Marantz

RS232C Control Specification

for

ST7001

Category : *Stereo Tuner*

Document Version : *1.01*

Date : **2006/08/10**

Number of Page : **14**

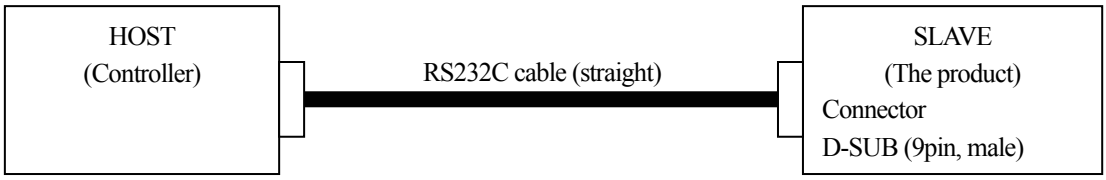
Table of Contents

1. Global Description

1-1. Overview

A Host controller can control or watch out the product as a Slave very easily via the communication cable.

1-2. Block Diagram

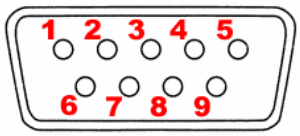


*** The product has D-SUB 9pin male connector.**

*** RS232C cable has to be the Straight type.**

1-3. Interface connection specification of the product

uP Interface	Signal name	Connection device	D-Sub Pin	Connecter
-	N.C.	-	1	<The product connector> RS232C D-SUB (9pin,**male)**
UART	TxD (output)	RS232C Level shift driver	2	
	RxD (input)		3	
-	N.C.	-	4	
-	GND	GND	5	
-	N.C.	-	6	
-	N.C.	-	7	
-	N.C.	-	8	
-	N.C.	-	9	



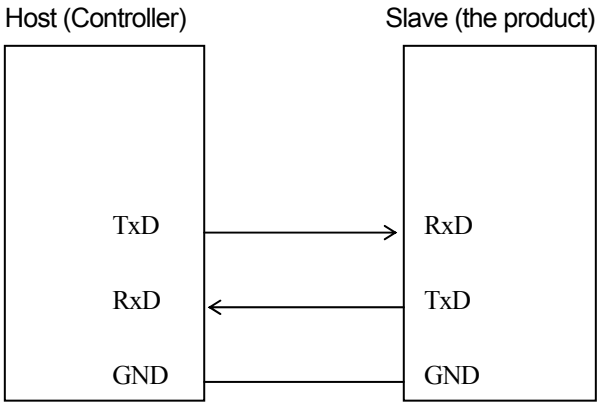
1-4. Assumptions and Dependencies

2. Detailed Description

The interface specification between the product and a Host controller is described below.

2-1. Connection format

2-1-1. Physical connection

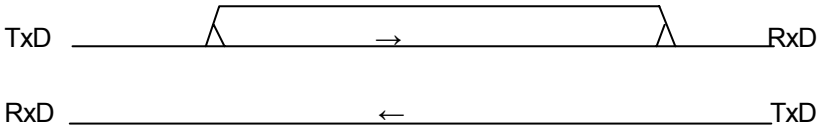


(Serial setting <RS232C basic>)

Baud Rate	: 9600bps
Data Bits	: 8bit
Parity	: None
Stop bit	: 1bit
Handshaking	: None

2-1-1-1. Data transmission sequence from Host to Slave

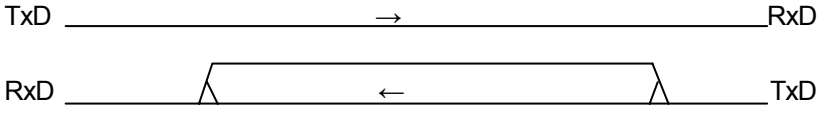
Host (Controller) Slave (The product)



1. Host starts a data transmission from TxD.
2. Host performs the data transmission of the number of required bytes, and ends a transmission.

2-1-1-2. Data transmission sequence from Slave to Host

Host (Controller) Slave (The product)



1. Slave starts a data transmission from TxD.
2. Slave performs the data transmission of the number of required bytes, and ends a transmission.

2-2. Transmission data format

2-2-1. Transmission data format from Host to Slave

There are two kinds of transmission data form from Host shown below.

2-2-1-1. Form1: Command

Command is a data that requests some status change.

Start character : '@'
COMMAND : see "Command list"
End character (CR) : 0Dh

Start	Command	End
'@'	"xxx:"+"..."	0Dh

2-2-1-2. Form2: Status request

Status request is a data that requests an answer of some status.

Start character : '@'
Request status : see "Status request list"
Request character : '?'
End character (CR) : 0Dh

Start	Request status	End
'@'	"xxx:?"+"..."	0Dh

2-2-2. Transmission data format from Slave to Host

There are two kinds of transmission data form from Slave shown below.

2-2-2-1. Form1: ACK/NAK

ACK is a reply data from Slave when Slave got an acceptable command data from Host.
(ACK is sent to Host when Slave has no related status by the Command.)

Start character : '@', ACK : 06h, End character (CR) : 0Dh

start	ACK	CR
'@'	06h	0Dh

NAK is a reply data from Slave when Slave got an incorrect Command data, Status request data or some other data from Host.

Start character : '@', NAK : 15h, End character (CR) : 0Dh

start	NAK	CR
'@'	15h	0Dh

2-2-2-2. Form2: Status answer and Auto status feedback

Status answers are reply data when Slave got an acceptable Request status or Command data from Host. Auto status feedbacks are sent to Host data when a Slave's status is changed.

Start character : '@'
Answer character : see "Status list"
End character (CR) : 0Dh

Start	Status	End
'@'	"xxx:"+"..."	0Dh

2-3. The transaction sequences and the regulations

2-3-1. The transaction sequences

The transactions have three kinds of sequence.

*A transaction is a Command from Host then Slave will be an answer by Status answer, ACK or NAK.

*A transaction is a Status request from Host then Slave will be an answer by Status answer or NAK.

*A transaction is Auto status feedback from Slave when a Slave's status changed. (If the auto status feedback is enabled.)

2-3-2. The transaction regulations

The transactions have some kinds of regulation.

* An answer (ACK, NAK or Status answer) transmittion by Slave has to finish within 500ms when got a Command or a Status request from Host.

* Host must not transmit an another Command or Status request until "it receives a answer by a previous Command or Status request" or "it passes a term of waitinng time from a finishing of previous transmission of a Command or a Status request ".

* Slave has to finish a transaction under 500ms when it sends Auto status feedback data.

2-3-3. Specification of Auto status feedback

There are some specific regulations about Auto status feedback.

* The product status has segmented into **four layers of 1, 2, 3 and 4**.

* The status of layer 1 are assigned most kindly status to Host. (The statuses of layer 2 are assigned kindly status, the statuses of layer 3 are not so need status to Host and the statuses of layer 4 are probably no wished statuses.)

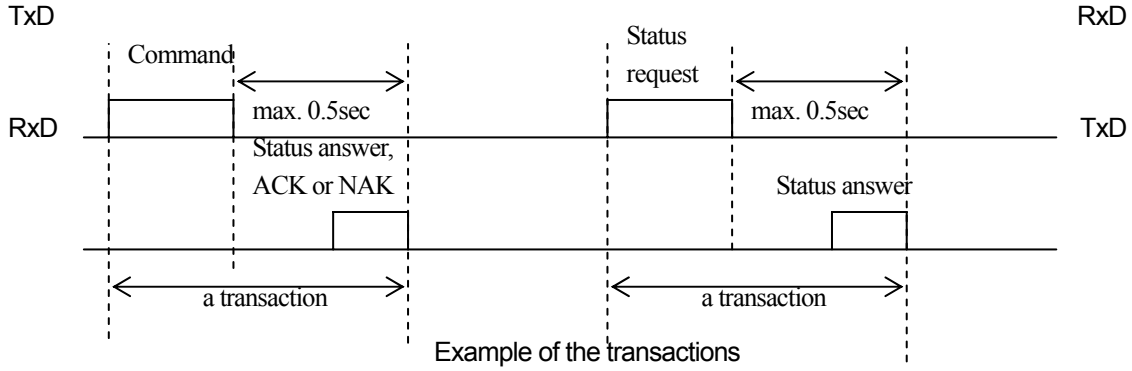
* Each layer status can control transmit enable or disable by Host command. (The product default would be all disables.)

* Slave sends auto status feedback by itself when the status is changed and if the status feedback is enabled.

* The product defined and segmentationed layers are takeing in status list.

2-3-4. Example of the transactions

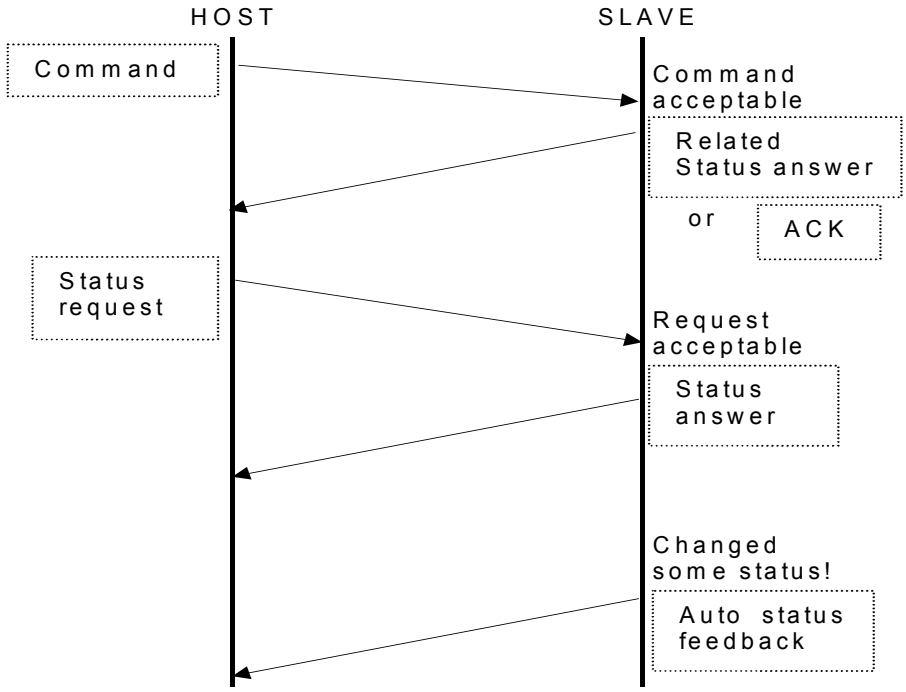
<Host> <Slave>



Example of the transactions

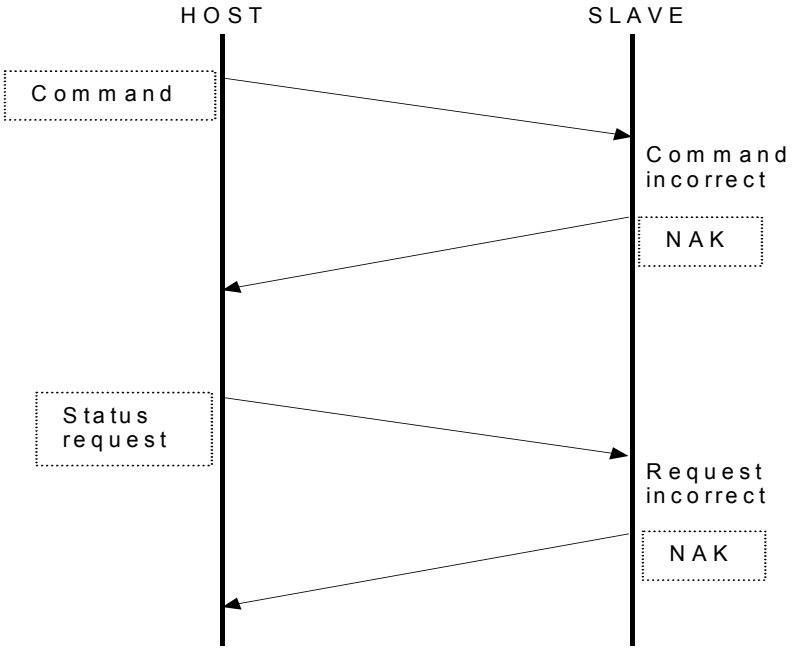
2-3-5. Examples of the handshaking flowchart

2-3-5-1. Example of successful handshaking



The product can reply ACK instead of related status, if the product can not send the related status immediatly.

2-3-5-2. Examples of handshaking error



3. Recommendations of Command, Status and Layer definition

- All Commands, Statuses and Layers will be defined other specific document.
- **[MANDATORY]** The product **MUST** have Commands and the Statuses same as a remote controller buttons (IR controller) of the product.
- All Commands are required working by discreate as ON/OFF commands. (It means that do not support TOGGLE command only.)
- All Commands and Statuses are defined same chharacter size except ACK/NAK on the product. (Recommended character length : 3~6 characters)
- It permits attaching 0x0A character to a reply characters from the product. In this case, must suppose that the object is followed altogether.
- Recommend to supports numbers or values direct setting command, if it has variable numbers or values.

4. Definitions of Command, Status and Layer

This section is told how to define "Command", "Status" and "Layer" of this product.

4-1. Commands

This chapter will show the commands of this product.

4-1-1. Normal Command list

Command			Reply from Slave
POWER	TOGGLE	"PWR:0"	"PWR:1" (OFF), "PWR:2" (ON)
	OFF	"PWR:1"	
	ON	"PWR:2"	
BAND	TOGGLE (work on same as RC)	"BND:0"	"BND:1"(FM), "BND:2"(AM), "BND:3"(DAB), "BND:4"(XM)
	BAND 1 (FM)	"BND:1"	
	BAND 2 (AM)	"BND:2"	
	BAND 3 (DAB)	"BND:3"	
	BAND 4 (XM)	"BND:4"	
SLEEP	VALUE	"SLP:0xxx"	"SLP:xxx" xxx = 001 ~120 min xxx = 000(OFF)
	OFF	"SLP:1"	
	ON (work on same as RC)	"SLP:2"	
DIMMER	TOGGLE (work on same as RC)	"DIM:0"	"DIM:1", (DIMMER OFF) "DIM:2", (DIMMER 1) "DIM:3", (DIMMER 2)
	DIMMER OFF	"DIM:1"	
	DIMMER 1	"DIM:2"	
	DIMMER 2	"DIM:3"	
DISPLAY	TOGGLE (work on same as RC)	"DIP:0"	"DIP:1" (Frequency), "DIP:2" (Reserved), "DIP:3" (RDS Station Name), "DIP:4" (RDS PS), "DIP:5" (RDS PTY), "DIP:6" (RDS CT), "DIP:7" (DAB DLS), "DIP:8" (DAB Ensemble Name), "DIP:9" (DAB PTY), "DIP:A" (DAB Ch. and Freq.), "DIP:B" (DAB Time and Date), "DIP:C" (DAB Bit Error), "DIP:D" (XM Default), "DIP:E" (XM Category), "DIP:F" (XM Sig. Sattus),

Command			Reply from Slave

Frequency	VALUE	"TFQ:0xxxxx" (xxxxx = freq.)	"TFQ:xxxxx"
			(xxxxx = Frequency)
			if (xxxxx < 00512) band = XM;
			else if (xxxxx < 02000) band=AM;
			else band=FM;
			(ex."08750" = FM87.50MHz)

	UP (work on same as RC)	"TFQ:1"	
	DOWN (work on same as RC)	"TFQ:2"	
	Auto-UP	"TFQ:3"	
	Auto-DOWN	"TFQ:4"	
Preset	VALUE	"TPR:0www"	"TPR:www" (www = current preset nr.) (www = 000 is no preset mode) (www = 001 ~ 200) 001 = A1, 009 = A9, 010= A10 011=B1,...100 =J10 101=K1,...200=T10(for XM)
	UP (work on same as RC)	"TPR:1"	
	DOWN (work on same as RC)	"TPR:2"	
Tuner mode	TOGGLE (work on same as RC)	"TMD:0"	"TMD:0"(-), "TMD:1" (MONO), "TMD:2" (AUTO)
	OFF(MONO)	"TMD:1"	
	ON(AUTO)	"TMD:2"	

Command			Reply from Slave
Numeric Key [1]	(work on same as RC)	"NUM:1"	ACK
Numeric Key [2]	(work on same as RC)	"NUM:2"	ACK
Numeric Key [3]	(work on same as RC)	"NUM:3"	ACK
Numeric Key [4]	(work on same as RC)	"NUM:4"	ACK
Numeric Key [5]	(work on same as RC)	"NUM:5"	ACK
Numeric Key [6]	(work on same as RC)	"NUM:6"	ACK
Numeric Key [7]	(work on same as RC)	"NUM:7"	ACK
Numeric Key [8]	(work on same as RC)	"NUM:8"	ACK
Numeric Key [9]	(work on same as RC)	"NUM:9"	ACK
Numeric Key [10]	(work on same as RC)	"MUN:A"	ACK

Command			Reply from Slave
Memory Group	GROUP DOWN	"MGP:1"	"MGP:0", (None) "MGP:A", "MGP:B", "MGP:C", "MGP:D", "MGP:E", "MGP:F", "MGP:G", "MGP:H", "MGP:I", "MGP:J", "MGP:K", "MGP:L", "MGP:M", "MGP:N", "MGP:O", "MGP:P", "MGP:Q", "MGP:R", "MGP:S", "MGP:T"
	GROUP UP	"MGP:2"	
	GROUP A	"MGP:A"	
	GROUP B	"MGP:B"	
	GROUP C	"MGP:C"	
	GROUP D	"MGP:D"	
	GROUP E	"MGP:E"	
	GROUP F	"MGP:F"	
	GROUP G	"MGP:G"	
	GROUP H	"MGP:E"	
	GROUP I	"MGP:I"	
	GROUP J	"MGP:J"	
	GROUP K	"MGP:K" (for XM Grp A)	
	GROUP L	"MGP:L" (for XM Grp B)	
	GROUP M	"MGP:M" (for XM Grp C)	
	GROUP N	"MGP:N" (for XM Grp D)	
	GROUP O	"MGP:O" (for XM Grp E)	
	GROUP P	"MGP:P" (for XM Grp F)	
	GROUP Q	"MGP:Q" (for XM Grp G)	
	GROUP R	"MGP:R" (for XM Grp H)	
	GROUP S	"MGP:S" (for XM Grp I)	
	GROUP T	"MGP:T" (for XM Grp J)	

Command			Reply from Slave
TIMER	TOGGLE	"TIM:0x" (x=prg.1,2 or 3)	"TIM:abc" (prg1=a, 2=b, 3=c) see status answer
	OFF	"TIM:1x" (x=prg.1,2 or 3)	
	ON	"TIM:2x" (x=prg.1,2 or 3)	
Tuner No. Display	Tuner Display 1	"TNO:1"	"TNO:1" (TUNER1), "TNO:2",(TUNER2) "TNO:3"(TUNER3)
	Tuner Display 2	"TNO:2"	
	Tuner Display 3	"TNO:3"	

Command			Reply from Slave
XM Category Search	VALUE	"CAT:0xx"	"CAT:yxx" y = 1(un search), 2(in search) xx = Category no, 01~32(00=None)
	CH. UP	"CAT:1"	
	CH. DOWN	"CAT:2"	
	CAT. NEXT	"CAT:3"	
	CAT. PREV.	"CAT:4"	

Specific Commands

Command from Host		Reply from Slave
Auto status feedback (The product default is disabled all auto status feedback.)	"AST:x" (x = '0' ~ 'F') bit 3 : Layer 4 (1 = Enable, 0 = Disable) bit 2 : Layer 3 (1 = Enable, 0 = Disable) bit 1 : Layer 2 (1 = Enable, 0 = Disable) bit 0 : Layer 1 (1 = Enable, 0 = Disable)	same as command define (Default ivalue = 0)

4-2. Status request and Status answer list

4-2-1. Normal Status request and Status (answer and feedback) list

Status request		Status answer and feedback	
POWER	"PWR:?"	OFF	"PWR:1"
		ON	"PWR:2"
BAND	"BND:?"	BAND 1 (FM)	"BND:1"
		BAND 2 (AM)	"BND:2"
		BAND 3 (DAB)	"BND:3"
		BAND 4 (XM)	"BND:4"
SLEEP	"SLP:?"	"SLP:xxx" (xxx = 000 = OFF) (xxx = 001~ 120min)	same as command reply (see Command list)
DIMMER	"DIM:?"	DIMMER OFF	"DIM:1"
		DIMMER LEVEL 1	"DIM:2"
		DIMMER LEVEL 2	"DIM:3"
DISPLAY	"DIP:?"	MODE 1 (Frequency)	"DIP:1", "DIP:2", "DIP:3", "DIP:4", "DIP:5", "DIP:6", "DIP:7", "DIP:8", "DIP:9", "DIP:A", "DIP:B", "DIP:C", "DIP:D", "DIP:E", "DIP:F"
		MODE 2 (Reserved)	
		MODE 3 (Reserved)	
		MODE 4 (RDS PS)	
		MODE 5 (RDS PTY)	
		MODE 6 (RDS CT)	
		MODE 7 (DAB DLS)	
		MODE 8 (DAB Ensemble Name)	
		MODE 9 (DAB PTY)	
		MODE 10 (DAB Ch. and Freq.)	
		MODE 11 (DAB Time and Date)	
		MODE 12 (DAB Bit Error)	
		MODE 13 (XM Default)	
		MODE 14 (XM Category)	
		MODE 15 (XM Signal Status)	

Status request		Status answer and feedback	
Tuner Frequency	"TFQ:?"	"TFQ:xxxxx"	same as command reply (see Command list)
Tuner Preset	"TPR:?"	"TPR:www"	same as command reply (see Command list)
Tuner mode	"TMD:?"	OFF (MONO)	"TMD:1"
		AUTO	"TMD:2"
TUNED Status	"TUD:?"	Not TUNED	"TUD:1"
		TUNED	"TUD:2"

Status request		Status answer and feedback	
TIMER	"TIM:?"	TIMER OFF=1, TIMER ON=2 (prg.1=a, prg.2=b, prg. 3=c)	"TIM:abc" (abc : OFF=1, ON=2)
Tuner Number Display	"TNO:?"	(Do not indicate on FL display)	"TNO:1" (Tuner 1)
			"TNO:2" (Tuner 2)
			"TNO:3" (Tuner 3)

Status request		Status answer and feedback	
Memory Group	"MGP:?"	Group none	"MGP:0"
		Group A	"MGP:A"
		Group B	"MGP:B"
		Group C	"MGP:C"
		Group D	"MGP:D"
		Group E	"MGP:E"
		Group F	"MGP:F"
		Group G	"MGP:G"
		Group H	"MGP:H"
		Group I	"MGP:I"
		Group J	"MGP:J"
		Group K (for XM Grp A)	"MGP:K"
		Group L (for XM Grp B)	"MGP:L"
		Group M (for XM Grp C)	"MGP:M"
		Group N (for XM Grp D)	"MGP:N"
		Group O (for XM Grp E)	"MGP:O"
		Group P (for XM Grp F)	"MGP:P"
		Group Q (for XM Grp G)	"MGP:Q"
		Group R (for XM Grp H)	"MGP:R"
		Group S (for XM Grp I)	"MGP:S"
		Group T (for XM Grp J)	"MGP:T"

Status request		Status answer and feedback	
XM Category Search	"CAT:?"	Un Category Search	"CAT:1xx" xx = Category no, 01~32(00=None)
		In Category Search	"CAT:2xx" xx = Category no, 01~32(00=None)

Status request		Status answer and feedback	
XM Channel Name	"CHN:?"	Channel name 8 char.	"CHN:xxxxxxxx" xxxxxxxx = name 8bytes
XM Artist Name	"ARN:?"	Artist name 16 char.	"ARN:xxxx..." xxxx... = name 16bytes
XM Song Title(Name)	"SON:?"	Song name 16 char.	"SON:xxxx..." xxxx... = name 16bytes
XM Signal Status	"SST:?"	(No XM Selected)	"SST:0"
		NO	"SST:1"
		WEAK	"SST:2"
		MARGINAL	"SST3"
		STRONG	"SST4"

4-2-2. Special Status request and Status answer list

Status request		Status answer and feedback
Auto status feedback	"AST:?"	see command list
Read Host I/F Software Version	"RSV:?"	"RSV:xx" (xx = '0'~'9', 'A'~'Z' or 'a'~'z') Set Default Value = 01

4-2-3. Layer of the statuses

Status		Layer
POWER	“PWR:”	1
BAND	“BND:”	1
SLEEP	“SLP:”	2
DIMMER	“DIM:”	2
DISPLAY	“DIP:”	1
Frequency	“TFQ:”	3
PRESET	“TPR:”	2
TUNER MODE	“TMD:”	2
TUNED Status	“TUD:”	2
TIMER	“TIM:”	2
Memory Group	“MGP:”	2
Tuner No. Display	“TNO:”	1

Status		Layer
Numeric Keys	“NUM:”	0 (wite only)

Status		Layer
XM Catecory Search	“CAT:”	1

Status		Layer
XM Channel Name	“CHN:”	2 (read only)
XM Artist Name	“ARN:”	4 (read only)
XM Song Title	“SON:”	4 (read only)
XM Signal Status	“SST:”	4 (read only)

Status		Layer
Auto status feedback	“AST:”	1
Read Host I/F Software version	“RSV:”	1

5. Revision history

Rev.	Date	Owner	Change description
1.0	08/04/06	Marantz America, Inc.	Issued Revision1.0
1.01	08/10/06	Marantz America, Inc.	Detail protocols are added