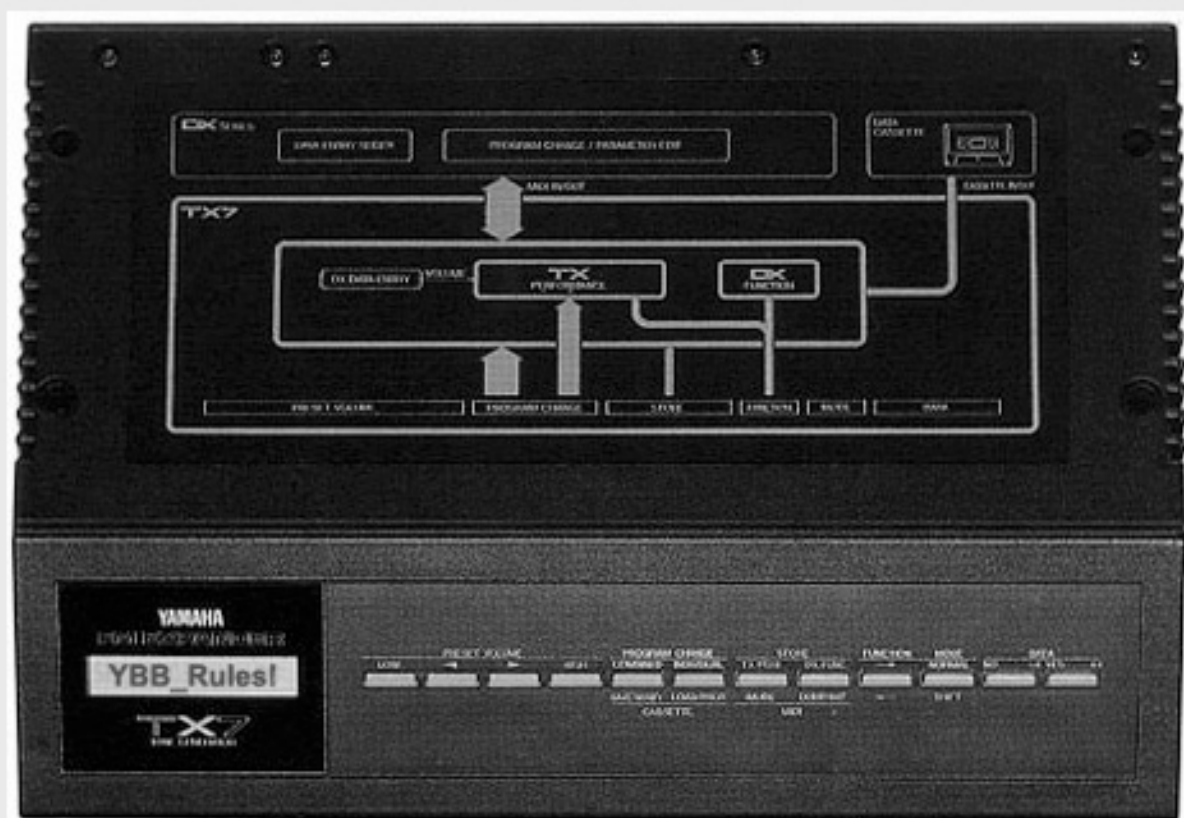


FM TONE GENERATOR

TX7

TX7

SERVICE MANUAL



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SINCE 1887



YAMAHA

SPECIFICATIONS

Sound Source	FM Tone Generator (6 Operators)
Simultaneous Output Notes	Polyphonic: 16 (first note priority) Monophonic: 1 (last note priority)
Internal Memory	32 PERFORMANCES (32 VOICES + 32 FUNCTIONS) 32 DX FUNCTIONS
Control Panel	PRESET VOLUME (4) PROGRAM CHANGE/CASSETTE (2) STORE/MIDI (2) FUNCTION (1) NORMAL/SHIFT (1) DATA ENTRY (2)
Display	LCD (16 characters x 1 line)
Connection Terminals	MIDI IN (DIN JACK 5P) MIDI OUT (DIN JACK 5P) MIDI THRU (DIN JACK 5P) CASSETTE (DIN JACK 8P) OUTPUT (PHONE JACK MONO) HEAD PHONE (PHONE JACK STEREO)
Power Requirements	US & Canadian models: 120V 50/60Hz General model: 220-240V 50/60Hz
Power Consumption	US & Canadian models: 12W General model: 10W
Dimensions (W x H x D)	351 x 50 x 241 mm (13-5/8" x 2" x 9-1/2")
Weight	2.3 kg (5 lbs. 1 oz.)

* All specifications are subject to change without notice.

IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

WARNING: Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

IMPORTANT: The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING: Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

IMPORTANT: Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

HOW TO USE THE TX7

1. What is the TX7?

The TX7 is a tone generator module that can be controlled by MIDI signals from the DX series, QX1, CX5 etc. It is the equivalent of the DX7 tone generating section. When connected to a DX7 or DX9, it can act as a function memory for the DX7 or DX9, and thus allow you to create sounds just like a DX1.

[Features]

- FM tone generation system.
- 16 note polyphonic.
- Internal memory: 32 voice data, 32 function data, stored in pairs. Each voice memory has its own function memory.
- Individual volume and high and low note limits can be set for each voice memory. Also, independently of the voice memory, two volumes may be preset, and recalled instantly by a front panel switch. This can be used for muting.
- Besides the TX7's own 32 voice memories and 32 function memories, it will store 32 function memories for the DX7. This can be used as an extended function memory for the DX7.

2. Memory diagram and flowchart of the TX7

The internal memory structure is shown below.

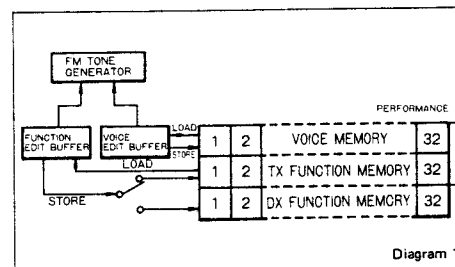


Diagram 1

The internal memory is as follows.

Voice edit buffer
Function edit buffer
32 voice memories
32 function memories
32 DX function memories
Volume, master tune

The voice and function data of the selected memory number is loaded into the voice and function buffers. Then, the voice and function data is loaded into the FM tone generator, and it is ready to produce sound.

All editing of voice and function data is done on the data in the buffers.

When the store command is executed, the data in the buffers is stored into the respective memories.

The data in the function edit buffer will be stored into the memory that you designate.

3. How the switches work

There are four kinds of switches on the front panel of the TX7. ① Switches to enter volume and data, ② Switches that have different operations when in normal or shift mode, ③ Selector switch normal/shift mode, ④ Switches to set function data. The operation of switches types ② ~ ④ is shown below.

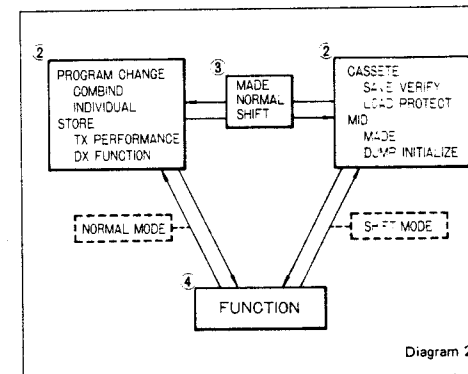


Diagram 2

NORMAL MODE: Program change mode
Store mode
Function mode
SHIFT MODE: Cassette mode
MIDI mode
Function mode

When changing from program change or store modes to cassette or MIDI modes, press MODE switch to change to SHIFT mode. Then press the cassette or MIDI switch. When changing the other way back to program change or store modes, press MODE switch again to change to NORMAL mode. Then press the program change or store mode switch.

The diagram below shows the assignment of the TX7's switches. When you press each switch (left), this message will appear (right).

TX7 SWITCH ASSIGNMENTS	
SWITCH	LCD DISPLAY
FUNCTION MODE	MASTER TUNE -SA-BB PLAY MODE -POLY/MONO PW 2ND=0-2: STR=0-12 PORTA (RTN/FLW) (PRT/CLS) 0-24 PORTA (PUL/PDS) (PRT/CLS) 0-24 MONO MONO (FLA/FDO PRT/CLS) 0-24 MIN=0-15: P(0/1), A(0/1), E(0/1) FD=0-15: P(0/1), A(0/1), E(0/1) BC=0-15: P(0/1), A(0/1), E(0/1) AT=0-15: P(0/1), A(0/1), E(0/1) SP L=(0-2-GB), H=(0-2-GB) ATTENUATION
NORMAL MODE	STORE PROGRAM CHANGE JMS 1-32 VOICE NAME JMS 1-32 VOICE NAME
SHIFT MODE	FUNCTION COPY? EDIT VOICE OUT? VOICE TRANSFER? VOICE INIT? 2: ENTRY REV (ON/OFF) MDI REV CH (1-16) NAME MODE (ON/OFF) 3: ENTRY VOL (ON/OFF) STL CHNG REV (ON/OFF) CASSETTE MEM PROTECT (ON/OFF) LOAD FUND INT EXT LOAD CASSETTE? SAVE NUMBER 0-127 SAVE FUND INT EXT SAVE "APR" TX=SAVE NUMBER VERIFY CASSETTE

The list below shows the abbreviations used with the TX7, and their full meaning.

TX7 ABBREVIATIONS	
FUNCTION MODE	
PW 2ND=(0-12) STEP=(0-12)	PITCH BEND WHEEL RANGE=(0-12) STEP=(0-12)
PORTA (RTN/FLW) (PRT/CLS)	PORTAMENTO (RETAIN/FOLLOW) (PORTAMENTO/SLISSAND)
PORTA (PUL/PDS) (PRT/CLS)	PORTAMENTO (FULL TIME/FINGERED) (PORTAMENTO/SLISSAND)
MIN=(0-15) P(0/1), A(0/1), E(0/1)	MODULATION WHEEL RANGE=(0-15) PITCH(OFF/ON)
FD=(0-15) P(0/1), A(0/1), E(0/1)	AMPLITUDE (OFF/ON) EQ BIAS (OFF/ON)
BC=(0-15) P(0/1), A(0/1), E(0/1)	FOOT CONTROLLER RANGE=(0-15) PITCH(OFF/ON)
AT=(0-15) P(0/1), A(0/1), E(0/1)	AMPLITUDE (OFF/ON) EQ BIAS (OFF/ON)
SP L=(0-2-GB), H=(0-2-GB)	BREATH CONTROLLER RANGE=(0-15) PITCH(OFF/ON)
	AMPLITUDE (OFF/ON) EQ BIAS (OFF/ON)
	AFTER TOUCH RANGE=(0-15) PITCH(OFF/ON)
	AMPLITUDE (OFF/ON) EQ BIAS (OFF/ON)
	SPLIT L=(0-2-GB), H=(0-2-GB)
SHIFT MODE	
MDI VOICE INIT?	VOICE INITIALIZED?
2: ENTRY REV (ON/OFF)	DATA ENTRY RECEIVE (ON/OFF)
MDI REV CH (1-16)	MDI RECEIVE CHANNEL (1-16)
3: ENTRY VOL (ON/OFF)	DATA ENTRY VOLUME (ON/OFF)
STL CHNG REV (ON/OFF)	CONTROL CHANGE RECEIVE (ON/OFF)

4. Program change mode

This is the mode to select voices. Use this mode when playing the TX7. This mode has the following two choices.

- Combined mode (when power is switched on, it will be in this mode.)
- Individual mode

Select voices using the [YES +1] [NO -1] switches.

1) Combined mode

Here is a diagram showing the data flow when a DX7 is connected to MIDI IN/OUT when the TX7 is in combined mode.

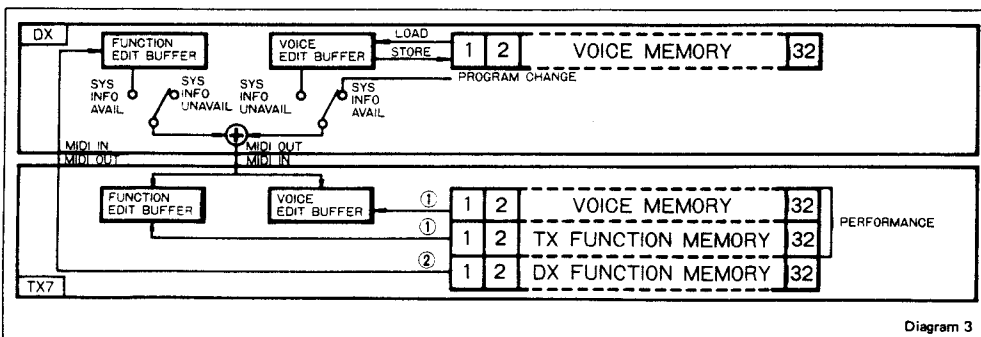


Diagram 3

- When you press a voice select switch on the DX7, program change data is sent from MIDI OUT. The TX7 will load voice and function data for the selected program number into its edit buffers ① At the same time, the DX function data for that program number will be sent from the TX7 MIDI OUT as one performance bulk data ②

- The same thing will happen if you select a program number using the TX7 switches. In this way, by using the program select switches of either the TX7 or the DX7, you can change both function memories simultaneously, simulating the operation of the DX1 performance memory.

2) Individual mode

- In the setup shown in diagram 3, when you press a DX7 voice select switch, program change data will be sent from MIDI OUT. The TX7 will send the DX function data for that program number out of its MIDI OUT as one performance bulk data ② However, the TX7 voice and function will not change, ie. ① will not occur.

- In the setup shown in diagram 3, when you change the TX7 voice number, the TX7 will load the selected voice and function data into its buffers ① However, DX function data will not be sent from MIDI OUT, ie. ② will not occur.

In this way, you may select programs independently for the TX7 and DX7, and change voice and function memories as a pair, thus expanding the possibilities of combinations.

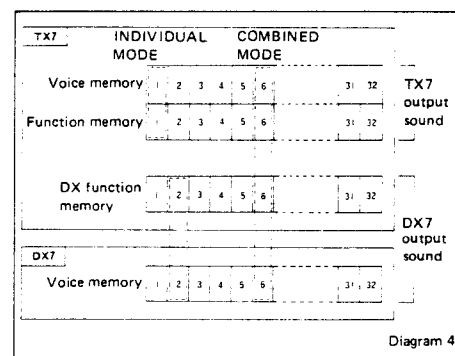


Diagram 4

3) Editing voices of the TX7

You may edit TX7 voices by sending the voice data from the TX7 to an editing device (such as the DX7), editing it, and sending the edited voice data back to the TX7.

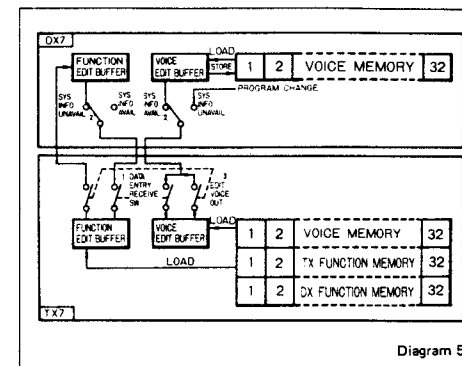


Diagram 5

- ① Turn the TX7 Data Entry Receive ON. (MIDI mode)
- ② Set the editing device to accept TX7 voice data. (For example, using the DX7, set the internal memory protect OFF, and set system information to AVAIL.)
- ③ When the TX7 display shows edit voice out, press [YES +1] to transmit the voice data in the edit buffer.
- ④ Put the editing device in edit mode, and edit the voice. This will change the data in the TX7 voice edit buffer (one parameter at a time). At present (January 1985), possible editing devices are DX7, DX9, DX1, YRM13.

*When in program change mode (combined mode, individual mode), if the DX7 system information is AVAIL and you press a voice select switch, 1 voice bulk data will be sent from MIDI OUT, and the data in the TX7 voice edit buffer will be replaced by the new data from the DX7.

5. Cassette mode

In this mode, you may store 32 voice and 32 TX function data, or 32 voice and 32 DX function data onto a cassette. Or, you may load this data from the cassette.

1) **Save** ... Saving data onto a cassette. Press SAVE/VERIFY while in shift mode.

- ① To keep track of data stored on a cassette, assign an index number to the data. When loading, the TX7 will display this number.

SAVE NUMBER ... Use the [+1] [-1] switches to select a number 0 ~ 127.
Save number

- ② Select the function data you want to save.

SAVE FUNC? ... Select using [+1], [-1] switches.
INT or EXT

1	2	VOICE MEMORY	32	→ INT
1	2	TX FUNCTION MEMORY	32	
1	2	DX FUNCTION MEMORY	32	

"INT" Save 32 voice data and 32 TX function data.
*This is automatically selected when power is turned ON.
"EXT" Save 32 voice data and 32 DX function data.

- ③ Execute save

SAVE TAPE? TX = ... To save, press [+1].
Save number

NOW WORKING!! ... This will take about 45 seconds. If you want to abort, press [-1].

FINISHED!!! ... Save completed.

*Attenuation function data will not be saved on tape.

- Saving the DX7 data together with the TX7 data as a performance.

- Set **[SAVE FUNC]** to INT and save. (Save the TX7 data as in steps ① ~ ③. [TAPE 1].)
- Turn the TX7 memory protect OFF.
- Send 32 DX7 voice data to the TX7. (MIDI TRANS-MIT)
The 32 TX7 voice memories now hold the DX7 voices.
- The TX7 will display "MIDI RECEIVED".
- Change to **[SAVE NUMBER]** to distinguish between DX7 and TX7 data.
- Set **[SAVE FUNC]** to EXT and save. (Save the DX7 data as in steps ① ~ ③. [TAPE 2])

TAPE 1	TAPE 2
TX-x	TX-y
32 VOICE DATA	32 (DX7) VOICE DATA
32 TX FUNCTION DATA	32 DX FUNCTION DATA

- 2) **Verify** ... Checking to see if data has been correctly saved. Press SAVE/VERIFY after saving data.

VERIFY CASSETTE? ... Press [+1].

NOW WORKING!! ... Play the tape. If you want to quit, press [-1].

FOUND TX = ... Save number

FINISHED!!! ... Tape data is OK. If there is a problem [TAPE ERROR] will be displayed.

- 3) **Protect** ... Protect memory. Press LOAD/PROTECT.

- ① Turn off memory protect. When loading from a cassette, receiving 32 voice and 64 performance data via MIDI, or storing to memory, protect must be turned OFF. When the power is turned ON, memory protect will be ON.

MEM PROTECT ON ... To turn memory protect OFF, press [-1].
OFF

- 4) **Load** ... Load data from tape. Press LOAD/PROTECT.

- ① Select the function data you want to load.

LOAD FUNC? ... Select using [+1] [-1] switches
INT or EXT

1	2	VOICE MEMORY	32	→ INT
1	2	TX FUNCTION	32	
1	2	DX FUNCTION	32	

Load 32 TX7 voice data and 32 TX7 function data.
Load 32 TX7 voice data and 32 DX7 function data.

- ② Execute load.

LOAD CASSETTE? ... To begin load, press [+1].

NOW WORKING!! ... If you want to abort, press [-1].

FOUND TX = ... Data has been found.
Save number

FINISHED!!! ... Finished loading.

LOAD CASSETTE?

*If you attempt to load while memory protect is ON, [MEMO-RY PROTECT] will be displayed, and you will not be able to load.

6. Store mode

In this mode you may store data from the edit buffers into memory.

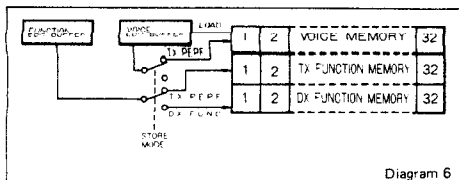


Diagram 6

- 1) **Store TX performance** ... Store voice and TX function data in the buffers into the voice memory and TX function memory you select. Press TX PERF.

- ① Selecting the memory number to store into.

STR TX PERF? ... Select the memory number using the [TX PERF] switch.
Memory number
*Set memory protect OFF.

To store, press [+1]

FINISHED!!! ... Voice and TX function data has been saved into the memory number you selected.

*The TX7 stores voice and function data as a pair. You cannot save only one of the other.

- 2) **Store DX function** ... Store the function data in the edit buffer into the DX function memory you select. Press DX FUNC.

- ① Selecting the memory number to store into.

STR DX5 FUNC? ... Select the memory number using the [DX FUNC] switch.
Memory number
*Set memory protect OFF.

To store, press [+1]

FINISHED!!! ... Function data has been saved into the DX function memory you selected.

7. MIDI mode

In this mode, you may set the conditions for MIDI data reception (MODE), and transmit or initialize voice data (DUMP/INIT).

- 1) **Setting TX7 MIDI reception condition** - Press (MODE).

- ① Control change reception

CTL. CHNG. REC. ... Select using [+1] [-1].
ON or OFF

"ON" ... The following control signals will be received.

- Modulation wheel
- Breath controller
- Foot controller
- Portamento time
- Volume (Not the same as volume control via the data entry slider.)
- Sustain switch
- Portamento switch

"OFF" ... The above control signals will not be received.

*Control change reception is memorized.

- ② Data entry reception

D. ENTRY RCV. ... Select using [+1], [-1].
ON or OFF

"ON" ... The following MIDI signals will be received. (when editing TX7 voice or function data)

- Data entry
- Increment
- Decrement

"OFF" ... The above signals will not be received.

*Data entry reception ON/OFF is memorized.

*This switch and the data entry volume switch cannot both be ON at the same time. When you set the data entry volume switch ON, this switch will automatically go OFF.

- ③ MIDI receive channel.

MIDI RCV. CH ... Select using [+1], [-1].
MIDI channel 1 ~ 16

*The TX7 MIDI output channel is automatically channel 1.

*The selected receive channel number is memorized.

- ④ Omni mode

OMNI MODE ... Select using [+1] [-1]
ON or OFF

"ON" ... The MIDI receive channel setting will have no effect, and MIDI signals on all channels will be received.
"OFF" ... Only MIDI signals with the same channel number as the receive channel setting will be received.

*Omni mode ON/OFF is memorized.

- ⑤ Data entry volume

D. ENTRY VOL ... Select using [+1] [-1]
ON or OFF

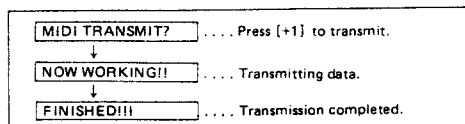
"ON" ... You may control the TX7's volume using the data entry slider on the DX7, DX9 or DX1.
"OFF" ... The data entry slider will not affect the TX7's volume.

*Data entry volume ON/OFF is memorized.

*This switch and the data entry receive switch cannot both be ON at the same time. When you set the data entry receive switch ON, this switch will automatically go OFF.

2) Transmitting and initializing voice data – Press (DUMP/INIT)

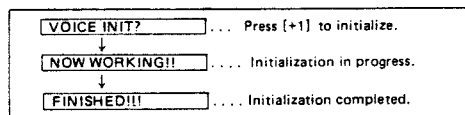
- ① MIDI transmit ... 32 voice and 64 performance data will be sent from the TX7 MIDI OUT.



*When transmitting to the DX7, set the DX7 memory protect OFF and set system information AVAIL.

*For the data format, see MIDI Data Format 4-8 (32 voice) and 4-7 (64 performance).

- ② Voice initialize ... This will set all data in the TX7 voice and function edit buffers, 32 voice, 32 TX function, and 32 DX function memories to the initial valves shown in table 1.



*If you want to initialize all memory to the valves in table 1, set memory protect OFF.

*If memory protect is ON when you initialize, [MEM. PROTECTED] will be displayed, and only the voice and function buffers will be initialized.

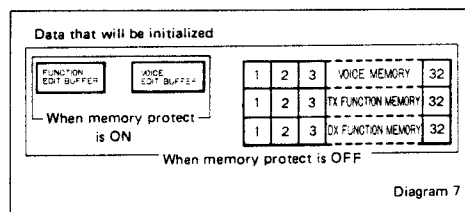


Diagram 7

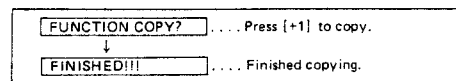
Table 1
<Initialize data>

VOICE		
Algorithm	1	
Feedback	0	
Pitch	8 feet	
EG		
EG scaling	None	
Output level	OP1	99
	OP2	6 0
Modulation	0	
Oscillator key sync	ON	
Transpose	C3	
LFO	Valve	Triangle
	Speed	35
	Delay	0
	Pitch modulation sensitivity	3
	Pitch modulation depth	0

FUNCTION

Master tune	440Hz	
Play mode	POLY	
Pitch bend	Range	7
	Step	0
Portamento	Mode	RETAIN
	Glissando switch	PORTAMENTO
	Time	0
Modulation wheel	Range	8
	Pitch	1
	Amplitude	0
	EG bias	0
Foot controller	Range	8
	Pitch	0
	Amplitude	0
	EG bias	0
Breath controller	Range	15
	Pitch	0
	Amplitude	0
	EG bias	0
After touch	Range	8
	Pitch	0
	Amplitude	0
	EG bias	0
Key limit	Lowest	C-2
	Highest	G8
Attenuation	7	

- ③ Function copy ... Copy the data in the function edit buffer to all 32 TX function memories or to all 32 DX function memories.



*The copying destination is determined by the cassette mode save function.

"INT" ... Copy function edit buffer to all 32 TX function memories.

"EXT" ... Copy function edit buffer to all 32 DX function memories.

*Before you copy, set memory protect OFF.

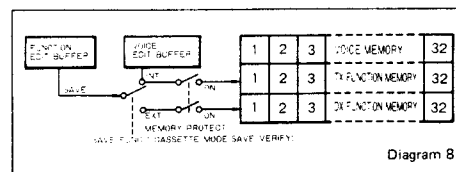
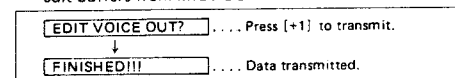


Diagram 8

- ④ Edit voice out ... Send the voice and function data in the edit buffers from MIDI OUT.



*Data is sent in the following order.

1. Function (1 performance bulk).
2. Voice (1 voice bulk).

*When transmitting to the DX7, set the DX7 memory protect OFF and set system information AVAIL.

8. Function mode

In this mode you may edit the data in the function edit buffer. Choose the parameter using the [FUNCTION] switch, and set the value using the [+1] [-1] switches. The [FUNCTION] switch will step through the functions in the order shown in table 2, and in shift mode, will step in the reverse order. Except for MASTER TUNE, all parameters may be set independently for each of the 32 function memories.

Table 2

(PARAMETER)

MASTER TUNE	MASTER TUNE	1
PLAY MODE	PLAY MODE	1
PITCH WHEEL RANGE	PW RANGE	STP
PITCH WHEEL STEP	PW STEP	TP
PORTAMENTO MODE (RTN, FLW, FGD, FUL)	PORTA	1
GLISSANDO SWITCH (GLS, PRT)	PORTA	2
PORTAMENTO TIME	PORTA	3
MODULATION WHEEL RANGE	MW	4
PITCH SW	MW	5
AMP SW	MW	6
EG RAS SW	MW	7
FOOT CONTROL RANGE	FC	8
PITCH SW	FC	9
AMP SW	FC	10
EG BIAS SW	FC	11
BREATH CONTROL RANGE	BC	12
PITCH SW	BC	13
AMP SW	BC	14
EG BIAS SW	BC	15
AFTER TOUCH RANGE	AT	16
PITCH SW	AT	17
AMP SW	AT	18
EG RAS SW	AT	19
LIMIT LOWEST KEY	SP	20
LIMIT HIGHEST KEY	SP	21
ATTENUATION	ATTENUATION	22

- *1 When POLY, RETAIN (RTN) sus key FOLLOW (FLW) sus key FINGERED (FGD) FULLTIME (FUL) When MONO.

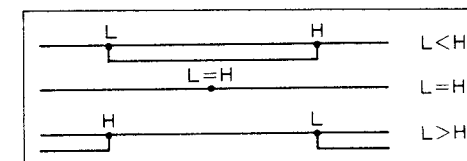
- *2 GLISSANDO (GLS) or PORTAMENTO (PRT)

- *3 The RANGE for MODULATION, FOOT, BREATH, and AFTERTOUCH will be displayed on a scale of 0 ~ 15. (The same as the DX1.) The relation to the DX7 range is shown below.

TX7	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DX7	0	6	13	19	26	33	39	46	53	59	66	72	79	86	92	99

- *4 SW. will be displayed as ON = 1, OFF = 0.

- *5 LIMIT KEY will be displayed as note name C-2 ~ G8. Key limit settings and note production range for the TX7 is shown below.



- *6 ATTENUATION is on a scale of 0 ~ 7.

The volume may be changed in 8 steps, with 7 as maximum and 0 as minimum. Settings of the preset volume switch or MIDI volume data will be adjusted on this scale.

9. Preset volume

You may raise or lower the volume of the TX7, and establish 2 preset volume levels.

- ① Raise volume ... Press the [>] switch. (press and hold)

*The volume will increase on a scale of 0 ~ 80 (81 levels), and the dark section of the LCD will increase or decrease with the volume. When you release the switch, the volume will stay at that level. The [<] switch has the same operation.

- ② Lower volume ... Press the [<] switch. (press and hold)

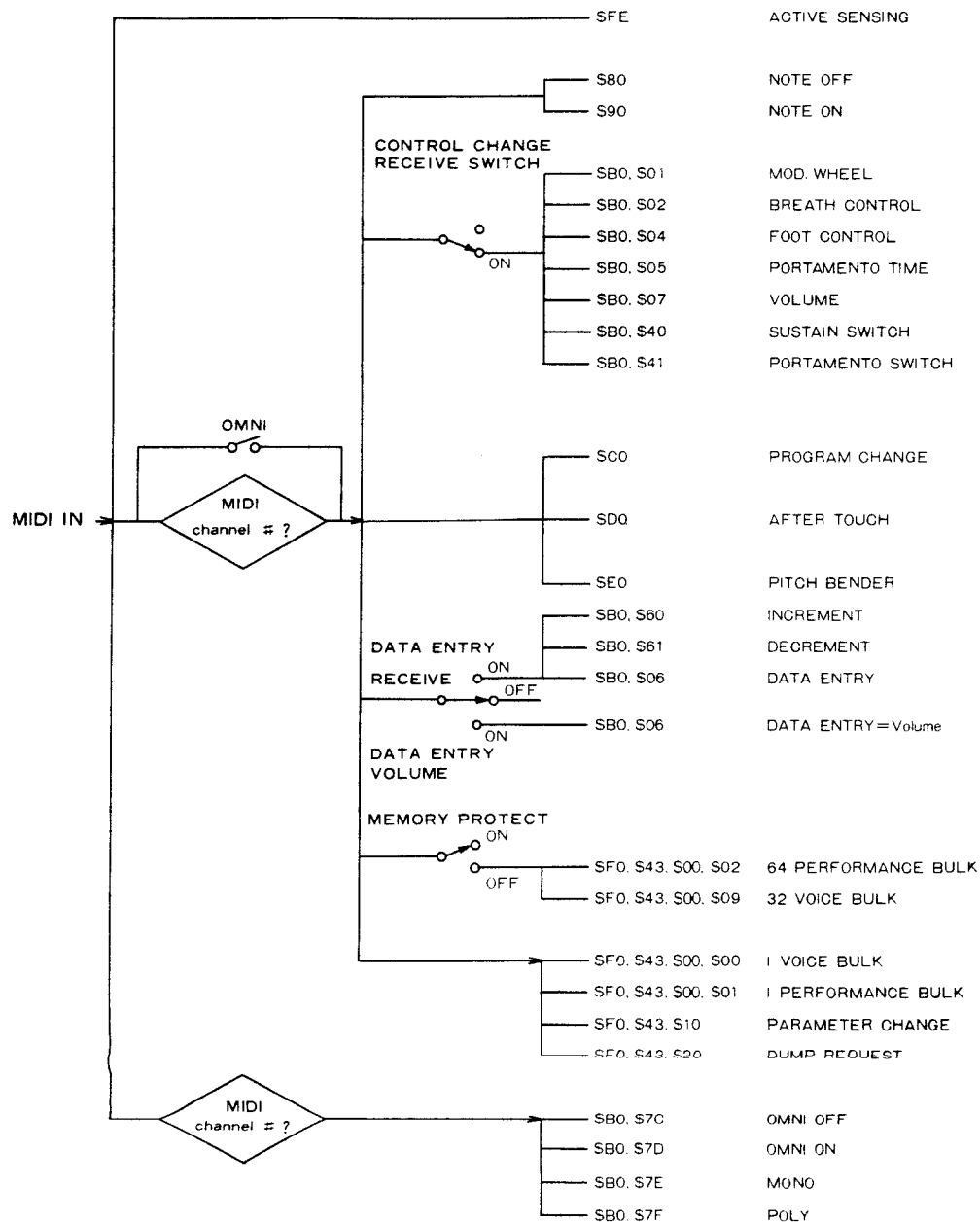
- ③ Store volume (LOW) ... While pressing the [LOW] switch, set the volume using the [>] [<] switches. Then release the [LOW] switch.

- ④ Store volume (HIGH) ... While pressing the [HIGH] switch, set the volume using the [>] [<] switches. Then release the [HIGH] switch.

- ⑤ Recall volume ... Press and release the [LOW] or [HIGH] switch. The volume you preset will be recalled.

MIDI DATA FORMAT

1. Reception conditions



2. Reception data

2-1 Reception Channel, Omni

Using the panel switches, you may select the TX7 MIDI reception basic channel 1-16 and OMNI ON/OFF, and store this in memory. When OMNI OFF, only data with a channel number corresponding to the basic reception channel will be received, but when OMNI ON, data for, all channels will be received.

2-2 Channel Voice Messages

2-2-1 Key OFF

Status 1 0 0 0 n n n n n = channel number.
Note no. 0 k k k k k k k k = 0 (C-2) ~ 127 (G8)
Velocity 0 v v v v v v v v v = ignored

2-2-2 Key ON/OFF

Status 1 0 0 1 n n n n n = channel number
Note no. 0 k k k k k k k k = 0 (C-2) ~ 127 (G8)
Velocity 0 v v v v v v v v v = 0 Key OFF
v = 1 ~ 127 Key ON

2-2-3 Control change

Status 1 0 1 1 n n n n
Control No. 0 c c c c c c c
Control value 0 v v v v v v v

(a) Data received when CONTROL CHANGE RECEIVE SWITCH ON

C = 1 Modulation
C = 2 Breath controller
C = 4 Foot controller
C = 5 Portamento time
C = 7 Volume
C = 64 Sustain SW.
C = 64 Portamento SW.

(b) Data received when DATA ENTRY RECEIVE SWITCH ON

C = 6 Data entry
C = 96 Increment
C = 97 Decrement

This data will change the voice or function parameter which has been selected by a system exclusive message.

(c) Data received when DATA ENTRY VOLUME ON

C = 6 Data entry
The data entry data will be received as volume data.

2-2-4 Program change

Status 1 1 0 0 n n n n
Program no. 0 p p p p p p p

It will disregard the 2 most significant bits of program no. and select programs 1-32.
This will be received only when the TX7 is in program change mode (COMBINED or INDIVIDUAL).

2-2-5 After touch

Status 1 1 0 1 n n n n
Pressure 0 v v v v v v v v

2-2-6 Pitch bend

Status 1 1 1 0 n n n n
Value (LSB) 0 u u u u u u u
Value (MSB) 0 v v v v v v v
8 bit resolution

2-3 Channel Mode Messages

Status 1 0 1 1 n n n n
0 c c c c c c c
0 v v v v v v v

C = 124 V = 0 OMNI MODE OFF
C = 125 V = 0 OMNI MODE ON
C = 126 V = 1 MONO MODE ON
C = 127 V = 0 POLY MODE ON

OMNI ON/OFF may also be selected using panel switches. Whichever signal arrives last has priority.
When the mode is changed, the voice will be dumped and key assign will be cleared.

2-4 System Realtime Messages

Status 1 1 1 1 1 1 0 active sensing

Once this code has been received, sensing will begin. If it does not receive any data or status for longer than 300 ms, it will dump voice, clear key assign, set sustain pedal off, set portamento switch on, and stop sensing.

2-5 System Exclusive Messages

2-5-1 1 voice bulk data

Status 1 1 1 1 0 0 0 0
ID 0 1 0 0 0 1 1
Substatus/ch 0 0 0 0 n n n n n = channel number
Byte count 0 0 0 0 0 0 1
Byte count 0 0 0 1 1 0 1 1
Data 0 d d d d d d d d
155 bytes
0 d d d d d d d d
Check sum 0 e e e e e e e e

The 155 bytes of voice data will enter the edit buffer and the voice of the currently sounding note will change. Check sum is the lowest 7 bits of the sum of all the data bytes.

2-5-2 1 performance bulk data

```
Status 1 1 1 1 0 0 0 0
ID      0 1 0 0 0 0 1 1
Substatus/ch 0 0 0 0 n n n n
Format no. 0 0 0 0 0 0 1
Byte count 0 0 0 0 0 0 0 0
Byte count 0 1 0 1 1 1 1 0
Data    0 d d d d d d d
```

94 bytes

```
0 d d d d d d d
Check sum 0 e e e e e e e
```

Out of the 94 bytes, only the data applying to the TX7 will enter the edit buffer. The function parameters of currently sounding notes will change. Ch A or B will receive the data according to the voice memory select flag in the data bytes.

2-5-3 64 performance bulk data

```
Status 1 1 1 1 0 0 0 0
ID      0 1 0 0 0 0 1 1
Substatus/ch 0 0 0 0 n n n n
Format no. 0 0 0 0 0 0 1 0
Byte count 0 0 1 0 0 0 0 0
Byte count 0 0 0 0 0 0 0 0
Data    0 d d d d d d d
```

4096 byte

```
0 d d d d d d d
Check sum 0 e e e e e e e
```

The above data can be received only when memory protect is OFF. When it has been received, the LCD will show **[MIDI RECEIVED If]**. Of the 64 performances, side A of the first 32 performances will be loaded into the function memories of programs 1-32. Whether the function memories are for the DX or TX will depend on the LOAD FUNCTION when you load the data from cassette. (When the power is turned on, it is set to TX functions.)

2-5-4 32 voice bulk data

```
Status 1 1 1 1 0 0 0 0
ID      0 1 0 0 0 0 1 1
Substatus/ch 0 0 0 0 n n n n
Format no. 0 0 0 0 1 0 0 1
Byte count 0 0 1 0 0 0 0 0
Byte count 0 0 0 0 0 0 0 0
Data    0 d d d d d d d
```

4096 bytes

```
0 d d d d d d d
Check sum 0 e e e e e e e
```

The above data can be received only when memory protect is OFF. When it has been received, the LCD will show **[MIDI RECEIVED!v]**. Voice data of programs 1-32 will change.

2-5-5 Parameter change

```
Status 1 1 1 1 0 0 0 0
ID      0 1 0 0 0 0 1 1
Substatus/ch 0 0 0 1 n n n n
Parameter group no. 0 g g g g g h h (g = 0, 1, 2, 4)
Parameter no. 0 p p p p p p p (h = 0, 1)
Data    0 d d d d d d d
```

Voice and function data in the edit buffer will change.

2-5-6 Dump request

```
Status 1 1 1 1 0 0 0 0
ID      0 1 0 0 0 0 1 1
Substatus/ch 0 0 1 0 n n n n
Format no. 0 f f f f f f f (f = 0, 1, 2, 9, 125)
```

When this has been received, the appropriate bulk data will be dumped from MIDI OUT.

3. Transmission data

Normally, there will be no data transmission. Data will be transmitted when there is a dump request signal from outside, or through operation of the panel switches. The transmitted data is voice and function system exclusive data. Data will always be sent on channel 1.

3-1 Transmission Conditions

(a) Transmission on dump request

The following 5 types of data will be transmitted according to format No. (f).

- f = 0 1 voice bulk data
The contents of the voice edit buffer will be sent.
- f = 1 1 performance bulk data
The contents of the function edit buffer will be sent, and bank A and B will have identical data.
- f = 2 64 performance bulk data
The contents of the TX function memories 1-32 will be sent.
- f = 9 32 voice bulk data
Voice data of programs 1-32 will be sent.

The above formats are the same for data reception, but an EOX (\$F7) is added at the end.

f = 125 Conditions acknowledge

```
Status 1 1 1 1 0 0 0 0
ID      0 1 0 0 0 0 1 1
Substatus/ch 0 0 0 0 0 0 0 0
Format no. 0 1 1 1 1 1 0 1
Byte count 0 0 0 0 0 0 0 0
Byte count 0 0 0 1 0 0 0 0
Data    0 d d d d d d d
```

```
0 d d d d d d d
Check sum 0 e e e e e e e
EOX      1 1 1 1 0 1 1 1
```

(b) Transmission by panel switch in **[MIDI TRANSMIT]** mode

When the display shows **[MIDI TRANSMIT?]** and you press the YES/+1 switch, the following data will be sent.

- 32 voice bulk data
- 64 performance bulk data

(c) Transmission by panel switch in **[COMBINED]** mode

When in combined mode, if ever you select a voice or it receives a program change signal, the following data will be sent.

- 1 performance data

(d) Transmission by panel switch in **[INDIVIDUAL]** mode

When in individual mode, if it receives a program change signal, the following data will be sent.

- 1 performance data

(e) Transmission by panel switch in **[EDIT VOICE OUT]** mode

When the display shows **[EDIT VOICE OUT]** and you press the YES/+1 switch, data will be sent in the following order.

- 1) 1 performance data
- 2) 1 voice data

4. System exclusive data format 4-1 DX7 VOICE PARAMETER CHANGE (g = 0)

Sub-group Number h	Parameter Number P	Parameter	Data	Notes
0	0	OP6 EG RATE 1	0 ~ 99	
	1	OP6 EG RATE 2	0 ~ 99	
	2	OP6 EG RATE 3	0 ~ 99	
	3	OP6 EG RATE 4	0 ~ 99	
	4	OP6 EG LEVEL 1	0 ~ 99	
	5	OP6 EG LEVEL 2	0 ~ 99	
	6	OP6 EG LEVEL 3	0 ~ 99	
	7	OP6 EG LEVEL 4	0 ~ 99	
	8	OP6 KEYBOARD LEVEL SCALING BREAK POINT	0 ~ 99	* 1
	9	OP6 KEYBOARD LEVEL SCALING LEFT DEPTH	0 ~ 99	
	10	OP6 KEYBOARD LEVEL SCALING RIGHT DEPTH	0 ~ 99	
	11	OP6 KEYBOARD LEVEL SCALING LEFT CURVE	0 ~ 3	* 2
	12	OP6 KEYBOARD LEVEL SCALING RIGHT CURVE	0 ~ 3	* 2
	13	OP6 KEYBOARD RATE SCALING	0 ~ 7	
	14	OP6 AMPLITUDE MODULATION SENSITIVITY	0 ~ 3	
	15	OP6 KEY VELOCITY SENSITIVITY	0 ~ 7	
	16	OP6 OPERATOR OUTPUT LEVEL	0 ~ 99	
	17	OP6 OSCILLATOR MODE	0 ~ 1	* 3
	18	OP6 OSCILLATOR FREQUENCY COARSE	0 ~ 31	* 4
	19	OP6 OSCILLATOR FREQUENCY FINE	0 ~ 99	* 4
	20	OP6 OSCILLATOR DETUNE	0 ~ 14	* 5
1	21 ~ 41	OP5		
	42 ~ 62	OP4		
	63 ~ 83	OP3		
	84 ~ 104	OP2		
	105 ~ 125	OP1		
	126	PITCH EG RATE 1	0 ~ 99	
	127	PITCH EG RATE 2	0 ~ 99	
	0 (128)	PITCH EG RATE 3	0 ~ 99	
	1 (129)	PITCH EG RATE 4	0 ~ 99	
	2 (130)	PITCH EG LEVEL 1	0 ~ 99	
	3 (131)	PITCH EG LEVEL 2	0 ~ 99	
	4 (132)	PITCH EG LEVEL 3	0 ~ 99	
	5 (133)	PITCH EG LEVEL 4	0 ~ 99	
	6 (134)	ALGORITHM SELECT	0 ~ 31	
	7 (135)	FEEDBACK	0 ~ 7	
	8 (136)	OSCILLATOR KEY SYNC	0 ~ 1	
	9 (137)	LFO SPEED	0 ~ 99	
	10 (138)	LFO DELAY	0 ~ 99	
	11 (139)	LFO PITCH MODULATION DEPTH	0 ~ 99	
	12 (140)	LFO AMPLITUDE MODULATION DEPTH	0 ~ 99	
	13 (141)	LFO KEY SYNC	0 ~ 1	
	14 (142)	LFO WAVE	0 ~ 5	* 6
	15 (143)	LFO PITCH MODULATION SENSITIVITY	0 ~ 7	
	16 (144)	TRANPOSE	0 ~ 48	Concert
	17 (145)	VOICE NAME 1	ASCII	pitch at 24
	26 (154)	VOICE NAME 10	ASCII	
1	27 (155)	OPERATOR ON/OFF	xxxxxx	* 7
	28 (156)	OPERATOR SELECT	0 ~ 5	* 8

*1 BREAK POINT

BREAK POINT	0	1	2	3	4	5	15	27	39	51	63	75	87	99
MIDI NOTE #	21	22	23	24	25	26	36	48	60	72	84	96	108	120
NOTE	A ₁	A ₁ #	B ₁	C ₀	C ₀ #	D ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈

*2 KEYBOARD LEVEL SCALING CURVE

	0	1	2	3
CURVE	-LIN	-EXP	+EXP	+LIN

*3 OSCILLATOR MODE

"0" frequency ratio
"1" fixed frequency

*4 FREQUENCY COARSE FINE

i) For Frequency Ratio
When FINE = 0

COARSE	0	1	2	3	10	30	31
FREQUENCY RATIO	0.5	1	2	3	10	30	31

When COARSE = 1

FINE	0	1	2	3	10	50	99
FREQUENCY RATIO	1.00	1.01	1.02	1.03	1.10	1.50	1.99

ii) For Fixed Frequency

When FINE = 0

COARSE	0	1	2	3	4	5	6	7		31
FREQUENCY (Hz)	1	10	100	1000	1	10	100	1000		1000

When COARSE = 0

FINE	0	1	2	3	4	5	10	20	50	99
FREQUENCY (Hz)	1.000	1.023	1.047	1.072	1.096	1.122	1.259	1.585	3.162	9.772

*5 DETUNE

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DETUNE	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7

*6 LFO WAVE

	0	1	2	3	4	5
WAVE	TRIANGLE	SAW DOWN	SAW UP	SQUARE	SINE	SAMPLE/HOLD

*7 OPERATOR ON OFF

Bit	b ₅	b ₄	b ₃	b ₂	b ₁	b ₀
OP	OP1	OP2	OP3	OP4	OP5	OP6

Bit Map
"0" ... OFF "1" ... ON

*8 OPERATOR SELECT

	0	1	2	3	4	5
OPERATOR	OP6	OP5	OP4	OP3	OP2	OP1

4-2 DX PERFORMANCE PARAMETER CHANGE (g = 1) (h = 0)

Parameter Number P	Parameter	Data	Notes
0			
1	SOURCE SELECT	1 ~ 16	* 3
2	POLY/MONO	0 ~ 1	
3	PITCH BEND RANGE	0 ~ 12	
4	PITCH BEND STEP	0 ~ 12	
5	PORTAMENTO TIME	0 ~ 99	
6	PORTAMENTO/GLISSANDO	0 ~ 1	
7	PORTAMENTO MODE	0 ~ 1	* 1
8			
9	MODULATION WHEEL SENSITIVITY	0 ~ 15	
10	MODULATION WHEEL ASSIGN	0 ~ 7	* 2
11	FOOT CONTROLLER SENSITIVITY	0 ~ 15	
12	FOOT CONTROLLER ASSIGN	0 ~ 7	* 2
13	AFTER TOUCH SENSITIVITY	0 ~ 15	
14	AFTER TOUCH ASSIGN	0 ~ 7	* 2
15	BREATH CONTROLLER SENSITIVITY	0 ~ 15	
16	BREATH CONTROLLER ASSIGN	0 ~ 7	* 2
17			
18			
19			
20			
21			
22			
23			
24			
25			
26	AUDIO OUTPUT LEVEL ATTENUATOR	0 ~ 7	
27			
28			
29			
30			
31			
32			
33			
34			
⋮			
63			Concert
64	MASTER TUNING	0 ~ 127	pitch at 64

*1 PORTAMENTO MODE

"0" ... sustain-key pitch retain
 "1" ... sustain-key pitch follow

*2 EFFECT ASSIGN

Bit	b ₂	b ₁	b ₀
ASSIGN	EG BIAS	AMPLITUDE	PITCH

*3 SOURCE SELECT

Corresponds to RECEIVE BASIC CHANNEL 1 ~ 16.

4-3 DX7 FUNCTION PARAMETER CHANGE (g = 2) (h = 0)

Parameter Number P	Parameter	Data	Notes
64	POLY/MONO	0 ~ 1	
65	PITCH BEND RANGE	0 ~ 12	
66	PITCH BEND STEP	0 ~ 12	
67	PORTAMENTO MODE	0 ~ 1	
68	PORTAMENTO/GLISSANDO	0 ~ 1	
69	PORTAMENTO TIME	0 ~ 99	
70	MODULATION WHEEL SENSITIVITY	0 ~ 99	* 1
71	MODULATION WHEEL ASSIGN	0 ~ 7	
72	FOOT CONTROLLER SENSITIVITY	0 ~ 99	* 1
73	FOOT CONTROLLER ASSIGN	0 ~ 7	
74	BREATH CONTROLLER SENSITIVITY	0 ~ 99	* 1
75	BREATH CONTROLLER ASSIGN	0 ~ 7	
76	AFTER TOUCH SENSITIVITY	0 ~ 99	* 1
77	AFTER TOUCH ASSIGN	0 ~ 7	

*1 EFFECT SENSITIVITY

Data is received on a range of 0 ~ 99 and stored on a range of 0 ~ 15.

4-4 TX FUNCTION PARAMETER CHANGE (g = 4) (h = 1)

Parameter Number P	Parameter	Data	Notes
0	DATA ENTRY RECEIVE SWITCH	0, 1	
1	CONTROL CHANGE RECEIVE SWITCH	0, 1	
2	DATA ENTRY VOLUME SWITCH	0, 1	
3	COMPUTE COMMUNICATION SWITCH	0, 1	
4	COMBINED (0) OR INDIVIDUAL (1)	0, 1	
5	NOTE LIMIT LOW	0 ~ 127	
6	NOTE LIMIT HIGH	0 ~ 127	
7	MEMORY PROTECT OFF/ON	0, 127	
11	LOAD FUNCTION SELECT INT/EXT	0, 127	

*1 When data 1 is received, COMBINED MODE, CONTROL CHANGE RECEIVE, DATA ENTRY RECEIVE will be set, and 1 performance data will not be sent.
 When data 0 is received, COMBINED MODE, CONTROL CHANGE RECEIVE, DATA ENTRY OFF will be sent, and 1 performance data will be sent.

4-5 1 VOICE BULK DATA

155 bytes of data. For the data format, see 0 ~ 154 of 4-1.

4-6 1 PERFORMANCE BULK DATA (f = 1)

Parameter Number P	Parameter	Data	Notes
0			
1			
2	VOICE A POLY/MONO	0 ~ 1	
3	VOICE A PITCH BEND RANGE	0 ~ 12	
4	VOICE A PITCH BEND STEP	0 ~ 12	
5	VOICE A PORTAMENTO TIME	0 ~ 99	
6	VOICE A PORTAMENTO/GLISSANDO	0 ~ 1	
7	VOICE A PORTAMENTO MODE	0 ~ 1	
8			
9	VOICE A MODULATION WHEEL SENSITIVITY	0 ~ 15	
10	VOICE A MODULATION WHEEL ASSIGN	0 ~ 7	
11	VOICE A FOOT CONTROLLER SENSITIVITY	0 ~ 15	
12	VOICE A FOOT CONTROLLER ASSIGN	0 ~ 7	
13	VOICE A AFTER TOUCH SENSITIVITY	0 ~ 15	
14	VOICE A AFTER TOUCH ASSIGN	0 ~ 7	
15	VOICE A BREATH CONTROLLER SENSITIVITY	0 ~ 15	
16	VOICE A BREATH CONTROLLER ASSIGN	0 ~ 7	
17			
18			
19			
20			
21			
22			
23			
24			
25			
26	VOICE A AUDIO OUTPUT LEVEL ATTENUATOR	0 ~ 7	
27			
28			
29			
30			
31	VOICE B		
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61	VOICE MEMORY SELECT FLAG	0 ~ 1	
62			
63			
64	PERFORMANCE NAME 1	ASCII	
65	PERFORMANCE NAME 2	ASCII	
66		ASCII	
67		ASCII	
68		ASCII	
69		ASCII	
70		ASCII	
71		ASCII	
72		ASCII	
73		ASCII	
74		ASCII	
75		ASCII	
76		ASCII	
77		ASCII	
78		ASCII	
79		ASCII	
80		ASCII	
81		ASCII	
82		ASCII	
83		ASCII	
84		ASCII	
85		ASCII	
86		ASCII	
87		ASCII	
88		ASCII	
89		ASCII	
90		ASCII	
91		ASCII	
92	PERFORMANCE NAME 29	ASCII	
93	PERFORMANCE NAME 30	ASCII	

4-7 64 PERFORMANCE BULK DATA (f = 2)

Data are listed in order for the 64 performances in units of 64 bytes (64 performance). The TX7 uses the first 32 performance groups.

Address	6	5	4	3	2	1	0	Parameter	Data	Parameter	Data
0	P/M							VOICE A POLY/MONO	0 ~ 1		
1	PBS(LO)						PBR	VOICE A P. BEND STEP	0 ~ 12	PITCH BEND RANGE	0 ~ 12
2							PTIM	VOICE A PORTA. TIME	0 ~ 99		
3						M	GL	VOICE A PORTA. MODE	0 ~ 1	PORTAMENTO/GLISSANDO	0 ~ 1
4	MWA					MWS		VOICE A MOD. WHEEL ASN.	0 ~ 7	MOD. WHEEL SENS.	0 ~ 15
5	FCA					FCS		VOICE A FOOT CONT. ASN.	0 ~ 7	FOOT CONT. SENS.	0 ~ 15
6	ATA					ATS		VOICE A AFTER TOUCH ASN.	0 ~ 7	AFTER TOUCH SENS.	0 ~ 15
7	BCA					BCS		VOICE A BREATH CON ASN.	0 ~ 7	BREATH CON. SENS.	0 ~ 15
8											
9											
10											
11											
12											
13											
14							ATN	VOICE A ATTENUATION	0 ~ 7		
15	PBS(HI)							VOICE A PITCH B. STEP	(MSB)		
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32						VMS	KMOD	VOICE MEMORY SELECT	0 ~ 1	KEY ASSIGN MODE	0 ~ 2
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
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89											
90											
91											
92											
93											

With the Key Assign in Single mode (KMOD = 0) VOICE A or B are loaded with VMS.
With Key Assign in DUAL, SPLIT (KMOD = 1, 2), VOICE A is always loaded.

Function ...	Transmitted	Recognized	Remarks
Basic Default	1	1 - 16 X	X memorized
Channel Changed	x	1 - 16 X	
Mode Default	3	1,2,3,4 X	
Messages	x	POLY, MONO(M=1) OMNION, OMNIOFF	not altered
Note	x	0 - 127	
Number : True voice	XXXXXXXXXXXX	0 - 127	
Velocity Note ON	x	o	
Note OFF	x	x	
After Key's	x	x	
Touch Ch's	x	o	
Pitch Bender	x	o	
Control	1 : x 2 : x 4 : x 5 : x 6 : x 7 : x	o o o o o o	Modulation wheel Breath control Foot controller Portamento time Data entry knob Volume
Change	64 : x 65 : x 96 : x 97 : x	o o o o	Sustain foot sw Portamento f sw Data entry +1 Data entry -1
Prog	x	o 0 - 127	
Change : True #	XXXXXXXXXXXX	0 - 31	
System Exclusive	o	o	Voice parameters
System : Song Pos	x	x	
: Song Sel	x	x	
Common : Tune	x	x	
System : Clock	x	x	
Real Time : Commands	x	x	
Aux : Local ON/OFF	x	x	
: All Notes OFF	x	x	
Mes- : Active Sense	x	o	
sages: Reset	x	x	
Notes			
Mode 1 : OMNI ON, POLY		Mode 2 : OMNI ON, MONO	o : Yes
Mode 3 : OMNI OFF, POLY		Mode 4 : OMNI OFF, MONO	x : No

CONSTRUCTION OF THE TX7

You may think of the TX7 as a DX7 without the sub CPU, that is to say, a DX7 without the keyboard section. The circuitry of the TX7 is on four boards; DM, AS, PN, and AD. The DM board contains the micro computer which controls the FM tone generator, panel switches, MIDI and the LCD. The AS board contains the FM tone generator. Its EGS and OPS (the same ICs as the DX7) are controlled by the MPU. The PN board contains the panel switches. The MPU on the DM board is constantly checking to see if any of these switches are being pressed. The AD board contains the power supply. To make it light and compact, we have used a switching power supply of the RCC (Ringing Choke Converter) type.

1. Memory map

The memory map of the TX7 is shown below.

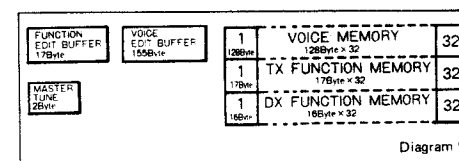
\$0000	MPU internal registers
\$001F	Free area
\$0040	MPU internal RAM
\$00FF	
	Free area
\$4000	Panel switches
\$4800	VCA control
\$5000	EGS
\$5800	OPS
\$6000	RAM1
\$6800	RAM2
\$7000	RAM3
\$7800	RAM4
\$7FFF	
	Free area
\$C000	ROM
\$FFFF	

1) Voice and function memory, and edit buffers

The data in RAM1, 2, 3 is as follows.

\$601E ~ \$701D	: 32 voice data
\$701E ~ \$70B8	: Voice edit buffer data
\$70C9 ~ \$72C8	: 32 TX function data
\$72C9 ~ \$74C8	: 32 DX function data
\$74C9 ~ \$74DA	: Function edit buffer data

Here is a comparison of the data format with the illustration on page 1.



Since the master tune data is common to all 32 voices, there are 2 additional bytes beside the 17 bytes in the function edit buffer. (When the DX performance parameter MASTER TUNE is sent via MIDI, it is only 1 byte. However, since the TX internal tuning data uses 14 bits, 2 bytes of memory space are needed.)

The format of each memory is as follows.

- Voice edit buffer data ... 155 bytes
Format is the same as DX voice parameter change parameter numbers 0 ~ 154. See MIDI data format 4-1.
- 32 voice data ... 128 bytes x 32 = 4 K bytes
Format for each voice is the same as the voice edit buffer, but 155 bytes of data is packed into 128 bytes of memory space. (Unused bits are moved over.)
- Function edit buffer data ... 17 bytes
Format is the same as MIDI data format 4-2 (DX performance parameter change) parameters 2 ~ 7, 9 ~ 16, 26. These 15 bytes plus the 2 bytes Key Limit Low and Key Limit High make up the total of 17 bytes.
- 32 TX function data ... 17 bytes x 32 = 544 bytes
Format for each function is the same as the function edit buffer. (When saving data to tape, attenuation data will not be saved.)
- 32 DX function data ... 16 bytes x 32 = 512 bytes
Format is the same as MIDI data format 4-2 (DX performance parameter change) parameters 2 ~ 7, 9 ~ 16. These 14 bytes plus the 2 bytes Key Limit Low and Key Limit High make up the total of 16 bytes.

2. Circuitry of the TX7

1) MPU (HD63A03X)

The TX7's MPU is the same as that of the TF1 (tone generation module for the TX816). The MPU contains an ACIA (Asynchronous communication unit), I/O ports, and RAM. The ACIA transmits and receives MIDI messages, and the I/O ports check the condition of the switches and send information to the LCD.

- Vcc, Vss Vcc is the SV power supply terminal, Vss is the ground terminal.
- EXTAL This receives a 4.71 Mhz clock with a 50% duty cycle. (Since an external clock is used, the XTAL terminal is left open.)
- MP₀, MP₁ This sets the operation mode of the MPU. MP₀ = "High", MP₁ = "Low".
- RES This terminal resets the MPU.
- STBY This terminal is for setting the MPU to stand-by mode, but since it is not used in this circuit, it has been fixed at "High".
- NMI This terminal is for non-maskable interrupt, but since it is not used in this circuit, it has been fixed at "High".
- Port Z In this circuit, P₂₀ ~ P₂₇ are used as follows.
P20 (out) Transmission to cassette. Transmission speed: 1200 band (1200Hz - 1 cycle "0", 2400 Hz - 2 cycle "1"), modulation: FSK. (However, the YRM-13 will not accept Key Limit or Attenuation data.)
P21 () Not used.

- P22 (in) This is a 500 KHz clock input which determines the MIDI transmission speed. The clock is internally divided by 16. Therefore, MIDI transmission is 31.25 K baud.
- P23 (in) Receives MIDI messages.
- P24 (out) Sends MIDI messages.
- P25 (out) This sends a signal to the RS terminal of the LCD. This signal tells the LCD whether the data from port 6 P60 ~ P67 is an instruction or data to be displayed. "High" means data to be displayed.
- P26 (out) This determines input or output of LCD data. "High": read. "Low": write.
- P27 (out) Finalize LCD data. Data finalized when down.
- Port 5
P50 (in) Condition of "Low" switch
P51 (in) Condition of "◀" switch
P52 (in) Condition of "▶" switch
P53 (in) Condition of "High" switch
P54, 55 Not used
P56 (in) Battery voltage condition
P57 (in) Read data from cassette
- Port 6
Port 6 P60 ~ P67 transmit instructions and data to the LCD.
- Bus
The address bus is A₀ ~ A₁₅. The data bus is D₀ ~ D₇.
- BA
Bus available terminal. When the MPU has received a HALT and the bus is free, this terminal will be "High". Not used in this circuit.
- LIR
This indicates that the data bus is carrying the op code of an instruction.
- R/W
When the MPU is reading, this is "High". When writing, this is "Low".
- WR
When the MPU is writing, this is "Low".
- RD
When the MPU is reading, this is "High".
- E
This enables a system clock to be sent.

2) Tone generator section

The tone generator section is the same as that of the DX7. The EGS and OPS use the same IC and function in the same way as the DX7. The EGS is master and the OPS is slave. All the OPS does is to perform FM calculations on the data sent to it from the EGS (FM calculation parameters EC₁ ~ EC₁₂, F₁ ~ F₁₄) according to the algorithm to which it is set.

• EGS

This is an acronym for Envelope Generator of Synthesizer. This is the LSI that reads voice data (rate, level, key code etc) from the MPU into its internal registers and produces (digital) envelope shape information according to the key on/off signals it receives from the MPU. It also produces (digital) frequency data for the key which has been pressed. Along with the key on (KON) data, the volume envelope data EC₁ ~ EC₁₂ and frequency data F₁ ~ F₁₄ are sent to the OPS, in synchronization with the system sync signal SYNC (92Y96).

- Vdd, Vss Vdd is +5V power supply, Vss is ground
- RES This terminal resets the EGS.
- SYNC Input terminal for synchronizing the OPS. (92Y96)
- CE Pulse input terminal for enabling reception of data from the MPU.
- WR Pulse input terminal for writing data from the MPU into internal registers. In the TX7, this is connected to GND.
- A₀ ~ A₇ Address input terminal for specifying internal registers.
- D₀ ~ D₇ Data input terminals
- F₁ ~ F₁₄ Parallel output for frequency data of each channel
- EC₁ ~ EC₁₂ Parallel output for volume data of each channel
- OE Data output control terminal, but in the TX7 is connected to GND.
- KON Output terminal for key ON data of the specified channel
- φ₁, φ₂ System clock input terminals

• OPS

This is an acronym for Operator of Synthesizer. By performing FM calculations on the volume envelope, frequency and KON data sent to it from the EGS and on the data already stored in the OPS registers (algorithm NO., feedback level), the OPS produces audio data (in 12 bit digital form). The data that the OPS receives directly from the MPU is 2 bytes as follows.

- | | |
|-------------------------------|--------|
| Mode (operation mode of OPS) | 1 byte |
| Algorithm no. (upper 5 bits) | 1 byte |
| Feedback level (lower 3 bits) | |

The terminal WR writes to the OPS, and has been assigned to addresses 5800 (H) ~ 5801 (H). Since the address line A₀ is connected to the data set terminal DS of the OPS, the OPS mode selector is A₀ = "Low", ie. 5800 (H). When A₀ = "High", ie. 5801 (H) specifies data register (algorithm no., feedback level).

The output data of the OPS is 12 bit. However, to make this the equivalent of 14 bit, the lower levels are expanded 2, 4, and 8 times respectively. To return this to the original value, shift data (SF₀ ~ SF₃) is sent out.

SF₀: 1 times, SF₁: 1/2 times, SF₂: 1/4 times, SF₃: 1/8 times.

- | | |
|--------------------------------------|--|
| Vdd, Vss | Vdd is +5V power supply, Vss is ground |
| • DS | This determines whether data, input D ₀ ~ D ₇ is mode or algorithm no and feedback. Mode is "L". |
| • WR | Input terminal indicates whether to write the data at D ₀ ~ D ₇ into an internal register. |
| • SH ₁ , SH ₂ | Sample and hold output terminal |
| • SYNC | Output terminal for 92Y96 sync signal |
| • F ₁ ~ F ₁₄ | Parallel inputs for frequency data from EGS |
| • DA ₁ ~ DA ₁₂ | Digital audio parallel outputs |
| • SF ₀ ~ SF ₃ | Shift data outputs (to restore expanded output data) |
| • EC ₁ ~ EC ₁₂ | Parallel inputs for volume envelope data from the EGS |
| • KON | Key ON data input for the selected channel |
| • D ₀ ~ D ₇ | Inputs for mode, algorithm number, and feedback level from the MPU |
| • φ ₁ , φ ₂ | System clock inputs |

3) D/A converter section

The 12 bit digital data from the OPS is sent to the DAC IC24 and converted into an analog signal. This 12 bit digital data has been expanded inside the OPS, so the IC26 and the connected resistances will return it to the original level. This is controlled by the shift data sent from the OPS (SF₀ ~ SF₃), which is sent at the same time as the 12 bit digital data. The shift data is as follows.

When the data sent to the DAC has been shifted 1 time, SF₀ sends "High".

When the data sent to the DAC has been shifted 2 times, SF₁ sends "High".

When the data sent to the DAC has been shifted 4 times, SF₂ sends "High".

When the data sent to the DAC has been shifted 8 times, SF₃ sends "High".

At this point, the level has been corrected, but it is still not a true analog waveform. Until the digital audio data comes into the sample and hold circuit, it is being output in steps (first note, second note, third note, ...). Controlled by the sampling signals SH₁ and SH₂, the IC27 samples the digital audio signal. A 120 pf capacitor holds the level and converts it into an analog signal. (SH₁ samples the first through eighth notes, SH₂ samples the ninth through sixteenth notes.) This waveform still has a stair-step shape, so it is put through a low-pass filter to become a true analog waveform. This signals volume is controlled by the VCA, and it is sent out.

4) Volume control and battery voltage check circuitry

Volume is controlled by the VCA IC38. The volume is determined by the following information.

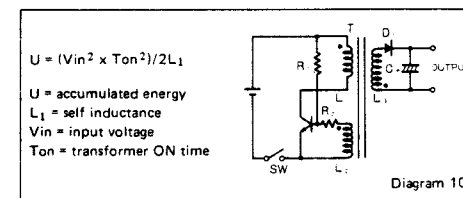
- Panel switch preset volume ...
 - Attenuation (function mode). . . ATTENUATION 0 ~ 7
 - Data entry volume control
 - Control change. . . control number 7
- These two are mutually exclusive; ie only one at a time.

When 4800 (H) comes up, IC28 (data latch) will latch the data on the data bus line. (At this time, it latches only the upper 6 bits of the data bus.)

This data that has been latched is sent out of the ○ terminal as "High" +5V, "Low" 0V, and is input to rader resistance RM₁. This voltage passes through IC35 (which makes up the low pass filter) and appears at pin 1 of IC35. It is divided by a 270Ω and a 22Ω resistors and added to pin 3 of the VCA IC38. This controls the VCA which controls the volume of the analog signal sent from the tone generator section. When the control voltage of the VCA is 0V, the volume is greatest and when it is 0.37V, the volume is least. As you can see from the software flow diagram ○, battery voltage check is performed when the power is turned on. A voltage identical to the volume control voltage is sent to pins of IC35. The output of that is sent to pin 3 of IC18 (battery voltage converter) on the DM board. When the power is turned on, the battery check routine will be entered, and pin 7 of IC35 has been programmed to rise from 0V. As long as the battery voltage is higher than this voltage, the output of IC18 pin 7 will be "High". When this voltage becomes higher than the battery voltage, the output of pin 7 will reverse to "Low". The MPU is checking for this, and when the battery voltage is less than 2.3V, the LCD will show "CHANGE BATTERY".

5) Power supply

The power supply used in the TX7 is of the type know as RCC (Ringing Choke Converter). The basic RCC circuit is shown in diagram 10. Tr₁ is a switching transistor. When this transistor is ON, energy accumulates in inductor L₁ of transformer T, and when OFF, the accumulated energy is released to side L₂. As the transistor Tr₁ repeats this switching, power is sent out. R₂ is a base current limiting resistor for Tr₁. R₁ is a starting resistor, and when the resistance is low, Tr₁ will start easier. Transformer T is an oscillating transformer, and isolates the primary and secondary. You may calculate the energy accumulated in transformer T (inductor) using the following equation.



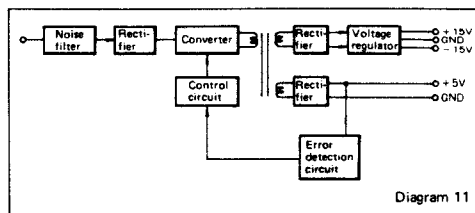
The operation of the RCC circuit is as follows.

1. When you turn on SW in diagram 10, current flows through R₁ to the base of Tr₁. This turns the Tr₁ on, and current flows in L₁, inducing voltage in L₂.

- The voltage at point A increases, and works to increase the Tr_1 collector current. Therefore, Tr_1 instantly saturates, and there is no more time difference in the current flowing in L_1 , so there is no more induced voltage in L_2 . At this time, reverse electromagnetic force (accumulated energy) is generated, and this energy induces voltage in L_3 . When this happens, the base of Tr_1 will have reverse bias because of the reversed e.m.f. in L_2 , and Tr_1 will go OFF.
- Next, when the accumulated energy of L_1 is released, base current flows again to Tr_1 through R_1 , and Tr_1 will begin operating again.

In this way, the desired voltage is attained as the accumulated energy in L_1 is released to L_3 by the switching action of Tr_1 .

The following is a block diagram of the TX7 power supply.



The actual circuitry of the TX7 is as follows.

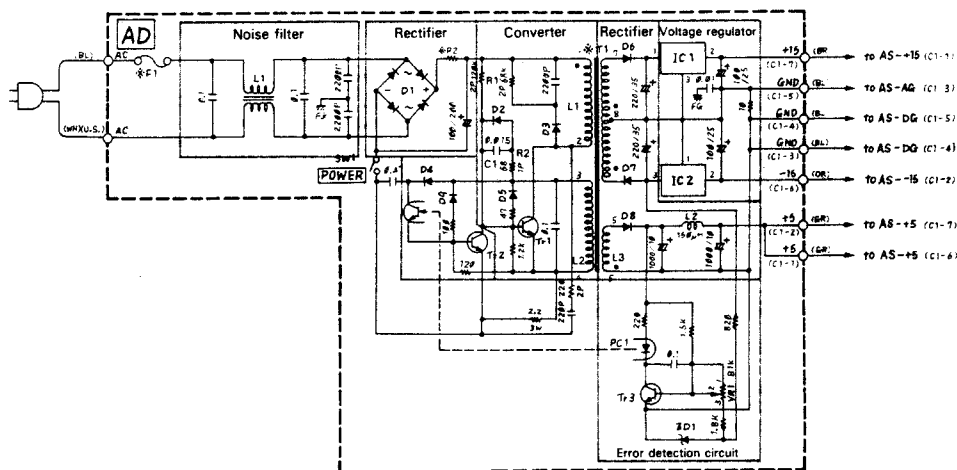


Diagram 12

- In diagram 12 the base driving circuit is D_2 , C_1 and R_2 . This controls the base current of Tr_1 through R_2 .
- Tr_2 controls the base current of Tr_1 , thus controlling the voltage that appears in the secondary.
- The error detection circuit examines the voltage fluctuation of the +5V, and feeds back the fluctuation to the control circuit through a photocoupler PC_1 (which electrically isolates the primary and secondary).
- On the basis of the information fed back to it, the control circuit increases the base current of Tr_2 , and by thus changing the oscillating frequency of Tr_1 , controls

the output voltage. The output voltage (+5V) may be adjusted using the VR_1 connected to the base of Tr_3 in the error detection circuit.

The power switch SW_1 turns the voltage to the emitter of Tr_1 on and off. Thus, as the converter circuit switches or does not switch, voltage is generated or stopped in the secondary. Therefore, even when the power switch SW_1 is off, voltage is present at the primary, so when servicing, please be careful.

3. Software flow

This is basically the same as the DX7.

The software can be divided into the main routine, timer interrupt routine and ACIA interrupt routine. Diagram 13 below shows the main routine flow from power on, diagram 14 shows the timer interrupt routine, and diagram 15 shows the ACIA interrupt routine.

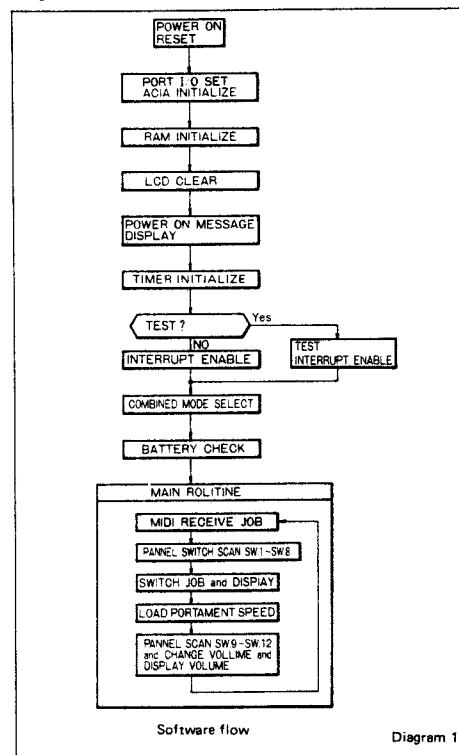


Diagram 13

1) Main routine

The data from the ACIA interrupt routine that accumulates in the input buffer is taken out and interpreted one byte at a time. When a complete MIDI message has been assembled, the appropriate operation is performed. This routine also scans the panel switches and displays and sets the appropriate information.

2) Timer interrupt routine

The internal timer cycles once every 2.6 ms. This checks MIDI reception for active sensing, panel switches for auto-repeat, and calculates and loads data such as LFO, pitch EG and pitch bender to the tone generator.

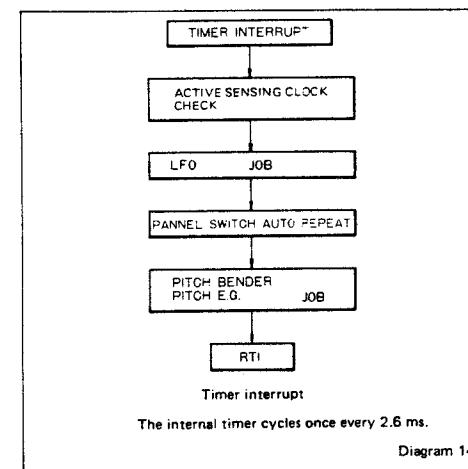


Diagram 14

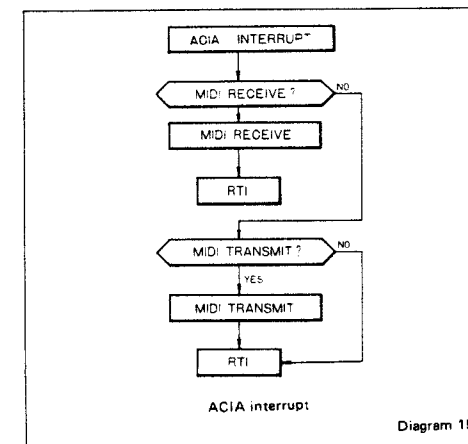
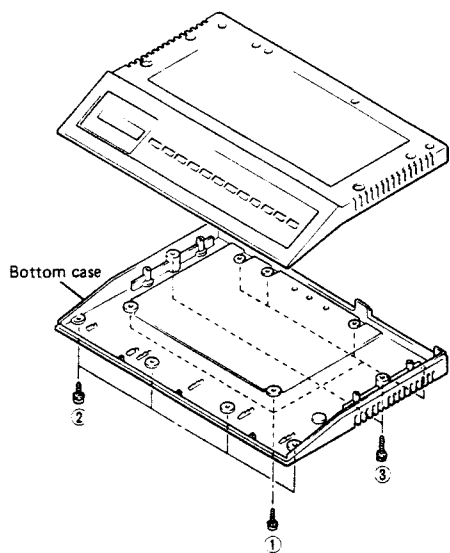
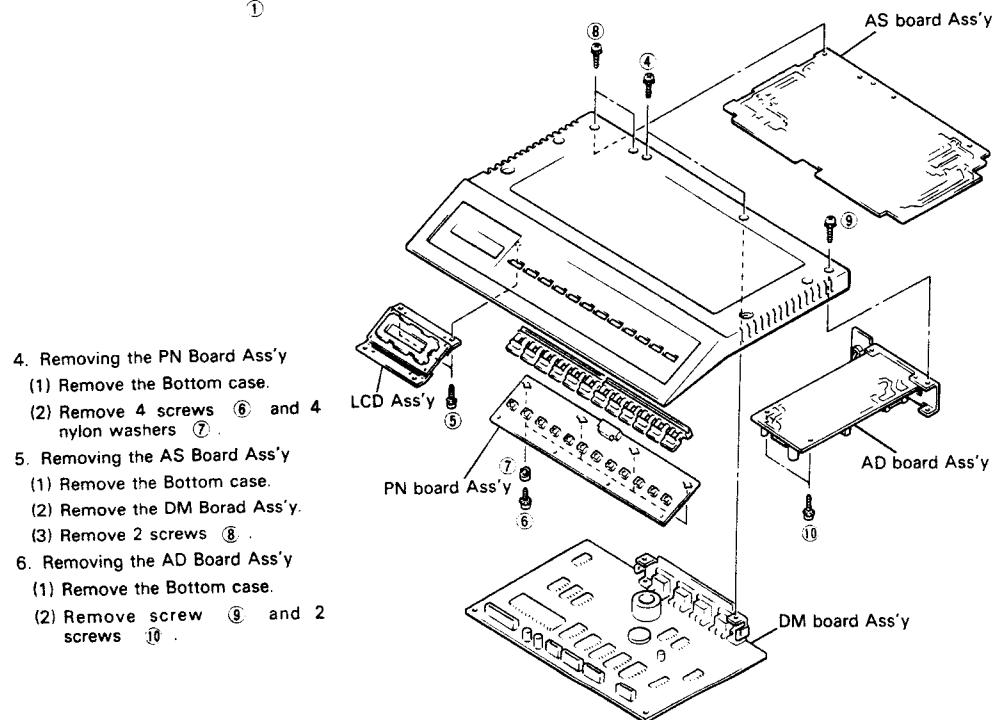


Diagram 15

■ DISASSEMBLY INSTRUCTIONS

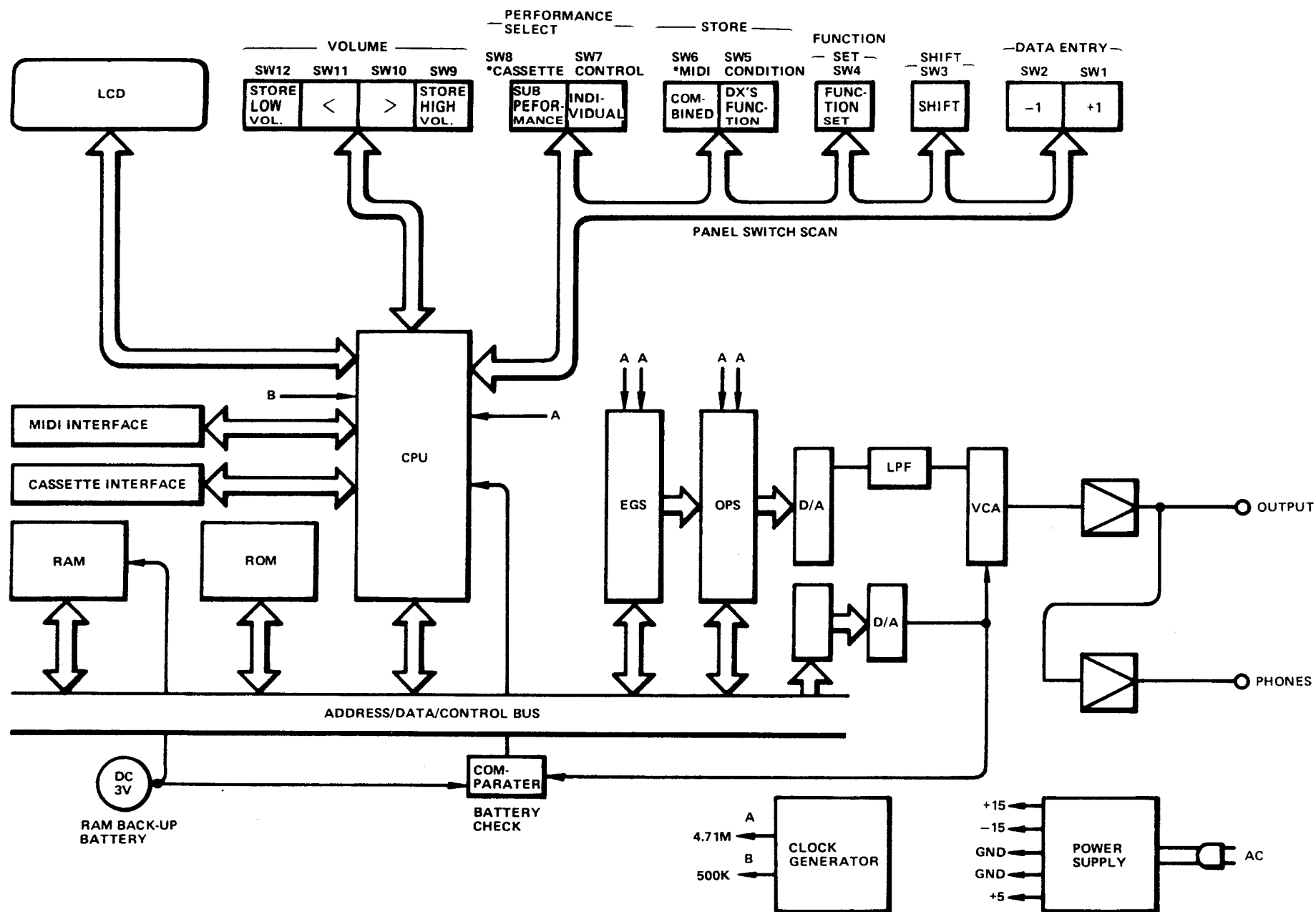


1. Removing the Bottom case
Remove 6 screws ①, 4 screws ②, and 2 screws ③.
2. Removing the DM Board Ass'y
(1) Remove the Bottom case.
(2) Remove 2 screws ④.
3. Removing the LCD Ass'y
(1) Remove the Bottom case.
(2) Remove 2 screws ⑤.

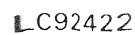


4. Removing the PN Board Ass'y
(1) Remove the Bottom case.
(2) Remove 4 screws ⑥ and 4 nylon washers ⑦.
5. Removing the AS Board Ass'y
(1) Remove the Bottom case.
(2) Remove the DM Board Ass'y.
(3) Remove 2 screws ⑧.
6. Removing the AD Board Ass'y
(1) Remove the Bottom case.
(2) Remove screw ⑨ and 2 screws ⑩.

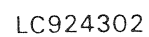
-30-



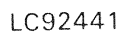
TX7



TX7



TX1

[illegible]

PARTS LIST

Notes DESTINATION ABBREVIATIONS

J: Japan C: Canadian
G: General WG: West Germany
U: U.S.A A: Australian

• PC BOARD PARTS

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model	Markets	ランク
✱	NA 81 43 00	DM Circuit Board	D M シ ー ト				
	FZ 00 41 00	Ceramic Cap.	0.1 μ F/16V	半 導 体 セ ラ コ ン			
	U1 23 71 00	Electrolytic Cap.	10 μ F/16V	小 型 ケ ミ コ ン			
	UJ 13 82 20	"	220 μ F/16V	"			
	U1 24 64 70	"	4.7 μ F/25V	"			
	FM 11 61 00	B.P. Cap.	1 μ F/50V	B.P. コ ン	#4601~		
	HI 20 99 90	Carbon Composition Resistor	10M	ソ リ ッ ト 抵 抗			
	HZ 00 31 90	MDULE Resistor	4.7k Ω ×8 9P	モ ジ ュ ー ル 抵 抗			
✱	HZ 00 48 10	"	4.7k Ω ×12 13P	"			
	IA 10 15 20	Transistor	2SA1015(O,Y)	ト ラ ン シ ス タ			
	IC 18 15 80	"	2SC1815(Y,GR)	"			
	IF 00 34 50	Diode	1SS133	ダ イ オ ー ド			
✱	IN 01 11 10	IC	EPROM27128	I C V1.1			
✱	IN 01 11 20	"	EPROM27128	" V1.2			
✱	IG 14 07 00	"	HD63A03X	"			
	IG 10 62 00	"	M5M5118P-151	"			
	IG 10 67 00	"	74LS138	"			
	IG 06 81 00	"	TC40H240	"			
	IG 05 10 00	"	TC40H004	"			
	IG 09 64 00	"	TC40H008	"			
	IG 05 11 00	"	TC40H074	"			
	IG 00 17 20	"	TC4069UBP	"			
	IG 10 55 00	"	HD7405P	"			
	IG 11 62 00	"	PST518	"			
	IG 13 49 00	"	IR9311	"			
	IG 10 70 00	"	NJM072	"			
	IR 00 14 00	"	TC74HC148P	"			
	IK 00 04 70	Photo Conductor	TLP552	フ ォ ト カ プ ラ ー			
	LB 91 81 40	XH Connector	14P	X H コ ネ ク タ ー			
✱	LB 01 81 10	Card Fit Connector	11P	カ ー ド フ ィ ッ ト コ ネ ク タ ー			
✱	LB 01 81 30	"	13P	"			
✱	LB 01 81 70	"	17P	"			
	LB 50 05 20	DIN Jack	5P	D I N ジ ャ ッ ク			
	LB 60 37 10	"	8P	"			
	LB 60 60 50	Socket IC	28P	I C ソ ケ ッ ト			
✱	PC 90 00 60	Lithium Battery	CR2032-IHS	リ チ ュ ウ ム 電 池			
	QU 00 47 00	Sela Lock		セ ラ ロ ッ ク	500KHz		
	QU 00 52 00	Quartz Crystal		水 晶 振 動 子	9.4265MHz		
✱	NA 81 43 10	AS Circuit Board	A S シ ー ト				
	FZ 00 41 00	Cermic Cap	0.1 μ F/16V	半 導 体 セ ラ コ ン			
	FI 36 42 20	Electro Magnetic Interference	0.022 μ	エ ミ フ ィ ル			
	U1 23 71 00	Electrolytic Cap.	10 μ F/16V	小 型 ケ ミ コ ン			
	U1 33 74 70	"	47 μ F/16V	"			

✱New Parts (新規部品)

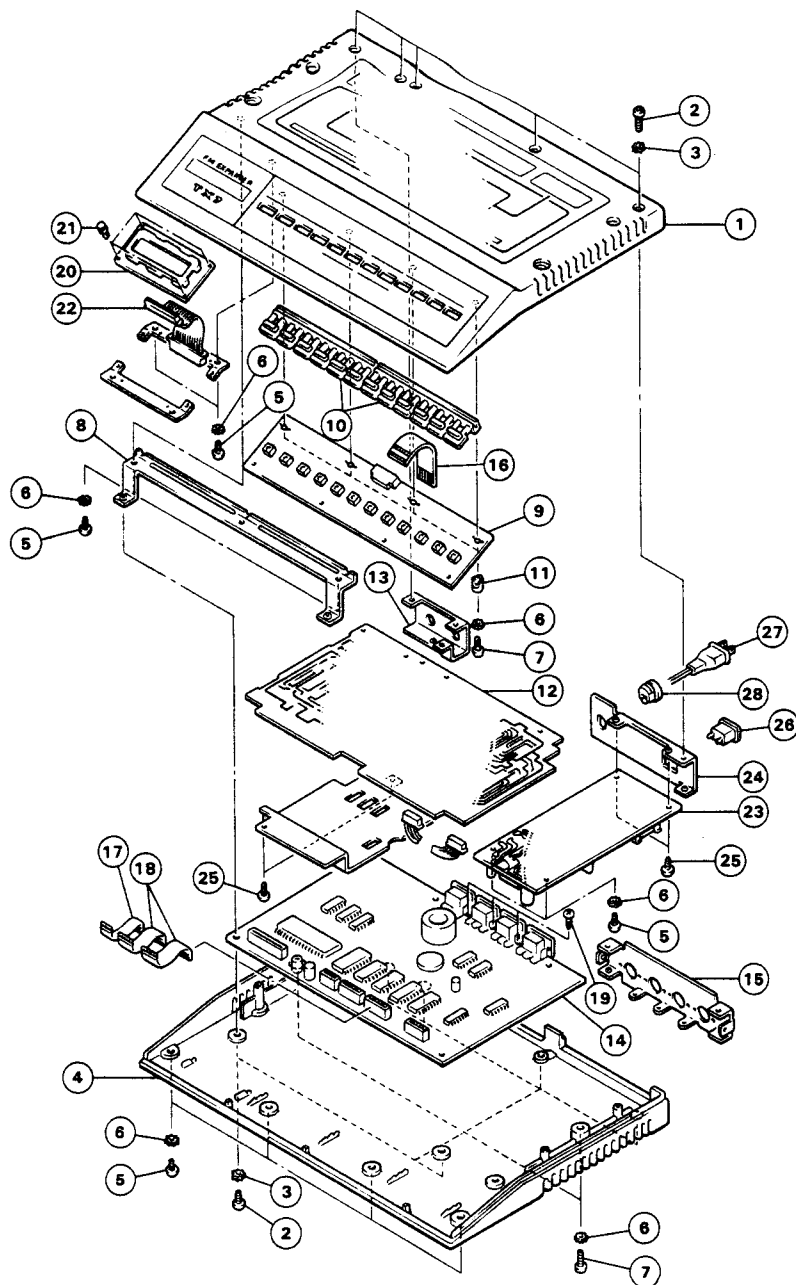
Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model	Markets	ランク
	UJ 13 81 00	Electrolytic Cap.	100 μ F/16V	小型ケミコン			
	UJ 13 82 20	"	220 μ F/16V	"			
	UJ 36 61 00	"	1 μ F/50V	"			
	UJ 16 71 00	"	10 μ F/50V	"			
	UK 34 64 70	B.P. Cap.	4.7 μ F/25V	B.P. コ ン			
	FM 11 61 00	"	1 μ F/50V	"			
	FT 55 21 20	Polypropylene Cap.	120PF	P.P. コ ン			
	FT 55 24 70	"	470PF	"			
*	HZ 00 50 60	Metal Film Resistor	560 Ω	金 膜 抵 抗			
	HZ 00 17 30	"	1k Ω	"			
	HZ 00 17 40	"	2k Ω	"			
*	HZ 00 47 80	Module Resistor	6bit DAC PKC6L103	モジュール抵抗			
	IA 10 15 20	Transistor	2SA1015(O.Y)	トランジスタ			
	IC 21 20 00	"	2SC2120(O.Y)	"			
	IF 00 34 50	Diode	1SS133	ダイオード			
	IG 10 60 00	IC	BA9221	I C			
	IG 04 38 00	"	HD7417P	"			
	IG 00 16 90	"	TC4016BP	"			
	IG 00 12 70	"	TC4066BP	"			
	IG 06 41 00	"	TC40H174P	"			
	IG 10 71 00	"	LF356N	"			
	IG 00 13 90	"	4558DV	"			
	IG 10 70 00	"	NJM072	"			
	IG 05 66 00	"	NJM386	"			
	IG 07 95 00	"	T6400	"			
	IG 06 25 00	"	UPC1252H2	"			
	IT 21 28 00	"	YM212800PS	"			
	IT 21 29 00	"	YM21290EGS	"			
	KC 00 12 50	Relay	MZ12	リ レ ー			
	LB 91 80 70	XH Connector	T.E. 7P	X H コ ネ ク タ ー			
*	LB 01 81 10	Card Fit Connector	T.E. 11P	カードフィットコネクタ ー			
*	LB 01 81 70	"	T.E. 17P	"			
	LB 40 05 70	XH Connector	T.E. 4P	X H コ ネ ク タ ー			
	LB 20 30 20	Jack, Phone Mono		ジャック・モノ			
*	LB 30 23 60	Jack, Phone Stereo		ジャック・ステレオ			
*	NA 81 43 20	PN Circuit Board		P N シ ー ト			
*	KA 90 70 30	Key Switch		タクトスイッチ			
*	LB 01 91 30	Card Fit Connector	13P	カードフィットコネクタ ー			

*New Parts (新規部品)

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model	Markets	ランク
*	NA 81 43 30	AD Circuit Board		A D シ ー ト		J	
*	NA 81 43 40	"		"		U	
*	NA 81 43 50	"		"		G	
*	NA 81 43 60	"		"		C	
*	NA 81 48 10	"		"		WG.A	
*	FR 20 31 00	Metalized Polyester Film Cap.	0.1 μ F	メタライズ・ポリエステルフィルム	C2		
*	FR 20 31 00	"	0.1 μ F	"	C1	J.U.C	
*	FR 20 32 20	"	0.22 μ F	"	C1	G.WG	
*	FZ 00 68 60	AL. Electrolytic CAP	1000 μ F/10V	ケミカルコンデンサー	C15,16		
*	FZ 00 74 40	"	100 μ F/25V	"	C12,14		
*	FZ 00 68 40	"	220/25V	"	C11,13		
*	FZ 00 68 80	"	100 μ F/200V	"	C5	J.U.C	
*	FZ 00 68 90	"	47 μ F/400V	"	C5	G.WG	
	HL 31 46 80	Metal Oxide Film Resistor	68 Ω /1W	サ ン キ ン 抵 抗	R5		
	HL 32 52 20	"	220 Ω /2W	"	R12	J.U.C	
	HL 32 81 20	"	120k Ω /2W	"	R3		
	HL 32 81 20	"	120k Ω /2W	"	R4,6	G.WG	
	HL 32 76 80	"	68k Ω /2W	"	R6	J.U.C	
	HL 32 81 20	"	120k Ω /2W	"	R17	G.WG	
*	HZ 00 48 40	Thermal Fusing Resistor	10 Ω /2W	抵抗温度ヒューズ	R2	C	
*	HZ 00 48 50	Wire Wound Resistor	10 Ω /3W	セメント抵抗	R2	J.U	
*	HZ 00 48 60	"	22 Ω /3W	"	R2	G.WG	
*	HZ 00 48 70	"	2.2 Ω /3W	"	R11	L.U.C	
*	HZ 00 48 80	"	4.7 Ω /3W	"	R11	G.WG	
	IC 26 55 00	Transistor	2SC2655	トランジスタ	TR2		
	IC 26 34 00	"	2SC2634	"	TR3		
*	IC 27 92 00	"	2SC2792	"	TR1	G.WG	
*	IC 25 55 00	"	2SC2555	"	TR1	J.U.C	
	IF 00 13 80	Diode	1SS84	ダイオード	D4,5,9		
	iH 00 12 20	"	S2K20	"	D8		
*	IF 00 85 90	"	ERB4402	"	D6,7		
*	iH 00 17 40	"	ERB4406	"	D3		
*	iH 00 17 50	"	ERB4302	"	D2		
*	iH 00 17 10	Diode Bridge	SIRBA40	ダイオードブリッジ	D1	J.U.C	
*	iH 00 17 20	"	SIRBA60	"	D1	G.WG	
	IF 00 14 70	Zener Diode	RD6.2E82	ツェナーダイオード	ZD1		
	IG 06 39 00	IC	1A μ PC7815H	I C	IC1		
	IG 07 75 00	"	1A μ PC7915H	"	IC2		
*	iK 00 04 80	Photo Conductor	PC817	フォトカプラー	PC1	J.U.C	
*	iK 00 04 90	"	PC511	"	PC1	G.WG	
	GA 84 14 00	Transformer	TYA018	ト ラ ン ス	T1	C	
*	GA 83 91 00	"	TM205	"	T1	J.U	
*	GA 83 95 00	"	TM206	"	T1	G.WG	
*	GE 30 08 20	Coil	150 μ H	コ イ ル	L2		
*	GD 90 07 60	AC Line Filter	PLA3021A	A C ラ イ ン フ ィ ル タ	L1	J.U.C	
*	GD 90 07 90	"	R5E203A	"	L1	G.WG	
	HT 57 05 40	Semi Variable Resistor	B1K	半 変 定 V R	VR1		
	KB 00 03 50	Fuse	2A 250V			J	
	KB 00 12 40	"	2A 250A			U.C	
	KB 00 07 10	"	T500mA 250A			G.WG	
	LB 60 24 60	NH Connector	T.E. 7P				
	LB 20 15 30	Fuse Holder Pin					

*New Parts (新規部品)

■ DISASSEMBLY VIEW

■ PARTS LIST
● MECHANISM CHASSIS UNIT

Ref No	Part No	Description	部 品 名	Remarks	Common Model	Markets	ランク
* 1	NX 80 13 40	Top Cover	ト ッ プ カ ハ ー			U	
* 2	NX 80 13 50	"	"			J, C, G, W, A	
2	ED 33 01 06	Bind Head Screw	3×10 BL	バ イ ン ド 小 ネ ジ			
3	EV 41 00 00	Toothed Lock Washer	M3 BL	歯 付 座 金			
4	NB 83 15 10	Bottom Cover	ボ ト ム カ ハ ー			U	
* 5	NB 83 27 00	"	"			J, C, G, W, A	
5	Ei 34 00 86	Bind Tapping Screw	4×8 BL	バ イ ン ド タ ッ プ イ ン ネ ジ			
6	EV 40 30 46	Toothed Lock Washer	M4	歯 付 座 金			
7	Ei 34 01 26	Bind Tapping Screw	4×12 BL	バ イ ン ド タ ッ プ イ ン ネ ジ			
* 8	AA 83 26 70	Circuit Board Rail	シ ー ト レ ー ル				
* 9	NA 81 43 20	PN Circuit Board	P N シ ー ト				
* 10	CB 83 53 80	Key Top	ス イ ッ チ ツ マ ミ				
* 11	CB 83 53 90	Spacer	ス ペ ー サ				
* 12	NA 81 43 10	AS Circuit Board	A S シ ー ト				
* 13	AA 83 27 20	ANGLE JK	ジャ ッ ク ア ン グ ル				
* 14	NA 81 43 00	DM Circuit Board	D M シ ー ト				
* 15	AA 83 27 30	ANGLE DIN	D I N ア ン グ ル				
* 16	Mi 80 37 30	Card Wire	13P	ス ミ カ ー ド			
* 17	Mi 80 37 50	"	11P	"			
* 18	Mi 80 37 40	"	17P	"			
19	ED 33 00 86	Bind Head Screw	3×6 BL	バ イ ン ド 小 ネ ジ			
20	NA 81 44 10	LCD Module	JN200060	L C D モ ジ ュ ー ル			
* 21	CB 83 56 50	Nylon Rivet	ナイ ロ ン リ ッ ベ ッ ト				
* 22	MZ 82 12 80	Wiring	LCD to DM	ワ イ ヤ			
* 23	NA 81 43 30	AD Circuit Board	A D シ ー ト			J	
* 24	NA 81 43 40	"	"			U	
* 25	NA 81 43 50	"	"			G	
* 26	NA 81 43 60	"	"			C	
* 27	NA 81 48 10	"	"			WG, A	
* 28	AA 83 26 80	Panel AC	A C パ ネ ル			J	
* 29	AA 83 26 90	"	"			U	
* 30	AA 83 27 00	"	"			C	
* 31	AA 83 27 10	"	"			G	
* 32	AA 83 34 40	"	"			WG	
25	ED 34 00 86	Bind Head Screw	4×8 BL	バ イ ン ド 小 ネ ジ			
* 26	KA 10 11 20	Power Switch	シ ー ゾ ー ス イ ッ チ				
27	MG 00 06 00	Power Cord	電 源 コ ー ド			J	
"	MG 00 01 00	"	"			U	
"	MG 00 01 30	"	"			A	
"	MG 00 02 70	"	"			C	
"	MG 00 08 60	"	"			G	
"	MG 00 04 50	"	"			WG	
28	CB 03 28 40	Cord Stopper	コ ー ド ス ト ッ パ ー			WG, A	
"	CB 06 86 30	"	"			J	
"	CB 07 27 50	"	"			G	
"	CB 80 68 50	"	"			C	
"	CB 81 12 30	"	"			U	

*New Parts (新規部品)

