

YAMAHA

MSX

MUSIC COMPUTER ORDINATEUR MUSICAL

CX5MII

OWNER'S MANUAL MODE D'EMPLOI

NIPPON GAKKI CO., LTD.

PRINTED IN JAPAN

FCC INFORMATION (for United States Customers Only)

While the following statement is provided to comply with FCC regulations in the United States, the corrective measures listed are applicable worldwide.

“WARNING – This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.”

The CX5MII and its accessories have been tested and certified to be in compliance with the limits established for this class of equipment pursuant to FCC Rules Part 15, Subpart J. These limits were established to provide a reasonable measure of protection against such interference; however, this does not guarantee that interference will not occur. If the CX5MII equipment is suspected of causing interference with other electronic equipment, verification can be made by turning off the CX5MII.

If the interference continues, then the CX5MII is not the source of the interference. If the CX5MII does appear to be the source of the interference, you should try to correct the situation by one or more of the following measures.

- Relocate either the CX5MII and its accessories or the electronic equipment that is being affected by the interference.
- Utilize power outlets for the CX5MII and the equipment being affected that are on different branch circuits (utilizing different circuit breakers or fuses), or install AC line filters.
- In the case of radio interference, relocate the antenna. If the antenna cable is 300 ohm ribbon lead, have it changed to 75 ohm coaxial cable (utilizing the necessary transformer/adaptors at either end, as required to match the cable).

If these corrective measures do not produce satisfactory results, please contact a Yamaha Retailer authorized to sell this product for suggestions and/or corrective measures. If you cannot locate a Yamaha Retailer authorized to sell this product in your general area, please contact the Yamaha International Corporation. MMC Service Division, 6600 Orangethorpe Avenue, Buena Park, CA 90620, USA.

If for any reason you should need additional information relating to radio and TV interference, you may find a booklet prepared by the Federal Communications Commission helpful: “How to Identify and Resolve Radio/TV Interference Problems.” This booklet, Stock #004-000-00345-4, is available from the U.S. Government Printing Office, Washington D.C. 20402.



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INTRODUCTION

FEATURES OF THE CX5MII MUSIC COMPUTER

- The CX5MII is an extremely versatile personal computer which conforms to MSX standard specifications. The unique feature of the CX5MII is its built-in FM Sound Synthesizer unit SFGII. (Please refer to the FM SOUND SYNTHESIZER UNIT, p.23.)
- 64K bytes RAM is standard. This means that the MSX Disk Operating System (MSX-DOS, not included) will run on the CX5MII. MSX-DOS opens up a whole new world of disk-based software for MSX machines. It provides extensive commands that allow you to manipulate information stored on disks. (Floppy Disk Drive FD-05 and MSX-DOS System Disk required.)
- Any software cartridge or peripheral device specified as being MSX compatible may be used with the CX5MII.
- Adjustable rear feet allow you to set the most comfortable angle for using the keyboard.
- A printer interface is standard.
- Two cartridge slots allow you greater flexibility.
For instance, you can insert a Floppy Disk interface (such as the Yamaha FD-051) in one, and a disk-compatible software cartridge in the other.
- A handy reset button lets you initialize the CX5MII without turning off the power.
- Separate audio and video outputs make for easy connection.

CX5MII ACCORDING TO AREA

There are different models of the CX5MII Music Computer, according to area. This manual refers to the computer as only the CX5MII, referring to all models. Where reference to a particular model is called for, the specific model number pertaining to the area in question will be used. The different model numbers, and the areas to which they pertain, are as follows:

The model of your CX5MII is specified on the back panel label. Consult the part of this manual for your particular model.

CX5MIIU – U.S.A., Taiwan, Central and South America

CX5MIIC – Canada

CX5MIIG – West Germany, Some European countries

CX5MIIS – Scandinavian countries

CX5MIIE – United Kingdom

CX5MIIF – France

CX5MIIB – Italy, Spain, etc.

CX5MIIA – Australia and New Zealand

NOTE:

The model differentiation is based on differences in television standards and power sources by countries or areas.

PRECAUTIONS

Please observe the following precautions regarding the CX5MII:

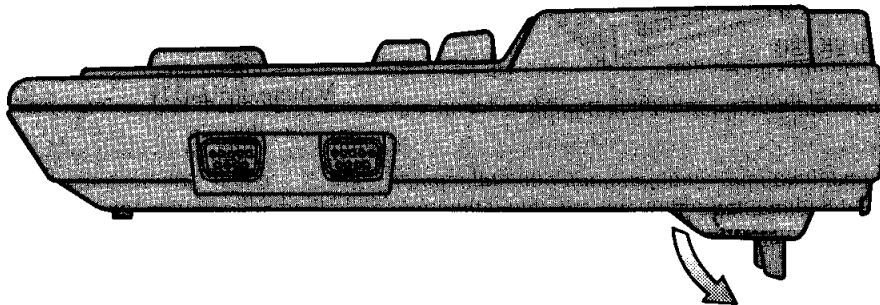
- a) Turn off power and disconnect the power cord if you feel something is wrong with the CX5MII.
- b) Handle the CX5MII with care. Avoid dropping or knocking it.
- c) Don't attempt to disassemble the CX5MII. Internal components may be damaged by doing so, and there are no user-serviceable parts inside.
- d) Keep the CX5MII dry.
- e) Handle all connection cords carefully.
- f) Disconnect the power during an electrical storm.
- g) Keep the CX5MII in a cool, dry, clean environment. Dust, heat, or excess humidity can cause corrosion or deterioration of connectors, leading to premature malfunction.
- h) Clean the CX5MII only with a moist or dry cloth. Do not use chemical cleaners or solvents.
- i) Keep the air vents unobstructed for proper cooling.
- j) Make sure power switch is turned off when making connections.

NOTE:

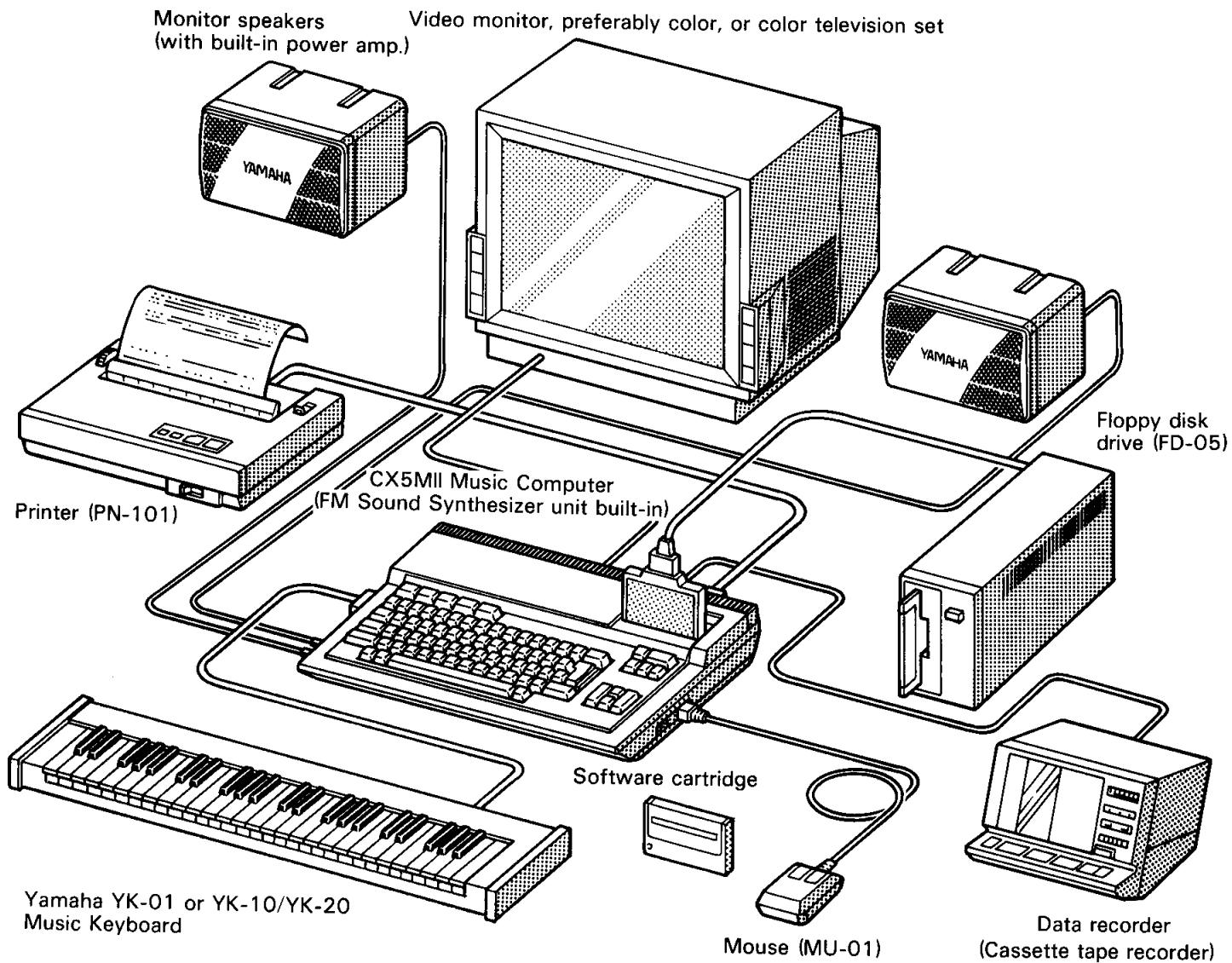
With computers, unlike some typewriters, the upper case letter O is not the same as the number Zero (0). Also, the lower case letter el (l) is not the same as the number 1. Be sure to type the correct characters.

ADJUSTABLE KEYBOARD ANGLE

Many people find a slightly tilted keyboard more comfortable for typing. To tilt the keyboard, unfold the two supports.



BASIC SYSTEM CONFIGURATION



Connecting Cable

Connect peripherals using the following cables.

- RF cable (included except for CX5MIIF)
- RGB cable (included only with CX5MIIF)
- Antenna switch box (included except for CX5MIIF)
- Audio and video connector cable
- Floppy disk interface cable
- Cassette connection cable (included)
- Printer cable
- MIDI cable

Peripherals

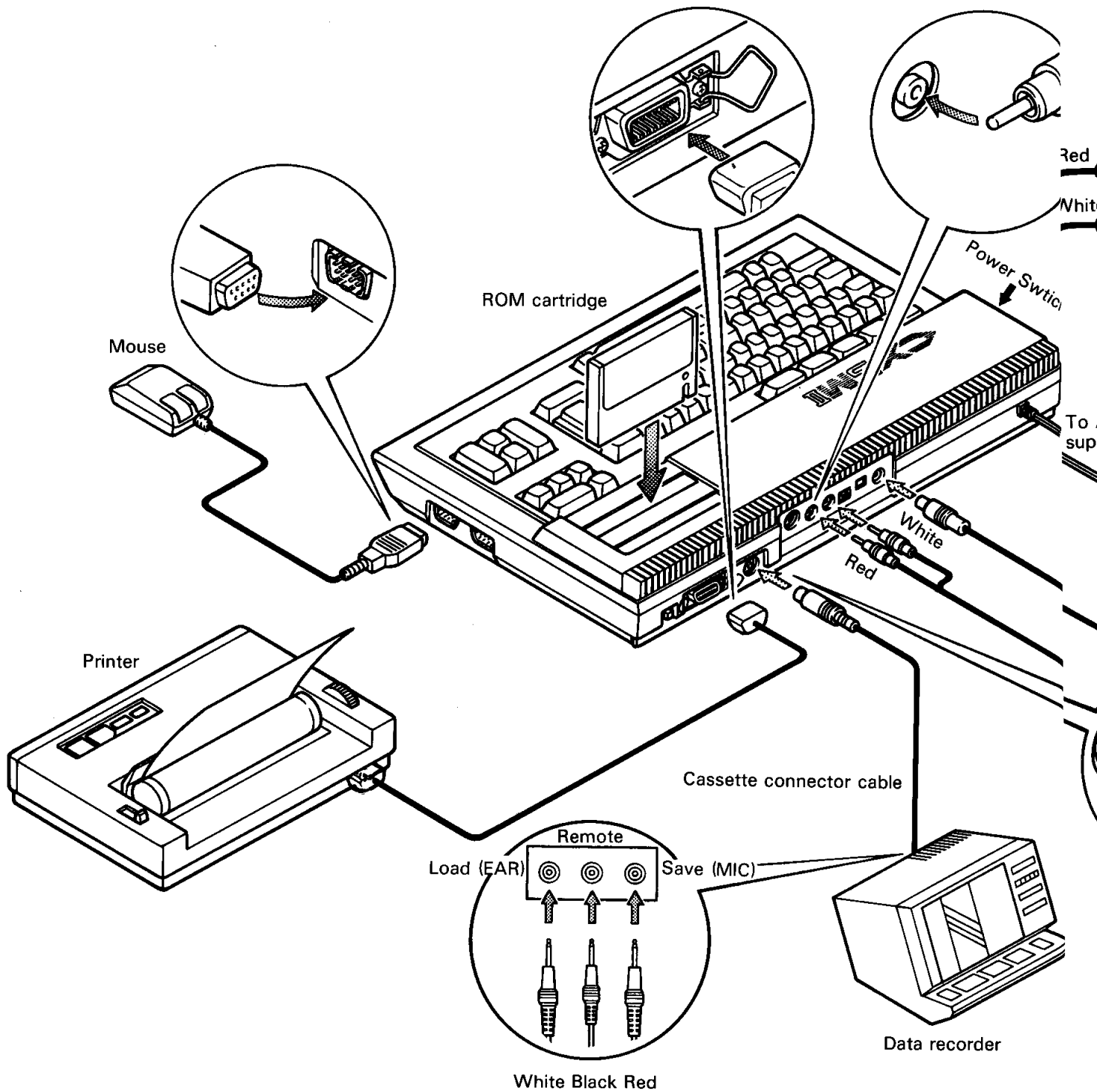
The following peripherals may be connected.

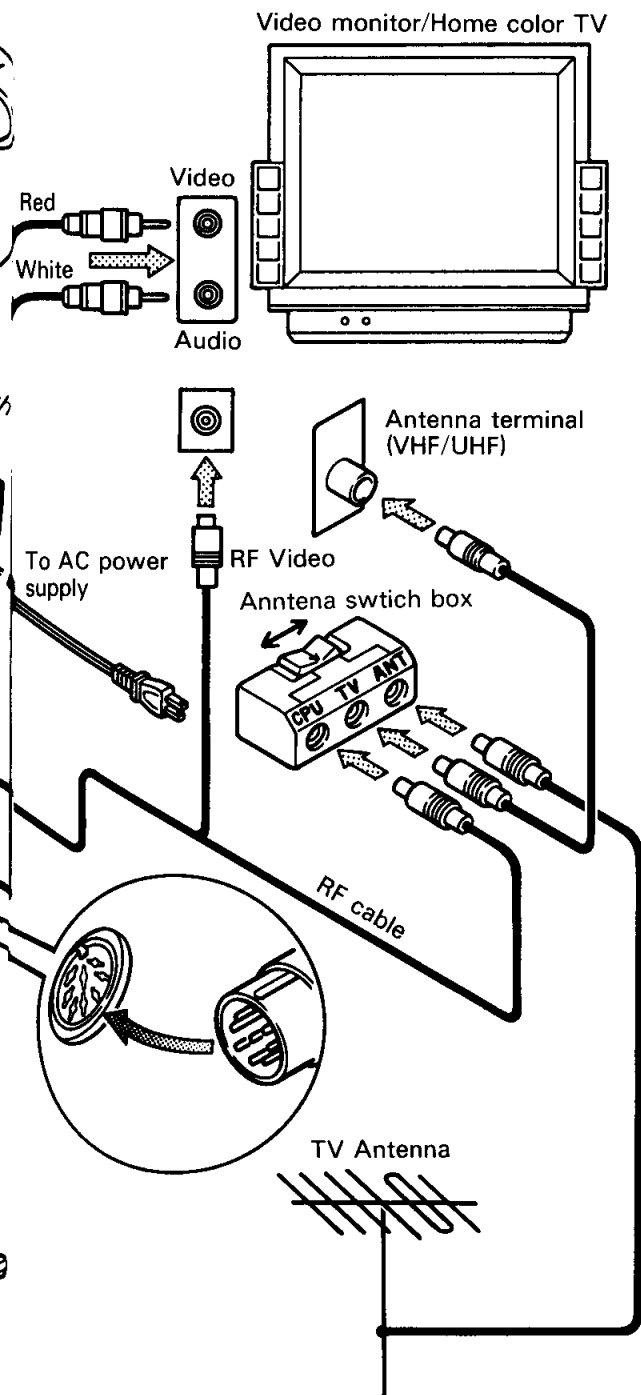
- TV (Video Monitor or Home Color TV)
- Data Recorder (Cassette Tape Recorder)
- Floppy Disk Drive (FD-05)
- Music keyboard (YK-01 or YK-10/YK-20)
- Digital keyboard with MIDI connector (DX series, etc.)
- Joysticks
- Mouse (MU-01)
- Printer (PN-101)

NOTE:

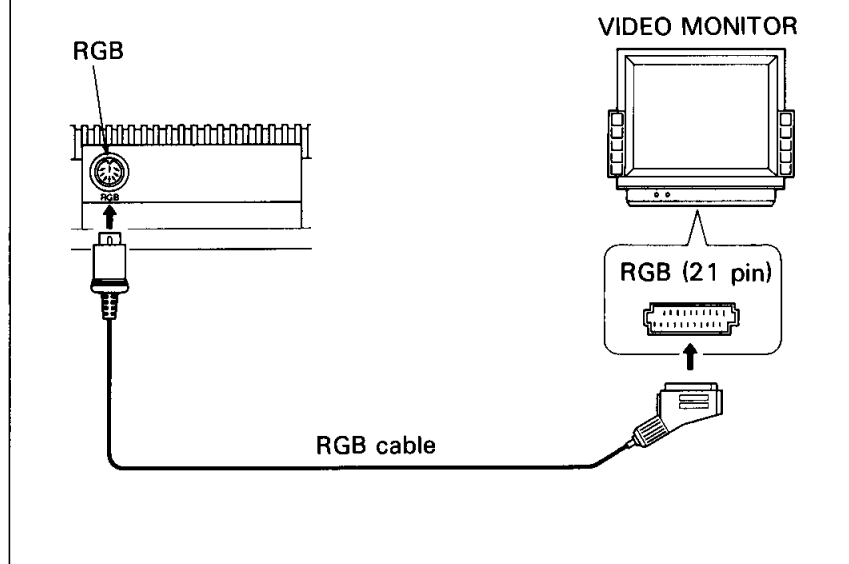
See pp.6 ~ 7 for diagram of connections.

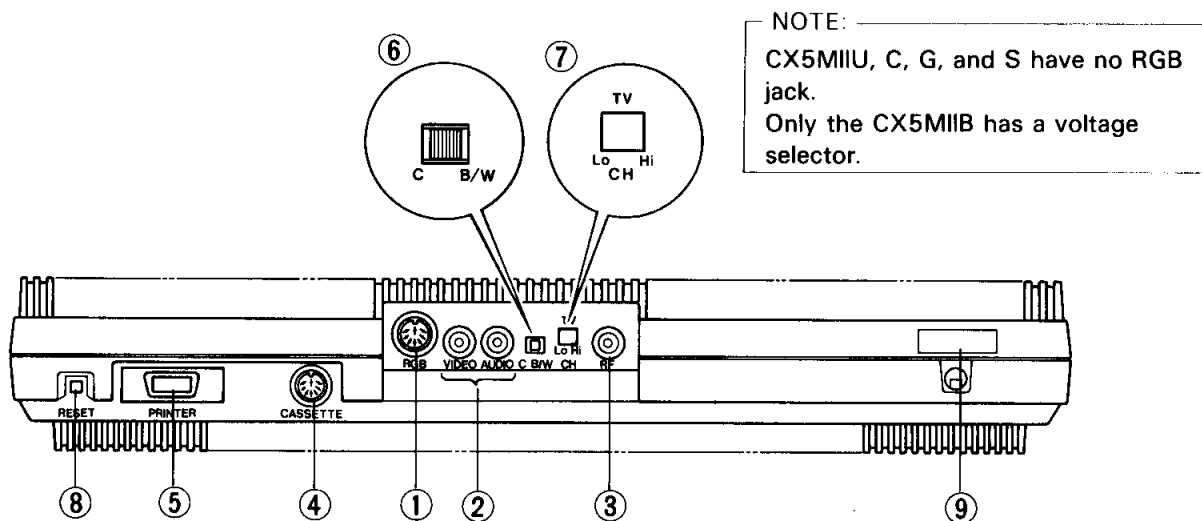
CONNECTING/REAR PANEL LAYOUT





CX5MIIF SPEC (for France) **RGB cable connection**





Display Connections

① RGB

This is a video output to connect the MSX to a display screen having an RGB input. RGB will produce the highest quality image, since each primary color (Red, Green and Blue) are sent separately.

② Audio/Video

Audio Sounds that the MSX produces (beep sounds and TSG output) are sent out from this jack. Connect it to the audio input of your television or to an amp/speaker.

Video This is a video output to connect the MSX to a standard computer display screen.

③ RF

If your television has an RF input, you may connect the MSX RF output directly to the television to the RF input.

When using a television with only antenna terminals (no RF input), you can connect the MSX RF output to the antenna terminals via the AS-01 switch box. Set the AS-01 switch according to whether you want to watch TV or use the computer.

Switches

⑥ C B/W

This switch selects Color or Black and White video output. Set it according to the type of video screen you are using. (This will not affect the RGB or RF outputs.)

⑦ TV Lo/Hi

This switch changes channels of the RF output. When you are using a television (connected to the RF output) as the video screen, select the channel that is not being use. (This will affect only the RF output.)

RF OUTPUT CHANNEL

Model	Area		Lo	Hi
CX5MIU, C A	U. S., Canada Australia	VHF	3	4
CX5MIH, S E, F, B	Others	UHF	36	

⑧ Reset Switch

Pressing and releasing this switch will reset the MSX to the same initial condition as when the power is turned on. All RAM memory will be erased, and if there is a program cartridge in a slot, it will start again from the beginning.

Other Connections

④ Cassette

Connecting a cassette data recorder to this jack lets you store programs and data on tape.

⑤ Printer

Connecting a printer to this jack will let you print out files or make a hard copy of the screen.

⑨ CX5MIIB Voltage Selection

This model is for use where the AC power supply is 220-240V. There is a gummed label above the AC power cable that indicates this. Under this label, there is a switch, and you may set the CX5MIIB for 110-120V use by resetting this switch. Peel off the label and set the switch for the power in your area.

OPERATION

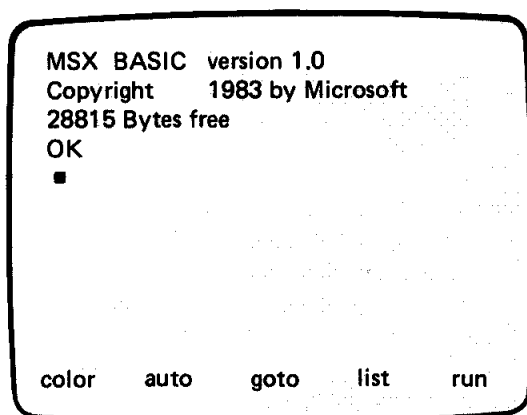
OPERATING THE CX5MII

Check Connections

1. Check Connections

Make sure all connections are properly made, according to the connection diagrams in this manual. If any connections are improperly made, make sure you turn power off to all components before remedying the situation.

2. Turn on the power switch of the CX5MII. When nothing is plugged into the ROM cartridge slots, the computer will enter the MSX Basic mode, and the screen display will be as follows:



3. When the screen display does not correspond to that shown here, turn off the main power switch, wait for at least 30 seconds, and turn on the power switch once again. If the screen display is still incorrect, check the following:

Check

- (1) Check to see that the power cord and switches of the video monitor (or TV) are correctly set, and is the monitor (TV) connected to the power mains?
- (2) Are the brightness and contrast of the screen set correctly?
- (3) Does the fine tuning control knob of the TV require adjustment?

THE CX5MII KEYBOARD

Using the CX5MII Keyboard

The CX5MII keyboard conforms to ASCII standards. The keyboard will function in the normal mode (as an alphanumeric keyboard) and in a special graphics mode as well (special graphics characters are accessed by specially designated keys on the keyboard). A repeat function is built in, so that if a key is pressed and held for longer than one second, the same character will be displayed repeatedly until the key is released. Many of the keys will serve different functions according to the particular CX5MII application program in use (MSX Basic, Yamaha FM Music Composer software cartridge, etc.). These multiple functions are explained in the corresponding operating manuals for the individual software packages.

Accent Marks

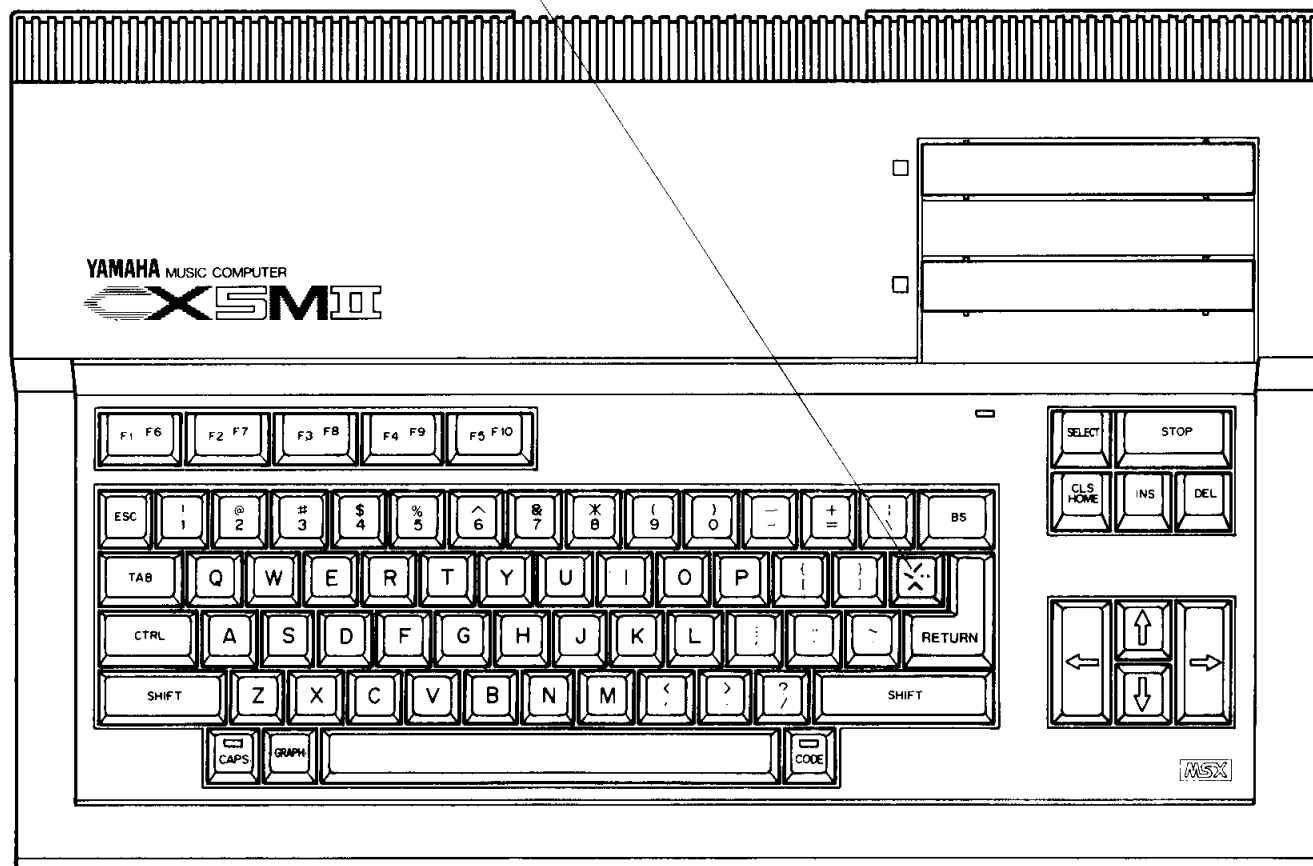
Pressing the accent mark key, or the shift and code keys with the dead key, will cause accent marks to be added to the letters a, e, i, o, and u when those letter keys are pressed. This will not operate with other keys.

Condition	Function
Normal	Accent grave (`)
Shift	Accent egr (´)
Graph	Accent grave (`)
Graph + shift	Accent egr (´)
Code	Accent circumflex (^)
Code + shift	Umlaut (¨)

NOTE:

For a list of characters produced using the **SHIFT** and **CODE** keys, See pp.50 ~ 51.

Accent Mark



NOTE:

The CX5MIIF has a different keyboard layout. (See the same page number of the French language section.)

Function keys

Function keys allow you to execute certain designated functions by simply pressing the designated key, rather than entering the full command from the keyboard. When using the CX5MII as an entry level computer for programming, these keys access the various commands shown in the diagram. These Basic commands are also displayed on the bottom of the monitor screen. When using Yamaha music software cartridges (FM Music Composer, Voicing Program, etc.) these keys will execute particular commands within the framework of the particular software program in use.

ESC key (Escape)

Performs the Escape function while programming in MSX Basic. Does not perform a direct function outside of MSX Basic.

TAB key

This key will move the cursor 8 spaces to the right each time it is pressed.

CTRL key (Control)

In combination with other keys, can be used to execute special functions. (See Control Code Table)

SHIFT key

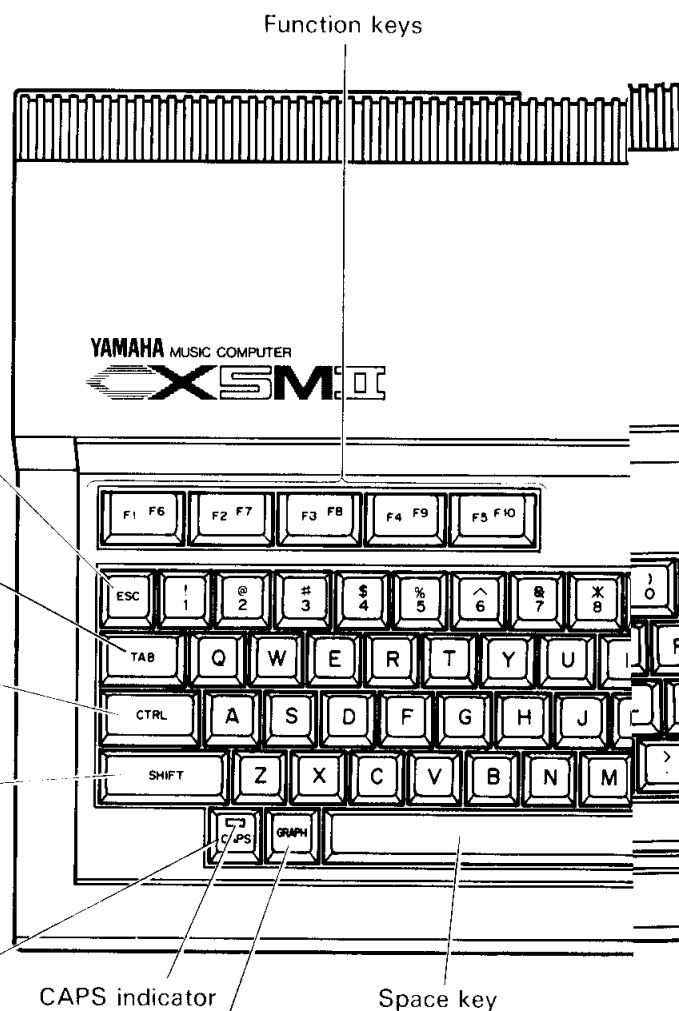
This key functions as a standard typewriter shift key. For any key which has two symbols marked on it, shift function will access the upper case characters. The **SHIFT** key has no effect when the **GRAPH** key is being held down.

CAPS key

This key functions similarly to a "shift lock" key on a standard typewriter, except that punctuation marks and numeric keys are not shifted. An indicator lights when the key is pressed, for visual confirmation of this mode. Pressing the key again cancels the mode, and the indicator goes out.

GRAPH key

The keyboard layout diagrams included in this manual show which keys on the keyboard are assigned special graphics characters as well as alphanumeric characters. These characters are accessed (displayed on the screen) when the corresponding key is pressed simultaneously with the **GRAPH** key.



BS key (Back space)

When the **[BS]** key is pressed, the character to the immediate left of the cursor is erased, and the cursor will move to the left by an amount corresponding to the number of characters erased.

Power indicator

SELECT key

This key has no direct function when the CX5MII is used strictly as a Basic computer. It does serve important functions when the CX5MII is used with a Yamaha software cartridge or when the "call music" command is invoked. The function of the **[SELECT]** key within each particular software package will be explained in the operating manual of that software package.

STOP key

Pressing the **[STOP]** key together with the **[CTRL]** key will stop a program while it is running.

CLS HOME key

Pressing the **[CLS HOME]** key while holding down the **[SHIFT]** key will clear the screen display, and return the cursor to the upper left hand corner of the screen (home position).

INS key (Insert)

When editing text displayed on the screen, the **[INS]** key allows you to insert characters at any point on the screen. When the **[INS]** key is pressed, the cursor will shrink to half its normal size, allowing characters, numbers and symbols to be inserted between the cursor and the character displayed to its left. Pressing the **[RETURN]** key, space key, or **[INS]** key again cancels the insert mode and restores the cursor to its original size.

DEL key (Delete)

When the **[DEL]** key is pressed, the character on the display screen where the cursor is positioned is erased, and the entire line to the right of that character moves left by an amount corresponding to the number of characters erased.

Cursor keys

These keys will move the cursor one character space or one line in the direction indicated by the arrow on the key. Pressing a cursor key repeatedly will move the cursor in the direction indicated by an amount equivalent to the number of times the key is pressed. The cursor keys have other special functions when the CX5MII is used with a Yamaha software cartridge.

RETURN key

Pressing this key "enters" a command statement and returns the cursor to the beginning of a new line.

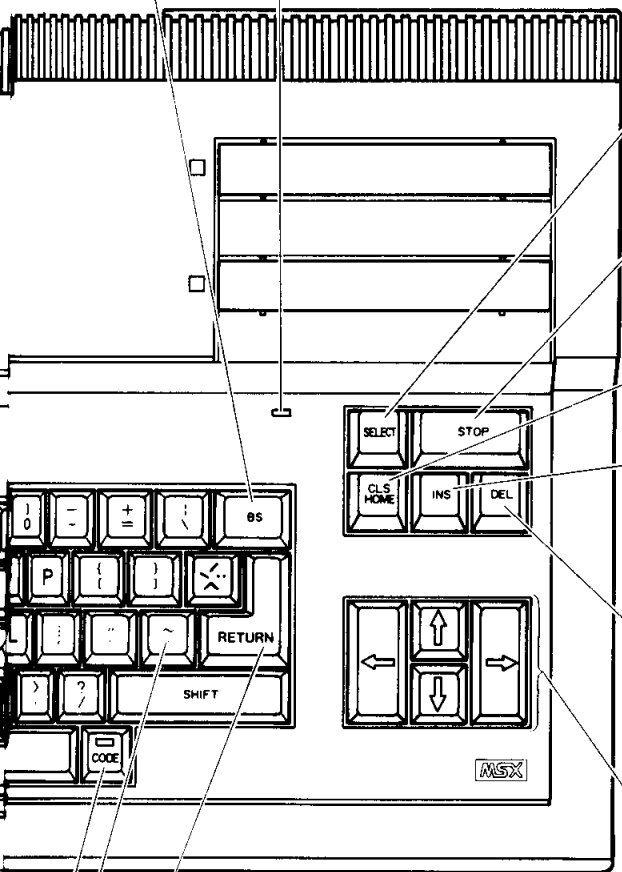
NOTE:

Only the CX5MIIIE has this key.



CODE key

Pressing the **[CODE]** key together with the appropriate key produces a second set of characters such as Greek, German, French, etc.



USING A ROM CARTRIDGE, EXTERNAL ROM PACK

Using a ROM Cartridge

Insert the cartridge as illustrated.

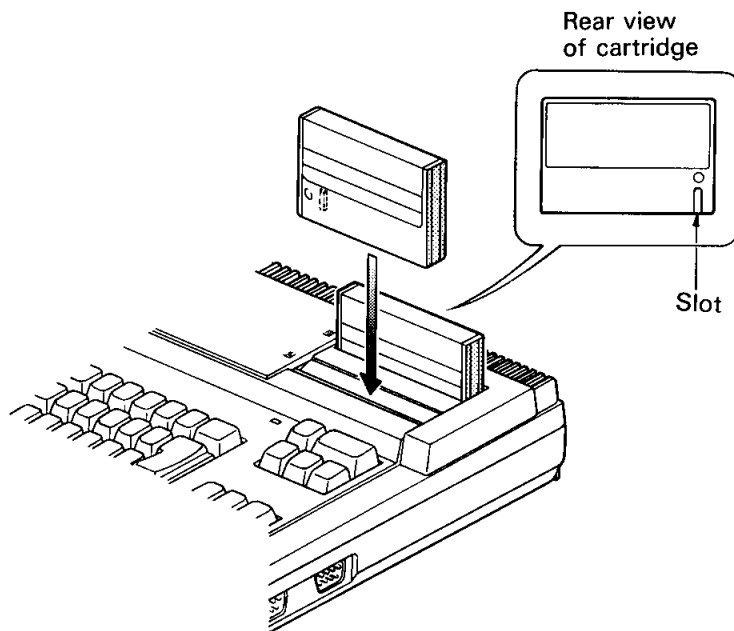
CAUTION:

Be sure that the power switch of the main unit is turned off before inserting a ROM cartridge. Remember that turning off the power will erase all programs contained in the computer memory, so if you have been writing a program you may wish to save the data on a cassette tape first. (see p.16)

1. You will find the ROM cartridge slot on the upper panel of the computer. Following the accompanying illustration, insert the appropriate cartridge into the slot, with the cartridge aligned as shown.
2. Normally, the cartridge slot is covered by a protective flap. Simply push the cartridge through the flap and press it firmly in place. Then turn on the CX5MII power switch.
3. For directions concerning the screen display and the operation procedures, consult the instruction manual supplied with the ROM cartridge.

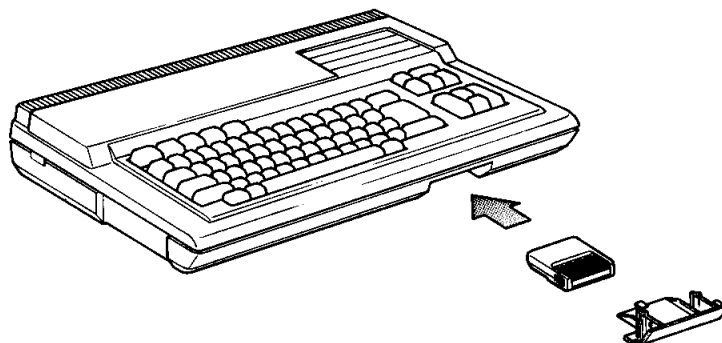
NOTE:

When shutting off the computer/sound system, turn off power to the CX5MII first. NEVER remove a ROM cartridge from the upper slots while the power is on. Make sure power is off before inserting or removing ROM cartridges; you might "get away" with this once or more, but it is possible that you might damage the CX5MII or the cartridge.



Using the External ROM pack

Before inserting a External ROM Pack, (front side), make sure that the power is turned off. Check that the correct side is up, and gently and firmly push it into the slot. Do not remove the ROM Pack while the power is still on. Doing so could damage both is and the MSX computer. For operation of the included FM Voicing Program ROM Pack, see the separately included FM Voicing Programll (YRM-502) manual.



SAMPLE PROGRAMS

The following are simple Basic programs that demonstrate the structure and flow of a Basic computer program. In order to become familiar with the CX5MII and the keyboard, try entering the programs and running them. When in the MSX Basic mode, the screen should appear as follows:

Type in the program just as it appears here, then type the command "run", followed by **RETURN**. If the program has been correctly entered, it should run properly. If not, type LIST and **RETURN** to list the program on the screen. Find your error and correct it, using the cursor keys, **INS** key, **DEL** key, etc. to edit on the screen. Then try to run it again.

NOTE:

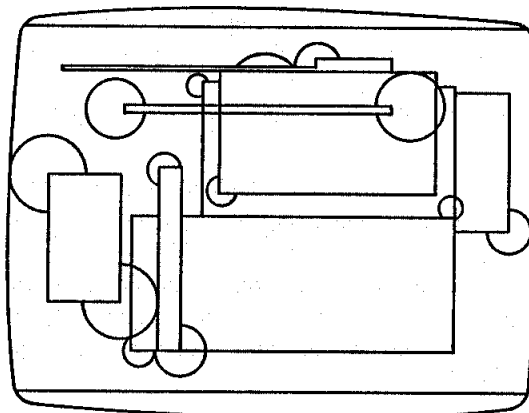
When entering the sample program, be sure to press the **RETURN** key at the end of each line. Otherwise, the computer will not recognize that you have entered a program line.

Also, when correcting the program displayed on the screen, the computer will not recognize that you have made a correction unless you press **RETURN** while the cursor is somewhere on that line.

Programs 1 and 2 have an endless loop in the last line. When you want to stop the program, press **STOP** while holding down **CTRL**.

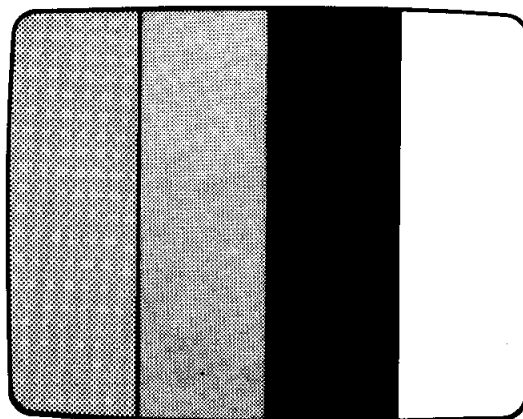
```
10 SCREEN 2
20 CLS
30 X = INT ((RND (1)) * 250)
40 Y = INT ((RND (1)) * 180)
50 C = INT ((RND (1)) * 16)
60 R = INT ((RND (1)) * 20)
70 CIRCLE (X, Y), R, C
80 X = INT ((RND (1)) * 250)
90 Y = INT ((RND (1)) * 180)
100 C = INT ((RND (1)) * 16)
110 LINE -(X, Y), C, BF
120 CIRCLE (X, Y), R, C
130 GOTO 30
```

This program will draw circles and boxes of many different sizes onto the screen in 15 colors.



```
10 CLS : SCREEN 2, 3, 0
40 LINE (0, 0) - (63, 192), 2, BF
50 LINE (64, 0) - (127, 192), 4, BF
60 LINE (128, 0) - (191, 192), 8, BF
70 LINE (192, 0) - (255, 192), 15, BF
80 GOTO 80
```

If you want to save this program for later use or study, please refer to the section on cassette save/load operations for instructions on how to save it on cassette tape. If you enter another program, it will write over the first one, so the first program must be cleared from memory. This is done by entering the command "new" (do not type the quotation marks) and pressing **RETURN**. The new program will display four color bars (green, dark blue, red, white) onto the screen. Changing the color numbers (2, 4, 8, 15) of lines 20 through 50 will enable color bars of the designated color to be drawn.



This program will play a short musical phrase.

```
10 BEEP
20 A$ = "T180ggagL2go5L4cdeedL1cL4eeefL2dL4edL1c"
30 B$ = "o2T180L1cgafcgL2fL4edL2c"
40 PLAY A$, B$
```

CASSETTE SAVE/LOAD OPERATIONS

1. Connections to the CX5MII

Please refer to the system connections diagram earlier in this manual, and make the proper connections. For cassette recorders that are not equipped with a remote terminal, only connect the microphone and the earphone (or AUX speaker) jacks.

2. Saving Programs to Cassette Tape

Turning off the power of the CX5MII will erase everything in memory; that is, the sample program you have just typed in. To keep this program for later use, it should be saved on cassette tape in the following manner:

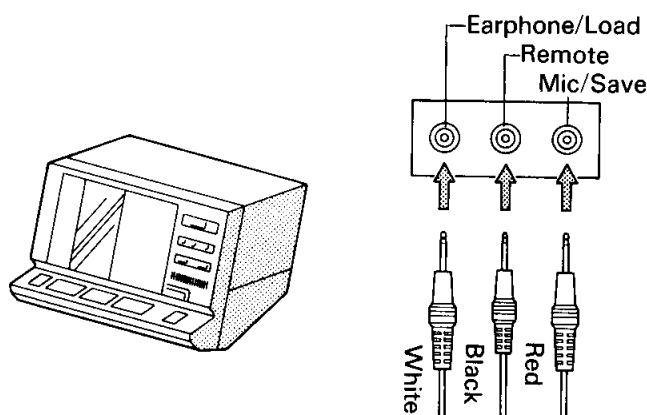
- (1) Place an appropriate tape in the cassette tape recorder.
- (2) press the **RECORD** and **PLAY** keys of the cassette tape recorder simultaneously, activating the recording mode.
If the cassette tape recorder is not equipped with a remote terminal, set the cassette tape recorder to the recording mode just before pressing the **RETURN** key in the next step.
- (3) Type **CSAVE**, followed by a quotation mark (") and the program name. A second quotation mark at the end of the program name is not necessary. Then press the **RETURN** key.

The program name should not exceed 6 characters in length. Upper case and lower case letters and numbers may be used for a program name. We recommend that you make note of the program name and its location on the tape (counter position) for future reference. **Upper and lower case characters are significant.**

- (4) The CX5MII will make a clicking sound as a relay operates, and the cassette tape recorder will begin to operate (when using the remote terminal).
- (5) After the program has been saved, **OK** will be displayed on the screen and the cassette tape recorder will stop.

(If the cassette tape recorder is not equipped with a remote terminal, the tape will not stop. Manually press the **STOP** button of the cassette tape recorder following the **OK** display on the screen.)

To prevent accidental loss of valuable programs, be sure to make at least one back-up of each program on a separate tape. Do this directly from the computer, as above, not by copying to tape. Tape copies are subject to degradation which may render them unusable.



Operation	Cassette recorder	Data recorder
Save	Play + Rec	Save
Load	Play	Load

csave "GAME 2"

csave "GAME 2"
OK
■

- (6) After the program has been saved, rewind the tape, press the **PLAY** button, and then type in the **CLOAD?** command for verification. (Do not leave the **"?"** otherwise data stored in the computer may be erased immediately.) If the data has been correctly saved on tape, the screen will show:

FOUND: (file-name)

OK

and the tape will stop. If the data has not been correctly saved, the screen will show:

Verify error

OK

If this happens try to save again.

3. Changing the Cassette Baud Rate

Baud rate means the speed at which data is transmitted or received. If you don't specify the baud rate for cassette save, the CX5MII will choose 1200 bps.

The baud rate of the cassette can be changed by the appropriate command. During program saving, set the following:

csave "(program name)" (for 1200 bps)

csave "(program name)",0 (for 1200 bps)

csave "(program name)",1 (for 2400 bps)

A higher baud rate requires better frequency response of the tape recorder and may be unusable due to data errors. Lower baud rates require more time to save and load programs, but may be more reliable with many recorders.

The cassette load baud rate is automatically selected.

4. Loading Programs from Cassette Tape

- (1) Set the volume control to slightly higher than the center position, and if the unit is equipped with a tone control, also set this control to slightly past the center position for more treble (high frequency) response.
- (2) Place a cassette tape containing the program to be run into the cassette tape recorder.
- (3) Press the **PLAY** button of the cassette tape recorder.

If the cassette tape recorder is not equipped with a remote terminal, press the **PLAY** button after first carrying out the following two steps.

```
MSX BASIC version 1.0
Copyright 1983 by Microsoft
28815 Bytes free
OK
■
cload "GAME 1"
```

- (4) Press the F7 function key (F2 function key while holding down the **SHIFT** key); cload'' will be displayed on the screen, an abbreviation for cassette load.
- (5) Following cload'', enter the name of the program to be run (normally printed on the case label of the cassette tape) from the keyboard. For example, if the name of the program to be run is GAME 1, the line should read: cload "GAME 1" (the second quotation mark is optional). Then press the **RETURN** key.
- (6) The CX5MII will make a clicking sound as its relay activates the REMOTE control cable, and the cassette tape recorder will begin to operate (assuming the remote terminal is used).

NOTE:

The program name should be entered exactly as it is listed on the case label of the cassette tape. The program will not be loaded properly unless spaces are entered as spaces, lower case characters entered as such, etc.

- (7) If, during the process of searching for the target program, a program with another name is found (for example "GAME 1" was to be loaded, but a program called "SOUND 1" was found by the computer before finding "GAME 1") skip: SOUND 1 followed by nontarget program has been found. In the meantime, the computer will continue to search for "GAME 1".

5. Loading when the Name of the Program is Unknown

- (1) If the **RETURN** key is pressed without specifying a program, the next program found on the tape will be loaded.
- (2) If you wish to know the names of all programs recorded on the tape, simply enter a simple program name that is not recorded on the tape (for example "UNKNOWN"). Since that program is not on the tape, the skip function will display the name of each program in turn.

```
cload "GAME 1"
Found: GAME 1
OK
■
```

```
cload "GAME 1"
skip: SOUND 1
```

```
cload "UNKNOWN"
skip: GAME 1
skip: GAME 2
skip: GAME 3
skip: SOUND 1
```

DISK SAVE/LOAD OPERATIONS

Starting DISK BASIC

1. Firmly insert the disk drive interface cartridge into a cartridge slot. (See the disk drive instruction manual.)
2. Turn the disk drive power on. Then turn the video monitor and computer power on. The following message will appear on the screen;
Enter date (mm,dd,yy):
3. Press **RETURN**. The screen will change to the display at right, and Disk BASIC is now active.

NOTE:

When you turn the power on, it will ask you for the date, but press **RETURN** without entering anything. Even if you enter the date, it will not be remembered in MSX-Disk BASIC.

IMPORTANT NOTE:

When using Disk BASIC, there are two things that you must always remember. On the disk drive, there is a small red LED marked "IN USE." This indicates that the disk drive is moving.

- When the LED is on, do not remove or insert disks.
- When the LED is on, do not turn off the disk drive power.

If you do either of these, there is a possibility that data on the disk may be lost forever. Please be careful.

```
MSX BASIC version 1.0
Copyright 1983 by Microsoft
23430 Bytes free
Disk BASIC version 1.0
OK
```

Formatting a disk

Before you can use a new disk in MSX-Disk BASIC it must be formatted. This sets up the disk so that you can read and write data to and from it. Formatting a disk will erase all the data that was on it before.

In MSX-Disk BASIC, you can do this to a disk by the **CALL FORMAT <_FORMAT>** command. When you type

CALL FORMAT [Return]

you will be asked which drive's disk to format.

Drive name? <A, B>

When you have only one drive, press [A]. Then it will ask you for the type of disk. Press 1 or 2. (See disk package) Now it will say;

Strike a key when ready

Insert a new disk in the drive and press any key on the MSX keyboard. When formatting is finished, the screen will show.

Format complete
OK

```
CALL FORMAT
Drive name? (A, B) A
```

- ```
1 - Double sided
2 - Single sided
```

```
? 2
Strike a key when ready
Format complete
OK
```

### NOTE:

If the display is showing "Strike a key when ready" and you decide to back out, you can cancel the **FORMAT** command by pressing **CTRL** + **STOP**. (But if you have mistakenly specified drive B when you really only have one drive, this will not work. Remove the disk and press a key, which will cause a "Disk error".)

### Saving a program from the CX5MII to disk

Let's try saving a program onto disk. Type in one of the sample programs shown on page 15. Now we will store this on a disk using the SAVE command, as follows;

SAVE "[device name]" file name [ .type]

(Items in [ ] are optional.)

The device name is A: (disk drive A). Let's name the program PROG1. We will explain about the type later, but for now just enter .BAS (indicating a BASIC program.) Type in the following and press **RETURN**. (In this case you omit A:.)

SAVE "A: PROG1.BAS"

The disk drive will whirl for a short time and the screen will show "OK." Your program has been saved onto the disk.

You can check to see that the program has actually been saved by using the FILES command. (See p.40)

### Loading a program from disk into the CX5MII

Erase the program in the CX5MII memory by using the NEW command. Now, let's load the program from the disk into the memory using the LOAD command.

LOAD "[device name]" file name [ .type]

(Items in [ ] are optional)

Type in the following and press **RETURN**. (In this case, you may omit A:.)

LOAD "A: PROG1.BAS"

When loading is finished, the display will show "OK". Using the LIST command, check to see that your program is back in the CX5MII memory.

### Checking the contents of a disk (FILES)

Using the FILES command will display the names of all the files on a disk. Simply type

FILES

and press **RETURN**. If the disk contains three files (PROG1, PROG2 and PROG3), the display will look like this.

```
10 -----
20 -----
30 -----
SAVE "A:PROG1.BAS"
OK
```

```
LOAD "A:PROG1.BAS"
OK
LIST
10 -----
20 -----
30 -----
```

```
FILES
PROG1 .BAS PROG2 .BAS
PROG3 .BAS
OK
```

### A note about file names and types

The file name may be up to 8 characters long, and may include numerals, but the first character must be a letter of the alphabet.

The file type is up to 3 letters long, and is separated from the file name by a (.) period. When there are many files on a disk, this makes it easy to tell what kind of file it is. For instance, you know that PROG1.BAS is a BASIC program. A data file might have the type .DAT. You may omit the file type, but it is often very helpful to include it. If you enter a file name of more than 8 letters, the 9th, 10th and 11th letters become the file type and a period is automatically inserted.

It does not matter whether you enter the file name in lower-case or capital letters. File names and types are automatically converted into capital letters.

### Erasing a file from a disk

By using the KILL command, you may erase any file you no longer need.

KILL "[device name]" file name [. type]"

(Items in [ ] may be omitted.)

When you type in this command and press **RETURN**, the file you specified will be erased. For example, if there were 3 programs (PROG1, PROG2, PROG3) on the disk and you "KILLED" PROG1, the contents of the disk before and after would be as shown on the screen at right.

```
KILL "A:PROG1.BAS"
OK
```

```
FILES
PROG2 .BAS PROG3 .BAS
OK
```





# **FM SOUND SYNTHESIZER UNIT**

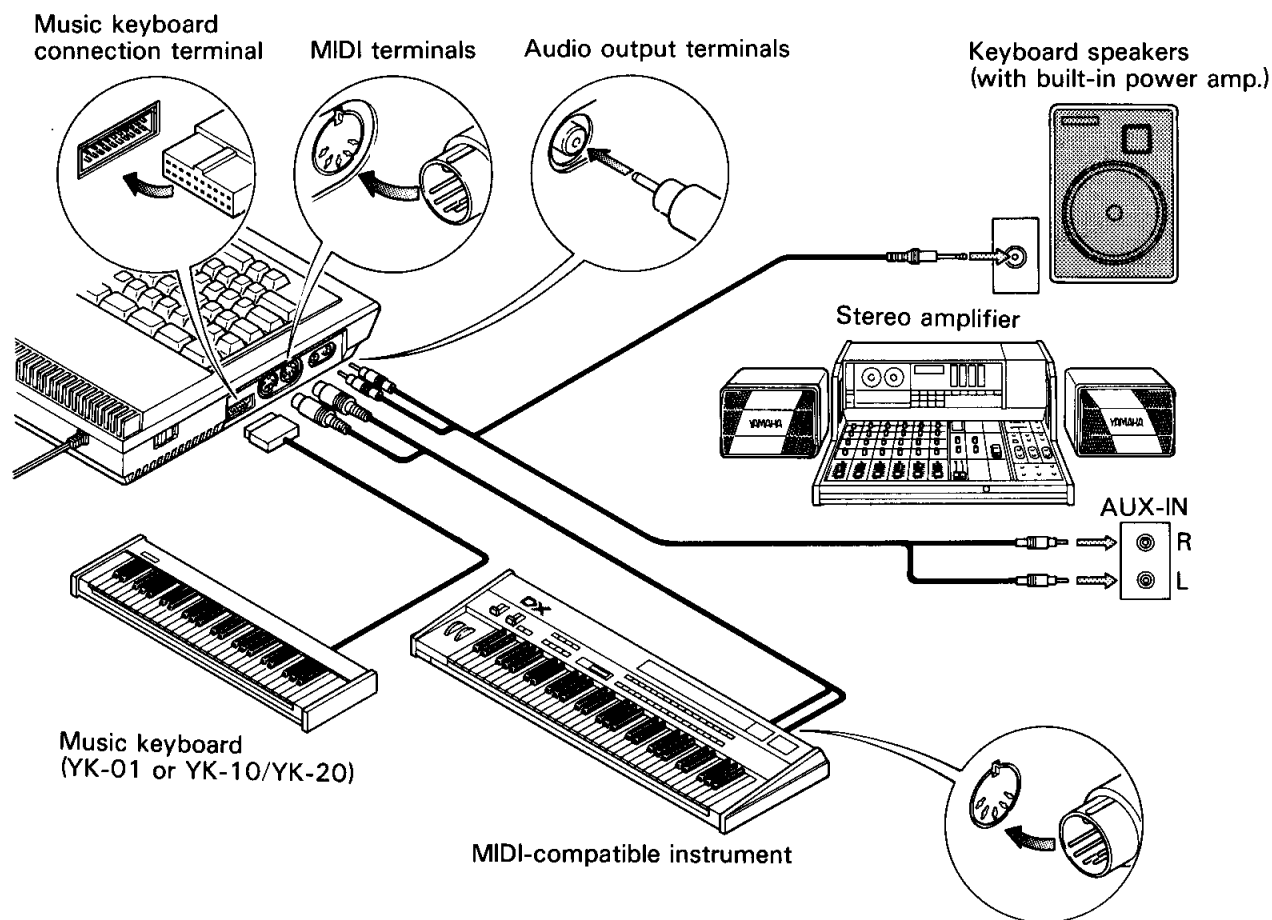
# INTRODUCING THE SFGII



The SFGII is an FM tone generator unit that plugs into the slide slot of an MSX computer. When used with a Yamaha Music Keyboard (YK-01, YK-10, YK-20; not included) or MIDI keyboard, it transforms your MSX into a digital synthesizer with wide possibilities. Here are some things you can do with the SFGII.

- Play a solo voice with rhythm and Auto Bass Chord accompaniment.
- Play up to 8 notes polyphonically with 1 or 2 voices (4 voices if you use a MIDI keyboard).
- Real time recording and playback of up to 1800 notes. (You can play chords, too.)
- Connect to an external MIDI sequencer or rhythm machine and use as a 4-voice, 2-note MIDI tone generator. You can set MIDI reception channels independently for each voice.
- By using the YRM-101 Music Composer software (sold separately), you can play up to 8 different voices simultaneously.
- Yamaha music software YRM-101 ~ 104 will run with no problems on the new SFGII. However, the playback tempo for the Music Composer (YRM-101) and Music Macro (YRM-104) may be a bit slower than if used with the SFG-01 (built-in FM Tone Generator of CX5M.)

# SYSTEM SETUP AND CONNECTIONS



## NOTE:

1. The CX5MII has built-in preamplifier circuitry, allowing you to connect the output of the FM Sound Synthesizer unit II directly to a video monitor "audio signal" input terminal. The signal is then monitored via the built-in TV or video monitor speaker. The audio signal is output from the CX5MII via the rear-panel jack. Please note that the FM Sound Synthesizer output has very high dynamic range and the sound will most likely be distorted when monitored through a built-in TV speaker. Output volume should be lowered when monitoring the signal in this way.
2. For better sound reproduction quality the FM Sound Synthesizer unit II can be connected directly to a stereo or keyboard amplifier. RCA pin-type audio output terminals are found on the left hand side of the CX5MII. This allows you to monitor output through a high-performance sound system in stereo. (With preset voices, the same signal is output to both the left and right channels. With the optional FM Voicing Program, output for new voices can be directed to each channel.)
3. About the required keyboard.  
Either a Music Keyboard (YK-01, YK-10, YK-20) or a MIDI keyboard (such as the DX7) is necessary. They will function almost identically; the main differences being that you cannot play Auto Bass Chords using a MIDI keyboard, and that the Music Keyboard is not velocity-sensitive. If you use a velocity sensitive MIDI keyboard, the SFGII will respond to your touch; if, of course, the SFG voices have been programmed with velocity sensitivity. (See the FM Voicing Program manual.)

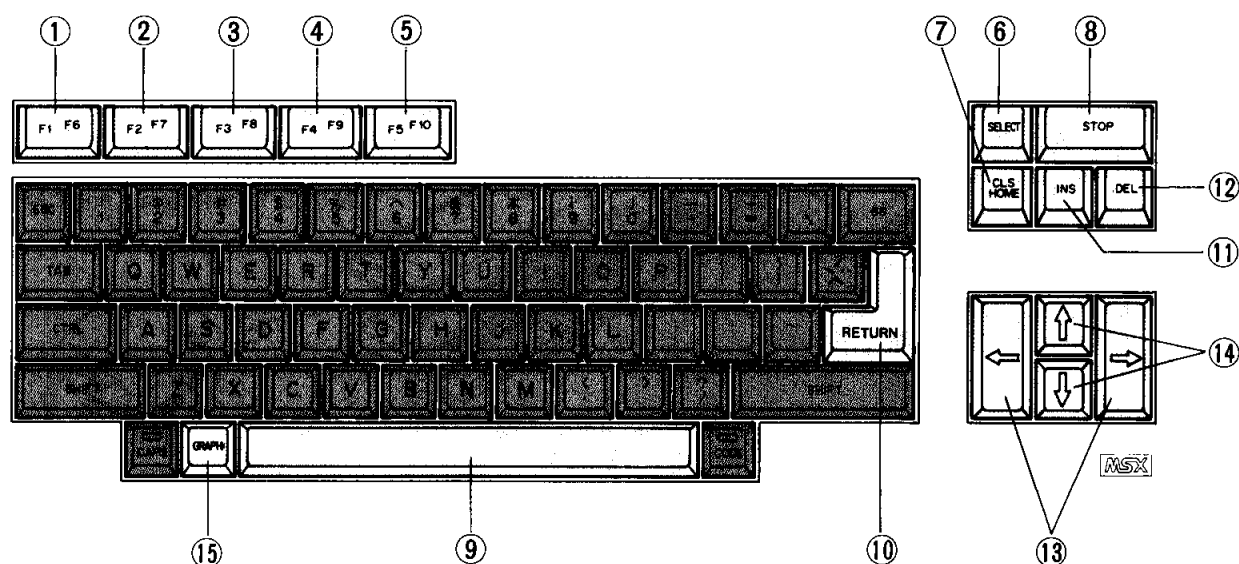
# BASIC OPERATION

To select sounds and functions on most electronic instruments, you operate switches and knobs on the panel. But on the SFGII, you select functions and change settings on the screen.

Press the keys to move the on the display to the function you want to change. Then, use the keys to change the setting. If you press the keys while pressing SHIFT, the setting will change in steps of 10.

## CX5MII Keyboard and Display Screen

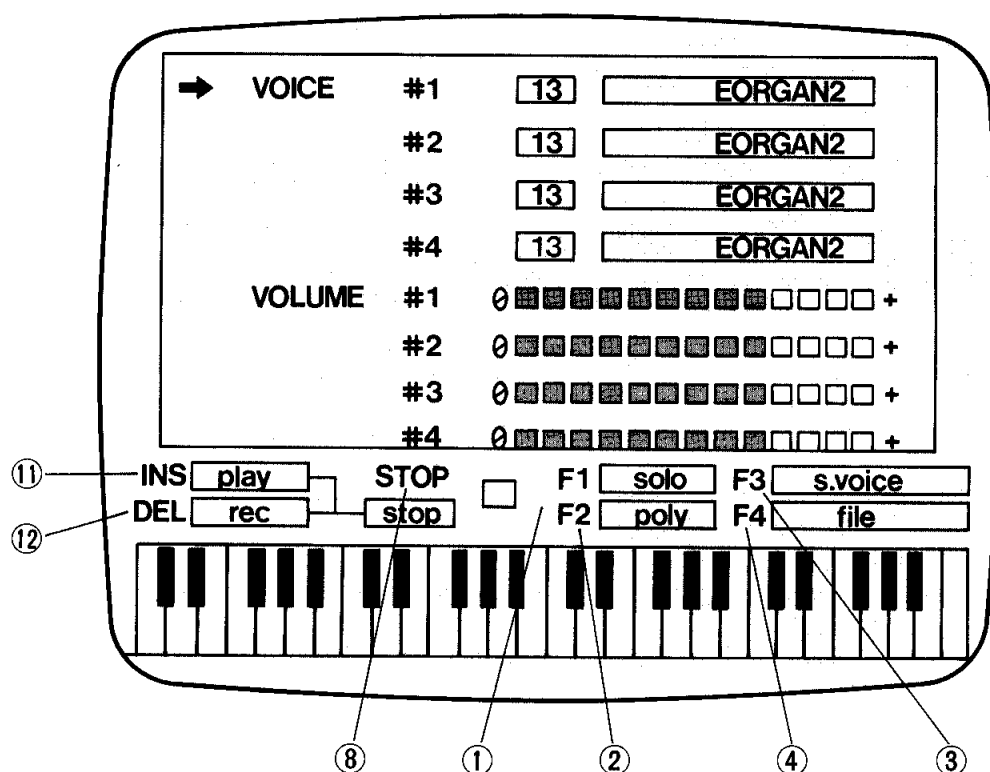
Here are the special Keys used to operate the SFGII.



- ① F1 Select SOLO mode
- ② F2 Select POLY mode
- ③ F3 Select VOICE mode
- ④ F4 Select FILE mode
- ⑤ F5 Start/Stop Auto Rhythm (Solo mode)

- ⑥ SELECT Change the Keyboard split point (POLY mode)  
Switch between instruments 1 & 2 (VOICE mode)
- SELECTx2 Switch between system voices and user voices
- ⑦ HOME Select printer type and hard copy density
- HOMEx2 Make a hard copy of the current screen
- ⑧ STOP Stop printing  
Stop playback, stop record

The mode that you are in will be highlighted in yellow.



⑨ Space key Select voice (VOICE mode)

⑩ RETURN

⑪ INS Start playback/record

⑫ DEL Record

⑬

Select function  
(move the → mark)

⑭

Change the setting

Move the → mark  
(VOICE mode)

SHIFT +

Change in steps of 10

⑮ GRAPH

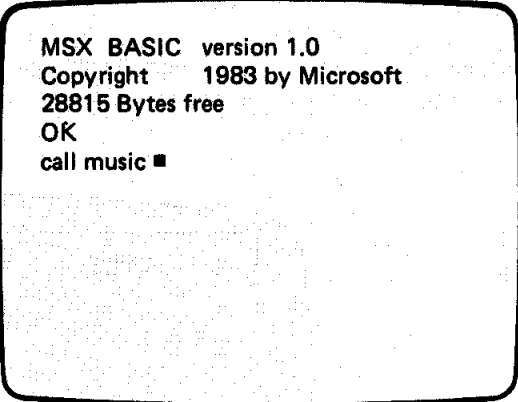
Switch Music Keyboard  
display on/off

# THE "CALL MUSIC" COMMAND

When you turn the CX5MII power on, it automatically enters MSX BASIC mode, and the following message is displayed.

**NOTE:**

In ordinary MSX BASIC mode, the SFGII and keyboard are inactive. To activate them, type CALL MUSIC or \_MUSIC and press **RETURN**. In a second or two, the screen display shown at right will appear.



```
MSX BASIC version 1.0
Copyright 1983 by Microsoft
28815 Bytes free
OK
call music ■
```

## ABOUT THE SFGII MODES

There are 2 ways to play the SFGII.

1. SOLO mode: in which you can play monophonically with Auto Bass Chord and rhythm accompaniment.
2. POLY mode: in which you can play up to 8-note chords. (No rhythm or Auto Bass Chords)  
Also, there are 2 other useful modes.
3. VOICE: in which you can see at a glance which voices (tone colors or sounds) are available.
4. FILE: in which you can save or load keyboard performances, and load voices that you have created using the separate FM Voicing Program.  
The function keys 1-4 correspond to these 4 modes. (These choices are always displayed above the keyboard at the bottom of the screen.)

# POLY MODE

When you first activate the SFGII, it will be in POLY mode, and the display at right will appear. Only part of the parameters will be shown, but you can "scroll" the screen up and down by using the  $\uparrow$   $\downarrow$  cursor keys. Use the  $\uparrow$   $\downarrow$  keys to select the parameter you want to change (move the flashing arrow mark up and down), and press the  $\leftarrow$   $\rightarrow$  keys to change it. (Pressing the  $\leftarrow$   $\rightarrow$  keys while pressing **SHIFT** will make the value jump up or down in steps of 10; useful for quick changes.)

## VOICE (Selecting Voice for Each Instrument)

### VOICE

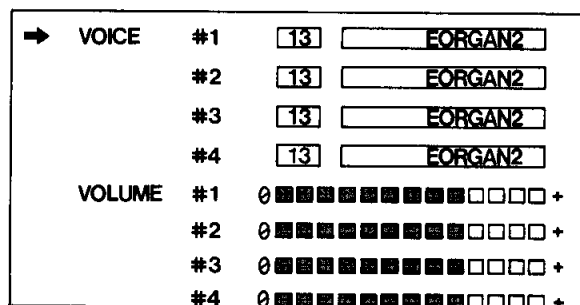
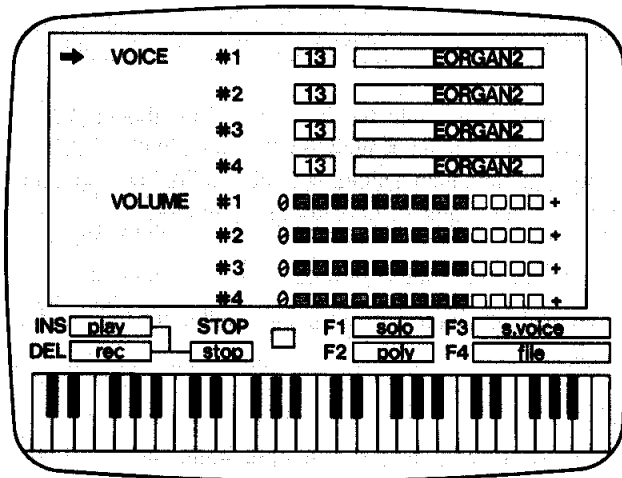
By itself, the SFGII can produce up to 4 different voices at once. Each of these 4 voices can be chosen separately. Use the  $\uparrow$   $\downarrow$  keys to move the cursor to the one you want to change, and use the  $\leftarrow$   $\rightarrow$  keys to choose the voice you want. When the power is first turned on, instruments #1 ~ 4 will all be set to voice 13 EORGAN2. Move through the different voices using the  $\leftarrow$   $\rightarrow$  keys. A list of the preset voices is on page 47 (You can also select voices that you created using the FM Voicing Program)

#### NOTE:

When the power is first turned on, only instruments #1 and #2 will be active. (#3 and #4 will be dark.) To activate #3 and #4, see MIDI p.43.

### VOLUME

This sets the output level for each instrument (0 ~ 13). Initial setting is 9.





## Play Mode



## SINGLE mode



## SPLIT mode


The keyboard at the bottom of the screen will indicate what part of the keyboard is playing which voice. The white part indicates instrument 1 and the yellow indicates instrument 2. When the SFGII is activated, the split point will be C3 (middle C), but you can change this as you wish.



Press **SELECT** once. The color indicating the keyboard range of instrument 2 will change to blue. Now, press whatever key you want to be the new split point. The color will change back to yellow. All keys to the left of the split point will play instrument 2, and the rest will play instrument 1. If you decide not to change the split point, just press **STOP**.



In this mode, each key you press will play both instruments 1 and 2. (Since the SFGII can produce up to 8 notes at once, this means that in DUAL mode you can play chords of up to 4 notes.)

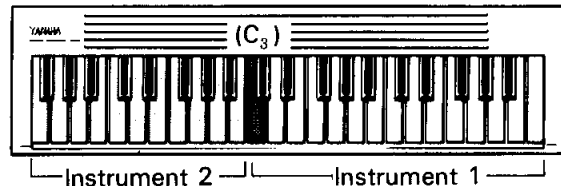
PLAY MODE  split  dual

SUSTAIN   on

DETUNE 0  +

OCTAVE #1  down  up

#2  down  up



## Effects and Other Functions

**SUSTAIN**

When sustain is on and you release a key, the sound will continue just as though you were still pressing the key. Of course, if the voice is the type that decays even if you hold down the key (like a bell, for example), sustain will have no effect.

**NOTE:**

If you are playing the SFGII from a MIDI keyboard that has a sustain pedal, this will change each time you press and release it.

If you are playing the SFGII from a MIDI keyboard that has a sustain pedal, this will change each time you press and release it.

**DETUNE**

This is a special effect only for DUAL mode. It lets you slightly change the pitch of instrument 2 relative to instrument 1, producing an especially thick and rich sound.

OCTAVE UP/DOWN





This lets you move instruments 1 and 2 up or down one octave. For example: in DUAL mode you can double the instrument an octave down, for a deep and powerful sound. (Try voice #14 PORGAN)

NOTE: —————

The SFG has a range of 8 octaves, and if octave up/down makes it exceed this, it will shift down/up to stay within its range.












The SFG has a range of 8 octaves, and if octave up/down makes it exceed this, it will shift down/up to stay within its range.

**SPEED, TREMOLO, VIBRATO**

Vibrato (periodic changes in pitch) and Tremolo (periodic changes in volume) have been set at ideal levels for each voice. However, you may change this if you wish. Remember that the settings you make here will affect all voices equally. Also, there may be little or no effect on some voices. Pressing  will make the speed of Vibrato and Tremolo faster;  will slow it down.  will increase the amount of Vibrato or Tremolo, and  will decrease it.

**NOTE:** When you create your own voices using the optional FM Voicing Program, remember that these Vibrato and Tremolo settings affect the AMD and PMD of the LFO. Therefore, if PMS and AMS of the voice you create are set to 0, Vibrato and Tremolo will have no effect.

**When you create your own voices using the optional FM Voicing Program, remember that these Vibrato and Tremolo settings affect the AMD and PMD of the LFO. Therefore, if PMS and AMS of the voice you create are set to 0, Vibrato and Tremolo will have no effect.**



|           |                                                                                                                                                                                                                                                             |                                                                                     |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PLAY MODE |                                                                                                                                                                          |  |
| SUSTAIN   |                                                                                                                                                                          |  |
| DETUNE    | 0  +                                                                                                                                                                     |                                                                                     |
| OCTAVE #1 |    |                                                                                     |
| OCTAVE #2 |    |                                                                                     |

**SPEED** s [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] f  
**TREMOLO** 0 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] +  
**VIBRATO** 0 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] +



**TEMPO**

This sets the tempo for recording and playback. (See p.38)

**TRANPOSE**







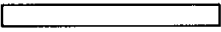

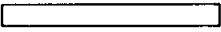

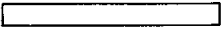


This lets you transpose up or down in half-steps, to a maximum of 7 steps. (All voices move together.) Each time you press  /  it will go down/up a 1/2 step.

**TUNING**

This lets you make fine adjustments in the tuning, to a maximum of 1/2 step up or down. Pressing the  /  keys will take the tuning up/down in steps of about 1.6 cents.

**MIDI (MIDI CH, CLOCK)**

See MIDI, p.43.

|          |                                                                                                                                                                         |                                                                                                                                                                         |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TEMPO    | s□□□□□□  □□□□□□ f                                                                    |                                                                                                                                                                         |
| TRANPOSE | b□□□□□□  □□□□□□ #                                                                    |                                                                                                                                                                         |
| TUNING   | b□□□□□□  □□□□□□ #                                                                    |                                                                                                                                                                         |
| MIDI CH. | #1                                                                                                                                                                      |   |
|          | #2                                                                                                                                                                      |   |
|          | #3                                                                                                                                                                      |   |
|          | #4                                                                                                                                                                      |   |
| CLOCK    |   |                                                                                                                                                                         |

**SOLO MODE (Press F1)**

In this mode you can play monophonically with Auto Rhythm and Auto Bass Chord accompaniment. The keyboard will play only one note at a time, but each note will sound 2 voices. (The same as dual mode in POLY.) Also, in this mode you can set various types of Portamento.

### VOICE (Selecting Voices for Each Instrument)

## VOICE

You may select each voice just as in POLY mode. (see p.29)

## VOLUME

This is the volume control for the sound you play on the keyboard.

## Balance

This is the volume balance of the two voices. When the marker is in the center, they will have the same volume. However, some voices may seem louder or softer than others, so balance them as you wish. Moving to the left  makes voice 1 louder, and  makes voice 2 louder.

### Effects and Other Functions

## DETUNE

This is the same effect as in POLY. (see p.31) In SOLO mode the keyboard is always in dual mode, so detune is always active.

## OCTAVE, SUSTAIN

The same effect as in POLY. (see p.31)

TRIGGER

This effect is unique to SOLO mode. It lets you specify whether each key pressed will trigger a new attack or not. Each time you press a key in "multi," the sound starts over again, regardless of how much or little it has decayed from the last note. For instance, if you are playing a bell-type voice, there will be the usual sharp, percussive attack for each new note. However if "single" is on, and you press a key while still holding down the previous key, there will be no new attack. The pitch will shift to the new key, but the sound will continue decaying just as if you had not played a new note. Obviously, if you keep playing notes with a voice that eventually decays to zero (like a bell), each new note will be softer and softer until you finally get no sound. When you release all keys and hit again, the voice will sound again normally.

**DETUNE**      0 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] +

**OCTAVE #1**    [ down | normal | up ]

**OCTAVE #2**    [ down | normal | up ]

**SUSTAIN**       [ off ]                  [ on ]

**TRIGGER**       [ multi ]                  [ single ]

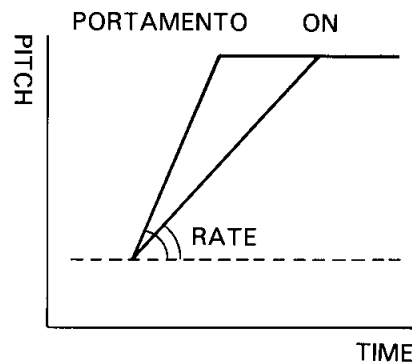
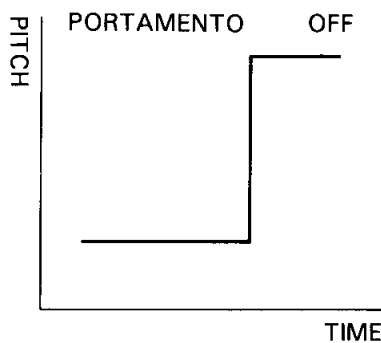
## PORTAMENTO (ON/OFF, MODE, RATE)

When this is on, it produces a “glide” from one note to the next.

**MODE:** This determines how the portamento acts. When "finger" is on, portamento will occur only when you play legato (press a key while holding down the last one). When "full" is on, portamento occurs with every note, whether or not the last note is still pressed.

**RATE:** This determines how fast the glide between notes is. Moving the marker to the left will produce a faster glide; moving right, a slower glide.

|                   |                                                    |               |
|-------------------|----------------------------------------------------|---------------|
| <b>PORTAMENTO</b> | <b>[off]</b>                                       | <b>[on]</b>   |
| <b>MODE</b>       | <b>[finger]</b>                                    | <b>[full]</b> |
| <b>RATE</b>       | <b>f [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] s</b> |               |



**SPEED, TREMOLO, VIBRATO**

These all have the same effect as in POLY. (see p.31)

## TRANSPOSE, TUNING

These have same effect as in POLY. (see p.32)

## MIDI CH.

This lets you select the MIDI reception channel. (see MIDI p.43) If you select the blank space (between 16 and 1), MIDI signals will not be received. Remember that in SOLO mode all keyboard playing is monophonic (only one note at a time), so the "(1 + 1) note" display will not change.

# CLOCK

This lets you select whether the tempo of the auto rhythm is controlled by the SFG's internal clock or by MIDI timing clock signals from outside. When "midi" is selected, the TEMPO display will change color and have no effect. (see MIDI, p.43)

TRANSPOSE      b ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ #

TUNING      b ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ #

MIDI CH.           



➔ CLOCK

***AUTO RHYTHM/AUTO BASS CHORD***

This is perhaps the most interesting feature of SOLO mode. Auto Rhythm gives you a percussion accompaniment, and Auto Bass Chord lets you produce chords in sync with the rhythm simply by holding one finger down on the keyboard.

To start or stop the auto rhythm, press **F5** . (If the start mode is “sync,” it will wait for you to press a key before starting.)

## R. PATTERN

This lets you select one of 6 rhythm patterns, as shown at right. Use the   keys to move through the patterns.

**BASS** Here you choose which bass sound you want:  
R1.BASS or R2BASS.

CHORD Here you choose which chord sound you want: RM.BRAS, RM.FLUTE, RM.GUIT, or RM.HORN.

NOTE:

For both Bass and Chord, if a blank is selected, it means that instrument will not sound.

# VOLUME

This sets the volume of the rhythm section.

## CHORD MK

When this is "on," part of the Music Keyboard is set aside for the Auto Bass Chord.  
(see AUTO BASS CHORD next page.)

## START MODE

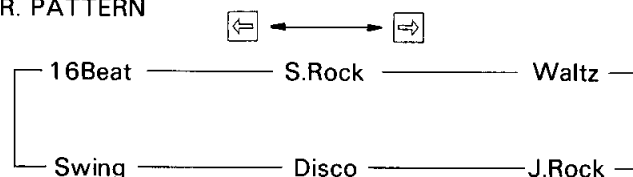
When this is on and you press **F5** to start the rhythm, it will wait for you to press a key before beginning the rhythm (ie., "synchro start").

# TEMPO

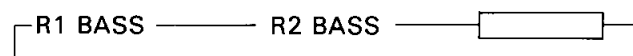
This sets the tempo of the rhythm accompaniment. Move the marker left for a slower tempo; right for faster.

|            |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R. PATTERN | <input type="text" value="16beat"/>                                                                                                                                                                                                                                                                                                                                                                                 |
| BASS       | <input type="text" value="R1.BASS"/>                                                                                                                                                                                                                                                                                                                                                                                |
| CHORD      | <input type="text" value="RM.BRAS"/>                                                                                                                                                                                                                                                                                                                                                                                |
| ➔ VOLUME   | 0 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> + |
| CHORD-MK   | <input checked="" type="checkbox"/> off <input type="checkbox"/> on                                                                                                                                                                                                                                                                                                                                                 |
| START.MODE | <input checked="" type="checkbox"/> normal <input type="checkbox"/> syno                                                                                                                                                                                                                                                                                                                                            |
| TEMPO      | s <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> f                                                                                          |

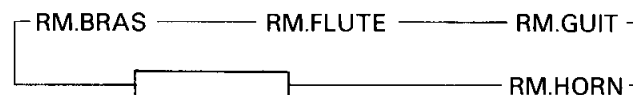
## R. PATTERN



**BASS**



CHORD



## AUTO BASS CHORD (ABC)

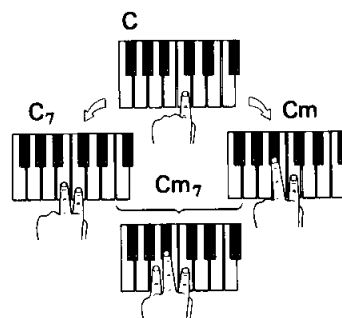
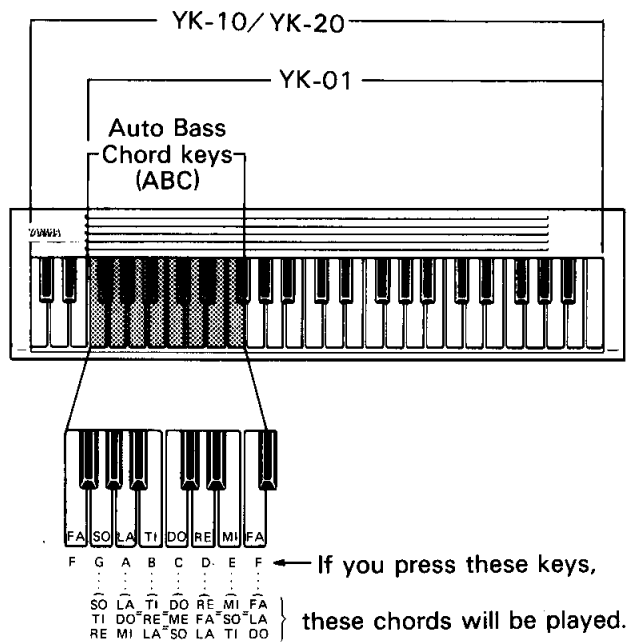
To play ABCs, you must use a Yamaha Music Keyboard; YK-01, 10 or 20. Playing on a MIDI keyboard will not produce ABCs.

Using ABC, you can play chords using one or more fingers.

1. Set CHORD MK. to "on." This sets aside part of the keyboard for ABCs. The ABC area will turn blue on the screen display. (See diagram)
2. Select voices for the bass and chord. (If you selected a blank, there will be no sound.)
3. When you press **[F5]**, the ABC will start in sync with the rhythm. (If START MODE is "sync," it will wait for you to press a key before starting.)
4. Press a key in the ABC area to produce a chord. You can Produce 4 types of chords using ABC by pressing 1 ~ 3 keys simultaneously (see diagram).

### NOTE:

1. The chord and bass note for the rhythm accompaniment will change when you press another key in the ABC area. Bass notes and chord patterns are synchronized with the rhythm. Once an ABC key has been pressed, that chord and bass note will be repeated until another ABC key is pressed. So you only have to press an ABC key if you want to change chords.
2. When changing chords, be careful to take your finger completely off the keys; otherwise the chords may not change. Press the key of the next chord only after you have released the previous keys.
3. Note that on the YK-10 and YK-20 the lowest 5 keys do not function in ABC mode.



### C7 Chord

Press a white key to the left of the key pressed for a major chord, together with the chord root key to produce a seventh chord.

### Cm Chord

Press the black key immediately to the left of the key pressed for a major chord, together with the chord root key, to produce a seventh chord.

### Cm7 Chord

Press the black key immediately to the left of the key pressed for a major chord, and a white key to the left of root key, along with the chord root key, to produce a minor seventh chord.

# VOICE MODE (press F3)

This mode lets you see at a glance which voices are available. When you press **F3**, the screen display will show the following.

The 2 currently selected voices are lit; instrument 1 is white, and instrument 2 is yellow.

Move the → mark using the cursor keys. To select a new voice, move the → to the voice you want, and press **RETURN** or **SPACE** key. The newly selected voice will light up.

## NOTE:

That the color of the → indicates whether you are selecting instrument 1 or 2 (white or yellow). To switch the color of the →, press **SELECT** once. Voices 47 and 48 are not used. If you select these, there will be no sound.

|    |          |    |          |    |          |
|----|----------|----|----------|----|----------|
| 01 | BRASS 1  | 17 | PICCOLO  | 33 | LO STG 1 |
| 02 | BRASS 2  | 18 | OBOE     | 34 | HORN LO  |
| 03 | TRUMPET  | 19 | CLARINET | 35 | WHISTLE  |
| 04 | STRING 1 | 20 | GLOCKEN  | 36 | STORM    |
| 05 | STRING 2 | 21 | VIERPHN  | 37 | RM. BRAS |
| 06 | EPIANO 1 | 22 | XYLOPHN  | 38 | RM. FLUT |
| 07 | EPIANO 2 | 23 | KOTO     | 39 | RM. GUIT |
| 08 | EPIANO 3 | 24 | ZITHER   | 40 | RM. HORN |
| 09 | GUITAR   | 25 | CLAV     | 41 | R1. BASS |
| 10 | EBASS 1  | 26 | HARPSIC  | 42 | R2. BASS |
| 11 | EBASS 2  | 27 | BELLS    | 43 | SNAREDR  |
| 12 | EORGAN 1 |    |          | 44 | RD CYMB  |
| 13 |          | 29 | SMADSYN  | 45 | PERC 1   |
| 14 | PORGAN 1 | 30 | HARMONI  | 46 | PERC 2   |
| 15 | PORGAN 2 | 31 | STEELDR  | 47 | CSM      |
| 16 | FLUTE    | 32 | TIMPANI  | 48 |          |

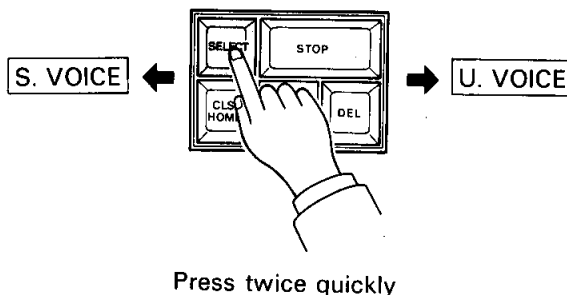
Currently selected voices

## SYSTEM VOICES and USER VOICES

The SFG always has 48 preset voices (system voices) which are there when you turn the power on. Using the separate FM Voicing Program, you can create your own voices to use with the SFGII. You can load these "user voices" into the SFGII (see FILE mode, p.40). The SFGII has memory space for 48 system voices and 48 user voices. To switch back and forth between these two, press **SELECT** twice (quickly). On the screen, the F3 box (above the keyboard on the right) will change from "s.voice" (system voice) to "u.voice" (user voice. If you have loaded your own set of voices into the SFGII, they will be displayed. If you have not, blank spaces will be displayed.

## NOTE:

You can switch between "user" and "system" voices at any time, no matter which mode you are in. Simply press **SELECT** twice. The message after **F3** will alternate between "s.voice" and "u.voice".





# RECORDING KEYBOARD PLAY

This function lets you record and play back performances on the keyboard (Music Keyboard or MIDI Keyboard). In effect, it is a kind of real time sequencer. You can record in either POLY or SOLO mode. Since only note data is recorded, voices, tempo, transpose, and tuning can be changed during playback. You can save recorded performances onto a disk or cassette. (see FILE mode, p.40)

## RECORDING

Press **[DEL]**. Now, when you press **[INS]**, recording will start. Whatever notes you play on the keyboard will be recorded into memory. Pressing **[STOP]** will stop the recording. The memory capacity is about 1800 notes. (If there is a Floppy Disk Drive attached to the system, the capacity will be a bit less.) If the capacity is exceeded, the recording will stop at that point.

### NOTE:

If you turn the MSX power off, your recording will be lost. Be sure to save it on a tape or disk. Only note on/off information is recorded. Other information received via MIDI, such as program change or control change (eg. sustain pedal), will not be recorded.

## PLAYBACK

When you press **[INS]**, playback will begin. To stop playback, press **[STOP]**. It may be interesting to change voices or transpose settings while your performance is being played back. You can accompany a recorded performance with "live" playing on the keyboard. However, the total number of notes at one time may not exceed 8 (in POLY mode). Due to limitations of the computer, playback tempo may sometimes be a bit slower.

### NOTE:

You can synchronize playback with an external MIDI sequencer or device that sends time clock signals. see p.44

## RECORDING AUTO BASS CHORDS

You may record performances with Auto Bass Chords. (SOLO mode)

1. Set CHORD.MK to "on" (setting aside part of the keyboard for Auto Bass Chords).
2. Set start mode to "sync," and press **[F5]** to start.
3. Press **[DEL]** and then **[INS]** to start recording.
4. Press **[STOP]** to end recording.

## AUTO BASS CHORD PLAYBACK

1. Make sure CHORD.MK is "on," and start mode is set to "sync."
2. Press **INS** to begin playback.
3. To stop playback, press **STOP** .

NOTE:

It is possible to record just the Auto Bass Chord section and play the keyboard during playback.

## FILE MODE (Press F4)

In this mode, you may save and load recorded keyboard performances (event data) to and from a disk or cassette. Also, you may load voice data that you created using the separate FM Voicing Program. You can also load voices from a Data Cartridge (Yamaha UDC-01). When you press **F4**, the screen shown at right will appear.

|           |                 |
|-----------|-----------------|
| → DEVICE  | Cassette        |
| OPERATION | Load voice data |
| FILE NAME |                 |
|           |                 |
|           |                 |
|           |                 |

### DEVICE

This indicates which device you are saving to or loading from. Press the **←** **→** keys to step through the 3 choices; Cassette-Cartridge-Disk.



|          |           |      |
|----------|-----------|------|
| Cassette | Cartridge | Disk |
|----------|-----------|------|

### NOTE:

Depending on the operation that is being performed, these 3 devices may not always be selectable. For instance, you cannot load event data from a Cartridge. So when OPERATION has been set to "load event data," you will not be able to select "Cartridge".

### OPERATION

This is where you select what you want to do. Here are the possible operations for each device.

| OPERATION       | Cassette                         | Cartridge                        | Disk                  |
|-----------------|----------------------------------|----------------------------------|-----------------------|
| Load voice data | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/> |
| Load event data | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> |
| Save event data | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> |
| Kill a file     | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Files           | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |

### FILE NAME

This is where you name the file you are saving, or specify which file you want to load. The file name must be capital letters or numbers, and up to 8 characters long. You can use the **BS** key to erase the character to the left of the **▲** mark, and use the **←** **→** keys to move the **▲** left and right.

If you input a space in your file name, it will be automatically deleted. For example, DA TA is the same as DATA.

- BS** ——— Delete one character to the left of the **▲**.
- ←** ——— Move **▲** to the left.
- ——— Move **▲** to the right.

### NOTE:

When you execute the "Files" command, all the file names on that disk will be displayed on the screen. You can specify the file name simply by moving the **→** mark to the one you want. This means you don't have to type in the name.

When you press **RETURN**, the operation you have selected will be performed. If you are saving or loading, it will ask you "Sure?" Check again; and if you are sure it's OK, press "Y" or **RETURN** again. If you press any other key, the operation will be aborted.

### **Saving and Loading with Cassette**

1. Select DEVICE "Cassette".
2. Select OPERATION "Save" or "Load".
3. Input FILE NAME.
4. Set cassette; to record for "Save", to play for "LOAD".
5. Press **RETURN**, and replay to "Sure?" by pressing it again.
6. When finished, stop the tape.

#### **NOTE:**

If you don't enter a file name, it will load the first one it finds.

If the file name you entered does not match what is on the tape, it will continue skipping over files until it finds the right one. The file name being skipped will appear in the message window.

If you want to quit while loading or saving, press **STOP** while holding down **CTRL**.

### **Loading voices from Data Memory Cartridge (UDC-01)**

Remember that with only the SFGII by itself, all you can do with a Data Cartridge is load voice data.

Follow the procedure outlined above for steps 1, 2, 3, 5.

Even if you don't input a file name, data will be loaded. But if the file name you input does not match the data in the cartridge, data will not be loaded. Instead, the file name of the cartridge will be displayed in the message window.

#### **NOTE:**

**REMEMBER** that all cartridges (ROM Software or Data Cartridges) must be inserted in the slots **BEFORE** you turn the power on. Do not insert a cartridge while the power is on. This could permanently damage the cartridge and computer.

### **Using the Floppy Disk**

#### **SAVING AND LOADING**

Follow the steps 1, 2, 3, 5 as outlined for cassette. When you save, a file discripeter of .EVG will automatically be added to your file name. Before you save onto a new disk, you must format it using the DISK-BASIC FORMAT command. (see the owner's manual for your disk drive)

When loading, if you do not enter a file name, the file that was written first will be loaded.

## FILE MODE (Press F4)

### KILL A FILE

You may save and load recorded keyboard

This operation lets you wipe out a file that you no longer need. A file descriptor of .EVB will automatically be added to the file name you input. So if you want to kill a file with a different descriptor, such as a voice data file, list the files by executing the "Files" command. Then, move the → mark to the file you want to kill, select "Kill A File," and press **RETURN**.

### FILES

This command shows you all the files on the disk. Select OPERATION "Files," and press **RETURN**. If there are too many file names to fit on the screen at once, the message area will ask "More?" When you are ready to see the rest of the files, press **RETURN** or "Y." Pressing any other key will end the command.

### ERROR MESSAGES

When saving or loading data, one of the following messages will be displayed if something is wrong.

| ERROR MESSAGE    | MEANS · CAUSE                                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------------------------|
| IO error         | An error occurred while saving or loading data.                                                                             |
| Bad file name    | The file name is wrong. Enter the correct file name.                                                                        |
| Device not ready | The device you specified is not connected. Make sure it is correctly connected.                                             |
| File not found   | The specified file cannot be found. Check the file name and input the correct one.                                          |
| Write protect    | The floppy disk is write protected. Remove the write protect.                                                               |
| FD not ready     | There is no floppy disk in the drive. Make sure that a disk is correctly inserted in the drive.                             |
| Disk full        | You have tried to save onto a floppy disk on which there is no more room. Delete some unnecessary files, or use a new disk. |
| Size too big     | There is too much data, so it cannot be loaded.                                                                             |
| Type mismatch    | The file type is incorrect, and cannot be loaded.                                                                           |

# MIDI

MIDI (Musical Instrument Digital Interface) is a worldwide standard for transmitting musical data. Just as all MSX personal computers, peripherals and software will work together, instruments that meet MIDI specifications can communicate with and control each other.

## MIDI Reception

In both SOLO and POLY modes, a MIDI instrument can control the SFGII, and you can use a MIDI keyboard in place of a Music keyboard. However, a MIDI keyboard cannot play Auto Bass Chords (SOLO mode).

### SETTING MIDI RECEPTION CHANNELS

In POLY mode, instruments 1 ~ 4 can all be controlled by MIDI information. Each instrument can have a different reception channel. This means you can play up to 4 different voices at once.

The MIDI transmission channel of the keyboard must match the reception channel of the SFGII.

- To enable MIDI reception, move the → to the instrument, and use the ⇐ ⇨ keys to select the reception channel. When a blank is selected, reception is off.
- When power is first turned on, instruments 1 and 2 are both set to receive MIDI channel 1.
- In SPLIT and DUAL modes, instrument 2 will always receive the same channel as instrument 1. It cannot be set independently.
- Number of notes per instrument  
The SFGII can produce up to 8 notes simultaneously. In SINGLE mode (POLY), only one instrument is used, and therefore you can play up to 8 notes at once. In DUAL and SPLIT modes, instruments 1 and 2 are used. If you use MIDI to play these instruments, there will be no change in the number of notes you can play. But if you activate instruments 3 and 4 to receive MIDI, the number of notes for each instrument will be as follows.
- The number of notes each instrument can produce will be displayed to the right of the reception channel.

Instrument No.

Reception channel (1 ~ 16)

Number of notes

| MIDI CH. | #1 | #2 | #3 | #4 |
|----------|----|----|----|----|
|          | 01 |    |    |    |
|          |    |    |    |    |
|          |    |    |    |    |
|          |    |    |    |    |

8 notes

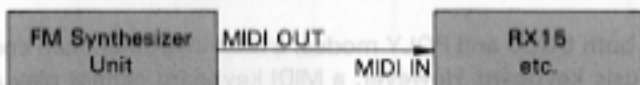
| Play mode  | Pattern | Inst. 1 | Inst. 2 | Inst. 3 | Inst. 4 |
|------------|---------|---------|---------|---------|---------|
| SINGLE     | 1       | 8       | OFF     | OFF     | OFF     |
|            | 2       | 6       | 2       | OFF     | OFF     |
|            | 3       | 6       | OFF     | 2       | OFF     |
|            | 4       | 6       | OFF     | OFF     | 2       |
|            | 5       | 4       | 2       | 2       | OFF     |
|            | 6       | 4       | 2       | OFF     | 2       |
|            | 7       | 4       | OFF     | 2       | 2       |
|            | 8       | 2       | 2       | 2       | 2       |
| SPLIT PLAY | 1       | 4       | 4       | OFF     | OFF     |
|            | 2       | 3       | 3       | 2       | OFF     |
|            | 3       | 3       | 3       | OFF     | 2       |
|            | 4       | 2       | 2       | 2       | 2       |

## Synchronized Playback

When playing back a recorded performance (see p.38), you may synchronize it to an external MIDI rhythm machine or sequencer. Or, you may do the opposite; synchronize an external device to the SFGII.

### SYNC EXTERNAL DEVICE TO SFGII

Set CLOCK to "internal." The SFGII will send timing clock, start and stop signals from MIDI OUT. If you set the external device's clock to "MIDI (external)," it will play in sync with the SFGII. Start playback as usual. (p.38)



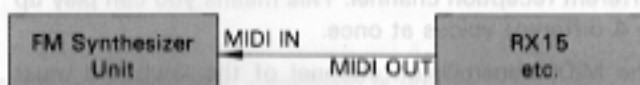
Set CLOCK to INTERNAL

Set SYNC to MIDI CLOCK

### SYNC SFG TO EXTERNAL DEVICE

Set CLOCK to "midi." The SFGII will synchronize to the start, stop and timing clock signals received from MIDI IN.

Press INS to start playback. Now the SFGII will wait for a MIDI start signal from the external device.



Set CLOCK to MIDI CLOCK

Set SYNC to INTERNAL

## MIDI Preception Data

The FM Sound Synthesizer Unit II will receive the following MIDI data.

## CHANNEL MESSAGES

When MIDI reception channel numbers are specified for each instrument, they will receive the following information sent on their channel.

### 1) Key off

Status 1000nnnn (8nH) n=Channel no.  
 Note no. 0kkkkkkk K=0 (C-2) ~ 127 (G8)  
 Velocity 0vvvvvvv V: ignored

### 2) Key on

Status 1001nnnn (9nH) n=Channel no.  
 Note no. 0kkkkkkk k=0 (C-2) ~ 127 (G8)  
 Velocity 0vvvvvvv v=0 Key off  
 v=1 ~ 127 Key on

### 3) Control change

Status 1011nnnn (BnH) n=Channel no.  
 Control no. 0ccccccc c=Control no.  
 Control value 0vvvvvvv  
 C= 5 Portamento time (only SOLO mode)  
 C= 7 Volume  
 C= 64 Sustain switch  
 C= 65 Portamento switch (only SOLO mode)  
 C=123 All note off

### 4) Program change

Status 1100nnnn (CnH) n=Channel no.  
 Program no. 0ppppppp p=Program no. (0 ~ 47)

## System Realtime Messages

When CLOCK is set to "midi," the following system realtime messages will be received.

### 1) Timing clock

Status 11110000 (F8H) 2) Start  
 Status 11110010 (FAH)

### 2) Continue start

Status 11110011 (FBH)

### 3) Stop

Status 11111100 (FCH)



## MIDI Transmission Data

Note data from the Music Keyboard and playback note data will be sent on MIDI channel 1.

## CHANNEL VOICE MESSAGE

### 1) Key on/off

|          |               |                                 |
|----------|---------------|---------------------------------|
| Status   | 1001000 (90H) |                                 |
| Note no. | 0kkkkkkk      | k=0 (C-2) ~ 127 (G8)            |
| Velocity | 0vvvvvvv      | v=0 Key off<br>v=1 ~ 127 Key on |

### 2) SYSTEM REALTIME MESSAGES

When CLOCK is set to "internal," the following System Realtime messages will be transmitted.

#### 1) Timing clock

|        |                |
|--------|----------------|
| Status | 11110000 (F8H) |
|--------|----------------|

#### 2) Start

|        |                |
|--------|----------------|
| Status | 11111010 (FAH) |
|--------|----------------|

#### 3) Stop

|        |                |
|--------|----------------|
| Status | 11111100 (FCH) |
|--------|----------------|

# PRINTOUT

You can make a hard copy (printout) of the screen in whatever mode you are in. Simply press **HOME** twice rapidly. You can use either an MSX printer or an Epson printer. By pressing **HOME** once, select the type of printer (msx or epson), and whether to make a single density or double density hard copy. Each time you press **HOME**, it will cycle through the choices as shown below. The currently selected type will appear in the **F4** (FILE) window.

msx-pr/D ——— msx-pr/S ——— eps-pr/D ——— eps-pr/S

When you have set the printing mode, press **STOP**.

Now, when you press **HOME** twice rapidly, the printer will make a hard copy of the screen.

To halt printing, press **STOP** while holding down **CTRL**.

## FM VOICE LIST

This table lists internal voices of the FM Sound Synthesizer unit.

Use the voice number when setting the voices with the FM Music Composer.

|    |          |    |          |    |          |    |          |
|----|----------|----|----------|----|----------|----|----------|
| 01 | BRASS 1  | 13 | EORGAN 2 | 25 | CLAV     | 37 | RM. BRAS |
| 02 | BRASS 2  | 14 | PORGAN 1 | 26 | HARPSI   | 38 | RM. FLUT |
| 03 | TRUMPET  | 15 | PORGAN 2 | 27 | BELLS    | 39 | RM. GUIT |
| 04 | STRING 1 | 16 | FLUTE    | 28 | HARP     | 40 | RM. HORN |
| 05 | STRING 2 | 17 | PICCOLO  | 29 | SMADSYN  | 41 | R1. BASS |
| 06 | EPIANO 1 | 18 | OBOE     | 30 | HARMONI  | 42 | R2. BASS |
| 07 | EPIANO 2 | 19 | CLARINET | 31 | STEELDR  | 43 | SNAREDR  |
| 08 | EPIANO 3 | 20 | GLOCKEN  | 32 | TIMPANI  | 44 | RD CYMB  |
| 09 | GUITAR   | 21 | VIBRPHN  | 33 | LO STG 1 | 45 | PERC 1   |
| 10 | EBASS 1  | 22 | XYLOPHN  | 34 | HORN LO  | 46 | PERC 2   |
| 11 | EBASS 2  | 23 | KOTO     | 35 | WHISTLE  | 47 | CSM      |
| 12 | EORGAN 1 | 24 | ZITHER   | 36 | STORM    | 48 |          |

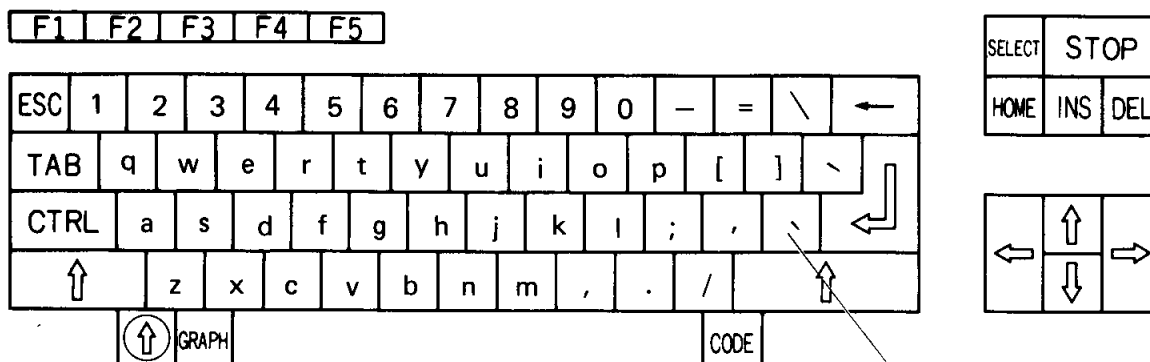


# **ADDITIONAL INFORMATION**

# KEYBOARD MODES

NOTE:

The CX5MIIF has a different keyboard layout. (See the same page number of the French language section.)

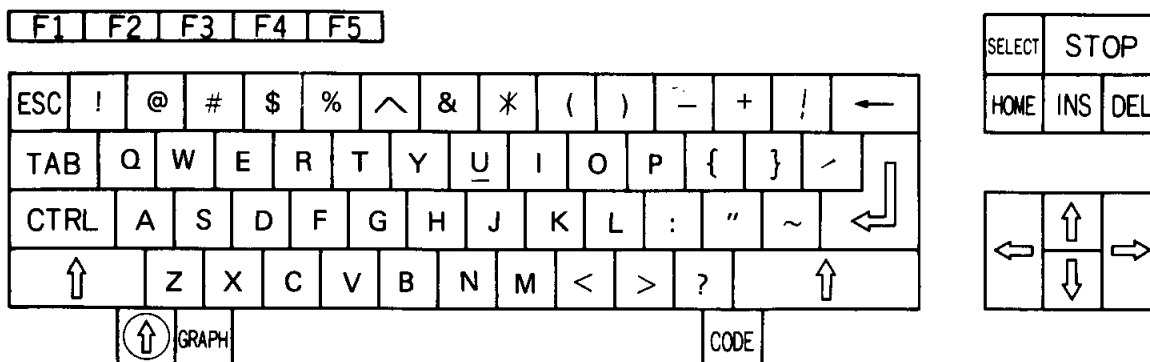


NOTE:

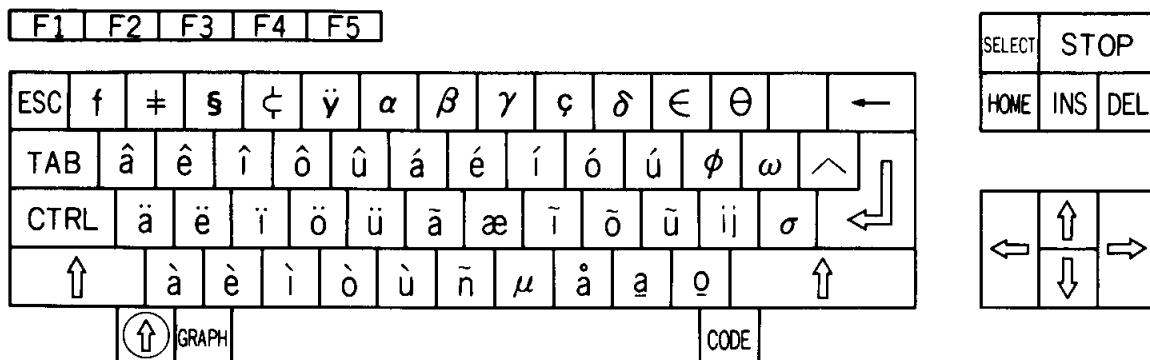
Only the CX5MIE has this key.



Normal + Shift Keys



Code Key



# Code + Shift Keys

F6 F7 F8 F9 F10

|      |       |    |   |   |   |   |   |   |   |   |   |    |      |   |
|------|-------|----|---|---|---|---|---|---|---|---|---|----|------|---|
| ESC  | i     | Pt | Π | £ | ¥ |   |   | Γ | Ç | Δ |   |    |      | ← |
| TAB  |       |    |   |   |   |   | É |   | π | Φ | Ω | .. |      | ↵ |
| CTRL | Ä     |    |   | Ö | Ü | Ã | Æ | Ï | Õ | Ū | Ŧ | Σ  |      | ↵ |
| ↑    |       |    |   |   |   |   | Ñ |   | Å |   | ¿ |    | ↑    |   |
| ⬆    | GRAPH |    |   |   |   |   |   |   |   |   |   |    | CODE |   |

|        |      |     |
|--------|------|-----|
| SELECT | STOP |     |
| CLS    | INS  | DEL |

|   |   |   |
|---|---|---|
| ← | ↑ | → |
|   | ↓ |   |

## Graph Key

F1 F2 F3 F4 F5

|      |       |   |   |   |   |   |   |   |   |   |   |   |      |   |
|------|-------|---|---|---|---|---|---|---|---|---|---|---|------|---|
| ESC  | ¼     | ½ | ¾ | □ | ÷ | ↑ | √ | ∞ | · | ○ | — | ± | ÷    | ← |
| TAB  | ≡     | ▶ | ▼ | ┐ | └ | ┌ | ▬ | ▬ | ▬ | ▬ | ☺ | ♪ | ÷    | ↵ |
| CTRL | -     | ◀ | ▶ | ┐ | + | └ | ▬ | ▬ | ▬ | ♠ | ♣ | ~ |      | ↵ |
| ↑    | ☼     | × | ◇ | └ | └ | └ | ♂ | ≤ | ≥ | ÷ |   |   | ↑    |   |
| ⬆    | GRAPH |   |   |   |   |   |   |   |   |   |   |   | CODE |   |

|        |      |     |
|--------|------|-----|
| SELECT | STOP |     |
| HOME   | INS  | DEL |

|   |   |   |
|---|---|---|
| ← | ↑ | → |
|   | ↓ |   |

## Graph + Shift Keys

F6 F7 F8 F9 F10

|      |       |   |   |   |   |   |   |    |    |   |   |   |      |   |
|------|-------|---|---|---|---|---|---|----|----|---|---|---|------|---|
| ESC  |       | ² | ⁿ |   |   | ↓ |   | ◻  | ◻  | + | ≡ |   |      | ← |
| TAB  | ≡     | ◀ | ▶ | ┐ |   | └ | ▬ | ▬  | ▬  | ▬ | ▬ | ♣ | ♪    | ÷ |
| CTRL |       | ◀ | ▶ | ┐ | + | └ | ▬ | ▬  | ▬  | ▬ | ♣ | ♥ | ≈    | ↵ |
| ↑    | ○     | + | - | ▬ |   | ▬ | ♀ | << | >> | ÷ |   |   | ↑    |   |
| ⬆    | GRAPH |   |   |   |   |   |   |    |    |   |   |   | CODE |   |

|        |      |     |
|--------|------|-----|
| SELECT | STOP |     |
| CLS    | INS  | DEL |

|   |   |   |
|---|---|---|
| ← | ↑ | → |
|   | ↓ |   |

# ASCII CODE TABLE

Graphic codes in the following chart can be designated by CHR \$& (hex).

|   | 0 | 1 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9  | A | B  | C | D | E | F |
|---|---|---|----|---|---|---|---|---|---|----|---|----|---|---|---|---|
| 0 |   | + |    | 0 | @ | P | ` | p | Ç | É  | á | Ã  | ▬ | ◀ | α | ≡ |
| 1 | ☺ | ⊥ | !  | 1 | A | Q | a | q | ü | æ  | í | ã  | ▣ | ✕ | β | ± |
| 2 | ☹ | ⊥ | "  | 2 | B | R | b | r | é | Æ  | ó | Ï  | ▣ | ✕ | Γ | ≥ |
| 3 | ♥ | ⊥ | #  | 3 | C | S | c | s | â | ô  | ú | ï  | ▣ | ▣ | Π | ≤ |
| 4 | ♦ | ⊥ | \$ | 4 | D | T | d | t | ä | ö  | ñ | Õ  | ▣ | ▣ | Σ | ƒ |
| 5 | ♣ | + | %  | 5 | E | U | e | u | à | ò  | Ñ | õ  | ▣ | ▣ | σ | J |
| 6 | ♠ |   | &  | 6 | F | V | f | v | å | û  | ä | Û  | ▣ | ▣ | μ | ÷ |
| 7 | · | — | '  | 7 | G | W | g | w | ç | ù  | ó | ü  | ▣ | ▣ | γ | ≈ |
| 8 | ▣ | ┐ | (  | 8 | H | X | h | x | ê | ÿ  | ı | IJ | ▣ | Δ | Φ | ○ |
| 9 | ○ | ┐ | )  | 9 | I | Y | i | y | ë | Ö  | ┐ | ij | ▣ | ‡ | θ | ● |
| A | ◉ | ┐ | *  | : | J | Z | j | z | è | Ü  | ┐ | ¾  | ▣ | ω | Ω | - |
| B | ♂ | ┐ | +  | ; | K | [ | k | { | ï | ¢  | ½ | ~  | ▣ | ▣ | δ | √ |
| C | ♀ | × | ,  | < | L | \ | l |   | î | £  | ¼ | ◇  | ▣ | ▣ | ∞ | n |
| D | ♪ | / | —  | = | M | ] | m |   | ì | ¥  | ı | ‰  | ▣ | ▣ | φ | ² |
| E | ♫ | \ | .  | > | N | ^ | n | ~ | Ä | Pt | 《 | π  | ▣ | ▣ | ε | ▣ |
| F | ⚙ | + | /  | ? | O | — | o | △ | Å | f  | 》 | §  | ▣ | ▣ | η |   |

# CONTROL CODE TABLE

The following table shows the function of each key when pressed together with the CTRL key.

| Character | Decimal | Hexadeo | Function                          |
|-----------|---------|---------|-----------------------------------|
| A         | 1       | 01      | Header for graphic character      |
| B         | 2       | 02      | Moves cursor to beginning of word |
| C         | 3       | 03      | Interrupts input wait status or   |
| D         | 4       | 04      | Ignored (ends AUTO command mode)  |
| E         | 5       | 05      | Deletes the line after the cursor |
| F         | 6       | 06      | Moves cursor to next word         |
| G         | 7       | 07      | Bell                              |
| H         | 8       | 08      | Backspace                         |
| I         | 9       | 09      | Same as TAB key                   |
| J         | 10      | 0A      | Line feed                         |
| K         | 11      | 0B      | Moves cursor to home position     |
| L         | 12      | 0C      | Clears screen                     |
| M         | 13      | 0D      | Carriage return                   |
| N         | 14      | 0E      | Moves cursor to last sentence     |
| O         | 15      | 0F      | Ignored                           |
| P         | 16      | 10      | Ignored                           |
| Q         | 17      | 11      | Ignored                           |
| R         | 18      | 12      | Inserts character to the left     |
| S         | 19      | 13      | Ignored (of the cursor)           |
| T         | 20      | 14      | Ignored                           |
| U         | 21      | 15      | Deletes line where the cursor is  |
| V         | 22      | 16      | Ignored                           |
| W         | 23      | 17      | Ignored                           |
| X         | 24      | 18      | Ignored                           |
| Y         | 25      | 19      | Ignored                           |
| Z         | 26      | 1A      | Ignored                           |
| [         | 27      | 1B      | Ignored                           |
| /         | 28      | 1C      | Cursor right                      |
| ]         | 29      | 1D      | Cursor left                       |
| ^         | 30      | 1E      | Cursor up                         |
| -         | 31      | 1F      | Cursor down                       |
| DEL       | 127     | 7F      | Deletes character where cursor is |



# BASIC COMMAND LIST

| Commands                             |                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----------------------------------|----|----|----------------------|--|---|----|--|-----------------------|---|---|----|----|-----------------------------------|--|---|----|----|----------------------------------|--|---|----|----|--------------------------------|
| AUTO                                 | AUTO [start], [, increment]                                                                                                          | Automatic line numbering to speed up text entry.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| CONT                                 | CONT                                                                                                                                 | Continues execution after STOP statement or Control-STOP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| DELETE                               | DELETE line range                                                                                                                    | Erases groups of lines from memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| LIST/LLIST                           | LIST [line num] [- line num]<br>LLST [line num] [- line num]                                                                         | Displays your program on the screen.<br>Displays your program on the printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| NEW                                  | NEW                                                                                                                                  | Erases all of your program and does a CLEAR.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| RENUM                                | RENUM [new] [, old] [, increment]                                                                                                    | Renumbers lines in memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| RUN                                  | RUN [<line number devfilename>]                                                                                                      | Starts execution of program; enters run mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| SAVE/LOAD<br>MERGE                   | SAVE devfilename<br>LOAD devfilename [, R]<br>MERGE devfilename                                                                      | Saves program to tape in ASCII text format.<br>Loads program from tape; must be in ASCII text format.<br>Adds a program from tape in ASCII text format to one in RAM.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| BASE (System<br>numeric variable)    | BASE (tabentry)                                                                                                                      | Allows VRAM locations for VDP tables to be set, all SCREENs.<br><div><div><div></div><div></div><div></div><div></div></div><div>Text mode (40 x 24)<br/>Text mode (32 x 24)<br/>Highest resolution mode<br/>Multicolor mode</div></div> <table><tr><td>0</td><td>5</td><td>10</td><td>15</td><td>: Base of Name Table</td></tr><tr><td></td><td>6</td><td>11</td><td></td><td>: Base of Color Table</td></tr><tr><td>3</td><td>7</td><td>12</td><td>17</td><td>: Base of Pattern Generator Table</td></tr><tr><td></td><td>8</td><td>13</td><td>18</td><td>: Base of Sprite Attribute Table</td></tr><tr><td></td><td>9</td><td>14</td><td>19</td><td>: Base of Sprite Pattern Table</td></tr></table> | 0  | 5                                 | 10 | 15 | : Base of Name Table |  | 6 | 11 |  | : Base of Color Table | 3 | 7 | 12 | 17 | : Base of Pattern Generator Table |  | 8 | 13 | 18 | : Base of Sprite Attribute Table |  | 9 | 14 | 19 | : Base of Sprite Pattern Table |
| 0                                    | 5                                                                                                                                    | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 15 | : Base of Name Table              |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
|                                      | 6                                                                                                                                    | 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    | : Base of Color Table             |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| 3                                    | 7                                                                                                                                    | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 17 | : Base of Pattern Generator Table |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
|                                      | 8                                                                                                                                    | 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 18 | : Base of Sprite Attribute Table  |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
|                                      | 9                                                                                                                                    | 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 19 | : Base of Sprite Pattern Table    |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| BSAVE/BLOAD                          | BSAVE devfilename, start addr, end [, run addr]<br>BLOAD devfilename [, runoption] [, offsetaddr]                                    | Saves a block of memory to tape in pure binary image format.<br>Loads into RAM a binary image stored on tape.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| CSAVE/CLOAD<br>CLOAD?                | CSAVE filename, speed<br>CLOAD [filename]<br>CLOAD? [filename]                                                                       | Saves program to tape in internal format.<br>Loads program from tape; must be in internal format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| TRON/TROFF                           | TRON<br>TROFF                                                                                                                        | Turns on line number trace during execution.<br>Turns off line number trace during execution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| Statements                           |                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| CLEAR                                | CLEAR (string size, [, freespace])                                                                                                   | Reserves RAM for string space and/or non-BASIC use; and also erases all variables, open files, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| CALL                                 | CALL routine name [(parameter list)]                                                                                                 | Activates an expanded BASIC statement capability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| CLOSE                                | CLOSE ([#] bufnum) [, [#] bufnum)                                                                                                    | Ends I/O with specified file number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| DATA                                 | DATA element [, element]                                                                                                             | Specifies list of internal data items.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| DIM                                  | DIM varname [, varname]                                                                                                              | Defines, reserves, and initializes arrays.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| DEFINT<br>DEFSNG<br>DEFDBL<br>DEFSTR | DEFINT vartype range [, range]<br>DEFSNG vartype range [, range]<br>DEFDBL vartype range [, range]<br>DEFSTR vartype range [, range] | Defines default variable type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| DEFFN                                | DEFFN varname [(argvar [, argvar])] = expression                                                                                     | Specifies user-defined functions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| DEF USR                              | DEF USR [digit] = intexpr                                                                                                            | Specifies starting location of user-defined machine-language function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| ERASE                                | ERASE array name [, array name]                                                                                                      | Deletes the specified array.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| END                                  | END                                                                                                                                  | Finishes execution, returns to direct mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| ERROR                                | ERROR errnum                                                                                                                         | Statement which will cause any error to occur.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| FOR ~ NEXT                           | FOR variable = start TO stop [STEP increment]<br>NEXT variable                                                                       | Loop statement; changes value of loop control variable ends a loop started with a FOR statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| GOSUB ~<br>RETURN                    | GOSUB line number<br>RETURN                                                                                                          | Calls new line number.<br>Ends a subroutine, returns to statement after GOSUB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| GOTO                                 | GOTO line number                                                                                                                     | Jumps to new line number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| IF ~ THEN/<br>IF ~ GOTO              | If conditional expr THEN statement list<br>If conditional expr GOTO line number                                                      | Selects different options based on condition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |
| IF ~ THEN ~<br>ELSE                  | If conditional expr THEN statement list<br>ELSE statement list                                                                       | Selects different options based on condition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |                                   |    |    |                      |  |   |    |  |                       |   |   |    |    |                                   |  |   |    |    |                                  |  |   |    |    |                                |

|                                      |                                                                                                                                                                                             |                                                                                                                                                                                                    |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IF ~ GOTO ~ ELSE                     | IF conditional expr GOTO line number<br>IF conditional expr ELSE statement list                                                                                                             | Selects different options based on condition.                                                                                                                                                      |
| INPUT                                | INPUT [<# filename,>] variable list "prompt"                                                                                                                                                | Reads in data items; must be in proper format.                                                                                                                                                     |
| KEY/KEY LIST                         | KEY <keynum, stringexpr><br>KEY LIST                                                                                                                                                        | Re-defines the use of the special function key.<br>KEY LIST lists on the screen entire text of all 10 function keys.                                                                               |
| LINE INPUT                           | LINE INPUT [<# filename,>] string var "stcons";                                                                                                                                             | Returns entire line of input, unformatted.                                                                                                                                                         |
| LET                                  | [LET] variable expression                                                                                                                                                                   | General variable assignment statement; the LET is optional.                                                                                                                                        |
| MAXFILES                             | MAXFILES = numexpr                                                                                                                                                                          | Specifies number of I/O files to reserve space for.                                                                                                                                                |
| MID \$                               | MID \$ (str var, start char [, length]) = strexpr                                                                                                                                           | In place replacement of string variable with new value.                                                                                                                                            |
| ON ERROR GOTO                        | NO ERROR GOTO line number                                                                                                                                                                   | Specifies error trapping and location of handler.                                                                                                                                                  |
| ON GOTO/<br>GOSUB                    | ON numexpr <GOTO> list of line numbers<br>ON numexpr <GOSUB> list of line numbers                                                                                                           | Case statement, does a GOTO based on variable value.<br>Case statement, does a GOSUB based on variable value.                                                                                      |
| ~ON/OFF/STOP                         | KEY (keynum) ON/OFF/STOP<br>STRIG (num) ON/PFF/STOP<br>STOP ON/OFF/STOP<br>SPRITE ON/OFF/STOP<br>INTERVAL ON/OFF/STOP                                                                       | Specifies function key-based interrupt.<br>Specifies joystick trigger interrupt.<br>Specifies Control-Stop interrupt.<br>Specifies sprite collision interrupt.<br>Specifies timer-based interrupt. |
| ON ~ GOSUB                           | ON <INTERVAL> = ticks<br>ON <KEY> GOSUB line num [, line num]<br>ON <SPRITE> GOSUB line num [, line num]<br>ON <STOP> GOSUB line num [, line num]<br>ON <STRIG> GOSUB line num [, line num] | Defines location of interrupt handler.                                                                                                                                                             |
| OPEN                                 | OPEN devfilename [FOR <APPEND>] AS [#] filename<br>OPEN devfilename [FOR <INPUT>] AS [#] filename<br>OPEN devfilename [FOR <OUTPUT>] AS [#] filename                                        | Associates file number with device name; initializes.<br>CAS : Cassette tape<br>CRT : CRT display<br>GRP : Graphics screen<br>LPT : Printer                                                        |
| OUT                                  | OUT address, data                                                                                                                                                                           | Sends data to Z-80 output port.                                                                                                                                                                    |
| POKE                                 | POKE loc, data                                                                                                                                                                              | Stores data in any RAM location.                                                                                                                                                                   |
| PRINT/LPRINT                         | PRINT [filename,] print list<br>LPRINT [filename,] print list                                                                                                                               | Sends data to file I/O device/sends data to printer.                                                                                                                                               |
| PRINT/LPRINT<br>USING                | PRINT USING [filename,] [format;] print list<br>LPRINT USING [filename,] [format;] print list                                                                                               | Option on PRINT statements for formatted output.                                                                                                                                                   |
| PRINT #/<br>INPUT #                  | PRINT [# filename,] print list<br>INPUT [# filename,] variable list                                                                                                                         | Sends data to text display screen.<br>Returns prompted input, must be in proper format.                                                                                                            |
| READ                                 | READ variable [, variable]                                                                                                                                                                  | Inputs data from DATA statement to variable.                                                                                                                                                       |
| REM                                  | REM any text                                                                                                                                                                                | Statement that is totally documentary.                                                                                                                                                             |
| RESTORE                              | RESTORE [line number]                                                                                                                                                                       | Resets pointer to allow DATA to be re-READ.                                                                                                                                                        |
| RESUME                               | RESUME<br>RESUME 0<br>RESUME NEXT<br>RESUME [line number]                                                                                                                                   | Specifies end of error handler and where to continue.                                                                                                                                              |
| STOP                                 | STOP                                                                                                                                                                                        | Temporarily stops execution with message, may be restarted.                                                                                                                                        |
| SWAP                                 | SWAP <numeric variable, numeric variable><br>String variable, string variable                                                                                                               | Switches values of two variables; fast and totally in place.                                                                                                                                       |
| TIME                                 | TIME = numexpr                                                                                                                                                                              | MSX BASIC keeps an internal 16-bit counter which it continually updates at 60 times per second.<br>Sets the system clock.                                                                          |
| WAIT                                 | WAIT port, and [, xor]                                                                                                                                                                      | Reads Z-80 input port and waits until condition is met.                                                                                                                                            |
| VDP (System<br>numeric variable)     | VDP (reg num)                                                                                                                                                                               | Allows access to actual VDP registers.                                                                                                                                                             |
| <b>Graphics and Sound Statements</b> |                                                                                                                                                                                             |                                                                                                                                                                                                    |
| BEEP                                 | BEEP no parameters                                                                                                                                                                          | Sounds alarm beep and resets all sound output.                                                                                                                                                     |
| CIRCLE                               | CIRCLE [@] [STEP] (x, y), radius [, color]<br>[startangle], [, endangle] [, aspect]                                                                                                         | Draws circles, arcs, wedges, and ovals.                                                                                                                                                            |
| CLS                                  | CLS                                                                                                                                                                                         | Clears screen to background color.                                                                                                                                                                 |

# BASIC COMMAND LIST

|                         |                                                                        |                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COLOR                   | COLOR [column] [, column] [, column]                                   | Sets default foreground; background; (not SCREEN 0) border color.<br>Here are the color numbers:<br>0 TRANSPARENT      8 MEDIUM RED<br>1 BLACK              9 LIGHT RED<br>2 MEDIUM GREEN    10 DARK YELLOW<br>3 LIGHT GREEN       11 LIGHT YELLOW<br>4 DARK BLUE        12 DARK GREEN<br>5 LIGHT BLUE        13 MAGENTA<br>6 DARK RED          14 GREY<br>7 CYAN              15 WHITE |
| DRAW                    | DRAW string expr                                                       | Uses Graphics Macro Language to draw entire objects.                                                                                                                                                                                                                                                                                                                                    |
| LINE                    | LINE [[@] [STEP] (x1, y1) - (@) [STEP] (x2, y2) [, color], <B> <BF>]   | Draws lines, hollow boxes, filled-in boxes.                                                                                                                                                                                                                                                                                                                                             |
| LOCATE                  | LOCATE (x), (y), [switch]                                              | Moves text cursor and turns it on or off.                                                                                                                                                                                                                                                                                                                                               |
| PUT SPRITE              | PUT SPRITE sprnum [, (@) [STEP] (x, y) [, color] [, sprimage]          | Actually controls display of 32 possible sprites.                                                                                                                                                                                                                                                                                                                                       |
| PAINT                   | PAINT (@) [STEP] (x, y) [, color] [, strexpr]                          | Fills any enclosed area with any color.                                                                                                                                                                                                                                                                                                                                                 |
| PLAY                    | PLAY [strexpr] [, strexpr] [, strexpr]                                 | Uses Music Macro Language to play 3-part background music.                                                                                                                                                                                                                                                                                                                              |
| PSET/PRESET             | PSET (@) [STEP] (x, y) [, color]<br>PRESET (@) [STEP] (x, y) [, color] | Resets any point on screen to background color.<br>Sets any point on screen to foreground color.                                                                                                                                                                                                                                                                                        |
| SCREEN                  | SCREEN [mode] [, spritel] [, key click] [, tape speed] [, printer]     | Sets display screen type and sprite size<br>SCREEN MODE<br>0 : Text mode (40 x 24 characters)<br>1 : Text mode (32 x 24 characters)<br>2 : Highest resolution mode<br>3 : Multicolor mode<br>SPRITE SIZE<br>0 : 8 x 8 pixels      2 : 16 x 16 pixels<br>1 : 8 x 8 pixels (large)    3 : 16 x 16 pixels (large)                                                                          |
| SPRITE \$               | SPRITE \$ (num) = stringexpr                                           | Accesses 64 or 256 possible sprite data patterns.                                                                                                                                                                                                                                                                                                                                       |
| VPOKE                   | VPOKE address, data                                                    | Writes data directly to any location in VRAM.                                                                                                                                                                                                                                                                                                                                           |
| ON/OFF                  | KEY : ON/OFF<br>MOTOR ON/OFF                                           | Turns function key prompt line on or off.<br>Turns cassette motor on and off.                                                                                                                                                                                                                                                                                                           |
| SOUND                   | SOUND register, setting                                                | Allows access to actual PSG registers.                                                                                                                                                                                                                                                                                                                                                  |
| WIDTH                   | WIDTH size                                                             | Sets width of text screens.<br>numeric expression in range<br>1 - 32 if SCREEN 1, or 1 - 40 if SCREEN 0                                                                                                                                                                                                                                                                                 |
| <b>String Functions</b> |                                                                        |                                                                                                                                                                                                                                                                                                                                                                                         |
| BIN \$                  | BIN \$ (integer expression)                                            | Converts integer to binary notation in character string.                                                                                                                                                                                                                                                                                                                                |
| POINT                   | POINT (x, y)                                                           | Returns color of any point on screen.                                                                                                                                                                                                                                                                                                                                                   |
| VPEEK                   | VPEEK (address)                                                        | Reads any location in VRAM.<br>Address :: = a numeric expression in range 0 - 16383                                                                                                                                                                                                                                                                                                     |
| STICK                   | STICK (which)                                                          | Reads digital joystick<br>which :: = numeric expression in range<br>0 - 3, 0 = keyboard, 1 and<br>2 = joystick sockets 1 and 2.                                                                                                                                                                                                                                                         |
| STRIG                   | STRIG (num) <ON/OFF/STOP>                                              | Reads trigger buttons from joystick.                                                                                                                                                                                                                                                                                                                                                    |
| PDL                     | PDL (choice)                                                           | Reads game paddles (knobs).                                                                                                                                                                                                                                                                                                                                                             |
| PAD                     | PAD (select)                                                           | Reads graphics pad (tablet).                                                                                                                                                                                                                                                                                                                                                            |
| TIME                    | TIME                                                                   | Returns the system clock.                                                                                                                                                                                                                                                                                                                                                               |

| Numeric Functions |                                         |                                                                           |
|-------------------|-----------------------------------------|---------------------------------------------------------------------------|
| ABS               | ABS (numexpr)                           | Absolute value.                                                           |
| ASC               | ASC (stringexpr)                        | Converts string character to corresponding character code.                |
| ATN               | ATN (numexpr)                           | Arctangent; inverse tangent of angle given in radians.                    |
| CDBL              | CDBL (numexpr)                          | Converts to double-precision BCD-format type.                             |
| CHR \$            | CHR \$ (numexpr)                        | Converts numeric value to corresponding one-byte character.               |
| CINT              | CINT (numexpr)                          | Converts to 16-bit signed integer type.                                   |
| COS               | COS (radangle)                          | Cosine of angle in radians.                                               |
| CSNG              | CSNG (numexpr)                          | Converts to single-precision BCD-format type.                             |
| CSRLIN            | CSRLIN                                  | Returns row text cursor is on.                                            |
| EXP               | EXP (exponent)                          | E raised to the power of n.                                               |
| EOF               | EOF (filenum)                           | Indicates whether end-of-file mark reached yet.                           |
| ERL               | ERL                                     | Contains line number of last error.                                       |
| ERR               | ERR                                     | Contains error number of last error.                                      |
| FRE               | FRE (dummy argument)                    | Unused RAM available or unused string space available.                    |
| FIX               | FIX (numexpr)                           | Strips off any fractional part, returning whole number only.              |
| HEX \$            | HEX \$ (numexpr)                        | Converts integer to hex notation in character string.                     |
| INKEY \$          | INKEY \$                                | Returns the character (or a null) string from the keyboard.               |
| INPUT \$          | INPUT \$ (number [, ( ) filenum])       | Returns specified number of raw, unechoed bytes.                          |
| INSTR             | INSTR ([start,] string, substring)      | Position of substring in a string.                                        |
| INT               | INT (numexpr)                           | Rounds down number to next lower whole part.                              |
| LEFT \$           | LEFT \$ (string expr, length)           | Substring of specified number of characters, from left.                   |
| LEN               | LEN (string expr)                       | Length of string.                                                         |
| LOG               | LOG (numarg)                            | Natural (base e) logarithm.                                               |
| LPOS              | LPOS (1)                                | Return printer column position.                                           |
| MID \$            | MID \$ (strexpr, start char [, length]) | Extracts specified substring from anywhere in string.                     |
| OCT \$            | OCT \$ (integer expression)             | Converts integer to octal notation in character string.                   |
| PEEK              | PEEK (addr)                             | Reads data from any memory location.                                      |
| POS               | POS (arg)                               | Returns column text cursor is on.                                         |
| RIGHT \$          | RIGHT \$ (strexpr, numexpr)             | Substring of specified number of characters, from right.                  |
| RND               | RND (numexpr)                           | Pseudo random number generator.                                           |
| SGN               | SGN (numexpr)                           | Signum function.                                                          |
| SIN               | SIN (numexpr)                           | Sine of angle in radians.                                                 |
| SPACE \$          | SPACE \$ (length)                       | Generates string of any length containing blank spaces.                   |
| SPC               | PRINT ... SPC (length)                  | PRINT command function producing blank spaces.                            |
| SQR               | SQR (numexpr)                           | Square root.                                                              |
| STR \$            | STR \$ (numexpr)                        | Converts number to character string containing the number.                |
| STRING \$         | STRING \$ (len, <numexpr/stringexpr>)   | Generates string with repeated characters.                                |
| TAB               | PRINT ... ; TAB (column); ...           | PRINT command function producing blank spaces to any point.               |
| TAN               | TAN (angle)                             | Tangent of angle in radians.                                              |
| USR               | USR (digit) (expression)                | Invokes user-defined machine-language that is previously set up function. |
| VAL               | VAL (strexpr)                           | Converts character string containing digits to number.                    |
| VARPTR            | VARPTR (<variable/#file number>)        | Returns pointer to location of variables and files in memory.             |

\_\_\_\_\_

|                                     |                                                                                                             |                                                                       |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>BLOAD</b>                        | BLOAD file name [, R] [, offset]<br>S                                                                       | Load a binary format file.                                            |
| <b>BSAVE</b>                        | BSAVE file name ,start ,end [, execution]<br>S                                                              | Save a binary format file.                                            |
| <b>CLOSE</b>                        | CLOSE [#] file number [, [#] file number] ...]                                                              | Close files.                                                          |
| <b>COPY</b>                         | COPY source file name [TO "destination file name]                                                           | Copy files.                                                           |
| <b>CVI/CVS/CVD</b>                  | CVI (2-byte string) CVS (4-byte string)<br>CVD (8-byte string)                                              | Convert string values to numeric values.                              |
| <b>DSKF</b>                         | DSKF (drive number)                                                                                         | Return the free space of a floppy disk.                               |
| <b>EOF</b>                          | EOF (file number)                                                                                           | Test if end-of-file is reached.                                       |
| <b>FIELD</b>                        | FIELD [#] file No. ,field 1 AS string variable 1<br>[field 2 AS string variable 2]...                       | Allocate the filed buffer to variables.                               |
| <b>FILES</b>                        | [L] FILES (file name)                                                                                       | Display the names of disk files.                                      |
| <b>FORMAT</b>                       | CALL FORMAT                                                                                                 | Format a floppy disk.                                                 |
| <b>GET</b>                          | GET [#] file number [, record number]                                                                       | Read a record from a random disk file.                                |
| <b>INPUT #</b>                      | INPUT# file number, variable list                                                                           | Read data from a sequential disk file.                                |
| <b>INPUT \$</b>                     | INPUT \$ (length, [#] file number)                                                                          | Return a string of specified length, read from a disk file.           |
| <b>KILL</b>                         | KILL file name                                                                                              | Delete a file from a disk.                                            |
| <b>LINE INPUT #</b>                 | LINE INPUT # file number string variable                                                                    | Read an entire line from a sequential disk file to a string variable. |
| <b>LOAD</b>                         | LOAD file name [, R]                                                                                        | Load a BASIC program into memory.                                     |
| <b>LOC</b>                          | LOC (file number)                                                                                           | Return the current record number.                                     |
| <b>LOF</b>                          | LOF (file number)                                                                                           | Return the length of a file.                                          |
| <b>LSET. RSET</b>                   | LSET string variable = string expression<br>RSET string variable = string expression                        | Move data from memory to a random file buffer.                        |
| <b>MERGE</b>                        | MERGE file name                                                                                             | Merge a specified disk file into the program in memory.               |
| <b>MKI \$<br/>MKS \$<br/>MKD \$</b> | MKI \$ (integer expression)<br>MKS \$ (single precision expression)<br>MKD \$ (double precision expression) | Convert numeric values to string values.                              |
| <b>NAME</b>                         | NAME old file name AS new file name                                                                         | Change the name of a disk file.                                       |
| <b>OPEN</b>                         | OPEN file name [FOR mode] AS [#] file number<br>[LEN = record length]                                       | Assign a file buffer for I/O.                                         |
| <b>PRINT #<br/>PRINT # USING</b>    | PRINT # file number [,USING string expression ;]<br>[expression] ...                                        | Output data to a sequential data file.                                |
| <b>PUT</b>                          | PUT [#] file number [, record number]                                                                       | Write a record from a random buffer to a random file.                 |
| <b>RUN</b>                          | RUN [file name [,R]]<br>[line number]                                                                       | Load a program file from a disk and RUN that program.                 |
| <b>SAVE</b>                         | SAVE file name [,A]                                                                                         | Save a BASIC program on memory as a disk file.                        |
| <b>SYSTEM</b>                       | CALL SYSTEM                                                                                                 | Return control to MSX-DOS                                             |
| <b>VARPTR</b>                       | VARPTR {[#] file number (variable name)}                                                                    | Return the address of the variable, or the address of FCB.            |

# ERROR MESSAGES

| ERROR MESSAGES             | MEANING/CAUSE                                                                                                                                                                  |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NEXT without FOR           | A variable in a NEXT statement does not correspond to any previously executed, unmatched FOR statement variable.                                                               |
| Syntax error               | A line is encountered that contains some incorrect sequence of characters (such as an unmatched parenthesis, misspelled command or statement, incorrect punctuation, etc.)     |
| RETURN without GOSUB       | A RETURN statement is encountered for which there is no previous, unmatched GOSUB statement.                                                                                   |
| Out of DATA                | A READ statement is executed when there are no DATA statements with unread data remaining in the program.                                                                      |
| Illegal function call      | A parameter that is out of range is passed to a math or string function. An "Illegal function call" error may also occur as the result.                                        |
| Overflow                   | The result of a calculation is too large to be represented in BASIC number format. If underflow occurs, the result is zero and execution continues without an error.           |
| Out of memory              | A program is too large, or has too many FOR loops, GOSUBs, or too many variables.                                                                                              |
| Undefined line number      | A nonexistent line is referenced in a GOTO, GOSUB, IF ... THEN ... ELSE, or DELETE statement. A new program line that contains only the line number, also causes this error.   |
| Subscript out of range     | An array element is referenced either with a subscript that is outside the dimensions of the array or with the wrong number of subscripts.                                     |
| Radimensioned array        | Two DIM statements are given for the same array; or, a DIM statement is given for an array after the default dimension of 10 has been established of that array.               |
| Division by zero           | A division by zero is encountered in an expression; or the operation of involution results in zero being raised to a negative power.                                           |
| Illegal direct             | A statement that is illegal in direct mode is entered as a direct mode command.                                                                                                |
| Type mismatch              | A string variable name is assigned a numeric value or vice versa; a function that expects a numeric argument is given a string argument, or vice versa.                        |
| Out of string space        | String variables have caused BASIC to exceed the amount of free memory remaining which has been allocated for string operation by CLEAR statement.                             |
| String too long            | An attempt is made to create a string more than 255 characters long.                                                                                                           |
| String formula too complex | A string expression is too long or too complex. The expression should be broken into smaller expressions.                                                                      |
| Can't continue             | An attempt is made to continue a program that:<br>1. Has halted due to an error.<br>2. Has been modified during a break in execution.<br>3. Does not exist.                    |
| Undefined user function    | AUSR function is called before the function definition (DEF statement) is given.                                                                                               |
| Device I/O error           | An error occurred on an I/O device operation.                                                                                                                                  |
| Verify error               | The contents of memory and the contents of a file turn out to be different. This error may occur when using CLOAD? command.                                                    |
| No RESUME                  | An error handling routine is entered but contains no RESUME statement.                                                                                                         |
| RESUME without error       | A RESUME statement is encountered before an error handling routine is entered.                                                                                                 |
| Unprintable error          | An error message is not available for the condition that exists.                                                                                                               |
| Missing operand            | An expression contains an operator with no operand following it; a command/statement is given without its compulsory parameters.                                               |
| Line buffer overflow       | An attempt is made to INPUT a line that contains more than 255 characters.                                                                                                     |
| Field overflow             | A FIELD statement is attempting to allocate more bytes than were specified for the record length of a random file.                                                             |
| Internal error             | An internal malfunction has occurred in MSX BASIC. Report to Microsoft the conditions under which the message appeared.                                                        |
| Bad file number            | A statement or command references a file with a file number that is not OPEN or is out of the range of file numbers specified at initialization.                               |
| File not found             | A LOAD KILL, NAME, or OPEN statement/command references a file that does not exist on the current disk.                                                                        |
| File already open          | A sequential output mode OPEN statement is issued for a file that is already OPEN; or a KILL statement is given for a file that is OPEN.                                       |
| Input past end             | An INPUT statement is executed after all the data in the file has been INPUT, or for a null (empty) file. To avoid this error, use the EOF function to detect the end of file. |
| Bad file name              | An illegal form is used for the file name with a LOAD, SAVE, KILL, or OPEN statement (e.g., a file name with too many characters).                                             |
| Direct statement in file   | A direct statement is encountered while LOADING and ASCII file. The LOAD is terminated.                                                                                        |
| Sequential I/O only        | A GET, or PUT statement is used with a file that has been OPENed as a sequential file.                                                                                         |
| File not OPEN              | An I/O command/statement is used with a file that has not been OPENed.                                                                                                         |

# DISK BASIC ERROR MESSAGES

| ERROR MESSAGES       | MEANING/CAUSE                                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bad FAT              | The file allocation table (FAT) is not in order. Probably the diskette is not initialized by FORMAT command.                                                                                                                   |
| Bad drive name       | An illegal drive name is used.                                                                                                                                                                                                 |
| Bad file mode        | An attempt is made to use PUT, GET, or LOF with a sequential file, to LOAD a random file, or to execute an OPEN statement with an improper file mode.                                                                          |
| Badsector number     | Should not occur in the final version of MSX DISK BASIC.                                                                                                                                                                       |
| Disk full            | All disk storage space is in use. When a Disk full error occurs and you press RETURN, it will return to command mode. However, data or program that was still unwritten to the disk when the error occurred will not be saved. |
| Disk I/O error       | An unrecoverable error occurred during a disk I/O operation.                                                                                                                                                                   |
| Disk offline         | The disk drive is off line.                                                                                                                                                                                                    |
| Disk write protected | The disk has a write protect tab intact, or is one that cannot be written to.                                                                                                                                                  |
| Field overflow       | A FIELD statement is attempting to allocate more bytes than were specified for the record length of a random file.                                                                                                             |
| File already exists  | The file name specified in a NAME statement is identical to a filename already in use on the disk.                                                                                                                             |
| File not found       | A LOAD, KILL, NEME, or OPEN statement/command references a file that does not exist on the current disk.                                                                                                                       |
| File still open      | A file is not CLOSED yet.                                                                                                                                                                                                      |
| Rename across disks  | An attempt was made to rename a file with a new drive designation. This is not allowed.                                                                                                                                        |
| Sequential I/O only  | A GET, or PUT statement is used with a file that has been OPENed as a sequential file.                                                                                                                                         |
| Too many files       | An attempt is made to create a new file (using SAVE or OPEN) when all 255 directory entries are full.                                                                                                                          |



# TROUBLESHOOTING

Check the following items if your CX5MII appears to malfunction during use. If it cannot be returned to normal working order, disconnect the power plug and contact your nearest service center.

| PROBLEM                                                       | CAUSE                                                                                             | CURE                                                                                                                     |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| The POWER lamp is not lit when the POWER switch is turned ON. | The unit is not connected to a wall outlet, or the wall outlet is "dead".                         | Connect the unit to a wall outlet, or check the outlet voltage.                                                          |
| Nothing appears on the screen.                                | There is no power to the monitor or TV.                                                           | Turn on the power.                                                                                                       |
|                                                               | The connections are improper.                                                                     | Connect the units correctly.                                                                                             |
|                                                               | The ROM cartridge is incorrectly inserted.                                                        | Insert the ROM cartridge correctly.                                                                                      |
|                                                               | The TV tuner is not set to the same channel as the TV adaptor.                                    | Match the channels of the TV and the TV adaptor.                                                                         |
|                                                               | The fine tuning, brightness and contrast of the TV are improperly adjusted.                       | Adjust the fine tuning, brightness and contrast.                                                                         |
| The reception signal is weak.                                 | The TV tuner is not set to the same channel as the RF adaptor.                                    | Match the channels of the TV and the TV adaptor.                                                                         |
|                                                               | The fine tuning of the TV requires adjustment.                                                    | Fine tune the TV.                                                                                                        |
|                                                               | The connections of the TV adaptor are incorrect.                                                  | Connect the TV adaptor correctly.                                                                                        |
| The ROM cartridge does not operate.                           | The cartridge is not fully inserted.                                                              | Fully insert the cartridge.                                                                                              |
|                                                               | The terminals of the cartridge are dirty.                                                         | Clean the terminals.                                                                                                     |
| A program cannot be loaded from cassette tape.                | The cables of the cassette recorder are incorrectly connected.                                    | Correctly connect the cables.                                                                                            |
|                                                               | The volume of the cassette recorder is too low.                                                   | Raise the volume of the cassette recorder.                                                                               |
|                                                               | The phase is incorrect (for units having adjustable phase).                                       | Correctly set the phase.                                                                                                 |
| The CX5MII "hangs" or stops during use.                       | Momentary loss of power. The POWER switch is turned OFF.                                          | Turn the power on. Operation of the unit will resume, but any programs stored in the unit will have been erased.         |
|                                                               | The power cord is disconnected. Interference free other electric devices entering the power cord. | Use a wall outlet where the effects of vacuum cleaners, microwave ovens, etc. are not present, or use an AC line filter. |
|                                                               | The connection of peripheral devices is incorrect.                                                | Connect the peripheral devices correctly.                                                                                |



# SPECIFICATIONS

## 1) CPU

Z80A (Clock frequency 3.57954MHz)

## 2) Memory

Main memory 64 KB (with memory mapper)  
 Video RAM 16 KB  
 ROM 48 KB  
 MSX-BASIC Ver. 1.0 32 KB  
 Sub ROM 16 KB

## 3) Keyboard

73 keys  
 Alpha-numeric keys and graphic characters x 49  
 Control codes, etc x 15  
 Cursor movement keys x 4  
 Function keys x 5

## 4) Video Out Specifications

Front: Alpha-numeric and graphic patterns  
 256 characters with 8 x 8 dot matrices  
 Color graphics: 16 colors with 256 x 192 resolution  
 32 sprites  
 Characters: 40/80 characters per line  
 (80 only with Green CRT or RGB TV)  
 Video output: RGB, RF, Video  
 (CX5MIIF has only RGB.)

## 5) Music Function

8 octaves 3 notes and noise

## 6) Slots

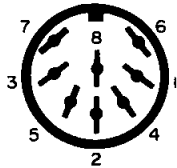
Upper slot 2 pcs.  
 Side slot 1 pcs.  
 External (front) slot 1 pcs.

## 7) Vundle software

FM Sound Synthesizer Unit II  
 FM Voicing Program II (Plug into External slot)

## 8) Cassette Data Recorder Interface

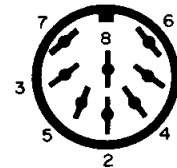
FSK 1200 BPS or 2400 BPS  
 8 pin DIN connector

| Pin# | Signal | Connection                                                                          |
|------|--------|-------------------------------------------------------------------------------------|
| 1    | GND    |  |
| 2    | GND    |                                                                                     |
| 3    | GND    |                                                                                     |
| 4    | CMTOUT |                                                                                     |
| 5    | CMTIN  |                                                                                     |
| 6    | REM+   |                                                                                     |
| 7    | REM-   |                                                                                     |
| 8    | GND    |                                                                                     |

## 9) Video/Audio Out (Except CX5MIIF)

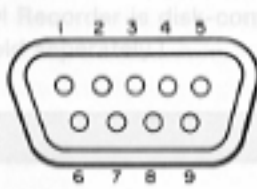
Connect with RCA type pin connection cables.

## 9) RGB Out CX5MIIF

| Pin# | Signal | Connection                                                                            |
|------|--------|---------------------------------------------------------------------------------------|
| 1    | GND    |  |
| 2    | SOUND  |                                                                                       |
| 3    | AV     |                                                                                       |
| 4    | V      |                                                                                       |
| 5    | YS     |                                                                                       |
| 6    | R      |                                                                                       |
| 7    | G      |                                                                                       |
| 8    | B      |                                                                                       |

## 10) Joystick Interface

9 pin type-D connector x 2 TTL connection

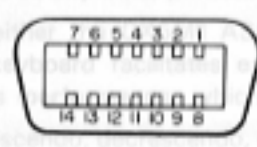
| Pin# | Signal | Connection                                                                        |
|------|--------|-----------------------------------------------------------------------------------|
| 1    | FWD    |  |
| 2    | BACK   |                                                                                   |
| 3    | LEFT   |                                                                                   |
| 4    | RIGHT  |                                                                                   |
| 5    | +5V    |                                                                                   |
| 6    | TRG1   |                                                                                   |
| 7    | TRG2   |                                                                                   |
| 8    | OUT    |                                                                                   |
| 9    | GND    |                                                                                   |

## 11) Printer Interface

8 bits parallel Centronics 14 pins TTL connection

Following conditions need to be met to produce hard copies.

- 1) More than 640 dots/line (or 480 dots/line so long as a double mode (960 dots/line) can be selected by ESC + "P")
- 2) The bit image command to be ESC + "S".

| Pin# | Signal | Connection                                                                          |
|------|--------|-------------------------------------------------------------------------------------|
| 1    | PSTB   |  |
| 2    | PDB0   |                                                                                     |
| 3    | PDB1   |                                                                                     |
| 4    | PDB2   |                                                                                     |
| 5    | PDB3   |                                                                                     |
| 6    | PDB4   |                                                                                     |
| 7    | PDB5   |                                                                                     |
| 8    | PDB6   |                                                                                     |
| 9    | PDB7   |                                                                                     |
| 10   | NC     |                                                                                     |
| 11   | BUSY   |                                                                                     |
| 12   | NC     |                                                                                     |
| 13   | NC     |                                                                                     |
| 14   | GND    |                                                                                     |

## 12) ROM Cartridge Slot (game slot)

| No. | Name   | I/O | No. | Name | I/O | No. | Name  | I/O |
|-----|--------|-----|-----|------|-----|-----|-------|-----|
| 1   | CS1    | O   | 2   | CS2  | O   | 3   | CS12  | O   |
| 4   | SLTSL  | O   | 5   | N/C  | -   | 6   | RFSH  | O   |
| 7   | WAIT   | I   | 8   | INT  | I   | 9   | MI    | O   |
| 10  | BUSDIR | I   | 11  | IORQ | O   | 12  | MERQ  | O   |
| 13  | WR     | O   | 14  | RD   | O   | 15  | RESET | O   |
| 16  | N/C    | -   | 17  | A9   | O   | 18  | A15   | O   |
| 19  | A11    | O   | 20  | A10  | O   | 21  | A7    | O   |
| 22  | A6     | O   | 23  | A12  | O   | 24  | A8    | O   |
| 25  | A14    | O   | 26  | A13  | O   | 27  | A1    | O   |
| 28  | A0     | O   | 29  | A3   | O   | 30  | A2    | O   |
| 31  | A5     | O   | 32  | A4   | O   | 33  | D1    | I/O |
| 34  | D0     | I/O | 35  | D3   | I/O | 36  | D2    | I/O |
| 37  | D5     | I/O | 38  | D4   | I/O | 39  | D7    | I/O |
| 40  | D6     | I/O | 41  | GND  | -   | 42  | CLOCK | O   |
| 43  | GND    | -   | 44  | SW1  | -   | 45  | +5V   | -   |
| 46  | SW2    | -   | 47  | +5V  | -   | 48  | -12V  | -   |
| 49  | SUNDIN | I   | 50  | -12V | -   |     |       |     |

MSX standard 50 pin connector

## 13) Extension Side Slot Pin Assignment (60 pin connector)

| No. | Name          | I/O | No. | Name          | I/O | No. | Name      | I/O |
|-----|---------------|-----|-----|---------------|-----|-----|-----------|-----|
| 1   | SOUND OUT     | O   | 2   | GND           |     | 3   | GND       |     |
| 4   | Phase Control | I   | 5   | Y             | O   | 6   | B-Y       | O   |
| 7   | C VIDEO       | O   | 8   | R-Y           | O   | 9   | EXT CLOCK | I   |
| 10  | CLOCK INT/EXT | I   | 11  | CS1           | O   | 12  | CS2       | O   |
| 13  | CS12          | O   | 14  | SLTSL         | O   | 15  | N/C       | -   |
| 16  | RFSH          | O   | 17  | WAIT          | I   | 18  | INT       | I   |
| 19  | MI            | O   | 20  | NO CONNECTION | -   | 21  | IORQ      | O   |
| 22  | MERQ          | O   | 23  | WR            | O   | 24  | RD        | O   |
| 25  | RESET         | O   | 26  | N/C           | -   | 27  | A9        | O   |
| 28  | A15           | O   | 29  | A11           | O   | 30  | A10       | O   |
| 31  | A7            | O   | 32  | A6            | O   | 33  | A12       | O   |
| 34  | A8            | O   | 35  | A14           | O   | 36  | A13       | O   |
| 37  | A1            | O   | 38  | A0            | O   | 39  | A3        | O   |
| 40  | A2            | O   | 41  | A5            | O   | 42  | A4        | O   |
| 43  | D1            | I/O | 44  | D0            | I/O | 45  | D3        | I/O |
| 46  | D2            | I/O | 47  | D5            | I/O | 48  | D4        | I/O |
| 49  | D7            | I/O | 50  | D6            | I/O | 51  | GND       | -   |
| 52  | CLOCK         | O   | 53  | GND           | -   | 54  | SW1       | -   |
| 55  | +5V           | O   | 56  | SW2           | -   | 57  | +5V       | -   |
| 58  | +12V          | -   | 59  | SOUND IN      | I   | 60  | -12V      | -   |

#### 14) General Specifications (CX5MIU, C)

AC power supply: AC 120V  $\pm$  10% 50/60Hz  
Power consumption: max 27 watts  
Operation condition: temperature 0-35°C  
                                  humidity less than 80%  
Dimensions: 440W x 98H x 285D (mm)  
                                  (17-3/10" x 3-9/10" x 11-2/5")  
Weight: 3.5 kg (25.32 lb)

#### 14) General Specifications (Except CX5MIU, C)

AC power supply: AC 220V  $\pm$  10% 50/60Hz  
                                  (Only the CX5MIIB has a voltage selector.)  
Power consumption: max 27 watts  
Operation condition: temperature 0-35°C  
                                  humidity then 80%  
Dimensions: 440W x 98H x 285D (mm)  
                                  (17-3/10" x 3-9/10" x 11-2/5")  
Weight: 3.5 kg (25.32 lb)

#### 15) FM sound Synthesizer Unit

Sound generator: FM Sound Generator  
                                  4 operators 8 algorithms  
Polyphony: 8 notes simultaneous  
Internal voices: 46 presets  
Connections: Audio output (L, R)  
                                  MIDI-IN, MIDI-OUT  
                                  Music keyboard connector  
Audio output:  
  Level: -9 dBm  
                                  FLUTE voice, 440 ~ 880 Hz  
                                  8 note simultaneous output  
  Impedance: 1.8 k $\Omega$   
Temperature range: 0 ~ 35°C  
Humidity range: 20 ~ 80%  
Dimensions: 126W x 150D x 26H mm  
                                  (5" x 5-9/10" x 1")  
Weights: 330 g (0.7 lb)

#### 16) Included Accessories (Except CX5MIIF)

RF Cable  
Cassette Interface Cable  
Antenna Switch Box  
FM Voicing Program II

#### 16) Included Accessories (CX5MIIF)

RGB Connector  
Cassette Interface Cable  
FM Voicing Program II

# CX5MII SOFTWARE AND PERIPHERAL OPTIONS

## MIDI Recorder YRM-301

This software turns your CX5MII into a 4-track real time MIDI recorder. You can record up to 4 separate tracks of MIDI data (including velocity and control change information). Each of these tracks can be edited separately. You can punch-in on even just 1 note, add, delete or copy measures, and merge tracks together.

Just as with multi-track tape recording, you can "pingpong" several tracks onto one, and continue recording on the tracks that have opened up. And because you are recording only digital information, there will never be any noise build or signal loss. Since the MIDI Recorder is disk-compatible, all data can be saved onto or loaded from a floppy disk. (Floppy Disk Drive FD-05, sold separately.)

## RX Editor YRM-302

This software greatly expands the capabilities of your Yamaha RX Digital Rhythm Machine. It lets you edit RX pattern and song data using the CX5MII, and displays all parameters and data on the screen for immediate visual conformation. The RX Editor also gives you many new capabilities that the RX by itself does not have.

For instance, you can name each pattern with a name of up to 6 letters. For most commands, you don't even have to touch the CX keyboard. Simply point to the command on the screen by moving the mouse, and click the button. (MU-01 MSX Mouse sold separately.) You can move each note forward or backward in steps of a 1/96 note, to create any subtle nuance. Also, when using the RX11, you can program separate volume and pan settings for each note. The memory holds 13,000 bytes, and since the RX Editor is disk-compatible, all song and pattern data can be quickly saved on or loaded from a floppy disk. (FD-05 Floppy Disk Drive sold separately.)

## FM Music Composer YRM-101

## FM Music Composer YRM-501

When connected to the Yamaha CX5MII Music Composer equipped with the Yamaha FM Sound Synthesizer unit, the Yamaha FM Music Composer software cartridge enables computer aided music composition and orchestration, and full performance control of all compositions. Notes are entered directly onto a music score displayed on the video monitor screen, and on-screen indication of phrasing, dynamics and performance control data is also provided. (YRM-501 allows you to store data on floppy disks as well.)

### FM Music Features

- Music composition with up to 8 separate parts can be performed automatically. Different voices can be used for each separate part, and changed at any time, permitting full orchestration control.
- Notes are entered from either the CX5MII ASCII keyboard or from a Yamaha YK-01 or YK-10/YK-20 Music Keyboard. The external keyboard facilitates easier note entry, and also permits keyboard accompaniment of "automatic" performances (performances which are electronically "recorded" and "played" by the computer.
- Notation for dynamics (crescendo, decrescendo, etc.) and tempo (ritardando, atempo, etc.) is entered from the computer keyboard, enabling a wide range of expressive control.
- The FM Music Composer can be used for automatic performance whereby compositions are played back on Yamaha's DX synthesizers and other MIDI compatible instruments.
- The full music score, along with all performance control data, can be converted to "hard copy" (printed out) with a suitable MSX-compatible external printer and/or saved on cassette tape or data memory cartridge (UDC-01).

### **FM Voicing Program YRM-102**

### **FM Voicing Program YRM-502**

The Yamaha FM Voicing Program software cartridge permits you to use the CX5MII to create synthesizer voices and play them back by means of the CX5MII's built-in FM Sound Synthesizer unit. While a rich assortment of preset voices is included with the FM Sound Synthesizer unit, the FM Voicing Program further expands the creative potential of the CX5MII by permitting creation of new voices, as well as modification of existing voices.

#### **FM Voicing Program Features**

- The FM Voicing Program enables you to modify all the voices which come preset into the FM Sound Synthesizer unit. It also enables you to create entirely new voices from scratch.
- Voices are created and edited by entering data from the CX5MII computer keyboard. All data is graphically displayed on the monitor screen. Voice creation can also be audibly monitored while editing by playing a Yamaha Music Keyboard which is connected to the computer.
- All voice data (the parameters of voices you edit or create) can be saved on cassette tape or data memory cartridge (UDC-01). The voice data can be used for performance when the CX5MII is equipped with the Yamaha FM Music Composer or the FM Music Macro program cartridges. (The YRM-502 allows you store data on floppy disks as well.)
- All voice data, and a complete listing of the names of all voices, can be converted to "hard copy" with an optional external printer.

### **DX7 Voicing Program YRM-103**

### **DX9 Voicing Program YRM-105**

### **TX7 Voicing Program YRM-304**

### **DX21 Voicing Program YRM-305**

The DX/TX Voicing Program software cartridge enables the CX5MII computer to be used for editing or creating voices for the Yamaha DX series Digital Programmable Algorithm Synthesizer and the Yamaha TX7 FM Tone Generator. The DX/TX is connected to the CX5MII via the FM Sound Synthesizer MIDI terminals. The DX/TX Voicing Program provides extremely efficient voice programming, with on-screen graphic displays of all voicing parameters.

#### **DX/TX Voicing Program Features**

- All DX/TX voicing parameters are displayed on the screen for easier, more efficient voice programming. Envelope generator and keyboard scaling data can be displayed numerically and graphically, for real-time visual confirmation of these parameters as they are changed.
- LFO (Low Frequency Oscillator) settings and other voice-modifying parameters can also be stored in CX5MII memory, so each distinct voice will have its own characteristic setting.
- All voice data, and a full listing of all voices, can be converted to "hard copy" with an external printer, saved on cassette tape, and/or stored on UDC-01 Data Memory cartridges and DX/TX RAM cartridges. LFO settings and other voice modifying parameters can also be stored on external memory. (The YRM-304 & 305 allow you to store data on floppy disks as well.)
- Editing of voice data can be done from either the CX5MII or from the DX/TX itself.

### **Yamaha FM Music Macro YRM-104**

### **Yamaha FM Music Macro II YRM-504**

The Yamaha FM Music Macro software cartridge allows the voicing and performance potential of the Yamaha FM Sound Synthesizer unit to be used within the framework of an MSX Basic program. Versatile Basic commands are provided for voice selection, music composition, and automatic performance. These special commands are used in a Basic program along with the full range of commands available in MSX Basic, adding the vast potential of the Yamaha FM Sound Synthesizer unit to standard Basic programming. (The YRM-504 allows you to store data on floppy disks as well.)

#### **Yamaha FM Music Macro Features**

- Up to four different voices may be used for simultaneous performance, providing dynamic musical performance capability within a Basic program.
- Music may be composed with up to 8 separate parts.
- Preset rhythm patterns may also be selected and modified for automatic performance along with the other synthesized voices.
- For a wider range of expressive control, volume and pitch may also be modified during performance of an individual voice.
- Performance data can be output to Yamaha DX synthesizers and other MIDI compatible instruments.

### **Yamaha Dot Impact Printer PN-101**

The PN-101 is a compact and quiet 9 dot printer for the CX5MII or any MSX computer. It will accept fan-fold paper, roll or sheet paper, and will print up to 80 characters per line. When used with Yamaha music software, it will make hard copy of the screen display graphics. Printing speed is 40 characters per second.

### **Yamaha 3.5 inch Floppy Disk Drive FD-05**

The FD-05 is a compact and quiet disk drive for use with the CX5MII or any MSX computer. It uses the standard MSX 3.5 inch dual-side double-density disks, with a capacity of 1 megabyte per disk. (720K bytes when formatted) Data from Yamaha FDD-compatible software (such as MIDI Recorder YRM-301 and RX Editor YRM-302) can be quickly stored to or loaded from a disk.

#### **NOTE:**

Only printers specified as being MSX-compatible may be used with the CX5MII. Only joysticks, paddles, touch pads, and other peripheral devices specified as being MSX-compatible may be used with the CX5MII.

In addition to the ROM software cartridges made available by Yamaha, the CX5MII will also run any ROM software cartridge specified as being compatible with an MSX computer.

#### **SERVICE**

The CX5MII are supported by Yamaha's worldwide network of factory trained and qualified dealer service personnel. In the event of a problem, contact your nearest Yamaha dealer.

Date : 10, Apr, 1985  
Version : 1.00

| Function ...    |                                                                         |                         |      |     |         |  |  |  |  | Transmitted  |           | Recognized   |       |                   |             | Remarks |         |
|-----------------|-------------------------------------------------------------------------|-------------------------|------|-----|---------|--|--|--|--|--------------|-----------|--------------|-------|-------------------|-------------|---------|---------|
|                 |                                                                         |                         |      |     |         |  |  |  |  | Synthe.      | Sequencer | Solo         | Poly  | Seq.              | Rh.         |         |         |
| Basic           | Default                                                                 |                         |      |     |         |  |  |  |  | 1            | 1         | 1*           | same  | x                 | * #2-#4 off |         |         |
| Channel         | Changed                                                                 |                         |      |     |         |  |  |  |  | 1-16         | 1-16      | 1-16         | as #1 | x                 |             |         |         |
| Mode            | Default                                                                 |                         |      |     |         |  |  |  |  | 3            | 3         |              |       | x                 |             |         |         |
|                 | Messages                                                                |                         |      |     |         |  |  |  |  | x            | x         |              |       | x                 |             |         |         |
|                 | Altered                                                                 | *****                   |      |     |         |  |  |  |  | x            | x         |              |       | x                 |             |         |         |
| Note            |                                                                         | 36-84                   |      |     |         |  |  |  |  | 0-127        | 0-127     |              |       | x                 |             |         |         |
| Number          |                                                                         | *****                   |      |     |         |  |  |  |  | 0-127        | 0-127     |              |       | x                 |             |         |         |
| Velocity        | Note ON                                                                 | x                       | v=64 | o   | v=1-127 |  |  |  |  | o            |           |              | x     |                   |             |         |         |
| Number          |                                                                         |                         | x    | 9nH | v=0     |  |  |  |  | x            |           |              | x     |                   |             |         |         |
| After           | Key's                                                                   |                         |      |     |         |  |  |  |  | x            |           |              | x     |                   |             |         |         |
| Touch           | Ch's                                                                    |                         |      |     |         |  |  |  |  | x            |           |              | x     |                   |             |         |         |
| Pitch           | Bender                                                                  |                         |      |     |         |  |  |  |  | x            |           |              | x     |                   |             |         |         |
|                 | ( 5 )                                                                   |                         |      |     |         |  |  |  |  | x            | o         | x            | x     | Portamento Speed  |             |         |         |
|                 | ( 7 )                                                                   |                         |      |     |         |  |  |  |  | x            | o         | o            | x     | Volume            |             |         |         |
|                 | (64)                                                                    |                         |      |     |         |  |  |  |  | x            | o         | o            | x     | Sustain ON/OFF    |             |         |         |
| Control         | (65)                                                                    |                         |      |     |         |  |  |  |  | x            | o         | x            | x     | Portamento ON/OFF |             |         |         |
| Change          |                                                                         |                         |      |     |         |  |  |  |  |              |           |              |       |                   |             |         |         |
| Prog            |                                                                         |                         |      |     |         |  |  |  |  | x            | o         | 0-47         | x     |                   |             |         |         |
| Change : True # |                                                                         | *****                   |      |     |         |  |  |  |  | 0-47         | x         |              |       |                   |             |         |         |
| System          | Exclusive                                                               |                         |      |     |         |  |  |  |  | x            |           |              | x     |                   |             |         |         |
| System          | Song pos                                                                |                         |      |     |         |  |  |  |  | x            |           |              | x     |                   |             |         |         |
|                 | Song sel                                                                |                         |      |     |         |  |  |  |  | x            |           |              | x     |                   |             |         |         |
| Common          | Tune                                                                    |                         |      |     |         |  |  |  |  | x            |           |              | x     |                   |             |         |         |
| System          | :Clock                                                                  | o(Internal Mode)        |      |     |         |  |  |  |  | o(MIDI Mode) |           |              |       |                   |             |         |         |
| Real Time       | :Commands                                                               | o(Internal Mode)*       |      |     |         |  |  |  |  | o(MIDI Mode) |           | * Except FBH |       |                   |             |         |         |
| Aux             | :Local ON/OFF                                                           | x                       |      |     |         |  |  |  |  | x            |           | x            |       |                   |             |         |         |
|                 | :All Notes OFF                                                          | o(126,127,123)          |      |     |         |  |  |  |  | o(123)       |           | x            |       |                   |             |         |         |
| Mes-            | :Active Sense                                                           | x                       |      |     |         |  |  |  |  | x            |           | x            |       |                   |             |         |         |
| sages           | :Reset                                                                  | x                       |      |     |         |  |  |  |  | x            |           | x            |       |                   |             |         |         |
| Notes           | In Split/Dual-Mode(of POLY Mode),MIDI Ch# of Inst#2 is same as Inst#1's |                         |      |     |         |  |  |  |  |              |           |              |       |                   |             |         |         |
|                 | In order to clear all notes, we send [All Notes OFF (126,127,123)]      |                         |      |     |         |  |  |  |  |              |           |              |       |                   |             |         |         |
| Mode 1          | : OMNI ON, POLY                                                         | Mode 2 : OMNI ON, MONO  |      |     |         |  |  |  |  |              |           |              |       |                   |             |         | o : Yes |
| Mode 3          | : OMNI OFF, POLY                                                        | Mode 4 : OMNI OFF, MONO |      |     |         |  |  |  |  |              |           |              |       |                   |             |         | x : No  |

