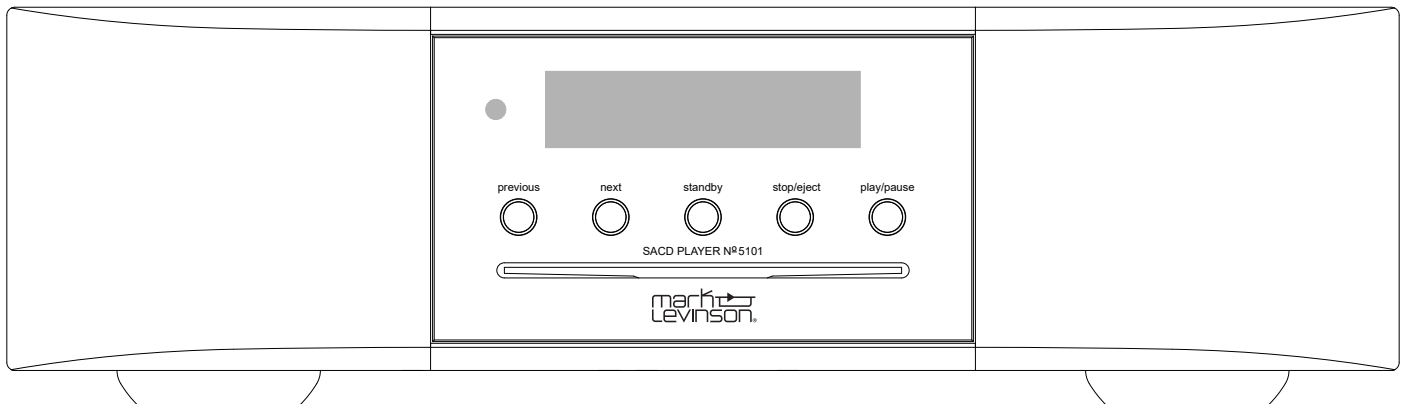




Custom Installation Notes: Programming Interface and IR Remote Commands for No5101



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Changelog

Issue A.0: Initial release

Controlling the No5101 via RS232/NET

Introduction

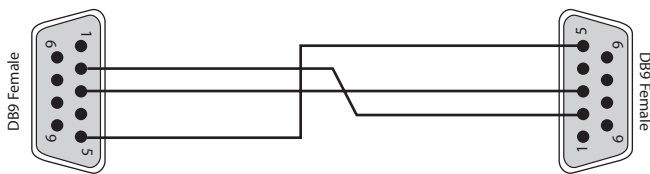
This document describes the remote control protocol for controlling the No5101 via the RS232/NET interface. The No5101 implements virtual IR commands in order to simplify the protocol. Any operation that can be invoked using the IR remote control can be achieved over RS232 using the Simulate RC5 IR command (0x08). See page 05 for details of this command. The RC5 IR code set is listed from page 9

IP control is via port 50000 of the IP address of the unit (in the Network Settings menu).

Conventions

- All hexadecimal numbers begin 0x.
- Any character in single quotes gives the ASCII equivalent of a hex value.
- <n> represents an unknown or variable number.

Serial Cable Specification



The cable is wired as a “straight through” cable:

Connector 1 pin	Connector 2 pin	Function
2	2	Rx
3	3	Tx
5	5	RS232 Ground

Data transfer format

- Transfer rate: 38,400bps.
- 1 start bit, 8 data bits, 1 stop bit, no parity, no flow control.

Command and response formats

Communication between the remote controller (RC) and the No5101 takes the form of sequences of bytes, with all commands and responses having the same basic format. The No5101 shall always respond to a received command, but may also send messages at other times.

Each transmission by the RC is the following format:

<St> <Zn> <Cc> <DI> <Data> <Et>

- St (Start transmission): 0x21 '!'
- Zn (0x01): see below.
- Cc (Command code): the code for the command
- DI (Data length): the number of data items following this item, excluding the ETR
- Data: the parameters for the command
- Et (End transmission): 0x0D

Each response by the No5101 is the following format::

<St> <Zn> <Cc> <Ac> <DI> <Data> <Et>

- St (Start transmission): 0x21 '!'
- Zn (0x01): see below.
- Cc (Command code): the code for the command
- Ac (Answer code): see below.
- DI (Data Length): the number of data items following this item, excluding the ETR
- Data: the parameters for the response of length n. n is limited to 255.
- Et (End transmission): 0x0D

The No5101 responds to each command from the RC within three seconds. The RC may send further commands before a previous command response has been received.

Zones

The following Zones are defined:

- 0x01 – Zone 1.

Answer codes

The following answer codes are defined:

- 0x00 – Status update.
- 0x82 – Zone Invalid.
- 0x83 – Command not recognised.
- 0x84 – Parameter not recognised.
- 0x85 – Command invalid at this time.
- 0x86 – Invalid data length.

State changes as a result of other inputs

It is possible that the state of the No5101 may be changed as a result of user input via the front panel buttons or via the IR remote control. Any change resulting from these inputs is relayed to the RC using the appropriate message type.

For example, if the user advanced to the next chapter using the ► button on the front panel, a Title/Chapter status message (defined below) would be sent to the RC. A similar action would be taken for all other state changes (including elapsed time).

Reserved Commands

Commands 0xF0 to 0xFF (inclusive) are reserved for test functions and should never be used.

Example command and response sequence

As an example, the command to simulate the RC5 command "20-53", PLAY:

STR	ZONE	CC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x02	0x14	0x35	0x0D

Assuming that the command was accepted by the player and is being processed, the No5101 responds to this command with the following sequence:

STR	ZONE	CC	AC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x00	0x02	0x14	0x35	0x0D

AMX Duet™ Support

The No5101 shall be fully compatible with AMX Duet™ Dynamic Device Discovery Protocol (DDDP) The following description of Dynamic Device Discovery comes from the AMX website (www.amx.com). Dynamic Device Discovery is part of AMX's Duet™ platform, which combines the proven reliability and power of NetLinx with the extensive capabilities of the Java 2 Micro Edition (J2ME) platform. When integrating a serial or IP device from a manufacturer embedding the Dynamic Device Discovery Protocol (DDDP), Duet recognizes the device and loads the appropriate Duet module, which automatically installs the new device. AMX's NetLinx Master can then find and install the Duet device module either from a library on the master, from AMX's Web site, or from the manufacturer's Web site. Duet also allows for device swapping so that programming changes are not required when devices with DDDP are removed or replaced – a huge benefit for end users. The Duet platform is an extension AMX's InConcert® manufacturer partner program, which was developed to ensure seamless communication between partners' devices and the AMX control system.

Data is specified in the ASCII format. All ASCII characters between the quotes "" should be recognised/transmitted. "\r" is a carriage return (0x0D)

Command: "AMX\r"

No5101 Response: "AMXB<Device-SDKClass=CD Player><Device-Make=Mark Levinson><Device-Model=No5101 ><Device-Revision=x.y.z>\r"

Where

x.y.z = RS232 protocol version number.

System Command Specifications

Power (0x00)

Request the stand-by state of *

Example

Command/response sequence to request the power state of zone 1 where zone 1 has power on:

Command: 0x21 0x01 0x00 0x01 0xF0 0x0D

Response: 0x21 0x01 0x00 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x00
DI	0x01
Data	0xF0 – Request power state
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x00
Ac	Answer code
DI	0x01
Data	0x00 – Zone is in stand-by 0x01 – Zone is powered on
Et	0x0D

Display Brightness (0x01)

Request the brightness of the front panel display.

Example

Command/response sequence for requesting the brightness of the display where the display is off:

Command: 0x21 0x01 0x01 0x01 0xF0 0x0D

Response: 0x21 0x01 0x01 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x01
DI	0x01
Data	0xF0 – Request brightness
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x01
Ac	Answer code
DI	0x01
Data	0x00 – Front panel is off 0x01 – Front panel L1 0x02 – Front panel L2
Et	0x0D

Simulate RC5 IR Command (0x08)

Simulate an RC5 command via the RS232 port. An additional status message will be sent in most cases as a result of the IR command.

Example

Command/response sequence to RC5 20-123 (Discrete power on):

Command: 0x21 0x01 0x08 0x02 0x14 0x7B 0x0D

Response: 0x21 0x01 0x08 0x00 0x02 0x14 0x7B 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x08
DI	0x02
Data1	RC5 System code
Data2	RC5 Command code
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x08
Ac	Answer code
DI	0x02
Data1	RC5 System code
Data2	RC5 Command code
Et	0x0D

Software version (0x04)

Request the version number of the various pieces of software on the No5101.

Example

Command/response sequence to request the RS232 protocol version (1.0):

Command: 0x21 0x01 0x04 0x01 0xF0 0x0D

Response: 0x21 0x01 0x04 0x00 0x03 0xF0 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x04
DI	0x01
Data	0xF0 – Request version RS232 Protocol 0xF1 – Request version main software 0xF5 – Request version microcontroller
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x04
Ac	Answer code
DI	0x03
Data1	Echo data from command
Data2	Major version number
Data3	Minor version number
Et	0x0D

Heartbeat (0x25)

Heartbeat command to check unit is still connected and communication - also resets the EuP standby timer.

Example

Command/response to sending a heartbeat command:

Command: 0x21 0x01 0x25 0x01 0xF0 0x0D

Response: 0x21 0x01 0x25 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x25
DI	0x01
Data	0xF0 - Heartbeat
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x25
Ac	Answer code
DI	0x01
Data1	0x00 - response
Et	0x0D

Playback elapsed time (0x28)

Requests the current playback time, track time (CD, MP3, etc)

Example

Command/response sequence to request the current playback time where the playback time is 0h03m24s:

Command: 0x21 0x01 0x28 0x01 0xF0 0x0D

Response: 0x21 0x01 0x28 0x00 0x03 0x00 0x03 0x18 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x28
DI	0x01
Data	0xF0 – Request elapsed time
Et	0x0D
RESPONSE:	
St	0x21
Zn	0x01
Cc	0x28
Ac	Answer Code
DI	0x03
Data1	Hours
Data2	Minutes
Data3	Seconds
Et	0x0D

Playback state/mode (0x29)

Request unit playback state and mode

Example

Command/response sequence to request the playback state, where the playback state is tray closed, playing in repeat all random mode:

Command: 0x21 0x01 0x29 0x01 0xF0 0x0D
Response: 0x21 0x01 0x29 0x00 0x04 0x01 0x01 0x00
0x21 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x29
DI	0x01
Data	0xF0 – Request playback state
Et	0x0D
RESPONSE:	
St	0x21
Zn	0x01
Cc	0x29
Ac	Answer Code
DI	0x04
Data1	Tray Status: 0x00 – Tray open 0x01 – Tray closed
Data2	Playback state: 0x00 – Stopped 0x01 – Playing 0x02 – Paused 0x03 – Resume-stop 0x04 – Scanning 0x05 - Coaxial SPDIF 0x06 - Optical SPDIF 0x0A – other state
Data3	Scanning/Slow play direction: 0x81 – Back 0x01 – Forward
Data4	Playback mode: 0x10 – Repeat one 0x20 – Repeat all 0x01 – Random 0x02 - Shuffle
Et	0x0D

Source Type(0x2C)

Request the current source type

Example

Command/response sequence to request the source type where the source is a CD

Command: 0x21 0x01 0x2C 0x01 0xF0 0x0D
Response: 0x21 0x01 0x2C 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x2C
DI	0x01
Data	0xF0 – Request source type
Et	0x0D
RESPONSE:	
St	0x21
Zn	0x01
Cc	0x2C
Ac	Answer Code
DI	0x01
Data	0x02 – CD 0x03 – Data disc 0x04 – USB media 0x05 - Network media 0x06 - Coaxial SPDIF 0x07 - Optical SPDIF 0x08 - SACD 0x20 – No Media
Et	0x0D

Track number(0x2D)

Request track number

Example

Command/response sequence to request the track number when track number is 3

Command: 0x21 0x01 0x2D 0x01 0xF0 0x0D

Response: 0x21 0x01 0x2D 0x00 0x03 0x03 0x00 0x00 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x2D
DI	0x01
Data	0xF0 – Request track number
Et	0x0D
RESPONSE:	
St	0x21
Zn	0x01
Cc	0x2D
Ac	Answer Code
DI	0x03
Data 1	Track number
Data 2	0x00
Data 2	0x00
Et	0x0D

Request incoming audio sample rate (0x44)

Request the incoming audio sample rate.

Example

Command/response sequence to request the incoming audio sample rate, where the rate is 48kHz:

Command: 0x21 0x01 0x44 0x01 0xF0 0x0D

Response: 0x21 0x01 0x44 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x44
DI	0x01
Data	0xF0 – Request incoming audio sample rate
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x44
Ac	Answer code
DI	0x01
Data1	Incoming audio sample rate: 0x00 – 32 KHz 0x01 – 44.1 KHz 0x02 – 48 KHz 0x03 – 88.2 KHz 0x04 – 96 KHz 0x05 – 176.4 KHz 0x06 – 192 KHz 0x07 – Unknown 0x08 – Undetected
Et	0x0D

RC5 command codes

Basic Functions

These codes are recognised as infra-red signals received by the front panel, RC5 electrical signals received by the remote in jacks and as control data using the 'Simulate RC5 IR Command' (0x08).

Function	RC5 code [system-command]	RC5 code [Data1 - Data2]
	Decimal	Hexadecimal
Standby	20-12	0x14 - 0x0C
EJECT	20-45	0x14 - 0x2D
COAX input	20-100	0x14 - 0x64
USB input	20-92	0x14 - 0x5C
DISC input	20-90	0x14 - 0x5A
Optical input	20-101	0x14 - 0x65
Nav UP	20-86	0x14 - 0x56
Nav LEFT	20-81	0x14 - 0x51
ENTER	20-87	0x14 - 0x57
Nav RIGHT	20-80	0x14 - 0x50
Nav DOWN	20-85	0x14 - 0x55
MODE	20-77	0x14 - 0x4D
HOME	20-67	0x14 - 0x43
<	20-33	0x14 - 0x21
Play/Pause	20-36	0x14 - 0x24
>	20-32	0x14 - 0x20
<<	20-50	0x14 - 0x32
Stop	20-54	0x14 - 0x36
>>	20-52	0x14 - 0x34
1	20-1	0x14 - 0x01
2	20-2	0x14 - 0x02
3	20-3	0x14 - 0x03
4	20-4	0x14 - 0x04
5	20-5	0x14 - 0x05
6	20-6	0x14 - 0x06
7	20-7	0x14 - 0x07
8	20-8	0x14 - 0x08
9	20-9	0x14 - 0x09
DISP	20-18	0x14 - 0x12
0	20-0	0x14 - 0x00
INFO	20-66	0x14 - 0x42

Advanced Functions

These RC5 codes are not present on the supplied remote control but have been created for custom install use. In order for the No5101 to respond to these codes they must be transmitted from a programmable IR remote control or over the control link using the 'Simulate RC5 IR Command' (0x08).

Function	RC5 Code [system-command]	RC5 Code [Data1 - Data2]
	Decimal	Hexadecimal
RPT1/RPT ALL	20-29	0x14 - 0x1D
Play	20-53	0x14 - 0x35
Pause	20-48	0x14 - 0x30
Shuffle/Random	20-64	0x14 - 0x40
Status	20-75	0x14 - 0x4B
Power ON	20-123	0x14 - 0x7B
Power OFF	20-124	0x14 - 0x7C



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