MARK LEVINSON No53 Serial Protocol User Guide

Contents

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Product Information

Specifications

- **Serial Protocol:** No53 No532 Serial Protocol
- **Trademark:** Mark Levinson
- **Manufacturer:** Harman International Industries, Incorporated
- **Part Number:** 070-18998| Rev 1 |10/08

Product Usage Instructions

General Description

The No5 Series Amplifiers Serial Communications Protocol is designed for communication between the Mark Levinson amplifier product and the HOST device. It allows for control and interaction with the amplifier through serial communication packets.

Ethernet Port & Cable Configuration

The amplifier can be connected to the HOST device using Ethernet cables. The physical connection involves connecting one end of the Ethernet cable to the Ethernet port of the amplifier and the other end to the Ethernet port of the HOST device.

Physical Connection using Ethernet Cables

1. Connect one end of the Ethernet cable to the Ethernet port of the amplifier.
2. Connect the other end of the Ethernet cable to the Ethernet port of the HOST device.

Message Formats and Examples

The communication between the amplifier and the HOST device is done using message formats. The message fields have specific formats for incoming messages, outgoing messages, requests, responses, and notifications. Examples of these message formats are provided below.

Format of the Message Fields
The message fields in the communication protocol have specific formats. These formats are used to define the structure of the messages exchanged between the amplifier and the HOST device.

Incoming Messages
Incoming messages are messages received by the amplifier from the HOST device. These messages contain commands, parameters, or other instructions that the amplifier needs to process.

Outgoing Messages
Outgoing messages are messages sent by the amplifier to the HOST device. These messages include responses, notifications, or other information requested by the HOST device.

- **Example Request – RQST**

  An example of a request message format is provided below:

  RQST:CMD=PARAM,PARAM_VALUE
- **Example Response – RSP**

  An example of a response message format is provided below:

  RSP:ACK=PARAM,PARAM_VALUE
- **Example Notification – NTF**

  An example of a notification message format is provided below:

  NTF:AV=PARAM,PARAM_VALUE

RQST Error Responses and Examples
When an error occurs in processing a request message, the amplifier sends an error response back to the HOST device. These error responses provide information about the error that occurred.

External Protocol Commands
The No5 Series Amplifiers Serial Communications Protocol supports various external protocol commands that can be used to control and interact with the amplifier. Some of these commands are:

- **FAULT**

  The FAULT command is used to check the fault status of the amplifier.
- **NOP**

  The NOP command is a no-operation command used for testing purposes.
- **HWSTATUS**

  The HWSTATUS command is used to retrieve the hardware status of the amplifier.
- **PWR**

  The PWR command is used to control the power state of the amplifier.
- **TEMP**

  The TEMP command is used to retrieve the temperature status of the amplifier.

Critical Fault Notifications
Critical fault notifications are sent by the amplifier to the HOST device when critical faults occur. These notifications provide information about the fault that occurred.

Notification Factory Defaults
The amplifier supports notification factory defaults, which allow the user to restore the default settings for notifications.

FAQ

- **Q: What documents should be used with this document?**

  A: The following documents should also be used with this document to understand how this protocol can be used with the No5 Series Amplifiers:
  - 070-18285 No53 Reference Monaural Power Amplifier Owner's Manual
  - 070-18979 No532 Dual Monaural Power Amplifier Owner's Manual
- **Q: Are there any changes in this document?**

  A: No changes have been made to this document.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution! Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Canada
This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada.

Documents
The following documents should also be used with this document to understand how this protocol can be used with the No5 Series Amplifiers.

- 070-18285 No53 Reference Monaural Power Amplifier Owner's Manual
- 070-18979 No532 Dual Monaural Power Amplifier Owner's Manual

Change List
No changes have been made.

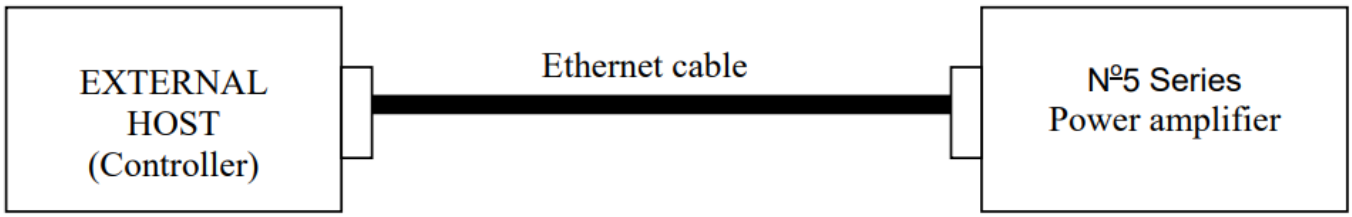
Definitions, Acronyms, and Abbreviations

- **\r** represents the ASCII new line control character (0x0D)
- **:** External Protocol String Field Separator

- **,** External Protocol String Field Parameter Separator for multiple parameters
- **ACK** Acknowledge
- **AV** Audio Video System generated response
- **CMD** Command
- **CS** Control Source
- **EOP** End of Packet
- **HOST** The device initiating or receiving the serial communication packets to/from the amplifier.
- **ML** Mark Levinson
- **No5xx** The Mark Levinson amplifier product receiving or transmits the serial communication packets to/from the HOST.
- **NAK/NACK** No Acknowledge
- **NTF** Notification
- **PARAM** Parameter
- **RM** Resource Manager
- **RQST** Request
- **RSP** Response
- **SOP** Start of Packet
- **SPLUT** Serial Protocol Lookup Table
- **SPG** Serial Protocol Guidelines
- **UI** User Interaction
- **User Parameter** A user-changeable variable that stores a specific value that describes an operating condition for the amplifier.

General Description

An external host controller can use the external protocol to control and monitor the operation of the No5 Series Power Amplifiers. The protocol consists of simple ASCII character set-based commands, which are passed to the amplifier as command packets via the Ethernet port. The amplifier will reply to command packets with an acknowledgment to signify that the command has been recognized and acted upon.



Ethernet Port & Cable Configuration

The No5 series power amplifiers are capable of obtaining a dynamically allocated IP address when connected to a DHCP server and the Network User Options are configured to use the DHCP server (default behavior). The DHCP setting can be modified via the internal Web page of the amplifier. Refer to the amplifier's user manual for further instructions. The amplifier setup for Ethernet Control is defaulted to Auto-Negotiate and recommends the end point to also be configured for Auto-Negotiation. However, the amplifiers are capable of:

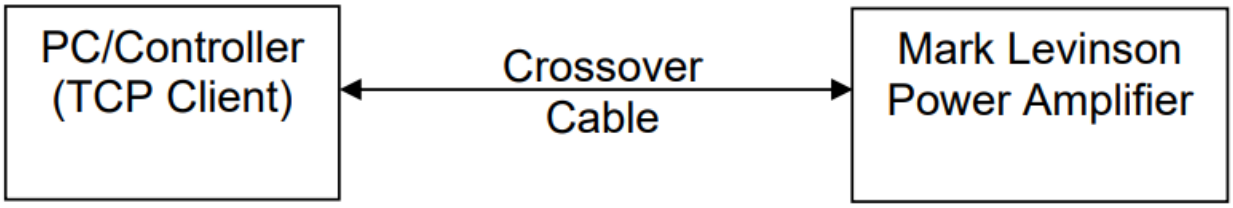
- 10/100 BaseT
- Half/Full-duplex
- flow control

- Pause control

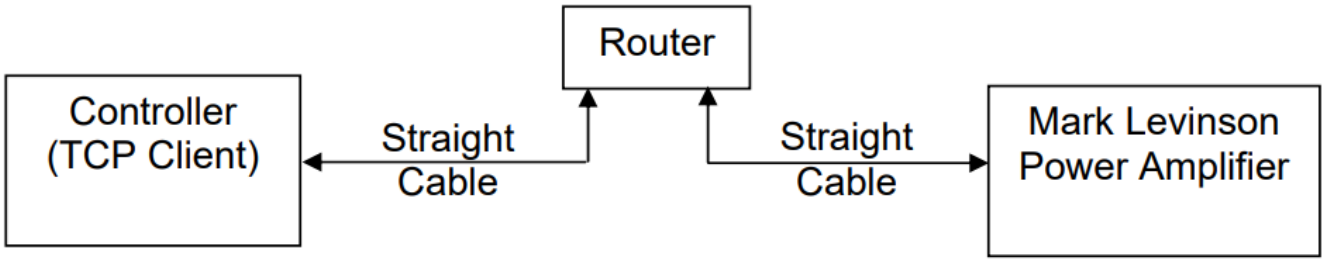
Note: These parameters are NOT user-adjustable.

Physical Connection using Ethernet Cables

- If using a Direct-to-Ethernet capable Component, use a Crossover Ethernet Cable.



- If using a router or switch, use a straight-through Ethernet Cable.



Message Formats and Examples

The external protocol consists of a structured format string with specific fields used to indicate:

- Message type
- Source of the command
- Command
- Status/Parameter

Messages can be transmitted to (incoming) and received from (outgoing) the amplifier to facilitate system control via the Ethernet connection.

Format of the Message Fields
All incoming and outgoing messages must use the following format:

- **HDR:SRC:CMD: PARAM\r**

where:

HDR The Header field specifies the type of message:
RQST – incoming request
RSP – outgoing response
NTF – outgoing notification.

SRC The Source field specifies the source of the message:
CS – message from a Control Source
UI – message from a User Interaction
AV – used by notifications to indicate and event was caused by the component without user interaction.

CMD The Command field specifies the command selected from the External Protocol Commands table to invoke the desired functionality.

PARAM The Parameter field specifies the selected parameter from the External Protocol Commands table to achieve the desired effect.

Fields are separated by a colon ":" and messages are terminated with a '\r' control character (0x0d).

- All fields, commands and associated parameters are case-sensitive and must be entered as listed in the External Protocol Commands table. Do not insert spaces in message sequences, unless they are indicated in the table.
- Maximum message size is 60 characters, including the line ending ASCII control character '\r' (0x0D).
- When an incoming or outgoing message uses more than one parameter, the individual parameters must be separated by commas.

- **HDR:SRC:CMD:PARAM1,PARAM2,PARAM3,…\r**

  When an incoming command requires multiple parameters per request (RQST), ALL parameters for the given command must be entered AND in the order presented in the External Protocol Commands table, as the descriptors are not utilized in the parameter field of the command/response string. The response message also follows these guidelines.

Incoming Messages
The Header Field (1st field) of every external protocol string indicates the type of message contained within the transmitted string. All incoming messages to the amplifier contain the string "RQST" in the header field. Any other string in the header field indicates an outgoing message. The control source that issued the Request (RQST) expects a reply within 500ms after receipt of the string to indicate that the message was received. This response can be an acknowledgement (ACK), the requested action if a data parameter was requested, or a WAIT to indicate the system has received the command but needs additional time to process the request.
NOTE: When an incoming request is received, the system acknowledges receipt of the string within 500ms of receiving the incoming message.

Outgoing Messages
Outgoing Messages are generated to acknowledge an incoming request, to provide requested information, or to inform of a system action occurring. As with an incoming message, the Header field is used to indicate the type of message contained within the string. Outgoing messages will be a response (RSP) to a request or a system-generated notification (NTF) message.

- **RSP – Response to Command Request**

  An outgoing RSP will be generated as a result of an incoming RQST. In most cases the response is an acknowledgement (ACK) unless the request is a query "?". In the case of a query, the RSP contains the

requested parameter, rather than an ACK.

- **NTF – Notification of System Action**
  An NTF is generated as the result of a system action occurring. When commands are issued to the system, they are placed in a queue in the order they are received. When the command is acted upon and the requested action has completed or occurred, a notification is generated within the system. If enabled, the notifications are sent if a user manually manipulates the front panel buttons or controls, presses IR keys on the remote control, issues an RQST via External Protocol to instruct the system to perform an action, or if a system fault is detected.

When an NTF event occurs, the source field indicates the source of the event:

- **UI** (user interaction)
- **AV** (component generated) fault

It's important to note that Notifications are only sent to the Controller if they are enabled. See the Notification Factory Defaults section of this document for the factory default settings. See the External Protocol Commands section in this document for more information.
Also, as commands are issued to change the state of a notification event (enable it or disable it), the external protocol notification database is updated to store this new state information, so that user configured notification states are automatically restored when the amplifier is power cycled. However, the user-configured states are reset to Factory Defaults at any time that the factory default settings are restored.

Example Request – RQST

- RQST:CS:PWR: ON\r – incoming Request (RQST) from a Control Source (CS) commanding Power (PWR) ON.
- RQST:CS:PWR:?\r – incoming Request (RQST) from a Control Source (CS) querying the Power (PWR) state.
- RQST:CS:PWR: NTF?\r – incoming Request (RQST) from a Control Source (CS) querying the Power (PWR) Notification state.

Example Response – RSP

- RSP:CS:PWR: ACK\r – outgoing Response (RSP) generated from a Control Source request, indicating the command (PWR) is valid and the parameter supplied during the request is within the expected range, acknowledging (ACK) the request is being processed.
- RSP:CS:PWR: ON\r – outgoing Response (RSP) generated from a Control Source query request, indicating the command (PWR) current state is (ON).
- RSP:CS:PWR: EN\r – outgoing Response (RSP) generated from a Control Source notification state query request, indicating the command (PWR) notification is enabled (EN).

Example Notification – NTF

- NTF:UI:PWR: ON\r – outgoing Notification generated from a User Interaction (UI), indicating the command power (PWR) has turned ON.
  NOTE: Notifications for a specific command must be enabled for system-generated messages.

RQST Error Responses and Examples

The External Protocol responds with the following message parameters when an unexpected Incoming Request string is detected. If these responses are received, please verify spelling, spacing and capitalization of all characters of the failing field.
The format of the response message string indicates where the error has been detected, as shown in the examples:

- INVALID_SRC – The entered Source is not valid and is not recognized by the system.
  Example: RSP: INVALID_SRC\r – received if sending RQST:Cs:PWR: ON\r
- INVALID_CMD – The entered Command is not valid and is not recognized by the system.
  Example: RSP:CS: INVALID_CMD\r – received if sending RQST:CS:PWr: ON\r
- INVALID_PRM – The entered Parameter is not a valid parameter for the given command, or is out of the acceptable range for the command.
  Example: RSP:CS:VOL:INVALID_PRM\r – received if sending RQST:CS:PWR:On\r
- INVALID_STR – The entered Request String is not formatted correctly and is not valid.
  Example: RSP:CS:INVALID_STR\r – received if sending QST:CS:PWR:ON\r, or RQST:CSPWR:ON\r
- NACK – The incoming request is Not Acknowledged, indicating the system is in Standby and the request is being ignored.
  Example: RSP:CS:PWR: NACK\r – received if sending RQST:CS:PWR: ON\r while the system is in Standby and the Link2 master is in Standby.
- WAIT/ERROR – If the system is unable to process a request (RQST) within 500mS, the external protocol automatically generates the WAIT response indicating the system needs additional time for processing. Up to 3 wait responses can occur before the system responds with ERROR, signifying it is unable to process the request. The typical response format is utilized, with the command field representing the name of the command that the system needs additional time to process.
  Example:
  - RSP:CS:PWR: WAIT\r
  - RSP:CS:PWR: WAIT\r
  - RSP:CS:PWR: WAIT\r
  - RSP:CS:PWR:ERROR\r

External Protocol Commands

The command examples under the field “Incoming Request” assumes the keywords RQST:CS: precedes the command parameter indicated in the table, i.e. RQST:CS:PWR:ON\r
The command examples under the field “Outgoing Response” must include the keyword RSP:CS: preceding the response indicated in the table, i.e. RSP:CS:PWR:ACK\r

DSPLY – This command only applicable to the No53 Amplifier

Command	Parameter	Function	Incoming Request	Outgoing Response	Comment
DSPLY	SETFB	Sets Display to Full Brightness	DSPLY: SETFB\r	DSPLY:ACK\r	
	SET2	Sets Display Brightness to Setting 2	DSPLY: SET2\r	DSPLY:ACK\r	
	SET1	Sets Display Brightness to Setting 1	DSPLY: SET1\r	DSPLY:ACK\r	
	OFF	Turns Display OFF	DSPLY: OFF\r	DSPLY:ACK\r	
	?	Request Current Display Setting	DSPLY:?\r	DSPLY:SETFB\r	Display set to Full Brightness
			DSPLY:?\r	DSPLY: SET2\r	Display Brightness at Set level 2
			DSPLY:?\r	DSPLY: SET1\r	Display Brightness at Set level 1
			DSPLY:?\r	DSPLY: OFF\r	Display is OFF
	EN	Enables Notification	DSPLY:EN\r	DSPLY:ACK\r	
	DIS	Disables Notification	DSPLY:DIS\r	DSPLY:ACK\r	
	NTF?	Query Notification State	DSPLY:NTF?\r	DSPLY:EN\r	Notification is Enabled
			DSPLY:NTF?\r	DSPLY:DIS\r	Notification is Disabled
				DSPLY:NACK\r	Command is ignored because the system is in Standby mode.

FAULT

Command	Parameter	Function	Incoming Request	Outgoing Response	Comment
FAULT	THERM	A critical system fault has occurred	Not Available		See the section “Critical Fault Notifications” in this doc for more details on this command notification
	PWR		Not Available		
	SIGNAL		Not Available		
	UNKNOWN		Not Available		

NOP

Command	Parameter	Function	Incoming Request	Outgoing Response	Comment
NOP	NOP	No operation is performed	NOP:NOP\r	NOP:ACK\r	Used for testing communication

HWSTATUS

Command	Parameter	Function	Incoming Request	Outgoing Response	Comment
HWSTATUS	NAME	Display the assigned host name.	HWSTATUS:NAME\r	Example: HWSTATUS:NO53_00005B\r	Response Only. Outgoing response column lists typical examples.
	MAC	Display the MAC address.	HWSTATUS:MAC\r	Example: HWSTATUS:AABBCCDDEEFF\r	
	IP	Display the Internet Protocol (IP) address.	HWSTATUS:IP\r	Example: HWSTATUS:192.168.10.10\r	
	STATICIP	Display the static IP address.	HWSTATUS:STATICIP\r	Example: HWSTATUS:192.168.50.3\r	
	MASK	Displays the IP address of the subnet mask.	HWSTATUS:MASK\r	Example: HWSTATUS:255.255.255.0\r	
	DHCP	DHCP Status	HWSTATUS:DHCP\r	HWSTATUS:ENABLE\r HWSTATUS:DISABLE\r	Response only.
	MLNETVER	Displays the ML Net version.	HWSTATUS:MLNETVER\r	Example: HWSTATUS:v0.1.0\r	For Customer Service use.

PWR

Command	Parameter	Function	Incoming Request	Outgoing Response	Comment
PWR	ON	Amp Powered ON from Standby	PWR:ON\r	PWR:ACK\r	
	STANDBY	Place Amp into Standby Mode	PWR:STANDBY\r	PWR:ACK\r	
	LP	Place Amp into Low Power Mode	PWR:LP\r	PWR:ACK\r	
	?	Request Current PWR State	PWR:?\r	PWR:ON\r	System Powered ON
			PWR:?\r	PWR:STANDBY\r	System in Standby
			PWR:?\r	PWR:LP\r	System in Low Power
	EN	Enables Notification	PWR:EN\r	PWR:ACK\r	
	DIS	Disables Notification	PWR:DIS\r	PWR:ACK\r	
	NTF?	Query Notification State	PWR:NTF?\r	PWR:EN\r	Notification is Enabled
			PWR:NTF?\r	PWR:DIS\r	Notification is Disabled

TEMP

Command	Parameter	Function	Incoming Request	Outgoing Response	Comment
TEMP	ALL	Requests all available temperatures in the box	TEMP:ALL\r	TEMP:ACK\r	
	BOX	Requests the overall ambient temperature inside the amplifier	TEMP:BOX\r	TEMP:ACK\r	

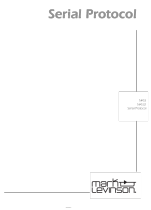
Critical Fault Notifications

System Error	Fault	Message
Over Temp (Internal)	Amplifier is operating at excessive temperature.	NTF:AV:FAULT:THERM\r
Power Fail Condition	Power failure due to over voltage, under voltage, or AC line power is outside of the line frequency limits.	NTF:AV:FAULT:PWR\r
Signal Fault	Indicates to Controller that the Component has had a General Signal Fault with ML Net or Link2 attached devices	NTF:AV:FAULT:SIGNAL\r
System Software	General signal fault due to excessive DC offset or excessive output current.	NTF:AV:FAULT:UNKNOWN\r

Notification Factory Defaults

Command	Factory Default Setting	Notes
DSPLY	**No**	
NOP	N/A	Notification not available for this command
NTF	N/A	Notification not available for this command
PWR	**YES**	

Documents / Resources

	MARK LEVINSON No53 Serial Protocol [pdf] User Guide No53 Serial Protocol, No53, Serial Protocol, Protocol

References

- Mark Levinson
- Manual-Hub.com - Free PDF manuals!
- User Manual