MIDI Implementation

1. RECOGNIZED DATA

■ Channel Voice Message

● Control Change

❍ Bank Select

Status	2nd byte	3rd byte
BnH	00H	mmH

n= MIDI Channel: 0H - FH (ch.1 - ch.16)
mm= Bank Number (MSB): 00H, 01H (0,1) 0 = USER
1 = PRESET

* With Bank Select, only the MSB is received; the LSB is disregarded.

❍ Control Change Nimber

Status	2nd byte	3rd byte
BnH	ccH	vvH

n= MIDI Channel: 0H - FH (ch.1 - ch.16)
cc = Controller Nimber: 01H - 1FH (1 - 31)
: 40H - 5FH (64 - 95)
vv = Value: 00H - 7FH (0 - 127)

* You can control VOLUME, WAH, MANUAL / MEMORY, USER / PRESET, TUNER (ON / OFF), CAPO (ON / OFF), EFX (ON / OFF), DELAY (ON / OFF), TAP, CHORUS (ON / OFF), and REVERB (ON / OFF) with Control Change. Transmit 7FH for the ON / OFF value, and transmit 00H after switching ON / OFF to complete the action.

● Program Change

Status	2nd byte
CnH	ppH

n = MIDI Channel: 0H - FH (ch.1 - ch.16)
pp = Program Number: 00H - 4FH (1 - 80)

* Patches are switched according to the Program Changes received.
* 4FH or above is disregarded.

BANK MSB	BANK LSB	PROG CHG	VGA-7	BANK MSB	BANK LSB	PROG CHG	VGA-7	BANK MSB	BANK LSB	PROG CHG	VGA-7	BANK MSB	BANK LSB	PROG CHG	VGA-7
0	0	1	U01	0	0	41	U41	1	0	1	P01	1	0	41	P41
0	0	2	U02	0	0	42	U42	1	0	2	P02	1	0	42	P42
0	0	3	U03	0	0	43	U43	1	0	3	P03	1	0	43	P43
0	0	4	U04	0	0	44	U44	1	0	4	P04	1	0	44	P44
0	0	5	U05	0	0	45	U45	1	0	5	P05	1	0	45	P45
0	0	6	U06	0	0	46	U46	1	0	6	P06	1	0	46	P46
0	0	7	U07	0	0	47	U47	1	0	7	P07	1	0	47	P47
0	0	8	U08	0	0	48	U48	1	0	8	P08	1	0	48	P48
0	0	9	U09	0	0	49	U49	1	0	9	P09	1	0	49	P49
0	0	10	U00.	0	0	50	U40.	1	0	10	P00.	1	0	50	P40.
0	0	11	U11	0	0	51	U51	1	0	11	P11	1	0	51	P51
0	0	12	U12	0	0	52	U52	1	0	12	P12	1	0	52	P52
0	0	13	U13	0	0	53	U53	1	0	13	P13	1	0	53	P53
0	0	14	U14	0	0	54	U54	1	0	14	P14	1	0	54	P54
0	0	15	U15	0	0	55	U55	1	0	15	P15	1	0	55	P55
0	0	16	U16	0	0	56	U56	1	0	16	P16	1	0	56	P56
0	0	17	U17	0	0	57	U57	1	0	17	P17	1	0	57	P57
0	0	18	U18	0	0	58	U58	1	0	18	P18	1	0	58	P58
0	0	19	U19	0	0	59	U59	1	0	19	P19	1	0	59	P59
0	0	20	U10.	0	0	60	U50.	1	0	20	P10.	1	0	60	P50.
0	0	21	U21	0	0	61	U61	1	0	21	P21	1	0	61	P61
0	0	22	U22	0	0	62	U62	1	0	22	P22	1	0	62	P62
0	0	23	U23	0	0	63	U63	1	0	23	P23	1	0	63	P63
0	0	24	U24	0	0	64	U64	1	0	24	P24	1	0	64	P64
0	0	25	U25	0	0	65	U65	1	0	25	P25	1	0	65	P65
0	0	26	U26	0	0	66	U66	1	0	26	P26	1	0	66	P66
0	0	27	U27	0	0	67	U67	1	0	27	P27	1	0	67	P67
0	0	28	U28	0	0	68	U68	1	0	28	P28	1	0	68	P68
0	0	29	U29	0	0	69	U69	1	0	29	P29	1	0	69	P69
0	0	30	U20.	0	0	70	U60.	1	0	30	P20.	1	0	70	P60.
0	0	31	U31	0	0	71	U71	1	0	31	P31	1	0	71	P71
0	0	32	U32	0	0	72	U72	1	0	32	P32	1	0	72	P72
0	0	33	U33	0	0	73	U73	1	0	33	P33	1	0	73	P73
0	0	34	U34	0	0	74	U74	1	0	34	P34	1	0	74	P74
0	0	35	U35	0	0	75	U75	1	0	35	P35	1	0	75	P75
0	0	36	U36	0	0	76	U76	1	0	36	P36	1	0	76	P76
0	0	37	U37	0	0	77	U77	1	0	37	P37	1	0	77	P77
0	0	38	U38	0	0	78	U78	1	0	38	P38	1	0	78	P78
0	0	39	U39	0	0	79	U79	1	0	39	P39	1	0	79	P79
0	0	40	U30.	0	0	80	U70.	1	0	40	P30.	1	0	80	P70.

■ Syetem Exclusive Message

Status	Data byte	Status
F0H	iiH, ddH ...eeH	F7H

F0H = System Exclusive
ii = Manufacturer ID: 41H (Roland)
dd ,..ee = Data: 00H - 7FH (0 - 127)
F7H = EOX (End of Exclusive / System common)

* For details refer to "Roland Exclusive Messeges."

2. TRANSMITTED DATA

■ System EXclusive Message

Status	Data byte	Status
F0H	iiH, ddH...eeH	F7H

F0H = System Exclusive
ii = Manufacturer ID: 41H (Roland)
dd ,..ee = Data: 00H - 7FH (0 - 127)
F7H = EOX (End of Exclusive / System common)

* For details refer to "Roland Exclusive Messeges."

3. Exclusive Communications

The VGA-7 can receive all of the unit's settings data with Exclusive messages.
The Model ID Exclusive messages that can be used with the VGA-7 are 00H–34H.

■ One Way Communication

● Data Set 1 DT1 (12H)

Byte	Description
F0H	Exclusive Status
41H	Manufacturer ID (Roland)
Dev	Device ID (Dev=01H)
00H	Model ID (VGA-7) MSB
34H	Model ID (VGA-7) LSB
12H	Command ID (DT1)
aaH	Address MSB
bbH	Address
ccH	Address
ddH	Address LSB
eeH	Data
:	:
ffH	Data
sum	Checksum
F7H	EOX (End of Exclusive)

Byte	Description
F0H	Exclusive Status
41H	Manufacturer ID (Roland)
Dev	Device ID (Dev=7FH)
00H	Model ID (FC-200) MSB
72H	Model ID (FC-200) LSB
12H	Command ID (DT1)
aaH	Address MSB
bbH	Address
ccH	Address
ddH	Address LSB
eeH	Data
:	:
ffH	Data
sum	Checksum
F7H	EOX (End of Exclusive)

4. Parameter Address Map

Address are shown in every 7-bit hexadecimal

```
Address      MSB                                  LSB
Binary       0aaa aaaa   0bbb bbbb   0ccc cccc   0ddd dddd
7 bit hex.   AA          BB          CC          DD

Size         MSB                                  LSB
Binary       0sss ssss   0ttt tttt   0uuu uuuu   0vvv vvvv
7 bit hex.   SS          TT          UU          VV
```

Address Block Map

```
Address         Block                  Sub Block              Note

00 00 00 00 +-----------------------+ +-----------------------+
            | SYSTEM                | | GK SET                | *Refer to Table 'GK SET'
            |                       | +-----------------------+
01 00 00 00 |                       | +-----------------------+
            |                       | | TUNER                 | *Refer to Table 'TUNER'
            |                       | +-----------------------+
02 00 00 00 |                       | +-----------------------+
            |                       | | NS                    | *Refer to Table 'SYSTEM'
            |                       | +-----------------------+
03 00 00 00 |                       | +-----------------------+
            |                       | | SYSTEM                | *Refer to Table 'NS'
            |                       | +-----------------------+
04 00 00 00 |                       | +-----------------------+
            |                       | | MIDI                  | *Refer to Table 'MIDI'
            +-----------------------+ +-----------------------+
0C 00 00 00 +-----------------------+ +-----------------------+
            | USER Patch            | | U01                   | *Refer to Table 'PATCH'
            |                       | +-----------------------+
0C 01 00 00 |                       | +-----------------------+
            |                       | | U02                   |
            |                       | +-----------------------+
    :       |                       |           :
    :       |                       |           :
0C 4E 00 00 |                       | +-----------------------+
            |                       | | U79                   |
            |                       | +-----------------------+
0C 4F 00 00 |                       | +-----------------------+
            |                       | | U70.                  |
            +-----------------------+ +-----------------------+
0C 50 00 00 +-------------------------------------------------+
            | USER Patch Dummy Address                        |
            |            for One Patch BULK DUMP/LOAD         |
            +-------------------------------------------------+
```

* Bulk data can be received during Load Standby in the MIDI Parameter screen.
* Be sure to splits parameters with a value of 2 or above when transmitting; always transmit these parameters in the same packet.
* When One Patch is use for the BULK DUMP operation, Dummy is supplied for the Address. When BULK DUMP is carried out using this Address, the data is stored to the current patch.

Table 'GK SET'

Address(H)	Size(H)	Data(H)	Parameter	Description
00 00 00 00	00 00 00 01	00 - 02	TYPE	00 : GK-2A 01 : GK-2 02 : PIEZO
00 00 00 01	00 00 00 01	00 - 2A	SCALE	00 : St 01 : Lp 02 : 20 03 : 21 : : : : 2A : 60
00 00 00 02	00 00 00 01	00 - 14	BRIDGE1	10 - 30
00 00 00 03	00 00 00 01	00 - 14	BRIDGE2	10 - 30
00 00 00 04	00 00 00 01	00 - 14	BRIDGE3	10 - 30
00 00 00 05	00 00 00 01	00 - 14	BRIDGE4	10 - 30
00 00 00 06	00 00 00 01	00 - 14	BRIDGE5	10 - 30
00 00 00 07	00 00 00 01	00 - 14	BRIDGE6	10 - 30
00 00 00 08	00 00 00 01	00 - 63	SENS1	0 - 99
00 00 00 09	00 00 00 01	00 - 63	SENS2	0 - 99
00 00 00 0A	00 00 00 01	00 - 63	SENS3	0 - 99
00 00 00 0B	00 00 00 01	00 - 63	SENS4	0 - 99
00 00 00 0C	00 00 00 01	00 - 63	SENS5	0 - 99
00 00 00 0D	00 00 00 01	00 - 63	SENS6	0 - 99
00 00 00 0E	00 00 00 01	00 - 01	DIRECTION	0 : NORMAL 1 : REVERSE
00 00 00 0F	00 00 00 01	00 - 01	PHASE	0 : NORMAL 1 : INVERSE
00 00 00 10	00 00 00 01	00 - 0A	LEVEL	-5 - 5
00 00 00 11	00 00 00 01	00 - 03	S1/S2	0 : PICKUP SEL 1 : NUMBER SEL 2 : BANK SEL 3 : TUNER
00 00 00 12	00 00 00 02		dummy data	

Table 'TUNER'

Address(H)	Size(H)	Data(H)	Parameter	Description
01 00 00 00	00 00 00 01	00 - 0A	PITCH	435Hz - 445Hz
01 00 00 01	00 00 00 01	00 - 0A	LEVEL	0(OFF) - 10

Table 'NS'

Address(H)	Size(H)	Data(H)	Parameter	Description
02 00 00 00	00 00 00 01	00 - 0A	THRESHOLD	0 - 10

Table 'SYSTEM'

Address(H)	Size(H)	Data(H)	Parameter	Description
03 00 00 00	00 00 00 01	00 - 02	FOOT SW TYPE	00 : EFFECTS (MOMENTARY) 01 : EFFECTS (LATCH) 02 : PROGRAM
03 00 00 01	00 00 00 01	00 - 01	EXP PEDAL HOLD	00 : ON 01 : OFF
03 00 00 02	00 00 00 04		dummy data	
03 00 00 06	00 00 00 01	00 - 02	BULK DUMP	00 : ALL 01 : PATCH (ALL) 02 : PATCH (ONE)

Table 'MIDI'

Address(H)	Size(H)	Data(H)	Parameter	Description
04 00 00 00	00 00 00 01	00 - 01	MIDI OUT SELECT	00 : OUT 01 : THRU

Table 'PATCH'

Offset(H)	Size(H)	Data(H)	Parameter	Description

* All the data is sent as nibble data.

===== COSM GUITAR =====

0C ** 00 00	00 00 00 02	00 - 05	TYPE	00 : ST 01 : LP 02 : TEL 03 : HOLLOW 04 : ACOUSTIC 05 : SPECIAL

* Depending on the TYPE, data values may be limited for the following parameters.

----- TYPE = 00 : ST -----

0C ** 00 02	00 00 00 02	00 - 02	VARIATION	00 : CLASSIC 01 : MODERN 02 : HS
0C ** 00 04	00 00 00 02	01	PICKUP	01 : FRONT
		02		02 : FRONT + CENTER
		03		03 : CENTER
		04		04 : CENTER + REAR
		06		06 : REAR

----- TYPE = 01 : LP -----

0C ** 00 02	00 00 00 02	00 - 02	VARIATION	00 : CLASSIC 01 : MODERN 02 : JR
0C ** 00 04	00 00 00 02	01	PICKUP	01 : FRONT
		05		05 : FRONT + REAR
		06		06 : REAR

----- TYPE = 02 : TEL -----

0C ** 00 02	00 00 00 02	00 - 02	VARIATION	00 : CLASSIC 01 : MODERN 02 : HS
0C ** 00 04	00 00 00 02	01	PICKUP	01 : FRONT
		05		05 : FRONT + REAR
		06		06 : REAR

----- TYPE = 03 : HOLLOW -----

0C ** 00 02	00 00 00 02	00 - 02	VARIATION	00 : SEMI 01 : FULL 02 : RICK
0C ** 00 04	00 00 00 02	01	PICKUP	01 : FRONT
		05		05 : FRONT + REAR
		06		06 : REAR

----- TYPE = 04 : ACOUSTIC -----

0C ** 00 02	00 00 00 02	00 - 05	VARIATION	00 : STANDARD 01 : ROUND 02 : METAL 03 : NYLON STR 04 : BANJO 05 : UKULELE
0C ** 00 04	00 00 00 02	07 - 08	PICKUP	07 : PIEZO 08 : MIC

----- TYPE = 05 : SPECIAL -----

0C ** 00 02	00 00 00 02	00 - 07	VARIATION	00 : BOWED 01 : PIPE 02 : ORGAN 03 : BRASS 04 : SOLO 05 : SYNTH1 06 : SYNTH2 07 : FILTER BASS

```
0C ** 00 04  00 00 00 02  00        PICKUP
0C ** 00 06  00 00 00 02            dummy data
0C ** 00 08  00 00 00 02  00 - 04   TUNING TYPE             00 : NORMAL
                                                            01 : 12 STRING
                                                            02 : OPEN TYPE
                                                            03 : NASHVILLE
                                                            04 : USER
```

* Depending on the TUNING TYPE, data values may be limited for the following parameters.

----- TUNING TYPE = 00 : NORMAL -----

```
0C ** 00 0A  00 00 00 02  00        VARIATION
```

----- TUNING TYPE = 01 : 12 STRING -----

```
0C ** 00 0A  00 00 00 02  00 - 02   VARIATION                00 : REGULAR
                                                            01 : OCTAVE
                                                            02 : DETUNE
```

----- TUNING TYPE = 02 : OPEN TYPE -----

```
0C ** 00 0A  00 00 00 02  00 - 02   VARIATION                00 : OPEN D
                                                            01 : OPEN G
                                                            02 : DROPPED D
```

----- TUNING TYPE = 03 : NASHVILLE -----

```
0C ** 00 0A  00 00 00 02  00 - 01   VARIATION                00 : TYPE 1
                                                            01 : TYPE 2
```

----- TUNING TYPE = 04 : USER -----

```
0C ** 00 0A  00 00 00 02  00        VARIATION
0C ** 00 0C  00 00 00 04            dummy data
0C ** 00 10  00 00 00 02  00 - 18   STRING1                  E↓- E - E↑
0C ** 00 12  00 00 00 02  00 - 18   STRING2                  B↓- B - B↑
0C ** 00 14  00 00 00 02  00 - 18   STRING3                  G↓- G - G↑
0C ** 00 16  00 00 00 02  00 - 18   STRING4                  D↓- D - D↑
0C ** 00 18  00 00 00 02  00 - 18   STRING5                  A↓- A - A↑
0C ** 00 1A  00 00 00 02  00 - 18   STRING6                  E↓- E - E↑
0C ** 00 1C  00 00 00 04            dummy data
0C ** 00 20  00 00 00 02  00 - 01   CAPO                     00 : OFF
                                                            01 : ON
0C ** 00 22  00 00 00 02  00 - 0B   CAPO FRET                -12 - -1
                          0D - 18                             1 - 12
0C ** 00 24  00 00 00 04            dummy data
```

===== COSM AMPLIFIER =====

```
0C ** 00 28  00 00 00 02  00 - 04   TYPE                     00 : CLEAN
                                                            01 : CRUNCH
                                                            02 : LEAD
                                                            03 : SPECIAL
                                                            04 : FULL RANGE
```

* Depending on the TYPE, data values may be limited for the following parameters.

----- TYPE = 00 : CLEAN -----

```
0C ** 00 2A  00 00 00 02  00 - 03   VARIATION                00 : JC
                                                            01 : CLASSIC1
                                                            02 : CLASSIC2
                                                            03 : MELLOW
```

----- TYPE = 01 : CRUNCH -----

```
0C ** 00 2A  00 00 00 02  00 - 03   VARIATIOM                00 : CLASSIC1
                                                            01 : CLASSIC2
                                                            02 : CLASSIC3
                                                            03 : MODERN
```

----- TYPE = 02 : LEAD -----

```
0C ** 00 2A  00 00 00 02  00 - 05   VARIATION                00 : CLASSIC I
                                                            01 : CLASSIC I+II
                                                            02 : MODERN1
                                                            03 : MODERN2
                                                            04 : METAL1
                                                            05 : METAL2
```

----- TYPE = 03 : SPECIAL -----

```
0C ** 00 2A  00 00 00 02  00 - 02   VARIATION                00 : LAYER1
                                                            01 : LAYER2
                                                            02 : FUZZ
```

----- TYPE = 04 : FULL RANGE -----

```
0C ** 00 2A  00 00 00 02  00 - 02   VARIATION                00 : FLAT
                                                            01 : SHAPED
                                                            02 : FAT
0C ** 00 2C  00 00 00 04            dummy data
0C ** 00 30  00 00 00 02  00 - 63   GAIN                     0 - 99
0C ** 00 32  00 00 00 02  00 - 63   VOLUME                   0 - 99
0C ** 00 34  00 00 00 02  00 - 63   BASS                     0 - 99
0C ** 00 36  00 00 00 02  00 - 63   MIDDLE                   0 - 99
0C ** 00 38  00 00 00 02  00 - 63   TREBLE                   0 - 99
0C ** 00 3A  00 00 00 02  00 - 63   PRESENCE                 0 - 99
0C ** 00 3C  00 00 00 04            dummy data
0C ** 00 40  00 00 00 02  00 - 04   SPEAKER TYPE             00 : ORIGINAL
                                                            01 : 1-12" OPEN
                                                            02 : 2-12" OPEN
                                                            03 : 4-10" OPEN
                                                            04 : 4-12" CLOSED
```

* Depending on the SPEAKER TYPE, data values may be limited for the following parameters.

----- SPEAKER TYPE = 00 : ORIGINAL-----

```
0C ** 00 42  00 00 00 02  00        VARIATION
```

----- SPEAKER TYPE = 01 : 1-12" OPEN -----

```
0C ** 00 42  00 00 00 02  00 - 01   VARIATION                00 : CLASSIC
                                                            01 : MODERN
```

----- SPEAKER TYPE = 02 : 2-12" OPEN -----

```
0C ** 00 42  00 00 00 02  00 - 01   VARIATION                00 : CLASSIC
                                                            01 : MODERN
```

----- SPEAKER TYPE = 03 : 4-10" OPEN -----

0C ** 00 42	00 00 00 02	00 - 01	VARIATION	00 : CLASSIC 01 : MODERN

----- SPEAKER TYPE = 04 : 4-12" CLOSED -----

0C ** 00 42	00 00 00 02	00 - 03	VARIATION	00 : CLASSIC 01 : MODERN 02 : CLASSIC STACK 03 : MODERN STACK
0C ** 00 44	00 00 00 04		dummy data	

===== EFFECTS =====

0C ** 00 48	00 00 00 02	00 - 01	EFX	00 : OFF 01 : ON
0C ** 00 4A	00 00 00 02	00 - 05	SELECT	00 : WAH 01 : SLOW GEAR 02 : COMP 03 : TREMOLO 04 : PHASER 05 : FLANGER
0C ** 00 4C	00 00 00 04		dummy data	
0C ** 00 50	00 00 00 02	00 - 63	WAH PEDAL	0 - 99
0C ** 00 52	00 00 00 02		dummy data	
0C ** 00 54	00 00 00 02	00 - 63	SLOW GEAR SENS	0 - 99
0C ** 00 56	00 00 00 02	00 - 63	SLOW GEAR RISE TIME	0 - 99
0C ** 00 58	00 00 00 02	00 - 63	COMP SUSTAIN	0 - 99
0C ** 00 5A	00 00 00 02	00 - 63	COMP ATTACK	0 - 99
0C ** 00 5C	00 00 00 02	00 - 63	TREMOLO RATE	0 - 99
0C ** 00 5E	00 00 00 02	00 - 63	TREMOLO INTENSITY	0 - 99
0C ** 00 60	00 00 00 02	00 - 63	PHASER RATE	0 - 99
0C ** 00 62	00 00 00 02	00 - 63	PHASER INTENSITY	0 - 99
0C ** 00 64	00 00 00 02	00 - 63	FLANGER RATE	0 - 99
0C ** 00 66	00 00 00 02	00 - 63	FLANGER INTENSITY	0 - 99
0C ** 00 68	00 00 00 02	00 - 01	DELAY	00 : OFF 01 : ON
0C ** 00 6A	00 00 00 02	00 - 02	DELAY VARIATION	00 : MONO 01 : PANNING 02 : HOLD
0C ** 00 6C	00 00 00 04	0000 - 0708	DELAY TIME	0 - 1800
0C ** 00 70	00 00 00 02	00 - 63	FEEDBACK	0 - 99
0C ** 00 72	00 00 00 02	00 - 63	DELAY LEVEL	0 - 99
0C ** 00 74	00 00 00 04		dummy data	
0C ** 00 78	00 00 00 02	00 - 01	CHORUS	00 : OFF 01 : ON
0C ** 00 7A	00 00 00 02	00 - 02	CHORUS VARIATION	00 : SPACE 01 : WARM 02 : BRIGHT
0C ** 00 7C	00 00 00 02	00 - 63	CHORUS INTENSITY	0 - 99
0C ** 00 7E	00 00 00 02		dummy data	
0C ** 01 00	00 00 00 02	00 - 01	REVERB	00 : OFF 01 : ON
0C ** 01 02	00 00 00 02	00 - 02	REVERB VARIATION	00 : PLATE 01 : ROOM 02 : HALL
0C ** 01 04	00 00 00 02	00 - 63	REVERB LEVEL	0 - 99
0C ** 01 06	00 00 00 02		dummy data	
0C ** 01 08	00 00 00 02	00 - 63	CHORUS RATE	0 - 99
0C ** 01 0A	00 00 00 76		dummy data	
0C ** 02 00	00 00 00 18		dummy data	

5. Supplementary material

● Decimal/Hexadecimal table

(hexadecimal values are indicated by a following "H")

MIDI uses 7-bit hexadecimal values to indicate data values and the address and size of exclusive messages. The following table shows the correspondence between decimal and hexadecimal numbers.

D	H	D	H	D	H	D	H
0	00H	32	20H	64	40H	96	60H
1	01H	33	21H	65	41H	97	61H
2	02H	34	22H	66	42H	98	62H
3	03H	35	23H	67	43H	99	63H
4	04H	36	24H	68	44H	100	64H
5	05H	37	25H	69	45H	101	65H
6	06H	38	26H	70	46H	102	66H
7	07H	39	27H	71	47H	103	67H
8	08H	40	28H	72	48H	104	68H
9	09H	41	29H	73	49H	105	69H
10	0AH	42	2AH	74	4AH	106	6AH
11	0BH	43	2BH	75	4BH	107	6BH
12	0CH	44	2CH	76	4CH	108	6CH
13	0DH	45	2DH	77	4DH	109	6DH
14	0EH	46	2EH	78	4EH	110	6EH
15	0FH	47	2FH	79	4FH	111	6FH
16	10H	48	30H	80	50H	112	70H
17	11H	49	31H	81	51H	113	71H
18	12H	50	32H	82	52H	114	72H
19	13H	51	33H	83	53H	115	73H
20	14H	52	34H	84	54H	116	74H
21	15H	53	35H	85	55H	117	75H
22	16H	54	36H	86	56H	118	76H
23	17H	55	37H	87	57H	119	77H
24	18H	56	38H	88	58H	120	78H
25	19H	57	39H	89	59H	121	79H
26	1AH	58	3AH	90	5AH	122	7AH
27	1BH	59	3BH	91	5BH	123	7BH
28	1CH	60	3CH	92	5CH	124	7CH
29	1DH	61	3DH	93	5DH	125	7DH
30	1EH	62	3EH	94	5EH	126	7EH
31	1FH	63	3FH	95	5FH	127	7FH

D: decimal
H: hexadecimal

Decimal expressions such as used for MIDI channel, Bank Select, and Program Change will be the value 1 greater than the decimal value given in the above table.

<Example>
What is the decimal equivalent of 5AH?
From the above table, 5AH = 90.

❍ Examples of actual MIDI messages

<Example> C0 32
CnH is the Program Change status and oIis the MIDI channel number. Since 0H = 0, and 32H = 50, this is a Program Change message of MIDI CH = 1, Program number 50.

❍ Examples of exclusive messages and calculating the checksum

Roland exclusive messages (DT1) are transmitted with a checksum at the end of the data (before F7) to check that the data was received correctly. The value of the checksum is determined by the address and data (or size) of the exclusive message.

❍ How to calculate the checksum

(hexadecimal values are indicated by a following "H")

The checksum consists of a value whose lower 7 bits are 0 when the address, size and checksum itself are added.
The following formula shows how to calculate the checksum when the exclusive message to be transmitted has an address of aa bb cc ddH, and data or size of ee ffH.

aa + bb + cc + dd + ee + ff = total
total / 128 = quotient ... remainder
128 - remainder = checksum

Checksum is 0 if the remainder is 0.

Roland Exclusive Messages

1. Data Format for Exclusive Messages

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

Byte	Description
F0H	Exclusive Status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
CMD	Command ID
[BODY]	Main data
F7H	End of exclusive

• MIDI status: F0H, F7H

An Exclusive message must be flanked by a pair of status codes, starting with a Manufacturer ID immediately after F0H (MIDI version 1.0).

• Manufacturer ID: 41H

The Manufacturer ID identifies the manufacturer of a MIDI instrument that sends an Exclusive message. Value 41H represents Roland's Manufacturer ID.

• Device ID: DEV

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

• Model ID: MDL

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

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

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

• Command ID: CMD

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

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

• Main data: BODY

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

2. Address-mapped Data Transfer

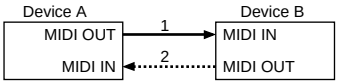
Address mapping is a technique for transferring messages conforming to the data format given in Section 1. It assigns a series of memory-resident records—waveform and tone data, switch status, and parameters, for example, to specific locations in a machine-dependent address space, thereby allowing access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

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

• One-way transfer procedure (See Section 3 for details.)

This procedure is suited to the transfer of a small amount of data. It sends out an Exclusive message completely independent of the receiving device's status.

Connection Diagram

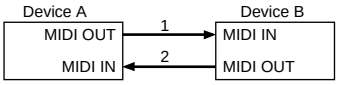


Connection at point 2 is essential for "Request data" procedures. (See Section 3.)

• Handshake-transfer procedure (This device does not use this procedure)

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

Connection Diagram



Connection at points 1 and 2 is essential.

Notes on the above procedures

** There are separate Command IDs for different transfer procedures.*

** Devices A and B cannot exchange data unless they use the same transfer procedure, share identical Device ID and Model ID, and are ready for communication.*

3. One-way Transfer Procedure

This procedure sends out data until it has all been sent and is used when the messages are so short that answerbacks need not be checked.
For longer messages, however, the receiving device must acquire each message in time with the transfer sequence, which inserts 20 milliseconds intervals.

Types of Messages

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

• Request data #1: RQ1 (11H) (This device does not use this procedure)

This message is sent out when there is a need to acquire data from a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of data required.
On receiving an RQ1 message, the remote device checks its memory for the data address and size that satisfy the request.
If it finds them and is ready for communication, the device will transmit a "Data set 1 (DT1)" message, which contains the requested data. Otherwise, the device won't send out anything.

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

** The size of the requested data does not indicate the number of bytes that will make up a DT1 message, but represents the address fields where the requested data resides.*

** Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.*

** The same number of bytes comprises address and size data, which, however, vary with the Model ID.*

** The error-checking process uses a checksum that provides a bit pattern where the last 7 bits are zero when values for an address, size, and that checksum are summed.*

•Data set 1: DT1 (12H)

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

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

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

** A DT1 message is capable of providing only the valid data among those specified by an RQ1 message.*

** Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.*

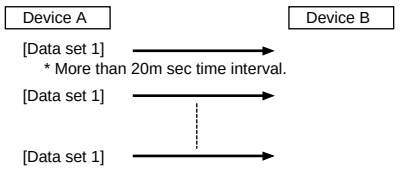
** The number of bytes comprising address data varies from one Model ID to another.*

** The error-checking process uses a checksum that provides a bit pattern where the last 7 bits are zero when values for an address, size, and that checksum are summed.*

•Example of Message Transactions

•Device A sending data to Device B

Transfer of a DT1 message is all that takes place.



•Device B requesting data from Device A

Device B sends an RQ1 message to Device A.
Checking the message, Device A sends a DT1 message back to Device B.