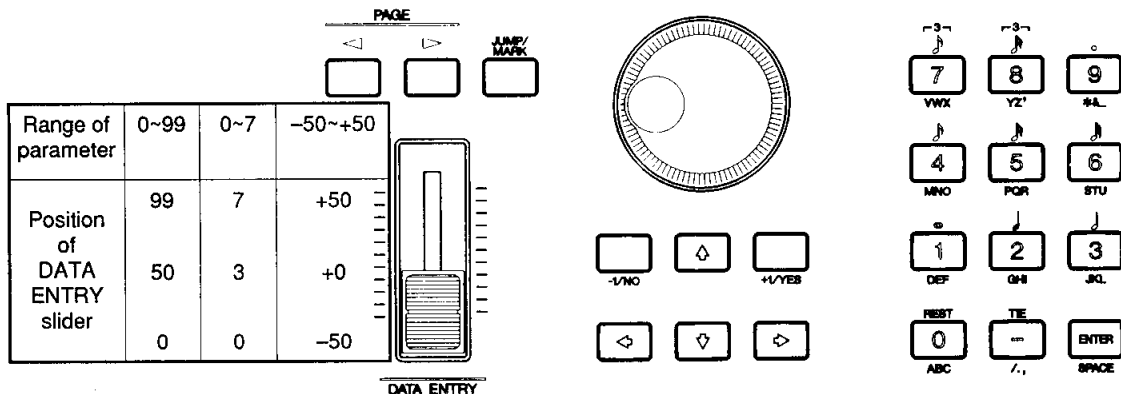
If you want to decrease or increase the existing data value by a significant amount, use the data entry wheel. As you rotate the wheel to the right (clockwise) the data will increase, and as you rotate the wheel to the left (counter-clockwise) the data will decrease. The wheel rotates freely; it modifies the data by its *movement*, not by its position. Like the -1/+1 keys, the data entry wheel modifies the existing value, but is more suitable for making larger continuous changes. In job or voice directories, the wheel can be used to select jobs and voices.



Data entry slider

If you want to set a data value to some setting relative to the entire range of that value (for example “maximum”, “minimum”, or “about 90% of maximum”), use the data entry slider. When you move the slider, the data value is immediately changed to correspond to the position of the slider. The range of the slider will match the range of the parameter value. For example if the parameter being modified has a value range of 0–127, pulling the slider fully towards you will set a value of 0, and pushing the slider fully away from you will set a value of 127. Setting the slider exactly in the middle of its range would set a value of 64.

Since the range of the slider always matches the range of the parameter you are adjusting, there is no need to remember the range of the parameter; just move the slider to the position that corresponds to the relative setting you want.

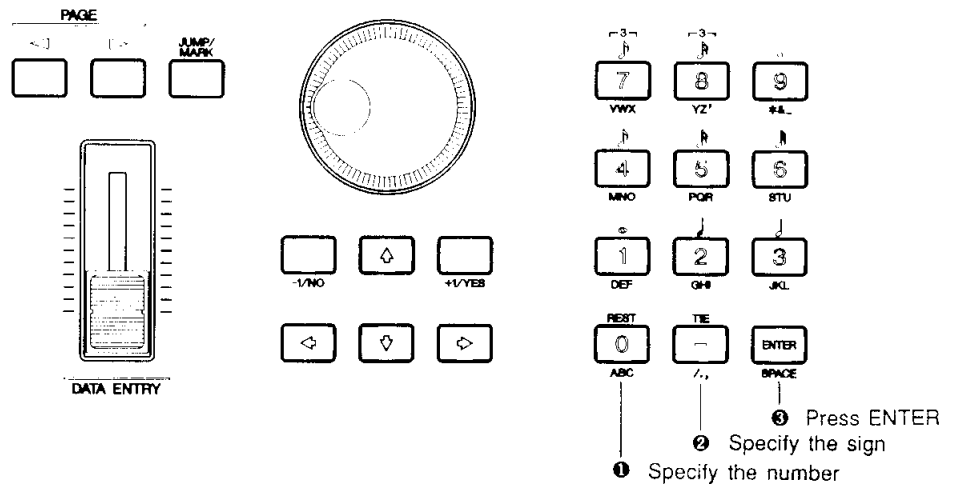


How to use the numeric key pad

The numeric key pad can be used to enter an absolute data values, as well as characters for a memory name or disk file name.

How to enter absolute numerical data

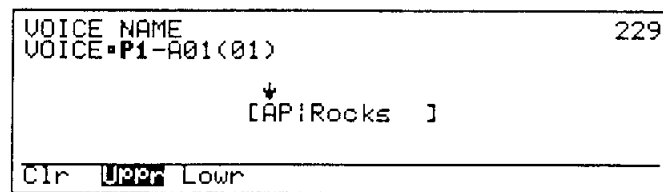
If you want to set a data value to some specific number (for example “57” or “121”), use the numeric key pad. Press one or more keys 0–9 to specify the number, press the – key to change the sign if necessary (when entering a negative number), and press ENTER. For example if you wanted to enter the number “–18”, you would press 1, 8, –, ENTER. If the data value has a three-place range (such as 0–127), there is no need to add a zero in front.



In most displays, the first digit you enter from the numeric key pad will be displayed blinking. When you enter the second digit the number will be finalized.

How to enter character data

You will sometimes need to enter character data to specify a voice name, multi name, file name, etc. When the currently selected parameter requires that you enter character data, the numeric key pad will act in a different way than usual. To try this out, jump to the Voice Name page by pressing the following keys in order; JUMP, 2, 2, 9, ENTER. The following display will appear.



This display is essentially the same as for any other job that requires you to enter character data. Press F1 (Clr) to clear the currently set name, and press F2 (Uppr) or F3 (Lowr) to select uppercase or lowercase letters.

Notice that below the 0 key are printed the characters "A", "B", and "C". Press the 0 key, and the numeral "0" will appear. Press it again for the character "A", again for "B", and again for "C". Press it once more and "0" will reappear. In this way, each time you press a key, the character indicated by the cursor will alternate through the alphabetical characters printed below it and the numeral printed on the key itself. (If you press another of the numeric keys, the cycle will begin from the first character.) Notice that the third press of 8 is an apostrophe, that 9 gives you an asterisk, ampersand, and an underline character, and that - enters a hyphen, slash, comma, and period.

Other characters are available in addition to the characters entered using the numeric key pad. These characters can be selected using the DATA ENTRY slider or the -1 +1 keys. Moving the DATA ENTRY slider will scroll through all available characters in the following order.

(Space) ! " # \$ % & ' () * + , - . / 0~9 : ;
< = > ? @ A~Z [\] ^ _ ` a~z { | } ~ (Space.)

Use the <> keys to move the cursor, and enter characters for the desired name. Pressing the ENTER (space) key will enter a blank and move the cursor to the right.

Other uses of the numeric key pad

In step recording mode, the numeric keys specify the note value printed above each key. For example key 1 will enter a whole note and key 6 will enter a 32nd note. Details will be explained in the section on step recording.

In jobs where you are required to set parameters and execute, you will execute the specified job by pressing the ENTER button. Details will be explained when necessary.

HOW TO USE THE SEQUENCER

This section is a step by step explanation of how to create a song using the SY99's built-in sequencer. By using the sequencer in conjunction with Multi mode, you can create songs of up to 16 independent parts.

Contents of this section	page
How the sequencer controls the tone generator.....	34
Set up a multi	36
Create rhythm patterns and edit the pattern track.....	38
Realtime recording.....	40
Punch-in recording	42
Song editing.....	44
Using a song edit job	46
Saving your sequence to disk	48

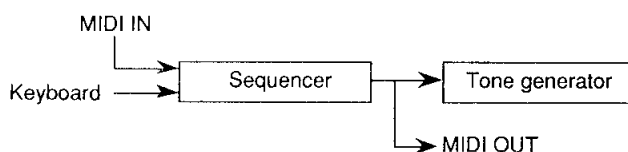
How the sequencer controls the tone generator

Although the SY99's tone generator and sequencer are contained in the same unit, they are independent. When the tone generator is in Multi mode, each channel of the multi can be played by a different track of musical data from the sequencer.

The tone generator and sequencer are independent

The SY99 is divided into two sections; a tone generator which produces sound, and a sequencer which records and plays back data such as notes and controller movements to control sound. The sequencer is completely independent of the tone generator, and has its own set of control buttons. This allows you to start or stop, record or playback at any time even while editing a voice or multi. It is especially helpful to edit a voice while it is being played by a sequencer pattern, or to make adjustments to the volume balance or pan settings of a multi while listening to the song playback.

The sequencer will record data from the SY99's keyboard and also from MIDI IN, and will play back data to the SY99's tone generator and also transmit it from MIDI OUT. The tone generator will produce sound in response to data from the sequencer and also from MIDI IN.



How the sequencer controls the tone generator

Depending on whether the SONG or the PATTERN button was last pressed, the sequencer will record and playback data either in Song mode or in Pattern mode. Depending on whether the VOICE or the MULTI button was last pressed, the tone generator will produce sound either in Voice mode or in Multi mode. This means that the sequencer and tone generator can work together in four possible ways as shown in the following table.

Sequencer	Mode	SONG	SONG	PATTERN	PATTERN
	Transmits	16 channels	16 channels	1 channel	1 channel
		↓	↓	↓	↓
Tone generator	Mode	VOICE	MULTI	VOICE	MULTI
	Receives	1 channel	16 channels	1 channel	16 channels

As you can see from the above table, the greatest musical complexity is possible when the sequencer is used in Song mode to play the tone generator in Multi mode. However other combinations of sequencer and tone generator will be useful when creating sequences, patterns, or voices. For example it is often helpful to keep a sequencer Pattern playing while you edit a Drum Voice.

Fifteen tracks + pattern track + patterns = one song

Each track 1–15 contains an independent musical performance; notes, pitch bends, controller movement, and program changes. Track 16 is a dedicated Pattern track. It contains pattern numbers and repeat marks. When playback comes to a pattern number, the specified pattern will be played.

About this tutorial

In the following pages of this section, we will be explaining the entire process of creating a song; creating patterns and arranging them in the pattern track, recording other tracks, and editing. Finally we will save the completed song to disk. Our procedure will be as follows.

1. Create a Multi by selecting a voice for each of the 16 channels, and making settings for volume, pan, etc. for each channel.
2. Enter Pattern mode and create several rhythm patterns.
3. Enter Song mode and place these patterns in track 16 (the pattern track).
4. Record one or more tracks in realtime.
5. Punch-in on a section of the track to fix a mistake.
6. Use song edit mode to correct and insert individual data events.
7. Use a song edit job to transpose specified measures.
8. Save the completed sequence to disk.

Note:

The output channel of the sequencer tracks can be changed if desired, allowing you to use two or more tracks to control a single channel of the multi. However to keep this tutorial simple, we will select normal voices (piano, bass, strings, etc.) for channels 1–15 of the multi and a drum voice for channel 16 of the multi. Tracks 1–15 of the sequencer will contain the music for the normal voices, and track 16 will contain the patterns to play the drum voice.

Set up a multi

When the SY99's tone generator is used in Multi mode, it will function as 16 independent synthesizers. This allows each track of the sequencer to play a different sound.

Start with an initialized multi

Since we will be creating a song with more than one track, we will use the SY99's tone generator in multi mode so that it will function as 16 independent synthesizers.

Press MULTI, then press EDIT. While holding SHIFT press F7 (15) to select the Initialize job.

```
INITIALIZE MULTI

ARE YOU SURE ?

(Yes or No)
```

Press +1/YES. The display will show "Completed!".

Select a voice for each channel of the multi

Press F1 (01) to get the Voice Select display. Here you can specify the voice that will be played by each channel 1-16 of the multi. Move the cursor and use the MEMORY, BANK, and memory select buttons 1-16 to select a voice for each channel.

In this example we will assume that you have selected Multi number 1, and assigned the following voices: P1-A03 Concert (a grand piano) for channel 1; P2-C06 Upright (an acoustic bass) for channel 2; P1-C15 Quartz (a string section) for channel 3; and P1-D14 Kits (drums) for channel 16. (Feel free to select voices for other channels of the multi as well.) Turn off unused channels of the multi by pressing F2 (Off). The display should appear as shown below:

```
VOICE SELECT                               401
MULTI#1-01  INIT MULTI VOICE
Selected Voice: P1-A03(03) AP1 Concert
P1-A03(03) (6:[Off]) (9:[Off]) 13:[Off]
P2-C06(06) (6:[Off]) (9:[Off]) 14:[Off]
P1-C15(15) (7:[Off]) 11:[Off] 15:[Off]
P1-D14(14) (8:[Off]) 12:[Off] 16:DR Kits
On Off                                     Edit
```

Press EXIT to return to the Multi Edit job directory.

Make pan settings for the multi

Press F5 (05) to select 05:St Pan. In this display you can make pan settings for each channel of the multi. For this example, we will pan the piano to the left, the strings to the center, and the bass to the right. Since the drum voice has a different pan setting for each of the 76 notes, we will let the drum voice use its own pan settings by setting it to "VC" (voice).

Make settings as shown in the following displays. To switch between the displays for channels 1-8 and channels 9-16, hold SHIFT and press F1 (1-8) or F2 (9-16). The pan range is from -31 (full left) through 0 (center) to +31 (full right). The asterisks show the approximate pan position for each channel. The "VC" setting can be selected by panning *past* the -31 setting.


```

VOICE STATIC PAN                                408
MULTI01-01  INIT MULTI VOICE
Selected Voice=P1-A03(03) AP:Concert
01 -16 * 05 + 0 *
02 +16 * 06 + 0 *
03 + 0 * 07 + 0 *
04 + 0 * 08 + 0 *
U1 U2 U3 U4 U5 U6 U7 U8

```

```

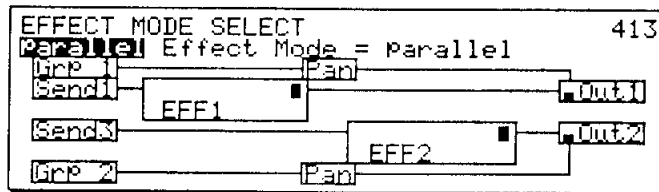
VOICE STATIC PAN                                409
MULTI01-01  INIT MULTI VOICE
Selected Voice=P1-A01(01) AP:Rocks
09 + 0 * 13 + 0 *
10 + 0 * 14 + 0 *
11 + 0 * 15 + 0 *
12 + 0 * 16 UC
1-8 9-16

```

Press EXIT to return to the Multi Edit job directory.

Make effect settings for the multi

Press F7 (07) to select 07:Effect from the Multi Edit job directory and then press F1 (01) to select 01:Effect Mode Select. With the initial settings the Effect Mode will be off. Press +1/YES twice to set the effect mode to "parallel".



With the initial settings, effect type 1:Rev.Hall is selected for both effect units. Press EXIT twice to return to the Multi Edit job directory.

Other settings in multi edit mode

To keep this example simple, we will leave the rest of the multi settings at their initial values. After completing this tutorial, you can read about *Multi edit* in the *Reference* section to learn more about setting up a multi.

Save the newly created multi

From the Multi Edit job directory press EXIT. Since you have modified the data, the top line of the display will blink "Auto-store multi".

```

AUTO-STORE MULTI Push Return/Quit/Store
01-01  INIT MULTI VOICE
INTERNAL                                01
01:Computer 05:Standar 06:Big Ban 13:Wind Un
02:Leroy's 08:America 10:Sound T 14:Tropica
03:Ballade 07:Combo J 11:Orchstr 15:Esnican
04:House 09:2 Horn 12:Baroque 16:Fork
Ret Quit Stor

```

Press F8 (Stor) and the multi will be stored into the currently selected multi memory. Or, if you want to keep the previous data of that multi, use the memory select buttons 1-16 to specify a different memory before you press F8 (Stor).

The bottom line of the display will ask "Are you sure?". Press +1/YES and the newly edited multi will be stored, and you will return to multi play mode.

Create rhythm patterns and edit the pattern track

Pattern mode allows you to create short phrases of 1–32 measures. In Song mode, these patterns can be placed in track 16 (the pattern track) of a song for use as rhythm parts or for phrases which appear frequently.

Make settings for pattern recording

Press PATTERN, then press RECORD to make the RECORD LED light. Make the following settings.

PATTERN01		(we will record pattern 01)
Time	= 4/4	(the pattern will be in 4/4 time)
Length	= 01	(the pattern will be one measure long)
Quantize	= 1/16	(notes will be corrected to the nearest 1/16th)
Receive Ch	= kbd	(notes will be recorded from the SY99 keyboard)
Click	= rec	(the click will sound only while recording)
Click Beat	= 1/4	(the click will sound on each quarter note)
Sync	= internal	(the SY99 will keep time to its own internal clock)

Press F1 (Real) to select realtime recording. The LCD should now appear as follows:

```
PATTERN RECORD [PATTERN01 ]
Measure=01 Time= 4/4 J=120 Used= 0%
Length   =01      Click   =rec
Quantize =1/16    Click Beat=1/4
Receive Ch=kbd   Sync    =internal
Real Stop      Job Stop Clr
```

Record the pattern

When you enter pattern recording mode, the keyboard will transmit the channel selected for track 16 (the pattern track) of the sequencer. With the default settings this will be channel 16, which will play the drum voice we selected for channel 16 of the multi.

Before you begin recording, play the keyboard to locate the rhythm sounds you will be using. Our first pattern will be a simple rhythm backing of bass drum, snare, and hi-hat.

Press RUN and pattern recording will begin. Keep time to the click and play the bass drum part (the A1 key) for one measure. The pattern will continue to repeat from beginning to end, and you can hear the bass drum pattern just recorded. Next, play the snare notes (E2), and finally play the hi-hat notes (A2 and B2). Of course it is possible to record more than one note at a time, and as you become more skilled you may wish to do so. You can delete any given note from the pattern by pressing SHIFT while holding down the key of the unwanted note, and allowing the pattern to run through the section you wish to erase.

Press STOP and pattern recording will end. Notice that the upper right corner of the LCD now shows PATTERN01w. The “w” indicates that data has been written into the pattern.

Record another pattern

For the second pattern we will record a fill-in with toms (B1, C2, D2, F2) and crash cymbal (C#3). Press RECORD to make the RECORD LED light, and move the cursor to the upper right and select PATTERN02. Notice that there is no “w” after the pattern number, since no data has been written into this pattern.

Press RUN and pattern recording will begin. Now you can record an appropriate fill-in pattern.

Press STOP and pattern recording will end.

Chain Pattern mode

Before recording the other tracks, we will place the previously recorded patterns into track 16. Press SONG and then EDIT to enter song edit mode. Press program select key 16 to select track 16 (the pattern track) for editing. While editing track 16 you will be in Chain Pattern mode.

CHAIN PATTERN			

Part	001	=	PATTERN**

Ptn	:	:	srch Copy Ins Del

Using repeat marks

In this example, we will chain patterns so that three measures of the basic rhythm are followed by a fill-in, and make this four-measure chain repeat eight times. Although it is possible to input all 32 parts (the four-measure chain x 8 times), it is more efficient to use repeat marks. To do this we will input data for each part as follows.

Part 001 : ll:
Part 002 : 01
Part 003 : 01
Part 004 : 01
Part 005 : 02
Part 006 : :ll x 7

Input the data for each part

Move the cursor to the right and press F2 (:ll) to enter a repeat begin mark for part 001, then press ENTER. The “Part” display will advance to 002. Select pattern “01w” for Part 002, and press ENTER.

In the same way input pattern 01 for parts 003 and 004, and pattern 02 for part 005.

For part 006, press F3 (:ll). Use -1 +1 to specify “x 7” so that the range of parts between the begin and end repeat marks repeat 7 times. Be sure to press ENTER to enter each part.

When you are finished editing the chain of patterns, press EXIT to return to Song Play mode. Press RUN and you will hear the newly edited chain of patterns.

Realtime recording

In realtime recording the notes you play will be recorded in the exact timing with which you play them.

Make settings for realtime recording

From the song play display press RECORD to enter song record mode and press F1 (Real) to select realtime recording.

If you have been following along with the previous pages of this section, the various settings will be the same as you specified in Pattern recording. However, for realtime recording a track, you may wish to turn off quantization. Move the cursor to Quantize and press -1 several times to select "off".

```
SONG RECORD [SONG01 -----]
Measure=001 Time= 4/4  ]=100 Used= 9%
Quantize =off          Click      =rec
Receive Ch=kbd        Click Beat=1/4
                       Sync       =internal
Real Step Fnch Over RPlc
```

Record the first track

In song mode, the memory buttons 1-15 select the track to record. For this example, press the select button 1 to make the track 1 LED light red. With the default settings track 1 of the sequencer will transmit its data on channel 1. Since in this example you have selected a piano voice for channel 1 of the multi, you will hear the piano voice when you play the keyboard.

To begin recording press RUN. The RUN LED will blink and after a two-measure countdown recording will begin. Play the keyboard. As you record, the Measure display will advance to show the number of the measure currently being recorded.

When you are finished recording the track, press STOP. You will return to the song play display.

Press |< to return to measure 1, and press RUN to hear the track you just recorded. Press STOP to stop playback.

Record additional tracks

To record additional tracks,

- press RECORD
- press a memory button 2-15 to select another track (LED lights red)
- and press RUN to record the track while listening to previously recorded parts. Press STOP to stop playback.

In this way, record all the tracks of the song. As you record each track you will hear the previously recorded tracks play back. The multi we created in the beginning of this example uses the following voices.

Multi channel	Voice number	Voice name
1	P1-A03	APiConcert
2	P2-C06	BAiUpright
3	P1-C15	STiQuartz
...		
16	P1-D14	DR Kits

With the initial settings of the sequencer, tracks 1–16 will transmit their data on channels 1–16 (this can be changed) and be received by channels 1–16 (this cannot be changed) of the multi. If you are following this example, record the piano on track 1, bass on track 2, and strings on track 3.

Punch-in recording

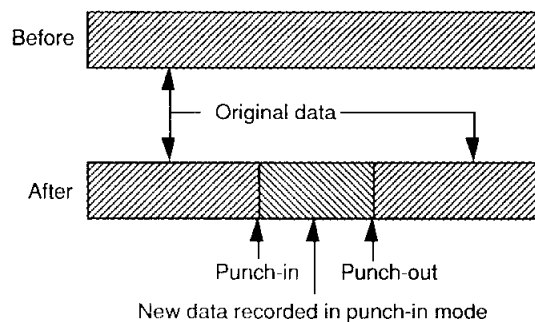
In punch-in recording the notes you play will be recorded in the exact timing with which you play them, but only over the measures you specify. This is useful when you wish to re-record only a specific section of a previously recorded track.

When to use punch-in recording

Suppose that while recording track 2, you made a few mistakes in measures 15 and 16. While it is possible to re-record the entire track, it is more efficient to use punch-in recording to re-record only the measures necessary. There is no point in using punch-in recording on a track which contains no data.

Punch-in recording allows you to specify the measure at which recording will begin and the measure at which recording will end. Measures before and after this area will not be affected.

The following diagram shows the result of punch-in recording.



Specify the area of measures to re-record

In this example we will assume that you wish to re-record measures 15 and 16 of track 2.

1. Press SONG to enter song play mode.
2. Press RECORD to enter song record mode.
3. Press F3 (Pnch) to select punch-in recording.
4. Press the program select button 2 to select track 2 for recording.
5. Specify "From Meas =015" and "To Meas =016".

```
SONG RECORD [SONG01 -----]
Measure=001 Time= 4/4 ]=100 Used= 9%
From Meas =015 To Meas =016
Quantize =off Click =rec
Receive Ch=kbd Click Beat=1/4
Sync =internal
Real Step Pnch Over R216
```

Re-record the specified measures

Move the cursor to Measure and select a point a few measures before 015. This will give you a chance to get the feel of the section you are going to re-record.

To begin recording press RUN. The RUN LED will blink on the beats. Play along with the original. When measure 15 is reached, the original recording on track 2 will disappear and your new playing will be recorded. When measure 16 ends, the original recording of track 2 will reappear, but playback will continue.

Press STOP and you will return to the song play display.

Song editing

Song edit mode allows you to modify, insert, or delete individual events that have been recorded in tracks 1–15.

When to use song edit

As explained earlier, a sequencer records not the *sound* of a musical performance but the *musical data*. Notes, controller movements, program changes, and other data are recorded as individual *events*. Song edit mode allows you to edit individual events that have been recorded in tracks 1–15.

In this example we will assume that the piano part in track 1 was perfect except for one F3 in the tenth measure that should have been an F#3.

Use Data Change mode to modify the data

From the song play mode or song record mode display, press EDIT. Press a memory select button 1–15 to select the track to edit (track 1 in this example).

If you are in Data Insert or Graph modes as explained below, press F8 (Data) and then press F2 (Chng) to select data change mode. The following display will appear.

```
SONG EDIT [SONG01 -----]
Measure=001 Time= 4/4 J=100 Used= 9%
 01|-----+-----+-----+-----|
001-01-00/96 === Meas.Bar ===
----- 4/4
----- Time -----
Ins Chng Del Grph Data
```

In this mode you can view and edit data in numerical form. With the cursor located at the measure number, use the dial or the -1 +1 keys to move through the data in the track. The lower part of the display will show the location (measure, beat, clock) and parameters of each data event.

```
SONG EDIT [SONG01 -----]
Measure=001 Time= 4/4 J=120 Used= 9%
 01|-----+-----+-----+-----|
001-01-00/96 A 1 0 40 mf
-----Note---Step---Gate---Vel---
Ins Chng Del Grph Data
```

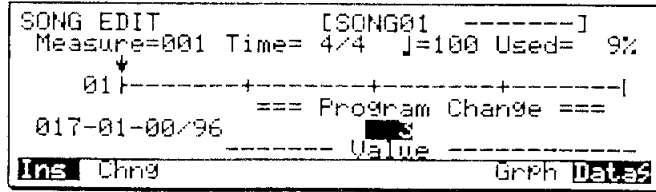
When you find the data you wish to modify (in this example, the mistaken note F3), move the cursor to Note and press +1 to change the F3 to F#3. Press ENTER to finalize the change.

Use Data Insert mode to insert new data

Song edit also allows you to insert new data into the track. In this example we will insert a program change at the beginning of measure 17 to change the voice played by this track. Press F1 (Ins) to select data insert mode.

To specify the type of data to be inserted, press and hold SHIFT. Then press F2 (Prog) to insert a program change.

With the cursor at the far left, specify measure 17 as the location where the program change will be inserted. Next, move the cursor to the value parameter to the right and specify the data (program change number 000...127). For this example, specify a program change of 3 to select P1-A06 EP:Classic.



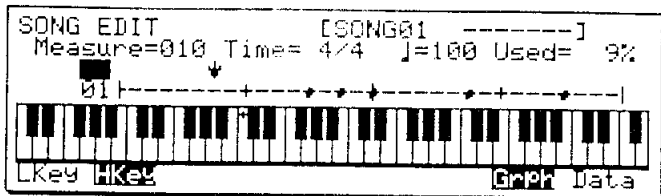
Press ENTER to insert the program change data. In the same way, insert another program change number 1 at the beginning of the track (measure 001-01-00/96) so that the original voice P1-A03 AP:Concert will be selected when the track begins.

Press F2 (Chng) to return to data change mode. Move the dial to scroll through the data and notice that the program change data has been inserted into the track.

When you return to song play mode and playback this track, the piano voice originally selected for this track will change to voice P1-A06 EP:Classic when playback reaches measure 17.

Use Graph mode to view notes

Song edit Graph mode allows you to view notes as dots on a keyboard diagram. Press F7 (Grph) to enter Graph mode. The following display will appear.



A horizontal line will be displayed with dots indicating the position of note data in the measure. To select the measure, place the cursor on the measure number and use the dial or -1 +1 keys. To move through the data note by note, place the cursor on the same row as the downward pointing arrow and use the dial or -1 +1 keys. As you move, the keyboard diagram in the lower part of the LCD will indicate the notes at the currently selected 32nd note area. The notes will also be played as you come to them.

Since the 76-note keyboard is too large to be completely displayed in the LCD, you may need to press F5 (Lkey) or F6 (Hkey) to view notes which have been played in the very highest or lowest ranges.

Graph mode displays only note data, and does not allow you to modify the data. However since it displays a diagram of the keyboard, you may find it convenient to use graph mode to find the note you wish to edit, and then press F8 (Data) to move to Data mode to change or insert data.

Playback the corrected song

Press EXIT to leave song edit mode and return to song play mode. Press \blacktriangleleft and then RUN to playback the song. Check that the F3 note has been corrected to F#3, and that the voice changes to program number 3 at measure 17.

Using a song edit job

Song edit jobs allow you to make overall changes in specified measures of a track, and to copy, erase, delete, insert, or apply other operations to entire measures

When to use a song edit job

As explained in the previous section, song edit mode allows you to modify, insert, or delete individual events of tracks 1–15. This gives you very precise control over individual data events, but it is often useful to use a Song Edit Job to make overall changes that apply to all the data in one or more entire measures.

Fifteen different song edit jobs are provided, allowing you to modify the data of specified measures in various ways. You can copy, erase, delete, or insert entire measures. In this example, we will use a song edit job to transpose the notes in measures 17–32 of track 3 an octave up.

Select the song edit job

From the song play display, press F4 (Job 2) to get the Song Edit Job display.

```
SONG EDIT JOB2                606
                                01
01: HdrnSE  05: Transps  09: MovClck 13: CreMeas
02: MdfGate 06: ThinOut 10: CpyMeas 14: MixTrck
03: MdfyVel 07: ErsEvnt 11: ErsMeas 15: ErsTrck
04: Cresc   08: NtShift 12: DelMeas
01  02  03  04  05  06  07  08  9
```

Press F5 (05) to select the 05:Transps (transpose) job.

```
TRANPOSE                [SONG01  -----] 611
----- Area -----
Top Measure = 001 Last Measure = 001
----- Parameter -----
Interval = + 0
```

Set parameters and execute the job

Now we will specify the track to be affected, the area of measures, and the amount by which the data will be transposed.

1. Press memory select button 3 to select track 3.
2. Set the Top Measure =017 and the Last Measure =032.
3. Set the Interval =+12 (one octave up).

After setting the parameters, press ENTER. The bottom line of the LCD will ask "Are you sure?". Press +1/YES and the job will be executed.

Press EXIT twice to leave song edit mode and return to song play mode.

Press RUN to playback the song, and notice that measures 17–32 of track 3 play an octave higher than measures 1–16.

Saving your sequence to disk

You may be so pleased with the fruits of your recording efforts that you would like to keep it on hand for playback in the future. Since all data is cleared from the SY99's sequencer memory when the power is turned off, you will want to save your song on a floppy disk.

In fact, it is a good idea to save your work periodically during the recording process, to prevent the accidental loss of valuable data should power to the SY99 be cut off for some reason.

Enter disk utility mode

Press UTILITY to enter utility mode, make sure that a floppy disk of the correct type (3.5" 2DD) is inserted into the disk drive, and press F4 (Disk) to select disk utility mode.

```
UTILITY (DISK SAVE TYPE=SY99) 816
Disk Utility                               01
01:Disk Status                             05:Backup Disk
02:Load From Disk                          06:Rename File
03:Save To Disk                             07>Delete File
04:Format Disk                              08:Disk Save Type
Sys MIDI Card Disk SmpI MDR Mstr          9
```

Format a new disk

Before a disk can be used it must be formatted to accept SY99 data. If the disk currently inserted into the disk drive has never before been used to store SY99 data, you must format it. *Formatting the disk will erase all the data on the disk.* Be careful not to accidentally format a disk which contains valuable data.

If the currently inserted disk has already been formatted, skip to the next step.

To format the disk, select 04:Format Disk (JUMP #818). The following display will appear.

```
FORMAT DISK                               818

Please insert a blank disk

Go
```

To execute the formatting operation press F8 (Go). You will be asked "Are you sure". If you are, press YES.

While the disk is being formatted the display will show "xx% Formatted". When the number reaches 100% the display will show "*** Completed ! ***". Press EXIT to return to the Disk Utility job directory.

Select the type of data to be saved

Select 03:Save To Disk and press ENTER. The disk drive will operate briefly, and the following display will appear.

```
SAVE TO DISK (DISK SAVE TYPE=SY99)
281K bytes Free
01:All Data                                06:MIDI File    01
02:Synthesizer All                        07:Card
03:Sequencer All
04:1 Song
05:Song ESEQ
```

Select 03:Sequencer All, and press ENTER to get the following display.

```
SAVE TO DISK (DISK SAVE TYPE=SY99)
Data Type = Sequencer All
01:- NEW -*          06:- NEW -*          01
02:- NEW -*          07:- NEW -*
03:- NEW -*          08:- NEW -*
04:- NEW -*          09:- NEW -*
05:- NEW -*          10:- NEW -*
▲ ▼                               Name Go
```

If files containing *Sequencer All* data have already been saved on this disk, the filenames will be displayed. Move the cursor in this area to select a disk file to which you want to save your newly recorded song. For this example, select any filename of “- NEW -*”.

Specify a filename

Press F7 (Name). This allows you to give an eight character name to the file.

```
SAVE TO DISK
File Name = [- NEW -*]
Clr Uppr Lowr                               Go
```

Press F1 (Clr) to clear the currently entered name. Then specify a filename, using the numeric keypad to enter characters. Each time you press one of the numeric keys, the LCD will cycle through the number printed on the numeric key and the three alphabetical characters printed below it. Press F2 (Uppr) to switch to upper-case characters. Press F3 (Lowr) to switch to lower-case characters.

Save the data to disk

After you have entered a name for the disk file press F8 (Go). The bottom line of the display will ask “Are you sure ?” If you are sure that you want to save the data, press YES and the data will be saved to the specified disk file. Press any mode select button to leave this job.

HOW TO EDIT A VOICE

This section explains how to edit an existing voice or create a new voice from scratch. Although it is possible to enjoy the SY99 just by playing preset voices, we suggest that you take some time to learn how to edit your own voices. It will take a bit of practice to create the sounds you want, but as you become more experienced you will find that creating voices is enjoyable and rewarding.

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What is a voice?

Each normal voice consists of settings for one, two, or four AFM or AWM elements (Element data) and settings which affect the entire voice (Common data). Each drum voice consists of a different AWM waveform for each of the SY99's 76 keys.

The Voice Mode determines the number of elements

The SY99 contains a 16-note AFM tone generator and a 16-note AWM tone generator. The Voice Mode setting determines how these tone generators are used to create a Voice, and how many elements are used for each note you play. Each voice uses one of these eleven voice modes.

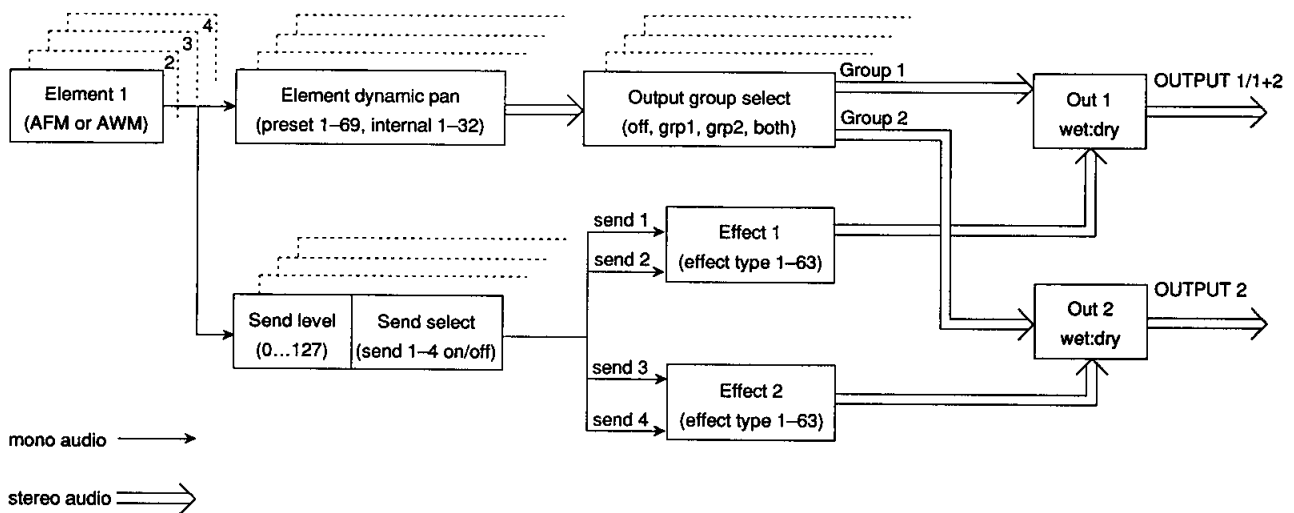
Mode	Element	E1	E2	E3	E4
01	1AFM mono	AFM	—	—	—
02	2AFM mono	AFM	AFM	—	—
03	4AFM mono	AFM	AFM	AFM	AFM
04	1AFM poly	AFM	—	—	—
05	2AFM poly	AFM	AFM	—	—
06	1AWM poly	AWM	—	—	—
07	2AWM poly	AWM	AWM	—	—
08	4AWM poly	AWM	AWM	AWM	AWM
09	1AFM & 1AWM poly	AFM	AWM	—	—
10	2AFM & 2AWM poly	AFM	AFM	AWM	AWM
11	Drum Set	76 AWM waveforms			

A normal voice uses one, two, or four elements

Voices created using modes 1–10 consist of Common data that affects all elements, and Element data for one, two, or four elements.

Common data includes a complete set of Effect data for the four DSP units, Controller data such as pitch bend and aftertouch assignments, and other data such as microtuning table selection, random pitch fluctuation, and portamento settings. Common data also contains settings such as element volume level, detune, note shift, note limit, and velocity limit for each element.

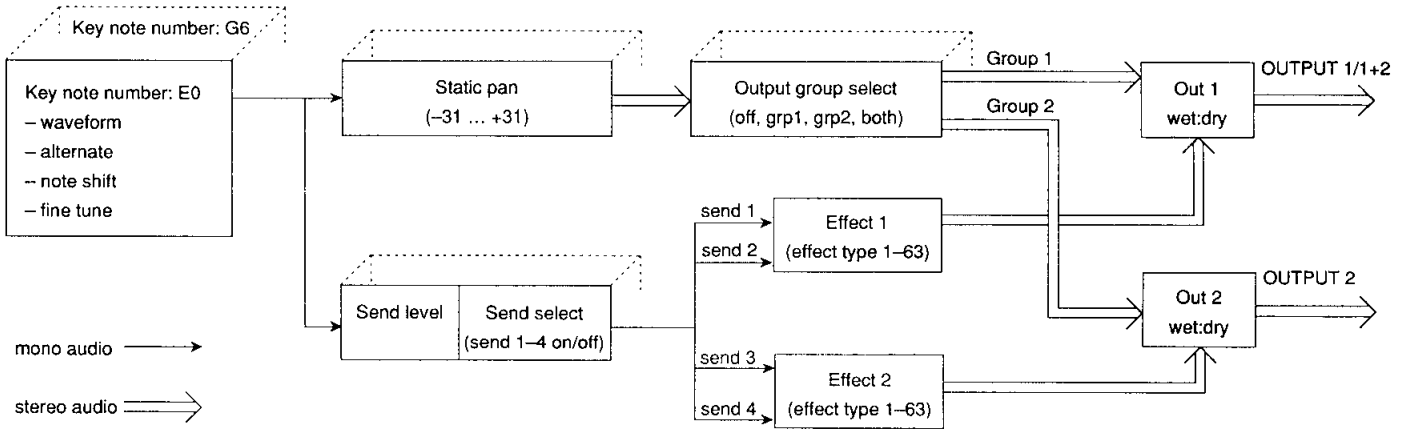
Element data includes AFM or AWM data for one, two, or four AFM or AWM elements. The voice mode will determine whether each element uses AFM tone generation or AWM tone generation. Details of AFM and AWM element data are covered separately in following sections.



A drum voice uses 76 AWM waveforms

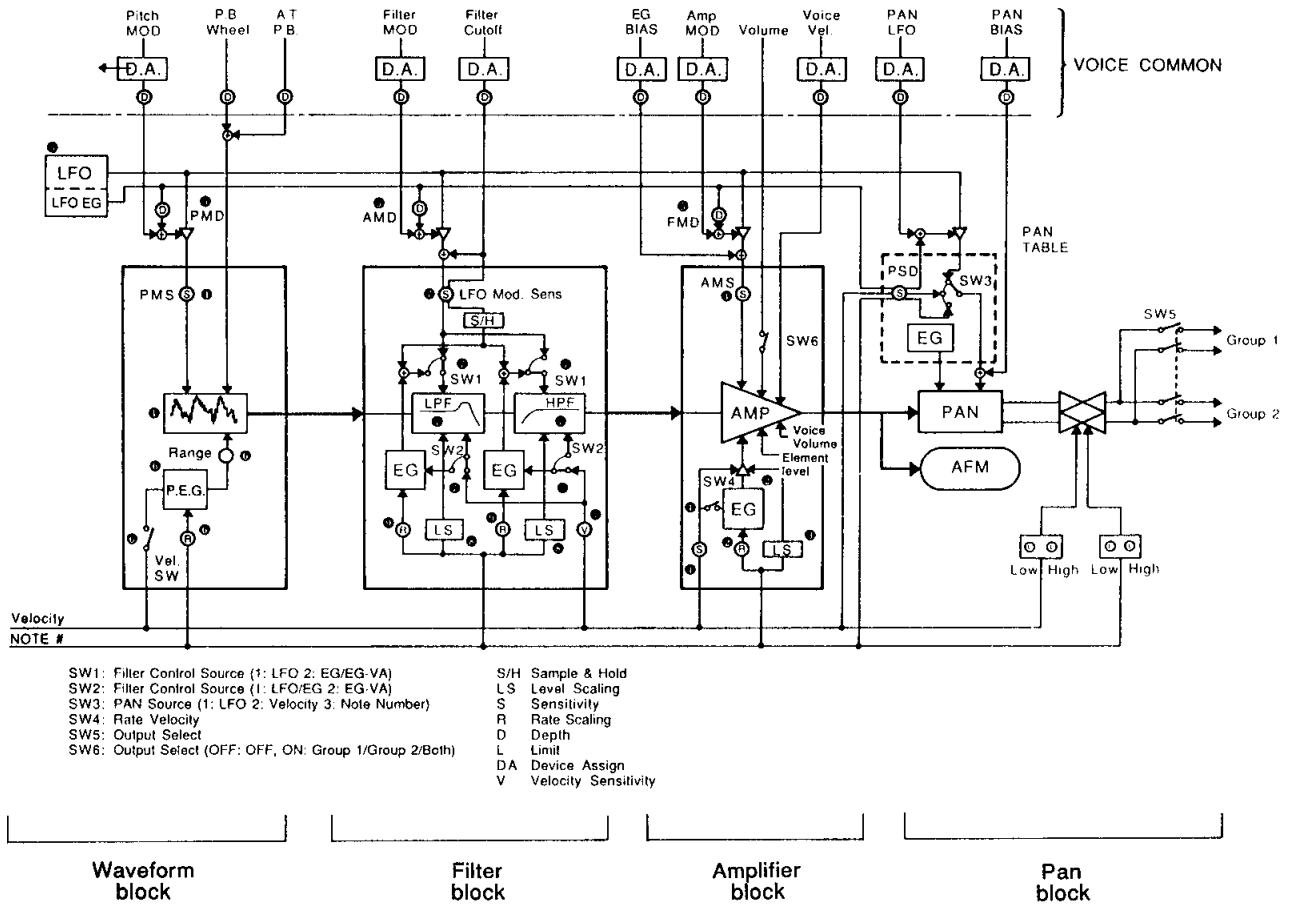
Voices created using mode 11 will have a different AWM waveform assigned to each of the 76 keys (E0–G6) of the SY99. Each key also has independent settings for volume, tuning, note shift, pan, etc.

This type of voice is most often used to arrange drums and percussion sounds across the keyboard so that each key will produce a different percussive sound. For example a bass drum might be assigned to C3, a snare to C#3, and a cymbal to D3. Drum voices may be played from the keyboard in real time or recorded from the keyboard into a sequencer track. Details of how to edit drum voices are given at the end of this section.



What is an AWM element?

An AWM element consists of four main blocks. The Waveform block plays back a sampled sound and determines the pitch, the Filter block modifies the tone, the Amplifier block modifies the volume, and the Pan block moves the sound between left and right outputs. Each block can be controlled in a variety of ways.



The above diagram shows how the various blocks in an AWM element are related, and how they can be controlled.

Many different ways to control sound

All interesting sounds are constantly changing. For instruments such as piano, the tone and volume of each note changes in a predictable way over time. For other instruments such as violin, the volume, tone, or pitch can be continuously and freely modified by the musician. The SY99 provides several ways to control various aspects of the sound.

- **Envelope Generator (EG):** An EG produces a fixed pattern of change over time. For example to simulate the attack and decay of a piano, you would set the volume EG to be loud when the note is first played and then gradually diminish in volume.

- **Note Number:** The number of the note which is played can be used to affect various aspects of the sound. For example, high notes can be made to decay more rapidly than low notes. Or, low notes can be made to change in pitch, tone, or volume more than high notes.
- **Key Velocity:** The velocity (speed) with which you play each key can affect various aspects of the sound. For example, strongly and softly played notes can differ in pitch, tone, or volume.
- **Low Frequency Oscillator (LFO):** The LFO produces various patterns of cyclical change. Vibrato is the result when the LFO is applied to the waveform block; wah-wah when applied to the filter block; and tremolo when applied to the amplitude block.
- **Controllers:** Controllers such as the pitch and modulation wheels, aftertouch, and optional foot controllers can be used to control the sound in various ways. Some controllers such as the pitch bend wheel can directly determine the pitch. Other aspects of the sound can be controlled by the controller you assign. For example you might assign Aftertouch so that the amount of vibrato (LFO modulation to the Waveform block) is increased as you press down on the keyboard.

The waveform block determines the pitch and basic tone

The basic sound of each AWM element is produced by a waveform (a digitally sampled sound). The SY99 contains 267 different waveforms in internal ROM, and an optional waveform card can be inserted into the WAVEFORM slot to provide additional waveforms. Samples loaded from disk or via MIDI sample dump can be assigned to your own waveforms, and used in the same way as preset or card waveforms.

The waveform block can be controlled in various ways to modify the *pitch* of the sound. The pitch EG can be used to give each note a fixed pattern of pitch change, and this pitch change can also be affected by the note number or by key velocity. Vibrato (pitch modulation) can be created using the LFO, and the amount of vibrato can be regulated by a controller. The pitch can be controlled directly using the pitch bend wheel and/or aftertouch.

The filter block modifies the tone

The filter block can be controlled in various ways to modify the *tone* of the sound. Each note can be given a fixed pattern of tonal change by using the filter EG, and this can be also affected by the note number or key velocity. Wah-wah (filter modulation) can be created using the LFO, and wah-wah depth can be regulated by a controller. The tone can also be directly affected by a controller.

The amplifier block modifies the volume

The amplifier block can be controlled in various ways to control the *volume* of the sound. Each note can be given a fixed pattern of volume change by using the amplifier EG, and this can also be affected by the note number or key velocity. Tremolo (volume modulation) can be created using the LFO, and tremolo depth can be regulated by a controller. The volume can also be directly affected by a controller.

The pan block moves the sound

The pan block can be controlled in various ways to move the sound between left and right outputs. Each note can be given a fixed pattern of panning by using the pan EG, and this panning can be further affected by either note number, key velocity, or LFO.

The basics of FM synthesis

FM synthesis is a patented Yamaha method for using Frequency Modulation (FM) to produce complex waveforms that can be controlled in musically useful ways.

Interesting sounds have complex waveforms

The sounds produced by most musical instruments have a very complex waveform, which is constantly changing.

Electronic instruments use an oscillator to produce a waveform. Unfortunately, electronic oscillators are best at producing simple and repetitive waveforms. These waveforms sound “artificial” or “electronic”, and are not very interesting to listen to. A major concern of electronic musical instrument design is to find a simple way to electronically produce a complex waveform and be able to control it.



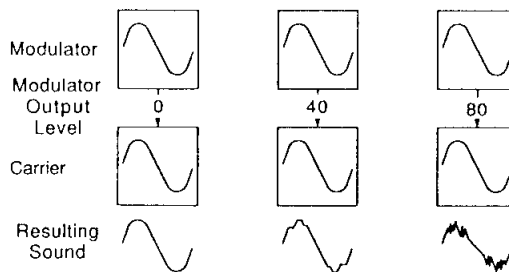
Complex waveform
= interesting sound

Simple waveform
= boring sound

FM is a simple way to make a complex waveform

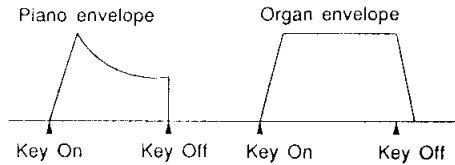
The advantage of FM synthesis is that waveforms with very complicated harmonic structure can be simply and economically created, and controlled in many different musically useful ways. In FM synthesis, one waveform is used to modulate another waveform. Even if the two original waveforms are simple, the result can be a complex and interesting sound.

In the following diagram, the upper oscillator is called the Modulator and the lower oscillator is called the Carrier. The complexity or brightness of the resulting waveform that we hear will depend on the output level of the Modulator; i.e., as we increase the modulation, the complexity or brightness will increase. Increasing the output level of the Carrier will simply increase the volume.



Interesting sounds change over time

Many instruments have a characteristic pattern with which the sound changes as time goes by. This “shape in time” is called the envelope. The following diagram shows how a piano envelope differs from an organ envelope. A piano begins loud and then gradually diminishes in volume and tonal complexity. An organ however maintains the same volume and tone as long as the key is pressed.



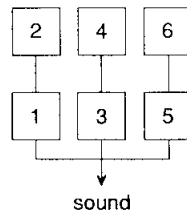
In synthesizers, a device called an Envelope Generator (EG) is used to produce a “shape in time” which can be used to control various aspects of the sound.

An algorithm is an arrangement of six operators

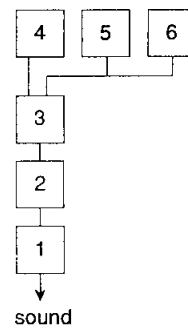
In Yamaha FM synthesizers, each oscillator has its own Envelope Generator (EG) to vary its output level over time. This package of oscillator and EG is called an Operator.

The FM tone generator of the SY99 uses six operators to produce sounds. These six operators can be arranged in 45 different basic Algorithms (patterns or combinations). Each operator acts either as a modulator or carrier depending on its *location* in the algorithm. Only operators that appear at the *bottom* of an algorithm are *carriers*.

For example algorithm 42 uses the six operators as three separate FM pairs; operators 2, 4, and 6 (the modulators) are modulating operators 1, 3, and 5 (the carriers). On the other hand, algorithm 6 has only one carrier; operators 4, 5, and 6 are all modulating operator 3, which is modulating operator 2, which is modulating operator 1.



Algorithm 42



Algorithm 6

How to change the tone of an FM sound

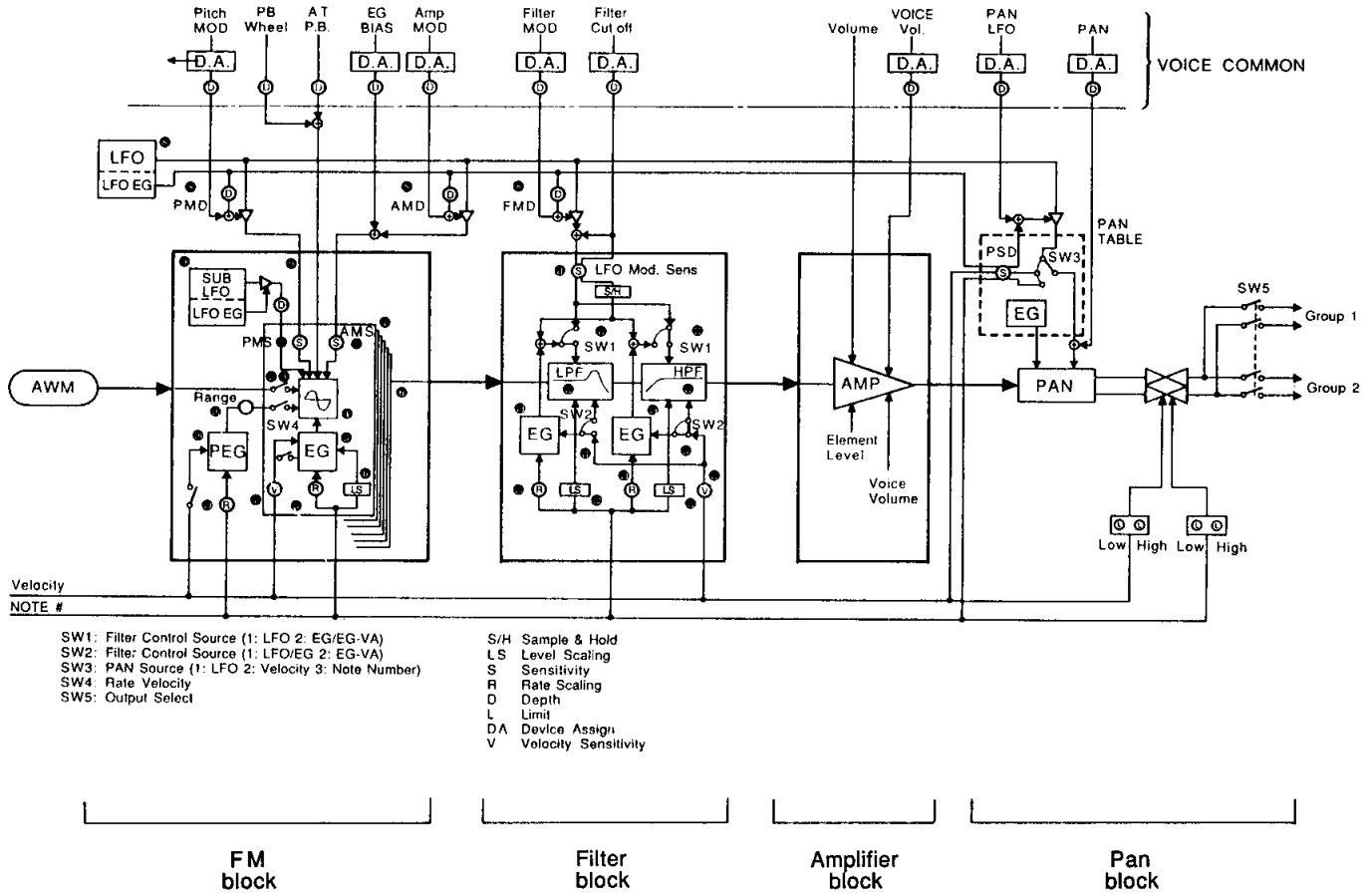
We have learned that the output level of a modulator operator determines how complex or bright the resulting sound will be. This means that changing the output level of a modulator will affect the tone. The output of the carrier operator is what we actually hear, so changing the output level of a carrier will affect the volume.

Before you begin editing an FM sound, check the algorithm to see how the operators are arranged. Notice which operators are acting as carriers and which are acting as modulators. Then you can adjust the output levels of the various operators to modify the tone or volume.

Each operator has its own EG to vary the operator output level over time. Adjusting the EG of a modulator will modify how the tone will change over time. Adjusting the EG of a carrier will modify how volume will change over time.

What is an AFM element?

An AFM element consists of four main blocks. The FM block uses six operators to create a complex sound and determines the pitch and basic tone, the Filter block modifies the tone, the Amplifier block modifies the volume, and the Pan block moves the sound between left and right outputs. Each block can be controlled in a variety of ways.



The above diagram shows how the various blocks in an AFM element are related, and how they can be controlled.

Many different ways to control sound

As explained in the previous section “What is an AWM element”, an AFM element can be controlled in various ways using EG, note number, key velocity, LFO, and controllers.

The FM block determines pitch, tone, and volume

The basic sound of each AFM element is produced by six FM operators arranged in an algorithm. The FM block can be controlled in various ways to modify the *pitch*, *tone*, and *volume* of the sound.

- EGs of the six operators determine how the volume and tone will change over time. Each operator EG can also be affected by the note number or key velocity.

- Pitch EG determines how each note will change in pitch over time. This pitch change can also be affected by the note number or by key velocity.
- LFO signal can be used to create vibrato (by modulating operator pitch) or tremolo (by modulating the output level of a carrier operator) or wah-wah (by modulating the output level of a modulator operator). The amount of pitch modulation or amplitude modulation from the main LFO can be regulated by a controller. In addition, the FM block of an AFM element contains a Sub LFO that can be used to modulate the pitch independently of the main LFO.
- The pitch of all operators can be controlled directly using the pitch bend wheel and/or aftertouch.
- As indicated by the “AWM” in the oval at the far left of the diagram, an AWM digital sample can be used to modulate an FM operator. This is one of the most significant features of the SY99’s tone generation system.

The filter block modifies the tone

The filter block can be controlled in various ways to modify the *tone* of the sound. Each note can be given a fixed pattern of tonal change by using the filter EG, and this can be also affected by the note number or key velocity. Wah-wah (filter modulation) can be created using the LFO, and wah-wah depth can be regulated by a controller. The tone can also be directly affected by a controller.

The filter blocks of AFM and AWM elements are identical.

The amplifier block modifies the volume

The amplifier block can be controlled directly by an assigned controller. Since the change in volume over time of an AFM element is determined by the EGs of carrier operators in the FM block, the amplifier block of an AFM element does not have its own EG.

The pan block moves the sound

The pan block can be controlled in various ways to move the sound between left and right outputs. Each note can be given a fixed pattern of panning by using the pan EG, and this panning can be further affected by either note number, key velocity, or LFO.

The pan blocks of AFM and AWM elements are identical.

The process of voice editing

Editing a voice is a three-step process: select a voice, modify parameters as necessary, and store the edited voice. If you do not store the voice after editing it, the original voice will reappear and your edits will be lost.

1. Select the voice to edit

The first step in the voice editing process is to select the voice you wish to edit. Although it is possible to create a voice starting with the initialized data (a voice where all parameters are set to zero or some basic value), it is usually more efficient to start with a voice that is similar to what you want, and edit it to meet your requirements.

To select a voice, press VOICE to enter voice play mode. The VOICE LED will light red. Select voice memory INTERNAL, CARD, PRESET 1, or PRESET 2. Then select bank A, B, C, or D. Finally select a voice 1–16. The LCD will show the selected voice name.

2. Edit parameters/ compare with the original voice

Now that you have selected a voice, press EDIT to edit it. The upper left of the LCD will show “VOICE EDIT”. If “Mode” at the lower left is not displayed in inverse, press F1 to get the following display.

Original data unchanged

```
VOICE EDIT E1:AFM E3:- 200
           E2:AWM E4:-
P1-A01(01) AP:Rocks 09
01:1AFM mono 05:2AFM Poly 09:1AFM&1AWM
02:2AFM mono 06:1AWM Poly 10:2AFM&2AWM
03:4AFM mono 07:2AWM Poly 11:Drum Set
04:1AFM Poly 08:4AWM Poly
Mode Com E1 E2
```

Notice that a small square is displayed at the left of the voice number. This indicates that the voice has not yet been edited. Press -1/+1 to modify the voice mode parameter. (For now, don't worry about what this parameter actually does. Here we are simply learning the *process* of voice editing.) The voice data has now been edited, and this is indicated by an inverse “E” displayed at the left of the voice number.

Data has been edited

```
VOICE EDIT E1:AFM E3:AWM 200
           E2:AFM E4:AWM
EP1-A01(01) AP:Rocks 10
01:1AFM mono 05:2AFM Poly 09:1AFM&1AWM
02:2AFM mono 06:1AWM Poly 10:2AFM&2AWM
03:4AFM mono 07:2AWM Poly 11:Drum Set
04:1AFM Poly 08:4AWM Poly
Mode Com E1 E2 E3 E4
```

Note:

While editing, it is often useful to see and hear the original data. (This Compare function is available in most editing screens, but NOT in the screen shown above. Move to another editing screen to try out the Compare function.) To temporarily bring back the original data, press EDIT (COMPARE). Notice that a “C” is now displayed, indicating that you are in Compare mode. While in compare mode you can view the various parameters, but will not be able to modify them. To return to Edit mode, press EDIT (COMPARE) once again, and the “C” will change back to an “E”.

3. Store the edited voice

When you have finished editing, you must store the voice if you want to keep it. After you finish editing, exit voice edit mode by pressing EXIT or any mode select key: VOICE, MULTI, SONG, PATTERN, or UTILITY. If you have edited the voice data in any way, the top line of the display will ask "AUTO-STORE VOICE" ?

```
AUTO-STORE VOICE  Push Return/Quit/Store
BP1-A01(01) AP:Rocks
INTERNAL Bank D
08:SI*Conc 05:PC:Snap 09:PC:Tahi 13:SE:Slit
10:ST*Ches 06:PC:Mari 10:PC:Cloc 14:DR Kits
03:BR*Spit 07:PC:Vibe 11:PC:Bala 15:DR Perc
04:ME*Blon 08:PC:Musi 12:PC:Peri 16:DR Mixe
Use bank D !          Ret Quit Stor
```

Note:

Voices which use voice mode 3 (4AFM mono), 8 (4AWM poly), and 10 (2AFM&2AWM) occupy extra memory, and can be stored only in bank D. The AUTO-STORE display for such voices will automatically show bank D, and will show "Use bank D" in the bottom line as a reminder.

Voices which use other voice modes can be stored in bank D as well.

The LCD will show the first seven characters of the voice names in the currently selected bank of voices. The voice name displayed in inverse indicates the voice memory into which the edited data will be stored.

Storing data will overwrite the data that previously occupied that memory, so if you do not want to overwrite the original data, use INTERNAL or CARD to specify the voice memory, select a bank A–D, and select the voice memory 1–16 in which you want to store your newly edited voice.

Procedure:

When: you exit editing mode and LCD blinks "AUTO-STORE VOICE"

Specify: the memory into which you wish to store the voice.

To return: to edit mode and continue editing without storing, press F6 (Ret).

To quit: editing and return to voice play mode without storing the edited data, press F7 (Quit). You will exit voice edit mode, and the bottom line of the LCD will show "Store cancelled !" until you press another button.

To store: the data press F8 (Stor). The bottom line will ask "Are you sure ? (Yes or No)". If you are sure you want to store the edited voice, press +1/YES and the bottom line of the LCD will show "Store completed". If you decide not to store, press -1/NO and the bottom line of the LCD will show "Store cancelled".

How voice edit mode is organized

The parameters of a voice are organized into two or more Job Directories, depending on the voice mode. Each job directory lists several groups of parameters. Select a job from the job directory, and edit the parameters in each job.

Normal voice

If a voice mode of 1–10 is selected, the voice will consist of 1, 2, or 4 elements. Each element will be either an AFM element or an AWM element, depending on the selected voice mode.

Voice parameters will be organized into the following job directories. Press a function key F1–F6 to see the job directories, and select the job you want to edit.

F1 (Mode)	F2 (Com)	F3 (E1)	F4 (E2)	F5 (E3)	F6 (E4)
Specify the Voice Mode	Common data edit job directory	AFM element edit job directory	OR	AWM element edit job directory	
1. 1AFM mono 2. 2AFM mono 3. 4AFM mono 4. 1AFM poly 5. 2AFM poly 6. 1AWM poly 7. 2AWM poly 8. 4AWM poly 9. 1AFM&1AWM poly 10. 2AFM&2AWM poly 11. Drum set	1. Element level 2. Element detune 3. Element note shift 4. Element note limit 5. Element velocity limit 6. Element dynamic pan 7. Output group select 8. Random pitch 9. Portamento 10. Effect set 11. Micro tuning set 12. Controller set 13. Voice name ... 15. Initialize voice 16. Recall voice	1. AFM algorithm 2. AFM oscillator 3. AFM EG 4. AFM operator output 5. AFM sensitivity 6. AFM LFO 7. AFM pitch EG 8. AFM filter ... 15. Initialize AFM element 16. Recall AFM element		1. _____ 2. AWM waveform set 3. AWM EG 4. AWM output 5. AWM sensitivity 6. AWM LFO 7. AWM pitch EG 8. AWM filter ... 15. Initialize AWM element 16. Recall AWM element	

Drum voice

If voice mode 11 has been selected, the voice will consist of 76 AWM waveforms, with a different waveform assigned to each key of the SY99's keyboard. Voice parameters will be organized into the following job directories. Press a function key F1–F2 to see the job directories, and select the job you want to edit.

F1 (Mode)	F2 (Com)
Specify the Voice Mode	Drum Set edit job directory
1. 1AFM mono 2. 2AFM mono 3. 4AFM mono 4. 1AFM poly 5. 2AFM poly 6. 1AWM poly 7. 2AWM poly 8. 4AWM poly 9. 1AFM&1AWM poly 10. 2AFM&2AWM poly 11. Drum set	1. Voice volume 2. Wave data set 3. Effect set 4. Controller set 5. Name ... 7. Initialize 8. Recall

How to select a job

Suppose that you are editing a normal voice and want to edit the Note Shift settings for each element. Press F2 to select the Voice Common data job directory.

```
VOICE EDIT E1:AFM E3: - 201
           E2:AWM E4: -
*P1-A01(01) AP|Rocks
01:ElemLvl 05:ULimit 09:Porta 13:Name 03
02:ElemDtn 06:ElemPan 10:Effect 14:-----
03:03.NtShift 07:OutSel 11:MerTune 15:Initlz
04:NTLimit 08:Random 12:CtrlLr 16:Recall
Mode Com E1 E2
```

Notice that the note shift parameter is job 03. Use the cursor keys or press 0 then 3 on the numeric key pad to move the inverse cursor to "03.NtShift". Then press ENTER and you will enter the Element Note Shift job.

```
ELEMENT NOTE SHIFT EL 1/2 204
VOICE*P1-A01(01) AP|Rocks
Element1 AFM = + 0 |-----*|
Element2 AWM = + 0 |-----*|
E1 E2
```

To return to the job directory, press EXIT.

You can use the <> (PAGE) keys to move to other jobs in the same directory. For example from the note shift job, pressing < would take you to job 02.Element Detune, and pressing > would take you to job 04.Note Limit.

Simple editing: reverb (Effect)

The effect units allow you to add a variety of effects such as chorus, flanging, echo, delay, reverb, pitch change, rotary speaker, and ring modulator, etc. Adjusting the effect is an easy way to change the overall character of a voice.

Select a voice and enter edit mode

Press VOICE and select a voice. So that it will be easy to hear the result of this editing example (and the editing examples in the following sections), select any bright, sustained voice. The voice names and parameter settings shown in the LCDs in this and following sections are for purpose of example, and do not necessarily correspond to any factory preset data.

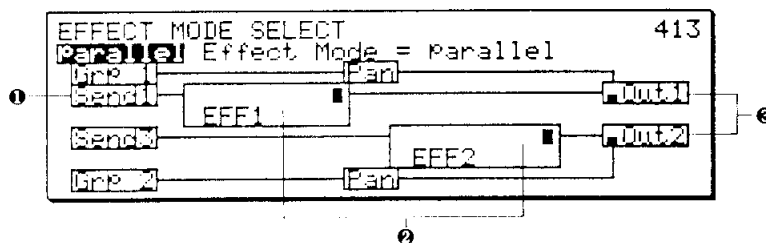
Press EDIT to enter voice edit mode. Press F2 to select the voice edit Common data job directory, and press the numeric keys 1 then 0 or use the arrow keys to select "10.Effect". Press ENTER and the Effect parameter job directory will appear.

```
EFFECT SET                      EL 1234 212
VOICE: I -D01(49) ST*Concert
01: Effect Mode Select          01
02: Effect Send
03: Effect 1 Parameter
04: Effect 2 Parameter
05: Effect Control
-----
01 02 03 04 05
```

First we will be selecting the effect mode and effect types. Press F1 to select "01.Effect Mode Select".

Select the effect modes

The SY99 contains two effect units, which can be connected either in serial or parallel. Use the -/+ keys to select the effect mode. The LCD will graphically indicate how the signal flows from the effect sends into the effect units, and then combined with the dry (unprocessed) sound from the stereo output groups. If "off" is selected the effect units will not be used.



The sound from the effect sends 1-4 ❶ is sent to the effect units ❷ and mixed ❸ with the dry stereo sound from the output groups. For this example, select "parallel" mode.

Select the effect type for effect 1

Press the cursor key \triangleright once to move the cursor to the "EFF1" area. The LCD will show the currently selected effect type above the graphic. You can select one of the 63 effect types for each of the SY99's two effect units. You will want to try out the various settings later; for now, set this to "1:Rev.Hall".

Adjust the wet:dry balance

Press the cursor key \triangleright key twice to move the cursor to the “Out1” area. The LCD will show “Out1 wet:dry =” above the graphic, followed by a ratio indicating the balance between effect and unprocessed sound that is output by the voice selected. The first number indicates the amount of effect sound that is output; the second indicates the amount of unprocessed sound which the effect sound is mixed with. Use the DATA ENTRY slider or the data entry wheel to change this value to 100:0, and notice how the sound changes. (Actually you will still hear some dry sound from Output 2.)

In order to make the result of the following edits obvious, leave the wet:dry setting at 0:100.

Adjust parameters for effect 1

Press the PAGE \triangleright key twice to get the following display.

If the lowest parameter numbers are not showing, press F1 (\triangle) to scroll up.

```
EFFECT 1 PARAMETER          EL  $\blacksquare$  214
Parallel EFF1 Type = 01:Rev. Hall
01:Reverb Time              = 2.6 sec
02:High                      = 0.9
03:Diffusion                 = 4
04:Initial Delay            = 30.0 ms
05:Rev Delay                 = 0.1 ms
```

Here you can edit the parameters of effect 1. With the cursor located at the value for “01:Reverb Time” (initially 2.6 seconds), increase the value while playing the keyboard. Notice that longer reverb times give the impression of a larger more reverberant hall.

You may wish to adjust some of the other parameters of the effect. The number of parameters will depend on the effect type. “01:Rev.Hall” has ten parameters. To adjust the other parameters, press F2 (∇) to get the following display.

```
EFFECT 1 PARAMETER          EL  $\blacksquare$  215
Parallel EFF1 Type = 01:Rev. Hall
06:Density                   = 4
07:ER/Rev Balance            = 78 %
08:Low Gain                   = 0 dB
09:High Gain                  = +06 dB
10:L.P.F.                     = Through
```

When finished, press EXIT twice to return to the voice edit Common data job directory.

Bypass the effect to hear the unprocessed sound

Whether you are in play mode or edit mode, you can press the EF BYPASS switch at any time to bypass the effect units. When you press EF BYPASS the LED will light, and you can hear the sound without the effect. Press it once again, and the LED will go out and the effect will be applied once again.

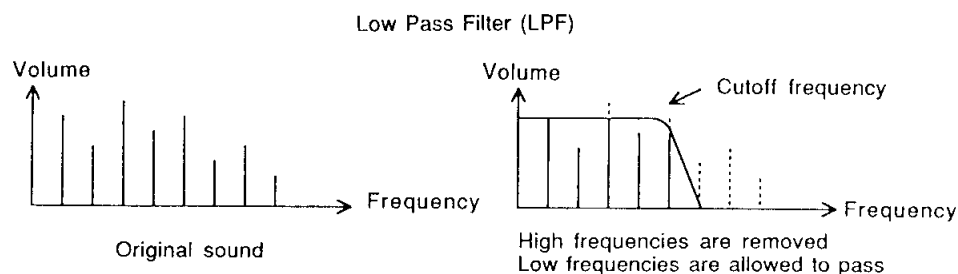
While the effect is bypassed, the volume will be compensated so that you will hear at least -12dB of direct sound.

Simple editing: tone (Filter)

Each element in a voice has two filters which can be used to make overall adjustments in tone. A filter can be controlled in various ways. Controlling a filter by key-on velocity is a simple way to make a voice respond expressively to your keyboard playing.

What is a filter

In electronic musical instruments, a filter removes a specified range of frequencies from the sound, and allows the rest to pass through. For example if the high frequencies are removed and the low frequencies allowed to pass through, the sound will be made darker. This type of filter is called a Low Pass Filter (LPF). The frequency at which the filter begins to affect the sound is called the Cutoff Frequency.



Each of the one, two, or four elements in a normal voice contains two filters, which can be controlled independently. One filter is fixed as a Low Pass Filter (LPF). The other filter can be used either as a LPF or as a High Pass Filter (HPF); i.e., a filter that allows only high frequencies to pass, resulting in a thinner tone.

Turn off unwanted elements

Each normal voice consists of one, two, or four elements, and each element has its own set of two filters. If the voice you are editing contains two or four elements, it may be helpful to listen to only one element as you adjust its filters. To the right of the voice name displayed in the voice edit job directory is a list of the elements used by the currently selected voice.

This voice uses two elements

```
VOICE EDIT E1:AFM E3: - 201
           E2:AWM E4: -
•P1-A01(01) AP:Rocks 03
01:ElemLvl 06:Ullimit 08:Porta 13:Name
02:ElemDtn 06:ElemPan 10:Effect 14:-----
03:ENLsmf 07:OutSel 11:Mcrtune 15:Initlz
04:ENL limit 08:Random 12:CtrlLr 16:Recall
Mode Com E1 E2
```

The voice selected in the above display uses two elements. Press EL 2 (the bank B button) to turn off element 2. Now you will hear only element 1. Press EL 2 once again and it will be turned on. You can turn each element on/off at any time while editing.

Specify the type of filter and the cutoff frequency

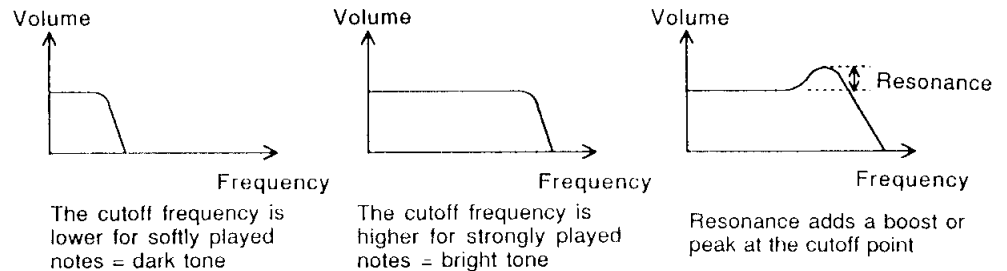
Press F3 to select the voice edit Element 1 job directory, select 08:Filter, and press ENTER.

Filter parameters are divided into three jobs. Press F1 to select 01:Cutoff Frequency.

CUTOFF FREQUENCY		OP	122453	249
VOICE=P1-A01(01)		APIRocks (E1/AFM)		
Filter1	LPF	Cutoff Freq	19.47kHz (124)	EG-VA
Filter2	LPF	Cutoff Freq	19.47kHz (124)	EG-VA
Resonance = 1		Velocity Sens	= -3	
		LFO Cutoff Sens	= +2	
		Sync	A19	

Set both filters 1 and 2 to LPF and 9.510 kHz, and set Velocity Sens = +7. Play notes on the keyboard, softly and then strongly. Notice that as the keyboard is played more strongly, the tone is brighter. This is because the velocity sensitivity setting of +7 allows the key velocity to increase the cutoff frequency of the filter.

Increasing the Resonance setting will boost the frequencies at the cutoff point, making the effect of the filter more noticeable.



Other ways to control the filter

The SY99 provides many ways to control the filter in addition to key velocity.

EG: Each of the two filters has its own independent EG, which can be used to give each note a fixed pattern of tonal change, such as the characteristic “whaaa” of a brass instrument.

Note Number: The note number can affect the rate at which each filter EG changes the tone, and/or affect the width of the change in tone. For example high notes can be made to change in tone more rapidly than low notes, or low notes can be made to change in tone more than high notes.

Key velocity: Key velocity can be used to affect the amount of tonal change produced by each filter EG. For example strongly played notes can be made to have a greater change in tone.

LFO: Wah-wah (cyclical tone change) occurs when the LFO is applied to the filter block.

Controllers: A specified controller (such as modulation wheel or foot controller) can be used to adjust the depth of the wah-wah (Filter Modulation) caused by the LFO.

For example to assign MODULATION 2 to filter depth, you must

1. go to System Utility, 3. Controllers (JUMP #803) and make sure that controller number 13 is assigned to MODULATION 2.
2. go to Voice Common Job 12.Controller Set (JUMP #226) and press F3 (Mod)
3. select controller number 13 to affect filter depth
4. go to element filter page (for an AFM element JUMP #249, for an AWM element JUMP #265), assign Filter to be controlled by LFO,
5. adjust LFO cutoff sensitivity for the amount of control you wish.
6. If the LFO has already been assigned to affect filter cutoff, you may wish to decrease the LFO F.Mod Depth (for an AFM element JUMP #244, for an AWM element JUMP #261).

Or, a device can be used to directly control the filter EG, for example allowing you to use a controller to continuously adjust the tone during a note.

Simple editing: vibrato (LFO)

The LFO produces a repeating pattern of change. Vibrato is created by applying the LFO to the pitch.

What is an LFO

A Low Frequency Oscillator (LFO) is a device that produces a waveform at a slow speed (low frequency). This slowly repeating waveform can be applied to various aspects of the sound to cause repeating patterns of change. When the LFO is applied to the pitch, vibrato is the result. When the LFO is applied to the filter, wah-wah is the result. When the LFO is applied to the volume, tremolo is the result.

Adjust the LFO

In this example we will use the LFO to add vibrato to the sound. Move to the Voice Edit job directory, and press F3 to get the Element 1 job directory. If element 1 is AWM, select job 06:LFO. If element 1 is AFM, select job 06:LFO and press F1 to select the Main LFO.

```
AFM LFO                               OP 23456 244
VOICE=P1-A01(01) AP:Rocks (E1/AFM)
Main LFO
Wave = triangle A Mod Depth = 0
      ^~ P Mod Depth = 20
Speed = 17 F Mod Depth = 0
Delay = 0 Init Phase = 0
Main Sub                                     A19
```

The Main LFOs of AWM and AFM elements are the same. (AFM elements have a Sub LFO which we will not be using in this example.)

Increase the P Mod Depth setting (Pitch Modulation Depth) while playing a note, and you will hear vibrato. If you do not hear any change when you increase the LFO P Mod Depth, you may need to increase the Pitch Modulation Sensitivity (PMS) as explained in the last two paragraphs below.

Other LFO parameters — Speed and Wave

To regulate the speed of vibrato, move the cursor to Speed and adjust the value over a range of 0–99. Extremely high settings will result in a buzzing sound, and extremely low settings will result in a very slow pitch change.

To modify the shape of the vibrato, move the cursor to Wave and select a different LFO waveform. The selected LFO waveform will be graphically shown in the line below.

Before you proceed to the next section of this example, set P Mod Depth to 0.

Increase the modulation sensitivity for an AWM element

Press EXIT to return to the Element 1 job directory, and select 05:Sensitivity (sensitivity).

```
AWM SENSITIVITY                       260
VOICE=P1-C02(34) BR:BigBand(E1/AFM)
Velocity Sens = 23
Rate Vel Switch = on
Amp Mod Sens = +7
Pitch Mod Sens = 2
```


Pitch Mod Sense (pitch modulation sensitivity) determines how sensitive the pitch will be to modulation from the LFO.

Increase the modulation sensitivity for an AFM element

Press EXIT to return to the Element 1 job directory and select 05:Sensitiv (sensitivity).

AFM SENSITIVITY		OP 123456 243				
VOICE=P1-A01(01)		AP:Rocks (E1/AFM)				
	OP1	OP2	OP3	OP4	OP5	OP6
Velocity	+4	+3	+2	+1	+3	+5
Rate Vel	off	off	on	on	on	on
PModSens	0	0	0	0	0	0
PModSens	1	1	0	0	0	0
KUS	Rate	AMS	PMS			H19

PModSens (pitch modulation sensitivity) is adjustable independently for each operator over a range of 0-7. To create normal vibrato, all operators must be pitch modulated equally by the LFO. Increase the PModSens equally for all operators. (If the LFO affects the pitch of some operators more than others, the harmonic structure of the sound will vary, which can be an interesting effect in its own right.)

Simple editing: using a controller

Many acoustic instruments allow the musician to modify the volume, tone, or pitch while a note is being played. The SY99's controllers can be assigned to continuously affect various aspects of the sound for musically expressive control.

Control makes musical expressiveness possible

On instruments such as piano or organ, there is little that the musician can do to modify the sound once the note has been played. However on instruments such as wind, brass, or strings, the volume, tone, or pitch can be continuously and freely modified even while sound is being produced. The SY99's Controllers (pitch and modulation wheels, aftertouch, optional foot controllers, etc.) can be used to control various aspects of the sound over the duration of a note. This allows the SY99 to be played with the musical expressiveness of an acoustic instrument.

Assign a controller to regulate vibrato

In the voice edit job directory, press F2 to get the Common data job directory and select 12:Cntllr (controller). In this example, press F3 (Mod) to get the LFO modulation controller assignment job.

CONTROLLER SET		EL	226
VOICEBP1-A01(01) AP Rocks			
Modulation Depth			
Pitch	Depth	MIDI Ctrl No.	& Device
	127	001	Modulation
Amplitude	0	off	
Filter	0	off	
PB	Aft	Mod	Pan Othr

Move the cursor to the Pitch row. Set Depth to its maximum value of 127 and the MIDI Controller Number to 001 Modulation. With this setting, the MODULATION 1 wheel will regulate the depth of pitch modulation over its full range. Move the MODULATION 1 wheel and notice that vibrato deepens as you move the wheel forward. You will probably find that when the wheel is fully forward, the effect is too extreme to be musically useful. Decrease the Depth setting so that the full range of the wheel is musically useful.

In this example, you assigned the MODULATION 1 wheel to control pitch modulation, but any other controller could have been used instead. It is also possible to assign two or more parameters to be regulated by the same controller.

Adjust the pitch bend range

The PITCH wheel located at the left of the keyboard always controls the pitch. Its function cannot be reassigned, but you can adjust its range. Press F1 (PB) to get the following display.

CONTROLLER SET		EL	225
VOICEBP1-A01(01) AP Rocks			
Pitch Bend Wheel			
Pitch Bend Range = 12			
PB depends on ZONED AFTERTOUCH MODE.			
PB	Aft	Mod	Pan Othr

With the settings as shown in the display, the PITCH wheel will bend the pitch up or down by two half steps. Modify the Pitch Bend Wheel value in the display, and move the PITCH wheel up and down to hear how the pitch is affected.

Note: The action of the PITCH wheel may be modified using the Zoned Aftertouch settings, described below. This allows for rather sophisticated usage of the PITCH wheel.

Use zoned aftertouch

The keyboard of the SY99 is sensitive to aftertouch (pressure on the keyboard after a note is played). A single aftertouch value is produced for the entire keyboard; not independently for each note. However, the SY99's Zoned Aftertouch parameter allows you to restrict the effect of aftertouch to a specified zone (area) of the keyboard, or even to the single highest or lowest note currently being pressed.

Press F2 (Aftt) to get a display like the following.

```
CONTROLLER SET          EL  276
VOICEBPI-A01(01)  API:Rocks
  After Touch
    Zoned After Touch Mode    = top
    Split Point               = C 3
    After Touch Pitch Bend Range = +2
  *SPLIT POINT is valid only SPLIT MODE.*
PB  Mod Pan Othr
```

As shown in the display, set Zoned After Touch Mode to "top", and After Touch Pitch Bend Range to "+2". Now play and hold a chord, and press firmly down on the keyboard. Notice that only the top note of the chord rises in pitch.

In this example, aftertouch is affecting the pitch bend. However just as you assigned vibrato to be affected by the MODULATION 1 wheel, you can also assign vibrato (or any other parameter) to be affected by aftertouch. In this case, zoned aftertouch would allow you to apply vibrato to just the top note of a chord when you press down on the keyboard. Since the melody line is usually the highest in pitch, zoned aftertouch can be used to make the melody stand out expressively from the other notes being played.

Other settings of Zoned After Touch Mode allow aftertouch to affect all notes, the bottom note, notes above a split point, or notes below a split point.

Other controller assignments

F4 (Pan) allows you to make assign controllers to regulate panning (stereo position), and F5 (Othr) allows you to make controller assignments for various other parameters.

Except for pitch bend, a different controller can be assigned to each parameter. It is also possible to assign the same controller to affect two or more parameters.

Simple editing: attack (EG)

The Envelope Generator (EG) determines how a sound attacks (begins) and decays (ends).

What is an envelope generator

Most instruments have a characteristic pattern in which the volume or tone changes over time. In electronic instruments, this is determined by the envelope generator (EG). The EG produces a fixed pattern of change over time. For example to simulate the attack and decay of a piano, you would set the volume EG to be loud when the note is first played and then gradually diminish in volume. The EGs of the SY99 allow you to specify a change over time by settings Levels and Rates. The levels are volume levels, and the rates determines the speed of change that leads to the next level.

In this example, we will be adjusting only R1 (rate 1) to change the attack of the sound.

AWM element EGs are slightly different from AFM element EGs. If you are editing an AWM element, continue to the next section "Adjusting the attack of an AWM element". If you are editing an AFM element, skip to the last section "Adjusting the attack of an AFM element".

Adjusting the attack of an AWM element

For an AWM element, the amplifier block EG determines how the volume of each note will change over time. From the AWM element 1 job directory, select 03:EG. If the Mode is set to "hold", change it to "attack".

```
AWM EG                               258
VOICE=P1-C16(48) ST:Pizza (E1/AWM)
Mode = Hold [x_1][Se91] R1=63
                                R2= 0 L2=63
                                R3=16 L3=63
                                R4= 0
                                RR=37 RS=+3
x 1 x 2 x 5 x 10 x 20 x 50 << >>
```

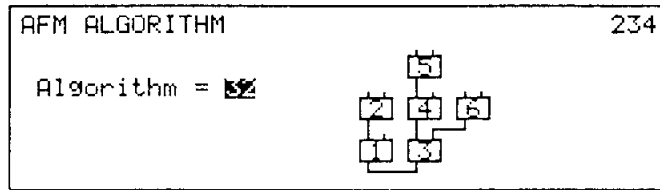
Move the cursor to R1 (rate 1) and decrease the value while repeatedly playing notes. Notice that as R1 decreases, the attack becomes slower.

Adjusting the attack of an AFM element

For an AFM element, the combined effect of the operator EGs determines the way the element's volume and tone change over time. From the AFM element 1 job directory, select 03:EG. Press F2 (All) and then press F3 (OnR) (key-on rates).

```
AFM OPERATOR EG                       OP 123456 238
VOICE=P1-A01(01) AP:Rocks (E1/AFM)
Keyon Rates & Rate Scaling
HT R1 R2 R3 R4 RS HT R1 R2 R3 R4 RS
1 0 51 25 19 15 +6 4 28 54 50 46 5 +5
2 0 51 21 16 12 +3 5 0 49 28 22 13 +7
3 0 46 26 18 15 +6 6 0 63 28 7 9 +0
Each All OnR OnL K-of A13
```

The EGs of carrier operators determine how the volume will change over time, and the EGs of modulator operators determine how the tone will change over time. To see which operators are acting as carriers, press F8 (Alg) to get a graphic display of the algorithm. The operators in the bottom row are acting as carriers.



In the algorithm used by this AFM element, operators 1 and 4 are the carriers. Press EXIT to return to the AFM operator EG display.

Move the cursor to R1 (rate 1) of the carrier operator(s), and decrease the value while playing. Notice that as R1 decreases, the attack becomes slower.

Depending on how the modulator operators are being used, it may be necessary to decrease R1 for modulator operators as well.

How to name and store your new voice

If you have followed along with the last five “Simple editing” sections, the voice is now probably quite different than when you first selected it. Even if the voice sounds rather strange, give it a new name and store it as explained in this section.

Enter a 10-character voice name

From the voice edit Common data job directory, select 13:Name.

```
VOICE NAME                               229
VOICE=P1-A01(01)
      ↓
      [AP]Rocks 1
-----
Clr Upper Lower
```

Press F1 (Clr) to clear the currently set voice name, and use the numeric keypad to enter the characters printed below each key. Press F2 to select uppercase characters and press F3 to select lowercase characters. Use <> to move the cursor.

For example to enter the voice name “New1”, use < to move the cursor to the beginning of the line, and press the following buttons; F2 to select uppercase, 4 three times to enter “N”, >, F3 to select lowercase, 1 three times to enter “e”, >, 7 three times to enter “w”, >, and 1 once to enter “1”.

Store the edited voice

When you have finished entering the voice name, press the mode select key VOICE to exit to the voice edit Common job directory. Since the voice data has been edited, the top line of the display will blink “AUTO-STORE VOICE”

```
AUTO-STORE VOICE  push Return/Quit/Store
BP1-A01(01) New Voice
INTERNAL Bank A
[AP]Rocks 06:EP:76St 00:EP:Bel1 13:KY:Smok 01
02:AP:Crsk 06:EP:Clas 10:EP:DXis 14:KY:Crsc
03:AP:Conc 07:EP:Nite 11:EP:GrnD 15:KY:Clav
04:AP:Stal 08:EP:Belr 12:EP:Uoxl 16:KY:Reso
Ret Quit Stor
```

Note:

Voices which use voice mode 3 (4AFM mono), 8 (4AWM poly), and 10 (2AFM&2AWM) occupy extra memory, and can be stored only in bank D. The AUTO-STORE display for such voices will automatically show bank D, and blink “Use bank D” in the bottom line as a reminder.

Voices which use other voice modes can be stored in bank D as well.

The LCD will show the first seven characters of the voice names in the currently selected bank of voices. The voice name displayed in inverse indicates the voice memory into which the edited data will be stored.

Storing data will overwrite the data that previously occupied that memory, so if you do not want to overwrite the original data, use INTERNAL or CARD to specify the voice memory, select a bank A–D, and select the voice memory 1–16 in which you want to store your newly edited voice.

For example to store your new voice in Internal memory bank C memory number 16, press INTERNAL, then C then 16.

```

AUTO-STORE VOICE  Push Return/Quit/Store
BP1-A01(01) New Voice
INTERNAL Bank C                               16
01:BR:Trmp 06:BR:FrHo 08:BR:Sp1a 13:ST:Chor
02:BR:BigB 09:BR:DrKH 10:BR:Pump 14:ST:Rosi
03:BR:Jazz 07:BR:Azen 11:BR:StgL 15:ST:Quar
04:BR:Mute 05:BR:DaBu 12:ST:Orta 05:BR:Trmp
Ret Quit Stor
  
```

The voice will be stored into this memory

Press F8 (Stor), and the bottom line will ask “Are you sure ? (Yes or No)”. If you are sure you want to store the edited voice, press +1/YES and the bottom line of the LCD will show “Store completed”. If you decide not to store, press -1/NO and the bottom line of the LCD will show “Store cancelled”.

You will then return to voice play mode.

```

VOICE=I -C16(48)      Trans.Ch= 1  100
New Voice             1AFM&1AWM
PARALLEL  EFF1:EQ -> St.Chorus
           EFF2:Rev. Stage 1
Store completed !
  
```

How to edit a drum voice

A drum voice is a special type of voice which plays a different AWM wave on each key of the SY99's 76-note keyboard. This is normally used to assign drums and percussion sounds to the keyboard when creating rhythm accompaniments.

Set the voice mode to Drum Voice

In the top level of voice edit mode, press F1 (Mode) to get the voice mode job and select 11:Drum Set.

```
VOICE EDIT - Drum Set - 200
BP1-A01(01) AP:Rocks 11
01:1AFM mono 05:2AFM Poly 09:1AFM&1AWM
02:2AFM mono 06:1AWM Poly 10:2AFM&2AWM
03:4AFM mono 07:2AWM Poly 11:Drum Set
04:1AFM Poly 08:4AWM Poly
Mode Com
```

Drum voice parameters

Press F2 (Com) to get the voice common data job directory. All drum voice parameters are contained in this job directory.

```
VOICE EDIT - Drum Set - 272
BP1-A01(01) AP:Rocks 01
01:Voice Volume 05:Name
02:Wave Data Set 06:-----
03:Effect Set 07:Initialize
04:Controller Set 08:Recall
Mode Com
```

As when editing a normal voice, a drum voice allows you to set the overall volume of the voice (01:Voice volume), make settings for the DSP effect units (03:Effect Set), specify the controller which will regulate the volume of the voice (04:Controller Set), and assign a name (05:Drum Set Name).

A drum voice differs from other voices mainly in the second parameter job, 02:Wave Data Set.

Wave Data Set — select a wave for each key

From the voice common data job directory, select 02:Wave Data Set.

```
WAVE DATA SET 274
VOICEBP1-A01(01) AP:Rocks (Drum Set)
Key Note Number : C 1
Waveform = Prset1 86 BD 1
Level = 127 Note Shift = + 0
Alternate = off Fine Tune = + 0
Output Group = both Static Pan = + 0
K-Dn K-Up Pre1 Pre2 Card Intr
```

This job is where you specify the AWM wave played by each key. Adjustments for level, pan, etc. can also be made independently for each key.

Press the C1 key or use F1 (K-Dn) and F2 (K-Up) to select C1 (two octaves below the C3 mark on the SY99 keyboard). Move the cursor to Waveform and select preset wave number 86 BD 1 (bass drum).

```
WAVE DATA SET 274
VOICEBP1-A01(01) AP:Rocks (Drum Set)
Key Note Number : C 1
Waveform = Prset1 86 BD 1
Level = 127 Note Shift = + 0
Alternate = off Fine Tune = + 0
Output Group = both Static Pan = + 0
K-Dn K-Up Pre1 Pre2 Card Intr
```


Next select note C#1 and specify preset wave number 94 SD 1 (snare drum).

```

WAVE DATA SET 274
VOICEBP1-A01(01) AP|Rocks (Drum Set)
Key Note Number : C#1
Waveform = Preset 94 SD 1
Level = 127 Note Shift = + 0
Alternate = off Fine Tune = + 0
Output Group = both Static Pan = + 0
K-Dn K-Up Pre1 Pre2 Card Intr
  
```

In this way, make the following settings for notes C1–F#1 to create the simple seven-instrument drum set shown in the table below. For notes F and F# set Alternate to “on”.

Note	Wave no.	Wave name	Alternate
C1	86	BD 1	off
C#1	94	SD 1	off
D1	104	Tom 1	off
D#1	105	Tom 2	off
E1	118	Ride	off
F1	112	HH mid	on
F#1	114	HH open	on

Alternate On/Off

Play notes C1–F#1 to play your new drum set. Notice that when you play F#1 (hi-hat open) and then quickly play F1 (hi-hat mid), the open hi-hat will stop sounding when the closed sound begins. It is impossible for a real hi-hat to produce closed and open sounds at the same time, and this is the reason that we set these two waves to Alternate on. When two or more waves are set to alternate on, the last-played wave will take priority and the previously played wave will be turned off.

Other wave data settings

The volume of each note is adjusted by Level. The tuning of each note is adjusted in half steps by Note Shift and finely by Fine Tune. The stereo position of each note is determined by Static Pan.

The *Voice edit mode, Drum set data* section explains the details of these and other parameters.

Name and store your new drum voice

As explained in the previous section, give your newly created drum voice a name and store it into memory. The previous section of this manual *How to use the sequencer* has shown how to use the sequencer to play a drum voice along with other parts in a song.

Note: *Drum voices may be stored in any of the four banks A through D. However, since these voices contain a large volume of data, only the data for notes C1 to C6 will be saved if a drum voice is stored in banks A, B, or C. Store drum voices in bank D if you wish to save the data for the full range of notes from E0 to G6.*

How to create a split and layered voice

Each normal voice consists of one, two, or four elements. By restricting each element to a specified range of the keyboard or a specified range of velocity values, you can create a split and/or layered voice.

Copy elements into the current voice

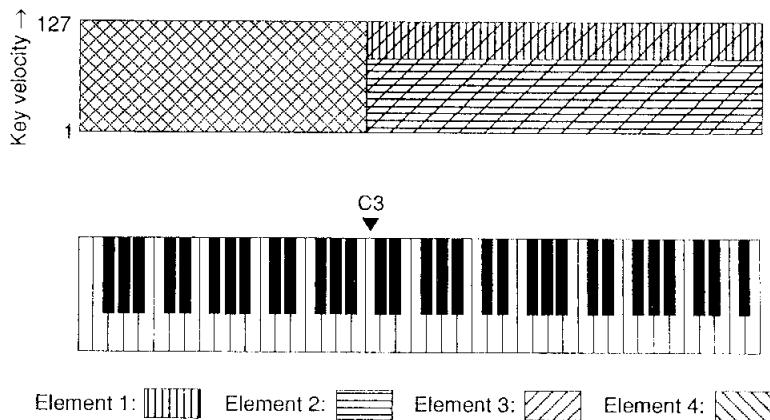
In this example, we will create a four-element voice by copying element data from other voices, and then setting the voice common parameters Element Note Limit and Element Velocity Limit so that each voice plays only in the range we specify.

Element 1: AFM brass (from P1-C06 DrkHorn) for notes above C3, sounded by velocities above 80

Element 2: AFM strings (from P2-C11 StgLayr) for notes above C3, sounded by velocities up to 79

Element 3: AWM piano (from P1-A01 Rocks) across the entire keyboard, all velocities

Element 4: AWM bass (from P2-C06 Upright) for notes up to C3, all velocities



Initialize the voice common data

We will begin by initializing the voice common data. (The data of each element will be overwritten by the elements we copy into the voice.) Select a non-drum voice. From the top level of voice edit mode, press F2 (Com), select job 15:Initz., and press ENTER. Press YES in response to the "Are you sure?" display.

Set the voice mode to 10:2AFM&2AWM

In this example we will create a four-element voice containing two AFM elements and two AWM elements. In the top level of voice edit mode, press F1 (Mode) to get the voice mode job, and select voice mode 10:2AFM&2AWM.

```

VOICE EDIT  E1:AFM E3:AWM 200
             E2:AFM E4:AWM
BP1-A01(01) AP:Rocks 10
01:1AFM mono 05:2AFM Poly 09:1AFM&1AWM
02:2AFM mono 06:1AWM Poly 10:2AFM&2AWM
03:4AFM mono 07:2AWM Poly 11:Drum Set
04:1AFM Poly 08:4AWM Poly
Mode Com E1 E2 E3 E4
    
```

Copy an element into element 1

In the top level of voice edit mode, press F3 (E1) to select the AFM element edit job directory, select 1:Algrthm, and press ENTER. (The *Copy element* function is available only while in AFM element jobs 1, 2, 6, or 7.) Press COPY to get the following display.

```
COPY ELEMENT
Source Voice Select
P1-A01(01) AP:Rocks 01
06:EP:76St 08:EP:Bel1 13:KY:Smok
10:AP:Drsk 06:EP:Clas 10:EP:DXis 14:KY:CrnC
08:AP:Conc 07:EP:Nite 11:EP:GrnD 15:KY:Clav
04:AP:Stg1 08:EP:Belr 12:EP:UoxL 16:KY:Reso
Src Elem
```

Here you can select the voice from which to copy the element. In this example, select P1-C06 DrkHorn. Then press F2 (Elem) to get the following display.

```
COPY ELEMENT
Element No. Select

Source Voice: P1-C06(38) BR:DrkHorn
E1:AFM E2:AWM E3: - E4: -
Element No. = 1

Src Elem Go
```

Here you can specify which element of the selected voice will be copied into the voice you are currently editing. AFM elements can be copied only into an AFM element, and AWM elements can be copied only into an AWM element. Since element 1 of DrkHorn is the only AFM element it contains, this is the only possible selection. Press F8 (Go), and then confirm YES to execute the copy element operation. The bottom line will show "Completed!" Press EXIT to exit the copy element display.

Copy other elements into elements 2-4

The element select buttons are located at the upper right of the front panel. In voice play mode they are used to select internal, card, or preset voices. In voice edit mode they are used to move between elements 1-4. Press element select button EL 2 to move to element 2. You will still be in the *AFM algorithm* editing display, but the EL 2 LED will be lit to indicate that element 2 is selected for editing.

Press COPY to get the Copy Element display, and select P1-C11 StgLayr element 1 to be copied into element 2 of your new voice.

```
COPY ELEMENT
Element No. Select

Source Voice: P1-C11(43) BR:StgLayr
E1:AFM E2:AWM E3: - E4: -
Element No. = 1

Src Elem Go
```

Press F8 (Go) to execute the copy element operation, and then press EXIT to return to the editing display.

In the same way, press element select button EL 3 to select element 3, and copy P1-A01 Rocks element 2 into element 3 of your new voice.

Then press element select button EL 4 to select element 4, and copy P2-C06 Upright element 2 into element 4 of your new voice.

Your new voice now consists of four elements: AFM brass, AFM strings, AWM piano, and AWM bass. Play the keyboard, and notice that each note sounds all four elements.

Assign key limits to each element

Press EXIT once to return to the top level of voice edit mode, and press F2 (Com) to get the voice common data job directory. Select job 04:NtLimit (note limit) and press ENTER to get the Element Note Limit display. Make settings so that the display looks like the following.

ELEMENT NOTE LIMIT				EL	285
VOICEBP1-A01(01)				API	Rocks
		Low	High		
Element1	AFM	C#3	G#3		
Element2	AFM	C#3	G#3		
Element3	AWM	C -2	G#3		
Element4	AWM	C -2	C#3		
E1	E2	E3	E4		Kbd

Play the keyboard and notice that the brass and strings will sound only for C#3 and above, and the bass only for C3 and below.

Assign velocity limits to each element

Press the PAGE > key once to get the Element Velocity Limit display. Make settings so that the display looks like the following.

ELEMENT VELOCITY LIMIT				EL	286
VOICEBP1-A01(01)				API	Rocks
		Low	High		
Element1	AFM	80	127		
Element2	AFM	1	127		
Element3	AWM	1	127		
Element4	AWM	1	127		
E1	E2	E3	E4		

Play the keyboard and notice that the notes C#3 and above will sound either brass or strings depending on how strongly you play.

Name and store your new split/layer voice

Using the procedure explained on page 74, give your newly created voice a name and store it into memory.

Other possibilities

You may wish to adjust the volume of each element (press PAGE < four times to get the *Element level* display, or JUMP #202).

The *Element note limit* setting in the above example creates abrupt changes; e.g., the bass plays at full volume on C3 and not at all on C#3. If you wish to make gradual keyboard crossfades between elements, set the output level scaling for each element. Refer to *4.AFM operator output* (JUMP #241) and *4.AWM output* (JUMP #259).

The *Element velocity limit* setting in the above example allows playing dynamics to create sudden change. If you wish to create gradual velocity crossfades between elements, set the velocity sensitivity parameters of each element to opposite settings (positive or negative values). See the velocity sensitivity parameters in *5.AFM sensitivity* (JUMP #243), *8.1 Cutoff frequency* (JUMP #249), and *5.AWM sensitivity* (JUMP #260).

The Utility mode setting *Velocity set* (JUMP #802) allows you to specify how the SY99 keyboard transmits velocity. When using velocity crossfades, you may wish to select Velocity curve 6 or 7. This will produce exponential crossfading which may sound more effective than the normal linear velocity curve.



