1. Outline

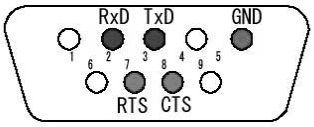
RX-Vx600 in this protocol refers to the RX-V2600, and RX-V1600.

1.1 Connection

5 wire system

	TxD(PIN3)	Transpose	-------->	RxD(PIN2)	
	RxD(PIN2)	Receive	<--------	TxD(PIN3)	
RX-Vx600	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 transmission to RX-Vx600 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

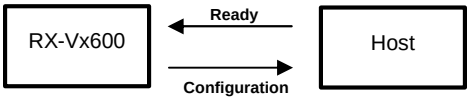
* The RX-Vx600 RTS port outputs at low level when the AC plug is disconnected.
If RTS output stays low even when the AC plug is connected, a problem may occur.

1.3 Data block timeout

It takes the RX-Vx600 a maximum of 500msec to send one data block. If a complete data block is not received within 500msec, cancel the transaction. A problem may occur.

2. Start Commands

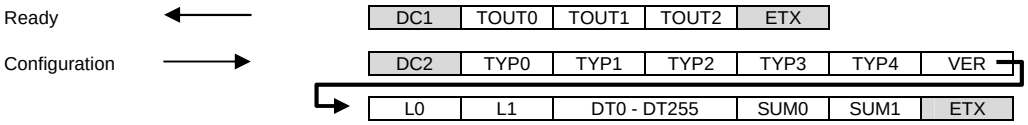
2.1 Starting Communication



The Ready command is the first command to be sent to the RX-Vx600 at the start of communication. TOUT0 - 2 in the Ready Command sets communication timeout.

RX-Vx600 sends a Configuration command (Model ID, software version, and setting data) to the host in reply to the Ready command.

The RX-Vx600 will send a Configuration command within 1 sec. after receiving a Ready command from the host. If not, send a Ready command again (max 5 times). If the RX-Vx600 won't send a Configuration command after the fifth retry, cancel the transaction because there may be a problem.



*TYPx Model ID = “R0191” (RX-V1600)
Model ID = “R0192” (HTR-5990)
Model ID = “R0193” (RX-V2600)
*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
VER	software version	A - Z	voluntary
L0 - 1	data length	0 - 9, A - F	0 - 0xFF
DT0 - 255	data	0 - 9, A - F	0 - 0xF
SUM0	upper 4 bit of SUM	0 - 9, A - F	0 - 0xF
SUM1	lower 4 bit of SUM	0 - 9, A - F	0 - 0xF

*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 / 2	System	0: OK / 1: Busy / 2: Standby
DT8	0 / 7	Power	Main Room / Zone2 / Zone3 Power Status (All off , All on, Main on…)
DT9	0 - E	Input	0: PHONO / 1: CD / 2: TUNER / 3: CD-R / 4: MD/TAPE / 5: DVD / 6: DTV / 7: CBL/SAT / 9: VCR1 / A: DVR/VCR2 / C: V-AUX / E:XM* *Only USA & Canada
DT10	0 / 1	Multi CH input	0: Off / 1: On
DT11	0 - 8	Audio Select	0: Auto / 3: COAX/OPT / 4: Analog / 5: Analog Only / 8:HDMI
DT12	0 / 1	Audio Mute	0: Off / 1: On
DT13	0 - E	Zone2 Input	0: PHONO / 1: CD / 2: TUNER / 3: CD-R / 4: MD/TAPE / 5: DVD / 6: DTV / 7: CBL/SAT / 9: VCR1 / A: DVR/VCR2 / C: V-AUX / E:XM* *Only USA & Canada
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 - 6	Extended Surround	0: Off / 1: EX/ES / 3: Auto / 4: EX / 5: PLIIx Movie / 6: PLIIx Music
DT23	0 - 2	OSD*	0:Full (Only V1600) / 1: Short / 2: Off
DT24	0 - 4	Sleep	0: 120 / 1: 90 / 2: 60 / 4: 30 / 4: OFF
DT25	0 - 4	Tuner Preset Page	0: Page A / 1: Page B / 2: Page C / 3: Page D / 4: Page E
DT26	0 - 7	Tuner Preset Number	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 - 2	Night Mode	Upper 4bit 0: OFF / 1:Cinema / 2:Music
DT28	0 - 2	Night Mode Parameter	Lower 4bit 0:Low / 1:Mid / 2:High
DT29	0 / 1	Speaker A	0: Off / 1: On
DT30	0 / 1	Speaker B	0: Off / 1: On
DT31	0 - D	Playback	0: Multi CH 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 / C: Other than AAC 2/0 / D: AAC 2/0
DT32	0 - B	Fs	0: Analog / 1: 32kHz / 2: 44.1kHz / 3: 48kiHz / 4: 64kHz / 5: 88.2kHz / 6: 96kHz / 7: Unknown / 8:128kHz / 9: 176.4kHz / A:192kHz / B: DTS 96/24
DT33	0 - 2	EX/ES playback	0: Off / 1: Matrix On / 2: Discrete On
DT34	0 / 1	THR / Bypass	0: Off / 1: On
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 Trigger Output	0: Off / 1: On
DT40	0 - 2	Decoder Mode	0: Auto / 1:DTS / 2:AAC* *Only Japanese Model
DT41	0 - 2	Dual Mono	0: Main / 1:Sub / 2:All (Only Japanese Model)
DT42	0 - 3	DC1 Trigger Control	0: All Zone OR / 1:Main / 2: Zone 2 / 3: Zone 3
DT43	0 / 1	DTS 96/24	0: Off / 1: On
DT44	0 - 3	DC2 Trigger Control	0: All Zone OR / 1:Main / 2: Zone 2 / 3: Zone 3
DT45	0 / 1	DC2 Trigger Output	0: Off / 1: On
DT46	0 / 1	Speaker B set	0: Main / 1: Zone B
DT47	0 - 3	Zone 2 Amp	0: EXT / 1: INT Surround / 2:INT Presence / 3: INT Both
DT48	0 - F	Level Front R	Upper 4bit
DT49	0 - F	Level Front R	Lower 4bit
DT50	0 - F	Level Front L	Upper 4bit
DT51	0 - F	Level Front L	Lower 4bit
DT52	0 - F	Level Center	Upper 4bit
DT53	0 - F	Level Center	Lower 4bit
DT54	0 - F	Level Surround R	Upper 4bit
DT55	0 - F	Level Surround R	Lower 4bit
DT56	0 - F	Level Surround L	Upper 4bit
DT57	0 - F	Level Surround L	Lower 4bit
DT58	0 - F	Level Surround Back R	Upper 4bit
DT59	0 - F	Level Surround Back R	Lower 4bit
DT60	0 - F	Level Surround Back L	Upper 4bit
DT61	0 - F	Level Surround Back L	Lower 4bit
DT62	0 - F	Level Presence R	Upper 4bit
DT63	0 - F	Level Presence R	Lower 4bit
DT64	0 - F	Level Presence L	Upper 4bit
DT65	0 - F	Level Presence L	Lower 4bit
DT66	0 - F	Level Subwoofer	Upper 4bit
DT67	0 - F	Level Subwoofer	Lower 4bit
DT68	0 - 4	XM Preset Page	0: Page A / 1: Page B / 2: Page C / 3: Page D / 4: Page E (Only USA & Canada)

DT69	0 - 7	XM Preset Number		(Only USA & Canada)
DT70	0 - 2	XM Search Mode		0:All CH / 1:Category / 2:Preset (Only USA & Canada)
DT71	0 - 3	XM Display Time		0:OFF / 1:10sec / 2:30sec / 3:ON (Only USA & Canada)
DT72	0 - F	XM Channel Number		Upper 4bit (Only USA & Canada)
DT73	0 - F	XM Channel Number		Lower 4bit (Only USA & Canada)
DT74	0 - F	LFE Level SP		Upper 4bit
DT75	0 - F	LFE Level SP		Lower 4bit
DT76	0 - F	LFE Level HP		Upper 4bit
DT77	0 - F	LFE Level HP		Lower 4bit
DT78	0 - F	Audio Delay		Upper 4bit
DT79	0 - F	Audio Delay		Lower 4bit
DT80	0 - F	Initial Volume		Upper 4bit (Only RX-V2600)
DT81	0 - F	Initial Volume		Lower 4bit (Only RX-V2600)
DT82	0 - A	Max Volume		0:-30dB / 1:-25dB / 2:-20dB / 3:-15dB / 4:-10dB / 5:-5dB / 6:0dB / 7:5dB / 8:10dB / 9:15dB / A:16.5dB (Only RX-V2600)
DT83	0 / 1	Decoder Mode Set		0: Auto / 1: Last
DT84	0 / 1	Audio Select Set		0: Auto / 1: Last
DT85	0 - 4	Dimmer		0: -4 / 1: -3 / 2: -2 / 3: -1 / 4: 0
DT86		**Don't care**		
DT87	0 - A	OSD Shift / GUI position		Upper 4bit
DT88	0 - A	OSD Shift / GUI position		Lower 4bit
DT89	0 / 1	Gray back		0: Off / 1: Auto (only RX-V1600)
DT90	0 / 1	Video conversion		0: Off / 1: On
DT91	0 - 2	D. Range	SP	0: MAX / 1: STD / 2: MIN
DT92	0 - 2	D. Range	HP	0: MAX / 1: STD / 2: MIN
DT93	0 / 1	Zone2 Volume Out		0: Variable / 1: Fixed
DT94	0 / 1	Zone3 Volume Out		0: Variable / 1: Fixed
DT95	0 / 1	Memory guard		0: Off / 1: On
DT96	0 - 2	SP set	Center	0: Large / 1: Small / 2: None
DT97	0 / 1		Front	0: Large / 1: Small
DT98	0 - 2		Sur. L/R	0: Large / 1: Small / 2: None
DT99	0 - 4		Sur. Back	0: Large x2 / 1: Large x1 / 2:Small x2 / 3:Small x1 / 4:None
DT100	0 - 3	Zone3 AMP		0: EXT / 1:INT:Surround / 2:INT:Presence / 3:INT:Both
DT101	0 / 1	SP set	Presence	0: Yes / 1: None
DT102	0 - 2		LFE/BASS	0: SWFR / 1: Front / 2: Both
DT103	0 / 1	Subwoofer Phase		Upper 4bit Phase 0:Normal / 1:Reverse
DT104		Subwoofer Phase		Lower 4bit **Don't Care**
DT105	0 / 1	Test mode		0: OFF / 1: ON
DT106	0 - 2	EQ Select		0: Auto PEQ / 1: GEQ / 2: Off (Only RX-V1600)
DT107	0 - F	Wall Paper		0:Yes / E: Gray / F: None (Only RX-V2600)
DT108		**Don't care**		
DT109		**Don't care**		
DT110		**Don't care**		
DT111	0 / 1	HDMI Support Audio		0: RX-V2600 or RX-V1600 / 1: Other
DT112	0 / 1	Component I/P		0: Off / 1: On
DT113	0 / 1	HDMI IP		0: Off / 1: On (Only RX-V1600)
DT114	0 - 4	GUI Language		0:English / 1:Japanese / 2:French / 3:German / 4:Spanish (Only RX-V2600)
DT115	0 - 3	HDMI Up-Scaling		0:Through / 1:480p(576p) / 2:1080i/ 3:720p (Only RX-V2600)
DT116	0 / 1	HDMI Aspect		0:Through / 1:16:9 Normal (Only RX-V2600)
DT117	0 - 2	THX SB Speaker Distance		0:undef 1ft(0.3m) / 1:1-4ft (0.3-1.2m) / 2:over 4ft (1.2m)
DT118	0 - 2	Zone2 OSD		0:Off / 1:Zone2 / 2:Zone2 & Zone3 (Only RX-V2600)
DT119	0 - 7	Decoder Select		0:Pro Logic / 1:PLIIx Movie / 2:PLIIx Music / 3:PLIIx Game / 4:Neo:6 Cinema / 5:Neo:6 Music / 6:CSII Cinema* / 7:CSII Music* *Only Japanese Model
DT120	0 / 1	Remote ID Tuner		0:ID1 / 1:ID2
DT121	0 / 1	Advanced Setup		0:Off / 1:On
DT122	0 / 1	Remote ID AMP		0:ID1 / 1:ID2
DT123	0 / 1	Fan Control Mode		0:Auto / 1:Cont
DT124	0 / 1	Speaker Impedance		0:8 ohm / 1:6 ohm (Except Japanese Model)
DT125	0 / 1	Tuner Setup		0:AM10/FM100 / 1:AM9/FM50 (Only Destination R & L)
DT126	0 / 1	Pure Direct		0:Off / 1:On
DT127	0 - E	Zone3 Input		0: PHONO / 1: CD / 2: TUNER / 3: CD-R / 4: MD/TAPE / 5: DVD / 6: DTV / 7: CBL/SAT / 9: VCR1 / A: DVR/VCR2 / C: V-AUX / E:XM* *Only USA & Canada
DT128	0 / 1	Zone3 Mute		0:Off / 1:On
DT129	0 - F	Zone3 Volume		Upper 4bit
DT130	0 - F			Lower 4bit
DT131	0 / 1	Remote Sensor		0:On / 1:Off
DT132	0 - C	MULTI_CH Select		00: 6ch / 02: 8ch CD / 03: 8ch CD-R / 04: 8ch MD/TAPE / 05: 8ch DVD /06: 8ch DTV / 07: 8ch CBL/SAT / 09: 8ch VCR1 / 0A: 8ch DVR/VCR2 / 0C: 8ch V-AUX
DT133	0 / 1	Remote ID XM		0:ID1 / 1:ID2 (Only USA & Canada)
DT134	0 / 1	Bi – AMP		0:On / 1:Off
DT135	0 - 8	Subwoofer Crossover		0: 40Hz / 1: 60Hz / 2: 80Hz / 3: 90Hz / 4: 100Hz / 5: 110Hz / 6: 120Hz / 7: 160Hz / 8: 200Hz
DT136	0 / 1	TV Format		0:PAL / 1:NTSC (Only RX-V2600)
DT137	0 / 1	PR/SB Priority		0:Presence / 1:Surround Back
DT138		**Don't care**		
DT139	0 - A	Zone2 Tone Control	Bass	0:-10dB … 5: 0dB … A:+10dB 2dB Step
DT140	0 - A	Zone2 Tone Control	Treble	0:-10dB … 5: 0dB … A:+10dB 2dB Step

DT141	0 - A	Zone3 Tone Control	Bass	0:-10dB … 5: 0dB … A:+10dB	2dB Step
DT142	0 - A	Zone3 Tone Control	Treble	0:-10dB … 5: 0dB … A:+10dB	2dB Step
DT143	0 / 1	Tone Bypass		0: Auto / 1: Off	
DT144	0 / 1	Wake on RS-232C Access		0: No / 1: Yes	

*DD = Dolby Digital
*OSD = On Screen Display

3. Control Commands

* The RX-Vx600 can receive control commands only when the power is on (except Power commands and System commands*).

* Do not send any control commands when the system status is Wait. No commands are permitted until the RX-Vx600 reports OK.

* The RX-Vx600 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 the RX-Vx600 doesn't send a Report Command after the fifth retry, cancel the transaction because there may be a problem.

* 'SW' switches the type of the control command. When the 'SW' is set to '0', you can control the RX-Vx600 remotely via RS-232C.

* The RX-Vx600 will only send one report command for each type of control. The Report Command will report only the final status of all settings in strings of commands (may not report all steps in a status, only final status).
For example, if the user sets the input selector on the unit to DTV just after the host sends a command to change the input to CD, the RX-Vx600 may report only the final status that the input was changed to DTV by the system operation.

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

- Command Switch (changing the type of control command)

Control command ←

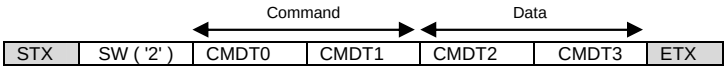
STX	SW	CMDT0	CMDT1	CMDT2	CMDT3	ETX
SW=0	Operation Command (Remote Control)	4 byte remote control code				
SW=1	Command (***Not in use***)	command		data		
SW=2	System command	command		data		
SW=3	Packet data	data				

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

* The RX-Vx600 uses the following three types of Control Commands.
- 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 Commands (SW = '2')



System Commands can be made by setting the 'SW' byte in the Control Command to '2'. With System commands you can control the RX-Vx600'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-Vx600 text data regarding tuner freq., master volume, input name, zone 2 input name.

SW	Command			Data			Report Command			Note
	CMDT0	CMDT1	Function	CMDT2	CMDT3	Parameter	Type	RCMD1,2	RDAT1,2	
2	0	0	Report Command Code	0	0	Enable	0	00	00(OK)	
				0	1	Disable				
2	0	1	Time between two report commands (Report Command Delay)	0	0	real time	0	00	00(OK)	
				0	1	50ms				
				0	2	100ms				
				0	3	150ms				
				0	4	200ms				
				0	5	250ms				
				0	6	300ms				
				0	7	350ms				
				0	8	400ms				
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					
			Main Input name text request	0	3					
			Zone2 input name text request	0	4					
			Zone3 volume value text request	0	5					
			Zone3 input name text request	0	6					
2	2	F	Firmware version request	0	0		0	00		
2	3	0	Main volume direct setting	X	X		0	26		
2	3	1	Zone2 volume direct setting	X	X		0	27		
2	3	4	Zone3 volume direct setting	X	X		0	A2		
2	3	8	Mute Type	0	0	Full	0	A5		
				0	1	-20dB				
2	3	E	Zone2 AMP	0	0	EXT	0	3E		
				0	1	INT: Sur.				
				0	2	INT: Presence				
				0	3	INT: Both				
2	3	F	Zone3 AMP	0	0	EXT	0	3F		
				0	1	INT: Sur.				
				0	2	INT: Presence				
				0	3	INT: Both				
2	4	0	Level Front R	X	X		0	40		
2	4	1	Level Front L	X	X		0	41		
2	4	2	Level Center	X	X		0	42		
2	4	3	Level Surround R	X	X		0	43		
2	4	4	Level Surround L	X	X		0	44		
2	4	5	Level Presence R	X	X		0	47		
2	4	6	Level Presence L	X	X		0	48		
2	4	7	Level Surround Back R	X	X		0	45		
2	4	8	Level Surround Back L	X	X		0	46		
2	4	9	Level Subwoofer (1)	X	X		0	49		
2	4	A	Level Subwoofer (2)	X	X		0	4A		
2	4	B	Zone2 Tone Control Bass	X	X		0	4B		
2	4	C	Zone2 Tone Control Treble	X	X		0	4C		
2	4	D	Zone3 Tone Control Bass	X	X		0	4D		
2	4	E	Zone3 Tone Control Treble	X	X		0	4E		
2	5	1	LFE Level for Speaker	X	X		0	51		
2	5	2	LFE Level for Headphone	X	X		0	52		
2	5	3	Audio Delay	X	X		0	53		
2	5	8	Wall Paper	0	0	Yes	0	58		only RX-V2600
				0	E	Gray				
				0	F	None				

SW	Command			Data			Report Command			Note
	CMDT0	CMDT1	Function	CMDT2	CMDT3	Parameter	Type	RCMD1,2	RDAT1,2	
2	5	A	MAX Volume	0	0	-30.0dB	0	5A		only RX-V2600
				0	1	-25.0dB				
				0	2	-20.0dB				
				0	3	-15.0dB				
				0	4	-10.0dB				
				0	5	-5.0dB				
				0	6	0.0dB				
				0	7	5.0dB				
				0	8	10.0dB				
				0	9	15.0dB				
				0	A	16.5dB				
2	5	B	Initial Volume	X	X		0	5B		only RX-V2600
2	5	E	Decoder Mode	X	X		0	5E		
2	5	F	Decoder Mode Set	0	0	Auto	0	5F		
				0	1	Last				
2	6	0	Audio Select Set	0	0	Auto	0	60		
				0	1	Last				
2	6	1	Dimmer	0	0	-4	0	61		
				0	1	-3				
				0	2	-2				
				0	3	-1				
				0	4	0				
2	6	2	OSD Shift* / GUI Position**	X	X		0	62		*RX-V1600 **RX-V2600
2	6	3	Gray Back	0	0	Off	0	63		RX-V1600
				0	1	Auto				
2	6	4	Dynamic Range for Speaker	0	0	MAX	0	64		
				0	1	STD				
				0	2	MIN				
2	6	5	Dynamic Range for Headphone	0	0	MAX	0	65		
				0	1	STD				
				0	2	MIN				
2	6	6	Zone2 Volume Out	0	0	Variable	0	66		
				0	1	Fixed				
2	6	8	Memory Guard	0	0	Off	0	68		
				0	1	On				
2	6	9	Video Conversion	0	0	Off	0	69		
				0	1	On				
2	6	B	Zone3 Volume Out	0	0	Variable	0	6B		
				0	1	Fixed				
2	6	C	Zone2 OSD	0	0	Off	0	6C		Only RX-V2600
				0	1	Zone2				
				0	2	Zone2 & 3				
2	7	0	Speaker Set Center	0	0	Large	0	70		
				0	1	Small				
				0	2	None				
2	7	1	Speaker Set Front	0	0	Large	0	71		
				0	1	Small				
2	7	2	Speaker Set Surround	0	0	Large	0	72		
				0	1	Small				
				0	2	None				
2	7	3	Speaker Set Surround Back	0	0	Large x2	0	73		
				0	1	Large x1				
				0	2	Small x2				
				0	3	Small x1				
				0	4	None				
2	7	4	Speaker Set Presence	0	0	Yes	0	74		
				0	1	None				
2	7	5	Speaker Set Bass Out	0	0	Subwoofer	0	75		
				0	1	Front				
				0	2	Both				
2	7	6	Speaker Set Subwoofer Phase	0	X	Normal	0	76		Lower 4bit Don't care
				1	X	Reverse				

SW	Command			Data			Report Command			Note
	CMDT0	CMDT1	Function	CMDT2	CMDT3	Parameter	Type	RCMD1,2	RDAT1,2	
2	7	B	Multi CH Select	0	0	6ch	0	7B		
				0	2	8ch CD				
				0	3	8ch CD-R				
				0	4	8ch MD/TAPE				
				0	5	8ch DVD				
				0	6	8ch DTV				
				0	7	8ch CBL/SAT				
				0	9	8ch VCR1				
				0	A	8ch VCR2				
				0	C	8ch V-AUX				
2	7	D	PR/SB Priority	0	0	Presence	0	7D		
				0	1	Sur. Back				
2	7	E	Subwoofer Crossover	0	0	40Hz	0	7E		
				0	1	60Hz				
				0	2	80Hz				
				0	3	90Hz				
				0	4	100Hz				
				0	5	110Hz				
				0	6	120Hz				
				0	7	160Hz				
				0	8	200Hz				
2	8	0	Test Tone	0	0	Off	0	80		
				0	1	On				
2	8	5	Component I/P	0	0	Off	0	85		
				0	1	On				
2	8	6	HDMI I/P	0	0	Off	0	86		RX-V1600
				0	1	On				
2	8	7	HDMI Up-Scaling	0	0	Through	0	87		Only RX-V2600
				0	1	480p(576p)				
				0	2	1080i				
				0	3	720p				
2	8	8	HDMI Aspect	0	0	Through	0	88		Only RX-V2600
				0	1	16:9 Normal				
2	8	A	THX SB Speaker Dist.	0	0	under 1ft (0.3m)	0	8A		
				0	1	1-4ft (0.3-1.2m)				
				0	2	over 4ft (1.2m)				
2	8	B	Night Mode	0	0	Off	0	8B		
				1	0	Cinema Low				
				1	1	Cinema Mid				
				1	2	Cinema High				
				2	0	Music Low				
				2	1	Music Mid				
				2	2	Music High				
2	8	F	HDMI Support Audio	0	0	RX-V1600	0	8F		
						RX-V2600				
				0	1	Other				
2	9	3	XM Display Time	0	0	Off	0	93		Only USA & Canada RX-V1600
				0	1	10sec				
				0	2	30sec				
				0	3	On				
2	9	4	XM Channel Number	X	X		0	94		Only USA & Canada
2	9	5	Hold / Release XM Display	0	0	Release	0	95		Only USA & Canada
				0	1	Hold				
2	A	7	EQ (Equalizer) Select	0	0	Auto PEQ	0	A7		RX-V1600
				0	1	GEQ				
				0	2	EQ Off				
2	A	8	Tone Control Auto Bypass	0	0	Auto	0	A8		
				0	1	Off				
2	B	0	Advanced Setup	0	0	Off	0	B0		Effective in STANDBY
				0	1	On				
2	B	1	Remote ID for AMP	0	0	ID1	0	B1		
				0	1	ID2				
2	B	2	Fan Control Mode	0	0	Auto	0	B2		
				0	1	Cont				
2	B	3	Speaker Impedance	0	0	8 ohm	0	B3		except Japanese Model
				0	1	6 ohm				
2	B	4	Tuner Frequency Step	0	0	10k/100kHz	0	B4		Destination R or L
				0	1	9k/50kHz				

SW	Command			Data			Report Command			Note
	CMDT0	CMDT1	Function	CMDT2	CMDT3	Parameter	Type	RCMD1,2	RDAT1,2	
2	B	5	Remote ID for Tuner	0	0	ID1	0	B5		
				0	1	ID2				
2	B	6	Language	0	0	English	0	B6		Only RX-V2600
				0	1	Japanese				
				0	2	French				
				0	3	German				
				0	4	Spanish				
2	B	7	User Preset	0	0	Cancel	0	B7		
				0	1	Preset				
2	B	8	Video Reset	0	0	Cancel	0	B8		
				0	1	Yes				
2	B	9	Remote Sensor	0	0	On	0	B9		
				0	1	Off				
2	B	A	Remote ID for XM	0	0	ID1	0	BA		USA & Canada
				0	1	ID2				
2	B	C	TV Format	0	0	PAL	0	BC		Only RX-V2600
				0	1	NTSC				
2	B	D	Wake on RS-232C Access	0	0	No	0	BD		
				0	1	Yes				

***OSD message function**

The OSD Message function can display a message of 16 characters to the RX-Vx600's OSD for a few seconds. The command sequence block will start by sending "start command" as mentioned above, followed by four bytes of packet data (SW:3) repeated four times. Then a message of sixteen characters (ASCII) will display and the command block will 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.

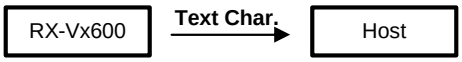
Characters available for displaying the message are as follows:
" "(SPACE) "!" "#" "%" "&" "(" ")" "*" "+" "," "-" "." "0" "1" "2" "3" "4" "5" "6" "7" "8" "9" ":" "<" "=" ">" "?" "A" "B" "C" "D" "E" "F" "G" "H" "I" "J" "K" "L" "M" "N" "O" "P" "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z" "[" "]" "_" "a" "b" "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 text data (ASCII) from the RX-Vx600 to be used by a host device as follows.

- Tuner frequency characters : " 1 07.9 "(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
Main Volume Value	DC1	0	1	SP	x	x	x	x	x	x	x	ETX
Zone2 Volume Value	DC1	0	2	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
Zone3 Volume Value	DC1	0	5	SP	x	x	x	x	x	x	x	ETX
Zone3 Input Name	DC1	0	6	x	x	x	x	x	x	x	x	ETX

3.2 Operation Command (SW = '0')

4 Byte Remote Control Code

STX	SW ('0')	CMDT0	CMDT1	CMDT2	CMDT3	ETX

Operation Command supports all **direct codes** from the standard and extended IR code library for the RX-x600.

	CMDT_						Report Command		
SW	0	1	2	3	Function	Setting	Type	RCMD1,2	Note
0	7	A	1	A	Main Volume	Up	0	26	
0	7	A	1	B		Down	0	26	
0	7	E	A	2	Audio Mute	On (Full)	0	23	
0	7	E	D	F		On (-20dB)	0	23	
0	7	E	A	3		Off	0	23	
0	7	A	1	4	Input	PHONO	0	21	
0	7	A	1	5		CD			
0	7	A	1	6		TUNER			
0	7	A	1	9		CD-R			
0	7	A	1	8		MD/TAPE			
0	7	A	C	1		DVD			
0	7	A	5	4		DTV			
0	7	A	C	0		CBL/SAT			
0	7	A	0	F		VCR1			
0	7	A	1	3		DVR/VCR2			
0	7	A	5	5		V-AUX			
0	7	A	B	4		XM			Only USA & Canada
0	7	E	A	4	Multi CH Input	On	0	21	
0	7	E	A	5		Off			
0	7	E	8	0	Pure Direct 2ch	On	0	8C	
0	7	E	8	2		Off			
0	7	E	A	6	Audio Select	Auto	0	22	
0	7	E	A	9		COAX/OPT			
0	7	E	A	A		Analog			
0	7	E	D	A		HDMI			
0	7	E	D	B	Decoder Mode	AUTO	0	5E	
0	7	E	A	8		DTS			
0	7	E	3	B		AAC			
0	7	A	D	A	Zone2 Volume	Up	0	27	
0	7	A	D	B		Down			
0	7	E	A	0	Zone2 Mute	On	0	25	
0	7	E	A	1		Off			
0	7	A	D	0	Zone2 Input	PHONO	0	24	
0	7	A	D	1		CD			
0	7	A	D	2		TUNER			
0	7	A	D	4		CD-R			
0	7	A	D	3		MD/TAPE			
0	7	A	C	D		DVD			
0	7	A	D	9		DTV			
0	7	A	C	C		CBL/SAT			
0	7	A	D	6		VCR1			
0	7	A	D	7		DVR/VCR2			
0	7	A	D	8		V-AUX			
0	7	A	B	8		XM			Only USA & Canada
0	7	A	1	D	All Zone Power	On	0	20	
0	7	A	1	E		Standby			
0	7	E	7	E	Main Zone Power	On	0	20	
0	7	E	7	F		Standby			
0	7	E	B	A	Zone2 Power	On	0	20	
0	7	E	B	B		Standby			
0	7	A	E	D	Zone3 Power	On	0	20	
0	7	A	E	E		STANDBY			
0	7	E	2	6	Zone3 Mute	On	0	A1	
0	7	E	6	6		Off			
0	7	A	F	D	Zone3 Volume	Up	0	A2	
0	7	A	F	E		Down			
0	7	A	F	1	Zone3 Input	PHONO	0	A0	
0	7	A	F	2		CD			
0	7	A	F	3		TUNER			
0	7	A	F	5		CD-R			
0	7	A	F	4		MD/TAPE			
0	7	A	F	C		DVD			
0	7	A	F	6		DTV			
0	7	A	F	7		CBL/SAT			
0	7	A	F	9		VCR1			
0	7	A	F	A		DVR/VCR2			
0	7	A	F	0		V-AUX			
0	7	A	B	9		XM			Only USA & Canada

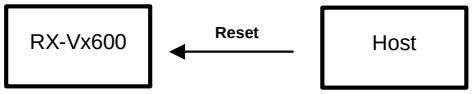
	CMDT_						Report Command		
	0	1	2	3	Function	Setting	Type	RCMD1,2	Note
0	7	E	B	0	On Screen	Off	0	2B	
0	7	E	B	1		Short (On)			
0	7	E	B	2		Full			RX-V1600
0	7	E	B	3	Sleep Timer	Off	0	2C	
0	7	E	B	4		120			
0	7	E	B	5		90			
0	7	E	B	6		60			
0	7	E	B	7		30			
0	7	E	B	8	EXTD SUR.	EX/ES	0	2D	
0	7	E	B	9		Off	0		
0	7	E	7	C		Auto	0		
0	7	E	D	C		EX	0		
0	7	E	D	D		PLIIx Movie	0		
0	7	E	D	E		PLIIx Music	0		
0	7	E	9	C	Night Listening Mode	Off	0	8B	
0	7	E	9	B		Cinema			
0	7	E	C	F		Music			
0	7	E	2	7	EFFECT	ON	0	28	
0	7	E	E	0	STRAIGHT		0	28	
0	7	E	E	1	DSP / Surround	Munich	0	28	Only RX-V2600
0	7	E	E	5		Vienna			
0	7	E	E	8		Freiburg			Only RX-V2600
0	7	E	E	C		The Bottom Line			
0	7	E	E	D		The Roxy Theatre			
0	7	E	F	0		Disco			
0	7	E	F	2		Game			
0	7	E	F	F		7ch Stereo			
0	7	E	C	0		2ch Stereo			
0	7	E	F	3		Pop/Rock			
0	7	E	F	5		Classical/Opera			Only RX-V2600
0	7	E	F	7		Mono Movie			
0	7	E	F	8		TV Sports			
0	7	E	F	9		Spectacle			
0	7	E	F	A		Sci-Fi			
0	7	E	F	B		Adventure			
0	7	E	F	C		General			
0	7	E	F	D		Standard			
0	7	E	F	E		Enhanced			
0	7	E	C	2		THX Cinema			
0	7	E	C	3		THX Music			
0	7	E	C	8		THX Game			
0	7	A	E	0	Tuner Preset Page	A	0	29	
0	7	A	E	1		B			
0	7	A	E	2		C			
0	7	A	E	3		D			
0	7	A	E	4		E			
0	7	A	E	5	Tuner Preset Number	1	0	2A	
0	7	A	E	6		2			
0	7	A	E	7		3			
0	7	A	E	8		4			
0	7	A	E	9		5			
0	7	A	E	A		6			
0	7	A	E	B		7			
0	7	A	E	C		8			
0	7	E	B	C	Tuner Band	FM	0	35	
0	7	E	B	D		AM			
0	7	E	B	E	Tuner Auto Tuning	Up	0	15	
0	7	E	B	F		Down			
0	7	E	A	B	Speaker Relay A	On	0	2E	
0	7	E	A	C		Off			
0	7	E	A	D	Speaker Relay B	On	0	2F	
0	7	E	A	E		Off			
0	7	E	2	B	System Memory Save	1	0	31	
0	7	E	2	C		2			
0	7	E	2	D		3			
0	7	E	2	E		4			
0	7	E	2	F		5			
0	7	E	3	0		6			

SW	CMDT_ 0	1	2	3	Function	Setting	Report Command Type	RCMD1,2	Note
0	7	E	3	5	System Memory Load	1	0	30	
0	7	E	3	6		2			
0	7	E	3	7		3			
0	7	E	3	8		4			
0	7	E	3	9		5			
0	7	E	3	A		6			
0	7	E	6	B	Main Volume Memory Save	1	0	33	
0	7	E	6	C		2			
0	7	E	6	D		3			
0	7	E	6	E		4			
0	7	E	6	F		5			
0	7	E	7	0		6			
0	7	E	7	5	Main Volume Memory Load	1	0	32	
0	7	E	7	6		2			
0	7	E	7	7		3			
0	7	E	7	8		4			
0	7	E	7	9		5			
0	7	E	7	A		6			
0	7	E	8	7	Zone2 Volume Memory Save	1	0	38	
0	7	E	8	8		2			
0	7	E	8	9		3			
0	7	E	8	A		4			
0	7	E	8	B		5			
0	7	E	8	C		6			
0	7	E	8	D	Zone2 Volume Memory Load	1	0	37	
0	7	E	8	E		2			
0	7	E	8	F		3			
0	7	E	9	0		4			
0	7	E	9	1		5			
0	7	E	9	2		6			
0	7	E	2	0	Zone3 Volume Memory Save	1	0	A4	
0	7	E	2	1		2			
0	7	E	2	2		3			
0	7	E	2	3		4			
0	7	E	2	4		5			
0	7	E	2	5		6			
0	7	E	6	0	Zone3 Volume Memory Load	1	0	A3	
0	7	E	6	1		2			
0	7	E	6	2		3			
0	7	E	6	3		4			
0	7	E	6	4		5			
0	7	E	6	5		6			
0	7	E	3	2	DC1 Trigger Control	Zone1	0	3A	
0	7	E	3	3		Zone2			
0	7	E	3	1		Zone3			
0	7	E	3	4		All Zone OR			
0	7	E	7	3	DC1 Trigger Zone1	On	0	36	
0	7	E	7	4		Off			
0	7	E	7	1	DC1 Trigger Zone2	On	0	36	
0	7	E	7	2		Off			
0	7	E	8	3	DC1 Trigger Zone3	On	0	36	
0	7	E	8	4		Off			
0	7	E	9	3	Dual Mono Mode	Main	0	39	Only Japanese Model
0	7	E	9	4		Sub			
0	7	E	9	5		All			
0	7	E	9	6	DC2 Trigger Control	Zone1	0	3B	
0	7	E	9	7		Zone2			
0	7	E	9	F		Zone3			
0	7	E	9	8		All Zone OR			
0	7	E	3	E	DC2 Trigger Zone1	On	0	3C	
0	7	E	3	F		Off			
0	7	E	3	C	DC2Trigger Zone2	On	0	3C	
0	7	E	3	D		Off			
0	7	E	8	5	DC2 Trigger Zone3	On	0	3C	
0	7	E	8	6		Off			
0	7	E	2	8	Speaker B SET	Main	0	3E	
0	7	E	2	9		Zone B			
0	7	E	9	9	ZONE2 Amp	INT: Presence	0	3F	
0	7	E	9	A		EXT			

SW	CMDT_ 0	1	2	3	Function	Setting	Report Command Type	RCMD1,2	Note
0	7	E	6	7	2ch Decoder	PLIIx Movie	0	6E	
0	7	E	6	8		PLIIx Music			
0	7	E	6	9		Neo:6 Cinema			
0	7	E	6	A		Neo:6 Music			
0	7	E	C	7		PLIIx Game			
0	7	E	C	9		Pro Logic			
0	7	E	C	A		CSII Cinema			Only Japanese Model
0	7	E	C	B		CSII Music			Only Japanese Model
0	7	A	6	0	XM CH Number	0	0		
0	7	A	6	1	XM CH/Preset Number	1	0	91*	*Preset Number
0	7	A	6	2	XM CH/Preset Number	2	0	91*	
0	7	A	6	3	XM CH/Preset Number	3	0	91*	
0	7	A	6	4	XM CH/Preset Number	4	0	91*	
0	7	A	6	5	XM CH/Preset Number	5	0	91*	
0	7	A	6	6	XM CH/Preset Number	6	0	91*	
0	7	A	6	7	XM CH/Preset Number	7	0	91*	
0	7	A	6	8	XM CH/Preset Number	8	0	91*	
0	7	A	6	9	XM CH Number	9	0		
0	7	A	6	A	XM CH/Preset Number	Up	0	91 / 94	91:Preset Number
0	7	A	6	B		Down			94:Channel Number
0	7	A	6	C	XM Category / Preset Page	Up	0	90	90:Preset Page
0	7	A	6	E		Down			
0	7	A	6	F	XM Hold/Release Display	Toggle	0	95	
0	7	A	7	0	XM History Next	Toggle			
0	7	A	7	1	XM Preset Memory				
0	7	A	B	5	XM Search Mode	All CH	0	92	
0	7	A	B	6		Category			
0	7	A	B	7		Preset			
0	7	A	B	A	XM Preset Page	A	0	90	
0	7	A	B	B		B			
0	7	A	B	C		C			
0	7	A	B	D		D			
0	7	A	B	E		E			
0	7	A	B	F	XM ENT.				Decide CH Number
0	7	A	7	3	Zone2 Tone Control	Bass +	0	4B	
0	7	A	7	4		Bass -			
0	7	A	7	5		Treble +	0	4C	
0	7	A	7	6		Treble -			
0	7	A	7	7	Zone3 Tone Control	Bass +	0	4D	
0	7	A	7	8		Bass -			
0	7	A	7	9		Treble +	0	4E	
0	7	A	7	A		Treble -			
0	7	A	A	0	GUI Operation	Top Menu		**No Report**	
0	7	A	D	E		Enter			
0	7	A	A	1		Exit			
0	7	A	9	D		Cursor Up			
0	7	A	9	C		Cursor Down			
0	7	A	9	E		Cursor Right			
0	7	A	9	F		Cursor Left			

4. Reset Command

The Reset Command recalls factory preset data. Once the factory presets are recalled, all user controllable setting / parameter data will be deleted and replaced with original factory settings.
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, request the Configuration Command using the Ready Command (see section 2) in order to get accurate feedback of RX-Vx600 status to your touch panel system.

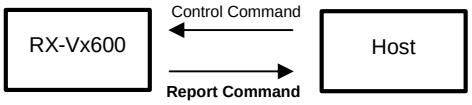
Ready ←

DC3	DEL	DEL	DEL	ETX

*recall factory preset of all data

5. Report Command

The RX-Vx600 will send a Report Command in response to Control Commands from the host controller. From the Report Command you can receive the current status of the RX-Vx600.



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

- System Status Report — RX-Vx600 reports a System Status Report when the system status has changed.
- Playback Status Report — RX-Vx600 reports a Playback Status Report when the internal playback status has changed.
- Operation Report — When the RX-Vx600 is controlled by remote controller, front panel, RS-232C or system controller, the RX-Vx600 sends an Operation Report, which includes the latest setting status of the controlled function.

* The RX-Vx600 reports a System State Report with system guard to inform its power status (power off) if it receives a control command while it is turned off.

* The guard status is included in the Report Command (GRD). If the control command the host sent was accepted, the guard status in the Report Command is '0' (No Guard). On the contrary the guard status will be 'System Guard' or 'Setting Guard' if 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 when a headphone is being used).

*If a status changes multiple times in a certain time, the RX-Vx600 reports 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 (IR)
2	controlled by keys in the unit
3	controlled by system
4	controlled by encoder

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

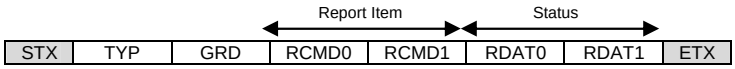
GRD	Guard status*
0	no guard
1	system guard
2	setting guard

*see the following table

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

Operation	No guard	System guard	Setting guard
Power	Power status	---	---
Input	Multi CH/ selected input		---
Audio Select	selected Audio Select	Multi CH Input is ON during Input Rename function doesn't have the designated Audio Select	---
Zone2 Input	selected input	zone2 selector is not at "REMOTE"	---
Mute	mute status	---	---
Zone2 mute	mute status	---	---
Main volume	volume value	---	---
DSP/Surround	Program ID	6ch input is ON source is not 32kHz,44.1kHz or 48kHz	---
EXTD SUR Key	status	Multi CH input is ON Surround 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	---
System Memory	selected number	---	---
Volume Memory	selected number	---	---
Speaker A/B	ON/OFF Status	Headphone Mode	---

5.1 System Status Reports

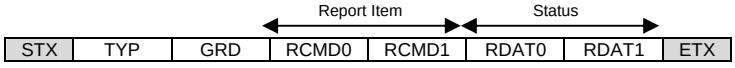


RCMD0, 1	Report Item	RDAT0, 1	Status	
00	system	00	OK	Ready to accept control commands
		01	Busy	Start of the term prohibits sending commands
		02	Standby	Report against commands which cannot be accepted when Power is on Standby

*RX-Vx600 sends this report when the system is reset or the power turns off.
It can be used for observation of the system revival.

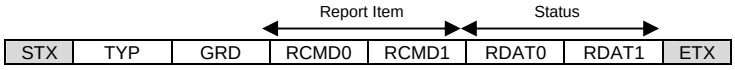
01	warning	00	Over Current	Report of abnormal states
		01	DC Detect	(Only when it's possible to report)
		02	Power Trouble	
		03	Over Heat	

5.2 Playback Status Reports



RCMD0, 1	Report Item	RDAT0, 1	Status	
10	Playback	00	Multi CH 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	
		09	176.4 kHz	
		0A	192.0 kHz	
		0B	48kHz (96kHz)	DTS 96/24 signal
12	EX / ES	00	Off	Playback status
		01	Matrix On	
		02	Discrete ON	
13	THR/Bypass	00	Off	
		01	On	When the DSP-LSI is Bypassed.
14	RED DTS	00	Release	RED DTS status*
		01	Wait	After the signals of DTS CD/LD are stopped, the RED DTS status stays at "Wait" for 2 sec., then changes to "Release" When the RED DTS is "Wait", this can be released by changing the Decoder Mode.
15	Tuner tuned	00	Not tuned	This report will be sent When the Tuner signal is changed.
		01	Tuned	
16	DTS 96/24	00	Off	DTS 96/24 decode
		01	On	

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	Main On / Zone2 Off / Zone3 Off
		03	Main Off / Zone2 On / Zone3 On
		04	Main On / Zone2 On / Zone3 Off
		05	Main On / Zone2 Off / Zone3 On
		06	Main Off / Zone2 On / Zone3 Off
		07	Main Off / 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	DTV
		x,7	CBL/SAT
		x.8	SAT
		x,9	VCR1
		x,A	DVR /VCR2
		X,B	VCR3/DVR
		x.C	V-AUX
		x,E	XM
		0/1,x	Multi CH input OFF/ON
22	Audio	x, 0	AUTO
	Select	x, 3	COAX / OPT
		x,4	ANALOG
		x, 5	ANALOG ONLY
		x. 8	HDMI
	Decoder	0, x	AUTO
	Mode	1, x	DTS
		2, x	AAC
23	Audio Mute	00	Off
		01	On
24	Zone2 Input	00	PHONO
		01	CD
		02	TUNER
		03	CD-R
		04	MD/TAPE
		05	DVD
		06	DTV
		07	CBL/SAT
		08	SAT
		09	VCR1
		0A	DVR/VCR2
		0C	V-AUX
		0E	XM
25	Zone2 Mute	00	Off
		01	On
26	Main	00	-oo (Infinite Attenuation)
	Volume	27	-80dB
		…	
		C7	0dB
		…	
		E8	16.5dB
27	Zone 2 Vol.	00	-oo (Infinite Attenuation)
		27	-80dB
		…	
		C7	0dB
		…	
		E8	16.5dB

RCMD0, 1	Report Item	RDAT0, 1	Status
28	Program	00	Munich
		01	Hall B
		02	Hall C
		04	Hall C
		05	Vienna
		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	7ch Stereo
		18	Pop / Rock
		19	DJ
		1C	Classical / Opera
		1D	Pavilion
		20	Mono Movie
		21	TV Sports
		24	Spectacle
		25	Sci-Fi
		28	Adventure
		29	General
		2C	Standard
		2D	Enhanced
		30	PLII Movie
		31	PLII Music
		32	Neo: 6 Movie
		33	Neo: 6 Music
		34	2ch Stereo
		35	STREO B 2CH Direct Stereo
		36	THX Cinema
		37	THX Music
		3C	THX Game
		80-B3	STRAIGHT
		80	STRAIGHT (Munich)
		85	STRAIGHT (Vienna)
		…	
		BC	STRAIGHT (THX Game)
29	Tuner Page	00	A
		01	B
		02	C
		03	D
		04	E
2A	Preset 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	EXTD SUR	00	Off
		01	EX/ES
		02	Discrete On
		03	Auto
		04	EX
		05	PLIIx Movie
		06	PLIIx Music
2E	SP Relay A	00	Off
		01	On
2F	SP Relay B	00	Off
		01	On

RCMD0, 1	Report Item	RDAT0, 1	Status	
30	System	01	Load	1
	Memory	02		2
		03		3
		04		4
		05		5
		06		6
31	System	01	Save	1
	Memory	02		2
		03		3
		04		4
		05		5
		06		6
32	Volume	01	Load	1
	Memory	02		2
		03		3
		04		4
		05		5
		06		6
33	Volume	01	Save	1
	Memory	02		2
		03		3
		04		4
		05		5
		06		6
34	Headphone	00	Off	
		01	On	
35	Tuner	00	FM	
	Band	01	AM	

RCMD0, 1	Report Item	RDAT0, 1	Status	
36	DC1 Trigger	00	Off (Due to the delay)	
	Output	01	On (Due to the delay)	
37	Zone 2 Vol.	01	Load	1
	Memory	02		2
		03		3
		04		4
		05		5
		06		6
38	Zone 2 Vol.	01	Save	1
	Memory	02		2
		03		3
		04		4
		05		5
		06		6
39	Dual	00	Main	
	Mono	01	Sub	
		02	All	
3A	DC1 Trigger	00	All Zone OR	
	Control	01	Main	
		02	Zone 2	
		03	Zone 3	
3B	DC2 Trigger	00	All Zone OR	
	Control	01	Main	
		02	Zone 2	
		03	Zone 3	
3C	DC2 Trigger	00	Off (Due to the delay)	
	Output	01	On (Due to the delay)	
3D	SP B	00	Main	
	SET	01	Zone B	
3E	Zone 2	00	EXT	
	Amp	01	INT: Surround	
		02	INT: Presence	
		03	INT: Both	
3F	Zone 3	00	EXT	
	Amp	01	INT: Surround	
		02	INT: Presence	
		03	INT: Both	

RCMD0, 1	Report Item	RDAT0, 1	Status
40	Level Front R	14	-10dB
		15	-9.5dB
		…	
		3C	+10dB
41	Level Front L	14	-10dB
		15	-9.5dB
		…	
		3C	+10dB
42	Level Center	14	-10dB
		15	-9.5dB
		…	
		3C	+10dB
43	Level Surround R	14	-10dB
		15	-9.5dB
		…	
		3C	+10dB
44	Level Surround L	14	-10dB
		15	-9.5dB
		...	
		3C	+10dB
45	Level Surround Back R	14	-10dB
		15	-9.5dB
		...	
		3C	+10dB
46	Level Surround Back L	14	-10dB
		15	-9.5dB
		…	
		3C	+10dB
47	Level Presence R	14	-10dB
		15	-9.5dB
		…	
48	Level Presence L	3C	+10dB
		14	-10dB
		15	-9.5dB
		…	
49	Level Subwoofer (1)	14	-10dB
		15	-9.5dB
		...	
		3C	+10dB
4B	Zone2 Tone Control Bass	00	-10dB
		01	-8dB
		...	
		0A	+10dB
4C	Zone2 Tone Control Treble	00	-10dB
		01	-8dB
		...	
		0A	+10dB
4D	Zone3 Tone Control Bass	00	-10dB
		01	-8dB
		...	
		0A	+10dB
4E	Zone3 Tone Control Treble	00	-10dB
		01	-8dB
		...	
		0A	+10dB

RCMD0, 1	Report Item	RDAT0, 1	Status
50	Main L/R Balance	00	Lch Max
		...	
		14	Mid
		...	
		28	Rch Max
51	LFE Level SP	00	-20dB
		01	-19dB
		...	
		14	0dB
52	LFE Level HP	00	-20dB
		01	-19dB
		...	
		14	0dB
53	Audio Delay	00	0ms
		01	
		...	
		F0	240ms
58	Wall Paper	00	YES
		0E	Gray
		0F	NONE
5A	MAX Volume	00	-30dB
		01	-25dB
		02	-20dB
		03	-15dB
		04	-10dB
		...	
		0A	16.5dB
5B	Initial Volume	00	Off
		27	-80dB
		…	
		C7	0dB
		…	
		E8	16.5dB
5E	Decoder Mode	0 , x	Auto
		1 , x	DTS
		2 , x	AAC
		X , 0	PHONO
		X , 1	CD
		X , 2	TUNER
		X , 3	CD-R
		X , 4	MD/TAPE
		X , 5	DVD
		X , 6	DTV
		X , 7	CBL/SAT
		X , 9	VCR1
		X , A	DVR / VCR2
		X , C	V-AUX
		x , E	XM
5F	Decoder Mode Set	00	Auto
		01	Last

RCMD0, 1	Report Item	RDAT0, 1	Status
60	Audio Select	00	Auto
		01	Last
61	Dimmer	00	-4
		01	-3
		02	-2
		03	-1
		04	0
62	OSD Shift	00	-5
		…	
		0A	+5
	GUI Position	X0	Horizontal -5
		…	
		XA	+5
		0X	Vertical -5
		…	
		AX	+5
63	Gray Back	00	Off
		01	Auto
64	Dynamic Range SP	00	Max.
		01	Std.
		02	Min.
65	Dynamic Range HP	00	Max.
		01	Std.
		02	Min.
66	Zone2 Volume Out	00	Variable
		01	Fixed
68	Memory Guard	00	Off
		01	On
69	Video Conversion	00	Off
		01	On
6B	Zone3 Volume Out	00	Variable
		01	Fixed

RCMD0, 1	Report Item	RDAT0, 1	Status
6C	Zone2	00	Off
	OSD	01	Zone2
		02	Zone2 & Zone3

RCMD0, 1	Report Item	RDAT0, 1	Status
6E	2ch Decoder	00	Pro Logic
		01	PLIIx Movie
		02	PLIIx Music
		03	PLIIx Game
		04	Neo:6 Cinema
		05	Neo:6 Music
		06	CSII Cinema
		07	CSII Music

RCMD0, 1	Report Item	RDAT0, 1	Status
70	Center	00	Large
	SP	01	Small
		02	None
71	Front	00	Large
		01	Small
72	Surround	00	Large
	SP	01	Small
		02	None
73	Surround	00	Large x2
	Back	01	Large x1
		02	Small x2
		03	Small x1
		04	None
74	Presence	00	Yes
		01	None
75	LFE	00	SWFR
	Bass	01	Main
	Out	02	Both
76	Subwoofer	0X	Normal
	Phase	1X	Reverse

RCMD0, 1	Report Item	RDAT0, 1	Status
7B	Multi CH	00	6ch
	Select	01	8ch Tuner
		02	8ch CD
		03	8ch CD-R
		04	8ch MD/TAPE
		05	8ch DVD
		06	8ch DTV
		07	8ch CBL/SAT
		09	8ch VCR1
		0A	8ch DVR/VCR2
		0C	8ch V-AUX
		0E	8ch XM
7D	PR/SB	00	Presence
	Priority	01	Surround Back
7E	Subwoofer	00	40 Hz
	Crossover	01	60 Hz
		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	On
85	Component	00	Off
	I/P	01	On
86	HDMI	00	Off
	I/P	01	On
87	HDMI	00	Through
	Up-Scaling	01	480p / 576p (NTSC / PAL)
		02	1080i
		03	720p
88	HDMI	00	Through
	Aspect	01	16:9 Normal
8A	THX	00	Under 1f (0.3m)
	SB Dist	01	1 – 4ft (0.3 – 1.2m)
		02	Over 4ft (1.2m)

RCMD0, 1	Report Item	RDAT0, 1	Status
8B	Night Mode	00	OFF
	Parameter	10	Cinema level LOW
		11	MIDDLE
		12	HIGH
		20	Music Level LOW
		21	MIDDLE
		22	HIGH
8C	Pure	00	Off
	Direct	01	On
8F	HDMI	00	RX-V2600 / V1600
	Support Audio	01	Other

RCMD0, 1	Report Item	RDAT0, 1	Status
90	XM	00	A
	Preset Page	01	B
		02	C
		03	D
		04	E
91	XM	00	1
	Preset Num	01	2
		02	3
		03	4
		04	5
		05	6
		06	7
		07	8

RCMD0, 1	Report Item	RDAT0, 1	Status
92	XM	00	All CH
	Search Mode	01	Category
		02	Preset
93	XM	00	Off
	Display Time	01	10sec
		02	30sec
		03	On
94	XM	00	CH #0
	CH Number	01	CH #1
		…	
		FF	CH #255
95	XM Display	00	Release
	Hold / Release	01	Hold

RCMD0, 1	Report Item	RDAT0, 1	Status
A0	Zone 3	00	PHONO
	Input	01	CD
		02	TUNER
		03	CD-R
		04	MD/TAPE
		05	DVD
		06	DTV
		07	CBL/SAT
		09	VCR1
		0A	DVR/VCR2
		0C	V-AUX
		0E	XM
A1	Zone 3	00	Off
	Mute	01	On
A2	Zone 3	00	-oo (Infinite Attenuation)
	Volume	27	-80dB
		...	
		C7	0dB
		…	
		E8	16.5dB

RCMD0, 1	Report Item	RDAT0, 1	Status
A3	Zone 3	01	Load 1
	Volume	02	2
	Memory	03	3
		04	4
		05	5
		06	6
A4	Zone 3	01	Save 1
	Volume	02	2
	Memory	03	3
		04	4
		05	5
		06	6
A5	Mute Type	00	Full
		01	-20dB
A7	EQ Select	00	Auto PEQ
	Type	01	GEQ
		02	EQ Off
A8	Tone	00	Auto
	Bypass	01	off

RCMD0, 1	Report Item	RDAT0, 1	Status
B0	Advanced	00	Off
	Setup	01	On
B1	Remote ID	00	ID1
	for AMP	01	ID2
B2	Fan Control	00	Auto
	Mode	01	Cont
B3	Speaker	00	8 ohm
	Impedance	01	6ohm
B4	Tuner	00	AM10/FM100 (kHz)
	Step	01	AM 9/FM50 (kHz)
B5	Remote ID	00	ID1
	for Tuner	01	ID2
B6	Language	00	English
		01	Japanese
		02	French
		03	German
		04	Spanish

RCMD0, 1	Report Item	RDAT0, 1	Status
B7	User	00	Cancel
	Preset	01	Reset
B8	Video	00	Cancel
	Reset	01	Yes
B9	Remote	00	On
	Sensor	01	Off
BA	Remote ID	00	ID1
	for XM	01	ID2
BB	Bi-AMP	00	On
		01	Off
BC	TV Format	00	PAL
		01	NTSC
BD	Wake on	00	No
	RS232C	01	Yes

Attention

*When the Input is changed, the RX-Vx600 sends an Operation Report for Input (RCMD0,1="21") and Audio Select (RCMD0,1="22").

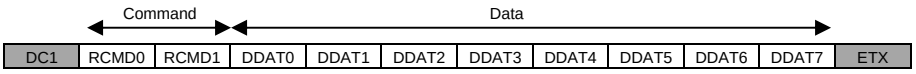
* When the System Memory is changed, the RX-Vx600 sends an Operation Report for System Memory (RCMD0,1="30") and Configuration Command.

* When a headphone is plugged into the headphone jack and the Speaker Relay is turned off, the RX-Vx600 sends an Operation Report for Speaker Relay A and B (RCMD0,1="2E","2F", RDAT="00(OFF)"). The RX-Vx600 sends an 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, the RX-Vx600 sends a Playback Status report.

* Each time the busy status of the system changes, the RX-Vx600 sends a System Status report.

5.4 Display Text Data Report



RCMD0,1	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'

RCMD0,1	ITEM	DDAT0	DDAT1–7
01	Main Volume	SP	7digits <Upper Lower>

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

RCMD0,1	ITEM	DDAT0	DDAT1-7
02	Zone2 Volume	SP	7digits <Upper Lower>

RCMD0,1	ITEM	DDAT0-7
03	Input name SP	8letters <Right Left>

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

RCMD0, 1	ITEM	DDAT0-7
04	Zone 2 Input name	8letters <Right Left>

RCMD0,1	ITEM	DDAT0-2	DDAT3-7
05	Zone3 Volume	SP	5digits <Upper Lower>

RCMD0, 1	ITEM	DDAT0-7
06	Zone 3 Input name	8letters <Right Left>

RCMD0,1	ITEM	DDAT0-3	DDAT4-7
F0	Remote Code	SP	4digits <Upper Lower>

(example)
'SP''SP''SP''SP' '7' 'A' '0' '0'

RCMD0,1	ITEM	DDAT0	DDAT1-2	DDAT3	DDAT4	DDAT5-6	DDAT7
FF	Version Information	Major Version	Software Version	"_" (Don't care)	RS-232C Major Version	DSP Parameter Version	" " (Don't care)

(example)
'SP''SP''SP''SP' '7' 'A' '0' '0'

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

Example of RX-Vx600 Control Procedure

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

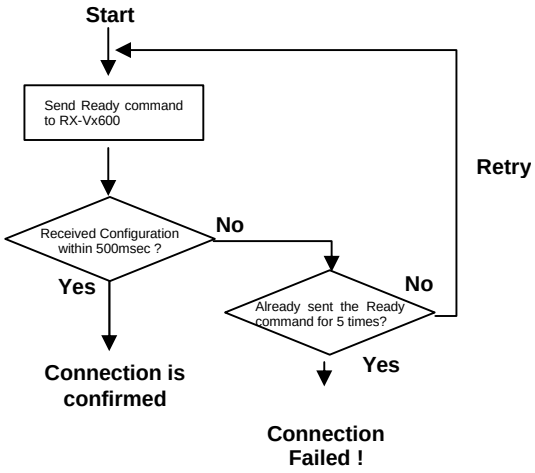
When the AC plug / RS-232C cable are not connected, the RX-Vx600 cannot send any data to the host. If the host doesn't receive a configuration command after sending a Ready command 5 times, the host should disable the RS-232C communication and send an alert to the graphic user interface (GUI).

[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 the AC plug/RS-232 cable (cf. [1]).

When the RS-232C cable is disconnected, the commands generated inside the RX-Vx600 are stored in the sending buffer. If the stored commands exceed the buffer memory size (buffer overflow), the RX-Vx600 stops reporting any commands. In this case, reconnecting the 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)

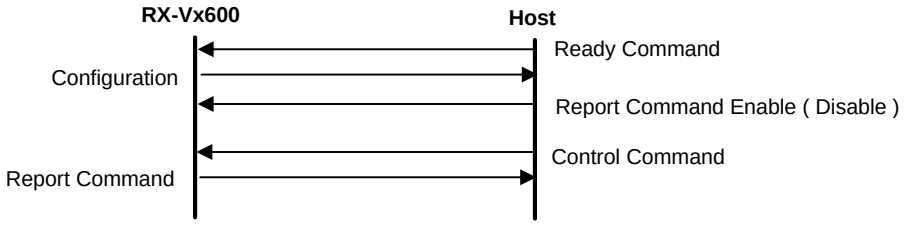


[3] AC plug connection detection (after [1],[2])

When the AC connection is reset, the RX-Vx600 sends a Configuration Command to the host.
The host can display the status of the RX-Vx600 to its GUI.

[4] Getting the status of the RX-Vx600 when the host boots up

At first, the host should send a Ready command and receive the Configuration Command from the RX-Vx600 (cf. [1]).
Once the connection is confirmed, the host can send Control Commands to the RX-Vx600.
When the RX-Vx600 is turned off, it accepts only System Commands and Power ON command.



[5] Error transactions after [4]

While sending a control command, if the RX-Vx600 didn't send any corresponding Report Commands regardless of re-trying for 5 times, the host should clear its send buffer and then check the AC plug / RS-232C connection sequence (cf. [1]). When the RX-Vx600 responds, the host can display the RX-Vx600 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

* Column numbers = the first hexadecimal digit
  Row numbers = the second hexadecimal digit

* The characters in the gray cells are available for RS-232C communication.