

1. Outline

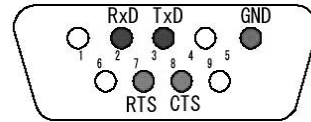
In case no comments in particular as for the contents of this papers, the descriptions are effective for the RX-V3200.

1.1 Connection

5 wire system

RX-V3200 Slave	TxD(PIN3)	Transpose	----->	RxD(PIN2)	HOST. master
	RxD(PIN2)	receive	<-----	TxD(PIN3)	
	GND(PIN5)	Ground	-----	GND(PIN5)	
	CTS(PIN8)	permit to send data	<-----	RTS(PIN7)	
	RTS(PIN7)	request to send data	----->	CTS(PIN8)	

*When not connected, data sending to RX-V3200 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-V3200 outputs low level while the AC plug is disconnected.

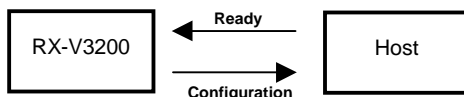
If RTS output stays low even when the AC plug is connected, there might be some trouble.

1.3 Data block timeout

It takes RX-V3200 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

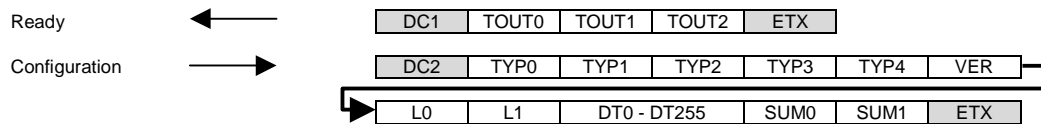
2.1 Starting Communication



Ready command is the very first command to be sent to RX-V3200 at the start of the communication. TOUT0 - 2 in Ready Command sets timeout of the communication.

RX-V3200 sends Configuration command (Model ID, software version, and setting data) to the host in reply to the Ready command.

RX-V3200 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-V3200 won't send any Configuration commands after fifth retry, please cancel the transaction because there might be some problems.



*TYPx : Model ID = "R0112"

*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 - 0xFFFF

*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	1 - 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 / 1	System	0: OK / 1: Busy
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 / 8: VCR1 / 9: VCR2-DVR / A: V-AUX
DT10	0 / 1	6ch input	0: OFF / 1: ON
DT11	0 - 4	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 / 8: VCR1 / 9: VCR2-DVR / A: 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	Not in use	Not in use
DT18	0 - F	Not in use	Not in use
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 - 6	Home bank	0: Bank Main / 1: Bank A / 2: Bank B / 3: Bank C
DT28	0 - 6	Volume bank	0: Bank Main / 1: Bank A / 2: Bank B / 3: Bank C
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 - 7	Fs	0: Analog / 1: 32kHz / 2: 44.1kHz / 3: 48kHz / 4: 64kHz / 5: 88.2kHz / 6: 96kHz / 7: Unknown
DT33	0 - 2	6.1/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	DC Control Out	0: LOW / 1: HIGH

*DD = Dolby Digital

*OSD = On Screen Display

3. Control Command



*RX-V3200 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-V3200 reports OK

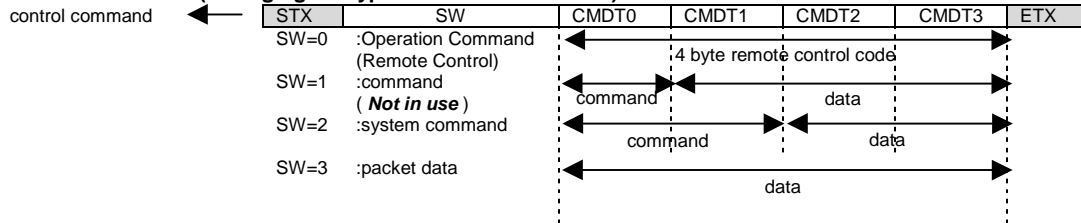
*RX-V3200 will send a Report Command** within 1 sec of receiving the Control Command. If no Report Command is received, resend control command (max 5 times) If RX-V3200 doesn't send a Report Commands after fifth retry, cancel the transaction because there might be some troubles.

*'SW' switches the type of the control command. When the 'SW' is set to '0', you can control RX-V3200 remotely via RS-232C.

*RX-V3200 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-V3200 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)



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

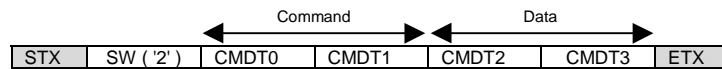
* 'SW' switches the command type of the Control Command.

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-V3200 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-V3200'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-V3200 text data regarding tuner freq., master volume, input name, zone2 input name.

(from RX-V3200)

SW	Command			data			Report Command		
	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				
			Not in use	0	2				
			Input name text request	0	3				
			Zone2 input name text request	0	4				
2	3	0	Master volume direct setting	0	0	-infinity	0	26	
				0	1	-99.5dB			
				.	.	.			
				C	6	-0.5dB			
				C	7	0dB			

*OSD message function

OSD Message function can display a message of 16 characters to V3200'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'	'T'	'e'	's'	ETX
STX	3	't'	't'	'm'	'e'	ETX
STX	3	's'	's'	'a'	'g'	ETX
STX	3	'e'	't'	'!'	't'	ETX

3. The command block will be finished automatically.

The available characters to display the message are as follows.

```

"(SPACE)"!""#"%"&"'("&""")""""*+","-
.0123456789:."<=">"'?"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"

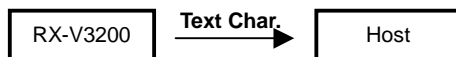
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***Commands to get the display characters as text data(ASCII)**

This command can get certain of text data(ASCII) from the RX-V3200 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.

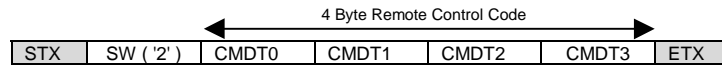


RCMD0,1	COMMAND	0 - 9, A - F	0~0xFF
DDAT 0 - 7	DATA	0 - 9, A - Z SP	ASCII char. Space char.

Report Command

[illegible]

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.

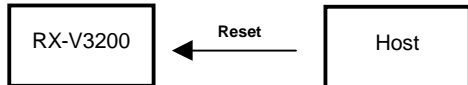
Operation Command						Report Command		
SW	CMDT0	CMDT1	CMDT2	CMDT3	function	setting	Type	RCMD1,2
0	7	A	1	A	master volume	Up	0	26
	7	A	1	B		Down		
	7	E	A	2	Audio Mute	ON		23
	7	E	A	3		OFF		
	7	A	1	4	Input	PHONO		21
	7	A	1	5		CD		
	7	A	1	6		TUNER		
	7	A	1	9		CD-R		
	7	A	C	9		MD/TAPE		
	7	A	C	1		DVD		
	7	A	5	4		D-TV/LD		
	7	A	C	0		CABLE (CBL/SAT)		
	7	A	0	F		VCR1		
	7	A	1	3		VCR2/DVR		
	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		
	7	E	A	8		DTS		22
	7	E	A	A		ANALOG		
	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	D	6		VCR1		
	7	A	D	7		VCR2/DVR		
	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	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	6.1/ES Key	ON (MATRIX)		2D
	7	E	B	9		OFF		
	7	E	7	C		AUTO		
	7	E	7	D		DISCRETE		
	7	E	E	0	Effect	OFF		28
	7	E	E	7		ON		
	7	E	E	1	DSP Program	Hall A (HALL1)		
	7	E	E	2		Hall B		
	7	E	E	3		Hall C		
	7	E	E	6		Live Concert (HALL / HALL2)		
	7	E	E	8		Freiburg (CHURCH)		
	7	E	E	9		Royaumont		
	7	E	E	A		Village Gate		
	7	E	E	C		The Bottom Line (JAZZ)		
	7	E	E	D		The Roxy Theatre (ROCK)		
	7	E	E	F		Arena		
	7	E	F	0		Disco		
	7	E	F	2		Game		
	7	E	F	F		5/6ch Stereo		
	7	E	F	3		Pop/Rock		
	7	E	F	5		Classical/Opera		
	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		

SW	CMDT0	CMDT1	CMDT2	CMDT3	function	setting	Type	RCMD1,2
0	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	0	2E
	7	E	A	C		OFF		
	7	E	A	D	speaker relay B	ON		2F
	7	E	A	E		OFF		
	7	E	2	0	Home bank	Main		30
	7	E	2	1		A		
	7	E	2	2		B		
	7	E	2	3		C		
	7	E	2	B	Home preset memory	A		
	7	E	2	C		B		
	7	E	2	D		C		
	7	E	3	5	Home preset recall	A		
	7	E	3	6		B		
	7	E	3	7		C		
	7	E	6	0	Volume bank	Main		31
	7	E	6	1		A		
	7	E	6	2		B		
	7	E	6	3		C		
	7	E	6	B	Volume preset memory	A		
	7	E	6	C		B		
	7	E	6	D		C		
	7	E	7	5	Volume preset recall	A		
	7	E	7	6		B		
	7	E	7	7		C		
	7	E	7	3	DC CONTROL OUT	HIGH		36
	7	E	7	4		LOW		

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-V3200 to your touch panel system.

Ready

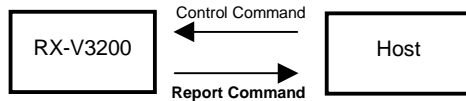


DC3	DEL	DEL	DEL	ETX
-----	-----	-----	-----	-----

*recall factory preset of all data

5. Report Command

RX-V3200 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-V3200.



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

- System Status Report : RX-V3200 reports a System Status Report when the system status changed.
- Playback Status Report : RX-V3200 reports a Playback Status Report when the internal playback status changed.
- Operation Report : When the RX-V3200 is controlled by remote controller, front panel, RS-232C or by system controller, RX-V3200 sends a Operation Report, which includes the latest setting status of the controlled function.

*RX-V3200 reports a System State Report with system guard to inform its power status (power off) when a control command was sent to RX-V3200 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-V3200, 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 (eg. 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-V3200 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

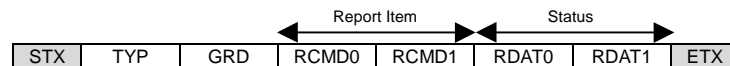
GRD	Guard status*
0	no guard
1	system guard
2	setting guard

*see the following chart

*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	SETMENU 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 01 02	OK Busy Power Off

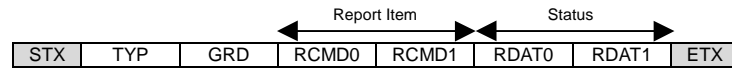
ready for accepting the control commands
start of the term prohibits sending commands
report against the command which cannot be accepted when the Power is Off

*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 01 02 03	over current DC Detect power trouble over heat
----	---------	----------------------	---

report of abnormal states
(Only when it's possible to report)

5.2 Playback Status Reports



RCMD0, 1	Report Item	RDAT0, 1	Status
10	Playback	00	external decoder
		01	Analog
		02	PCM
		03	D.D.(except for 2/0)
		04	D.D.(2/0)
		05	D.D.karaoke
		06	D.D.6.1
		07	DTS
		08	DTS.Matrix ES
		09	Digital
		0A	DTS Analog Mute
		0B	DTS Discrete ES
11	Fs	00	Analog
		01	32kHz
		02	44.1kHz
		03	48kHz
		04	64kHz
		05	88.2kHz
		06	96kHz
		07	Unknown
12	6.1/ES	00	ON (Matrix ON)
		01	OFF
		02	Discrete ON
13	Thr / Bypass	00	Normal
		01	Bypass
14	RED dts	00	Release
		01	Wait
15	Tuner tuned	00	Not tuned
		01	Tuned

audio code mode excepting for 2/0
audio code 2/0

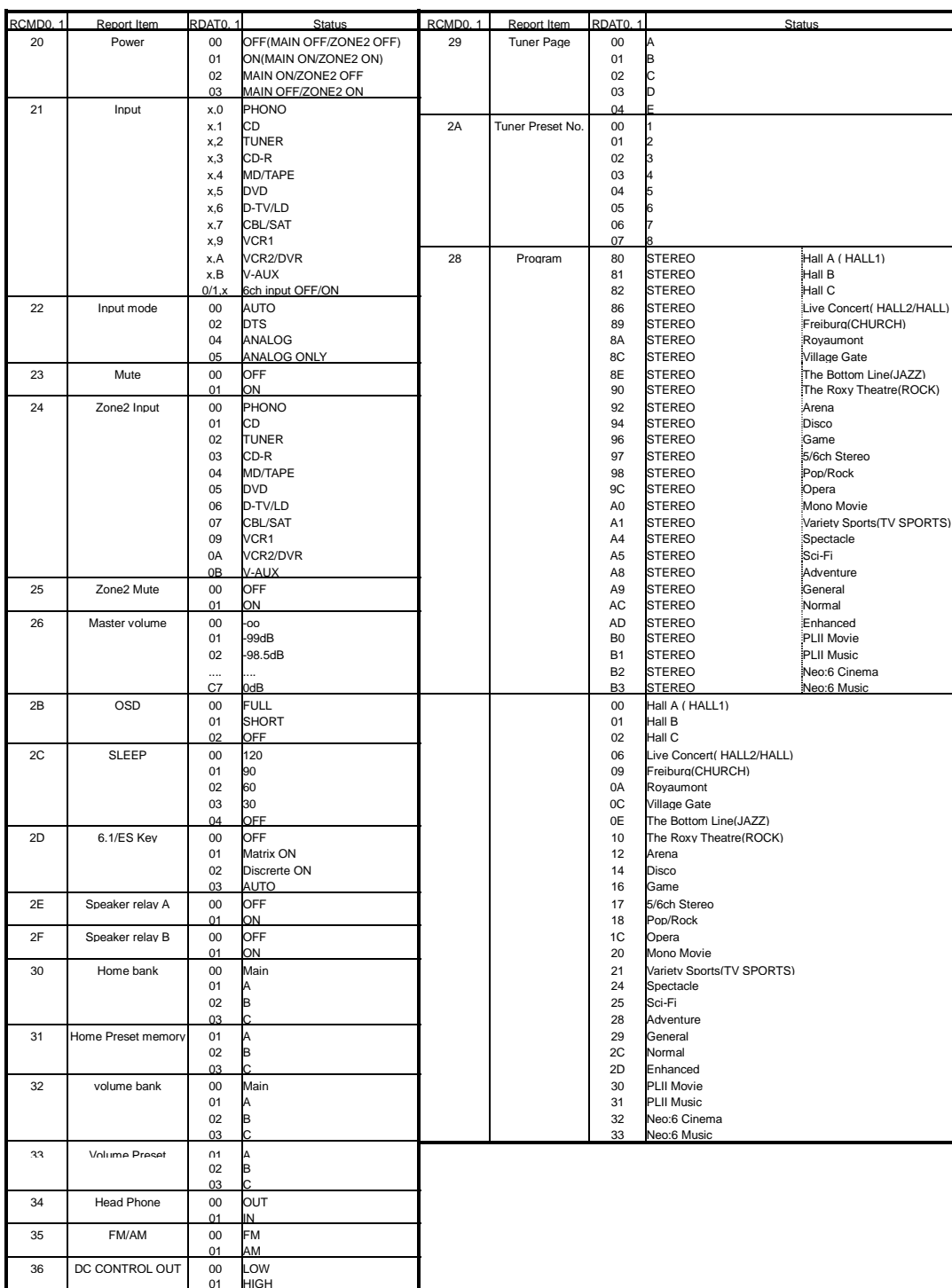
waiting to decode, etc

6.1/ES Playback status

DSP Through status

RED dts status*
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.

This report will be sent in case of signal changed.



Attention

*When the Input is changed, RX-V3200 sends Operation Report for Input (RCMD0,1="21") and Input mode(RCMD0,1="22").

*When the Home bank is changed, RX-V3200 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-V3200 send the Operation Report for Speaker Relay A and B (RCMD0,1="2E","2F", RDAT="00(OFF)"). RX-V3200 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-V3200 send a Playback Status report.

*Each time the busy status of the system changes, RX-V3200 send the System Status report.

Example of RX-V3200 Control Procedure

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

When the AC plug / RS-232C cable are not connected, RX-V3200 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]).

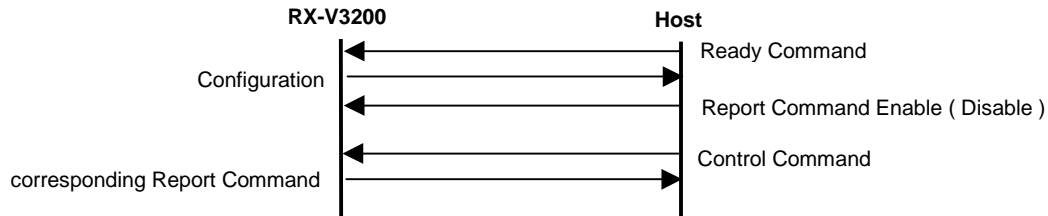
When the RS-232C cable is disconnected, the commands generated inside RX-V3200 are stored in the sending buffer. If the stored commands exceed the bufer memory size (buffer overflow), RX-V3200 stops reporting any commands. In this case, reconnecting AC plug or Connection Start procedure [1] will be needed in order to enable the command report.

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

When the AC connection is reset, RX-V3200 send Configuration Command to the host. Host can feedback the status of RX-V3200 to its GUI.

[4] Getting the status of the RX-V3200 when the host boot up

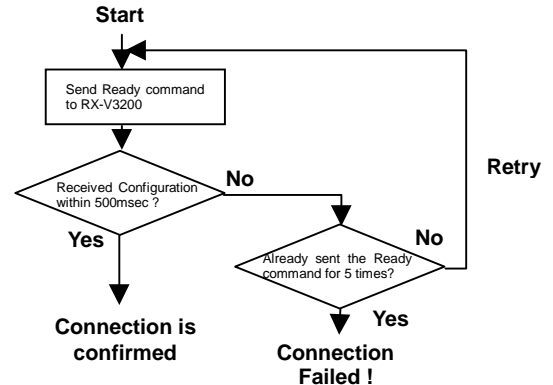
At first, host should send Ready command and receive the Configuration Command from RX-V3200 (see [1]). Once the connection is confirmed, host can send Control Commands to the host. While the RX-V3200 is turned off, RX-V3200 only accept System Command and Power ON command.



[5] Error transactions after [4]

While sending control command, if RX-V3200 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-V3200 responded, the host can feedback the RX-V3200 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.

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



1 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	l	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.