MIDI BULK DATA FORMAT ON HS ELECTONE

When Requesting All of RAM

F0, 43, 70, model, 00, data....., checksum, F7

Model numbers are: $19 for HS-8, HS-8T, $18 for HS-7, HS-7T, $17 for HS-6, $16 for HS-5, and $15 for HS-4.

The data section is converted to 7 bit from the original 8 bit data and the 2 byte counter showing the byte count for every block.

The data section is divided into 6 blocks altogether. The byte count is shown at the beginning of every block of original 8 bit data.

The checksum is calculated on the byte count of each block (prior to 7 bit conversion) and the original 8 bit data. It is calculated under the 8 bit values (no carry) with the MBS set to 0.

The method for converting 8 bit data to 7 bits is carried out as described below. The data after conversion may be either 1 or 2 bytes.

Original 8 Bit Data	Data After Conversion	
00△△△△△△	00△△△△△△	Original bits 5 thru 0 are moved to bits 5 thru 0.
01△△△△△△	01△△△△△△	Original bits 5 thru 0 are moved to bits 5 thru 0.
	0101xxxx	Original bits 7 thru 6 are moved to bits 5 thru 4.
10△△△△△△	01△△△△△△	Original bits 5 thru 0 are moved to bits 5 thru 0.
	0110xxxx	Original bits 7 thru 6 are moved to bits 5 thru 4.

That is, when data bit 6 becomes 1 after conversion, the original 8 bit data is shown as 2 bytes. The original 8 bit data shows either bit 7 or bit 6 as 1.

The data is made up of the registration of each block (in the following order: User Voice, Registration, User pattern, CSP and RSP). The FMP(UK), FMP(LK), FMP(PK), FMP (Registration) should consist of the following configuration prior to conversion.

Address	(byte count)	Data content
$0000	(1)	Lower 8 bits of byte count on registration, etc.
$0001	(1)	Higher 8 bits of byte count on registration, etc.
$0002	(77)	Data of user voice 1
$004F	(77)	Data of user voice 2
$009C	(77)	Data of user voice 3
$00E9	(77)	Data of user voice 4
$0136	(67)	
$0179	(67)	Data of registration 1
$01BC	(67)	Data of registration 2
$01FF	(67)	Data of registration 3
$0242	(67)	Data of registration 4
$0285	(67)	Data of registration 5
$02C8	(67)	Data of registration 6
$030B	(67)	Data of registration 7
$034E	(67)	Data of registration 8
$0391	(67)	Data of registration 9
$03D4	(67)	Data of registration 10
$0417	(67)	Data of registration 11
$045A	(67)	Data of registration 12
$049D	(67)	Data of registration 13
$04E0	(67)	Data of registration 14
$0523	(67)	Data of registration 15
$0566	(67)	Data of registration 16
$05A9	(19)	Data of all of registration
$0603	(4415)	Data of rhythm user pattern
$1743	(769)	Data of ABC user pattern
$1A44	(130)	Data of CSP 1
$1AC6	(130)	Data of CSP 2
$1B48	(130)	Data of CSP 3
$1BCA	(130)	Data of CSP 4
$1C4C	(250)	Data of RSP 1
$1D46	(250)	Data of RSP 2
$1E40	(250)	Data of RSP 3
$1F3A	(250)	Data of RSP 4
$1F3B	(1)	Lower 8 bits of byte count on FMP(UK)
$1F3C	(1)	Higher 8 bits of byte count on FMP(UK)
$1F3D	(varies)	Data of FMP(UK)
$xxxx	(1)	Lower 8 bits of byte count on FMP(LK)
$xxxx	(1)	Higher 8 bits of byte count on FMP(LK)
$xxxx	(varies)	Data of FMP(LK)
$xxxx	(1)	Lower 8 bits of byte count on FMP(SK)
$xxxx	(1)	Higher 8 bits of byte count on FMP(SK)
$xxxx	(varies)	Data of FMP(SK)
$xxxx	(1)	Lower 8 bits of byte count on FMP(PK)
$xxxx	(1)	Higher 8 bits of byte count on FMP(PK)
$xxxx	(varies)	Data of FMP(PK)
$xxxx	(1)	Lower 8 bits of byte count on FMP(registration)
$xxxx	(1)	Higher 8 bits of byte count on FMP(registration)
$xxxx	(varies)	Data of FMP(registration)

When Requesting User Voice Data

F0, 43, 70, model, 00, data...., checksum, F7

Model numbers are: $19 for HS-8, HS-8T, $18 for HS-7, HS-7T, $17 for HS-6, $16 for HS-5, and $15 for HS-4.

The data section is converted to 7 bit from the original 8 bit data and the 2 byte counter showing the original 8 bit data.

The checksum is calculated on the original 8 bit data and the byte counter value (prior to 7 bit conversion). It is calculated under the 8 bit values (no carry) with MBS at 0.

The original 8 bit data is converted to 7 bits thru the same method employed when requesting all of RAM.

The user voice data prior to conversion should show the configurations below.

Address	(byte count)	Data content
$0000	(1)	Lower 8 bits of byte count on registration
$0001	(1)	Higher 8 bits of byte count on registration
$0002	(77)	Data of user voice 1
$004F	(77)	Data of user voice 2
$009C	(77)	Data of user voice 3
$00E9	(77)	Data of user voice 4

The contents of all user voice data are described below.

offset	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	
+ 0	TONE NUMBER								
+ 1	SLTL								
+ 2	SLPT								
+ 3	PFLG	BFLG	FILTER						
+ 4					SY_EN	SY/CL	SL_EN	ON/OF	
+ 5	TEGMUL								
6			FB			CON			
+ 7 - + A	0	DT1			MUL1				4 slots
+ B - + E	1	TBSEL			MUL2				4 slots
+ F - +12	RR_EN	TL							4 slots
+13 - +16	KS		FIX	AR					4 slots
+17 - +1A	AM_EN	TEGSEN		D1R					4 slots
+1B - +1E	DT2		0	D2R					4 slots
+1F - +22	D1L			RR					4 slots
+23 - +26	PAT_CONV					KSTYPE			4 slots
27 - +2A	EGSFT		1	TAR		TSEN			4 slots
+2B - +2E				BRSEN					4 slots

LFO (lead attack)

+2F		PMS						
+30	LFO							
+31	1	PMD						
+32				ATT_VIB_SENS			WAVE	
+33	ATTACK TIME							

LFO (am)

+2F							AMS	
+30	LFO							
+31	0	AMD						
+32							WAVE	
+33								

LFO (lead & orchestra vibrato)

offset	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
+34		PMS						
+35	LFO							
+36		PMD						
+37							WAVE	
+38	DELAY TIME (lead)							

DFL

offset	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
+39	OGAIN					OSFT		
+3A	T0							
+3B	T1							
+3C	K1							
+3D	T2							
+3E	K2							
+3F	T3							
+40	K3							
+41	T4							
+42	K4							
+43	T5							
+44	K5							
+45	T6							
+46	K6							
+47	T7							
+48	K7							
+49	T8							
+4A	K8							
+4B	S/D					ISFT		
+4C								EN

TONE NUMBER : Tone number
SLTL : Total slide level compensation rate
SLPT : Slide pitch coefficient(pitch exchange time: 4.12 ms)
Current value = 1 ÷ coefficient x (goal value - current value) + current value
PFLG : UK assignment octave downward flag (0 = normal, 1 = down)
BFLG : PK walk octave downward flag(0 = normal, 1 = down)
FILTER : Filter (DFL) on/off flag(0 = off, 1 = on)
SY_EN : Automatic symphonic enabled flag
SY/CL : Automatic symphonic effect(0 = celeste, 1 = symphonic)
SL_EN : Tone group select on/off enabled flag
ON/OF : Tone group select on/off flag(0 = off, 1 = on)
TEGMUL : TEG multiplication coefficient
FB : Feedback amount
CON : Connection
DT1 : Detune 1
MUL1 : Multiple 1
TBSEL : Sign table select
MU : Multiple 2
RR_EN : Release enabled flag
TL : Total level
KS : Key scale
FIX : Frequency fix
AR : Attack rate
AM_EN : AM modulation enabled flag
TEGSEN : TEG sense
OPZ_TL = TL + (TEGSEN x 6 ÷ 128) x (TL x TEGMUL ÷ 256)
D1R : First decay rate
DT2 : Detune 2
D2R : Second decay rate
D1L : First decay level
RR : Release rate
PAT_CONV : Exchange coefficient on key scale table
KSTYPE : Key scale type
EGSFT : EG shift
TAR : Initial touch attack addition rate

(velocity	01 - 64	65 - 96	97 - 112	113 - 128
TAR = 0 ->	00	00	00	00
TAR = 1 ->	00	00	00	01
TAR = 2 ->	00	00	01	02
TAR = 3 ->	00	01	02	03)

TSEN : Initial touch total level addition rate
BRSEN : Brilliance sense

PMS : Pitch modulation sense
LFO : Designation on LFO dispatch frequency
PMD : Pitch modulation depth
ATT_VIB_SENS : Attack vibrato sense
WAVE : Waveform
ATTACK TIME : Attack time
AMS : AM modulation sense
AMD : AM modulation depth
DELAY TIME : Delay time on delayed vibrato

GAIN : Output gain
SFT : Output shift
T0, T1, .. , T8 : Filter parameters
K1, K2, .. , K8 : Filter parameters
S/D : Single/double select
ISFT : Input shift
FE : Filter-enabled flag

When Requesting Registration Data

F0, 43, 70, model, 00, data...., checksum, F7

Model numbers are: $19 for HS-8, HS-8T, $18 for HS-7, HS-7T, $17 for HS-6, $16 for HS-5, and $15 for HS-4.

The data section is converted to 7 bit from the original 8 bit data and the 2 byte counter showing the original 8 bit data.

The checksum is calculated on the original 8 bit data and the byte counter value (prior to 7 bit conversion). It is calculated under the 8 bit values (no carry) with MBS at 0.

The original 8 bit data is converted to 7 bits thru the same method employed when requesting all of RAM.

The registration data prior to conversion should show the configurations below.

Address (byte count)	Data content
$0000 (1)	Lower 8 bits of byte count
$0001 (1)	Higher 8 bits of byte count
$0002 (67)	Data of registration 1
$0045 (67)	Data of registration 2
$0088 (67)	Data of registration 3
$00CB (67)	Data of registration 4
$010E (67)	Data of registration 5
$0151 (67)	Data of registration 6
$0194 (67)	Data of registration 7
$01D7 (67)	Data of registration 8
$021A (67)	Data of registration 9
$025D (67)	Data of registration 10
$02A0 (67)	Data of registration 11
$02E3 (67)	Data of registration 12
$0326 (67)	Data of registration 13
$0369 (67)	Data of registration 14
$03AC (67)	Data of registration 15
$03EF (67)	Data of registration 16
$0432 (3)	Data of all the registration

When Requesting User Pattern Data

F0, 43, 70, model, 00, data...., checksum, F7

Model numbers are: $19 for HS-8, HS-8T, $18 for HS-7, HS-7T, $17 for HS-6, $16 for HS-5, and $15 for HS-4.

The data section is converted to 7 bit from the original 8 bit data and the 2 byte counter showing the original 8 bit data.

The checksum is calculated on the original 8 bit data and the byte counter value (prior to 7 bit conversion). It is caluculated under the 8 bit values (no carry) with MBS at 0.

The original 8 bit data is converted to 7 bits thru the same method employed when requesting all of RAM.

The user pattern data prior to conversion should show the configurations below.

Address	(byte count)	Data content
$0000	(1)	Lower 8 bits of byte count
$0001	(1)	Higher 8 bits of byte count
$0002	(576)	Directory of user pattern
$0242	(3839)	Rhythm user pattern data
$1142	(769)	ABC user pattern data

When Requesting CSP Data

F0, 43, 70, model, 00, data...., checksum, F7

Model numbers are: $19 for HS-8, HS-8T, $18 for HS-7, HS-7T, $17 for HS-6, $16 for HS-5, and $15 for HS-4.

The data section is converted to 7 bit from the original 8 bit data and the 2 byte counter showing the original 8 bit data.

The checksum is calculated on the original 8 bit data and the byte counter value (prior to 7 bit conversion). It is calculated under the 8 bit values (no carry) with MBS at 0.

The original 8 bit data is converted to 7 bits thru the same method employed when requesting all of RAM.

The CSP data prior to conversion should show the configurations below.

Address (byte count)		Data content
$0000	(1)	Lower 8 bits of byte count
$0001	(1)	Higher 8 bits of byte count
$0002	(130)	Data of CSP 1
$0084	(130)	Data of CSP 2
$0106	(130)	Data of CSP 3
$0188	(130)	Data of CSP 4
$020A	(250)	Data of RSP 1
$0304	(250)	Data of RSP 2
$03FE	(250)	Data of RSP 3
$04F8	(250)	Data of RSP 4

The contents of all CSP data are described below.

00～C0	:	Chord data The 4 higher bits show the root, the lower 4 bits show the chord type.
D0～DF	:	Registration data This data shows which number was pressed for registration memory.
E0～E5	:	Rhythm variation data This is the Fill-in, Intro/Ending ON/OFF data.
F2～F4	:	Repeat signal
F8～FB	:	Beat length data
FF	:	End signal

Chord Sequence Data

The beat length and then the chord data are programmed, except when continuing with the same beat length. In such a case, the beat length data can be omitted in subsequent data.

Registration Sequence DATA

Program the registration data and the rhythm variation data.

*FF is the only data which is not programmed.

CSP data list

The 4 lower bits → / The 4 higher bits ↓	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	C# Major	D Major	D# Major	E Major	F Major	F# Major	G Major	G# Major	A Major	A# Major	B Major	C Major	NO CHORD	REG 1	RHY NOR	
1	C# 6th	D 6th	D# 6th	E 6th	F 6th	F# 6th	G 6th	G# 6th	A 6th	A# 6th	B 6th	C 6th		REG 2	RHY F1	
2	C# M7	D M7	D# M7	E M7	F M7	F# M7	G M7	G# M7	A M7	A# M7	B M7	C M7		REG 3	RHY F2	Segno
3	C# +5	D +5	D# +5	E +5	F +5	F# +5	G +5	G# +5	A +5	A# +5	B +5	C +5		REG 4	RHY FU	Coda
4	C# -5	D -5	D# -5	E -5	F -5	F# -5	G -5	G# -5	A -5	A# -5	B -5	C -5		REG 5	RHY INT	D.S
5	C# minor	D minor	D# minor	E minor	F minor	F# minor	G minor	G# minor	A minor	A# minor	B minor	C minor		REG 6	RHY END	
6	C# m6	D m6	D# m6	E m6	F m6	F# m6	G m6	G# m6	A m6	A# m6	B m6	C m6		REG 7		
7	C# mM7	D mM7	D# mM7	E mM7	F mM7	F# mM7	G mM7	G# mM7	A mM7	A# mM7	B mM7	C mM7		REG 8		
8	C# 7th	D 7th	D# 7th	E 7th	F 7th	F# 7th	G 7th	G# 7th	A 7th	A# 7th	B 7th	C 7th		REG 9		1/4 note
9	C# 7+5	D 7+5	D# 7+5	E 7+5	F 7+5	F# 7+5	G 7+5	G# 7+5	A 7+5	A# 7+5	B 7+5	C 7+5		REG 10		half note
A	C# 7-5	D 7-5	D# 7-5	E 7-5	F 7-5	F# 7-5	G 7-5	G# 7-5	A 7-5	A# 7-5	B 7-5	C 7-5		REG 11		3/4 note
B	C# 7sus4	D 7sus4	D# 7sus4	E 7sus4	F 7sus4	F# 7sus4	G 7sus4	G# 7sus4	A 7sus4	A# 7sus4	B 7sus4	C 7sus4		REG 12		whole note
C	C# m7	D m7	D# m7	E m7	F m7	F# m7	G m7	G# m7	A m7	A# m7	B m7	C m7		REG 13		
D	C# 7-5	D m7-5	D# m7-5	E m7-5	F m7-5	F# m7-5	G m7-5	G# m7-5	A m7-5	A# m7-5	B m7-5	C m7-5		REG 14		
E	C# dim	D dim	D# dim	E dim	F dim	F# dim	G dim	G# dim	A dim	A# dim	B dim	C dim		REG 15		

	C#	D	D#	E	F	F#	G	G#	A	A#	B	C		REG		end
F	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF	UNDEF		16		mark

REG n :On of REGISTRATION MEMORY No. n
RHY NOR:Off of FILL IN and INTRO/ENDING
RHY F1 :On of FILL IN 1
RHY F2 :On of FILL IN 2
RHY FU :On of USER FILL IN
RHY INT:On of INTRO
RHY END:On of ENDING
UNDEF :No chord at playback when no chord type found.

Example: Programs Registration 1, 4 beats of C, 4 beats of Am, 2 beats of Dm, 2 beats of G7, FILL 1 and 4 beats of C.

Data: D0 E0 FB B0 85 F8 15 68 D0 E1 FB B0 FF
REG1 NOR 4beats C Am 2beats Dm G7 REG1 F1 4beats C End mark

The contents of all RSP data are described below.

The following items can be programmed in the RSP. When pressing the beat length button:
1) set one of the registration memory number buttons to ON (registration data);
2) set one of the rhythm select number buttons to ON (rhythm select data);
3) set the USER 1 and 2 buttons ON or OFF (user button data)
4) set the FILL-IN and INTRO/ENDING buttons ON or OFF (rhythm variation data)

When replaying, the appropriate rhythm select button should be ON, the USER 1 and 2 buttons, the FILL-IN, and the INTRO/ENDING buttons should be either ON or OFF as programmed. The rhythm is made from the registration programmed by the 7 rhythm and user pattern select buttons marked with a dot.

00~5F : Registration/Rhythm Variation data
The 4 higher bits show Rhythm Variation and the 4 lower bits show Registration.
80~AD : Rhythm Select/User button data
The 4 higher bits show ON/OFF status of User button and the 4 lower bits show On of which No. of Rhthm Select button.
F2~F4 : Repeat signal
F8~FB : Beat length data
FF : End signal

Program the rhythm pattern in the following order: Beat length data, registration/rhythm variation data, and rhythm select/user button data, except when continuing with the same beat length. In such case, the beat length data can be omitted in subsequent data.

*FF is the only data which is not programmed.

RSP data list

The 4 lower bits								←The 4 higher bits							
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	REG1 NOR	REG1 F1	REG1 F2	REG1 FU	REG1 INT	REG1 END			RH0 U:OFF	RH0 USR1	RH0 USR2					
1	REG2 NOR	REG2 F1	REG2 F2	REG2 FU	REG2 INT	REG2 END			RH1 U:OFF	RH1 USR1	RH1 USR2					
2	REG3 NOR	REG3 F1	REG3 F2	REG3 FU	REG3 INT	REG3 END			RH2 U:OFF	RH2 USR1	RH2 USR2					SEGNO
3	REG4 NOR	REG4 F1	REG4 F2	REG4 FU	REG4 INT	REG4 END			RH3 U:OFF	RH3 USR1	RH3 USR2					CODA
4	REG5 NOR	REG5 F1	REG5 F2	REG5 FU	REG5 INT	REG5 END			RH4 U:OFF	RH4 USR1	RH4 USR2					D.S
5	REG6 NOR	REG6 F1	REG6 F2	REG6 FU	REG6 INT	REG6 END			RH5 U:OFF	RH5 USR1	RH5 USR2					
6	REG7 NOR	REG7 F1	REG7 F2	REG7 FU	REG7 INT	REG7 END			RH6 U:OFF	RH6 USR1	RH6 USR2					
7	REG8 NOR	REG8 F1	REG8 F2	REG8 FU	REG8 INT	REG8 END			RH7 U:OFF	RH7 USR1	RH7 USR2					
8	REG9 NOR	REG9 F1	REG9 F2	REG9 FU	REG9 INT	REG9 END			RH8 U:OFF	RH8 USR1	RH8 USR2					1/4 note
9	REG10 NOR	REG10 F1	REG10 F2	REG10 FU	REG10 INT	REG10 END			RH9 U:OFF	RH9 USR1	RH9 USR2					half note
A	REG11 NOR	REG11 F1	REG11 F2	REG11 FU	REG11 INT	REG11 END			RH10 U:OFF	RH10 USR1	RH10 USR2					3/4 note
B	REG12 NOR	REG12 F1	REG12 F2	REG12 FU	REG12 INT	REG12 END			RH11 U:OFF	RH11 USR1	RH11 USR2					whole note
C	REG13 NOR	REG13 F1	REG13 F2	REG13 FU	REG13 INT	REG13 END			RH12 U:OFF	RH12 USR1	RH12 USR2					
D	REG14 NOR	REG14 F1	REG14 F2	REG14 FU	REG14 INT	REG14 END			RH13 U:OFF	RH13 USR1	RH13 USR2					
E	REG15 NOR	REG15 F1	REG15 F2	REG15 FU	REG15 INT	REG15 END										

F	REG16 NOR	REG16 F1	REG16 F2	REG16 FU	REG16 INT	REG16 END									end mark

REG n : ON of REGISTRATION MEMORY No. n
NOR : OFF of FILL IN, INTRO/ENDING
F1 : ON of FILL IN 1
F2 : ON of FILL IN 2
FU : ON of USER FILL IN
INT : ON of INTRO
END : ON of ENDING
U:OFF : OFF of both USER 1 and USER 2
USR1 : ON of USER 1
USR2 : ON of USER 2
RH? : ON of Rhythm Select button No. ?

RH0	RH1	RH2	RH3	RH4	RH5	RH6	USER1
MARCH	WALTZ	SWING	SAMBA	LATIN ROCK	BOUNCE	DISCO	
RH7	RH8	RH9	RH10	RH11	RH12	RH13	USER2
TANGO	BALLAD	BOSSA NOVA	LATIN	SLOW ROCK	8BEAT	16BEAT	

Example

1st bar: Playbacks preset pattern transferred to RH12 of Registration 1.
REG1, NOR, RH12, U:OFF

2nd bar: Playbacks preset pattern transferred to RH13 of Registration 1.
REG1, NOR, RH13, U:OFF

1st and 2nd beat of the 3rd bar: Playbacks pattern registered in USER 1 of Registration 1.
REG1, NOR, RH12, USR 1

3rd and 4th beat of the 3rd bar: Playbacks pattern registered in USER FILL of Registration 1.
REG1, FU, RH12, USR 1

4th bar: Playbacks preset pattern transferred to RH12 of Registration 1.
REG1, NOR, RH12, U:OFF

Data: FB 00 8C 00 8D F9 00 9C 30 9C FB 00 8C FF

4th beat	REG1 NOR	RH12 U:OFF	REG1 NOR	RH13 U:OFF	2nd beat	REG1 NOR	RH12 USR1	REG1 FU	RH12 USR1	4th beat	REG1 NOR	RH12 U:OFF	end mark

When Requesting FMP Data

F0, 43, 70, model, 00, data...., checksum, F7

Model numbers are: $19 for HS-8, HS-8T, $18 for HS-7, HS-7T, $17 for HS-6, $16 for HS-5, and $15 for HS-4.

The data section is converted to 7 bits from the original 8 bit data using the byte count for all blocks as shown on the 2 byte counter.

The data section is divided into 5 blocks altogether. The byte count is shown at the beginning of every block of original 8 bit data.

The checksum is calculated on the byte count of each block (prior to 7 bit conversion) and the original 8 bit data. It is calculated by addition of the 8 bit values (no carry) with with the MBS at 0.

The original 8 bit data is converted to 7 bits thru the same method employed when requesting all of RAM.

All blocks are composed of data is the following order: FMP(UK), FMP(LK), FMP(SK), FMP(PK), and FMP(registration). This data should display the following configurations prior to conversion.

Address	(byte count)	Data content
$0000	(1)	Lower 8 bits of the FMP(UK) byte count
$0001	(1)	Higher 8 bits of the FMP(UK) byte count
$0002	(varies)	Data of FMP(UK)
$xxxx	(1)	Lower 8 bits of the FMP(LK) byte count
$xxxx	(1)	Higher 8 bits of the FMP(LK) byte count
$xxxx	(varies)	Data of FMP(LK)
$xxxx	(1)	Lower 8 bits of the FMP(SK) byte count
$xxxx	(1)	Higher 8 bits of the FMP(SK) byte count
$xxxx	(varies)	Data of FMP(SK)
$xxxx	(1)	Lower 8 bits of the FMP(PK) byte count
$xxxx	(1)	Higher 8 bits of the FMP(PK) byte count
$xxxx	(varies)	Data of FMP(PK)

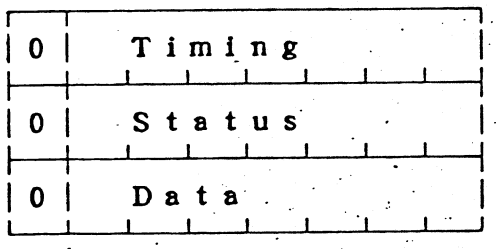
$xxxx (1) Lower 8 bits of the FMP(registration) byte count
$xxxx (1) Higher 8 bits of the FMP(registration) byte count
$xxxx (varies) Data of FMP(registration)

The largest possible values of the variable length byte count are shown below.

UK and LK: 8192 bytes
SK and PK: 8192 bytes
Registration: 512 bytes

The content of all blocks of FMP data is described below.

Performance/Registration data: 1 set is composed of 3 bytes.



Timing: 0 at the start of FMP recording. Each beat of the rhythm is divided into 24 increments. It is reset to 0 when this reached 128.

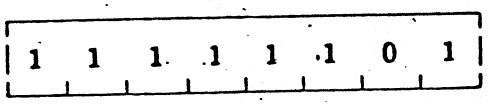
Status, Data

When switching registration memory
Status: 0F
Data: Registration No. minus 1(e.g. if the registration is 1, then 00; if the registration is 16, then 0F)

Panel switch ON/OFF
Status: Refer to the SW chord on page 79 of the HS Owner's Guide.
Data: Refer to the SW data on page 79 of the HS Owner's Guide.

Performance data
Status: Key Code
Data: Velocity

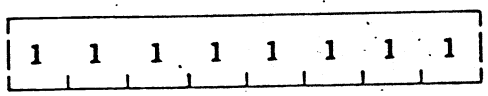
Measure mark data: 1 byte of data



$FD

Each beat of rhythm is divided into increments of 24, and written into each block when it reached 128.

End data: 1 byte of data



$FF

All blocks end with $FF.

When Requesting Tone Parameter Data

F0, 43, 70, model, 00, data...., checksum, F7

Model codes: $19 for HS-8, HS-8T, $18 for HS-7, HS-7T, $17 for HS-6, $16 for HS-5, and $15 for HS-4.

The data section is converted to 7 bits from the original 8 bit data.

The checksum is calculated by addition of the original 8 values (no carry) with MBS at 0.

The original 8 bit data is converted to 7 bits thru the same method employed when requesting all of RAM.

The tone parameters (prior to conversion) should be as described below.

Address (byte count)	Data content
$0000 (varies)	Tone parameter data....
	U/L LEAD: Maximum of 57 bytes
	UK ORCHESTRAL: Maximum of 77 bytes
	LK ORCHESTRAL: Maximum of 77 bytes
	UK COMBINATION: Maximum of 57 bytes
	LK COMBINATION: Maximum of 57 bytes
	PK BASS: Maximum of 57 bytes
	ARPEGGIO: Maximum of 57 bytes
	U/L PERCUSIIVE: Maximum of 57 bytes

The command requesting this data (Prior to conversion) is described below.

Format of Send/Receive Request Command

F0, 43, 70, 70, XX, ID1, ID2, SPL, SPH, DCL, DCH, F7

XX is 01 when requesting send, and 02 when requesting receive.
ID1 and ID2 show the type of tone parameter requested, as shown below.

With ID2 at 00, and
ID1 at 00: U/L LEAD
08: UK ORCHESTRAL
10: LK ORCHESTRAL
18: UK COMBINATION
20: LK COMBINATION
28: PK BASS
30: ARPEGGIO
38: U/L PERCUSSIVE

SPL and SPH show the position from the first requesting tone parameter data. SPL shows L7 bit of the position, and SPH shows H7 bit.
DCL and DCH shows byte count from offset of of the requesting tone parameter.
DCL shows L7 bit of byte count, and DCH shows H7 bit.
The format of the tone parameter data is the same one with each user voice data.

Regarding of other MIDI data format

Tempo of control change

F0, 43, 70, 70, 40, 50, TL, TH, F7

Tempo from 40 to 240 at the display expresses on 8 bit and sets apart in TH and TL.

	MSB LSB	
TH	xx765432	From bit 7 to bit 2 of the original 8 bit data enters from bit 5.
TL	x10xxxxx	From bit 1 to bit 0 of the original 8 bit data enters from bit 6.

However, the bit value at x section is 0.