1. Outline

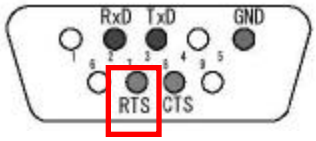
In case no comments in particular as for the contents of this papers, the descriptions are effective for the RX-Vx400. RX-Vx400 in this paper means both RX-V2400 and RX-V1400.

1.1 Connection

5 wire system

	TxD(PIN3)	Transpose	-------->	RxD(PIN2)	
	RxD(PIN2)	receive	<-------	TxD(PIN3)	
RX-Vx400	GND(PIN5)	Ground	---------	GND(PIN5)	HOST.
Slave	CTS(PIN8)	permit to send data	<-------	RTS(PIN7)	master
	RTS(PIN7)	request to send data	-------->	CTS(PIN8)	

*When not connected, data sending to RX-Vx400 is prohibited (CTS port pull down).



1.2 RS-232C Settings

* Full duplex, start-stop synchronization communication

Baud rate	: 9600bps
Data bits	: 8
Parity	: No
Stop bit	: 1bit
Handshaking	: Hardware

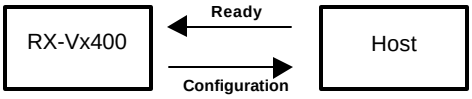
*RTS port of RX-Vx400 outputs low level while the AC plug is disconnected.
If RTS output stays low even when the AC plug is connected, there might be some trouble.

1.3 Data block timeout

It takes RX-Vx400 maximum 500msec to send one data block. If a complete data block is not received within 500msec, please cancel the transaction. There might be some trouble.

2. Start transactions

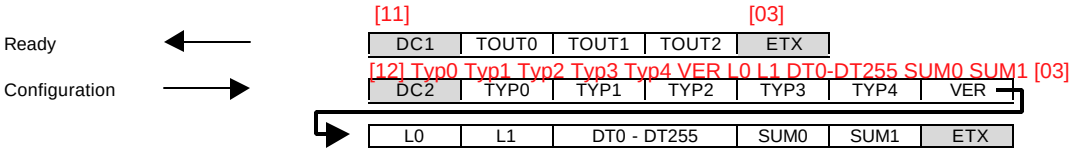
2.1 Starting Communication



Ready command is the very first command to be sent to RX-Vx400 at the start of the communication. TOUT0 - 2 in Ready Command sets timeout of the communication.

RX-Vx400 sends Configuration command (Model ID, software version, and setting data) to the host in reply to the Ready command.

RX-Vx400 will send a Configuration command within 1 sec. after receiving a Ready command from the host. If not, please send a Ready command again (max 5 times). If RX-Vx400 won't send any Configuration commands after fifth retry, please cancel the transaction because there might be some problems.



*TYPx : Model ID = “R0161” (RX-V2400)
*VER : Software Version
*SUM : the sum of all data except for the header and footer

*TYPx Model ID = "R0226" (RX-V1800)
Model ID = "R0227" (HTR-6190)
Model ID = "R0225" (RX-V3800)
*VER Software Version
*SUM The sum of all data except for the header and footer

function name	function	data (ASCII)	range (HEX)
TOUT0 - 2	communication timeout	0 - 9, A - F	0 - 0xFFF

*timeout between the header and the footer
*timeout=0 means no timeout

function name	function	data (ASCII)	range (HEX)	
TYP0 - 4	model ID	0 - 9, A - F	voluntary	R
VER	software version	A - Z	voluntary	0161
L0 - 1	data length	0 - 9, A - F	1 - 0xFF	09
DT0 - 255	data	0 - 9, A - F	0 - 0xF	@E01 9000 0
SUM0	upper 4 bit of SUM	0 - 9, A - F	0 - 0xF	A
SUM1	lower 4 bit of SUM	0 - 9, A - F	0 - 0xF	7

Power	00	ALL(Main/Zone2/3) OFF	
	01	ALL(Main/Zone2/3) ON	
	02	MainON / Zone2 OFF / Zone3 OFF	
	03	MainOFF / Zone2 ON / Zone3 ON	
	04	MainON / Zone2 ON / Zone3 OFF	
	05	MainON / Zone2 OFF / Zone3 OFF	
	06	MainOFF / Zone2 ON / Zone3 ON	
	07	MainOFF / Zone2 OFF / Zone3 ON	

*Data Structure of Configuration command

data	When the power is OFF, only DT0,1, …,9 are sent to the Host.		
DT0	**Fixed**	**Baud Rate**	**Don't care ('@')**
DT1	**Fixed**	**Receive Buffer**	**Don't care ('E')**
DT2	**Fixed**	**Receive Buffer**	**Don't care ('0')**
DT3	**Fixed**	**Command Timeout**	**Don't care ('1')**
DT4	**Fixed**	**Command Timeout**	**Don't care ('9')**
DT5	**Fixed**	**Command Timeout**	**Don't care ('0')**
DT6	**Fixed**	**Handshaking**	**Don't care ('0')**
DT7	0 / 1	System	0: OK / 1: Busy 2: Power Off
DT8	0 / 1	Power	0: OFF / 1: ON
DT9	0 - C	Input	0: PHONO / 1: CD / 2: TUNER / 3: CD-R / 4: MD-TAPE / 5: DVD / 6: D-TV-LD / 7: CBL-SAT / 9: VCR1 / A: VCR2-DVR / C: V-AUX
DT10	0 / 1	6ch input	0: OFF / 1: ON
DT11	0 - 6	Input Mode	0: AUTO / 2: DTS / 4: ANALOG / 5: ANALOG ONLY
DT12	0 / 1	Audio Mute	0: OFF / 1: ON
DT13	0 - C	Zone2 Input	0: PHONO / 1: CD / 2: TUNER / 3: CD-R / 4: MD-TAPE / 5: DVD / 6: D-TV-LD / 7: CBL-SAT / 9: VCR1 / A: VCR2-DVR / C: V-AUX
DT14	0 / 1	Zone2 Mute	0: OFF / 1: ON
DT15	0 - F	Master Volume	Upper 4 bit
DT16	0 - F	Master Volume	Lower 4 bit
DT17	0 - F	Zone2 Volume	Upper 4 bit
DT18	0 - F	Zone2 Volume	Lower 4 bit
DT19	0 - F	Program	Upper 4 bit
DT20	0 - F	Program	Lower 4 bit
DT21	0 / 1	Effect	0: OFF / 1: ON
DT22	0 - 3	6.1/ES key status	0: OFF / 1: MATRIX ON / 2: DISCRETE ON / 3: AUTO
DT23	0 - 2	OSD*	0: FULL / 1: SHORT / 2: OFF
DT24	0 - 3	Sleep	0: 120 / 2: 90 / 3: 60 / 4: 30 / 5: OFF
DT25	0 - 4	Tuner Page	0: Page A / 1: Page B / 2: Page C / 3: Page D / 4: PageE
DT26	0 - 7	Tuner No.	0: No.1 / 1: No.2 / 2: No.3 / 3: No.4 / 4: No.5 / 5: No.6 / 6: No.7 / 7: No.8
DT27	0 - 1	Night mode	0: OFF / 1: ON
DT28		**Don't Care**	
DT29	0 / 1	Speaker relay A	0: OFF / 1: ON
DT30	0 / 1	Speaker relay B	0: OFF / 1: ON
DT31	0 - B	Playback	0: 6ch input / 1: Analog / 2: PCM / 3: DD*(except 2.0) / 4: DD(2.0) / 5: DD.Karaoke / 6: DD.EX / 7: DTS / 8: DTS-ES / 9: Other DIGITAL / A: DTS Analog Mute / B: DTS ES Discrete
DT32	0 - B	Fs	0: Analog / 1: 32kHz / 2: 44.1kHz / 3: 48kiHz / 4: 64kHz / 5: 88.2kHz / 6: 96kHz / 7: Unknown B: DTS 96/24
DT33	0 - 2	EX/ES playback	0: OFF / 1: MATRIX ON / 2: DISCRETE ON
DT34	0 / 1	Thr / Bypass	0: Normal / 1: Bypass
DT35	0 / 1	RED dts	0: Release / 1: Wait
DT36	0 / 1	Head Phone	0: OFF / 1: ON
DT37	0 / 1	TUNER BAND	0: FM / 1: AM
DT38	0 / 1	TUNER TUNED	0: NOT TUNED / 1: TUNED
DT39	0 / 1	DC1 Control Out	0: LOW / 1: HIGH
DT40		Don't care	
DT41		**Don't Care**	
DT42	0-2	DC1 TRG Ctrl.	0: Zone1 / 1: Zone2 / 2: Zone1&2
DT43	0/1	dts 96/24	0: OFF / 1: ON
DT44	0-2	DC2 TRG Ctrl.	0: Zone1 / 1: Zone2 / 2: Zone1&2
DT45	0/1	DC2 Trigger	0: LOW / 1: HIGH
DT46		SP B set	0: Zone1 / 1: Zone2
DT47		Zone 2 SP out	0: OFF / 1: ON
DT48		MAIN R	Upper 4bit
DT49			Lower 4bit
DT50		MAIN L	Upper 4bit
DT51			Lower 4bit
DT52		CENTER	Upper 4bit
DT53			Lower 4bit
DT54		REAR R	Upper 4bit
DT55			Lower 4bit
DT56		REAR L	Upper 4bit
DT57			Lower 4bit
DT58		SUR BACK	Upper 4bit
DT59		R	Lower 4bit
DT60		SUR BACK	Upper 4bit
DT61		L	Lower 4bit
DT62		FRONT R	Upper 4bit
DT63			Lower 4bit
DT64		FRONT L	Upper 4bit
DT65			Lower 4bit
DT66		SWFR 1	Upper 4bit
DT67			Lower 4bit

DT68		**Don't Care**		
DT69		**Don't Care**		
DT70		**Don't Care**		
DT71		**Don't Care**		
DT72		**Don't Care**		
DT73		**Don't Care**		
DT74		LFE Lvl. SP		Upper 4bit
DT75				Lower 4bit
DT76		LFE Lvl. HP		Upper 4bit
DT77				Lower 4bit
DT78		Audio Delay		Upper 4bit
DT79				Lower 4bit
DT80		**Don't Care**		
DT81		**Don't Care**		
DT82		**Don't Care**		
DT83		**Don't Care**		
DT84		Input mode set		0: AUTO / 1: LAST
DT85		Dimmer		0: -4 / 1: -3 / 2: -2 / 3: -1 / 4: 0
DT86		OSD Message		
DT87		OSD shift		Upper 4bit
DT88				Lower 4bit
DT89		Glay back		0: OFF / 1: AUTO
DT90		Video conversion		0: OFF / 1: ON
DT91		D. Range	SP	0: MAX / 1: STD / 2: MIN
DT92			HP	0: MAX / 1: STD / 2: MIN
DT93		Zone 2 vol. Out		
DT94		**Don't Care**		
DT95		Memory guard		0: OFF / 1: ON
DT96		SP set	Center	0: Large / 1: Small / 2: None
DT97			Main	0: Large / 1: Small
DT98			Rear L/R	0: Large / 1: Small / 2: None
DT99			Rear CT	0: Large / 1: Small / 2: None
DT100			Front	0: Yes / 1: None
DT101			LFE/BASS	0: SWFR / 1: Main / 2: Both
DT102		6CH	Center	0: Center / 1: Main
DT103			SWFR	0: SWFR / 1: Main
DT104		Main level		0: Normal / 1: -10dB
DT105		Test mode		0: OFF / 1: Dolby / 2: DTS
DT106				
DT107		LVL 6CH MAIN L		Upper 4bit
DT108				Lower 4bit
DT109		MAIN R		Upper 4bit
DT110				Lower 4bit
DT111		CENTER		Upper 4bit
DT112				Lower 4bit
DT113		SL		Upper 4bit
DT114				Lower 4bit
DT115		SR		Upper 4bit
DT116				Lower 4bit
DT117		SBL		Upper 4bit
DT118				Lower 4bit
DT119		SBR		Upper 4bit
DT120				Lower 4bit
DT121		FORNT L		Upper 4bit
DT122				Lower 4bit
DT123		FRONT R		Upper 4bit
DT124				Lower 4bit
DT125		SWFR		Upper 4bit
DT126				Lower 4bit
DT127	0 - C	Z3 Input		
DT128	0/1	Z3 Mute		
DT129	0 - F	Z3 Volume		Upper 4bit
DT130	0 - F			Lower 4bit
DT131				
DT132		MULTI_CH SELECT		00:6CH / 01:8CH TUNER / 02: 8CH CD / 04: 8CH CD-R / 05: 8CH DVD / 06: DTV / 07: 8CH CBL/SAT / 09: 8CH VCR1 / 0A: VCR2/DVR / 0C: VAUX
DT133		MULTI_CH SURROUND to		00: Surround / 01: Main
DT134		SP SET SW1		00: L-R / 01: F-R / 02: NONE
DT135		SP SET CROSSOVER		00: 40Hz / 01: 60Hz / 02: 80Hz / 03: 90Hz / 04: 100Hz / 05: 110Hz / 06: 120Hz / 07: 160Hz / 08: 200Hz
DT136		COMPONENT OSD		00: OFF / 01: ON
DT137		PB/SB SELECT		00: PR / 01: SB

*DD = Dolby Digital
*OSD = On Screen Display

3. Control Command

*RX-Vx400 can receive control commands only while the power is on.
(Except Power commands and System commands*)

*Please do not send any control commands while the system status is in wait. No commands are permitted until RX-Vx400 reports OK

*RX-Vx400 will send a Report Command** within 1 sec of receiving the Control Command. If no Report Command is received, resend control command (max 5 times) If RX-Vx400 doesn't send a Report Commands after fifth retry, cancel the transaction because there might be some troubles.

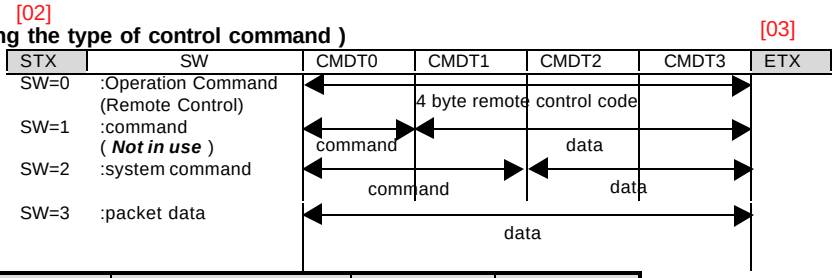
*'SW' switches the type of the control command. When the 'SW' is set to '0', you can control RX-Vx400 remotely via RS-232C.

*RX-Vx400 will only send one report command for each type of control. The Report Command will report only the final status of all settings in a strings of commands (may not report all steps in a status, only final status).
For example, if a user set the input selector on the unit to D-TV/LD just after the host sends command to change input to CD, RX-Vx400 may report only the final status that the input was changed to D-TV/LD by the system operation.

*System command, **Report command --> described in later

- Command Switch (changing the type of control command)

control command

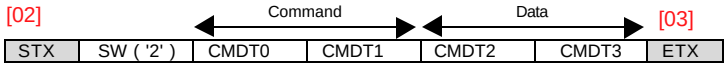


function name	function	data (ASCII)	range (HEX)
SW	command switch	0 - 9	0 - 9
CMDT0 - 3	command & data	0 - 9, A - F	variable

* 'SW' switches the command type of the Control Command.
SW=0 : 4 byte command for remote control code
SW=1 : 1 byte command 0 - F (HEX expression in ASCII)
SW=2 : 2 byte command 10 - FF (HEX expression in ASCII)
SW=3 : 4 byte packet data

* RX-Vx400 uses following three types of Control Command.
- Operation Commands for remote control (SW = 0)
- System Commands for system setting (SW = 2)
- packet data for test data transmission (SW = 3)

3.1 System Command (SW = '2')



System Command can be made by setting the 'SW' byte in the Control Command to '2'. With System command you can control RX-Vx400's system settings (Report Command Enable / Disable, Report Command delay, etc)

With a System Command you can also ...

- set absolute master volume value.
- send text strings to the On Screen Display (OSD).
- request RX-Vx400 text data regarding tuner freq., master volume, input name, zone2 input name.

(from RX-Vx400)

	Command			data			Report Command		
SW	CMDT0	CMDT1		CDMT2	CMDT3		Type	RCMD1,2	RDAT1,2
2	0	0	report command enable	0	0	enable	0	00	00(OK)
				0	1	disable	0	00	00(OK)
2	0	1	time between two report commands	0	0	real time	0	00	00(OK)
			(Report Command Delay)	0	1	50ms	0	00	00(OK)
				0	2	100ms	0	00	00(OK)
				0	3	150ms	0	00	00(OK)
				0	4	200ms	0	00	00(OK)
				0	5	250ms	0	00	00(OK)
				0	6	300ms	0	00	00(OK)
				0	7	350ms	0	00	00(OK)
				0	8	400ms	0	00	00(OK)
2	1	0	OSD message start command	0	0	start	0	00	00(OK)
2	2	0	Tuning frequency text request	0	0		Refer to the following section		
			Main volume value text request	0	1				
			Zone2 volume value text request	0	2				
			Input name text request	0	3				
			Zone2 input name text request	0	4				
			Zone 2 volume value text request	0	5				
			Zone2 input name text request	0	6				
2	3	0	Master volume direct setting	X	X		0	26	
2	3	1	Zone 2 volume direct setting	X	X		0	27	
2	3	2	Main L/R balance	X	X		0	50	
2	3	3	Main level	0	0	Normal	0	3D	
2	3	4	Zone 3 volume direct setting	X	X				
2	4	0	LEVEL MAIN R	X	X		0	40	
2	4	1	MAIN L	X	X		0	41	
2	4	2	CENTER	X	X		0	42	
2	4	3	REAR R	X	X		0	43	
2	4	4	REAR L	X	X		0	44	
2	4	5	FRONT R	X	X		0	45	
2	4	6	FRONT L	X	X		0	46	
2	4	7	SUR BACK R	X	X		0	47	
2	4	8	SUR BACK L	X	X		0	48	
2	4	9	SWFR 1	X	X		0	49	
2	4	A	SWFR 2	X	X		0	4A	
2	5	0	LFE SP	X	X		0	51	
2	5	1	LFE HP	X	X		0	52	
2	5	2	Audio Delay	X	X		0	53	
2	5	3	SP Delay Center	X	X		0	54	
2	5	4	SP Delay Rear CT	X	X		0	55	
2	6	0	Input Mode	0	0	Auto	0	60	
				0	1	Last	0	60	
2	6	1	Dimmer	X	X		0	61	
2	6	2	OSD Shift	X	X		0	62	
2	6	3	Gray Back	0	0	Off	0	63	
				0	1	Auto	0	63	
2	6	4	Dynamic Range SP	0	0	Max	0	64	
				0	1	STD	0	64	
				0	2	Min	0	64	
2	6	5	Dynamic Range HP	0	0	Max	0	65	
				0	1	STD	0	65	
				0	2	Min	0	65	
2	6	6	Zone 2 Volume Output	0	0	Var.	0	66	
				0	1	Fix	0	66	

@TODO

@TODO

2	6	7	Zone 2 Mode	0	0	Mode 1	0	67	
				0	1	Mode 2	0	67	
2	6	8	Memory Guard	0	0	Off	0	68	
				0	1	On	0	68	
2	6	9	Video Conversion	0	0	Off	0	69	
				0	1	On	0	69	
2	6	A	Component OSD	0	0	Off	0	6A	
				0	1	On	0	6A	
2	6	B	Zone 3 Vol output	0	0	Var.	0	6B	
				0	1	Fix	0	6B	
2	7	0	SP Center	0	0	Large	0	70	
				0	1	Small	0	70	
				0	2	None	0	70	
2	7	1	Main	0	0	Large	0	71	
				0	1	Small	0	71	
2	7	2	Rear L/R	0	0	Large	0	72	
				0	1	Small	0	72	
				0	2	None	0	72	
2	7	3	SBACK	0	0	Large x2	0	73	
				0	1	Large x1	0	73	
				0	2	Small x2	0	73	
				0	3	Small x1	0	73	
				0	4	None	0	73	
2	7	4	Front (only V3300)	0	0	Yes	0	74	
				0	1	None	0	74	
2	7	5	LFE/Bass	0	0	SWFR	0	75	
				0	1	Main	0	75	
				0	2	Both	0	75	
2	7	6	SUBWOOFER 1	0	0	L-R	0	76	
				0	1	F-R	0	76	
				0	2	None	0	76	
	7	7	SUBWOOFER 2	0	0	L-R	0	77	
				0	1	F-R	0	77	
				0	2	None	0	77	
2	7	8	6CH Center to	0	0	Center	0	78	
					1	Main	0	78	
2	7	9	6CH SWFR to	0	0	SWFR	0	79	
2	7	A	6CH Surround to	0	0	Surround	0	7A	
					1	Main	0	7A	
2	7	B	Multi CH select	0	0	6CH	0	7B	
				0	1	8CH	0	7B	
2	7	D	PR / SB select	0	0	Sur.Back	0	7D	
				0	1	Presence	0	7D	
2	7	E	Subwoofer Cross Over	0	0	40 Hz	0	7E	
				0	1	60 Hz	0	7E	
				0	2	80 Hz	0	7E	
				0	3	90 Hz	0	7E	
				0	4	100 Hz	0	7E	
				0	5	110 Hz	0	7E	
				0	6	120 Hz	0	7E	
				0	7	160 Hz	0	7E	
				0	8	200 Hz	0	7E	
2	8	0	Test	0	0	Off	0	80	
					1	Dolby	0	80	
					2	DSP	0	80	
2	9	0	6CH Level MAIN R	X	X		0	90	
	9	1	MAIN L	X	X		0	91	
	9	2	CENTER	X	X		0	92	
	9	3	REAR R	X	X		0	93	
	9	4	REAR L	X	X		0	94	
	9	5	FRONT R	X	X		0	95	
	9	6	FRONT L	X	X		0	96	
	9	7	SUR BACK R	X	X		0	97	
	9	8	SUR BACK L	X	X		0	98	
	9	9	SWFR 1	X	X		0	99	
	9	A	SWFR 2	X	X		0	9A	

: Not supported by RX-Vx400 Series

***OSD message function**

OSD Message function can display a message of 16 characters to Vx300's OSD for a few seconds. The command sequence block will start by sending "start command" as mentioned above, followed by 4 bytes of packet data (SW:3) repeated four times. Then the message of sixteen characters(ASCII) will display and the command block finish automatically.

(ex.)Want to display " Test message ! " characters to OSD.

1. Send the start command.

STX	2	1	0	0	0	ETX

2. Send SW:3 commands four times as follows.

STX	3	' '	'T'	'e'	's'	ETX
STX	3	't'	' '	'm'	'e'	ETX
STX	3	's'	's'	'a'	'g'	ETX
STX	3	'e'	' '	'!'	' '	ETX

3. The command block will be finished automatically.

The available characters to display the message are as follows.

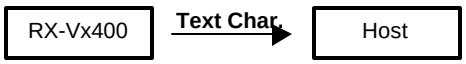
""(SPACE)"!""#""%""&""(")""*""+","-
".""0""1""2""3""4""5""6""7""8""9":""<""="">""?""A""B""C""D""E""F""G""H""I""J""K""L""M""N""O""P""Q""R""S""T""U""V
""W""X""Y""Z""[""]""_""a""b""c""d""e""f""g""h""i""j""k""l""m""n""o""p""q""r""s""t""u""v""w""x""y""z"

***Commands to get the display characters as text data(ASCII)**

This command can get certain of text data(ASCII) from the RX-Vx400 to be used by Host device as follows.

- Tuner frequency characters : " 107.9 "(MHz)
- Master volume value characters : " –99.0dB" / " MUTE"
- Input name : " MY PC " (Even renamed by "SET MENU:INPUT RENAME")
- Zone2 input name : " PS 2 " (Even renamed by "SET MENU:INPUT RENAME")

The response protocol for the text request commands are as follows.

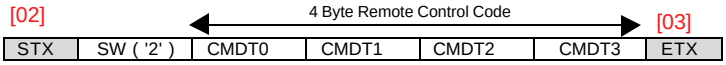


RCMD0,1	COMMAND	0 – 9,A - F	0...0xFF
DDAT 0 - 7	DATA	0 – 9,A - Z SP	ASCII char. Space char.

Report Command

	DC1	RCMD0	RCMD1	DDAT 0	DDAT 1	DDAT 2	DDAT 3	DDAT 4	DDAT 5	DDAT 6	DDAT 7	ETX
Tuner Frequency	DC1	0	0	SP	SP	x	x	x	x	x	x	ETX
Master Volume Value	DC1	0	1	SP	x	x	x	x	x	x	x	ETX
Input Name	DC1	0	3	x	x	x	x	x	x	x	x	ETX
Zone2 Input Name	DC1	0	4	x	x	x	x	x	x	x	x	ETX

3.2 Operation Command (SW = '0')



Operation Command supports all **direct codes** from the standard and extended IR code library for the RX-3200. **No toggle codes** are supported.

SW = 0

Operation Command							Report Command	
SW	CMDT0	CMDT1	CMDT2	CMDT3	function	setting	Type	RCMD1,2
0	7	A	1	A	master volume	Up	0	26
	7	A	1	B		Down		
	7	E	A	2	Audio Mute	ON		23
	7	E	A	3		OFF		
	7	A	1	4	Input	PHONO		21
	7	A	1	5		CD		
	7	A	1	6		TUNER		
	7	A	1	9		CD-R		
	7	A	C	9		MD/TAPE		
	7	A	C	1		DVD		
	7	A	5	4		D-TV/LD		
	7	A	C	0		CABLE (CBL/SAT)		
	7	A	C	A		SAT		
	7	A	0	F		VCR1		
	7	A	1	3		VCR2/DVR		
	7	A	C	8		VCR3		
	7	A	5	5		V-AUX		
	7	E	A	4	6ch input	ON		
	7	E	A	5		OFF		
	7	E	A	6	Input Mode	AUTO		22
	7	E	A	7		D.D., RF		
	7	E	A	8		DTS		
	7	E	A	9		DIGITAL		
	7	E	A	A		ANALOG		
	7	E	3	B		AAC		
	7	A	D	A	Zone 2 Volume	UP		27
	7	A	D	B		DOWN		
	7	E	A	0	Zone2 mute	ON		25
	7	E	A	1		OFF		
	7	A	D	0	Zone2 Input	PHONO		24
	7	A	D	1		CD		
	7	A	D	2		TUNER		
	7	A	D	4		CD-R		
	7	A	C	F		MD/TAPE		
	7	A	C	D		DVD		
	7	A	D	9		D-TV/LD		
	7	A	C	C		CABLE (CBL/SAT)		
	7	A	C	B		SAT		
	7	A	D	6		VCR1		
	7	A	D	7		VCR2/DVR		
	7	A	C	E		VCR3		
	7	A	D	8		V-AUX		
	7	A	1	D	Power	ON		20
	7	A	1	E		OFF		
	7	E	7	E	Main(Zone1) Power	ON		
	7	E	7	F		OFF		
	7	E	B	A	Zone2 power	ON		
	7	E	B	B		OFF		
	7	A	E	D	Zone 3 Power	ON		27
	7	A	E	E		STANDBY		
	7	E	2	6	Zone 3 Mute	ON		91
	7	E	6	6		OFF		
	7	A	F	D	Zone 3 Vol.	UP		92
	7	A	F	E		DOWN		
	7	A	F	1	Zone 3 Input	PHONO		90
	7	A	F	2		CD		
	7	A	F	3		TUNER		
	7	A	F	5		CD-R		
	7	A	F	4		MD/TAPE		
	7	A	F	C		DVD		
	7	A	F	6		DTV/LD		
	7	A	F	7		CBL/SAT (cable)		
	7	A	F	8		SAT		
	7	A	F	9		VCR1		
	7	A	F	A		VCR2		
	7	A	F	B		DVR		
	7	A	F	0		V-AUX		
	7	E	B	0	On screen(OSD)	OFF		2B
	7	E	B	1		SHORT		
	7	E	B	2		FULL		
	7	E	B	3	Sleep	OFF		2C
	7	E	B	4		120		
	7	E	B	5		90		
	7	E	B	6		60		
	7	E	B	7		30		
	7	E	B	8	EX/ES	ON (MATRIX)		2D
	7	E	B	9		OFF		
	7	E	7	C		AUTO		
	7	E	7	D		DISCRETE		
	7	E	9	B	Night mode	ON		82
	7	E	9	C		OFF		82
	7	E	2	7	Effect	**ON**		28
	7	E	E	0	Stereo			
	7	E	E	1	DSP Program	Hall A (HALL1)		
	7	E	E	2		Hall B		

SW = 0

	7	E	E	3		Hall C		
	7	E	E	4		Hall U.S.A.		
	7	E	E	5		Hall E		
	7	E	E	6		Live Concert (HALL2)		
	7	E	E	7		Tokyo		
	7	E	E	8		Freiburg (CHURCH)		
	7	E	E	9		Royaumont		
	7	E	E	A		Village Gate		
	7	E	E	B		Village Vanguard		
	7	E	E	C		The Bottom Line (JAZZ)		
	7	E	E	D		The Roxy Theatre (ROCK)		
	7	E	E	E		Warehouse Loft		
	7	E	E	F		Arena		
	7	E	F	0		Disco		
	7	E	F	1		Party		
	7	E	F	2		Game		
	7	E	F	F		7ch Stereo		
	7	E	F	3		Pop/Rock (Music Video)		
	7	E	F	4		DJ		
	7	E	F	5		Classical/Opera		
	7	E	F	6		Pavillion		
	7	E	F	7		Mono Movie		
	7	E	F	8		Variety Sports		
	7	E	F	9		Spectacle		
	7	E	F	A		Sci-Fi		
	7	E	F	B		Adventure		
	7	E	F	C		General		
	7	E	F	D		Normal		
	7	E	F	E		Enhanced		
	7	E	6	7		PLII MOVIE		
	7	E	6	8		PLII MUSIC		
	7	E	6	9		NEO:6 CINEMA		
	7	E	6	A		NEO:6 MUSIC		
	7	E	C	1		2CH DIRECT STEREO		
	7	E	C	0		2CH STEREO		
	7	E	C	2		THX (ULTRA2) CINEMA + PL		
	7	E	C	3		THX MUSIC		
	7	E	C	7		THX (ULTRA2) CINEMA + PL2		
	7	E	C	8		THX (ULTRA2) CINEMA + NEO6		
	7	A	E	0	Tuner preset page	A	0	29
	7	A	E	1		B		
	7	A	E	2		C		
	7	A	E	3		D		
	7	A	E	4		E		
	7	A	E	5	Tuner preset No.	1		2A
	7	A	E	6		2		
	7	A	E	7		3		
	7	A	E	8		4		
	7	A	E	9		5		
	7	A	E	A		6		
	7	A	E	B		7		
	7	A	E	C		8		
	7	E	B	C	Tuner band	FM		35
	7	E	B	D		AM		
	7	E	B	E	Auto tuning start	UP		15
	7	E	B	F		DOWN		
	7	E	A	B	speaker relay A	ON		2E
	7	E	A	C		OFF		
	7	E	A	D	speaker relay B	ON		2F
	7	E	A	E		OFF		
	7	E	2	B	Home preset memory	A		
	7	E	2	C		B		
	7	E	2	D		C		
	7	E	2	E		D		
	7	E	2	F		E		
	7	E	2	0		F		
	7	E	3	5	Home preset recall	A		
	7	E	3	6		B		
	7	E	3	7		C		31
	7	E	3	8		D		
	7	E	3	9		E		
	7	E	3	A		F		
	7	E	6	B	Volume preset memory	A		
	7	E	6	C		B		
	7	E	6	D		C		
	7	E	6	E		D		
	7	E	6	F		E		
	7	E	6	0		F		
	7	E	7	5	Volume preset recall	A		
	7	E	7	6		B		
	7	E	7	7		C		
	7	E	7	8		D		
	7	E	7	9		E		
	7	E	7	A		F		
	7	E	8	7	Z2 Vol. Memory	A		
	7	E	8	8		B		
	7	E	8	9		C		
	7	E	8	A		D		
	7	E	8	B		E		
	7	E	8	C		F		
	7	E	8	D	Z2 Vol. Recall	A		
	7	E	8	E		B		
	7	E	8	F		C		
	7	E	9	0		D		
	7	E	9	1		E		

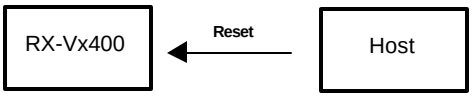
SW = 0

Always returns:
[02] 0139 02[03]

	7	E	9	2		F		
	7	E	2	0	Z3 Vol. Memory	A		94
	7	E	2	1		B		
	7	E	2	2		C		
	7	E	2	3		D		
	7	E	2	4		E		
	7	E	2	5		F		
	7	E	6	0	Z3 Vol. Recall	A		93
	7	E	6	1		B		
	7	E	6	2		C		
	7	E	6	3		D		
	7	E	6	4		E		
	7	E	6	5		F		
	7	E	3	2	DC1 TRG Control	Zone 1		3A
	7	E	3	3		Zone 2		
	7	E	3	1		Zone 3		
	7	E	7	1	Zone 2 DC1 TRG	On		36
	7	E	7	2		Off		
	7	E	7	3	Zone 1 DC1 TRG	On		36
	7	E	7	4		Off		
	7	E	8	3	Zone 3 DC1 TRG	On		36
	7	E	8	4		Off		
	7	E	9	3	Dual Mono	Main		39
	7	E	9	4		Sub		
	7	E	9	5		All		
	7	E	9	6	DC2 TRG Control	Zone 1		3B
	7	E	9	7		Zone 2		
	7	E	9	F		Zone 3		
	7	E	9	8		Zone OR		
	7	E	3	C	Zone 2 DC2 TRG	On		3C
	7	E	3	D		Off		
	7	E	3	E	Zone 1 DC2 TRG	On		3C
	7	E	3	F		Off		
	7	E	8	5	Zone 3 DC2 TRG	On		3C
	7	E	8	6		Off		
	7	E	2	8	SP B SET	Zone 1		3E
	7	E	2	9		Zone 2		
	7	E	9	9	Zone 2 SP OUT	On		3F (70/73/78)
	7	E	9	A		Off		

4. Reset Command

Reset Command recalls factory preset data. Once the factory preset are recalled, all user controllable setting / parameter data will be deleted and replaced with original factory settings.
Please do not use this command unless you have been experiencing problems with the system or if you just want to clean up the system.



After the system is reset, please request the Configuration Command using Ready Command (see section 2) in order to get accurate feedback of status of RX-Vx400 to your touch panel system.

*recall factory preset of all data

5. Report Command

RX-Vx400 will send Report Command in response to Control Commands from the host controller. From Report Command you can receive the current status of the RX-Vx400.

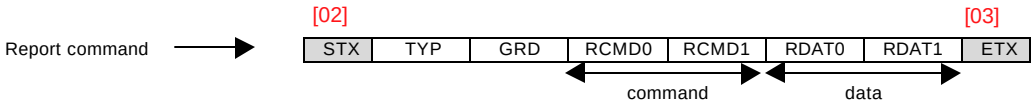
There are three types of Report Command classified by their information type.

- System Status Report : RX-Vx400 reports a System Status Report when the system status changed.
- Playback Status Report : RX-Vx400 reports a Playback Status Report when the internal playback status changed.
- Operation Report : When the RX-Vx400 is controlled by remote controller, front panel, RS-232C or by system controller, RX-Vx400 sends a Operation Report, which includes the latest setting status of the controlled function.

*RX-Vx400 reports a System State Report with system guard to inform its power status (power off) when a control command was sent to RX-Vx400 while it's turned off.

*The guard status is included in the Report Command (GRD). If the control command the host sent was accepted by RX-Vx400, the guard status in the Report Command is '0' (No Guard). On the contrary the guard status will be 'System Guard' or 'Setting Guard' when the command was guarded for some reason (e.g. If you send a 'Speaker A ON' command while you are using a headphone, the guard status will be 'System Guard' because the speaker controls are prohibited by system while a headphone is used.)

*If a status changed multiple times in a certain time, RX-Vx400 report only one report command.



function name	function	data (ASCII)	range (HEX)
TYP	control type	0 - 9	0 - 9
GRD	guard status	0 - 9	0 - 9
RCMD0, 1	command	0 - 9, A - F	0 - 0xFF
RDAT0, 1	data	0 - 9, A - F	0 - 0xFF

<Control type> This indicates for which type of control the report command is.

TYP	control type
0	controlled by RS-232C
1	controlled by remote controller (I/R)
2	controlled by keys in the unit
3	controlled by system
4	controlled by encoder

<Guard status> This indicates guard status against all control command

GRD	Guard status*
0	no guard
1	system guard
2	setting guard

*see the following chart

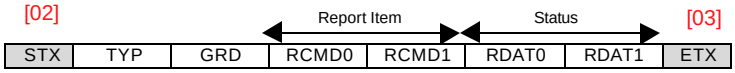
[02] 3 0 1 5 0 1 [03]

[STX]
Typ: controlled by System
GRD: 0
Tuner Tuned: Tuned
[ETX]

*Factor of the guards and the contents informed in report commands when there are no guards

operation	no guard	system guard	setting guard
Power	Power status	---	---
Input	6ch input/ selected input		---
Input mode	selected Input mode	6ch Input is ON during Input Rename function doesn't have the designated Input mode	---
Zone2 Input	selected input	zone2 selector is not at "REMOTE"	---
Mute	mute status	---	---
Zone2 mute	mute status	---	---
master volume	volume value	---	---
Program	Program ID	6ch input is ON source is not 32kHz,44.1kHz or 48kHz	---
6.1/ES Key	status	6ch input is ON Program is OFF	---
Tuner page	page	Tuner function is not active	---
Tuner Preset No.	No.	Tuner function is not active	---
OSD	status	SET MENU is active Test tone is ON	Memory Guard is ON
Sleep	status	Test tone is ON	---
Home	selected Bank	---	---
Home volume	selected Bank	---	---
Speaker A/B	ON/OFF Status	Headphone Mode	---

5.1 System Status Reports

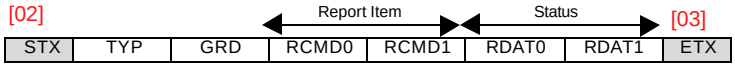


RCMD0, 1	Report Item	RDAT0, 1	Status	
00	system	00	OK	ready for accepting the control commands
		01	Busy	start of the term prohibits sending commands
		02	Power Off	report against the command which cannot be accepted when the Power is Off

*RX-VX00 sends this report when the system is reset or the power turns off.
It can be used for observation of the system revival.

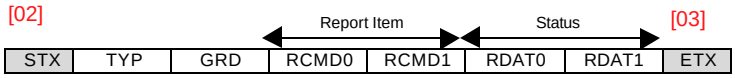
01	warning	00	over current	report of abnormal states
		01	DC Detect	(Only when it's possible to report)
		02	power trouble	
		03	over heat	

5.2 Playback Status Reports



RCMD0, 1	Report Item	RDAT0, 1	Status	
10	Playback	00	6CH Input	
		01	Analog	
		02	PCM	
		03	D.D.(except for 2/0)	When audio code mode is other than 2/0
		04	D.D.(2/0)	When audio code mode is 2/0
		05	D.D.karaoke	
		06	D.D.EX	
		07	DTS	
		08	DTS. ES	
		09	Other Digital	When waiting for decoding, etc.
		0A	DTS Analog Mute	.
		0B	DTS Discrete	
		0C	Other than AAC 2/0	
		0D	AAC 2/0	
11	Fs	00	Analog	
		01	32kHz	
		02	44.1kHz	
		03	48kHz	
		04	64kHz	
		05	88.2kHz	
		06	96kHz	
		07	Unknown	
		08	128.0 kHz Unknown	
		09	176.4 kHz Unknown	
		0A	192.0 kHz Unknown	
		0B	48kHz (96kHz)	DTS 96/24 signal (A/B)
12	EX/EX	00	Off	Playback status
		01	Matrix On	
		02	Discrete ON	
13	Thr / Bypass	00	Off	Fs when other than 32/44.1/48kHz
		01	On	
14	RED dts	00	Release	RED dts status*
		01	Wait	After the signals of DTS CD/LD are stopped, the RED dts status keeps "Wait" for 30 sec., then turned to "Release" While the RED dts is "Wait", this can be released by changing the Input Mode.
15	Tuner tuned	00	Not tuned	This report will be sent in case of signal changed.
		01	Tuned	
16	Dts 96/24	00	Off	DTS 96/24 decode
		01	On	(A/B)

5.3 Operation Reports



RCMD0, 1	Report Item	RDAT0, 1	Status
20	Power	00	ALL(Main/Zone2/3) OFF
		01	ALL(Main/Zone2/3) ON
		02	MainON / Zone2 OFF / Zone3 OFF
		03	MainOFF / Zone2 ON / Zone3 ON
		04	MainON / Zone2 ON / Zone3 OFF
		05	MainON / Zone2 OFF / Zone3 OFF
		06	MainOFF / Zone2 ON / Zone3 ON
		07	MainOFF / Zone2 OFF / Zone3 ON
21	Input	x,0	PHONO
		x,1	CD
		x,2	TUNER
		x,3	CD-R
		x,4	MD/TAPE
		x,5	DVD
		x,6	D-TV/LD
		x,7	CBL/SAT
		x,8	SAT
		x,9	VCR1
		x,A	VCR2/DVR
		x,B	VCR3/DVR
		x,C	V-AUX
		0/1,x	6ch input OFF/ON
22	Input mode	00	AUTO
		02	DTS
		04	ANALOG
		05	ANALOG ONLY
		06	AAC
23	Mute	00	OFF
		01	ON
24	Zone2 Input	00	PHONO
		01	CD
		02	TUNER
		03	CD-R
		04	MD/TAPE
		05	DVD
		06	D-TV/LD
		07	CBL/SAT
		08	SAT
		09	VCR1
		0A	VCR2/DVR
		0B	VCR3/DVR
		0C	V-AUX
25	Zone2 Mute	00	OFF
		01	ON
26	Master vol.	00	-oo
		39	-80dB
		...	
		C7	0dB
		...	
		E8	16.5dB
27	Zone 2 Vol.	00	-oo
		39	-80dB
		...	
		C7	0dB
		...	
		E8	16.5dB

RCMD0, 1	Report Item	RDAT0, 1	Status
28	Program	00	Hall A (HALL1)
		01	Hall B
		02	Hall C
		04	Hall C
		05	Hall E
		06	Live Concert
		08	Tokyo
		09	Freiburg
		0A	Royaumont
		0C	Village Gate
		0D	Village Vanguard
		0E	The Bottom Line
		10	The Roxy Theater
		11	Warehouse Loft
		12	Arena
		14	Disco
		15	Party
		16	Game
		17	6/8CH Stereo
		18	Pop/Rock
		19	DJ
		1C	Opera
		1D	Pavillion
		20	Mono Movie
		21	Variety Sports
		24	Spectacre
		25	Sci-Fi
		28	Adventure
		29	General
		2C	Normal
		2D	Enhanced
		30	PLII Movie
		31	PLII Music
		32	Neo: 6 Movie
		33	Neo: 6 Music
		36	THX A Cinema
		37	THX B Music
		34	STREO A 2CH Streo
		35	STREO B 2CH Direct Streo
		80-B3	STRAIGHT
		80	STRAIGHT (HALL A)
		81	STRAIGHT (HALL B)
		...	
		B3	STRAIGHT (NEO:6 MUSIC)
29	Tuner Page	00	A
		01	B
		02	C
		03	D
		04	E
2A	No.	00	1
		01	2
		02	3
		03	4
		04	5
		05	6
		06	7
		07	8
2B	OSD	00	Full
		01	Short
		02	Off
2C	Sleep	00	120
		01	90
		02	60
		03	30
		04	Off
2D	EX/ES(Key)	00	Off
		01	Matrix On
		02	Discrete On
		03	Auto
2E	SP Relay A	00	Off
		01	On
2F	SP Relay B	00	Off
		01	On

6ch Input Off/On

As measured from commands, the OSD, and the front panel

00	mute
27	-80db
63	-50db
77	-40db
9F	-20db
AF	-12db

A0	Zone 3 Input	00 ... 0C	Phono ... V-Aux
A1	Zone 3 Mute	00 01	Off On
A2	Zone 3 Vol	00 39 C7 E8	-inf -80dB 0dB 16.5dB

RCMD0, 1	Report Item	RDAT0, 1	Status
30	Home	01	Preset A
		02	B
		03	C
		04	D
		05	E
		06	F
31	Home	01	Memory A
		02	B
		03	C
		04	D
		05	E
		06	F
32	Home Vol.	01	Preset A
		02	B
		03	C
		04	D
		05	E
		06	F
33	Home Vol.	01	Memory A
		02	B
		03	C
		04	D
		05	E
		06	F
34	Headphone	00	Off
		01	On
35	FM/AM	00	FM
		01	AM

RCMD0, 1	Report Item	RDAT0, 1	Status
36	DC1 Trigger	00	Off (Due to the delay
		01	On (Due to the delay
37	Home	01	Preset A
	Zone 2 Vol.	02	B
		03	C
		04	D
		05	E
		06	F
38	Home	01	A
	Zone 2 Vol.	02	B
		03	C
		04	D
		05	E
		06	F
39	Dual	00	Main
	Mono	01	Sub
		02	All
3A	DC1 Trigger	00	ALL ZONE OR
	CTRL	01	ZONE1
		02	ZONE2
		03	ZONE3
3B	DC2 Trigger	00	ALL ZONE OR
	CTRL	01	ZONE1
		02	ZONE2
		03	ZONE3
3C	DC2 Trigger	00	Off (Due to the delay
	OUTPUT	01	On (Due to the delay
3D	MAIN	00	Normal
	LEVEL	01	-10dB
3E	SP B	00	MAIN
	SET	01	ZONE B
3F	ZONE2	00	OFF
	SP OUT	01	ON

RCMD0, 1	Report Item	RDAT0, 1	Status
40	LEVEL	14	-10dB
	MAIN R	15	
		...	
(*4)		3C	+10dB
41	LEVEL	14	-10dB
	MAIN L	...	
(*4)		3C	+10dB
42		14	-10dB
	LEVEL	15	
	CENTER	...	
(*4)		3C	+10dB
43		14	-10dB
	LEVEL	15	
	REAR R	...	
(*4)		3C	+10dB
44		14	-10dB
	LEVEL	15	
	REAR L	...	
(*4)		3C	+10dB
45		14	-10dB
	LEVEL	15	
	SUR BACK	...	
(*4)	R	3C	+10dB

RCMD0, 1	Report Item	RDAT0, 1	Status
46	LEVEL	14	-10dB
	SUR	15	
	BACK L	...	
(*4)		3C	+10dB
47	LEVEL	14	-10dB
	FRONT R	15	
		...	
(*4)		3C	+10dB
48	LEVEL	14	-10dB
	FRONT	15	
	L	...	
(*4)		3C	+10dB
49	LEVEL	00	-20dB
	SWFR 1	01	-19.5dB
		...	
(*4)		28	0dB
4A	LEVEL	00	-20dB
	SWFR	01	-19.5dB
	2	...	
(*4)		28	0dB

RCMD0, 1	Report Item	RDAT0, 1	Status
50	Main	00	Lch Max
	L/R	...	
	Balance	14	Mid
		...	
		28	Rch Max
51	LFE	00	-20dB
	Level	01	-19dB
	SP	...	
		14	0dB
52	LFE	00	-20dB
	Level	01	-19dB
	HP	...	
		14	0dB
53	Audio	00	0ms
	Delay	01	
		...	
		A0	160ms

RCMD0, 1	Report Item	RDAT0, 1	Status
54	SP	00	0ms
	Delay	01	0.5ms
	Center	...	
		0A	5ms
55	SP	00	0ms
	Delay	01	0.5ms
	Rear CT	...	
		3C	30ms

RCMD0, 1	Report Item	RDAT0, 1	Status
60	Input	00	Auto
	Mode	01	Last
61	Dimmer	00	-4
		01	-3
		02	-2
		03	-1
		04	0
62	OSD	00	-5
	Shift	01	-4
		02	-3
		03	-2
		04	-1
		05	0
		06	+1
		07	+2
		08	+3
		09	+4
		0A	+5

RCMD0, 1	Report Item	RDAT0, 1	Status
63	Gray	00	Off
	Back	01	Auto
64	Dynamic	00	Max.
	Range	01	Std.
	SP	02	Min.
65	Dynamic	00	Max.
	Range	01	Std.
	HP	02	Min.
66	Zone 2	00	Var.
	Vol. out	01	Fix
67	Zone 2	00	Mode 1
	Mode	01	Mode 2
68	MEM	00	Off
	Guard	01	On
69	Video	00	Off
	Conv.	01	On
6A	COMP	00	Off
	OSD	01	On
6B	Zone 3	00	Var.
	Vol. out	01	Fix

RCMD0, 1	Report Item	RDAT0, 1	Status
70	Center	00	Large
	SP	01	Small
		02	None
71	Main	00	Large
		01	Small
72	Rear LR	00	Large
	SP	01	Small
		02	None
73	SUR	00	Large x2
	BACK	01	Large x1
		02	Small x2
		03	Small x1
		04	None
74	Front	00	Yes
		01	None
75	LFE	00	SWFR
	Bass	01	Main
	Out	02	Both

RCMD0, 1	Report Item	RDAT0, 1	Status
76	SW1	00	L-R
		01	F-R
		02	NONE
78	6CH	00	Center
	Center	01	Main
79	6CH	00	SWFR
	SWFR	01	Main
7A	6CH	00	SURROUND
	SUR	01	MAIN
7B	MULTI CH	00	6CH
	SELECT	01	8CH
7E	SW	00	40 Hz
	CROSS	01	60 Hz
	OVER	02	80 Hz
		03	90 Hz
		04	100 Hz
		05	110 Hz
		06	120 Hz
		07	160 Hz
		08	200 Hz

RCMD0, 1	Report Item	RDAT0, 1	Status
80	Test	00	Off
		01	Dolby
		02	DSP
81	ANALOG	00	OFF
	SPECIAL	01	ON (2ch)
		02	ON (Multi)
82	NIGHT	00	OFF
	MODE	01	ON

```
83      00      Tone - Bypass
         01      Tone - Treble
         02      Tone - Bass
84      xx      00 = - 6.0 dB
                 01 = - 5.5 db
                 ...
                 0C = 0 dB
                 ...
                 18 = + 6.0 dB
85      0C      0 dB is reported even though
                 the on-screen db changes!
```

RCMD0, 1	Report Item	RDAT0, 1	Status
90	MULTI CH	14	-10dB
	LEVEL	15	
	MAIN R	...	
(*4)		3C	+10dB
91	MULTI CH	14	-10dB
	MAIN L	...	
(*4)		3C	+10dB
92	MULTI CH	14	-10dB
	LEVEL	15	
	CENTER	...	
(*4)		3C	+10dB
93	MULTI CH	14	-10dB
	LEVEL	15	
	REAR R	...	
(*4)		3C	+10dB
94	MULTI CH	14	-10dB
	LEVEL	15	
	REAR L	...	
(*4)		3C	+10dB
95	MULTI CH	14	-10dB
	LEVEL	15	
	SUR BACK	...	
(*4)	R	3C	+10dB
96	MULTI CH	14	-10dB
	LEVEL	15	
	SUR	...	
(*4)	BACK L	3C	+10dB
97	MULTI CH	14	-10dB
	LEVEL	15	
	FRONT R	...	
(*4)		3C	+10dB
98	MULTI CH	14	-10dB
	FRONT	15	
	L	...	
(*4)		3C	+10dB
99	MULTI CH	00	-20dB
	LEVEL	01	-19.5dB
	SWFR 1	...	
(*4)		28	0dB
9A	MULTI CH	00	-20dB
	LEVEL	01	-19.5dB
	SWFR	...	
(*4)	2	28	0dB

Attention

*When the Input is changed, RX-Vx400 sends Operation Report for Input (RCMD0,1="21") and Input mode(RCMD0,1="22").

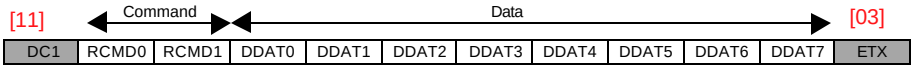
*When the Home bank is changed, RX-Vx400 sends Operation Report for Home bank (RCMD0,1="30") and Configuration Command.

*When a headphone is plugged into the headphone jack and Speaker Relay turned off, RX-Vx400 send the Operation Report for Speaker Relay A and B (RCMD0,1="2E","2F", RDAT="00(OFF)"). RX-Vx400 sends the Operation Command for Speaker Relay A and B when the headphone is removed also.

*Each time the source from the Inputs or playback status (ex. 6.1/ES, RED dts etc.) of the system changes, RX-Vx400 send a Playback Status report.

*Each time the busy status of the system changes, RX-Vx400 send the System Status report.

5.4 Display Text Data Report



0CMD0,1	ITEM	DDAT0,1	DDAT2 -7
00	Tuner Frequency	SP	6digits <Upper Lower>

(example)
AM 1710kHz = 'SP' 'SP' '1' '7' '1' '0'
FM 108.5MHz = 'SP' 'SP' '1' '0' '8' '.' '5' '0'

OCMD0,1	ITEM	DDAT 0	DDAT1 –7
01	Master Volume	SP	5digits <Upper Lower>

(example)
-99dB = 'SP' '-' '9' '9' '.' '0' 'd' 'B'

OCMD0,1	ITEM	DDAT0 –2	DDAT3 –7
02	Zone2 Volume	SP 02	3digits <Upper Lower>

DCMD0,1	ITEM	DDAT0 -7
03	Input name SP	8letters <Right Left>

(example)
D-TV/LD = 'SP' 'D' '-' 'T' 'V' '/' 'L' 'D'

OCMD0, 1	ITEM	DDATO -7
04	Zone 2 Input name	8letters <Right Left>

FUNCTION	ITEM	DATA (ADCII)	RANGE
RCMD0,1	Command	0-9, A-F	0...0xFF
DDAT	Data	0-9, A-Z	ASCII
0-7		SP, other ASCII	Space, dots

Example of RX-Vx400 Control Procedure

[1] Connection Start procedure (AC Plug / RS-232C cable connection)

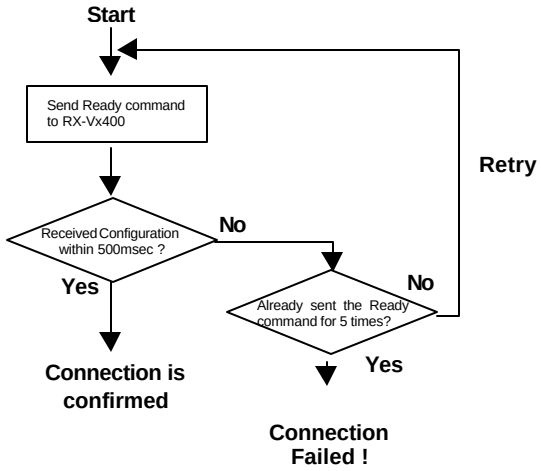
When the AC plug / RS-232C cable are not connected, RX-Vx400 cannot send any data to host. If the host doesn't receive a configuration command after sending Ready command 5 times, host should disable the RS-232C communication of the host and send alert to the graphic user interface (GUI).

[2] AC plug / RS-232C connection check sequence after the connection has been confirmed in the procedure [1].

If the host doesn't receive a Report Command within 500ms of sending a command, the host should resend the command. If no Report Command is received after sending 5 times, check AC plug/RS-232 cable (see [1]).

When the RS-232C cable is disconnected, the commands generated inside RX-Vx400 are stored in the sending buffer. If the stored commands exceed the bufer memory size (buffer overflow), RX-Vx400 stops reporting any commands. In this case, reconnecting AC plug or Connection Start procedure [1] will be needed in order to enable the command report.

[1] : AC Plug / RS-232C connection check (Start transaction)

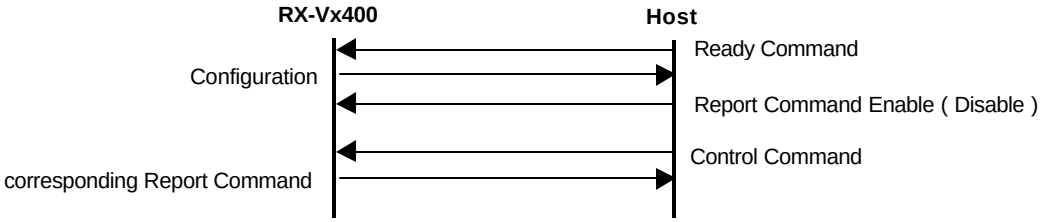


[3] AC plug connection detection (after [1],[2])

When the AC connection is reset, RX-Vx400 send Configuration Command to the host.
Host can feedback the status of RX-Vx400 to its GUI.

[4] Getting the status of the RX-Vx400 when the host boot up

At first, host should send Ready command and receive the Configuration Command from RX-Vx400 (see [1]).
Once the connection is confirmed, host can send Control Commands to the host. While the RX-Vx400 is turned off, RX-Vx400 only accept System Command and Power ON command.



[5] Error transactions after [4]

While sending control command, if RX-Vx400 didn't send any corresponding Report Commands regardless of re-trying for 5 times, host should clear its send buffer and then check AC plug / RS-232C connection sequence (see [1]). When the RX-Vx400 responded, the host can feedback the RX-Vx400 status to its GUI then return to the normal communication sequence. If not, the host should cancel the communication and report the alert to its GUI.

Appendix

* ASCII Chart

	0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	I	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	EXC	+	;	K	[	k	{
C	FF	FS	,	<	L	¥	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	...
F	SI	US	/	?	O	_	o	DEL

* the column number = the first hexadecimal digit
  the row number = the second hexadecimal digit

* The characters in the gray sells are available in the RS-232C communications.