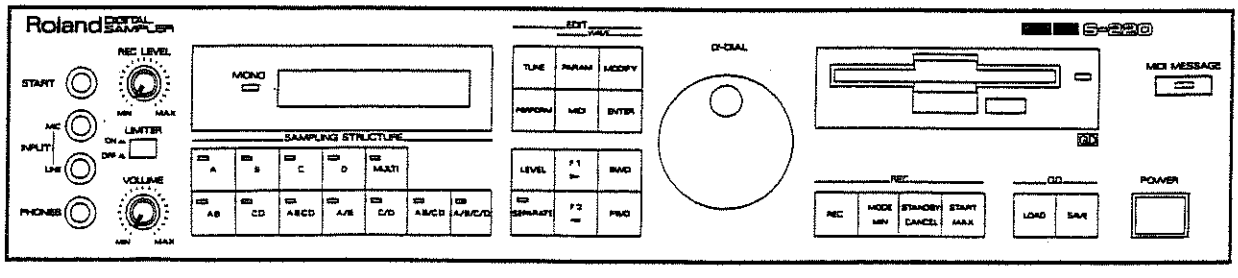
Roland

MIDI DIGITAL SAMPLER

S-220

Owner's Manual



FEATURES

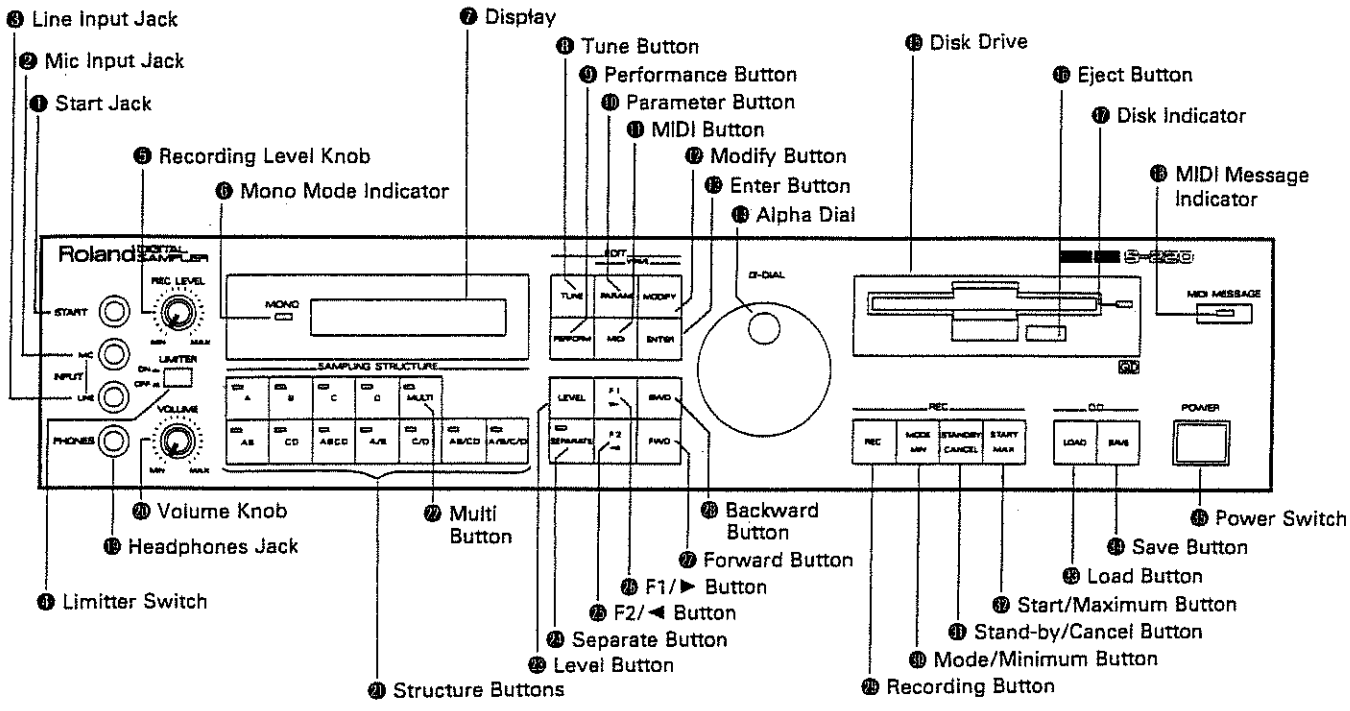
The Roland Digital Sampler S-220 is a completely new type of MIDI Sound Module which can record (sample and record into computer memory) all sorts of sounds, then play these sounds via a connected instrument.

The S-220 is conceptually like a tape recorder, in that it records sound. However, the recording process is very different, since the S-220 is recording into computer memory. Computers can accept information only as digital signals, so the S-220 converts audio signal into digital. It does this by examining (sampling) the incoming signal level a great many times every second, and sequentially recording these different levels in computer memory. This digital recording process is called SAMPLING.

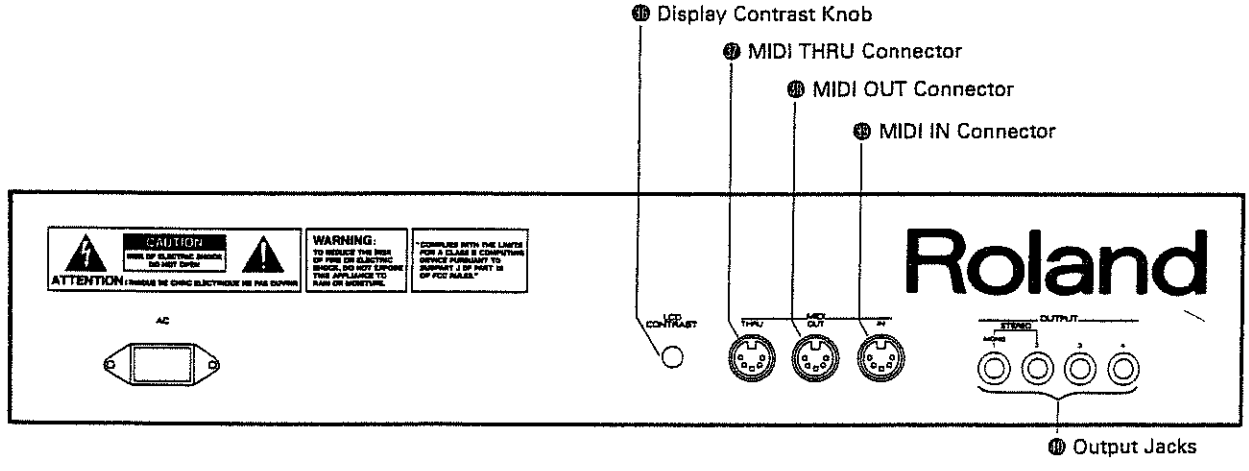
- The S-220 has four Banks (A, B, C and D) to record the sounds, therefore any of the four samples can be instantaneously selected.
- The S-220 features a dynamics function.
- The Split function allows it to play two different sounds in the upper and the lower sound ranges.
- The sound you have recorded can be saved onto a 2.8 inch quick disk (QD) for future use.
- The liquid crystal display and the alpha dial serve to make the operation quicker and easier.
- MIDI Mono Mode makes the S-220 useful for the GR Guitar System.
- The S-10 Roland Digital Sampling Keyboard Sound Library QD can be used for the S-220.
- The MULTI function allows the S-220 to behave like several sound modules, with different sounds.

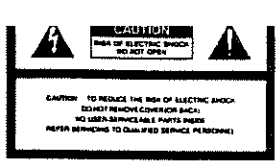
PANEL DESCRIPTION

[Front Panel]



[Rear Panel]







The lightning flash with arrowhead within an 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 electric shock to persons.



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

INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK OR INJURY TO PERSONS.

IMPORTANT SAFETY INSTRUCTIONS

WARNING When using electric products, basic precautions should always be followed, including the following;

1. Read all the instructions before using the product.
2. To reduce the risk of injury, close supervision is necessary when a product is used near children.
3. Do not use this product near water- for example, near a bathtub, washbowl, kitchen sink, in a wet basement, or near a swimming pool, or the like.
4. This product should be used only with a cart or stand that is recommended by the manufacture.
5. This product, either alone or in combination with an amplifier and headphones or speakers, 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 level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.
6. The product should be located so that its location or position does not interfere with its proper ventilation.
7. The product should be located away from heat sources such as radiators, heat registers or other products that produce heat.
8. The product should avoid using in where it may be effected by dust.
9. The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product.
10. The power-supply cord of the product should be unplugged from the outlet when left unused for a long period of time.
11. Do not tread on the power-supply cord.
12. Do not pull the cord but hold the plug when unplugging.
13. When setting up with any other instruments, the procedure should be followed in accordance with instruction manual.
14. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
15. The product should be serviced by qualified service personnel when:
    A: The power-supply cord or the plug has been damaged; or
    B: Objects have fallen, or liquid has been spilled into the product; or
    C: The product has been exposed to rain; or
    D: The product does not appear to operate normally or exhibits a marked change in performance: or
    E: The product has been dropped, or the enclosure damaged.
16. Do not attempt to service the product beyond that described in the user-maintenance instructions. All other servicing should be referred to qualified service personnel.

SAVE THESE INSTRUCTIONS

ADVARSEL!

Lithiumbatteri. Eksplosionsfare.
Udskiftning må kun foretages af en sagkyndig, og som beskrevet i servicemanual.

VARNING!

Lithiumbatteri. Explosionsrisk.
Får endast bytas av behörig servicetekniker.
Se instruktioner i servicemanualen.

ADVARSEL!

Lithiumbatteri. Fare for eksplotion.
Må bare skiftes av kvalifisert tekniker som beskrevet i servicemanualen.

VAROITUS!

Lithiumparisto. Räjähdysvaara.
Pariston saa vaihtaa ainoastaan alan ammottimies.

WARNING

THIS APPARATUS MUST BE EARTH GROUNDED.

The three conductors of the mains lead attached to this apparatus are identified with color as shown in the table below, together with the matching terminal on the UK type power plug. When connecting the mains lead to a plug, be sure to connect each conductor to the correct terminal, as indicated.
"This instruction applies to the product for United Kingdom."

MAINS LEADS		PLUG
Conductor	Color	Mark on the matching terminal
Live	Brown	Red or letter L
Neutral	Blue	Black or letter N
Grounding	Green-Yellow	Green, Green-Yellow, letter E or symbol

Bescheinigung des Herstellers /Importeurs

Hiermit wird bescheinigt, daß der/die/das
ROLAND DIGITAL SAMPLING MODULE S-220
(Gerät, Typ, Bezeichnung)

in Übereinstimmung mit den Bestimmungen der
Amtsbl. Vfg 1046 / 1984
(Amtsblattverfügung)

funk-entstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Roland Corporation Osaka / Japan
Name des Herstellers/Importeurs

RADIO AND TELEVISION INTERFERENCE

"Warning – This equipment has been verified to comply with the limit for a Class B computing device, pursuant to Subpart J, of Part 15, of FCC rules. Operation with non certified or non-verified equipment is likely to result in interference to radio and TV reception."

The equipment described in this manual generates and uses radio frequency energy. If it is not installed and used properly, that is, in strict accordance with our instructions, it may cause interference with radio and television reception.

This equipment has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J, of Part 15, of FCC Rules. These rules are designed to provide reasonable protection against such a interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by the following measure:

- Disconnect other devices and their input/output cables one at a time. If the interference stops, it is caused by either the other device or its I/O cable.

These devices usually require Roland designated shielded I/O cables. For Roland devices, you can obtain the proper shielded cable from your dealer. For non Roland devices, contact the manufacturer or dealer for assistance.

If your equipment does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the TV or radio antenna until the interference stops.
- Move the equipment to one side or the other of the TV or radio.
- Move the equipment farther away from the TV or radio.
- Plug the equipment into an outlet that is on a different circuit than the TV or radio. (That is, make certain the equipment and the radio or television set are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with coaxial cable lead in between the antenna and TV.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet prepared by the Federal Communications Commission:

"How to Identify and Resolve Radio TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4

Please read the separate volume "MIDI", before reading this owner's manual.

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IMPORTANT NOTES

- The appropriate power supply for this unit is shown on its name plate. Please make sure that the line voltage in your country meets the requirement.

- Please do not use the same socket used for any noise generating device (such as a motor, or variable lighting system).

- This unit might not work properly if turned on immediately after being turned off. If this happens, simply turn it off and turn it on again a few seconds later.

- Before setting up this unit with other devices, turn this unit and all the other units off.

- Use a soft cloth and clean only with a mild detergent.

- Do not use solvents such as paint thinner.

- Avoid using this unit in excessive heat or humidity or where it may be affected by direct sunlight or dust.

- If is normal for this unit to get hot while being operated.

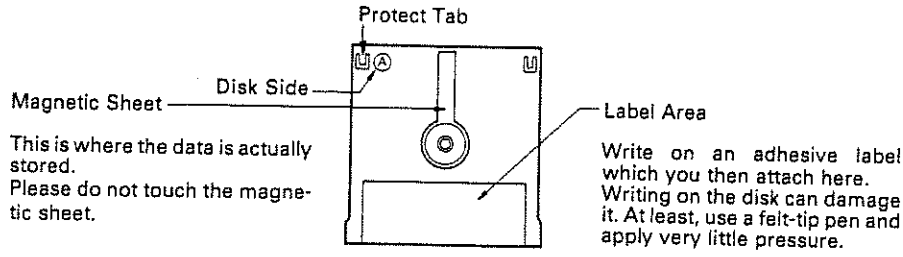
- Operating the unit near a neon, fluorescent lamp, TV or CRT Display may cause noise interference. If so, change the angle or the position of the unit.

- The built-in disk drive of the S-220 is a precision machine. So, please handle it gently. Specially while the Disk Drive is running, do not give a strong shock to the unit.

- The S-220 features a memory back-up system that retains the data even when switched off. The battery that supports the back-up circuit should be replaced every five years. Call Roland for battery replacement. (The first replacement may be required before five years, depending on how much time had passed before you purchased the unit.)

■ How to handle the Quick Disk (QD)

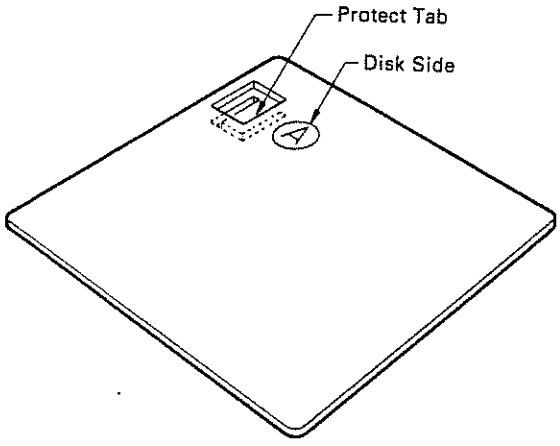
The sampled sound on the S-220 can be saved onto a 2.8 inch double sided quick disk.



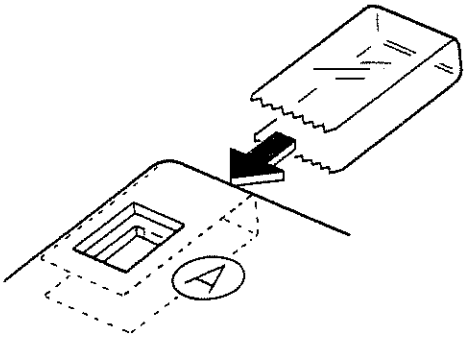
- Please do not touch the magnetic sheet, or the disk may become damaged.
- Do not fold or bend the disk.
- When the disk is not to be used, preserve it vertically in the supplied protective jacket. Do not keep it on a slant or bent.
- Keep the disk from extremely hot or cold temperatures, dust or direct sunlight.
- Do not expose the disk to strong magnetic fields such as headphones or speakers.
- Take out the protection sheet inserted in the disk drive, by pushing the Eject Button. In transit, reinsert the sheet into the drive.
- Please be sure to put the S-220 on a steady and horizontal place.
- Never remove or insert the disk, or switch the S-220 on or off while the indicator of the disk drive is lit, or the disk may be permanently damaged.
- Please be sure that the label is securely attached to the QD, or the label may come off in the disk drive, making it difficult to take it out.
- Please connect the QD securely to the disk drive. When removing the QD, push the Eject Button until it clicks. If the QD has stuck in the disk drive, do not try to remove it but push the Eject Button, and it will come out without any trouble.

Protect Tab on the Disk

To protect the data saved on the disk from accidental loss or erasure, snap off the Protect Tab on the disk, This way, the disk can be no longer used for backup, but the data can be read from the disk just the same. A tab is provided for each side, A and B.



If you wish to use the disk again for saving other data, stick a cellophane adhesive tape as shown below.

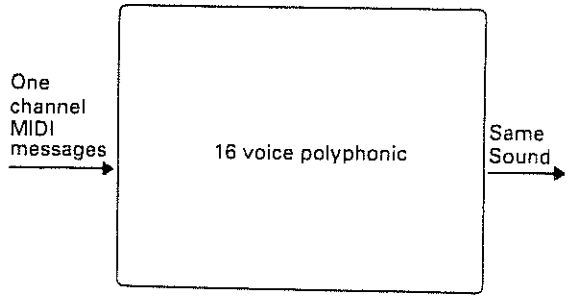


OUTLINE OF THE S-220

The S-220 is a sound module that is played by the MIDI signal sent from an external MIDI device. More than one MIDI message can be received by the S-220 using different MIDI channels from 1 to 16.

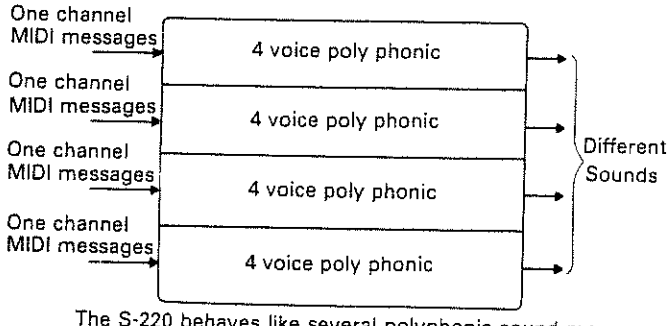
Also, the S-220 can select MIDI Poly or Mono mode, The MIDI Poly mode allows it to receive more than one MIDI message on one channel, and MIDI Mono mode allows one message on each of 8 channels. In other words, in the Poly mode, the S-220 is a 16 voice polyphonic sound module which can be used with a MIDI sequencer or keyboard.

Poly Mode



Using the MULTI function in Poly mode, several different polyphonic sounds can be individually controlled on different MIDI channels.

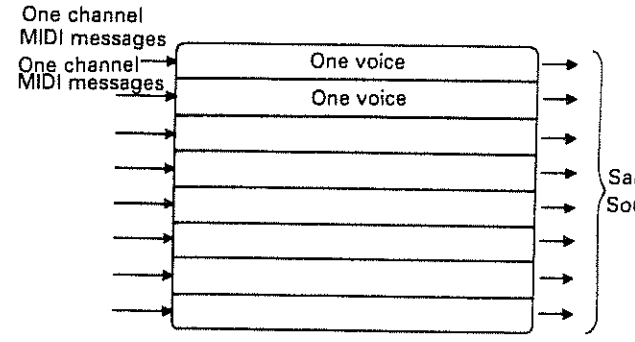
Poly Mode (With Multi Function ON)



The S-220 behaves like several polyphonic sound modules.

In Mono mode, the S-220 is 8 sets of monophonic sound modules which use 8 MIDI channels. The Mono mode is effective for using a GR-Guitar System (interfaced with a MIDI-Guitar Converter): the signal from each string can be received separately, allowing realistic guitar sounds without spoiling its natural characteristics.

Mono Mode



Note messages and Pitch Bend Messages can be controlled for the individual channel.

* Past Roland Guitar Synthesizers (e.g. GR-700, GR-77B) provide only the MIDI Poly mode.

The S-220's Mono mode does not allow it to set a different sound for each note separately. This is because each channel is not perfectly independent. The Note Messages (e.g. pitch, velocity) and the Bender messages (guitar's string bend), however, are independent.

If MIDI Mono mode is not correctly selected, the S-220 will not operate properly (e.g. a chord is not played, etc.). Please check the type of device that controls the S-220, and set the S-220's MIDI Mode correctly.

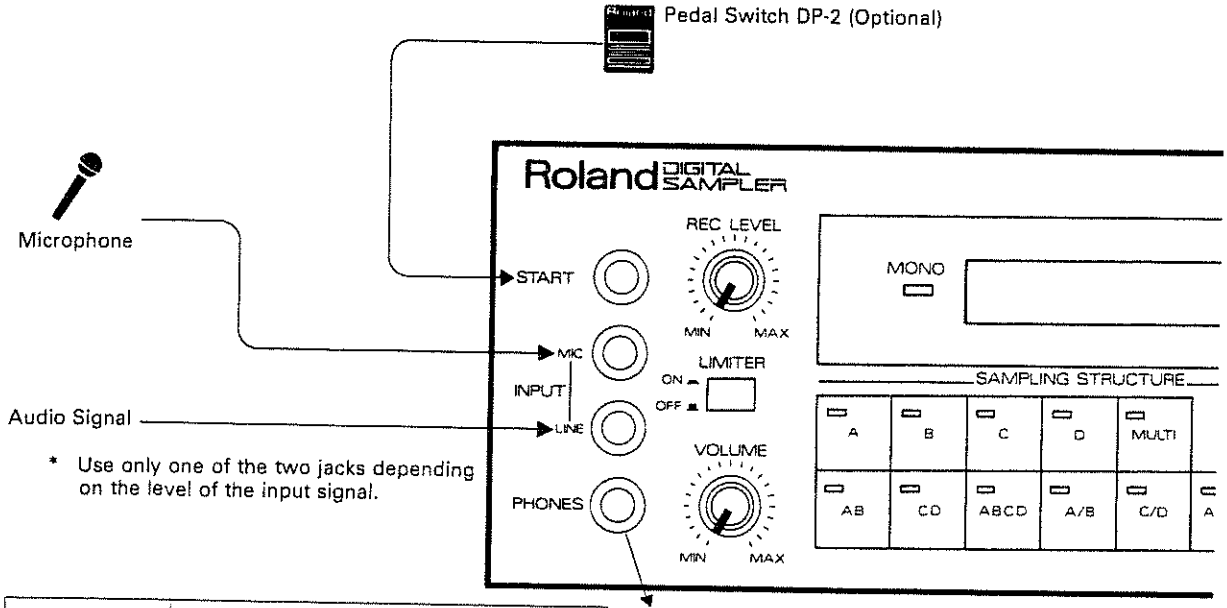
About Error Messages

If the Display responds with an Error message (which is different from what should oceur), see "Error Messages" on page 98.

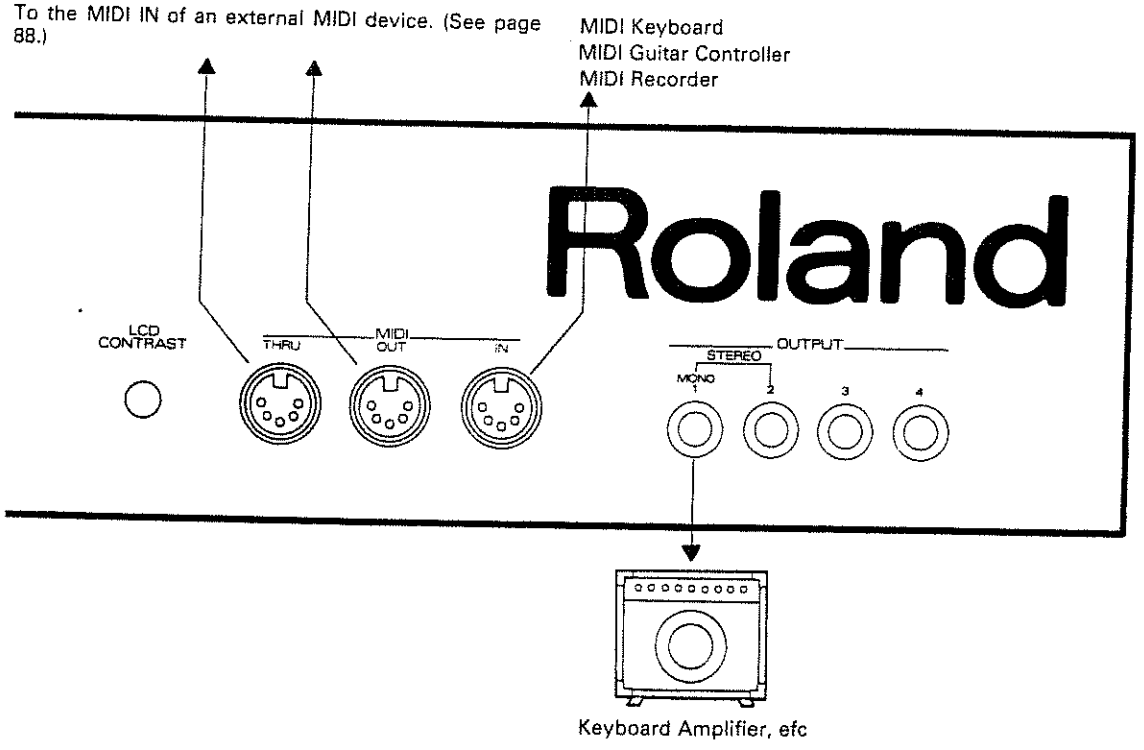
1 Basic Procedure

1. MIDI Setup

a. Connections



MIC (–50 dB)	Microphone, Electric Guitar, etc.
LINE (–20 dB)	Cassette Deck, CD Player, etc.



PROCEDURE

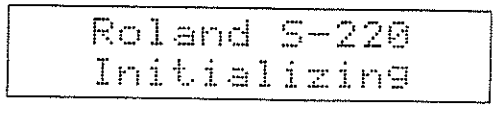
① Push the Eject Button to remove the protect sheet.

② Connect the MIDI OUT connector on the transmitter (controller) to the MIDI IN on the S-220 using the supplied MIDI Cable.

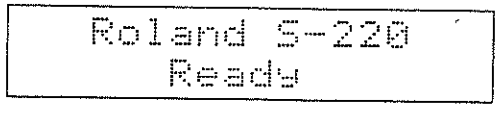
③ Connect the appropriate Output Jack on the S-220 to the input jack on the amplifier using the supplied audio cable.

④ Turn on the S-220, transmitter MIDI device then the amplifier.

When the S-220 is turned on, the Display responds with:



In a few seconds, the Display changes to:



* If necessary, adjust the contrast of the Display using the Contrast Knob on the rear panel.

b. MIDI Mode Selection

The S-220 is released from the manufacturer in Poly mode as a default. If using the MIDI-Guitar Converter, change it to the Mono mode as follows before going to the next section "c. MIDI channel setting".

PROCEDURE

① Push any of the Structure Buttons, then the MIDI Button.

② Push the Forward or Backward Button to call "MIDI Mode" in the Display.



③ By rotating the Alpha Dial, change the Display from "POLY" to "MONO".

④ Push the Enter Button.

The Mono Mode Indicator lights up.

* When the Mono mode command is sent from an external MIDI device, the S-220 will be set to Mono mode and the Mono Mode Indicator will light up. Meanwhile, the S-220 recognizes how many voices it can output at a time, and indicates it in the"Channel Range" section. (See page 91.)

* The MIDI Mode setting is retained in memory even after the unit is turned off.

c. MIDI Channel Setting

The MIDI channels of the connected units should be set to the same number, Unless the S-220's receive MIDI channel is set correctly, the necessary MIDI messages cannot be received, therefore, the S-220 cannot be played properly.

PROCEDURE

① Push any of the Structure Buttons, then the MIDI Button.

② Push the Forward or the Backward Button to call MIDI channel (Basic channel) in the Display.



③ By rotating the Alpha Dial, set the receive MIDI channel of the S-220 to the same number as the transmit MIDI channel of the external device.

④ Push the Enter Button.

If the MIDI channel is set correctly, the Note On signal sent from the transmitter will light up the MIDI Message Indicator on the S-220.

The MIDI-Guitar Converter is designed to transmit MIDI signals to each string separately; the MIDI channel you set (=basic channel) is assigned to the 1st string, the next to the 2nd string, the next one to the 3rd string, and so on. For instance, if you set the MIDI channel 2, it is assigned to the first string, channel 3 to the second string, channel 4 to the third string and so on up to channel 7 to the sixth string.

* The MIDI channel you have set will be retained in memory even after the S-220 is turned off.

* A MIDI channel higher than 16 will be ignored, and therefore cannot receive messages.

The S-220 can sample all sorts of sounds and record them into the built-in computer memory as digital data. This digital data can be used to play various sounds. In other words, when no digital data is recorded in memory (right after the S-220 is turned on for the first time), there is no sound heard from it.

To play the S-220, you must record sounds or load back the data saved on the quick disk (QD).

Using the QD sound library, the S-220 can be played as a high quality preset type MIDI sound module (The S-10's sound library QD can be used for the S-220) even without recording any sound.

2. Loading from QD

First of all, load the data from the supplied disk to the S-220's internal memory, and listen to the sounds.

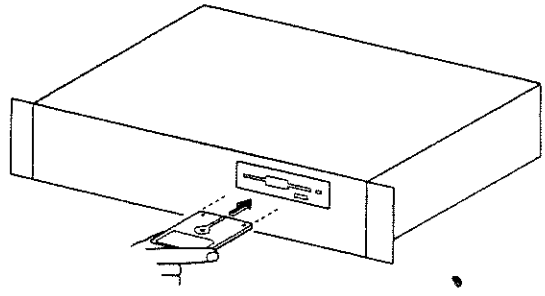
One side of the disk contains one sound, i.e. two sounds on one disk. The S-220's internal memory can store up to two disks of data, which is four different sounds.

Both the A and B sides of a disk may be used for one sound.

a. Loading each of the four different sounds

PROCEDURE

① Insert the supplied quick disk #001 "Drum Set" into the disk drive with the A side (BD) facing upward.

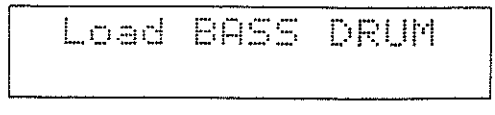


(Please gently hold the sides of the Disk with your thumb and forefinger, then slowly insert it.)

② Push the Load Button.

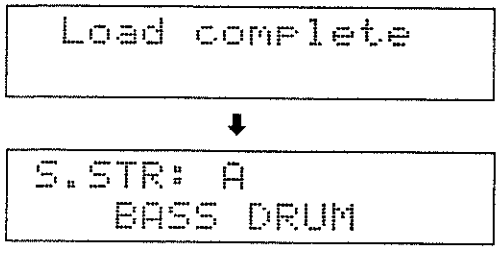
* Usually for loading, the Load Button should be pushed after inserting the disk. However, if it is inserted while "READY" is still shown in the Display after the S-220 is switched on, pushing the Load Button is not necessary.

During loading, the Display will respond with:



While the disk drive is running, the disk drive indicator is lit. **This is to warn you not to remove or insert a disk. That would break the disk or erase the data.**

After a while, the Display will change as shown below.



This shows that the sound saved on side A (BD) of the disk has been loaded into the S-220. Also, the indicator of the Structure Button A is lit. Now, you can hear Bass Drum by sending MIDI Note On messages.

③ Make sure that the disk drive indicator is dark, push the Eject Button, remove the QD and reinsert it into the disk drive with side B (SD) facing upward this time.

④ Push the Load Button.

⑤ Likewise, load the C (TOM) and the D (HH) sides of the "Drum Set" disk.

Now, four different sounds are loaded into the S-220's internal memory.

By pressing the Structure Buttons A, B, C or D, you can select any of the four sounds. We regard these A, B, C and D as locations where the sounds reside. Each Bank can retain the sound data of one second at 30 kHz sampling frequency, and two seconds at 15 kHz. (See page 53). To make a sustained sound, you may loop the sampled sounds. (See page 52.)

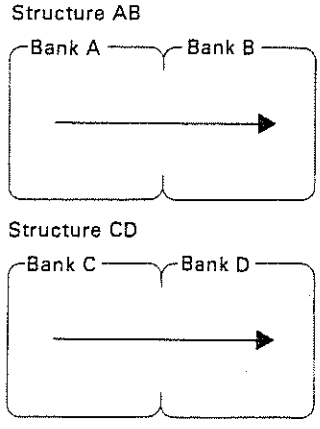
* The key you play on the keyboard may sound in a different pitch. This is because of the Recording Key Number.

b. Structure Buttons

The Structure Buttons A, B, C and D are used to select the corresponding sound of the Banks A, B, C and D. These Banks can be recorded or played simultaneously or sequentially by using other Structure Buttons. This is effective for combining two Banks for recording a long tone, etc.

1) Structure AB, CD (ABCD)

The AB Structure can be used for joining the Bank A sound with the B sound, Likewise, the CD Structure button joins the C and D. This is useful for combining two banks for sampling two second sounds (four seconds at 15 kHz sampling frequency). You may also combine two different samples and play them.



The ABCD Structure plays (or records) the Banks A, B, C, and D sequentially.

* If the Structure (ABCD) is used for playing the "Drum Set", the volume of the later sounds will be very low. This is because of the Wave Parameters (explained later on page 55).

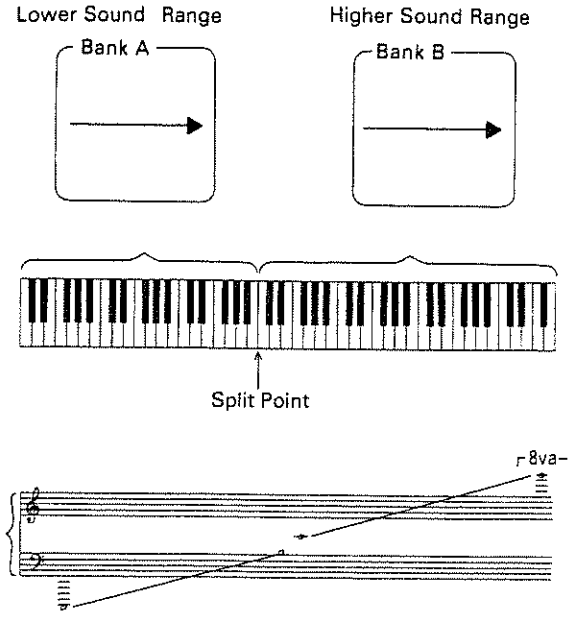
2) Structure A/B, C/D

The A/B Structure button plays the Bank A sound in the lower keyboard range and the Bank B sound in the upper. The C/D button works similarly, playing each sound separately in the lower and upper sound ranges. The S-220 allows you to divide the whole sound range into two sections, and assign different sounds to each range. The Split Point is the divding line of the two sections.

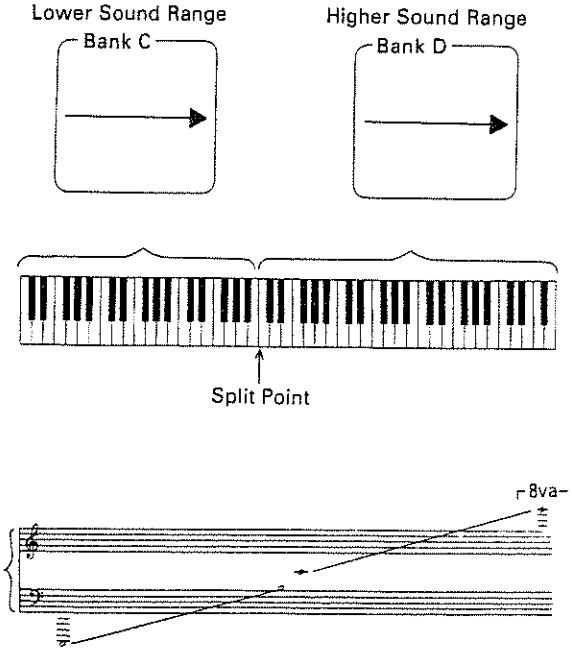
The Split Point can be set anywhere you like. (See page 17.)

The actual Split Point of the "Drum Set" is different from the following picture.

Structure A/B



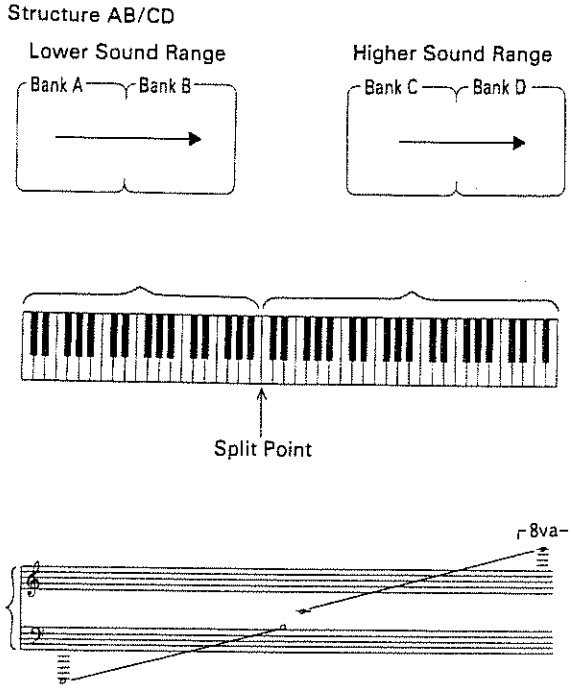
Structure C/D



3) Structure AB/CD

The AB/CD Structure button plays the Bank A sound then the B sound in the lower section, while the C sound is followed by the D in the upper section.

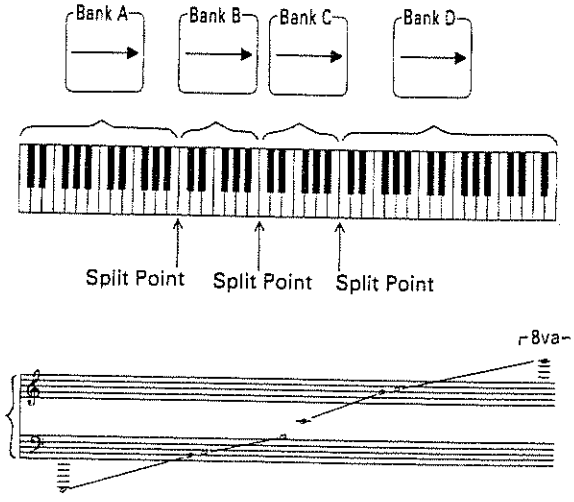
Structure AB/CD



4) Structure A/B/C/D

The A/B/C/D Structure button splits the S-220 into four sound ranges, and plays each Bank, A, B, C and D in the four sections, separately.

Structure A/B/C/D



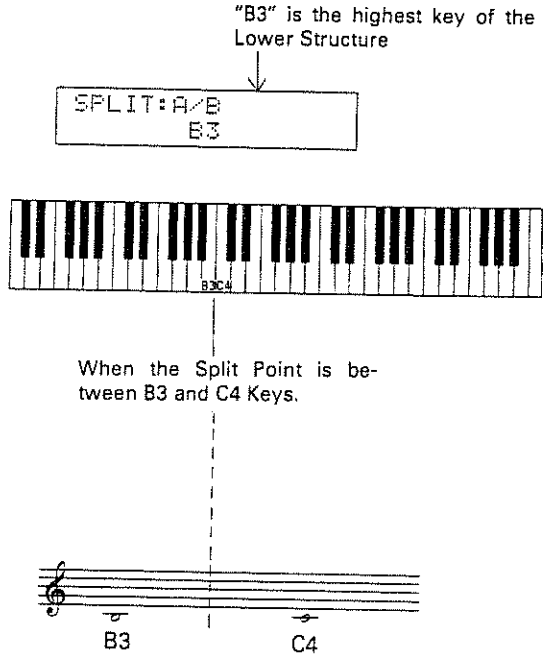
These Split Structures are specially useful to create sound such as a piano, where the tone of the instrument voices over the range of the keyboard.

5) Changing Split Points

① Push the F1 button, and the Parameter Button. (Or push the Parameter Button twice.)

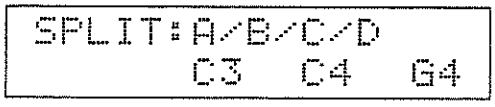


The key number of the highest note in each Bank is shown in the Display.



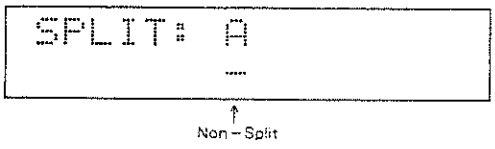
② Change the flashing key number using the Alpha Dial.

When the Structure A/B/C/D is in use, or when the Structure A/B and the Dual function (page 34) are in use, two or three split points will be shown. In this case, move the flashing positions using the buttons ▶ and ◀, then change the split point by rotating the Alpha Dial.



③ Push the Enter Button.

When a non-split Structure is selected, but you have tried to change the split point, the Display will respond as follows, showing that it is not possible.



6) Note on Sampling Structure

The QD includes the data of the sampling structure. When the loading is completed, the relevant indicators on the panel will light up to tell you which structure is used.

* When the Banks of two different sounds are combined, the pitches or volumes of the two sounds may differ. This is related to the Wave Parameters explained later (page 55) in this manual.

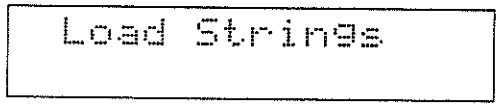
c. Loading both sides of a QD

Some data consist of more than one Bank, and is therefore, saved on both sides of a QD, or even on a QD's. For instance, "STRINGS" of the QD#002 "STRINGS & CHORUS" which is structure A/B, is saved on both sides, A and B, of the QD. That is, to play this, you should load both sides of the QD.

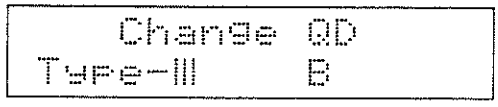
PROCEDURE

① Make sure that the disk drive indicator is dark, push the Eject Button and take out the QD.

② Insert the #002 QD with the A side facing upward, and push the Load Button.



When side A is loaded, the Display will change to:

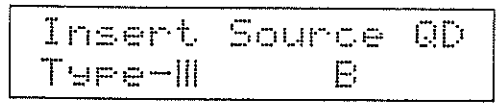


↑
Destination Bank

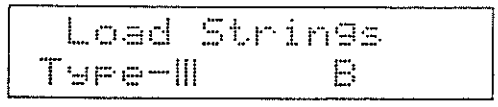
The Display tells you that the data on side B is required.

③ Make sure that the disk drive indicator is dark, push the Eject Button and take out the QD.

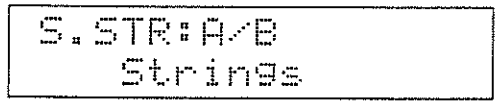
The Display will respond with:



④ Re-insert the QD with B side facing upward, and loading will start automatically.



When both sides of the QD are loaded, the S-220 is ready to play (Play Mode) with the relevant structure.



In the Play mode, the Display shows the sound name.

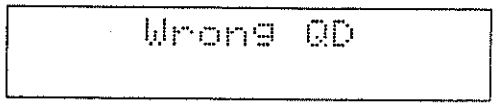
Banks C and D are still empty. You may, if necessary, load Banks C and D or structure C/D. Insert the relevant QD and push the Load Button.

If you notice that you are using the wrong disk during the loading procedure. Wait until the disk drive indicator goes out, then push any of the Structure Buttons. The S-220 will stop loading and return to the Play mode. Change the disks and repeat the loading procedure.

While loading a QD, the lower part of the Display shows the QD Type. (See page 72.)

About Errors

When a set of data (both sides of a QD or even two QD's) is supposed to be loaded, but you try to load the data irrelevant to the one previously loaded before, the Display will respond with:



Take out the disk and insert the appropriate one, and the loading process will continue.

d. Cancelling the Structure Setting before Loading

- It is possible to load one set of data (e.g. Bank B of the Structure A/B) to a different Bank (e.g. Bank C).
  This, however, may alter the sound, because the original Structure is ignored.

PROCEDURE

Push the Structure Button A, B, C or D where you wish to load the data, and without releasing it, push the Load Button.

- **A/B ↔ C/D**

To load strucfure A/B to C/D, or strucfure C/D to A/B, push the strucfure Button A/B (or C/D) where you wish to load the data, and without releasing it, push the Load Button.

- **AB ↔ CD**

To load structure AB to CD, or structure CD to AB, push the structure Button AB (or CD) where you wish to load the data, and without releasing it, push the Load Button.

* If is not possible to load a structure to a diffrent type of structure. (e.g. from structure A/B to CD.) If you use a disk that contains an irrelevant structure, the Display will respond with "Wrong QD".

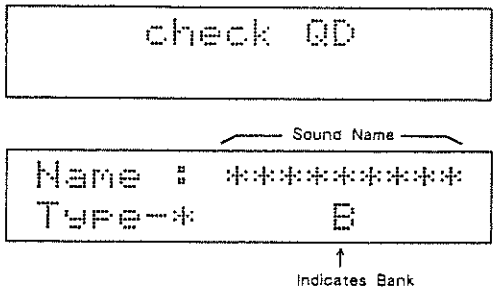
e. Monitoring the QD Data

You can monitor the contents of the QD: such as the Sound Name or Structure setting.

PROCEDURE

① Insert the relevant QD.

② Push the F1 Button, then the Load Button.



The Display shows the Sound Name and the Bank where the sound is to be loaded. Also, the Structure setting can be seen on the Structure Indicator.

While the above indication is shown in the Display, the data is not yet loaded.

To load the data you are now monitoring in the Display, push the Load Button.

To monitor another disk, make sure that the disk drive indicator is dark and change the disks. Inserting the disk will automatically monitor the data.

If you do not want to load the data you have monitored, push any of the Structure Buttons, and the S-220 will return to the Play mode.

[2] Performance Controlling Functions

The S-220 features various functions for controlling performance, such as pitch bender, vibrato and auto arpeggio.

The performance controlling functions can be easily engaged by using the buttons on the panel.

Most of the performance controlling functions consist of Performance Parameters. Performance Parameters are loaded from a QD, and the effect of the function can be altered by changing the value of each parameter as follows.

1. Editing Performance Parameters

To change the preprogrammed value of each parameter, take the following procedure.

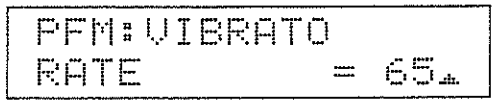
PROCEDURE

① Push the Performance Button.

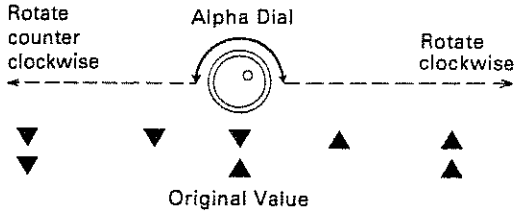
② By using the Forward Button and the Backward Button, call the performance parameter you wish to edit with the aid of the Display window.



③ By rotating the Alpha Dial, change the value of the parameter.



The number shown at the right of the Display will change as below.



Pushing the Maximum Button sets the highest value, and pushing the Minimum Button sets the lowest value.

To return to the original value before being edited, push the Cancel Button.

If you wish to edit other parameters, repeat the steps ② and ③.

④ Push the Enter Button.

The performance parameters will always be called in sequence, as shown below.

Vibrato	*RATE MNUAL DEPTH PRESS SENS DELAY DEPTH DELAY TIME	Vibrato Rate Manual Vibrato Depth Vibrato Pressure Sensitivity Delay Vibrato Depth Delay Time of Delay Vibrato
Pitch Bender	*BEND MODE	Pitch Bend Mode
Arpeggio	*SYNC SOURCE INT RATE PLAY MODE PLAY RANGE NOTE REPEAT DECAY RATIO	Arpeggio Sync Mode Arpeggio Rate Arpeggio Play Mode Arpeggio Range Arpeggio Repeat Arpeggio Decay
Velocity Mix	*MIX LEVEL THRESHOLD	Mix Level Velocity Mix Threshold
Velocity Switch	*THRESHOLD	Velocity Switch Threshold
Detune	*RANGE V-SNS DTUNE RANGE PRESS SENS ABEND DEST BEND DEST	Detune Range Velocity Sensitivity Detune Range Detune Pressure Sensitivity Auto Bend Destination Pitch Bend Destination
Delay	*DELAY TIME KEY OFFSET DELAY LEVEL V-SNS TRESH	Delay Time Key Offset Delay Sound Level Delay Velocity Switch
Trigger Play	*GATE TIME *- - - -	Gate Time Trigger Play Key

* The parameters with * mark can be sequentially called by pushing the F2 Button while holding the Forward Button down, or pushing the F1 Button while holding the Backward Button.

You can edit the parameters while actually listening to the sound, but the change cannot be heard unless you stop playing the S-220, then play it again.

2. Performance Controlling Functions determined by Performance Parameters

a. Vibrato

Receiving MIDI Modulation messages (caused by operating the modulation lever/wheel on the keyboard), the S-220 will create Vibrato effects. This is called "Manual Vibrato". Also, receiving MIDI Aftertouch messages, the depth of vibrato effect can be controlled by how hard you push the keys. "Delay Vibrato" is the vibrato that does not come on immediately, but comes on after a certain time has elapsed.

To control these vibrato effects, the following five performance parameters are involved.

- **Vibrato Rate**



This sets rate of the vibrato from 0 to 127.

- **Manual Vibrato Depth**



This sets the depth of the manual vibrato from 0 to 127.

* When the MIDI Modulation switch (explained on page 89) in the MIDI Function section is set to OFF, MIDI Modulation messages will be ignored, therefore, Manual vibrato cannot be obtained.

- **Vibrato Pressure Sens**



This sets the sensitivity of Manual vibrato that is controlled by Aftertouch, from 0 to 127.

* When the Channel Pressure switch (explained on page 90) in the MIDI Function section is set to OFF, the MIDI Aftertouch messages will be ignored, therefore, Manual Vibrato cannot be controlled by Aftertouch.

- **Delay Vibrato Depth**



This sets the depth of the delay vibrato from 0 to 127.

- **Delay Time of the Delay Vibrato**



This sets the time needed for the delayed vibrato to come on from 0 to 127.

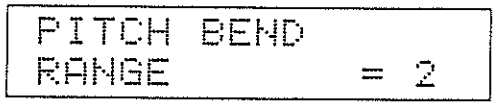
*** If the vibrato switch (explained on page 66) in the Wave Parameter section is set to OFF, the sound would not take on vibrato at all.**

b. Pitch Bend

When the S-220 receives the MIDI Pitch Bend message (caused by operating the bender on the keyboard or guitar's string bend), it creates a Pitch Bend effect.

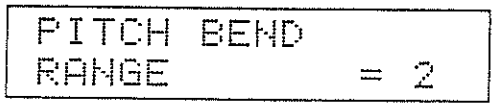
The depth of the pitch bend effect can be set with the Bend Range.

[Bend Range]



PROCEDURE

① Push the F1 Button, then the Performance Button. (Or push the Performance Button twice.)



② Using the Alpha Dial, change the value of the Bend Range.

The Bend Range can be set in semi-tone steps from 0 to 12 (one octave).

③ Push the Enter Button.

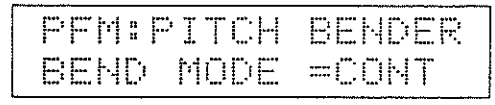
* The S-220 cannot play a pitch that exceeds the original sampled sound REC KEY (explained on page 59) by two octaves. Any higher pitch (Bend-up) will be substituted by the highest possible pitch.

* The Bend Range value you have set will be retained in the S-220's memory, but cannot be retained in the QD.

* If the Bender switch (explained on page 55) in the Wave Parameter section is set to OFF, the sound would not take on the pitch bend effect.

* If the MIDI Pitch Bend switch (explained on page 99) in the MIDI Function section is set to OFF, the MIDI Pitch Bend messages are ignored, therefore, the pitch bend effect cannot be obtained.

- **Pitch Bend Mode**



The Pitch Bend messages can function in two different ways as shown in the table below.

Mode	Display	Description
Normal (Continue)	CONT	Usual smooth pitch bend.
Chromatic	CHRM	Chromatic pitch bend.

c. Arpeggio

When a Chord Key On signal is received, the chord can be arpeggiated.

[Arpeggio ON/OFF]

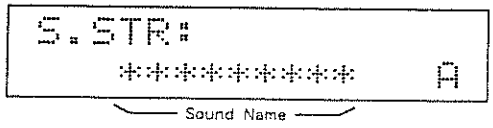
PROCEDURE

① Push the F2 Button, then the Performance Button. (Or push the Performance Button three times.)



② Select ON or OFF with the Alpha Dial.

③ Push the Enter Button.



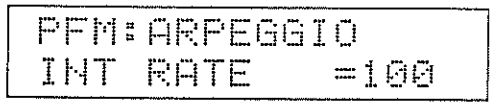
When the Arpeggio is set to ON, the Display shows "A" at the far-right, and a chord will be arpeggiated.

* The Arpeggio function does not work in Mono mode.

Six performance parameter are involved with the Arpeggio function.

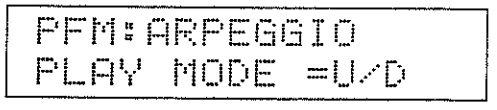
- **Arpeggio Rate**

Pushing the Parameter Button during arpeggio performance will cause the Display to show the Arpeggio Rate.



Set the rate of the arpeggio from 0 to 127.

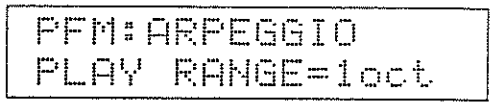
- **Arpeggio Mode**



Set the shape of the arpeggio.

Mode	Display	Description
Upward	UP	
Downward	DOWN	
Up and Down	U/D	
Random	RND	Plays the pressed keys at random.

- **Arpeggio Range**



This sets how many octaves should be used for the arpeggio performance from 1 to 3 octaves.

- **Arpeggio Repeat**

```
PFM:ARPEGGIO
NOTE REPEAT=  1
```

This sets how many times each note of the chord will be played, from 1 to 16 times.

- **Arpeggio Decay**

```
PFM:ARPEGGIO
DECAY RATIO= 10
```

At 1, the arpeggio decays fastest and at 10, it is sustained at a set volume.

* When the Dynamics Sens switch (see page 65) of the Wave Parameter section is set other than 127, the decay effect cannot be completed.

- **Arpeggio Sync Mode**

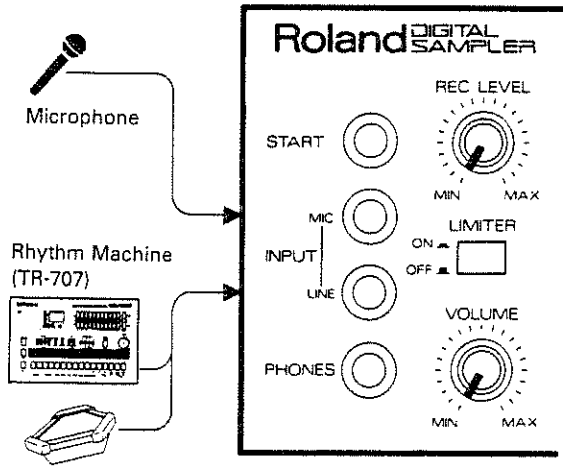
```
PFM:ARPEGGIO
SYNC SOURCE=INT
```

This selects whether the arpeggio should play on its own or sync to an external device.

Mode	Display	Description
Internal Clock	INT	Internal clock controls arpeggio performance.
External Trigger	EXT	Every external trigger plays one step of the Arpeggio.

External Trigger Mode

In this mode, an external trigger signal (audio or pulse) fed into the Input Jack will play each note of the chord. Every trigger signal plays one of the keys you are pushing on the keyboard according to the Arpeggio Mode.

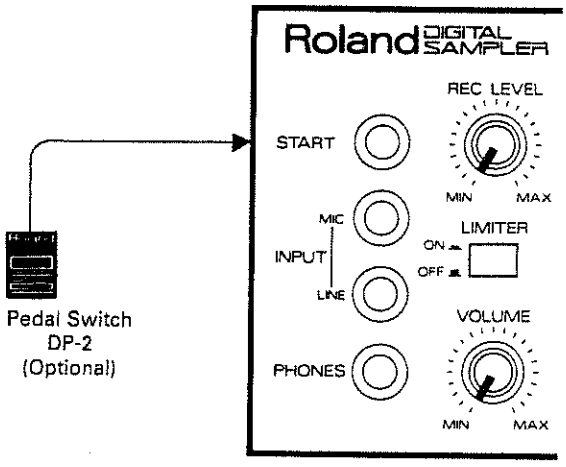


* Use either the MIC or LINE Output.

Set the Recording Level Knob to the position which allows the most stable action.

* Two input jacks cannot be used at the same time. When both jacks are used, only the Line Input will work.

By connecting the optional Pedal Switch DP-2 to the Start Jack, pushing the pedal can play each note of the arpeggio.



d. Trigger Play

By feeding an external signal (audio or pulse) to the MIC or Line Input Jack, the note selected with the performance parameter will be played.

Connection is exactly the same as page 27.

By connecting the optional Pedal Switch to the Start Jack, Trigger playing can be performed with the pedal switch.

The Trigger Play function is available even during normal performance. However, when the Arpeggio is turned on, it will function differently as shown below.

Arpeggio Sync Mode	What is done by External Trigger
INT	The Arpeggio is performed in the set keys.
EXT	The Arpeggio played on the Keyboard will sync to the external trigger

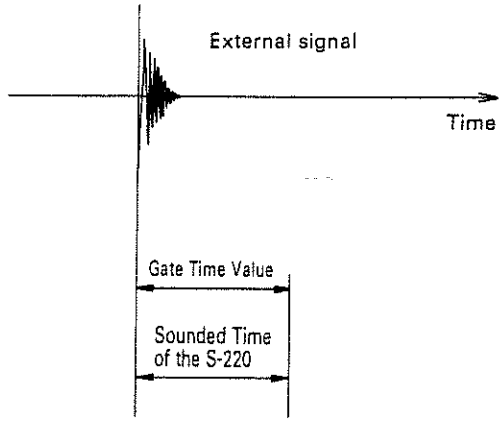
Trigger Playing involves two performance parameters.

- **Gate Time**

```
PFM:EXT TRIGGER
GATE TIME  =  8
```

When the external signal is very short (e.g. the signal from a drum pad), the actual time of the sound can be set with the Gate Time from 0 to 127. Higher numbers mean a longer gate time.

When the external signal is very short (=the set gate time is short)



- **Key Assignment for Trigger Play**

```
PFM:EXT TRIGGER
 —   —   —   —
 ↑
Flashes
```

Up to four notes to be triggered can be assigned. There are two ways to do this.

<Key registration with the Alpha Dial>

PROCEDURE

① Push the Forward Button until the Display responds with:

```
PFM:EXT TRIGGER
 —   —   —   —
 ↑
Flashes
```

It shows that up to four keys can be registered. "—" in the Display shows that no key is registered. When a key is registered, the key number will be shown in the Display.

② Rotate the Alpha Dial until the desired key number is shown in the Display.

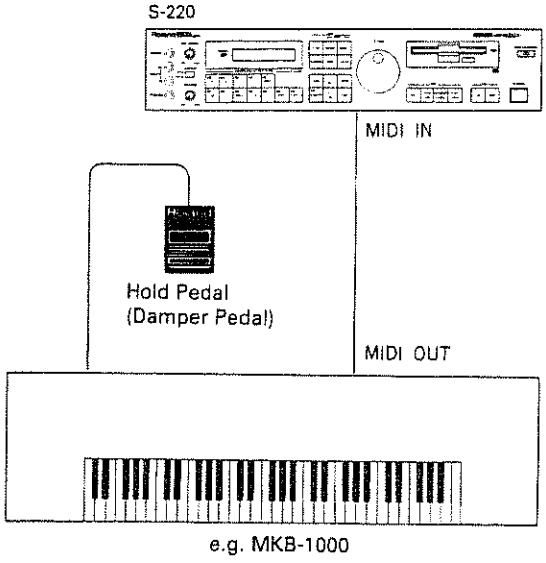
```
PFM:EXT TRIGGER
C3   —   —   —
```

To register the next key, push the ▶ button to make the next position flash, and select a key number by rotating the Alpha Dial. Likewise, the third and fourth keys can be registered.

③ When registration is completed, push the Enter Button.

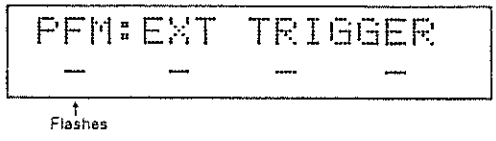
<Registration from the keyboard>

Connect a controller that features the Hold function (e.g. a MIDI keyboard featuring a Hold/Damper pedal).



e.g. MKB-1000

① Push the Forward Button until "EXT TRIGGER" is shown in the Display.



↑
Flashes

② Press the Hold Pedal.

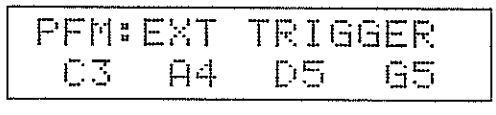


③ While still pressing the Hold Pedal, push the keys (up to four keys) which you wish to register.



④ Release the Hold Pedal without releasing the keys.

⑤ Push the Enter Button.

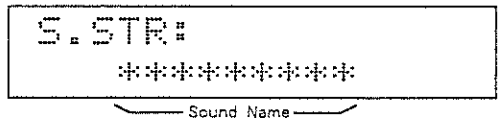


e. Detune

By playing one key, you can actually generate two sounds in slightly different pitches.

PROCEDURE

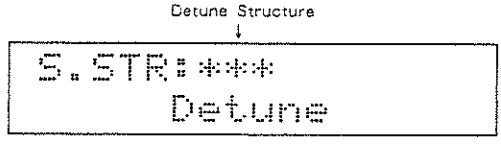
① Push the Structure Button which contains the Bank you wish to use.



② Push the F1 button.



③ Push the same Structure Button you pushed in step ①.



* When using the Detune function, the S-220 is eight voice polyphonic.

To turn the Detune function off, simply push any of the Structure Button.

The Detune function involves five performance parameters.

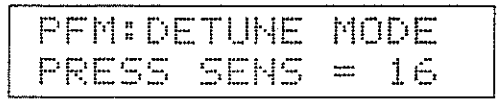
- **Detune Range**

In the Detune mode, the Detune Range value appears first by pushing the Performance Button.



The pitch difference between the two sounds can be determined by the value of the Detune Range from 0 to 127. Higher values increase the pitch difference.

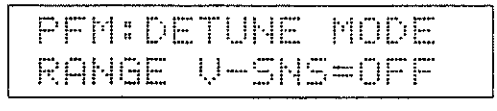
- **Detune Pressure Sens**



This determines the sensitivity of the Detune effect which is controlled by Aftertouch messages, from 0 to 127.

* When the Channel Pressure switch (explained on page 90) in the MIDI Function section is set to OFF, Aftertouch message are ignored, therefore the Detune effect cannot be controlled by Aftertouch.

- **Detune Velocity Sens**



When this is ON, the Detune effect is controlled by how you play the keyboard (Velocity messages).

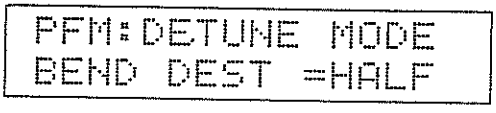
- **Auto Bend Destination**



When the auto bend effect (explained on page 66) is applied to a sound, one or both of the detuned sounds can take on the auto bend effect.

Mode	Display	Description
Both	BOTH	Both voices take on Auto Bend.
Half	HALF	Either of voices takes on Auto Bend

- **Pitch Bend Destination**



One or both of the detuned sounds can take on the pitch bend effect.

Mode	Display	Description
Both	BOTH	Both voices take on Pitch Bend
Half	HALF	Either of voices takes on Pitch Bend

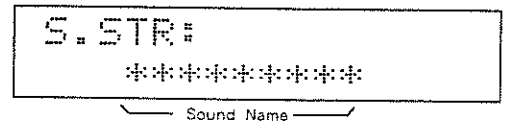
* When the Pitch Bend switch (explained on page 65) in the Wave Parameter section is OFF, the sound would not take on the pitch bend effect.

If the MIDI Bend (explained on page 89) in the MIDI Function section is set to OFF, the MIDI pitch bend messages are ignored, therefore, the pitch bend effect cannot be obtained.

f. Delay

When a key is played, the direct sound will be heard then the delayed sound.

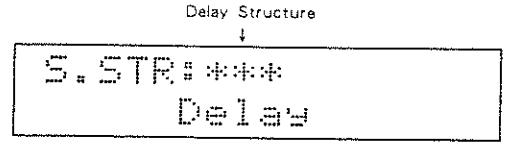
① Push the Structure Button that contains the sound you wish to take on the Delay effect.



② Push the F2 button.



③ Push the same Structure Button that you pushed in step ①.



* When the Delay function is in use, the S-220 is eight voice polyphonic.

To turn the Delay function off, simply push any of the Structure Buttons.

The Delay function involves four performance parameters.

- **Delay Time**

Delay time is the time spent between the direct and the delay sounds. In the Delay mode, the Delay time value will be shown first in the Display by pushing the Performance Button.

```
PFM:DELAY MODE
DELAY TIME = 45
```

0 to 127 are valid.

- **Delay Sound Level**

```
PFM:DELAY MODE
DELAY LEVEL= 75
```

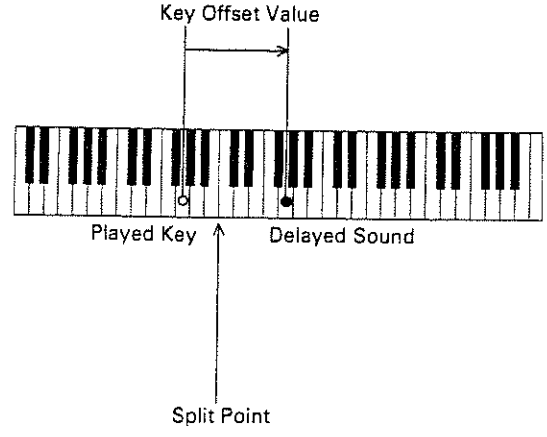
The level of the delay sound can be set from 0 to 127.

- **Key Offset**

```
PFM:DELAY MODE
KEY OFFSET =  0
```

You can set the pitch of the delay sound higher or lower than the direct sound, in semi-tone steps from —12 (one octave lower) to + 12 (one octave higher).

When the Split mode is selected with the Structure Button, the pitch of the delay sound may exceed that of the split. In this case, the delayed sound is different from the voice of the played key.



- **Delay Velocity Switch**

```
PFM:DELAY MODE
V-SNS TRESH= 79
```

You can set a minimum level (=threshold level) where the delay effect is turned on. 0 to 127 are valid, and at higher values, stronger playing is required to turn the delay effect on.

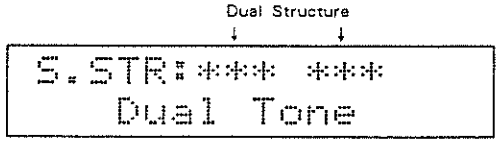
g. Dual Function

By playing only one key, the sounds in two different Structures can be generated. Also, you can mute or generate sound by playing the keyboard softer or harder.

1) Dual Tone

In the Dual Tone mode, the sounds of two different Structures can be simultaneously generated by playing only one key.

► Push two Structure Buttons at the same time.



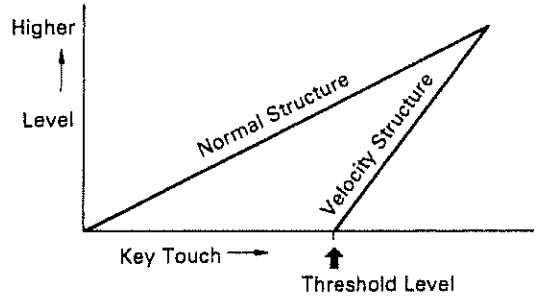
However, note that you cannot select Structures which contain the same Banks, e.g., the Structure A and A/B, or A and AB/CD.

When the Dual Tone function is in use, the S-220 is eight voice polyphonic.

To turn the Dual Tone function off, simply push any of the Structure Buttons.

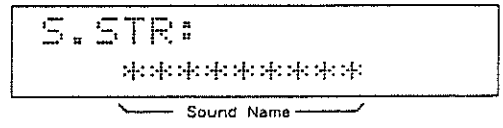
2) Velocity Mix

In another form of the Dual Tone function, one of the Structures (—Velocity Structure) can be muted under a set threshold level (minimum volume), while the other Structure (—Normal Structure) will always be heard no matter how softly you play the keyboard. That is, one of the sounds can be generated only if you play the keyboard stronger than the set threshold level, but it is muted if the volume is lower than the threshold level.

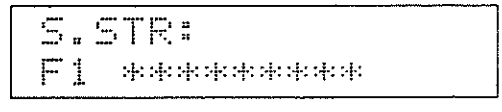


PROCEDURE

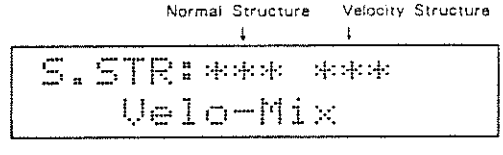
① Push the Structure Button to select the Normal Structure.



② Push the F1 button.



③ Push the Structure Button of the Velocity Structure.



The indicator of the normal Structure is lit, and that of the Velocity Structure flashes.

However, note that you cannot select Structures which contain the same Bank, e.g., the Structures A and A/B, or A and AB/CD.

When the Velocity Mix function is in use, the S-220 is eight voice polyphonic.

To turn the Velocity Mix function off, simply push any of the Structure Buttons.

The Velocity Mix function involves two performance parameters.

- **Velocity Mix Threshold**

This can set the threshold level (minimum volume) at which the Velocity Structure can sound.

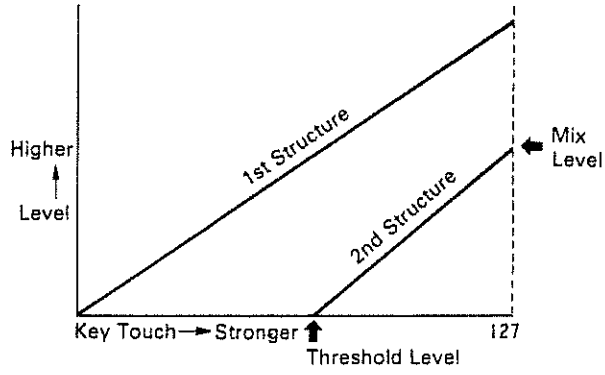


You can set the minimum strength of your key touch required for the Velocity Structure to sound from 0 to 127. When the value is higher, a stronger playing manner is required, therefore, only by a very strong playing manner, can you hear both Structures.

- **Mix Level**

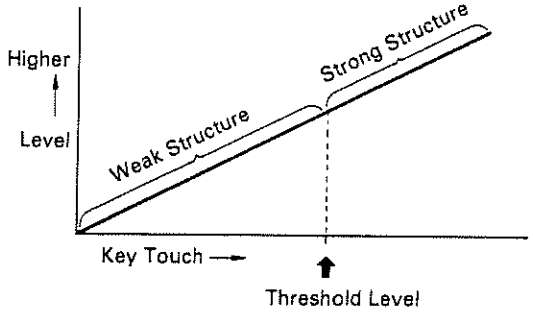


This sets the maximum volume of the 2nd Structure when receiving the maximum volume message via MIDI, from 0 to 127.



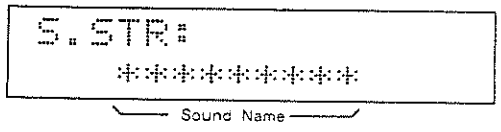
3) Velocity Switch

This function can select one of the two sounds to be generated depending on how you play the keyboard (Velocity). That is, you can hear one sound (=Weak Structure) when playing the keyboard softer than a set velocity, and the other sound (=Strong Structure) when playing harder than that velocity.

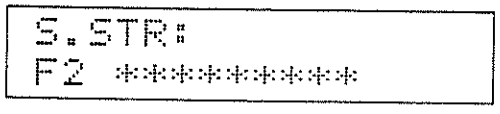


PROCEDURE

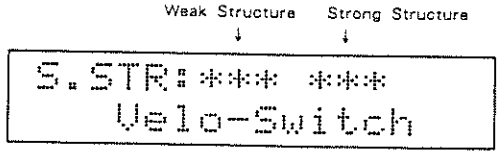
① Push the Structure Button to select the Weak Structure.



② Push the F2 button.



③ Push the Structure Button to select the Strong Structure.



The indicator of the Weak Structure is lit, and that of the Strong Structure flashes.

However, when the above function is in use, you cannot select Structures which contain the same Banks, such as A and A/B, or A and AB/CD, etc.

* In this mode, the S-220 is 16 voice polyphonic.

To turn the Velocity Switch function off, simply push any of the Structure Buttons.

- **Velocity Switching Threshold**

This determines the threshold level (velocity) under which the Weak Structure is selected, and over which the Strong Structure is selected.

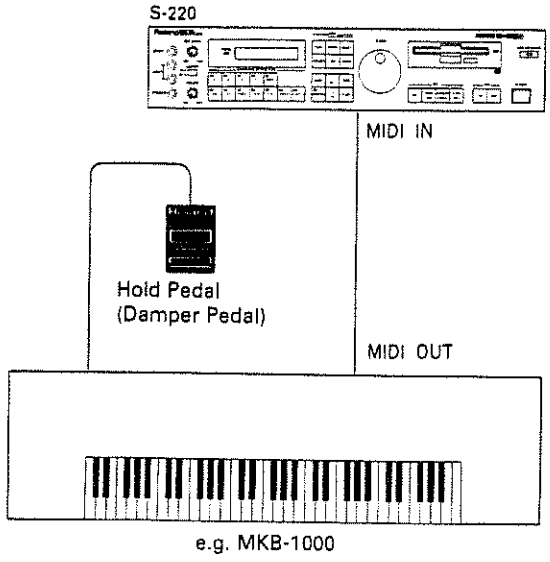


Set the threshold level from 0 to 127. By setting a high value (velocity), you can hear the Strong Structure only when playing the keyboard hard.

3. Performance Controlling Functions which are unrelated to Performance Parameters

a. Pedal Hold

When a controller that features the Hold function (e.g. a MIDI keyboard featuring a Hold/Damper pedal), the Hold function can be turned on or off by pressing the pedal. Pedal Hold is the function that retains the sound even after the key is released.



e.g. MKB-1000

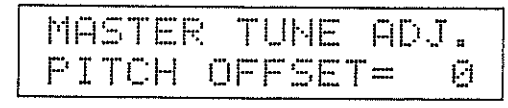
* A sound which is not looped (explained on page 52) cannot take on the Hold effect.

b. Tuning

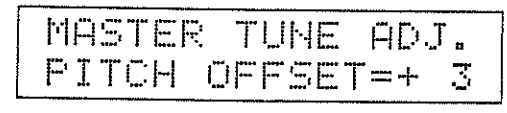
The S-220 can be tuned to other musical instruments within the range of one semi-tone up or down.

PROCEDURE

① Push the Tune Button.



② Rotate the Alpha Dial until the S-220 is tuned to the other musical instrument.



The value shown in the Display represents how many cents are raised or lowered. (100 cents make a semitone)

③ Push the Enter Button.

To return to 0 cent, simply push the Enter Button while holding the Tune Button down.

4. Performance Parameters for Loading

Each side of a QD contains one Bank of data with the information of performance parameters and split points. When the data is loaded from the QD to the S-220, the performance parameters of the data loaded last will be kept in the S-220's memory. This means that you should be careful when loading data into the S-220 from different sets of QD's. If you wish to use only the voice and the split point information, you can leave out the performance parameter information as follows.

- **Loading the data into the S-220 without Performance Parameters**

Push the F2 button, then the Load Button, and the data will be loaded leaving the performance parameter information.

5. Output Control

a. Output Level

The overall volume of the S-220 is adjusted by the Volume Knob on the front Panel, or by Volume messages sent from an external device.

* When the S-220 is in Mono mode, the volume message is received on the same channel that receives Control Changes. (See page 91.)

When the volume of the S-220 is set to minimum value by a MIDI Volume message, no sound is generated, even when KEY ON messages are received. If this happens, turn up the volume as follows.

PROCEDURE

① Push the Level Button, then push the Forward or Backward Button until the Display shows "VOLUME".



② Set the desired volume with the Alpha Dial.

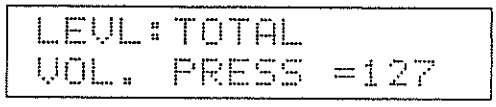
③ Push the Enter Button.

b. Control of the Output Level with Aftertouch

The volume can also be controlled by aftertouch messages. The sensitivity of the effect can be set as follows.

PROCEDURE

① Push the Level Button, then push the Forward or Backward Button until the Display shows "VOL. PRESS".



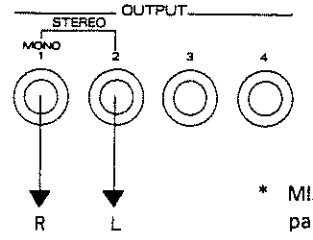
② Set the desired sensitivity with the Alpha Dial.

③ Push the Enter Button.

* When Channel Pressure (explained on page 90) is set to OFF, Aftertouch messages are ignored, therefore the volume cannot be controlled by Aftertouch.

c. Balance

When the Separate function is not used (when the Separate Button is not illuminated: see page 50), exactly the same signal is sent to all the Output Jacks, 1 to 4. Then, when receiving Balance messages from an external MIDI device, the output jacks 1 and 3 have different volumes from the output jacks 2 and 4. When using Outputs 1 and 2 in stereo, you can control the positioning of the sound with this function.

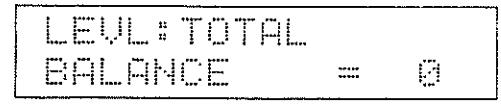


* MIDI Balance messages pan the sound.

* When the S-220 is in Mono mode, the balance message is received on the same channel that receives Control Changes. (See page 91.)

When the volume of one jack is set to the minimum with the MIDI balance message, no sound is output from that jack. If this happens, change the balance of the two outputs as follows.

① Push the Level Button, then push the Forward or Backward Button until the Display shows "BALANCE".



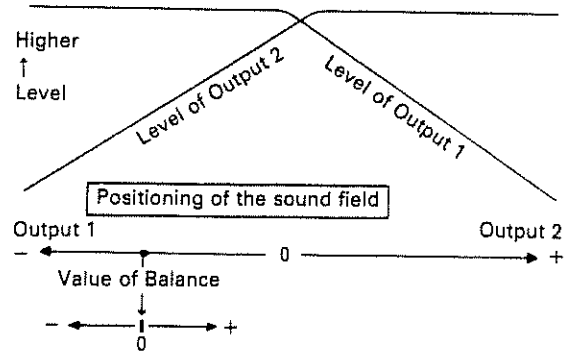
② Set the desired balance with the Alpha Dial.

③ Push the Enter Button.

* When Balance (explained on page 90) in the MIDI Function section is set to OFF, balance messages are ignored, therefore, the balance of two sounds cannot be controlled with MIDI.

d. Control of Balance with Aftertouch

Balance can be controlled by the aftertouch messages. When using the Outputs 1 and 2 in stereo, pushing the key harder after playing it in a normal manner will pan the sound in the direction set here.



Value of Balance Pressure Sensitivity

Set the direction and sensitivity (the amount of change) of the aftertouch as follows.

PROCEDURE

① Push the Level Button, then push the Forward or the Backward Button until the Display shows "BAL. PRES.".



② Set the direction and the sensitivity of the aftertouch with the Alpha Dial.

③ Push the Enter Button.

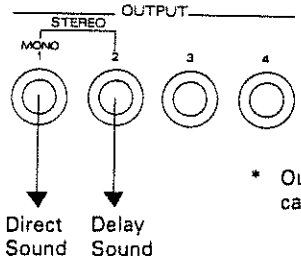
* When Channel Pressure (explained on page 90) in the MIDI Function section is set to OFF, aftertouch messages are ignored, therefore aftertouch cannot control the balance.

e. Separate Function

When the Dual Tone or the Velocity Mix function is in use, pushing the Separate Button will divide the output of the two Structures befween two output jacks 1 and 2. Also, when the Detune or the Delay function is in use, pushing the Sepatate Button will output the normal and the effect sounds separately.

This is called theSeparate function.

When the output jacks 1 to 4 are all used, output 3 sends the same signal as output 1, and output 4 sends the same signal as output 2.



* Output Level and Balance can be controlled via MID.

* When the Separate function is being used, and only Output 1 is connected, two sounds will be mixed and sent from Ouptut1. In this case, the volume balance of two sounds can be controlled by the MIDI Balance messages.

Even when the Separate function is being used, the output level and balance can be controlled by MIDI.

3 MULTI FUNCTION

The S-220's Multi function makes the S-220 behave like several sound modules. Using the Multi function, the S-220 can play up to four sounds (Structures) at the same time. Each sound (Structure) can be individually controlled by a different MIDI channel, giving an ensemble performance by one S-220. Moreover, four outputs are provided, allowing you to send the audio signal of each sound (Structure) separately.

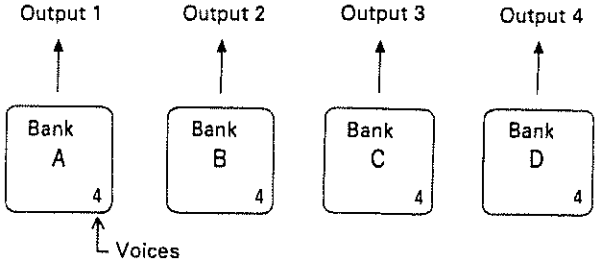
There are five different forms of Multi function:

■ MULTI-1

Four single Stuctures (A, B, C and D) can be controlled separately on different MIDI Channels.

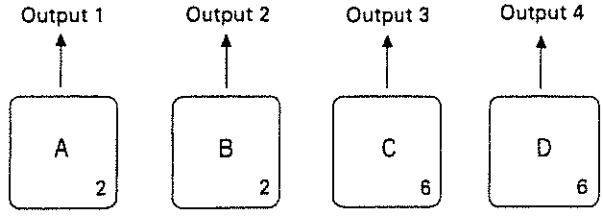
These four sounds are individually sent through the four output jacks.

Each Structure is four voice polyphonic.



■ MULTI-2

This is very similar to MULTI-1. The only difference is that the Structures A and B are two voice, and C and D are six voice polyphonic.

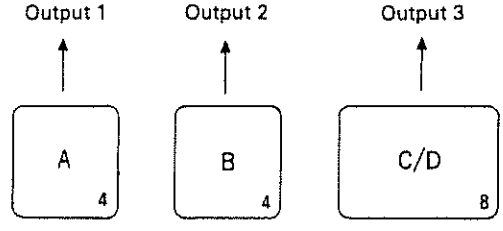


■ MULTI-3

Two single Structures (A and B) and one split Structure (C/D) can be played.

This may be effectively used for a split Structure that reproduces the sound of a musical instrument over a wide sound range.

Structure A and B are four voice, and Structure C/D is eight voice polyphonic.

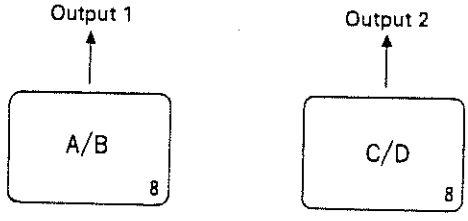


■ MULTI-4

Two split Structures (A/B and C/D) can be played.

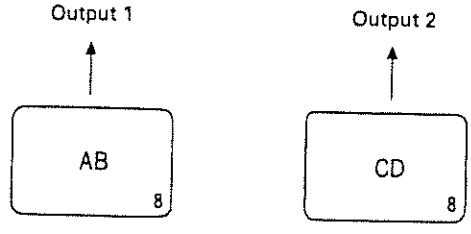
Like MULTI-3, this can be effectively used for a split Structure that reproduces the sound of a musical instrument over a wide sound range.

Each Structure is eight voice polyphonic.



■ MULTI-5

Two sets of combined Structures (AB and CD) can be simultaneously played. Each Structure is eight voice polyphonic.



1. Multi Function Procedure

a. Default Settings

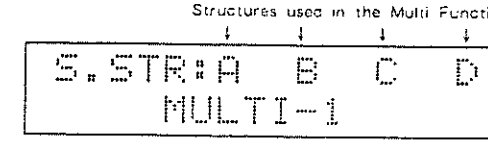
First, check the Structure of the sounds for which you wish to Multi-play, then select one of the five Multi modes. If necessary, alter the order of the Structures, as explained on page 20.

PROCEDURE

① When the sounds (Structures) are prepared, push the Multi Button.

When the unit is set to Mono mode, the Multi function cannot be used, therefore, the Multi Button does not function.

The indicators of the Multi Button and the Separate Button light up, and the Display indicates the Multi mode.



② Using the Forward or Backward Button, select the Multi mode you like.

To cancel the Multi function, simply push the Multi Button, or any of the Structure Buttons.

When the Multi function is in use, the individual MIDI channels can receive the following MIDI messages.

Notes

Modulation

Pitch Bend

Channel Pressure

Hold

Volume

In Multi play mode, you can edit Performance Parameters, Wave Parameters, Split Points, etc, but cannot perform Wave modification (explained on page 74), Sampling (on page 50) or saving/loading of data. If you try to do it, the Multi function will be automatically cancelled. The following functions cannot be used.

Arpeggio

Trigger-play

Detune

Delay

Dual Tone

Velocity Mix

Velocity Switch

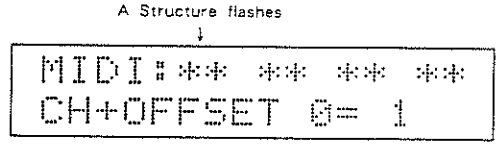
b. MIDI Channel for each Structure

To activate the Multi function, a MIDI channel should be set for each sound (Structure).

PROCEDURE

① Push the MIDI Button.

② Push the Forward or Backward Button until the Display shows "MIDI CH + OFFSET".



Now, you can set the MIDI channel of the Structure that is shown as a flashing letter at the upper part of the Display.

③ Push the ▶ or ◀ button until the Structure you want flashes in the Display.

④ Set the MIDI channel you want with the Alpha Dial.

The number shown in the Display is added to the basic channel set in "MIDI Channel Setting" on page 12. However, if the sum of the numbers exceeds 17, it will show 17=1, 18=2 and so on.

⑤ Continue to set the MIDI channels for the other Structures by repeating steps ③ and ④ as many times as required.

More than one Structure can be set to the same channel number.

* A MIDI channel can be separately set for each sound (Structure) only when the Multi function is in use.

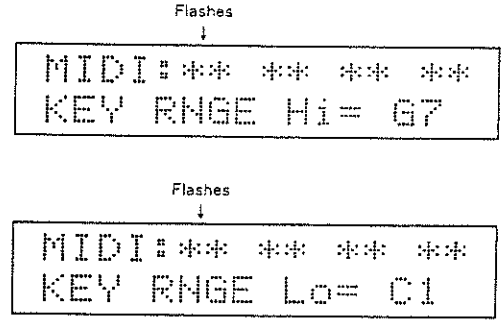
* If the basic channel is changed (on page 12), the MIDI channels set here will all be changed.

c. Sound Range in each Structure

Each sound (Structure) can have a different sound range (=the highest and the lowest key numbers=Key Range).

① Push the MIDI Button.

② Push the Forward or the Backward Button until the Display shows "KEY RANGE" of each Structure.



The highest and the lowest key numbers should be set.

The key number of the Structure flashing in the upper part of the Display can now be changed.

③ Push the ▶ or ◀ Button until the Structure whose key range is to be changed is displayed.

④ Using the Forward and Backward Buttons and the Alpha Dial, set the highest and the lowest key numbers.

⑤ Continue to set the Key Range of the other Structures by repeating steps ③ and ④ as many times as required.

⑥ Push the Enter Button.

* A Key Range can be separately set for each sound (Structure) only when the Multi function is in use. When the Multi function is not being used, the Key Range set with Key Range (explained on page 90) in the MIDI function section is valid.

d. Output Level in each Structure

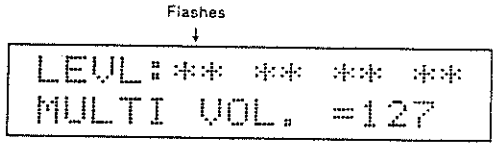
The output level of each Structure can be individually controlled by MIDI Volume messages.

Also, by using the following procedure, the output level can be individually set for each Structure on the S-220.

PROCEDURE

① Push the Level Button.

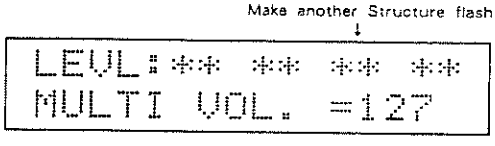
② Push the Forward or the Backward Button until the Display shows the Volume level of each Structure.



The output level of the Structure flashing in the upper part of the Display can be edited.

③ Using the ▶ and ◀ Button, make the Structure whose output level is to be edited flash.

④ Using the Alpha Dial, set the output level.



⑤ Continue to edit the output levels of the other Structures by repeating steps ③ and ④ as many times as required.

⑥ Push the Enter Key.

* When using the Multi function, the volume set here has priority over the overall volume (Total Volume→page 38).

* An Output level can be individually set for each Structure only when the Multi function is in use.

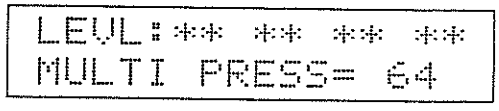
e. Output Level Control of Each Structure by Aftertouch

By using external Aftertouch messages, the output level of each Structure can be controlled separately.

The sensitivity of the aftertouch can be set separately for each Structure as follows.

① Push the Level Button.

② Push the Forward or the Backward Button until the Display shows "MULTI PRESS".



The sensitivity of the Structure flashing in the upper part of the Display can be edited.

③ Using the ▶ or ◀ Button, make the Structure whose sensitivity is to be edited flash.

④ Change the value of the sensitivity with the Alpha Dial.

⑤ Continue to set the sensitivities of other Structures by repeating steps ③ and ④ as many times as required.

⑥ Push the Enter Button.

* When using the Multi function, the sensitvity of aftertouch set here has priority over the Volume Pressure sensitivity (explained on page 39).

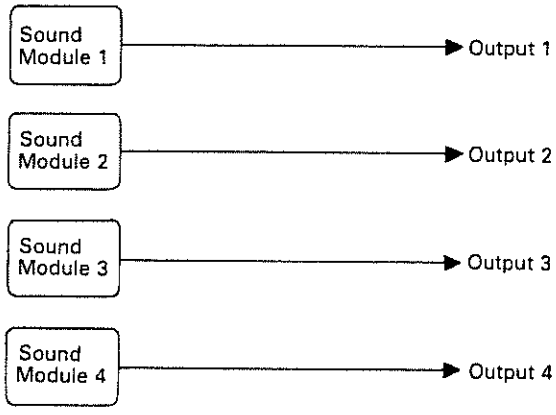
* Sensitivity of aftertouch, individually set for each Structure, is valid only when the Multi function is in use.

2. Parallel Output

When the Multi function is in use, the four outputs allow you to send the audio signals of each sound (Structure) separately. Moreover, it is possible to send a mixed signal.

■ When all the four Output Jacks are connected:

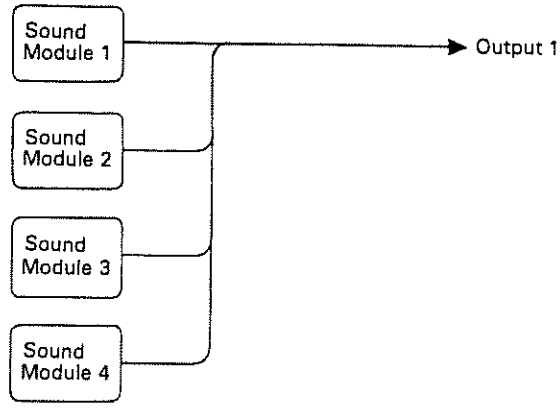
Each Structure is individually sent out.



* When the Multi function is not in use, exactly the same signal is sent through the four output jacks. Also, when the Separate function is in use, Outputs 1 and 2 are stereo, Output 3 sends out the same signal as Output 1, and Output 4 sends the same signal as Output 2.

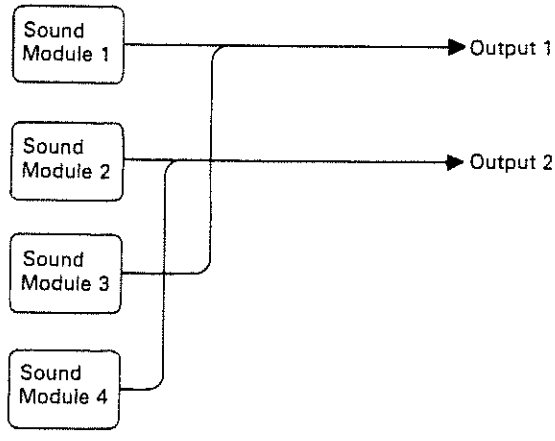
■ When only Output Jack 1 is connected:

All the sounds are mixed and sent to Output 1.



■ When Output Jacks 1 and 2 are connected:

Output 1 sends the signals intended for Output 1 and Output 3, and Output 2 sends the signals intended for Output 2 and Output 4.



3. Split using the Multi Function

When the Multi Function is in use, it is possible to play different sounds (Structure) in different key ranges using only one keyboard controller. This is very similar to a Split Structure, but one advantage is that this allows you to extract each sound separately in parallel (parallel output). To obtain this effect, however, you should set the MIDI channels of all sounds to the same number, and set appropriate key ranges.

When using a Split Structure, parallel output cannot be done; you should assign each sound to a different Structure. To set a new Structure, push the relevant Structure Button, then the Enter Button.

When using the A/B/C/D Structure, however, parallel output can achieved by following the procedure:

① Push the A/B/C/D Structure Button.

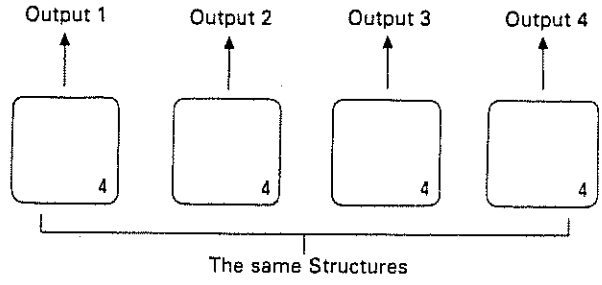
② Push the Separate Button while holding the MIDI Button down.

③ Push the Multi Button to select [MULTI-1] or [MULTI-2].

* The above procedure will automatically set the MIDI channel of each sound to the same number (=basic channel), and the key range of each sound is set depending on the Split Points of the Structure A/B/C/D. This means, that if you wish to use a usual Multi function after the above procedure, you should set the MIDI channels or key ranges again.

4. Parallel Output of each sound

The Multi function (MULTI 1 to 5) is controlling different sounds (Structures) on different MIDI channels. It, however, is possible to control the same sound (Structure) on different channels. In this case, any Structure can be selected. And also, the volume can be controlled by aftertouch or volume messages on each MIDI channel.

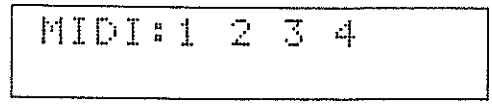


▶ While holding the relevant Structure Button down, push the Multi Button.

The separate Button, Multi Button and the Structure Button light up.

MIDI channel, sound range, output level or aftertouch sensitivity can be set for each of the four channels just like in a usual Multi mode (MULTI 1 to 5).

The four numbers shown on the upper line of the Display represent Output 1, 2, 3 and 4 from lift to right.



4 SAMPLING

Without using the performance disk, you can sample the voice from a microphone or audio equipment, and play it from the keyboard.

1. Basic Sampling

Plug a microphone or an instrument into the input Jack.

Use the Line or Mic jack depending on the type of device used. (See "Connection" on page 10.)

* These two input jacks cannot be used at the same time. When two jacks are used, only the Line Input will work.

The Limiter Switch is provided to enable you to sample without sound distortion even when an excessive input is fed in.

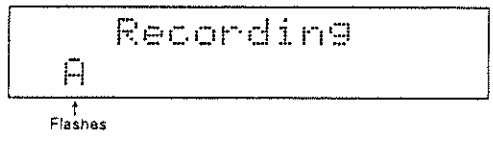
* When a microphone is connected, turn the Master Volume down, or it may cause howling. If this happens, use headphones.

PROCEDURE

① Select the Bank (A, B, C, or D) to be sampled.

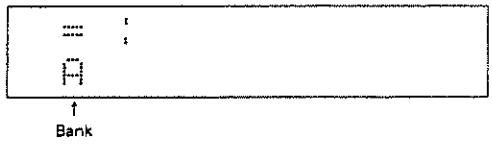


② Push the Recording Button.



The selected Bank will be shown in the Display. Here, you can monitor the sound with an amplifier, speakers, or headphones connected to the Headphone Jack.

③ Push the Stand-by Button.



The Display now serves as a level meter.

* At this stage (stand-by mode), sampling has not yet started.

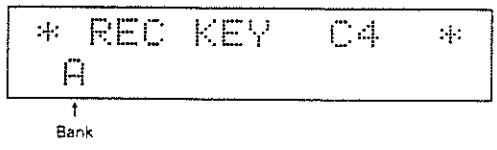
④ Adjust the input level with the Recording Level Knob as you actually listen to the sound.
Just like a volume adjustment in tape recording, set the level as high as possible without exceeding the right margin in the Display.

⑤ Set the level of the Auto Trigger by rotating the Alpha Dial until the " : " mark in the Display reaches the desired position.

* Auto Trigger is the function that starts the sampling automatically when a signal exceeding the set level is fed into the sampler.

When a signal that exceeds the trigger level (represented with a " : " mark) is fed into the sampler, the far right of the Display shows a " * " mark. Make sure that the " * " does not appear in the Display because of noise alone.

⑥ Push the Start Button. (When a pedal switch is connected to the Start Jack, press the pedal.)



Now, the Display shows the pitch assigned to the sound to be sampled. When sampling a sound from a musical instrument, try to feed the correct pitch.

* Even if a different pitch is used, it can be corrected later. (See page 59.)

* The Rec Key Number of the sample can also be changed. (See the next page.)

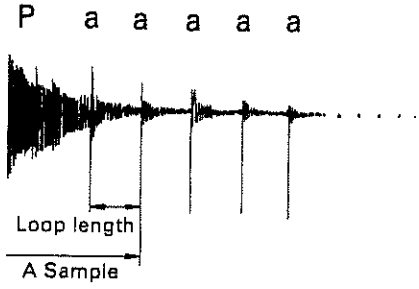
When a sound that exceeds the set Auto Trigger level is fed in, the sampling is performed, and the unit goes back to the Play mode in several seconds.

The performance parameters set beforehand are retained in the S-220, therefore, it may not necessarily be played with the sampled sound. Reset all the performance parameters to the default setting by pushing the Enter Button while holding the Performance Button down.

You can now hear the sampled sound by using an external device as a MIDI controller.

—About Looping—

A sampled sound longer than 0.8 sec will automatically be looped (Autolooping). The looping function repeats a part of the sampled sound. In this way, sustained sounds can be performed. For instance, you can produce a "Paaaa...." sound by a sampling "Pa".



* Looping a sample can produce an annoying ticking or propping noise, but this can be removed later by correcting the Wave Parameters (explained on page 55).

* If the S-220's built-in computer cannot find an appropriate start point for the loop, the looping is not performed.

* If the Autoloop function (explained on page 77) in the Wave Modify section is set to Mode 3 or 4, looping will be more difficult.

2. Changing Sampling Conditions

You can change the following sampling conditions: Key Number, Trigger Modes and Sampling Clock.

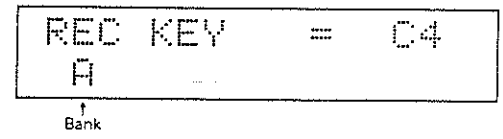
PROCEDURE

① Push the Record Button, then the Mode Button, and select the conditions you wish to change by using the Forward and Backward Buttons.

② Make the necessary alterations with the Alpha Dial.

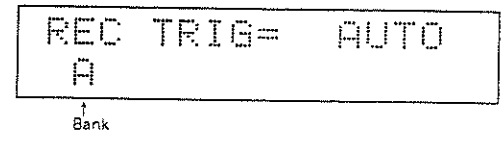
③ Push the Stand-by Button, and you can move on to the sampling procedure.

- **Changing Key Numbers in Sampling**



When you are sampling a specific pitch, you may wish to change the key number. It is important to remember that a pitch higher than the original sampled sound by more than 21 semi-tones is substituted by the pitch of the lower octave.

- **Changing Trigger Modes**



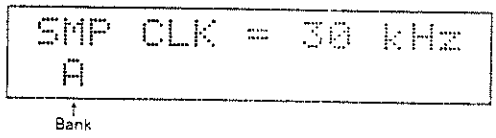
Usually, set this to Auto Trigger mode. However, when sampling a slow attack sound making it difficult to start sampling, select Manual mode.

When the Manual mode is selected, the " : " mark in the Display goes out.

By pushing the Start Button and the pedal switch connected to the Start Jack (or by pushing the Start Button twice), the sampling begins.

* The selected mode will remain even after the S-220 is turned off.

• Sampling Frequency



The S-220's sampling (recording) process is achieved by examining (sampling) the incoming signal level, a great many times per second (=sampling frequency) and sequentially converting these different levels into digital signals, and then recording them into computer memory.

The Sampling frequency is the number of times per second that a sample is made of the input signal. The S-220 can sample either at 30,000, or 15,000 samples per second. (30kHz or 15kHz)

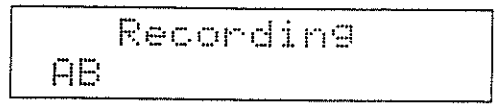
At higher sampling frequencies, the sampling time is shorter, but the audio quality of the sample is better. On the other hand, at lower sampling frequencies, the sampling of longer sounds is possible, but the audio quality of the sample is slightly lowered. At 30kHz, the longest sampling time (per structure) is one second, and at 15kHz, 2 seconds.

3. Sampling a Long Tone or Split

To sample a long tone, you need the Structure AB (two seconds), CD (two seconds), or ABCD (four seconds). Also, when the tone slightly differs depending on the pitch, or two different sounds are required in the upper and lower sections of the keyboard, you need the Structure A/B, C/D, AB/CD or A/B/C/D.

a. Sampling a Long Tone (Using Structure AB, CD or ABCD)

The necessary procedure is almost the same as for basic sampling (on page 50). After selecting a combined Structure such as AB, CD or ABCD, push the Record Button, and the group of the relevant Banks is shown in the Display.

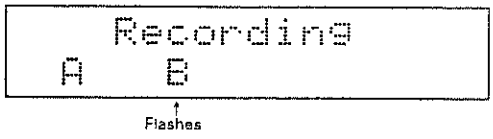


By selecting Sampling Clock of 15 kHz (on page 52), the time can be extended even more.

In single Bank sampling, the auto-looping is performed on a sample exceeding 0.8 sec. But in a structure of combined Bank, auto-looping works when the last Bank exceeds 0.8 sec. For instance, in structure AB, a sample longer than 1.8 sec will be looped.

b. Sampling of Split Structures

When a Split Structures such as A/B, C/D, AB/CD or A/B/C/D is selected, the group of the relevant Banks is shown in the Display by pushing the Record Button. Select the desired group of the Banks to be sampled by rotating the Alpha Dial.



The necessary procedure is basically the same as for basic sampling (on page 50). In this mode, however, the next Bank to be sampled is displayed after you have sampled one Bank. When all Banks are sampled, the S-220 will automatically return to the Play mode.

If you wish to go back to the Play mode for verifying what you have sampled so far, push any of the Structure Buttons. When you resume sampling, be sure to assign the correct Bank.

4. De-activating Looping

To sample a long tone, you use more than one Bank combined, and Looping may not be necessary. The Looping function can be removed later or even now before any sampling is performed.

To cancel the Looping function now, simply push any of the Structure Buttons while the Display is showing the following indication.



[5] Correcting the Sampled Data

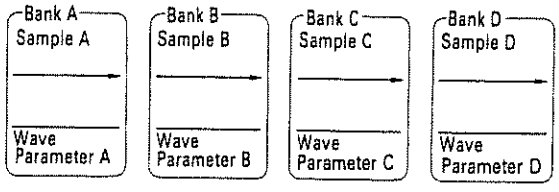
The sampled sound is stored in the S-220's memory, and later when the instrument is played, read from the memory and reconstructed. Wave Parameters are involved with the Reading and Reconstruction.

Even useless samples will come to serve a purpose if modified by the wave parameters to be played in a different way. For instance, the pitch of a sample can be modified during reading. Also, by using the wave parameters and changing the style of playing, you can perform various things, e.g. changing looping, adding envelope curves, etc. In other words, wave parameters are not involved with transforming the sample itself, but only with changing how it is read from memory. If you wish to actually process the sample itself, follow the "Wave Modification" on page 74.

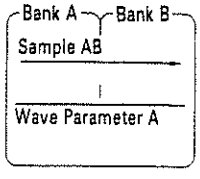
Each sampled sound has a set of wave parameters.

When more than one Bank is used for sampling a sound, the group of the Banks has a set of wave parameters.

Single Bank Structure



Structure AB



This concept applies to the Split Structure as well.

Immediately after sampling, Wave Paramerers are reset to the default settings.Here, you change the values of wave parameters according to the sampled sound.

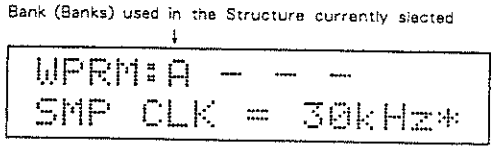
* Data loaded from a QD can also be modified with the wave parameters.

1. Editing Wave Parameters

Any of the wave parameters can be edited using the following method.

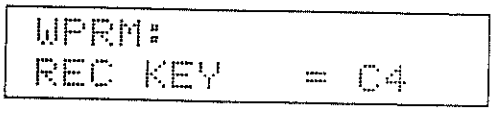
① Push the Parameter Button .

The Display shows the Bank(s) which is to be edited by the wave parameters.



② Select the Bank (Structure) to be edited by using the ▶ button and the ◀ button.

③ Select the wave parameter to be changed with the Forward Button or Backward Button.



④ By rotating the Alpha Dial, change the value of the parameter.

Pushing the Maximum Button sets the highest value, and pushing the Minimum Button sets the lowest value.

To return to the original value before being edited, push the Cancel Button.

⑤ Repeat steps ② to ④ as many times as necessary.

⑥ Push the Enter Button .

The wave parameters will always be called in sequence, as shown below.

*SMP CLK	Sampling Clock
REC KEY	Recording Key Number
BANK TUNE	Bank Tune
*SCAN MODE	Scanning Mode
LOOP	Loop ON/OFF
ADRS GROUP	Address Group
ADRS V-SW	Address Velocity Switch
*ST1	Start Point (1)
EN1	End Point (1)
LP1	Loop Length (1)
LOOP TUNE1	Loop Tune (1)
*ST2	Start Point (2)
EN2	End Point (2)
LP2	Loop Length (2)
LOOP TUNE2	Loop Tune (2)
*ENV V-SENS	Envelope Velocity Sensitivity
ENV RATE1	Envelope Rate1
ENV LEVEL1	Envelope Level1
ENV RATE2	Envelope Rate2
ENV LEVEL2	Envelope Level2
ENV RATE3	Envelope Rate3
ENV LEVEL3	Envelope Level3
ENV RATE4	Envelope Rate4
DYN SENS	Dynamic Sensitivity
*KEY FOLLOW	Key Follow
PITCH BEND	Pitch Bend ON/OFF
VIBRATO	Vibrato ON/OFF
A-BEND RATE	Auto Bend Rate
A-BEND DPTH	Auto Bend Depth

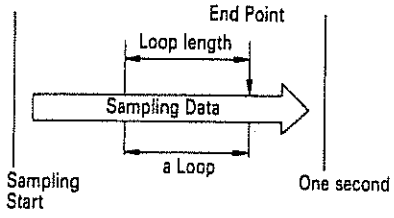
* The parameters with a * mark can be sequentially called by pushing the F2 Button while holding the Forward Button down, or pushing the F1 Button while holding the Backward Button.

* Wave parameters can be edited while listening to the sound. However, the change of the sound may not be recognized. To monitor the edited sound, stop playing the S-220, then play it again.

2. Changing Looping

If you find the looping of the sample is strange or the pitch of a loop is incorrect, edit the sample with the wave parameters.

The picture will help you understand Looping.

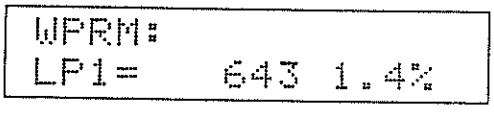


- **Loop ON/OFF**



This selects whether to loop or not.

- **Loop Type**

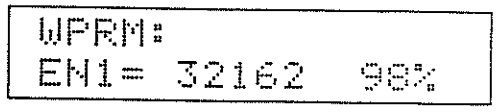


A loop is a section which replays while the key is being held down.

The length of the loop can be set with the "Loop Length".

* When the loop length is too short, the loop may get out of pitch. A pitch gap less than a semitone can be later corrected by the Loop Tune parameter (See page 59).

- **End Point**



This is the end point of a loop.

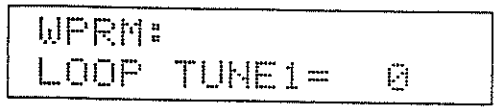
* Even when Loop OFF is selected, the End Point can be set; any sound after the End Point is muted.

* The loop length and the end point are preprogrammed separately.

Address Display

Address is the value that represents the time of the Start Point, Loop Length (explained later) and End Point. The length of a whole Bank is 32,767 address. A set of two Banks is 65.535 address. A set of four Banks is 131.071. The percentage, that the address accounts for (of the whole Bank) is shown in the Display.
The value can be changed by rotating the Alpha Dial. Rotating the dial fast changes the value drastically.

- **Loop Tune**



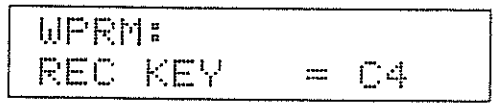
This can correct the pitch of a loop from −50 to +50.

3. Tuning a Sample

When you have sampled a pitch different from the key number shown in the Display, the pitch of the sampled sound can be tuned here.

Two wave parameters are involved, one is the Recording Key Number that tunes in semi-tone steps, and the Bank Tune that involves more delicate tuning.

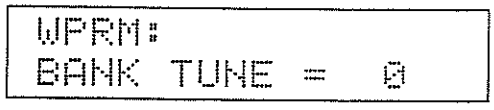
- **Recording Key Number**



When you are sampling a specific pitch, change this to the relevant key number. If not, release the key, play it again and while listening to the sound, tune to the other instrument using the Alpha Dial.

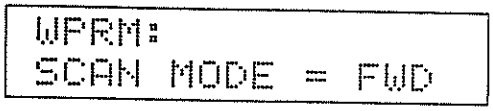
* A pitch higher than the sampled pitch (Recording Key Number) by more than 21 semi-tones will be substituted by a lower octave.

- **Bank Tune**



You can change the pitch from −50 to +50 cents.

4. Scanning Mode



FWD, BWD and ALT determine how to read the samples:

FWD (Forward)

This plays the loop section in sequence as it was recorded. Usually, select this mode.

BWD (Backward)

This plays the sample in reverse sequence, just like the reverse playback of a tape recorder.

ALT (Alternate)

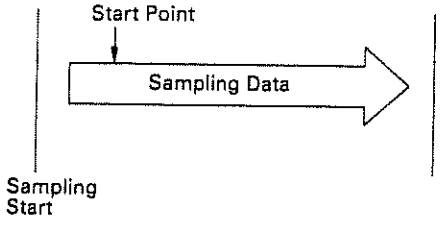
This changes the direction of the loop alternately. Changing the loop length, various effects can be obtained.

5. Start Point



You can change the start point of the sample. The sample will be played from the set start point. This is useful for correcting the start point of the sample recorded in Manual mode.
Also, this can start the sample from the middle.

* It is not possible to set the start point through a Loop.



- **Address Groups (1, 2)**

```
WPRM:
ADRS GROUP   = 1
```

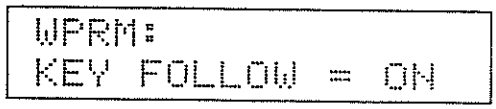
The S-220 allows you to program two different sets of Start Point, Loop Length, End Point and Loop Tune settings (Address Groups). You can select which address group is to be used.

	Address Group 1	Address Group 2
Start Point	ST1	ST2
End Point	EN1	EN2
Loop Length	LP1	LP2
Loop Tune	LOOP TUNE1	LOOP TUNE2

Address group 2 can be programmed in exactly the same way as address group 1. However, Start Point 2 cannot be set to any other value but zero, or the value of the Start Point 1. (Usually, select the value of the Start Point 1.)

When Start point 2 is set to the same value as the Start point 1, changing start point 1 will automatically change Start point 2.
In this case, if the loop of group 2 is situated before the loop of group 1, Start point cannot be set to the later address, therefore, Start point 1 cannot be set to address later than the beginning of the loop of group 2. When Start point 2 is set to zero, Start Point 1 can move from address 0 to just before Loop 1.

6. Key Follow

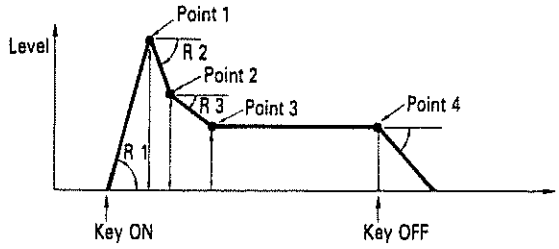


Usually Key Follow is ON, and playing each key on the keyboard will create the corresponding pitch.

Key Follow OFF is a rather special effect that generates only the same pitch as the sampled sound whatever note may be played. The pitch to be generated, moreover, can be altered by Bank Tune of the Wave Parameters. (See page 59.)

7. Envelope

The S-220 offers you a wide range of control over the envelopes of the sampled sound.



* R 1 and R 2 change depending on how you play the keyboard.

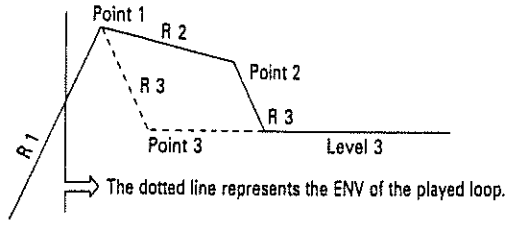
An envelope curve is determined by levels and rates. A Wave Parameter "Rate" is a slope from a level (volume) to the next level. A Higher Rate means a steeper slope. When the level difference between the first level and the next is small, the time needed is shorter.

Notes on Envelope Parameters

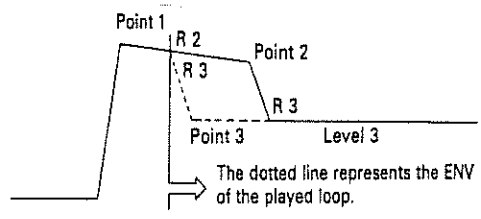
* When L1 is set to exactly the same length as L2, R2 has no meaning. Points 1 and 2 become one, and R1 is followed by R3 right away.

When L3 is set to exactly the same length as L2, R3 has no meaning. Points 2 and 3 become one.

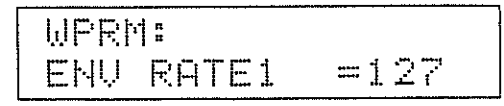
* When looped before the curve reaches Point 1, Point 1 slides to Point 3 in the slope of R3.



* When looped while decaying in the slope of R2, the slope changes to R3 and slides to Point 3.



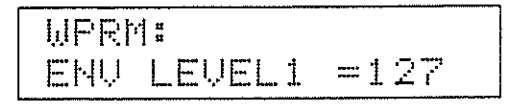
- **Envelope Rate 1 (R1)**



The Envelope Rate 1 (the slope from Key-On to Point 1) can be set from 0 to 127.

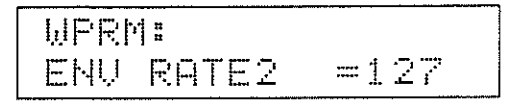
* With the Wave Parameter "Envelope Velocity Sensitivity" (explained on page 64) set to high, the rate can be controlled by the touch sensitivity of the keyboard.

- **Envelope Level 1 (L1)**



The level of Point 1 can be set from 0 to 127.

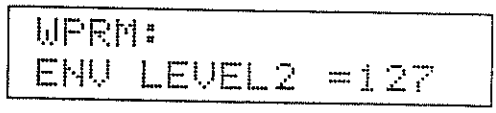
- **Envelope Rate 2 (R2)**



The Envelope Rate 2 (the slope from Point 1 to Point 2) can be set from 0 to 127.

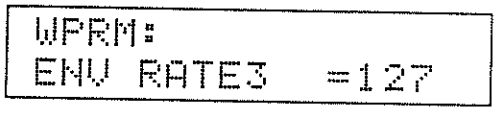
* With the Wave Parameter "Envelope Velocity Sensitivity" (on page 64) set to high, the rate can be controlled by the touch sensitivity of the keyboard.

- **Envelope Level 2 (L2)**



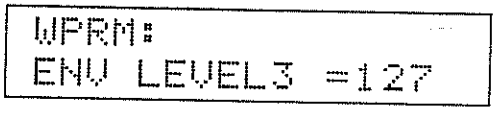
The level of Point 2 can be set from 0 to 127.

- **Envelope Rate 3 (R3)**



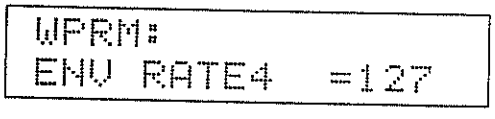
Envelope Rate 3 (the slope from Point 2 to Point 3) can be set from 0 to 127. (The actual slope of R3 is a curve.)

- **Envelope Level 3 (L3)**



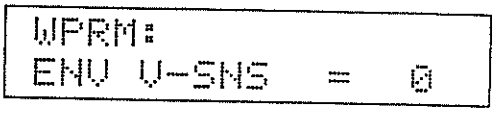
The level of Point 3 can be set from 0 to 127.

- **Envelope Rate 4 (R4)**



This is the slope that slides down from Key-Off to volume zero. Higher values mean quicker decay. (The actual slope of R4 is a curve.)

- **Envelope Velosity Sensitivity**

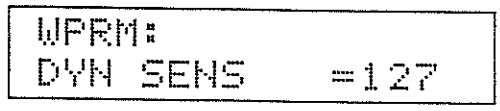


With the Envelope Velocity Sens set to higher values, R1 and R2 are controlled by the dynamics of the keyboard. That is, playing the keyboard harder will quicken the attack time, and vice versa.

* Even without setting the Envelope curve, the attack time can be controlled with the sensitivity of the keyboard, by raising the value of the Envelope Velocity Sensitivity.

* No matter how hard you play the keyboard, you cannot obtain a sharper attack than that of the sample sound.

8. Dynamic Sense



Dynamic Sense is the maximum effect of the touch sensitivity, from 0 to 127. The volume will change more drastically with higher values.

9. Pitch Bender ON/Off



This selects whether the selected Bank will take on the Pitch Bender effect. The Dual function (performance controlling functions) allows you to mix a Bank with pitch bender effect and a Bank without, creating a special effect.

* When the MIDI Bender (explained on page 25) in the MIDI Functions is set to Off, the MIDI Pitch Bend message is ignored, the pitch bend effect cannot be obtained.

* When the Bend Range (explained on page 89) is set to zero, the pitch bend effect cannot be obtained.

10. Vibrato On/Off



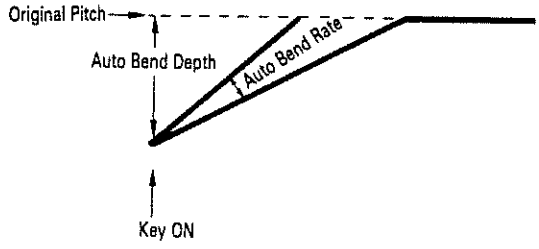
This selects whether the selected Bank will take on the vibrato effect (Manual or Delayed Vibrato) or not. The Dual function (performance controlling functions) allows you to mix a Bank with vibrato and a Bank without it, creating a special effect.

* When the MIDI Modulation (explained on page 89) in the MIDI Functions is set to Off, the MIDI Modulation message is ignored, therefore, the Manual Vibrato effect cannot be obtained.

* Parameters for Vibrato, such as Vibrato Depth can be controlled by relevant Performance Parameters (on page 24).

11. Auto Bend

Auto Bend involves the depth and the rate of change of the pitch at the beginning of the sample.



- **Auto Bend Depth**



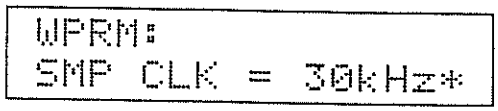
This determines how much the pitch should be lowered from the sampled sound.

- **Auto Bend Rate**



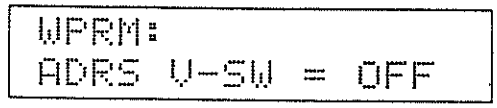
This determines the slope sliding to the original pitch, from 0 to 127.

12. Sampling Frequency



This shows the sampling frequency of the sample. This cannot be changed, but you may want to see this when performing a "MIX" (page 82) in the Wave Modification section, or "COMBINE" (page 83).

13. Address Velocity Switch



Each structare of the S-220 can include two address groups. It is then possible to switch between these two different sounds by playing the keyboard harder, or softer.

The Address Velocity Switch sets the minimum key touch strength required to sound one of the two Address Groups (page 61). When you play the keyboard softer than the set value, the Address Group selected with "ADDRESS GROUP" in the Wave parameter section will sound. In the other words, with higher values, stronger key touch is required to sound the other Address Group.

The values set here are not continuous; they are:- OFF, 15, 30, 40.....105, 110, 115.

To actually use the Address Velocity Switch function, see page 87.

14. Copying Wave Parameters

The following Wave Parameters can be copied individually or in bulk from a Bank to other Banks of a Split Structure. This is much easier and quicker than making the Wave Parameters from scratch.

Wave Parameters which can be copied are:

Scanning mode
Loop (ON/OFF)
Address Groups
Address Velocity Switch
Envelope Velocity Sensitivity
Envelope
Dynamic Range
Key Follow
Pitch Bender
Vibrato
Auto Bend Depth
Auto Bend Rate

[Bulk Copy]

After you have finished editing all the Wave Parameters in one Bank of the Split Structure, go to the following procedure.

While holding Save Button down, push either ▶ or ◀.

All the parameters shown left are copied from this Bank to other Banks of the Split Structure.

[Individual Copy]

PROCEDURE

① Select the Wave Parameter you wish to copy.

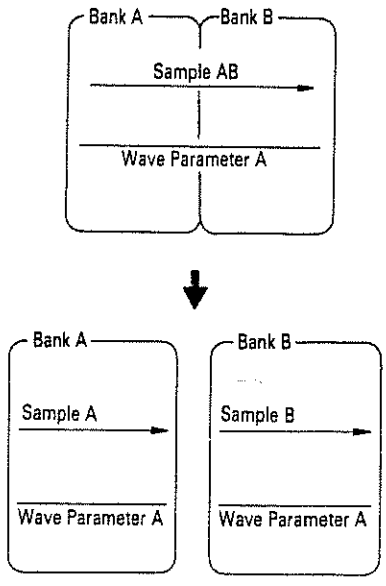
② While holding the Recording Button down, push either ▶ or ◀.

The parameter selected in step ① is copied from this Bank to other Banks of the Split Structure.

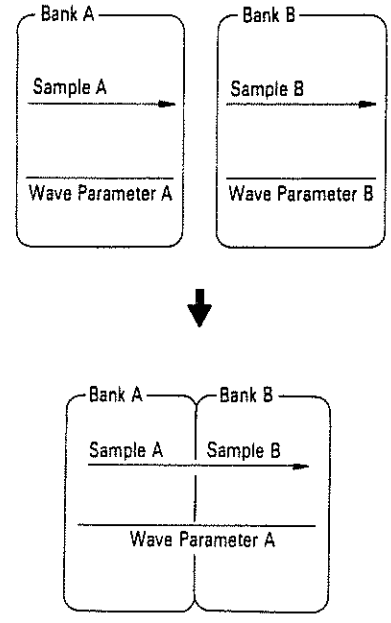
15. Structure and Wave Parameters

When more than one Bank is combined for recording a sample, these Banks (e.g AB, CD, ABCD) are considered to be one group, and one group has a set of wave parameters.

When the Structure AB is separated into A and B, each of A and B requires, and is given, the set of parameters owned by the Structure AB. (The Loop Type is One Shot and the Start Point is 0.)



On the other hand, when the two Structures A and B are converted to one Structure AB, it will have the set of parameters which used to belong to Bank A. (Loop is OFF and the Start Point is 0.) The parameters which belonged to Bank B will be lost, therefore, the pitch of the sampled sound is altered by Bank A's Recording Key Number and Bank Tune. Bank A and B will be played sequentially, but they will not be automatically set to the same pitch. In other words, unless they are recorded in the same pitch, the tuning after recording has on meaning.



6 Saving

A whole Bank of the sampled sounds can be saved on a quick disk(QD) with the Wave parameters, Performance Parameters, Split Point, Structure Mode, Bank Name and File Name. The saved data can be loaded back to the S-220 at any time. In this way, exactly the same situation can be reproduced.

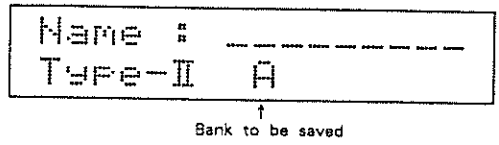
Data programmed on the S-220 can be used as data for the Roland Digital Sampling Keyboard S-10, or the Digital Sampler MKS-100.

1. Basic Saving

PROCEDURE

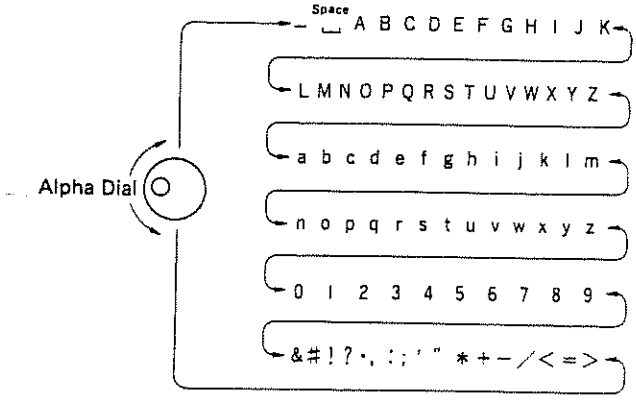
① Call the Bank to be saved and select the Structure Mode for playing it back.

② Push the Save Button .



③ Write a File Name of the data as follows.

As you rotate the Alpha Dial, a letter, number or sign will appear at the flashing cursor in the Display. When the first letter is written, move the cursor to the next position using the ▶ Button, then write the second letter with the Alpha Dial.

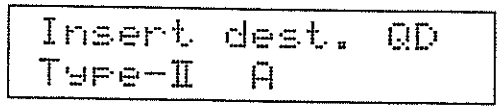


The cursor can be moved backward using the ◀ Button.

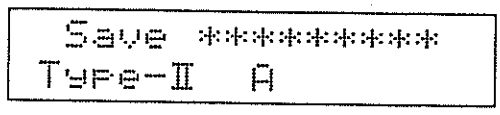
To make a space, simply push the Forward Button.

④ If you have written the File Name, insert the QD on which the data is to be saved.

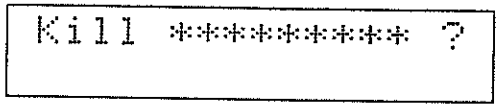
⑤ Push the Save Button.



When a brand new QD is used, the data will be automatically saved onto it.



When any previous data is written on the QD, the Display will respond with:

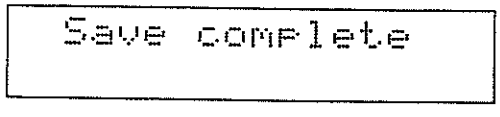


If you wish to retain the data saved on the QD, make sure the disk drive indicator is dark, push the Eject Button and take the QD out, then insert another QD.

Now, push the Save Button.

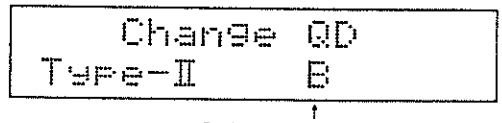
* To cancel saving, push any Structure Button

When saving is completed, the Display will change to:



To protect the saved data from any accidental loss, take the QD out, and snap off the Protect Nail. (See page 8.)

When more than one Bank is used in a Structure, the Display will respond as below, This tells you that you need to save the other Bank to the other side of the QD.



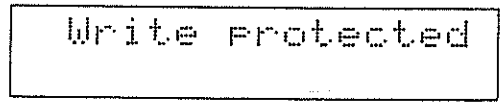
↑
Bank that needs saving data

⑥ As the Display indicates, remove the QD and reinsert it with the other side facing upward, (or insert another QD)

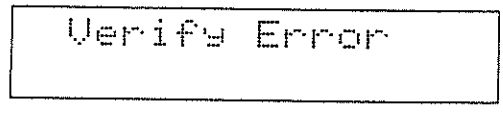
Likewise, save all the Banks of the Structure.

When saving is impossible, the following error messages will be shown.

Error



This tells you that the Protect Nail on the QD is snapped off. Replace it with a proper QD.
To use such a QD again for saving, attach a cellophane tape as shown below.



This tells you that the QD is damaged. Replace it with a proper one.

2. Saving more information

The following settings can be saved onto a disk as well as sound data, wave parameters, performance parameters, and split points.

- Output Level (See page 38.)
- Output Level Control with Aftertouch (See page 39.)
- Balance (See page 39.)
- MIDI Channel for each Structure (See page 44.)
- Sound Range for each Structure (See page 45.)
- Output Level for each Structure (See page 46.)
- Output Level Control with Aftertouch for each Structure (See page 47.)
- MIDI Basic Channel (See page 12.)
- MIDI Mode (See page 11.)
- All the other MIDI Functions (See page 89 to 92.)

All the necessary procedures are the same as for Basic saving on page 70,except that the F2 Button should be pressed before pushing the Save Button in step ②.

Loading such QD data will load the above parameter settings at the same time.

* When loading without performance parameters (explained on page 38), the parameters listed above are not loaded.

QD Types

A QD is categorised as Type I, II or III depending on the number of parameters included on it. A QD made by "Basic Saving" is Type II. A QD made by "Saving more information" is Type I. A QD from the S-10 or MKS-100 is Type III.

The parameters included in each QD Type are shown on page 102.

3. Quick Saving without Verification

This saving skips the verifying procedure whether the QD contains any previous data or not, and is therefore quicker. A brand new QD can be saved using this method.

▶ Take exactly the same procedure as "1. Basic Saving", but push the F1 button before pushing the Save Button in step ②.

[6] Wave Modification

Not only editing the Wave Parameters and Performance Parameters, the S-220 also allows you to edit the sampled sound itself. We call this Wave Modification.

The Wave Modification actually processes the sample itself, therefore, the modified data cannot be restored. Please be sure to save the data onto a OD before performing Wave Modification.

First, select the factor to be wave-modified as follows.

PROCEDURE

① Select the Structure by using the appropriate Structure Button.

② Push the Modify Button.

The Display shows "Wave Modify" for a moment. This indicates that it is now in the Wave Modify mode.

* While in the Wave Modify mode, no sound can be generated.

③ Using the Forward Button and the Backward Button, call the factor to be edited.

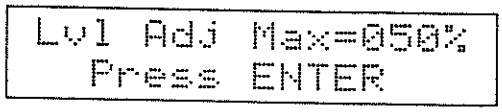
Now, go to the next procedure for actual Wave Modification.

[Wave Modification of individual Bank(s)]

You can wave-modify an individual Bank or Banks of a combined Structure as well as the whole Structure.
e.g. You can adjust the level (See page 75) of Bank C of the Structure A/B/C/D, or apply a "Digital Filter" (page 80) to Banks C D of the Structure AB/CD.

► Push the Structure Button that corresponds to the Bank or Banks to be extracted from a combined Structure, then hit the Enter Button.
► To return the extracted Bank (or Banks) to the original Structure, push the Structure Button of that Structure, then hit the Enter Button.

1. Level Adjusting



The volume of the sampled sound in each Bank can be adjusted.

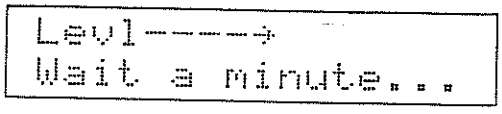
Take step ① on page 74 selecting any Structure you like.

Take steps ② and ③, selecting "Level Adjust".

④ Set the desired level using the Alpha Dial.

* Here, if you push both the Button ▶ and the Button ◀ at the same time, the maximum level of the sample is detected and shown in the Display. This will help you set the volume.

⑤ Push the Enter Button.

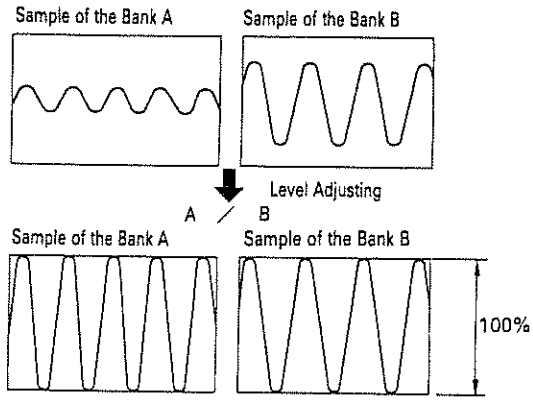


The S-220 returns to the Playing mode.

* When the level is set to 100%, each Bank will be automatically set to the maximum volume which is the level just before the sound is distorted. However, some samples are distorted every time they are played. This, however, does not mean that the Wave Data itself is distorted. So, simply set a lower value to remove the distortion.

When a Split Structure is selected, the volume of each Bank will become equal to the level set in the Level Adjusting.

e.g.) Level Adjustment of the Structure AB



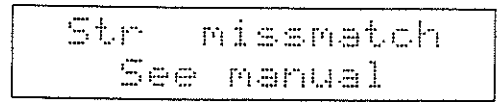
To adjust the level of a Bank or Banks of a Split Structure (e.g. AB/CD), take the following procedure.

1) Simply call the relevant Bank(s) by pushing the appropriate Structure Button, then the Enter Button.

2) Adjust the level of a Bank or group of Banks by taking steps ② to ⑤.

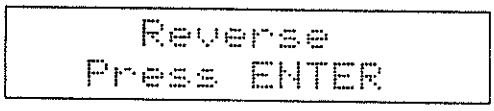
3) Return the Bank or the group of Banks to the Structure it belongs to by pressing the Structure Button which was selected before you took step ①, then push the Enter Button.

Error



When this error message is indicated, the selected Structure is irrelevant, therefore, cannot be level-adjusted. Select the appropriate Structure by pushing the corresponding Structure Button then the Enter Button. Then repeat the whole procedure.

2. Reverse

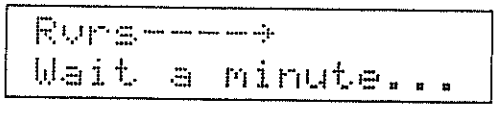


The reverse function on the S-220 plays the sample backwards; similar to a tape recorder's reverse playback. If a Structure consists of more than one Bank, the group of Banks will be played as one, while each Bank will be individually played in a Split Structure.

Take step ① on page 74 selecting any Structure you like.

Take steps ② and ③, selecting "Reverse".

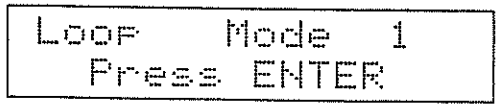
④ Push the Enter Button.



When the sample is modified, the Display returns to the Playing mode indication.

* A loop cannot be reversed; the looping is cancelled and Loop OFF (explained on page 58) is set automatically.

3. Auto Loop



Even when the looping is cancelled by an other Wave modification process, the Auto Loop function can detect the optimum loop length and End point.

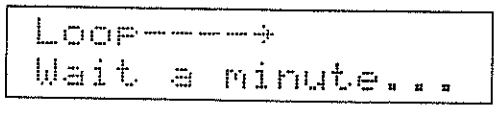
In a Structure of combined Banks, the group of Banks is looped as one, while each Bank of a Split Structure is looped individually.

Take step ① on page 74, selecting any Structure you like.

Take steps ② and ③, selecting "Auto Loop".

④ By rotating the Alpha Dial, experiment and select one of the four Looping Modes.

⑤ Push the Enter Button.

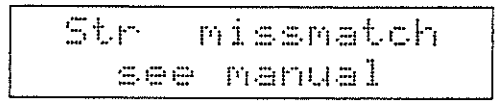


When Auto Looping is finished, the Display changes to the Playing Mode indication. If you find the looping unsatisfactory, select a different mode, and repeat Auto-loop procedure, or follow "Changing Looping" on page 58.

* After the Looping is exected, the Wave Parameters LP2 and EN2 will retain the detected loop length and end point, and Address group 2 is selected.

* The looping mode set in step ④ will remain till a new sample has been taken.

Error



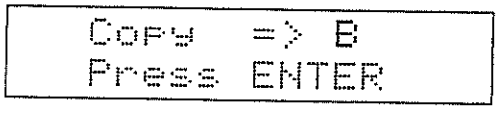
When this error message is indicated, the selected Structure is irrelevant, therefore, it cannot be auto-looped. Select an appropriate Structure by pushing the corresponding Structure Button then the Enter Button. Then repeat the whole procedure.

4. Copy

The sampled sound and the Wave Parameters stored in a Bank (or Structure) can be copied into a different Bank (or Structure).
The destination Bank(s) is limited, depending on the type of the source Bank(s) that you wish to copy as shown below.

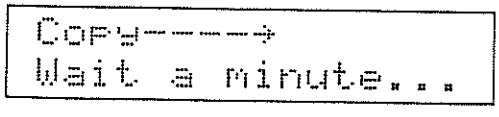
Source Banks(s)		Destination Bank(s)
A	→	B, C, D
B	→	A, C, D
C	→	A, B, D
D	→	A, B, C
AB	→	CD
CD	→	AB
A/B	→	C/D
C/D	→	A/B

Take step ① on page 74, assigning the source Bank (Structure), and go to steps ② and ③, selecting "Copy".



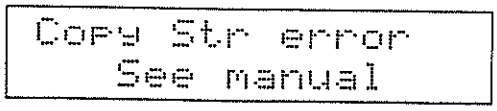
The destination Bank (Structure) is shown in the Display. When the source Bank is A, B, C or D, you can select the destination Bank with the Alpha Dial.

④ Push the Enter Button.



When copying is done, the Display returns to the Playing mode indication.

Error



When you have assigned a destination Bank (Structure) where the source Bank (Structure) cannot be copied, the following error indication is shown in the Display.

Repeat the copying procedure with a proper Bank (Structure) selected.

5. Swap

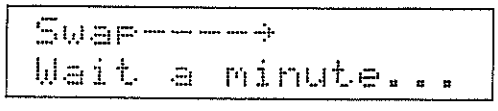
The contents (sampled sound and Wave Parameters) of two different Banks (Structures) can be swapped. The destination Bank (Structure) is limited, depending on the source Bank (Structure) that you wish to swap as shown on page 78.

Take step ① on page 74, selecting one of the two Banks (Structures) to be swapped.

Take steps ② and ③, selecting "Swap".



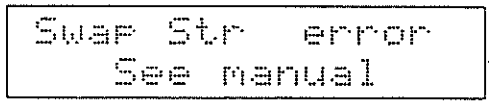
Now, the data is swapped between the Bank (Structure) shown in the Display (destination) and the one whose structure indicator is lit (source). When the source Bank selected in step ① is A, B, C or D (single Structure), you can change the destination Structure (shown in the Display), by using the Alpha Dial.



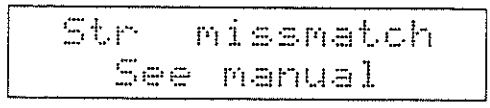
When swapping is completed, the Display will return to the Playing mode indication.

To swap a single Bank of a Structure (such as A of A/B) with another single Bank of another Structure (such as C of C/D), it is necessary to extract the Bank from the Structure beforehand, as shown in [Ware Modification of indiridual Bank (s)] on page 74.

Error



The following error indication shows that you have chosen Structure which cannot be swapped.

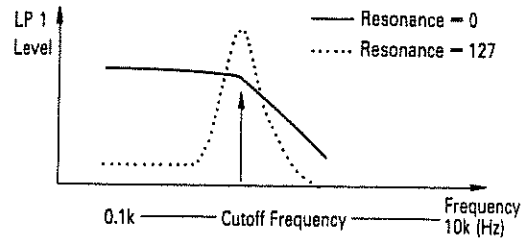


Select the appropriate Structure by pushing the corresponding Structure Button then the Enter button. Then repeat the whole procedure.
(Take the above procedure for both Structures.)

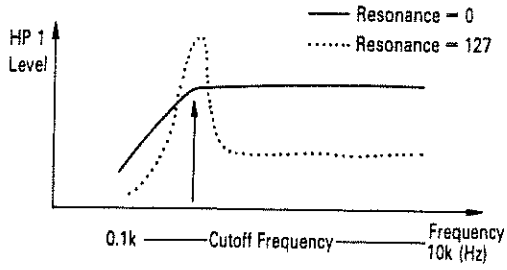
6. Digital Filter

The Digital Filter can be used to reduce sampling noise or to change the timbre of the sampled voice.

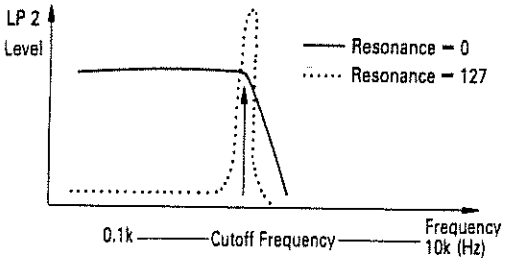
There are four different filters optional.



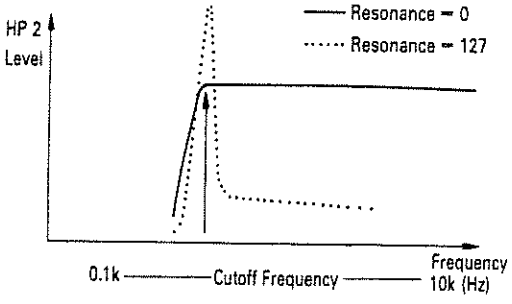
Lowpass Filter with relatively mild cutoff frequency.



Highpass Filter with relatively mild cutoff frequency.



Lowpass Filter with sharp cutoff frequency



Highpass Filter with sharp cutoff frequency

Resonance: This emphasizes the harmonic contents at the set cutoff frequency, creating electric and metalic sound.

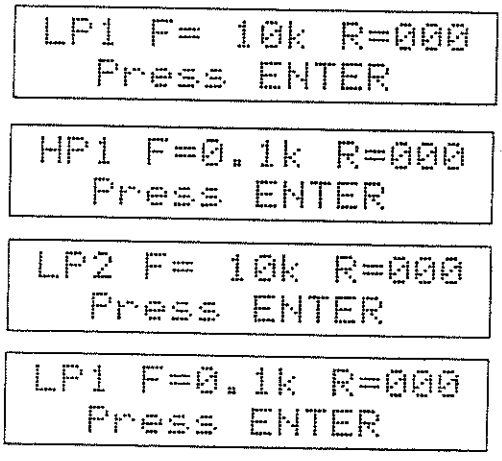
* The digital filtering is a form of processing achieved by the internal computer, therefore, it cannot be performed while the keyboard is being played.

* The filtered sample cannot be restored again. Please be sure to make a backup QD before filtering the sample.

* To use two filters at the same time, take the following procedure twice.

Take step ① on page 74, selecting any Structure you like.

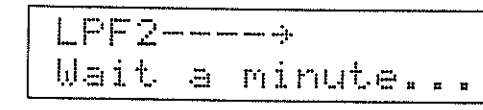
Take steps ② and ③, selecting one of the four filters.



④ Set the Cutoff Frequency and the Resonanse, using the Alpha Dial, and ▶ (or ◀) Button.

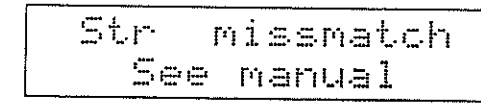
The range of cutoff frequency varies depending on the sampling frequency of the sample; 0.1 to 10 kHz at 30 kHz sampling frequency, and 0.1 kHz to 5 kHz for 15 kHz sampling.

⑤ Push the Enter Button.



When the memory is rewritten with the filtered data, the Display returns to the Playing mode indication.

Error



When this error message is indicated, the selected Structure is irrelevant, therefore, cannot be digital-filtered. Select the appropriate Structure by pushing the corresponding Structure Button then the Enter Button. Then repeat the whole procedure.

7. Mixing

The voices of two different Banks (Structures) can be mixed.

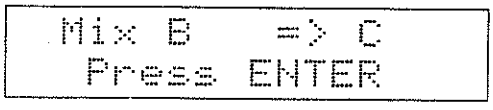
* Two voices are mixed in the pitches of when sampled. Recording Key Number or Bank Tune (See page 59) does not affect the pitches of sounds.

* The Structure to be mixed should be the same type. (For instance, the Structure A and CD cannot be mixed)

* The mixed data can be written into the source Structure or the same type of Structure. The voices to be mixed should have the same sampling frequency. 15 kHz sampling cannot be properly mixed with 30 kHz.
  (Sampling frequency of a wave data can be monitored in "Sampling Frequency" on page 67)

Take Step ① on page 74, selecting either of the Structures to be mixed.

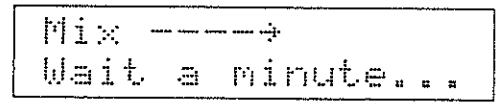
Take steps ② and ③, selecting "Mix".



The Structure shown in the left of the Display and the one whose Structure Button is lit are mixed and rewritten into the Structure shown at the right of the Display.
When the Structure A, B, C or D is selected (the indicator on), the Structure (shown at the left of the Display) which is to be mixed with the selected structure can be altered.

④ Select the destination Structure (shown at the right of the Display) by moving the flashing cursor with the ▶ button and using the Alpha Dial.

⑤ Push the Enter Button.



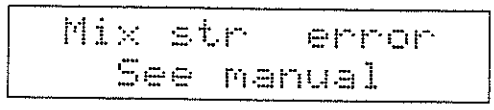
When the mixed data is written, the Display returns to the Playing mode indication.

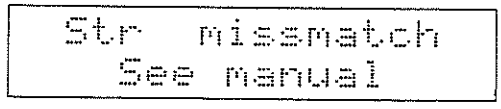
Now, the Wave Parameters are reset as shown below. You may need to edit the Wave Parameters here.

SMP CLK	- - -
REC KEY	- - -
BANK TUNE	0
SCAN MODE	FWD
LOOP	OFF
ADRS GROUP	1
ADRS V-SW	OFF
ST1	0 (0.0%)
EN1	- (100%)
LP1	4 (-%)
LOOP TUNE1	0
ST2	0 (0.0%)
EN2	- (100%)
LP2	4 (-%)
LOOP TUNE2	0
ENV V-SENS	0
ENV RATE1	127
ENV LEVEL1	127
ENV RATE2	127
ENV LEVEL2	127
ENV RATE3	127
ENV LEVEL3	127
ENV RATE4	127
DYN SENS	127
KEY FOLLOW	ON
PITCH BEND	ON
VIBRATO	ON
A-BEND RATE	127
A-BEND DPTH	0

Error

The following error indication shows that the selected Structure is not appropriate.





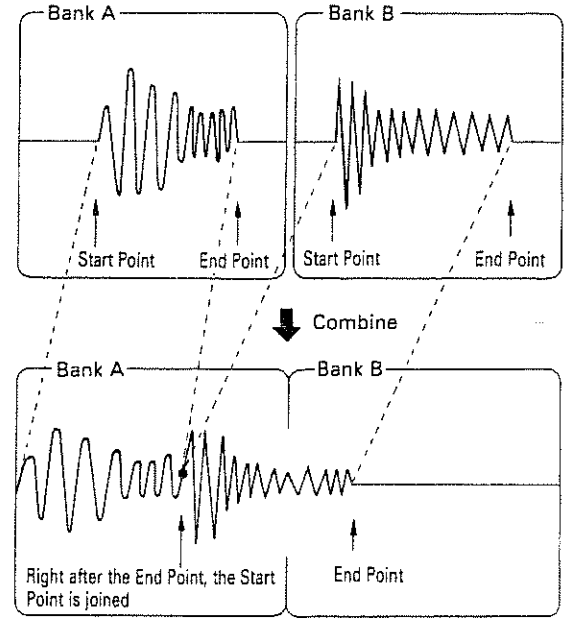
Select the appropriate Structure by pushing the corresponding Structure Button then the Enter Button. Then repeat the whole procedure.
(Take the above procedure for both Structures.)

8. Combine

Combining Function is joining two voices (Banks) with the unnecessary portions discarded.

When two voices stored in the two independent Banks (such as the Structure A, B, C, D, A/B, C/D, or A/B/C/D) are combined in the two Bank Structure (such as AB, CD, or AB/CD), the End Point of the first sample is directly joined to the Start Point of the second sample.

* The Start and the End points selected with wave parameter "Address Group" are used.



* Two voices are combined in the pitches of when sampled. Recording Key Number or Bank Tune (See page 59) does not affect the pitches of sounds.

The Structure which can be combined are:

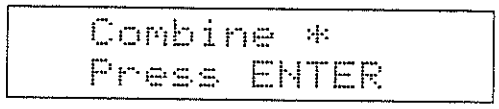
A → B
C → D
AB → CD

* The voice in each Bank should use the same sampling frequency. (The sampling frequency of the wave data can be monitored in "Sampling Frequency" on page 67.)

① Assign the Structure A or C. To combine the Structure AB and CD, assign AB.

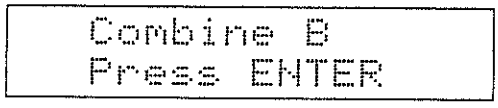
② Push the Modify Button.

Using the Forward Button and the Backward Button, select "Combine".



④ Using the Alpha Dial, select the second Structure to be combined (B, D or CD).

The Display shows the Structure you have selected.



⑤ Push the Enter Button.



The combined data is stored in the Structure whose indicator is lit. And the Display returns to the Playing mode indication.

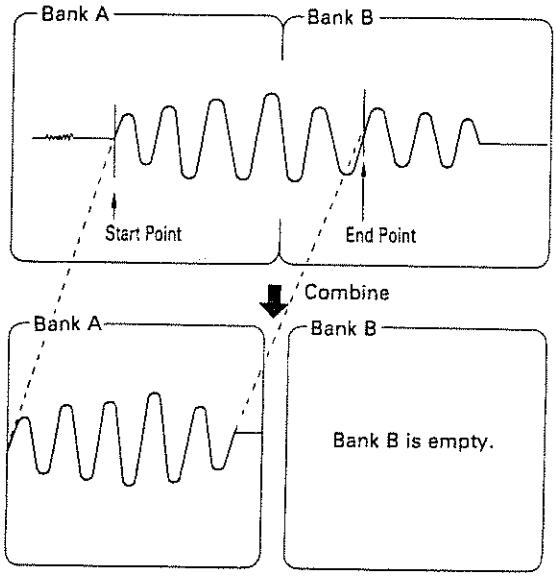
The status of Wave Parameter after combined:

SMP CLK	– – –
REC KEY	Prior Bank (s)
BANK TUNE	Prior Bank (s)
SCAN MODE	FWD
LOOP	OFF
ADRS GROUP	1
ADRS V–SW	OFF
ST1	0
EN1	The value equivallent to the END POINT of the address group selected in the posterior Bank (s).
LP1	The value of LOOP LENGTH of the address group selected in the posterior Bank (s).
LOOP TUNE1	The value of LOOP TUNE of the address group selected in the posterior Bank (s).
ST2	0
EN2	The value equivallent to the END POINT of the address group selectedin the prior Bank (s).
LP2	The value of LOOP LENGTH of the address group selected in the prior Bank (s).
LOOP TUNE2	The value of LOOP TUNE of the address group selected in the prior Bank (s).
ENV V–SENS	0
ENV RATE1	127
ENV LEVEL1	127
ENV RATE2	127
ENV LEVEL2	127
ENV RATE3	127
ENV LEVEL3	127
ENV RATE4	127
DYN SENS	Prior Bank (s)
KEY FOLLOW	Prior Bank (s)
PITCH BEND	Prior Bank (s)
VIBRATO	Prior Bank (s)
A–BEND RATE	127
A–BEND DPTH	0

If the combined data is shorter than the source Bank, the Structures are stored in one bank. For instance, if each of A and B contains 0.4 sec data, the combined data will become 0.8 sec which is shorter than one Bank. In this case, the data will be stored in Bank A (or C) instead of AB (or CD).

[Cutting unnecessary portions (of Structure AB, CD or ABCD)]

Using the Combining function, you can remove the unnecessary portions: before the Start Point of the first Bank and after the End Point of the second Bank.



The portions to be used after being combined are between the Start Point and the End Point set with the corresponding Wave Parameters.

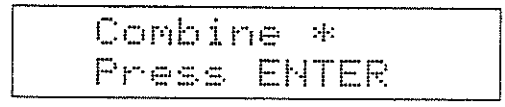
That is, the combined data may be short enough to be rewritten in one Bank(A). In this way, one of the two Banks can be emptied ready to be used for a new sample.

* The Start Point and the End Point selected with Wave Parameter "Address Group" are valid.

① Select the Structure AB, CD or ABCD.

② Push the Modify Button.

③ Using the Forward Button and the Backward Button, select "Combine".



④ Push the Enter Button. (Do not touch the Alpha Dial.)



When Combining is completed, the Display returns to the Play mode indication.

Error

The following error indication shows that the Structure you have selected is not appropriate.

```
Combine str err
See manual
```

```
Str mismatch
See manual
```

Select the appropriate Structure by pushing the corresponding Structure Button then the Enter Button. Then repeat the whole procedure.
(Take the above procedure for both Structures.)

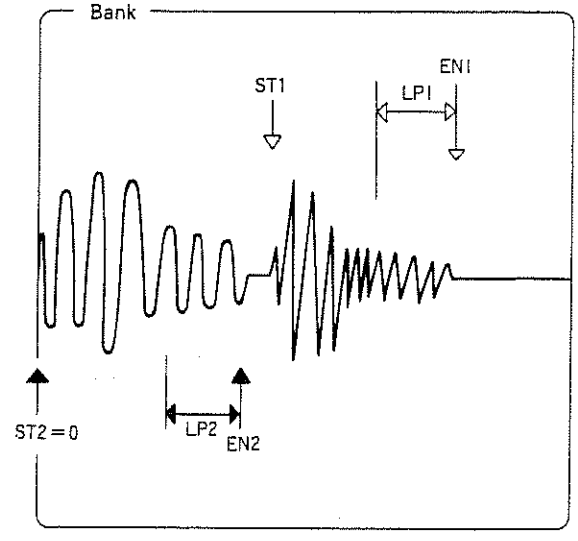
The following error indication shows that the combined data will be exactly the same as the original voice. Please check the Start Point and the End Point of the Wave Parameters.

```
No need to Combn
See manual
```

Effective use of Address Velocity Switch

When two Structures(voices) are combined in one Bank, the Address Velocity Switch can be effectively used so that either of the two sounds is played depending how hard you play the keyboard. A wave parameter [Address Velocity Switch] and two Address groups are involved.

As an example, set the Start and End points and the Loop Length as follows.



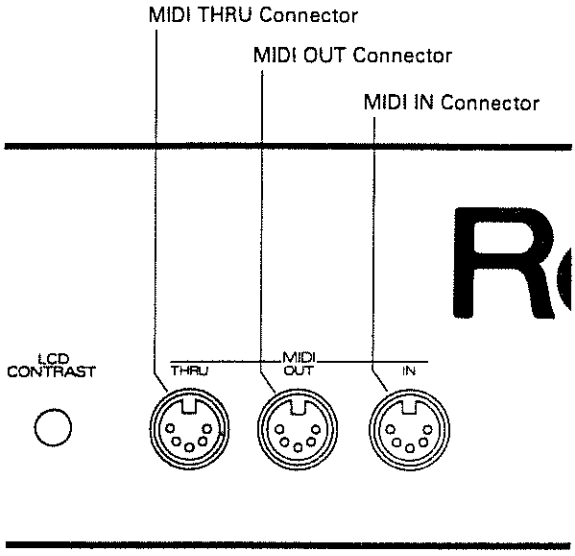
Unless [Address Velocity Switch] is set to OFF, the Address group selected with [Address Group] is played by weaker key touch than the selected level, and therefore, the other Address group is played by stronger key touch. That is, two completely different sounds can be played by changing how you play the keyboard.

This function is effective for percussive sounds.

* Wave parameters are common for the two Address groups, therefore, they cannot be set to different values.

8 MIDI

The S-220 features the following three MIDI Connectors.



■ MIDI IN Connector

Connect the MIDI IN connector of the S-220 to the MIDI OUT of the external device (e.g. MIDI key board, MIDI sequencer). The S-220's sound will be played by the external device.

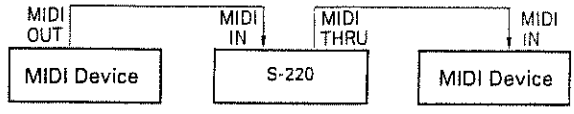
■ MIDI OUT Connector

Through this connector, messages such as Structure selection are transmitted.

* The MIDI OUT does not transmit the signal fed into the MIDI IN.

■ MIDI THRU Connector

An exact copy of the signal fed into the MIDI IN is sent out through this connector. Using MIDI THRU connectors, one MIDI device can control more than one MIDI device.



* The MIDI THRU connectors technically allow you to connect many MIDI devices, but in practice, we recommend you use the optional MIDI Output Selector MPU-105 for the connection of more than three units.

1. Changing MIDI Functions

How the MIDI messages are sent and received is controlled by the MIDI Functions.
The MIDI Functions you set are retained even after the unit is turned off. Also, these can be written on a QD. (See page 72.) Loading a QD which contains MIDI Function data will automatically rewrite the MIDI Functions in the internal memory.

The setting of each MIDI Function can be changed as follows.

① Push the MIDI Button.

② Select the MIDI Function you wish to change using the Forward Button and the Backward Button.

③ By rotating the Alpha Dial, change the setting of the MIDI Function as desired.

Repeat steps ② and ③ as many times as required.

④ Push the Enter Key.

To reset all the MIDI Functions (except for the MIDI Channel) to the defaults (which are shown in the following Displays), push the Enter Button while holding the MIDI Button down.

MIDI Functions commonly set for Poly and Mono Mode.

- **MIDI Channel (Basic Channel)**



Select any of the MIDI Channels 1 to 16.

- **Pitch Bend**



ON: Receive
OFF: Ignore

- **Hold**



ON: Receive
OFF: Ignore

- **Modulation**



ON: Receive
OFF: Ignore

- **Volume**



ON: Receive and Transmit
OFF: Ignore

- **Balance**



ON: Receive and Transmit
OFF: Ignore

- **Program Change**



ON: Receive and Transmit
OFF: Ignore

- **Channel Pressure (Aftertouch)**



ON: Receive
OFF: Ignore

- **Registered Parameters**



(Bend Range and Master Tune messages)

ON: Receive and Transmit
OFF: Ignore

- **System Exclusive**



ON: Receive and Transmit
OFF: Ignore

- **Key Range**

This can set the highest and the lowest key number which can be received by the S-220.

* This function is not valid when the Multi Function is used.

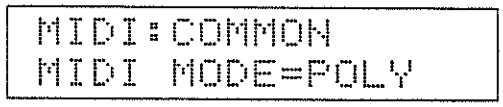


Assign the highest key number to be received.



Assign the lowest key number to be received.

- **MIDI Mode**



This function selects MIDI Poly mode or MIDI Mono mode.

MIDI Functions for Mono Mode

- **Channel Range (the number of voices)**



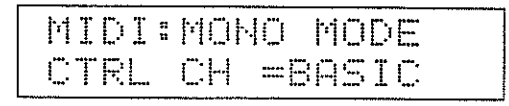
You can select the maximum number (1 to 8) of voices played simultaneously in Mono mode.

Changing "Channel Range" will automatically change the number of the voices to be used. For instance, when the Basic channel is set to 1, selecting 6 voices will automatically set the channels 1 to 6.
Also, when the Basic channel is set to 12, and the number of voices is 8, channels from 12 to 16 are used,. Any number higher than 17 will be ignored, turning the unit to 5 voice polyphonic.

The number shown in [ ] is the number of voices actually played.

* When the Mono mode command is transmitted from an external MIDI device, the S-220 will automatically be set to Mono mode. (The Mono Mode indicator lights up.) Meanwhile the number of voices simultaneously sounded is recognized. The Mono mode command of Channel Range=0 means that the all the voices are sounded.

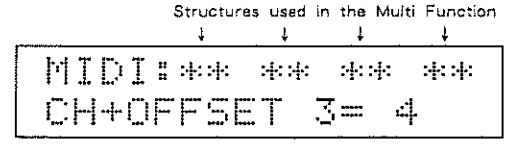
- **The MIDI Channel that can receive Control Changes**



When the S-220 is set to Mono mode, this selects the MIDI channel on which the Control messages common for all the voices are received. As a Control Channel, you can use either the basic channel (the channel number you set in the MIDI Channel of the MIDI Function) or the global channel (the channel one number lower than the basic channel). Usually, the basic channel should be selected.

MIDI Functions for Multi Mode

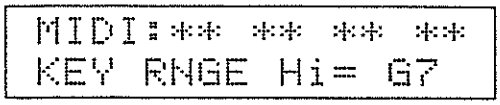
- **MIDI Channel setting for each Structure**

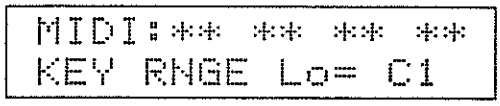


When the Multi function is in use, a different MIDI channel can be set for each Structure. (See page 44.)

* The default setting is 0,1,2 and 3 as the number to be added to the Basic channel.

- **Key Range for each Structure**





When the Multi function is in use, you can separately set the sound range that the S-220 can receive for each Structure. (See page 45.)

2. Program Change

The S-220 can receive or transmit the following message using the Program Change; the Structure Selection, ON/OFF of the Detune, Delay and Dual Functions.

The table shown right represents the Program Change number assigned to each message.

Program Change assignment can be seen on the S-220 as follows.

① Push the F2 Button, then the MIDI Button.

② Rotate the Alpha Dial, and the Program Change number and the corresponding message is shown in the Display.

Program Change No.
Performance Control Function
Structure

# 1		A		
# 2		B		
# 3		C		
# 4		D		
# 5		AB		
# 6		CD		
# 7		ABCD		
# 8		A/B		
# 9		C/D		
# 10		AB/CD		
# 11		A/B/C/D		
# 12	DT	A		DT: Detune Function
# 13	DT	B		
# 14	DT	C		
# 15	DT	D		
# 16	DT	AB		
# 17	DT	CD		
# 18	DT	ABCD		
# 19	DT	A/B		
# 20	DT	C/D		
# 21	DT	AB/CD		
# 22	DT	A/B/C/D		
# 23	DL	A		DL: Delay Function
# 24	DL	B		
# 25	DL	C		
# 26	DL	D		
# 27	DL	AB		
# 28	DL	CD		
# 29	DL	ABCD		
# 30	DL	A/B		
# 31	DL	C/D		
# 32	DL	AB/CD		
# 33	DL	A/B/C/D		
# 34	Du	A	B	Du: Dual Function
# 35	Du	A	C	
# 36	Du	A	D	
# 37	Du	A	CD	
# 38	Du	A	C/D	
# 39	Du	B	C	
# 40	Du	B	D	
# 41	Du	B	CD	
# 42	Du	B	C/D	
# 43	Du	C	D	
# 44	Du	C	AB	
# 45	Du	C	A/B	
# 46	Du	D	AB	
# 47	Du	D	A/B	
# 48	Du	AB	CD	
# 49	Du	AB	C/D	
# 50	Du	CD	A/B	
# 51	Du	A/B	C/D	
# 52	VM	A	B	VM: Velocity Mix Function
# 53	VM	A	C	The structure at the left side always sounds and the one at the right side sounds only with a stronger playing manner.
# 54	VM	A	D	
# 55	VM	A	CD	
# 56	VM	A	C/D	
# 57	VM	B	A	
# 58	VM	B	C	
# 59	VM	B	D	
# 60	VM	B	CD	
# 61	VM	B	C/D	
# 62	VM	C	A	
# 63	VM	C	B	
# 64	VM	C	D	
# 65	VM	C	AB	
# 66	VM	C	A/B	
# 67	VM	D	A	
# 68	VM	D	B	
# 69	VM	D	C	
# 70	VM	D	AB	
# 71	VM	D	A/B	
# 72	VM	AB	C	
# 73	VM	AB	D	
# 74	VM	AB	CD	
# 75	VM	AB	C/D	
# 76	VM	CD	A	
# 77	VM	CD	B	
# 78	VM	CD	AB	
# 79	VM	CD	A/B	
# 80	VM	A/B	C	
# 81	VM	A/B	D	
# 82	VM	A/B	CD	
# 83	VM	A/B	C/D	
# 84	VM	C/D	A	
# 85	VM	C/D	B	
# 86	VM	C/D	AB	
# 87	VM	C/D	A/B	
# 88	VS	A	B	VS: Velocity Switch Function
# 89	VS	A	C	The structure at the left side sounds with so ter playing and the one at the right sic sounds with stronger playing.
# 90	VS	A	D	
# 91	VS	A	CD	
# 92	VS	A	C/D	
# 93	VS	B	A	
# 94	VS	B	C	
# 95	VS	B	D	
# 96	VS	B	CD	
# 97	VS	B	C/D	
# 98	VS	C	A	
# 99	VS	C	B	
#100	VS	C	D	
#101	VS	C	AB	
#102	VS	C	A/B	
#103	VS	D	A	
#104	VS	D	B	
#105	VS	D	C	
#106	VS	D	AB	
#107	VS	D	A/B	
#108	VS	AB	C	
#109	VS	AB	D	
#110	VS	AB	CD	
#111	VS	AB	C/D	
#112	VS	CD	A	
#113	VS	CD	B	
#114	VS	CD	AB	
#115	VS	CD	A/B	
#116	VS	A/B	C	
#117	VS	A/B	D	
#118	VS	A/B	CD	
#119	VS	A/B	C/D	
#120	VS	C/D	A	
#121	VS	C/D	B	
#122	VS	C/D	AB	
#123	VS	C/D	A/B	
#124		A		Receive Only
#125		B		
#126		C		
#127		D		
#128		AB		

3. System Exclusive

When [System Exclusive] in MIDI functions is set to ON, editing any of the following parameters (e.g. rotating the Alpha dial, or proceeding "MIN" "MAX", "Cancel", etc.) will send MIDI System Exclusive messages.

Wave Parameters
Performance Parameters
Split Points
Parameters for setting Output Levels
Arpeggio ON/OFF
Separate Button ON/OFF
MIDI Functions (Key Range, Channel Offset for the Mulit function, Key Range for the Multi function)

MIDI Exclusive transmitted here is the message that tells what parameter is set to what value.
When you record performance data programmed in the S-220 into a computer of MIDI sequencer (e.g. the MRC-500 System), "Exclusive" of both units must be set to ON, so that sound data will be recorded together with the performance data.

* The S-220 can transmit the value (information) of any of the parameters listed above, just by calling the parameter and pushing the Save button, instead of actually editing the parameter with the Alpha Dial.

* Pushing the Enter Button will transmit a message that says "the Enter Button is pushed".
  Receiving the above message, the S-220 will react in exactly same way as when the Enter Button had been pressed.

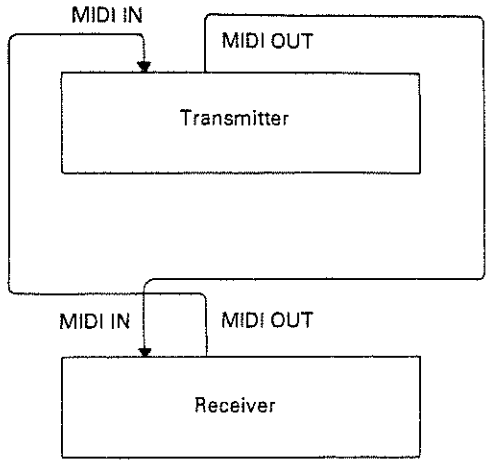
* The selected Multi Mode (MULTI-1 to 5) will be transmitted to the external device as MIDI messages.

[Data Transfer]

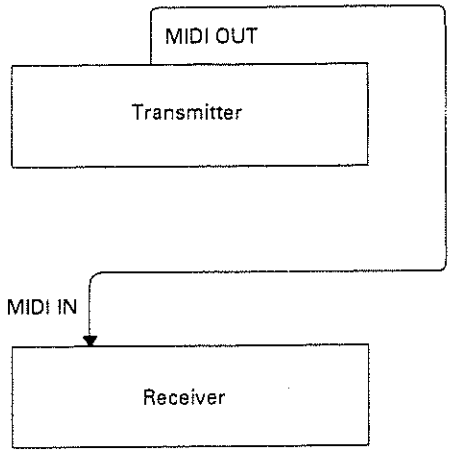
Using the MIDI Exclusive messages, you can copy the data in the S-220 to another S-220 or the MKS-100 or S-10, (This does not require a QD.) This is called Data Transfer.

There are two types of Data Transfer; Handshake and One-way. Handshake allows you to verify whether the receiver is ready to receive the data, while one-way transmits the data without confirming the condition of the receiver. The S-220 can select either of the two methods.

Handshake connection



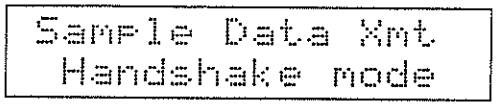
One-way connection

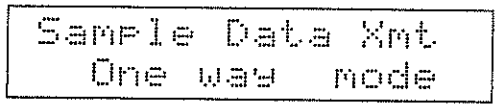


① Set the MIDI Channel of the receiver to the same number as the transmitter's. Then turn MIDI Exclusive and Program Change of each unit ON.

② Select the Structure to be transmitted on the transmitter, and push Enter.

③ On the transmitter, push F1 then the MIDI Button, then select one of the following Displays using the Forward or Backward Button.

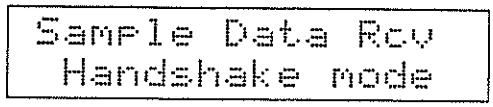




④ Push the Enter Button on the transmitter.

When using handshake connection, you can take the following procedure instead of step ③ and ④.

③ On the receiver, push F1 then the MIDI Button, then select the following Display using the Forward or Backward Button.



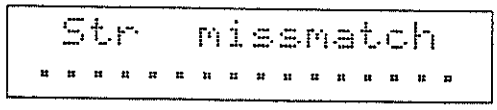
④ Push the Enter Button on the receiver.

To stop data transfer in the middle, push any of the Structure Buttons on the transmitter.

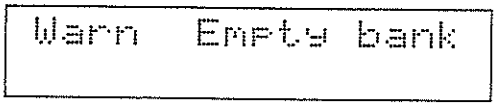
When data transfer is finished, the S-220 returns to the Play mode.

* Handshake transfer takes approximately 25 seconds in each Bank and one-way takes about 45 seconds.

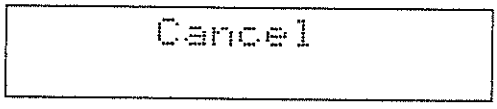
Error



An irrelevant Structure is selected, therefore data cannot be transferred. On the transmitter, select the correct Structure (Structure Button, then Enter) and repeat the whole procedure.



No data is recorded in the transmitter's Bank.

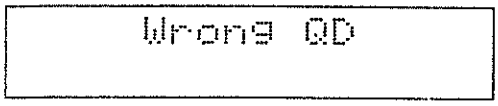


Data cannot be transferred, presumably because of a loose connection.

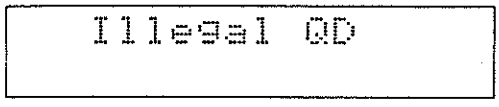
Check if the connection is made correctly.

9 ERROR MESSAGES

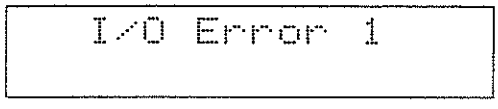
Error Messages shown during loading



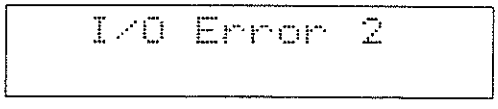
The connected QD is irrelevant with the data to be loaded:
Replace the QD with a relevant one.



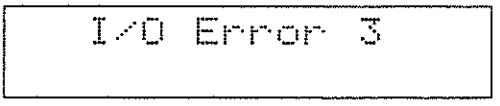
The connected QD contains no data.



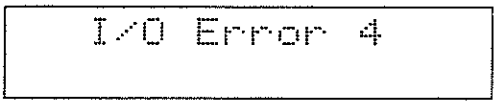
The S-220 has broken down. Call Roland.



The QD is damaged.
Replace it with a new one and repeat the loading procedure.

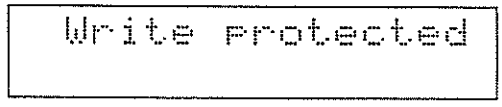


The S-220 has broken down. Call Roland.

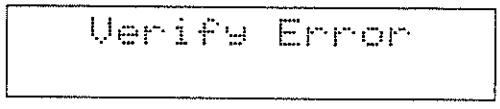


The S-220 has broken down. Call Roland.

Error Messages shown during saving



The Protect Tab is snapped off.
Replace the QD with a proper one, or attach a cellophane tape at the appropriate position.

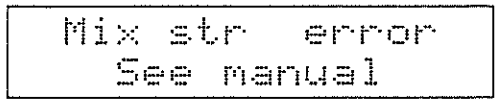


The connected QD is damaged. Replace it with an other QD.

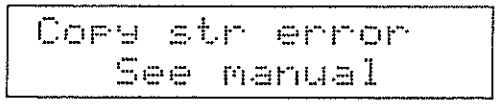
Error Messages shown during Wave Modification



The Structure you have selected cannot be combined. Select an appropriate Structure by pushing the Corresponding Structure Button then the Enter Button.



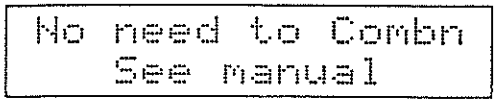
The Structure you have selected cannot be mixed. Select an appropriate Structure by pushing the Corresponding Structure Button then the Enter Button.



The Structure you have selected cannot be copied. Select an appropriate Structure by pushing the Corresponding Structure button then the Enter Button.

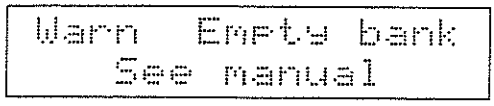


The Structure you have selected cannot be swapped. Select an appropriate Structure by pushing the Corresponding Structure Button then the Enter Button.

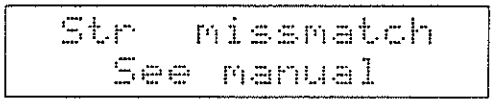


The combined data would become exactly the same as the original voice.

Check the values of the Start point and the End point of the Wave Parameters.



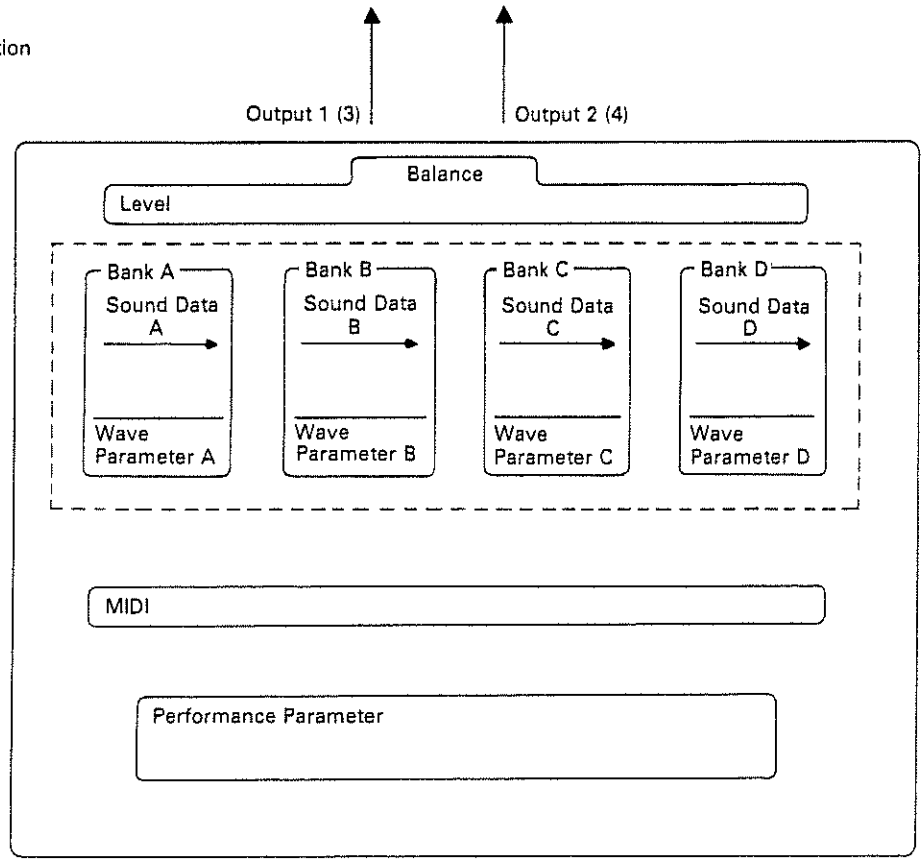
There is no data in the selected Bank.



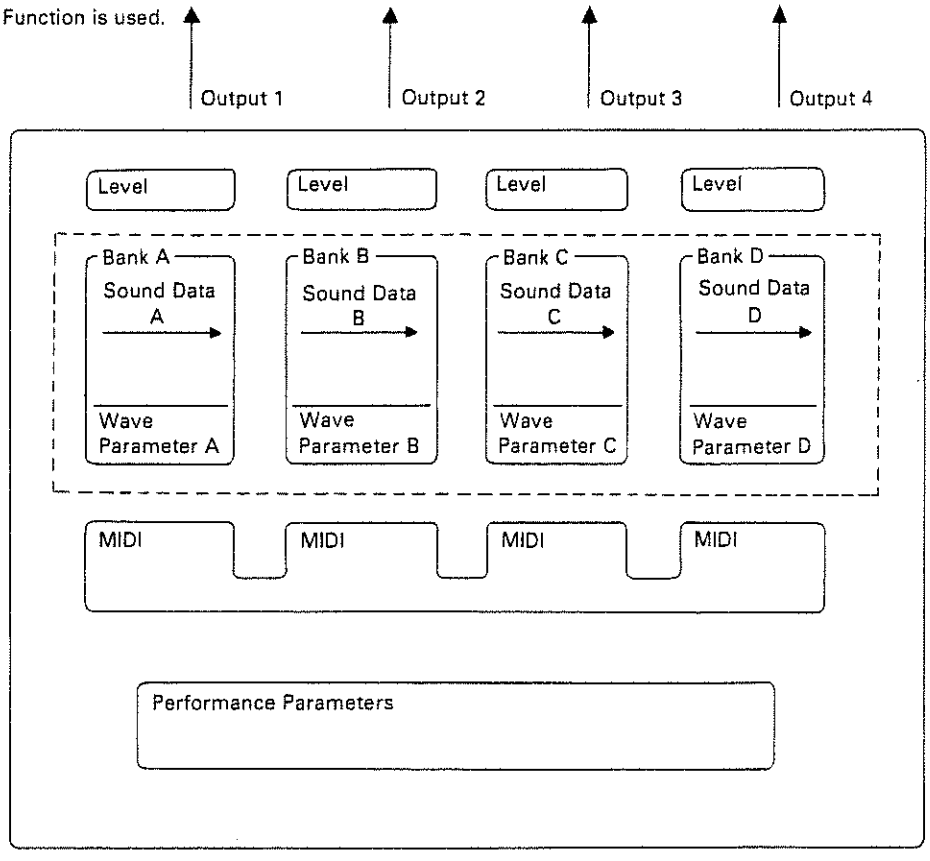
When this error message is indicated, the selected Structure is irrelevant, and therefore, cannot be wave modified. Select the appropriate Structure by pushing the corresponding Structure Button then the Enter button. Then repeat the whole procedure. (If two Structures are relevant, take the above procedure for both Structures.)

<<S-220 Parameter Construction>>

Normal Condition



When the Multi Function is used.



Wave Parameters

	Type I	Type II	Type III
SMP CLK	○	○	○
REC KEY	○	○	○
BANK TUNE	○	○	○
SCAN MODE	○	○	○
LOOP	○	○	○ LOOP TYPE
ADRS GROUP	○	○	○ LOOP TYPE
ADRS V-SW	○	○	OFF (fixed)
ST1	○	○	○ ST
EN1	○	○	○ END
LP1	○	○	○ LP
LOOP TUNE1	○	○	○ LOOP TUNE
ST2	○	○	ST1 (fixed)
EN2	○	○	○ AEN
LP2	○	○	○ ALP
LOOP TUNE2	○	○	0 (fixed)
ENV V-SENS	○	○	○
ENV RATE1	○	○	○
ENV LEVEL1	○	○	○
ENV RATE2	○	○	○
ENV LEVEL2	○	○	○
ENV RATE3	○	○	○
ENV LEVEL3	○	○	○
ENV RATE4	○	○	○
DYN SENS	○	○	○
KEY FOLLOW	○	○	○
PITCH BEND	○	○	○
VIBRATO	○	○	○
A-BEND RATE	○	○	○
A-BEND DPTH	○	○	○

Performance Parameter		Type I	Type II	Type III
Vibrato	RATE	O	O	O
	MNUAL DEPTH	O	O	O
	PRESS SENS	O	O	–
	DELAY DEPTH	O	O	O
	DELAY TIME	O	O	O
Pitch Bender	BEND MODE	O	O	O
Arpeggio	SYNC SOURCE	O	O	O
	INT RATE	O	O	O
	PLAY MODE	O	O	O
	PLAY RANGE	O	O	O RANGE
	NOTE REPEAT	O	O	O
	DECAY RATIO	O	O	O DECAY
Velocity Mix	MIX LEVEL	O	O	127 (fixed)
	THRESHOLD	O	O	O
Velocity Switch	THRESHOLD	O	O	O
Detune	RANGE V–SNS	O	O	O DETUNE MODE
	DTUNE RANGE	O	O	O
	PRESS SENS	O	O	64 (fixed)
	ABEND DEST	O	O	O
	BEND DEST	O	O	O
Delay	DELAY TIME	O	O	O
	KEY OFFSET	O	O	O
	DELAY LEVEL	O	O	O
	V–SNS TRESH	O	O	O
Trigger Play	GATE TIME	O	O	O
	– – – –	O	O	O

MIDI FUNCTIONS		Type I	Type II	Type III
Functions Commonly set for Poly and Mono	BASIC CH	O	–	–
	PITCH BEND	O	–	–
	HOLD PEDAL	O	–	–
	MODULATION	O	–	–
	VOLUME	O	–	–
	BALANCE	O	–	–
	PGM CHANGE	O	–	–
	CH PRESSURE	O	–	–
	REG PARAM	O	–	–
	EXCULUSIVE	O	–	–
	KEY RNGE Hi	O	–	–
	KEY RNGE Lo	O	–	–
	MIDI MODE	O	–	–
For Mono Mode	CH RANGE	O	–	–
	CTRL CH	O	–	–
For Multi Function	CH+OFFSET	O	–	–
	KEY RNGE Hi	O	–	–
	KEY RNGE Lo	O	–	–

Output Level		Type I	Type II	Type III
Normal Setting	VOLUME	O	–	–
	VOL. PRESS	O	–	–
	BALANCE	O	–	–
	BAL. PRESS	O	–	–
Multi Function	MULTI VOL.	O	–	–
	MULTI PRESS	O	–	–

* Parameter names of the S-220 may be different from those of the S-10 or MKS-100 though the functions are the same.

Wave Parameters

SMP CLK	
REC KEY	
BANK TUNE	
SCAN MODE	
LOOP	
ADRS GROUP	
ADRS V-SW	
ST1	
EN1	
LP1	
LOOP TUNE1	
ST2	
EN2	
LP2	
LOOP TUNE2	
ENV V-SENS	
ENV RATE1	
ENV LEVEL1	
ENV RATE2	
ENV LEVEL2	
ENV RATE3	
ENV LEVEL3	
ENV RATE4	
DYN SENS	
KEY FOLLOW	
PITCH BEND	
VIBRATO	
A-BEND RATE	
A-BEND DPTH	

Parformance Parameters

Vibrato	RATE	
	MNUAL DEPTH	
	PRESS SENS	
	DELAY DEPTH	
	DELAY TIME	
Pitch Bender	BEND MODE	
Arpeggio	SYNC MODE	
	INT RATE	
	PLAY MODE	
	PLAY RANGE	
	NOTE REPEAT	
	DECAY RATIO	
Velocity Mix	MIX LEVEL	
	THRESHOLD	
Velocity Switch	THRESHOLD	
Detune	RANGE V-SNS	
	DTUNE RANGE	
	PRESS SENS	
	ABEND DEST	
	BEND DEST	
Delay	DELAY TIME	
	KEY OFFSET	
	DELAY LEVEL	
	V-SNS TRESH	
Trigger Play	GATE TIME	
	- - - -	

MIDI Functions

Functions Commonly set for Poly and Mono Mode	BASIC CH	
	PITCH BEND	
	HOLD PEDAL	
	MODULATION	
	VOLUME	
	BALANCE	
	PGM CHANGE	
	CH PRESSURE	
	REG PARAM	
	EXCLUSIVE	
	KEY RNGE Hi	
	KEY RNGE Lo	
	MIDI MODE	
For Mono Mode	CH RANGE	
	CTRL CH	
For Multi Function	CH+OFFSET	
	KEY RNGE Hi	
	KEY RNGE Lo	

Output Level

Normal Setting	VOLUME	
	VOL. PRESS	
	BALANCE	
	BAL. PRESS	
Multi Function	MULTI VOL.	
	MULTI PRESS	

SPECIFICATIONS

S-220: MIDI Digital Sempler

Voice: 16 Voice Polyphonic

Front Panel

Structure Buttons
Multi Button
F1 / ▶ Button
F2 / ◀ Button
Tune Button
Parameter Button
Modify Button
Performance Button
MIDI Button
Enter Button
Level Button
Separate Button
Forward Button
Backward Button
Record Button
Mode/Minimum Button
Stand-by/Cancel Button
Start/Maximum Button
Load Button
Save Button
Headphone Jack
Start Jack
Input Jacks (MIC, LINE)
Limiter Switch
Power Switch

Performance Controllers

Alpha Dial
Volume Knob
Recording Level Knob

Display

16 figure 2 line Liquid Crystal Display (back lit)

Disk Drive

2.8 inch Quick Disk (QD)

Rear Panel

Output Jack × 4
MIDI Connectors (IN, OUT, THRU)
Display Contrast Knob

Dimensions

483(W) × 410(D) × 90(H) mm/
19-1/4" × 16-1/8" × 3-7/16"

Weight

7 kg/15 lb 7 oz

Power Consumption

21 W

Accessories

Connection Cable (PJ-1)
MIDI Cable
Sample Sound QD

Options

Headphones: RH-100
Pedal Switch: DP-2
Pad: PD-20
Microphone
Quick Disk: QD-10
Sound Library: L-101 to L-111

WHAT TO DO

No sound is produced:

■ If the MIDI Message Indicator is dark:

- MIDI connection is not made properly.
- MIDI channels are not set properly.
- The S-220 is set to Wave Modifying, loading, Saving or Data Transfer mode.

■ If the MIDI Message Indicator is alight:

- No sound data is written in the internal memory of the S-220.
- The Volume Knob is set to the MIN position.
- The output level is lowered by MIDI Volume messages.
- KEY RANGE in the MIDI Function section is not set properly.
- START POINT and END POINT in the Wave Parameter section are not set properly.
- ENVELOPE in the Wave Parameter section is not sent properly.
- Arppegio Sync Mode is set to EXT, and Arppegio is turned on, but no external trigger signal is fed in.

■ When the Multi Function is in use:

- MIDI channel for each sound is not set properly.
- Output level for each sound is set to 0.

The Multi Button does not function:

- MIDI MODE in the MIDI Function section is set to Mono mode.

Pitch Bend function does not work:

- PITCH BEND of the MIDI Function section is set to OFF.
- BEND RANGE is set to 0.
- PITCH BEND in the Wave Parameter section is set to OFF.

Vibrato effect cannot be obtained:

- VIBRATO in the Performance Parameter section is not set properly.
- VIBRATO in the Wave Parameter section is set to OFF.
- MODULATION in the MIDI Function section is set to OFF.
- When in Mono mode, the MIDI channel (on which Modulation messages are sent—usually the MIDI transmit channel) of the external MIDI device does not match the MIDI receive channel for Modulation messages.

Aftertouch does not work on volume or vibrato:

- CHANNEL PRESSURE in the MIDI Function section is set to OFF.
- When in Mono mode, the MIDI channel (on which Aftertouch messages are sent—usually the MIDI transmit channel) of the external MIDI device does not match the MIDI receive channel for Aftertouch messages.
- The sensitivity of the aftertouch that controls output level is set to 0.

Hold cannot be performed by using the Hold pedal:

- HOLD in the MIDI Function section is set to OFF.
- LOOP in the Wave Parameter section is set to OFF.
- When in Mono mode, the MIDI channel (on which Hold messages are sent—usually the MIDI transmit channel) of the external MIDI device does not match the MIDI receive channel for Hold messages.

Arpeggio effect cannot be obtained:

- Arpeggio Sync mode is set to EXT, but no external trigger is fed in.
- The S-220 is set to Mono mode.
- The Multi function is in use.

'87-9-AE2-3B

Roland

Roland

S-220

MIDI Implementation

Roland Exclusive Messages

1. Data Format for Exclusive Messages

Roland's MIDI implementation uses the following data format for all exclusive messages (type IV) :

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
CMD	Command ID
[BODY]	Maindata
F7H	End of exclusive

MIDI status : F0H, F7H

An exclusive message must be flanked by a pair of status codes, starting with a Manufactures-ID immediately after F0H (MIDI version1.0).

Manufactures-ID : 41H

The Manufactures-ID identifies the manufacturer of a MIDI instrument that triggeres an exclusive message. Value 41H represents Roland's Manufactures-ID.

Device-ID : DEV

The Device-ID contains a unique value that identifies the individual device in the multiple implementation of MIDI instruments. It is usually set to 00H - 0FH, a value smaller by one than that of a basic channel, but value 00H - 1FH may be used for a device with multiple basic channels.

Model-ID : MDL

The Model-ID contains a value that uniquely identifies one model from another. Different models, however, may share an identical Model-ID if they handle similar data.

The Model-ID format may contain 00H in one or more places to provide an extended data field. The following are examples of valid Model-IDs, each representing a unique model :

01H
02H
03H
00H, 01H
00H, 02H
00H, 00H, 01H

Command-ID : CMD

The Command-ID indicates the function of an exclusive message. The Command-ID format may contain 00H in one or more places to provide an extended data field. The following are examples of valid Command-IDs, each representing a unique function :

01H
02H
03H
00H, 01H
00H, 02H
00H, 00H, 01H

Main data : BODY

This field contains a message to be exchanged across an interface. The exact data size and contents will vary with the Model-ID and Command-ID.

2. Address-mapped Data Transfer

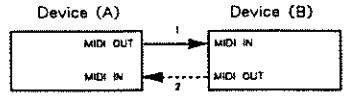
Address mapping is a technique for transferring messages conforming to the data format given in Section 1. It assigns a series of memory-resident records--waveform and tone data, switch status, and parameters, for example--to specific locations in a machine-dependent address space, thereby allowing access to data residing at the address a message specifies.

Address-mapped data transfer is therefore independent of models and data categories. This technique allows use of two different transfer procedures : one-way transfer and handshake transfer.

One-way transfer procedure (See Section3 for details.)

This procedure is suited for the transfer of a small amount of data. It sends out an exclusive message completely independent of a receiving device status.

Connection Diagram

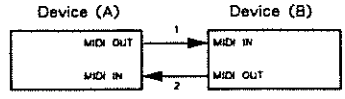


Connectionat point2 is essential for "Request data" procedures. (See Section3.)

Handshake-transfer procedure (See Section4 for details.)

This procedure initiates a predetermined transfer sequence (handshaking) across the interface before data transfer takes place. Handshaking ensures that reliability and transfer speed are high enough to handle a large amount of data.

Connection Diagram



Connectionat points1 and 2 is essential.

Notes on the above two procedures

* There are separate Command-IDs for different transfer procedures.
* DevicesA and B cannot exchange data unless they use the same transfer procedure, share identical Device-ID and Model ID, and are ready for communication.

3. One-way Transfer Procedure

This procedure sends out data all the way until it stops when the messages are so short that answerbacks need not be checked.
For long messages, however, the receiving device must acquire each message in time with the transfer sequence, which inserts intervals of at least 20milliseconds in between.

Types of Messages

Message	Command ID
Request data 1	RQ1 (11H)
Data set 1	DT1 (12H)

Request data # 1 : RQ1 (11H)

This message is sent out when there is a need to acquire data from a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of data required.
On receiving an RQ1 message, the remote device checks its memory for the data address and size that satisfy the request.

If it finds them and is ready for communication, the device will transmit a "Data set 1 (DT1)" message, which contains the requested data. Otherwise, the device will send out nothing.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
11H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ssH	Size MSB
⋮	⋮
	LSB
sum	Check sum
F7H	End of exclusive

*The size of the requested data does not indicate the number of bytes that will make up a DT1 message, but represents the address fields where the requested data resides.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The same number of bytes comprises address and size data, which, however, vary with the Model-ID.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Data set 1 : DT1 (12H)

This message corresponds to the actual data transfer process. Because every byte in the data is assigned a unique address, a DT1 message can convey the starting address of one or more data as well as a series of data formatted in an address - dependent order.

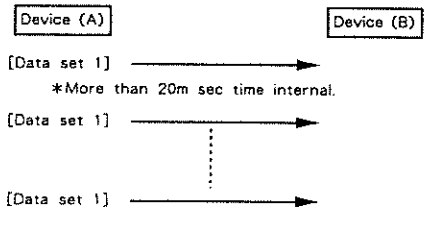
The MIDI standards inhibit non-real time messages from interrupting an exclusive one. This fact is inconvenient for the devices that support a "soft-through" mechanism. To maintain compatibility with such devices, Roland has limited the DT1 to 256 bytes so that an excessively long message is sent out in separate segments.

Byte	Description
F0H	Exclusive
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
12H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ddH	Data
⋮	⋮
sum	Check sum
F7H	End of exclusive

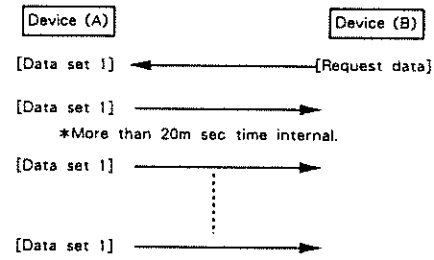
*A DT1 message is capable of providing only the valid data among those specified by an RQ1 message.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The number of bytes comprising address data varies from one Model-ID to another.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Example of Message Transactions

● Device A sending data to Device B
Transfer of a DT1 message is all that takes place.



● Device B requesting data from Device A
Device B sends an RQ1 message to Device A. Checking the message, Device A sends a DT1 message back to Device B.



4. Handshake-Transfer Procedure

Handshaking is an interactive process where two devices exchange error checking signals before a message transaction takes place, thereby increasing data reliability. Unlike one-way transfer that inserts a pause between message transactions, handshake transfer allows much speedier transactions because data transfer starts once the receiving device returns a ready signal.

When it comes to handling large amounts of data--sampler waveforms and synthesizer tones over the entire range, for example--across a MIDI interface, handshaking transfer is more efficient than one-way transfer.

Types of Messages

Message	Command ID
Want to send data	WSD (40H)
Request data	RQD (41H)
Data set	DAT (42H)
Acknowledge	ACK (43H)
End of data	EOD (45H)
Communication error	ERR (4EH)
Rejection	RJC (4FH)

Want to send data : WSD (40H)

This message is sent out when data must be sent to a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of the data to be sent.

On receiving a WSD message, the remote device checks its memory for the specified data address and size which will satisfy the request. If it finds them and is ready for communication, the device will return an "Acknowledge (ACK)" message.
Otherwise, it will return a "Rejection (RJC)" message.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
40H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ssH	Size MSB
⋮	⋮
	LSB
sum	Check sum
F7H	End of exclusive

*The size of the data to be sent does not indicate the number of bytes that make up a "Data set (DAT)" message, but represents the address fields where the data should reside.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The same number of bytes comprises address and size data, which, however, vary with the Model-ID.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Request data : RQD (41H)

This message is sent out when there is a need to acquire data from a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of data required.

On receiving an RQD message, the remote device checks its memory for the data address and size which satisfy the request. If it finds them and is ready for communication, the device will transmit a "Data set (DAT)" message, which contains the requested data. Otherwise, it will return a "Rejection (RJC)" message.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
41H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ssH	Size MSB
⋮	⋮
	LSB
sum	Check sum
F7H	End of exclusive

*The size of the requested data does not indicate the number of bytes that make up a "Data set (DAT)" message, but represents the address fields where the requested data resides.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The same number of bytes comprises address and size data, which, however, vary with the Model-ID.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Data set : DAT (42H)

This message corresponds to the actual data transfer process. Because every byte in the data is assigned a unique address, the message can convey the starting address of one or more data as well as a series of data formatted in an address-dependent order.

Although the MIDI standards inhibit non-real time messages from interrupting an exclusive one, some devices support a " soft- through " mechanism for such interrupts. To maintaincompatibility with such devices, Roland has limited the DAT to 256bytes so that an excessively long message is sent out in separate segments.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
42H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ddH	Data
⋮	⋮
sum	Check sum
F7H	End of exclusive

*A DAT message is capable of providing only the valid data among those specified by an RQD or WSD message.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The number of bytes comprising address data varies from one model ID to another.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Acknowledge : ACK (43H)

This message is sent out when no error was detected on reception of a WSD, DAT, "End of data (EOD)", or some other message and a requested setup or action is complete. Unless it receives an ACK message, the device at the other end will not proceed to the next operation.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
43H	Command ID
F7H	End of exclusive

End of data : EOD (45H)

This message is sent out to inform a remote device of the end of a message. Communication, however, will not come to an end unless the remote device returns an ACK message even though an EOD message was transmitted.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
45H	Command ID
F7H	End of exclusive

Communications error : ERR (4EH)

This message warns the remote device of a communications fault encountered during message transmission due, for example, to a checksum error. An ERR message may be replaced with a "Rejection (RJC)" one, which terminates the current message transaction in midstream.

When it receives an ERR message, the sending device may either attempt to send out the last message a second time or terminate communication by sending out an RJC message.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
4EH	Command ID
F7H	End of exclusive

Rejection : RJC (4FH)

This message is sent out when there is a need to terminate communication by overriding the current message. An RJC message will be triggered when :

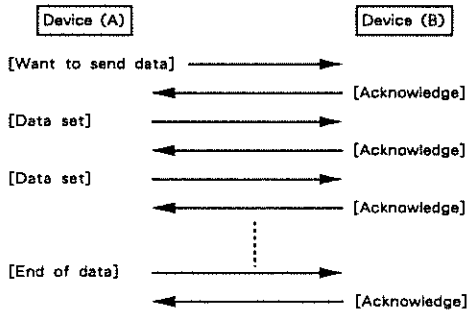
- a WSD or RQD message has specified an illegal data address or size,
- the device is not ready for communication.
- an illegal number of addresses or data has been detected.
- data transfer has been terminated by an operator.
- a communications error has occurred.

An ERR message may be sent out by a device on either side of the interface. Communication must be terminated immediately when either side triggers an ERR message.

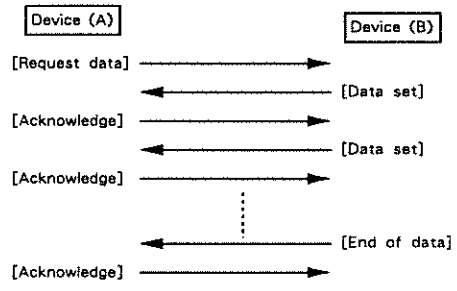
Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
MDL	Model ID
4FH	Command ID
F7H	End of exclusive

Example of Message Transactions

● Data transfer from device (A) to device (B).

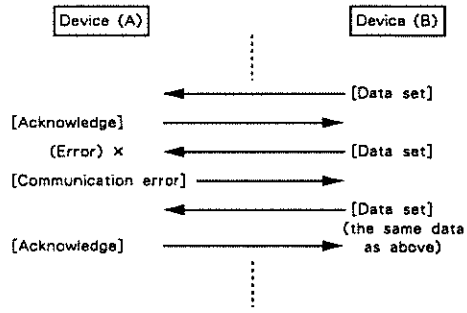


● Device (A) requests and receives data from device (B).

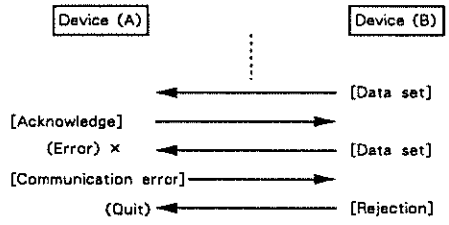


● Error occurs while device (A) is receiving data from device (B).

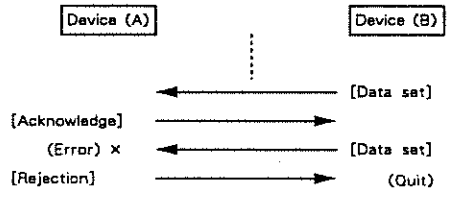
1) Data transfer from device (A) to device (B).



2) Device (B) rejects the data re-transmitted, and quits data transfer.



3) Device (A) immediately quits data transfer.



MODEL S−220 **MIDI Implementation** Version : 1.00

1. TRANSMITTED DATA

■ CONTROL CHANGE

MAIN VOLUME

Status	Second	Third
BnH	07H	vvH

n=MIDI channel number : 0H~FH (0~15) 0=ch.1 15=ch.16
vv=Main volume value : 00H~7FH (0~127)

Transimitted if the MIDI volume switch in the MIDI function is ON. Individual volume value can be set only in MULTI modes.

BALANCE

Status	Second	Third
BnH	08H	vvH

vv=balance value : 00H~7FH (0~127)

Transmitted if the MIDI balance switch in the MIDI function is ON.

REGISTERED PARAMETERS

When BEND RANGE or MASTER TUNE is edited, RPC (Registered parameter control number) and its value are sent as follows.

BnH, 64H, pp, 65H, qq, 06H, mm, 26H, ll
pp, qq=RPC number LSB, MSB
mm, ll=parameter value MSB, LSB

Pitch Bend Sensitivity

RPC number	value MSB	value LSB	
0	mmH	00H	(Pitch bend sensitivity) BEND RANGE

mm=Pitch bend sensitivity : 00H~0CH (0~12) 0~12 semitone, 1 semitone step

Master Fine Tuning

RPC number	value MSB	value LSB	
1	mmH	llH	(Master fine tuning) MASTER TUNE

mm,ll=Master fine tuning : 7FH,36H~00H,4AH −99~+99 cent, 1 cent step

Registered Parameter Controls

Status	Second	Third
BnH	64H	ppH

Status	Second	Third
BnH	65H	qqH

pp=RPC number LSB : 00H, 01H
qq=RPC number MSB : =00H

RPC number 0 : pitch bend sensitivity
1 : master fine tuning

Transmitted if the MIDI registered parameters switch in the MIDI function is ON.

Data Entry

Status	Second	Third
BnH	06H	mmH

Status	Second	Third
BnH	26H	llH

mm=parameter value MSB : 00H~7FH (0~127)
ll=parameter value LSB : 00H~7FH (0~127)

Transimitted if the MIDI registered parameters switch in the MIDI function is ON.

■ PROGRAM CHANGE

Status	Second
CnH	ppH

pp=propgram number : 00H~7AH (0~122)

Tranmitted if the MIDI program change switch in the MIDI function is ON.

See Owner's Manual for the relationship between Program numbers and sampling structures. (P.93)

■ SYSTEM EXCLUSIVE

Status
F0H : System Exclusive
F7H : EOX (End of Exclusive)

Transmitted if the MIDI system exclusive switch in the MIDI function is ON.
See section 「3. Exclusive communication」.

2. NOTE EVENT

■ NOTE EVENT

NOTE OFF

Status	Second	Third
8nH	kkH	vvH
9nH	kkH	00H

n=MIDI channel number : 0H~FH (0~15) 0=ch.1 15=ch.16
kk=note number : 18H~67H (24~103)
vv=velocity : ignored

Note numbers outside the range 24−103 are ignared.

NOTE ON

Status	Second	Third
8nH	kkH	vvH

kk=note number : 18H~67H (24~103)
vv=velocity : 01H~7FH (1~127)

Note numbers outside the range 24−103 are ignored.

■ CONTROL CHANGE

MODULATION

Status	Second	Third
BnH	01H	vvH

vv=modulation depth : 00H (0) modulation OFF
01H~7FH (1~127) modulation ON

Transmitted if the MIDI modulation switch in the MIDI function is ON.

MAIN VOLUME

Status	Second	Third
BnH	07H	vvH

vv=main volume value : 00H~7FH (0~127)

Received if the MIDI volume switch in the MIDI function is ON. Individual volume value can be set only in MULTI modes.

BLANCE

Status	Second	Third
BnH	08H	vvH

vv=balance value : 00H~7FH (0~127)

Received if the MIDI switch in the MIDI function is ON.

REGISTERD PARAMETERS

BEND RANGE, and MASTER TUNE are represented in a combination of RPC (Registered parameter control number) and its value.
BnH, 64H, pp, 65H, qq, 06H, mm, 26H, ll
pp, qq=RPC number LSB, MSB
mm, ll=parameter value MSB, LSB

Pitch Bend Sensitivity

RPC number	value MSB	value LSB	
0	mmH	00H	(Pitch bend sensitivity) BEND RANGE

mm=Pitch bend sensitivity : 00H~0CH (0~12) 0~12 semitone, 1 semitone step

Master Fine Tuning

RPC number	value MSB	value LSB	
1	mmH	llH	(Master fine tuning) MASTER TUNE

mm,ll=Master fine tuning : 7FH,36H~00H,4AH −99~+99 cent, 1 cent step

Registered Parameter Control

Status	Second	Third
BnH	64H	ppH

Status	Second	Third
BnH	65H	qqH

pp=RPC number LSB : 00H,01H
qq=RPC number MSB : =00H

RPC number 0 : pitch bend sensitivity
1 : master fine tuning

Received if the MIDI registered parameters switch in the MIDI function is ON.

Data Entry

Status	Second	Third
BnH	06H	mmH

Status	Second	Third
BnH	26H	llH

mm=parameter value MSB : 00H~7FH (0~127)
ll=parameter value LSB : 00H~7FH (0~127)

Recived if the MIDI registered parameters switch in the MIDI function is ON.

HOLD 1

Status	Second	Third
BnH	40H	vvH

vv=00H~3FH (0~63) : OFF
vv=40H~7FH (64~127) : ON

Recived if the MIDI hold switch in the MIDI finction is ON.

■PROGRAM CHANGE

Status	Second
CnH	ppH

pp=Program number : 00H~7AH (0~122)

Recived if the MIDI program change switch in the MIDI function is ON.
See Owner's Manual for the relationship between Program numbers and sampling structures. (P.93)

CHANNEL PRESSURE

Status	Second
DnH	vvH

vv=Channel pressure value : 00H~7FH (0~127)

Recieved if the MIDI channel pressure switch in the MIDI function is ON.

PITCH BEND CHANGE

Status	Second	Third
BnH	mmH	llH

mm,ll=Pitch bend value : 00H,00H~7FH,7FH 0~16383 (-8192~+8191)

Recieved if the MIDI pitch bend switch in the MIDI function is ON.

■MODE MASSAGE

ALL NOTE OFF

Status	Second	Third
BnH	7BH	00H

When the ALL NOTES OFF is recognized, all the notes which have been turned ON only by MIDI IN note ON messages are turned OFF. However, if the damper ON message has been recognized, these ON notes will be not turned OFF until the Dmper OFF message is received. In Multi mode, ALL NOTES OFF is received on each MIDI channel individually, but ignored in Mono mode.

OMNI OFF

Status	Second	Third
BnH	7CH	00H

OMNI ON

Status	Second	Third
BnH	7DH	00H

OMNI OFF and OMNI ON mode messages are treated as ALL NOTES OFF.
In Multi mode, there are received on each MIDI channel individually, but ignored in Mono mode.

MONO

Status	Second	Third
BnH	7EH	mmH

mm=MONO channel range : 00H~7FH (0~127)

MONO channel range 'mm' is recoginzed as follow.

mm	True MONO channel range
0	8
1-8	1-8
9-127	8
Manual set	1-8

Channel range 'mm' is memorized until it is edited or the power is turned off.
The table below shows which message is recoginzed by which channel (s) in MONO mode.

	Control channel mode	
message	**'BASIC'**	**'GLOBAL'**
Note on/off	individual	individual
Control change	basic	global*
Mode message	basic	basic
Program change	basic	global*
Channel pressure	basic	global*
Pitch bender	individual	individual
Exclusive	basic	basic

*Global channel is equal to "basic channel less 1".
If basic channel is 1, global channel is 16.

POLY

Status	Second	Third
BnH	7FH	00H

■SYSTEM EXCLUSIVE

Status
F0H : SYSTEM EXCLUSIVE
F7H : EOX (End of Exclusive)

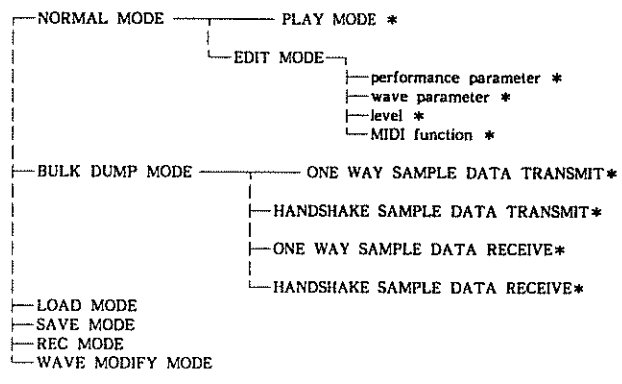
Received if the MIDI system exclusive switch in the MIDI function is ON.
See section [3. Exclusive communication]

3. CONCEPT OF EXCLUSIVE COMMUNICATION

It is possible to communicate with outside world using exclusive message in NORMAL Mode or SAMLE DATA DUMP Mode.
NORMAL Mode refers to the mode in which S-220 generates and COMMUNICATION in NORMAL Mode.
In SAMPLE DATA DUMP Mode the following 4 functions are available as explained in sections 6, 7, 8 and 9.

1. ONE WAY SAMPLE DATA TRANSMIT
2. HANDSHAKE SAMPLE DATA TRANSMIT
3. ONE WAY SAMPLE DATA RECEIVE
4. HANDSHAKE SAMPLE DATA RECEIVE

The construction of 'MODE' is as follows.



*...Exclusive communication available mode

The S-220's MIDI functions that work with Exclusive communication are CH OFFSET, KEY RANGE (common) and KEY RANGE (multi). All exclusive communications must follow the Roland Exclusive Format Type IV shown below.

(Roland Exclusive Format Type IV).

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device-ID#=MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)
e	0aaa aaaa	Command-ID#
[f	0bbb bbbb	Address MSB] [] depend on Command-ID
[g	0ccc ccc	Address]
[h	0ddd dddd	Address LSB]
[i	0eee eeee	Data]
[	:	]
[j	0fff ffff	Checksum]
k	1111 0111	End of System Exclusive

Summed value of the allbyte between Command=ID and EOX (both excluded) must be 00H (7 bits).

4. EXCLUSIVE COMMUNICATIONS IN NORMAL MODE

4.1 Communication format

4.1.1 Request (One way) RQ1 11H

The S-220 can recognize 'Request' command in NORMAL Mode even during edit of performance parameter or wave parameter.
Pressing LOAD on the S-220 panel in Normal mode transmits 'Request' command, asking for the data on currently editing parameter (displayed on LCD).

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	Roland ID#	
c	0000 nnnn	Device-ID#=MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)	
e	0001 0001	Command-ID# (RQ1)	
f	0aaa aaaa	Address MSB	*4.1-1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Size MSB	*4.1-2
j	0eee eeee	Size	
k	0fff ffff	Size LSB	
l	0ggg gggg	Checksum	
m	1111 0111	End of System Exclusive	

4.1.2 Data set (One way) DT1 12H

The S-220 can recognize 'Request' command in NORMAL Mode even during edition of performance parameter or wave parameter.
Pressing SAVE on the S-220 during edit of parameter currently shown on the LCD.

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	Roland ID#	
c	0000 nnnn	Device ID#=MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)	
e	0001 0010	Command-ID# (DT1)	
f	0aaa aaaa	Address MSB	*4.1-1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Data	*4.1-3
	:		
j	0eee eeee	Checksum	
k	1111 0111	End of System Exclusive	

Notes :
*4.1-1 ADDRESS
If aaaaaaa-ccccccc done not indicate the top address of the parameter, the message will be ignored.

*4.1-2 SIZE
Data size is ignored in NORMAL mode (except for wave data communication and LCD message buffers). The size is determined by the size of a parameter addressed by aaaaaa-cccccc. But tranmitterhave to send dummy 'size'.

*4.1-3 DATA
Data if one parameter is sent at one time.
Dta of only one parameter is recognized at one time.

5. Address mapping of parameters

5.1 Coarse address map of normal mode

Address	Description
000000	Temporary wave parameters
000	Block-1
100	Block-2
200	Block-3
300	Block-4
000800	Performance parameters
000900	Status
001000	Command
001100	Edit control
002000	Wave Edit control
020000	Wave data of Bank-A
060000	Wave data of Bank-B
0A0000	Wave data of Bank-C
0E0000	Wave data of Bank-D

5.2 Address of wave parameters

Temporary wave parameters *5.2-1

Address	Data	Description	
000000	Temporary wave parameter block-1		
0	0aaa aaaa	TONE NAME (ASCII) 9bytes	*5.2-2
	:		
9	0aaa aaaa	REC KEY 24-103	
0A	0aaa aaaa	BANK TUNE 14-64-114 (-50-0-+50)	
0B	0aaa aaaa	LOOP TUNE-1 14-64-114 (-50-0-+50)	
0C	0000 00aa	SCAN MODE 00 : FWD 01 : ALT 10 : BWD	
0D	0000 00aa	LOOP TYPE LOOP/ADRS GROUP 00 : OFF 1 01 : ON 1 10 : ON 2 11 : OFF 2	
0E	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd 0000 00ee	ST1 (start address-1) ee ddddcccc bbbbaaaa=0-NNNNNN	*5.2-3
13	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd 0000 00ee	EN1 (end address-1) ee ddddcccc bbbbaaaa=0-MMMMMM	*5.2-3
18	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd 0000 00ee	LP1 (loop length-1) ee ddddcccc bbbbaaaa=0-MMMMMM	*5.2-3
1D	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd 0000 00ee	EN2 (end address-2) ee ddddcccc bbbbaaaa=4-MMMMMM	*5.2-3
22	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd 0000 00ee	LP2 (loop length-2) ee ddddcccc bbbbaaaa=4-MMMMMM	*5.2-3
27	0000 000a	KEY FOLLOW 0 : OFF 1 : ON	
28	0000 000a	PITCH BEND 0 : OFF 1 : ON	
29	0000 000a	VIBRATO 0 : OFF 1 : ON	
2A	0aaa aaaa	ENV V-SENS 0-127	
2B	0aaa aaaa	ENV RATE1 0-127	
2C	0aaa aaaa	ENV LEVEL1 0-127	
2D	0aaa aaaa	ENV RATE2 0-127	
2E	0aaa aaaa	ENV LEVEL2 0-127	
2F	0aaa aaaa	ENV RATE3 0-127	
30	0aaa aaaa	ENV LEVEL3 0-127	
31	0aaa aaaa	ENV RATE4 0-127	
32	0aaa aaaa	DYN RANGE 0-127	
33	0aaa aaaa	ABEND RATE 0-127	
34	0aaa aaaa	ABEND DPTH 0-127	

35	0aaa aaaa	SPT KEY#1	24－103 ＊5.2－4
36	0aaa aaaa	SPT KEY#2	24－103
37	0aaa aaaa	SPT KEY#3	24－103
38	0000 000a	SMP CLK (sampling clock rate)	0：30KHz 1：15KHz
39	0aaa aaaa	LOOP TUNE－2 14－64－114 (－50－0－＋50)	
3A	0000 000a	ST2 (start address－2) ＊5.2－3	0：ST1 (start address－1) 1：0 (top of bank)
3B	0000 aaaa	ADRSV－SW (address velocity switch threshold) ＊5.2－5	0－15

000100 Temporary wave parameter block－2
:
3B

000200 Temporary wave parameter block－3
:
3B

000300 Temporary wave parameter block－4
:
3B

COMMUNICATION OF TEMPORARY WAVE PARAMETERS

PARAMETER	TRANSMIT	RECOGNIZE (DT1)
TONE NAME	RQ1	immediately in playmode
REC KEY	RQ1,[SAVE],edit	not immediate
BANK TUNE	RQ1,[SAVE],edit	immediate
LOOP TUNE－1	RQ1,[SAVE],edit	immediate
SCAN MODE	RQ1,[SAVE],edit	not immediate
LOOP TYPE	RQ1,[SAVE],edit	not immediate
ST1	RQ1,[SAVE],edit	not immediate
EN1	RQ1,[SAVE],edit	immediate
LP1	RQ1,[SAVE],edit	immediate
EN2	RQ1,[SAVE],edit	immediate
LP2	RQ1,[SAVE],edit	immediate
KEY FOLLOW	RQ1,[SAVE],edit	not immediate
PITCH BEND	RQ1,[SAVE],edit	not immediate
VIBRATO	RQ1,[SAVE],edit	not immediate
ENV V－SENS	RQ1,[SAVE],edit	immediate
ENV RATE1	RQ1,[SAVE],edit	immediate
ENV LEVEL1	RQ1,[SAVE],edit	immediate
ENV RATE2	RQ1,[SAVE],edit	immediate
ENV LEVEL2	RQ1,[SAVE],edit	immediate
ENV RATE3	RQ1,[SAVE],edit	immediate
ENV LEVEL3	RQ1,[SAVE],edit	immediate
ENV RATE4	RQ1,[SAVE],edit	immediate
DYN RANGE	RQ1,[SAVE],edit	not immediate
ABEND RATE	RQ1,[SAVE],edit	immediate
ABEND DEPTH	RQ1,[SAVE],edit	not immediate
SPT KEY#1	RQ1,[SAVE],edit	not immediate
SPT KEY#2	RQ1,[SAVE],edit	not immediate
SPT KEY#3	RQ1,[SAVE],edit	not immediate
SMP CLOCK	RQ1,[SAVE]	not immediate
LOOP TUNE－2	RQ1,[SAVE],edit	immediate
ST2	RQ1,[SAVE],edit	not immediate
ADRS V－SW	RQ1,[SAVE],edit	not immediate

＊TRANSMIT : Message is sent upon occurence of the following.
RQ1 RQ1 received
[SAVE] SAVE is pressed
edit Parameter is edited using alpha－dial or button

＊RECOGNIZED : Recognized DT1 will be processed either for reltime effect or for later use.
Immediate affects current voice
Not immediate affects newly played note only

Notes :

＊5.2－1 Temporary wave parameters

CONCEPT

WAVE PARAMETERS are stored in two areas : BANL AREAs and TEMPORARY AREAs.

TEMPORARY AREA is directly involved in reproducing sound,BANK AREA is involved in transferring data to ／from QD. Wave parameter from QD are sored into curresponding banl areas and will be returned back to the QD When SAVE is pressed.

Data in the bank areas will be called, as required as reference, when another structure is selected from STRUCTURE button. The new parameters are written into TEMPORARY areas.

Edit operation on the panel changes wave parameter in the TEMPORARY AREA. Pressing ENTER (see Notes ＊5.5－1) duplicates TEMPORARY contents into BANK area.

Wave parameter in TEMPORARY area is used in Data Transfer Mode.

The behavior of S－220 depends on temporary wave parameters when it scans wave data and generatrs sounds.

In edit mode, these parameters are displayed on S－220's LCD.

But if the sampling sturcture is changed, the data of temporrary wave parameters will be destroyed. If it is necessary to memorize the data of temporary wave parameters, press "ENTER" button (see Notes ＊5.5－1) when it is in play mode or wave parameter (contains the split points) edit mode.

1－tone uses 1－temporary block, as shown in the following chart. When dual function mode (dual－tone, v－mix, v－switch) is selected, 2nd structure (whose LED is blinking) uses block－2. TEMPORARY BLOCKs are used in the following ways :

Structures consisting of a bank and structures linking more than one bank to form a voice data use one set of wave parameter.

Split structures use a parameter set for each section.

MULTI MODE handle plural structures. Dual functions (dual tone, velocity mix and velocity switch) require two structures (i.e. different temporary blocks) for voicing. Two structures are distinguished from each other by STRUCTURE LED (see DUAL TONE FUNCTION below).

Delay and Detune are regarded as non－dual function.

Non Dual Tone Function
(Normal Play Mode or when detune or delay is engaged.)

sampling structure	block #
A	0
B	0
C	0
D	0
AB	0
CD	0
ABCD	0
A／B	0／1
C／D	0／1
AB／CD	0／1
A／B／C／D	0／1／2／3

Dual Tone Function

sampling structure	STRUCTURE LED block # (stays on)	STURCTURE LED block # (blinking)
A	0	(2)
B	0	(2)
C	0	(2)
D	0	(2)
AB	0	(2)
CD	0	(2)
A／B	0／1	(2／3)
C／D	0／1	(2／3)

Multi Function

mode of multi	block #
MULTI－1 A, B, C, D	0, 1, 2, 3
MULTI－2 A, B, C, D	0, 1, 2, 3
MULTI－3 A, B, C／D	0, 1, 2／3
MULTI－4 A／B, C／D	0／1, 2／3
MULTI－5 AB, CD	0／1

＊5.2－2 TONE NAME

If plural blocks are used, the top block of them should be used for the communication.

＊5.2－3 ADDRESS DATA

These values (NNNNNN, MMMMMM) will vary depending on the sampling structure, as shown in the following chart.

structure	NNNNNN (MMMMMM－4)	MMMMMM (BANK SIZE)
A	32763 (7FFBH)	32767 (7FFFH)
B	32763 (7FFBH)	32767 (7FFFH)
C	32763 (7FFBH)	32767 (7FFFH)
D	32763 (7FFBH)	32767 (7FFFH)
AB	65531 (FFFBH)	65536 (FFFFH)
CD	65531 (FFFBH)	65536 (FFFFH)
ABCD	131067 (1FFFBH)	131071 (1FFFFH)

These address values must be consistent with the following equationss.

1. ST1 ; start address 1

(1) If ST2＝0, then
00000H＝＜ST1＜＝ (EN1－LP1)

(2) If ST2＝ST1,EN1－LP1＜＝EN2－LP2, then
00000H＝＜ST1＜＝EN1－LP1

(3) If ST2＝ST1,EN2－LP2＜EN1－LP1, then
00000H＝＜ST1＜＝EN2－LP2

2. EN1 ; end address 1
ST1＋LP1＜＝EN1＜＝MMMMMM

3. LP1 ; loop length 1
4＝＜LP1＜＝EN1－ST1

4. ST2 ; start address 2
(1) If ST1＝＜EN2－LP2, then
ST2＝0 or ST2＝ST1 (＝ST1)

(2) If ST1＞EN2－LP2, then
ST2＝0

5. EN2 ; end address 2
(1) If ST2=0, then
0=<EN2=<MMMMM

(2) If ST2=ST1, then
ST1=<EN2=<MMMMM

6. LP2 ; loop length 2
4=<LP2=<EN2−ST2

*5.2−4 SPLIT POINTS
SPT KEY # designates a key at which a split structure is split.
Three SPT #'s are provided for each block. The table below shows availability of SPT KEY # for a given structure.

Structure	Available SPT KEY #
A/B	SPT KEY#2 for a block storing A Bank content
C/D	SPT KEY#2 for a block storing B Bank content
AB/CD	SPT KEY#2 for a block storing C Bank content
A/B/C/D	SPT KEY#1, #2 #3, for a blockstoring A Bank content
A,B,C/D (MULTI−3)	SPT KEY#2 for a Block−3
A/B,C/D (MULTI−4)	SPT KEY#2 for a Block−1 (A/B) SPT KEY#2 for a Block−3 (C/D)

*5.2−5 ADDRESS VELOCITY SWITCH
Address velocity swith values are interpreted as follows.

value	threshold level
0	OFF
1	15
2	30
3	40
4	50
5	60
6	70
7	75
8	80
9	85
10	90
11	95
12	100
13	105
14	110
15	115

5.3 Address of performance parameters

000800 Performance parameters *5.3−1

		VIBRATO	
0	0aaa aaaa	LFO RATE	0−127
1	0aaa aaaa	MNUAL DEPTH	0−127
2	0aaa aaaa	DELAY DEPTH	0−127
3	0aaa aaaa	DELAY TIME	0−127
		PITCH BENDER	
4	0000 000a	BEND MODE	0 : CONT 1 : CHRM
		ARPEGGIO	
5	0000 000a	SYNC SOURCE	0 : INT
6	0aaa aaaa	INT RATE	0−127
7	0000 00aa	PLAY MODE	00 : UP 01 : DOWN 10 : U/D 11 : RND
8	0000 00aa	PLAY RANGE	00 : 1oct 01 : 2oct 10 : 3oct
9	000a aaaa	NOTE REPEAT	1−16
A	0000 aaaa	DECAY RATIO	1−10
		VELOCITY MIX	
B	0aaa aaaa	THRESHOLD	0−127
		VELOCITY SWITCH	
C	0aaa aaaa	THRESHOLD	0−127
		DETUNE MODE	
D	0000 000a	RANGE V−SNS	0 : OFF 1 : ON
E	0aaa aaaa	DTUNE RANGE	0−127
F	0000 000a	ABEND DEST	0 : BOTH 1 : HALF
1	0000 000a	BEND DEST	0 : BOTH 1 : HALF
		DELAY MODE	
11	0aaa aaaa	DELAY TIME	0−127
12	0aaa aaaa	DELAY LEVEL	0−127
13	0aaa aaaa	KEY OFFSET 52−64−76 (−12−0−+12)	
		EXT TRIGGER	
14	0aaa aaaa	TRG G−TIME	0−127
15	0aaa aaaa	TRIGGER KEY#1	23 (OFF) −103
16	0aaa aaaa	TRIGGER KEY#2	23 (OFF) −103
17	0aaa aaaa	TRIGGER KEY#3	23 (OFF) −103
18	0aaa aaaa	TRIGGER KEY#4	23 (OFF) −103
		VIBRATO	
19	0aaa aaaa	PRESS SENS	0−127
		DETUNE MODE	
1A	0aaa aaaa	PRESS SENS	0−127
		VELOCITY MIX	
1B	0aaa aaaa	MIX LEVEL	0−127
		DELAY MODE	
1C	0aaa aaaa	V−SENS TRESH	0−127
		VCA LEVEL	
1D	0aaa aaaa	VOL. PRESS (TOTAL)	0−127
1E	0aaa aaaa	BAL. PRESS (TOTAL)	0−127
1F	0aaa aaaa	MULTI PRESS (output−1)	0−127
20	0aaa aaaa	MULTI PRESS (output−2)	0−127
21	0aaa aaaa	MULTI PRESS (output−3)	0−127
22	0aaa aaa	MULTI PRESS (output−4)	0−127
		KEY RANGE	
23	0aaa aaaa	KEY RANGE HI (Common)	24−103
24	0aaa aaaa	KEY RANGE LO (Common)	24−103
25	0aaa aaaa	KEY RANGE HI (output−1)	24−103
26	0aaa aaaa	KEY RANGE LO (output−1)	24−103
27	0aaa aaaa	KEY RANGE HI (output−2)	24−103
28	0aaa aaaa	KEY RANGE LO (output−2)	24−103
29	0aaa aaaa	KEY RANGE HI (output−3)	24−103
2A	0aaa aaaa	KEY RANGE LO (output−3)	24−103
2B	0aaa aaaa	KEY RANGE HI (output−4)	24−103
2C	0aaa aaaa	KEY RANGE LO (output−4)	24−103
		CHANNEL OFFSET	
2D	0000 aaaa	OFFSET (output−1)	0−15
2E	0000 aaaa	OFFSET (output−2)	0−15
2F	0000 aaaa	OFFSET (output−3)	0−15
30	0000 aaaa	OFFSET (output−4)	0−15
		SEPARATE	
31	0000 abcd	Separates witch	*5.3−2

COMMUNICATION OF PERFORMANCE PARAMETERS

PARAMETER	TRANSMIT	RECOGNIZE (DT1)
VIBRATO		
LFO RATE	RQ1,[SAVE],edit	immediate
MNUAL DEPTH	RQ1,[SAVE],edit	immediate
DELAY DEPTH	RQ1,[SAVE],edit	immediate
DELAY TIME	RQ1,[SAVE],edit	not immediate
PITCHBENDER		
BEND MODE	RQ1,[SAVE],edit	immediate
ARPEGGIO		
SYNC SOURCE	RQ1,[SAVE],edit	immediate
INT RATE	RQ1,[SAVE],edit	immediate
PLAY MODE	RQ1,[SAVE],edit	immediate
PLAY RANGE	RQ1,[SAVE],edit	immediate
NOTE REPEAT	RQ1,[SAVE],edit	immediate
DECAY RATIO	RQ1,[SAVE],edit	immediate
VELOCITY MIX		
THRESHOLD	RQ1,[SAVE],edit	not immediate
VELOCITY SWITCH		
THRESHOLD	RQ1,[SAVE],edit	not immediate
DETUNE MODE		
RANGEV-SENS	RQ1,[SAVE],edit	not immediate
DTUNE RANGE	RQ1,[SAVE],edit	immediate
ABEND DEST	RQ1,[SAVE],edit	not immediate
BEND DEST	RQ1,[SAVE],edit	immediate
DELAY MODE		
DELAY TIME	RQ1,[SAVE],edit	mute delay voice
DELAY LEVEL	RQ1,[SAVE],edit	not immediate
KEY OFFSET	RQ1,[SAVE],edit	mute delay voice
EXT TRIGGER		
TRG G-TIME	RQ1,[SAVE],edit	not immediate
TRIGGER KEY-1-4	RQ1,[SAVE],edit	not immediate

The above parameters are also applicable to MKS-100 and S-10.

PARAMETER	TRANSMIT	RECOGNIZE (DT1)
VIBRATO		
PRESS SENS	RQ1,[SAVE],edit	immediate
DETUNE MODE		
PRESS SENS	RQ1,[SAVE],edit	immediate
VELOCITY MIX		
MIX LEVEL	RQ1,[SAVE],edit	not immediate
DELAY MODE		
V-SENS TRESH	RQ1,[SAVE],edit	not immediate
VCA		
VOL. PRESS	RQ1,[SAVE],edit	immediate
BAL. PRESS	RQ1,[SAVE],edit	immediate
MULTI PRESS1-4	RQ1,[SAVE],edit	immediate
MIDI		
KEY RANGE HI (common)	RQ1,[SAVE],edit	not immediate
KEY RANGE LO (common)	RQ1,[SAVE],edit	not immediate
KEY RANGE HI (out1-4)	RQ1,[SAVE],edit	not immediate
CH OFF SET (out1-4)	RQ1,[SAVE],edit	not immediate
SEPARATE		
SEPARATE ON OFF	RQ1, edit	immediate

The above parameters are exclusively applied to S-220.

Notes :

*5.3-1 PERFORMANCE PARAMETERS

Performance parameters (MIDI functions-CH OFFSET, KEY RANGE ; LEVEL parameters, SEPARATE ON/OFF) are transmitted when one of those parameters is edited or 'Request data' is received ; or SAVE button is pressed in performance parameter edit mode. When Data set command (DT1) is recognized, the corresponding parameter will be changed.

Performance parameters do not require execution of WRITE command,since no temporary areas are involved.

*5.3-2 SEPARATE

The value 'abcd' has the following functions.

a : separate in velocity mix mode
b : separate in dual tone
c : separate in delay mode
d : separate in detune mode

(1 : separate on, 0 : separate off)

5.4 Address of status

000900	Status request		
	Structure# of temporary wave parameter blocks		*5.4-1
00	0000 aaaa	aaaa : structure#of block-1	
	0000 aaaa	aaaa : structure#of block-2	
	0000 aaaa	aaaa : structure#of block-3	
	0000 aaaa	aaaa : structure#of block-4	
	Structure# of wave parameter banks		*5.4-2
10	0000 aaaa	aaaa : structure#of bank-A	
	0000 aaaa	aaaa : structure#of bank-B	
	0000 aaaa	aaaa : structure#of bank-C	
	0000 aaaa	aaaa : structure#of bank-D	
	Structure# of outputs		*5.4-3
20	000b aaaa	baaaa : structure#of output-1	
	000b aaaa	baaaa : structure#of output-2	
	000b aaaa	baaaa : structure#of output-3	
	000b aaaa	baaaa : structure#of output-4	
30	0aaa aaaa	Version number (ID)	*5.4-4
:			
3F			

Notes :

COMMUNICATION

*5.4-1 - *5.4-10 : cannot be changed by Data set command (DT1). Transmitted only when Request data command (RQ1) is received.

*5.4-1 STRUCTURE # OF TEMPORARY WAVE PARAMETER BLOCKS (see *5.2-1)

If the data of this address is requested to send, structure # of the temporary wave parameter block-n will be transmitted.

Structure number is as follows.
If the block would not be used, structure # is 0FH.

structure#	sampling structure
0	A
1	B
2	C
3	D
4	AB
5	CD
6	ABCD
0FH	Not used

*5.4-2 STRUCTURE # OF WAVE PARAMETER BANKS (see *5.2-1)

If the data of this address is requested to send, structure # of the wave parameter bank will be transmitted.

Structure number is explained in *5.4-1

*5.4-3 STRUCTURE # OF OUTPUTS

If the data of this address is requested to send, it will be transmitted to show which sampling structure is assignedto the output.

The value 'baaaa' has the following meanings.
If the output is not to be separated, structure # is 0FH.

Detune Mode
b : 0 Lower Pitch Voice
1 Higher Pitch Voice

Delay Mode
b : 0 Direct Signal Voice
1 Delay Signal Voice

aaaa : structure number

aaaa : structure number

structure#	sampling structure
0	A
1	B
2	C
3	D
4	AB
5	CD
6	ABCD
7	A/B
8	C/D
9	AB/CD
0A11	A/B/C/D
0FH	All Structures (Not separated)

*5.4-4 VERSION NUMBER (ID)
If thye mdata of this address is requested to send, the name and the version number of the model will be transmitted in 16 ASCII character codes as follow.

"S-220x.xx" (x.xx : version number)

5.5 Address of commands

001000	Commands		
00	0aaa aaaa	Write request command switch	*5.5-1
01	0000 000a	ARPEGGIO on/off 0 : OFF 1 : ON	
02	0aaa aaaa	BULK DUMP MODE switch	*5.5-2
03	0000 000a	Poly assign mode switch 0 : Mode-1 1 : Mode-2	*5.5-3
04	0000 000a	MONO assign mode switch 0 : Mode-1 1 : Mode-2	*5.5-4
05	0000 0aaa	Multi mode change	*5.5-5
06	0000 00aa	Play mode status line (LCD 1st line) select	*5.5-6

COMMUNICATION OF COMMAND

PARAMETER	TRANSMIT	RECOGNIZE (DT1)
WRITE REQUEST	[ENTER]	ignore
ARPEGGIO	RQ1,edit	immediate
BULK DUMP MODE SWITCH	[F1] [MIDI]	immediate
POLY MODE ASSIGN	RQ1,edit	immediate
MONO MODE ASSIGN	RQ1,edit	immediate
MULTI MODE CHANGE	RQ1,edit	immediate
STATUS LINE SELECT	RQ1,[SAVE],edit	immediate

Notes :

*5.5-1 WRITE COMMAND SWITCH
Writing any data into this address copies Wave parameter in Temporary block to Bank area. The status of currently selected structure is registered into structure #.

*5.5-2 BULK DUMP MODE SWITCH
If any data is written into this address, the mode will changefrom NORMAL MODE to BULK DUMP MODE.
The transmitter should wait more than 10msec before changing the mode from normal to bulk dump.

*5.5-3 POLY ASSIGN MODE SWITCH
It is possible to select key assign mode in MIDI poly mode.
"Poly mode" contains all MULTI modes.

*5.5-4 MONO ASSIGN MODE SWITCH
It is possible to select key assign mode in MIDI mono mode.
This does not have an effect on detune, delay, dual and velocity mix.

*5.5-5 MULTI MODE CHANGE
If the value 'aaa' is received, multi mode changes as follows.

aaa	Multi mode
0	Multi mode off (exit multi mode)
1	Multi-1
2	Multi-2
3	Multi-3
4	Multi-4
5	Multi-5
6	SMulti (same structure multi mode)

If any program change message is received, it will exit multi mode, and change to the structure.

*5.5-6 PLAY MODE STATUS LINE
'Status line' is the first line of LCD and is programmable to display message used in play mode. There are four types of messages as shown below.

value : 0000 00aa

aa : Status message type number in non-multi mode

0. Sampling structure
1. Temporary block status (see*5.4-1)
2. Bank status (see*5.4-2)
3. Output status (see*5.4-3)

5.6 Address of edit control

001100	Edit control		*5.6-1
00	0000 aaaa	Edit mode change 0-11	*5.6-2
01	0000 0aaa	Parameter select command	*5.6-3
02	0000 00aa	Parameter value edit command	*5.6-4
03	000b aaaa	Parameter value alpha-dial edit	*5.6-5
04	0000 000a	Wave parameter copy command	*5.6-6
05	0000 aaaa	Parameter initialize command	*5.6-7
06	0aaa aaaa	Current editing parameter data request	*5.6-8
08	0000 000a	Address edit display mode 0 : Decimal 1 : Hexadecimal	*5.6-9
09	0000 00aa	LCD control command	*5.6-10
001110 : 00111F	0aaa aaaa	Message buffer-1 (line-1)	*5.6-11
001120 : 00112F	0aaa aaaa	Message buffer-2 (line-2)	

COMMUNICATION OF EDIT CONTROL

PARAMETER	TRANSMIT	RECOGNIZE (DT1)
EDIT MODE CHANGE	RQ1	immediate
PARAMETER SELECT	-	immediate
PARAMETER VALUE	-	immediate
PARAMETER ALPHA DIAL	-	immediate
WAVE PARAMETER COPY	edit	immediate
PARAMETER INITIALIZE	edit	immediate
CURRENT PARAM REQUEST	-	immediate
ADDRESS EDIT DISPLAY	RQ1,edit	not immediate
LCD CONTROL	-	immediate
MESSAGE BUFFER	RQ1	immediate

Notes :

*5.6-1 EDIT CONTROL
In these addresses, there are edit commands and LCD control commands. It is possible to control most of all parameters without picking the buttons on S-220 's panel.
When transmitting both parameter select command (*5.6-3) and parameter value edit command (*5.6-4, *5.6-5) in sequence (or vice versa), wait more than 20msec before sending the second command which otherwise might be ignored.

*5.6-2 EDIT MODE CHANGE
If edit mode number 'aaaa' is written into this address,the mode (contains play mode) is changed.
This is analogous to manual operations on S-220.
The number means as follows.

aaaa	Edit mode
0	Play mode (exit edit mode)
1	Master tune edit mode
2	Performance parameter edit mode
3	MIDI parameter edit mode
4	Wave parameter edit mode
5	Program change-s,structur table
6	Split point edit mode
7	(same as #6)
8	Bender range edit mode
9	Arpeggio ON/OFF edit mode
10	Level edit mode
11	Utility mode

*5.6-3 PARAMETER SELECT COMMAND
If parameter select command 'aaa' is to be written into this address, the editing destination parameter is changed as follows. This does the same as manual operations on S-220 .

command	operation	equivalent panel press F2 button.
0	TOP	Holding BWD button, press F2 button.
1	INDEX BWD	Holding BWD button, press F1 button.
2	BWD	Press BWD button.
3	FWD	Press FWD button.
4	INDEX FWD	Holding FWD button, press F2 button.
5	BOTTOM	(Holding FWD button, press F1 button.
6	RIGHT	Press /> F1 button.
7	LEFT	Press /> F1 button.

*5.6-4 PARAMETER VALUE EDIT COMMAND
If parameter value edit command 'aa' is written into this address, the editing parameter value is changed as follows, and then S-220 transmits 'data set' of the changed parameter.
This is analogous to manual operations on S-220 .

command	operation
0	MIN
1	CANCEL
2	MAX

*5.6-5 PARAMETER VALUE ALPHA-DIAL EDIT
If parameter value alpha-daial edit command 'baaaa' is written into this address, the editing parameter value is changed. In address parameter editing such as start point,'baaaa' is used to specify the amount of value to be shifted.
S-220 then transmits 'data set' of the changed parameter.
This procedure duplicates the alpha-dial operation on the panel.

Command 'baaaa' means as follows.

b	polarity
0	+ (inc)
1	− (dec)

aaaa	absolute normal address*	difference of value
0	0	000h
1	1	001h
2	1	001h
3	1	001h
4	1	003h
5	1	006h
6	1	00Ah
7	1	012h
8	1	020h
9	1	038h
10	1	060h
11	1	0B0h
12	1	131h
13	1	203h
14	1	35Dh
15	1	5A8h

*Address parameter means ST1, EN1, LP1, EN2, LP2.

*5.6−6 WAVE PARAMETER COPY COMMAND
Effective only on wave parameter editing.
Writing 'a' (wave parameter copy command) into this address (in split, dual or multi mode) copies fixed parameters in current temporary block to all other blocks being used.
This procedure duplicates panel operation.
The command number means as follows.

a	operation
0	copy only current editing parameter
1	copy all fixed parameters (see owner's manual P.68)

*5.6−7 PARAMETER INITIALIZE COMMAND
If wave parameter initialize command number 'aaaa' is written intothis address, the fixed parameters are initialized.
This is same as manual operations on S−220.
The command number means as follows.

aaaa	operation
0	initialize temporaly wave parameter block−1
1	initialize temporaly wave parameter block−2
2	initialize temporaly wave parameter block−3
3	initialize temporaly wave parameter block−4
4	initialize all temporaly wave parameter blocks
5	initialize master tune
6	initialize performance parameters
7	initialize MIDI parameters except BASIC CHANNEL
8	initialize level parameters

*5.6−8 CURRENT EDITING PARAMETER DATA REQUEST
If request data command (RQ1) is received, the data set command of current editing parameter is transmitted.
This is the same as the operation : pushing 'SAVE' button in edit mode.

*5.6−9 ADDRESS EDIT DISPLY MODE
If address edit disply switch 'a' is to be writteninto this address, the display mode of address parameters (see *5.6−21) is change. If the switch is set at 'Decimal', the data will be displayed in decimal value, and if the switch is 'Hexadecimal', the data will be displayed in hexadecimal value.

*5.6−10 LCD CONTROL COMMAND
It is possible to write any messages into LCD of S−220 by using message buffer (see *5.6−11) and control command.
LCD control command consists of Set data that causes display of data taken from message buffers, and Clear command that fills all message buffers with space code.
Request data command (RQ1) for this address is ignored.

message buffer−1 : LCD upper row
message buffer−2 : LCD lower row

The command number means as following functions.

aa	operation
0	clear message buffer−1
1	clear message buffer−2
2	set message buffer−1 to LCD
3	set message buffer−2 to LCD

*5.6−11 MESSAGE BUFFER
If any data is to be written into this address, the code 'aaaaaaa' (7−bit ASCII) is written into the message buffer.
It is possible to write string data into the address which is not top of the message buffer.

Any address of any size within the specified range can be allocated to this area.
Any message written in this area won't affect LCD as long as LCD control command is not executed.
Displayed message can be scanned or overwritten through MIDI.

5.7 Address of wave data

020000	Wave data	*5.7−1
020000	Wave data of bank−A	
0000	Wave segment 0	
0	0aaa aaaa	
1	0bbb bb00	
	aaaa aaabbbbb Wave data	
	(12 bit 2's complement)	
0100	Wave segment 1	
:		
057F7F		
060000		
:	Wave data of bank−B	
097F7F		
0A0000		
:	Wave data of bank−C	
0D7F7F		
0E0000		
:	Wave data of bank−D	
117F7F		

Notes :
*5.7−1 Wave data
It is also possible to set or request wave data in normal mode.
The transmitter should transfer (set) or request wave data with 1 wave segment. And top address of communicating must be 'xxxx00' (x...7−bit hex).
1 wave segment consists of 64 words of wave data, it is equal to 128 addresses of MIDI map. So all wave data from bank−A to D consist of 2048 wave segments. The transmitter need not wait any moment between a segment and the next segment.

6.TRANSMITTED EXCLUSIVE MESSAGES IN BULK DUMP MODE

WAVE data is determined by sampling structure.
It is transmitted in the following order.

WAVE DATA−WAVE PARAMETER−PERFORMANCE PARAMETER

6.1 One way transfer

6.1.1 Data set DT1 12H

Transmitted when 'ENTER' button is pressed in 'Sample Data Xmt One way ' mode.

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	Roland ID#	
c	0000 nnnn	Device−ID# =MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)	
e	0001 0010	Command−ID# (DT1)	
f	0aaa aaaa	Address MSB	*6−1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Data	*6−2
	:		
j	0eee eeee	Checksum	
k	1111 0111	End of System Exclusive	

6.2 Handshaking communication

6.2.1 Want to send data WSD 40H

Transmitted when 'ENTER' button is pressed in 'Sample Data Xmt Handshake' mode.

	Byte	Description	
a	1111 0000	Exclusivestatus	
b	0100 0001	RolandID#	
c	0000 nnnn	Device−ID# =MIDIbasicchannel where nnnn+1=channel#	
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)	
e	0100 0000	Command−ID# (WSD)	
f	0aaa aaaa	Address MSB	*6−1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Size MSB	*6−3
j	0eee eeee	Size	
k	0fff ffff	Size LSB	
l	0ggg gggg	Checksum	
m	1111 0111	End of System Exclusive	

6.2.2 Request data RQD 41H

Transmitted when 'ENTER' button is pressed in 'Sample Data Rcv Handshake' mode.

	Byte	Description	
a	1111 0000	Exclusivestatus	
b	0100 0001	Roland ID#	
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)	
e	0100 0001	Command-ID# (RQD)	
f	0aaa aaaa	Address MSB	*6-1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Size MSB	*6-3
j	0eee eeee	Size	
k	0fff ffff	Size LSB	
l	0ggg gggg	Checksum	
m	1111 0111	End of System Exclusive	

6.2.3 Data set DAT 42H

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	Roland ID#	
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)	
e	0100 0010	Command-ID# (DAT)	
f	0aaa aaaa	Address MSB	*6-1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Data	*6-2
	:		
j	0eee eeee	Checksum	
k	1111 0111	End of System Exclusive	

6.2.4 Acknowledge ACK 43H

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)
e	0100 0011	Command-ID# (ACK)
f	1111 0111	End of System Exclusive

6.2.5 End of data EOD 45H

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)
e	0100 0101	Command-ID# (EOD)
f	1111 0111	End of System Exclusive

6.2.6 Communication error ERR 4EH

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)
e	0100 1110	Command-ID# (ERR)
f	1111 0111	End of System Exclusive

6.2.7 Rejection RJC 4FH

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)
e	0100 1111	Command-ID# (RJC)
f	1111 0111	End of System Exclusive

Notes :

*6-1 Address is determined by sampling structure.
Address of first Data set command (DT1, DAT), Want to send data (WSD) or Request data (RQD) is as follows.

structure	address (7-bit HEX) WAVE DATA	WAVE PARAMETER	PERFORMANCE PARAMETER
A	020000	010000	010800
B	060000	:	:
C	0A0000	:	:
D	0E0000	:	:
AB	020000	:	:
CD	0A0000	:	:
ABCD	020000	:	:
A B	020000	:	:
C D	0A0000	:	:
AB CD	020000	:	:
A B C D	020000	010000	010800

*6-2 Number of data in one Data set command (DT1) is as follows.

structure	Number of data (Decimal) WAVE DATA	WAVE PARAMETER	PERFORMANCE PARAMETER
A	128	73	28
B	:	:	:
C	:	:	:
D	:	:	:
AB	:	:	:
CD	:	:	:
ABCD	:	73	:
A/B	:	146	:
C/D	:	:	:
AB/CD	:	:	:
A/B/C/D	128	146	28

*6-3 Size (MSB-LSB) is as follows.

structure	Size of data (7-bit Hex) WAVE DATA	WAVE PARAMETER	PERFORMANCE PARAMETER
A	040000	000049	00001C
B	:	:	:
C	:	:	:
D	040000	:	:
AB	080000	:	:
CD	080000	:	:
ABCD	100000	000049	:
A/B	080000	000112	:
C/D	080000	:	:
AB/CD	100000	000112	:
A/B/C/D	100000	000224	00001C

7. RECOGNIZED EXCLUSIVE MESSAGES IN BULK DUMP MODE

Transmitted wave data is determined by sampling structure.
It must be transmitted in the following order.
WAVE DATA-WAVE PARAMETER-PERFORMANCE PARAMETER

*The following exclusive message is recognized only in BULK DUMP MODE. When all sample sata is received completely, sampling structure changes accordingly.

7.1 One way receive

7.1.1 Data set DT1 12H

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	RolandID#	
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)	
e	0001 0010	Command-ID# (DT1)	
f	0aaa aaaa	Address MSB	*7-1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Data	*7-2
	:		
j	0eee eeee	Checksum	
k	1111 0111	End of System Exclusive	

7.2 Handshaking communication

7.2.1 Want to send data WSD 40H

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	Roland ID#	
c	0000 nnnn	Device-ID# =MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model-ID# (S-10, MKS-100, S-220)	
e	0100 0000	Command-ID# (WSD)	
f	0aaa aaaa	Address MSB	*7-1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Size MSB	*7-3
j	0eee eeee	Size	
k	0fff ffff	Size LSB	
l	0ggg gggg	Checksum	
m	1111 0111	End of System Exclusive	

7.2.2 Request data RQD 41H

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	RolandID#	
c	0000 nnnn	Device−ID# =MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)	
e	0100 0001	Command−ID# (RQD)	
f	0aaa aaaa	Address MSB	*7−1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Size MSB	*7−3
j	0eee eeee	Size	
k	0fff ffff	Size LSB	
l	0ggg gggg	Checksum	
m	1111 0111	End of System Exclusive	

7.2.3 Data set DAT 42H

	Byte	Description	
a	1111 0000	Exclusive status	
b	0100 0001	Roland ID#	
c	0000 nnnn	Device−ID# =MIDI basic channel where nnnn+1=channel#	
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)	
e	0100 0010	Command−ID# (DAT)	
f	0aaa aaaa	Address MSB	*7−1
g	0bbb bbbb	Address	
h	0ccc cccc	Address LSB	
i	0ddd dddd	Data	*7−2
	:		
j	0eee eeee	Checksum	
k	1111 0111	End of System Exclusive	

7.2.4 Acknowledge ACK43H

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device−ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)
e	0100 0011	Command−ID# (ACK)
f	1111 0111	End of System Exclusive

7.2.5 End of data EOD 45H

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device−ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)
e	0100 0101	Command−ID# (EOD)
f	1111 0111	End of System Exclusive

7.2.6 Communication error ERR 4EH

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device−ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)
e	0100 1110	Command−ID# (ERR)
f	1111 0111	End of System Exclusive

7.2.7 Rejection RJC 4FH

	Byte	Description
a	1111 0000	Exclusive status
b	0100 0001	Roland ID#
c	0000 nnnn	Device−ID# =MIDI basic channel where nnnn+1=channel#
d	0001 0000	Model−ID# (S−10, MKS−100, S−220)
e	0100 1111	Command−ID# (RJC)
f	1111 0111	End of System Exclusive

Notes :

*7−1 Address of first DATA set command (DT1, DAT), Want to send data (WSD) or Request data (RQD) is as follows.

structure	address (7−bit HEX) WAVE DATA	WAVE PARAMETER	PERFORMANCE PARAMETER
A	020000	010000	010800
B	060000	:	:
C	0A0000	:	:
D	0E0000	:	:
AB	020000	:	:
CD	0A0000	:	:
ABCD	020000	:	:
A／B	020000	:	:
C／D	0A0000	:	:
AB／CD	020000	:	:
A／B／C／D	020000	010000	010800

*7−2 Number or data in data set is as follows.

structure	Number of data (Decimal) WAVE DATA	WAVE PARAMETER	PERFORMANCE PARAMETER
A	2−244	73	28
B	:	:	:
C	:	:	:
D	:	:	:
AB	:	:	:
CD	:	:	:
ABCD	:	73	:
A／B	:	146	:
C／D	:	:	:
AB／CD	:	:	:
A／B／C／D	2−244	146	28

Number of data of WAVE DATA must be even.

*7−3 size (NSB−LSB) is as follows.

structure	Size of data (7−bit Hex) WAVE DATA	WAVE PARAMETER	PERFORMANCE PARAMETER
A	040000	000049	00001C
B	:	:	:
C	:	:	:
D	040000	:	:
AB	080000	:	:
CD	080000	:	:
ABCD	100000	000049	:
A／B	080000	000112	:
C／D	080000	:	:
AB／C	D10000	0000112	:
A／B／C／D	100000	0000224	00001C

8. Address mapping of SAMPLE DATA

Address			
010000	Wave parameter of block−1		
010000	0aaa aaaa	TONE NAME	
9	0000 aaaa	SAMPLING STRUCTURE	
A	0000 aaaa	DESTINATION BANK	
B	0000 abcd		
		a BENDER	0 : OFF 1 : ON
		b KEY FOLLOW	0 : OFF 1 : ON
		c VIBRATO	0 : OFF 1 : ON
		d SAMPLING RATE	0 : 30kHz 1 : 15kHz
C	0000 aabb		
		aa LOOP MODE	00 : 1SHOT−1 01 : LOOP−1 10 : LOOP−2 11 : 1SHOT−2
		bb SCAN MODE	00 : FORWARD 01 : ALTERNATE 10 : BACKWARD
D	0000 aaaa		
E	0000 0bbb		
		bbb aaaa REC KEY NUMBER	
F	0000 aaaa		
10	0000 0bbb		
		bbb aaaa LOOP TUNE−2	
11	0000 aaaa		
12	0000 bbbb		
13	0000 cccc		
14	0000 dddd		
		bbbbaaaa ddddcccc ST1 (bit15−0)	
15	0000 aaaa		
16	0000 bbbb		
17	0000 cccc		
18	0000 dddd		
		bbbbaaaa ddddcccc LP1 (bit15−0)	
19	0000 aaaa		
1A	0000 bbbb		
1B	0000 cccc		
1C	0000 dddd		
		bbbbaaaa ddddcccc EN1 (bit15−0)	

1D 0000 aaaa
1E 0000 bbbb
1F 0000 cccc
20 0000 dddd
bbbbaaaa ddddcccc LP2 (bit15-0)

21 0000 aaaa
22 0000 bbbb
23 0000 cccc
24 0000 dddd
bbbbaaaa ddddcccc EN1 (bit15-0)

25 0000 aabb
aa LP1 (bit16,17)
bb EN1 (bit16,17)

26 0000 aabc
aa ST1 (bit16,17)
b Editing hardware 0 : MKS-100, S-10
1 : S-220

c ST2 0 : ST1
1 : 0

27 0000 aaaa aaaa ADRS V-SW (See*5.2-5)

28 0000 aabb
aa LP2 (bit16,17)
bb EN2 (bit16,17)

29 0000 aaaa
2A 0000 bbbb
bbbbaaaa BANK TUNE

2B 0000 aaaa
2C 0000 bbbb
bbbbaaaa LOOP TUNE-1

2D 0000 aaaa
2E 0000 bbbb
bbbbaaaa ENV V-SENS

2F 0000 aaaa
30 0000 bbbb
bbbbaaaa ENVELOPE RATE1

31 0000 aaaa
32 0000 bbbb
bbbbaaaa ENVELOPE RATE2

33 0000 aaaa
34 0000 bbbb
bbbbaaaa ENVELOPE RATE3

35 0000 aaaa
36 0000 bbbb
bbbbaaaa ENVELOPE RATE4

37 0000 aaaa
38 0000 bbbb
bbbbaaaa ENVELOPE LEVEL1

39 0000 aaaa
3A 0000 bbbb
bbbbaaaa ENVELOPE LEVEL2

3B 0000 aaaa
3C 0000 bbbb
bbbbaaaa ENVELOPE LEVEL3

3D 0000 aaaa
3E 0000 bbbb
bbbbaaaa KEY SPLIT POINT-1

3F 0000 aaaa
40 0000 bbbb
bbbbaaaa KEY SPLIT POINT-2

41 0000 aaaa
42 0000 bbbb
bbbbaaaa KEY SPLIT POINT-3

43 0000 aaaa
44 0000 bbbb
bbbbaaaa DYN SENS

45 0000 aaaa
46 0000 bbbb
bbbbaaaa ABEND RATE

47 0000 aaaa
48 0000 bbbb
bbbbaaaa ABEND DEPTH

010049
:
010111
Wave parameter of block-2

010112
:
01015A
Wave parameter of block-3

01015B
:
010224
Wave parameter of block-4

010800
Performance parameter

0 0000 aaaa
1 0000 bbbb
bbbbaaaa EXTERNAL TRIGGER KEY NUMBER-1

2 0000 aaaa
3 0000 bbbb
bbbbaaaa EXTERNAL TRIGGER KEY NUMBER-2

4 0000 aaaa
5 0000 bbbb
bbbbaaaa EXTERNAL TRIGGER KEY NUMBER-3

6 0000 aaaa
7 0000 bbbb
bbbaaaa EXTERNAL TRIGGER KEY NUMBER-4

8 0000 aaaa
9 0000 bbbb
bbbbaaaa EXTERNAL TRIGGER TRIGGER TIME

A 0000 aaaa
B 0000 bbbb
bbbbaaaa ARPEGGIO RATE

C 0000 aa00 ARPEGGIO SYNC 00 : INTERNAL CLOCK
01 : EXTERNAL CLOCK

D 0000 aabb
aa ARPEGGIO MODE 00 : UP
01 : DOWN
10 : UP/DOWN
11 : RANDOM

bb ARPEGGIO RANGE 00 : 1 OCTAVE
01 : 2 OCTAVE
10 : 3 OCTAVE

E 0000 aaaa
F 0000 bbbb
bbbbaaaa ARPEGGIO REPEAT TIME

10 0000 aaaa
11 0000 bbbb
bbbbaaaa ARPEGGIO DECAY RATIO

12 0000 aaaa
13 0000 bbbb
bbbbaaaa VIBRATO RATE

14 0000 aaaa
15 0000 bbbb
bbbbaaaa MANUAL VIBRATO DEPTH

16 0000 aaaa
17 0000 bbbb
bbbbaaaa DELAY VIBRATO DEPTH

18 0000 aaaa
19 0000 bbbb
bbbbaaaa DELAY VIBRATO TIME

1A 0000 aaaa
1B 0000 bbbb
bbbbaaaa DELAY TIME OF DELAY MODE

1C 0000 aaaa
1D 0000 bbbb
bbbbaaaa DELAY LEVEL OF DELAY MODE

1E 0000 aaaa
1F 0000 bbbb
bbbbaaaa DELAY KEY OFF SET OF DELAY MODE

20 0000 aaaa
21 0000 bbbb
bbbbaaaa DETUNE RANGE OF DETUNE MODE

22 0000 aaaa
23 0000 bbbb
bbbbaaaa THRESHOLD LEVEL OF VELOCITY MIX MODE

24 0000 aaaa
25 0000 bbbb
bbbbaaaa THRESHOLD LEVEL OF VELOCITY SWITCH MODE

26 0000 abcd
a=AUTO BEND DESTINATION OF DETUNE MODE 0 : BOTH
1 : HALF

b=BEND DESTINATION OF DETUNE MODE 0 : BOTH
1 : HALF

c=BENDER MODE 0 : CONTINUOUS
1 : CHROMATIC

d=RANGE V-SNS 0 : ON
1 : OFF

27 0000 0000 dummy
:
3F

40 0000 0aaa MULTI MODE NUMBER 0-4
41 0000 0000 dummy

42 0000 000a MULTI MODE ON/OFF
43 0000 bcd0
a=VELOCITY MIX
b=DUAL TONE
c=DELAY MODE
d=DETUNE MODE

44 0000 aaaa
45 0000 bbbb
bbbbaaaa VIBRATO PRESS SENS

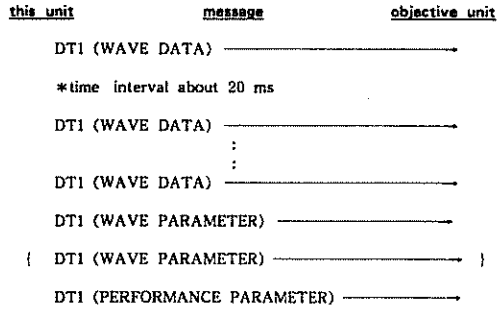
46 0000 aaaa

47	0000 bbbb	
		bbbbaaaa DETUNE PRESS SENS
48	0000 aaaa	
49	0000 bbbb	
		bbbbaaaa MIX LEVEL
4A	0000 aaaa	
4B	0000 bbbb	
		bbbbaaaa DELAY THRESHOLD
4C	0000 aaaa	
4D	0000 bbbb	
		bbbbaaaa VIBRATO PRESS SENS
4E	0000 0000	dummy
:		
179		
17A	0000 aaaa	DATA TYPE 1-3 KEY WORD
:		
17F	0000 ffff	
020000		Wave data of bank-A
0	0aaa aaaa	
1	0bbb bb00	
		aaaa aaabbbbb Wave data (12 bit 2's complement)
:		
057F7F		
060000		
:		Wave data of bank-B
097F7F		
0A0000		
:		Wave data of bank-C
0D7F7F		
0E0000		
:		Wave data of bank-D
117F7F		

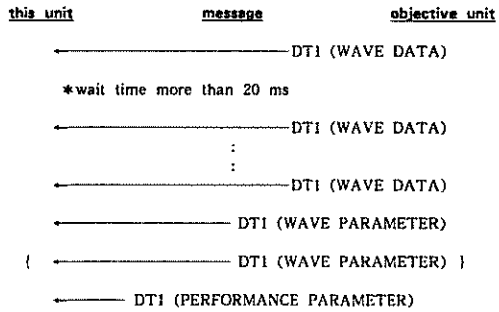
The address and the wave parameter value in BULK DUMP MODE have no relation with the address in normal mode and the displayed value on LCD.

9. Sequence of communication

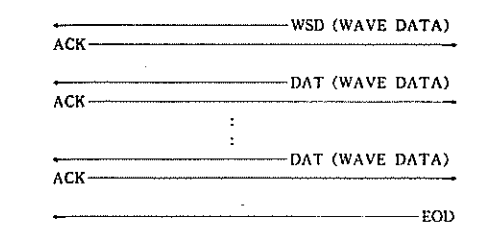
9.1 When one way data set of WAVE DATA is tranmitted

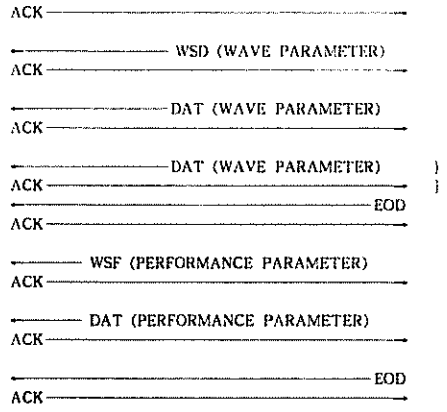


9.2 When one way data set of WAVE DATA is received

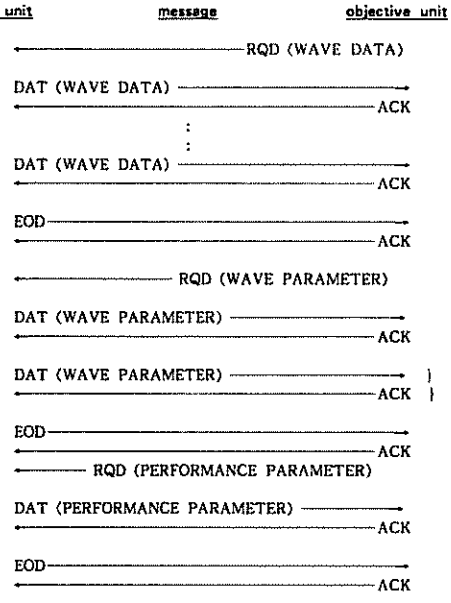


9.3 When want to send data is received





9.4 When request data is received



Notes :

*When S-220 receives ERR, it sends same data set again.

*When a tranmitting S-220 receives any illegal command (ex. a note on), it ignores and waits for legal command.

*When a receiving S-220 receives any illegal command (ex. a note on), it ignores and waits for legal command.

*S-220 sends RJC and stops BULK DUMP sequence after pressing sampling structure button.

*S-220 stops BULK DUMP sequence just after receiving RJC.

16-VOICE DIGITAL SAMPLING MODULE

MODEL S-220

MIDI Implementation Chart

Date : Apr. 30. 1987

Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic	Default	1-16	1-16	Memorized
Channel	Changed	1-16	1-16	
	Default	×	Mode 3, 4	Memorized
Mode	Messages	×	POLY, MONO	Omni on, off ingnored
	Altered	*********		
Note Number		×	24-103	Depends on Key Range
	True Voice	*********	24-103	
Velocity	Note ON	×	○ (v=1-127)	
	Note OFF	×	×	
After Touch	Key's	×	×	
	Ch's	×	*1	
Pitch Bender		×	*1 (0-12 semi)	9 bit resolution
Control Change	1	×	*1	Modulation
	7	×	*1	Main Volume
	8	×	*1	Balance
	64	×	*1	Hold1
	100, 101	*1, *2 (0, 1)	*1, *2 (0, 1)	RPC LSB, MSB
	6, 38	*1, *2	*1, *2	Data Entry MSB, LSB
Prog Change		*1 (0-122)	*1 (0-127)	
	True #	*********	0-122	
System Exclusive		*1	*1	
System Common	Song Pos	×	×	
	Song sel	×	×	
	True	×	×	
System Real Time	Clock	×	×	
	Commands	×	×	
Aux Message	Local ON/OFF	×	×	
	All Notes OFF	×	○ (123-127)	
	Active Sense	×	○	
	Reset	×	×	
Notes		*1 Can be set to ○ or × manually, and memorized. *2 RPC=Registered parameter control number. RPC #0 : Pitch bend sensitivity RPC #1 : Master fine tuning Parameter values are given by Data Entry.		

Mode 1 : OMNI ON, POLY　　Mode 2 : OMNI ON, MONO　　○ : Yes

Mode 3 : OMNI OFF, POLY　　Mode 4 : OMNI OFF, MONO　　× : No

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