

 **LINN PRODUCT**

RS232 KNEKT INTERFACE

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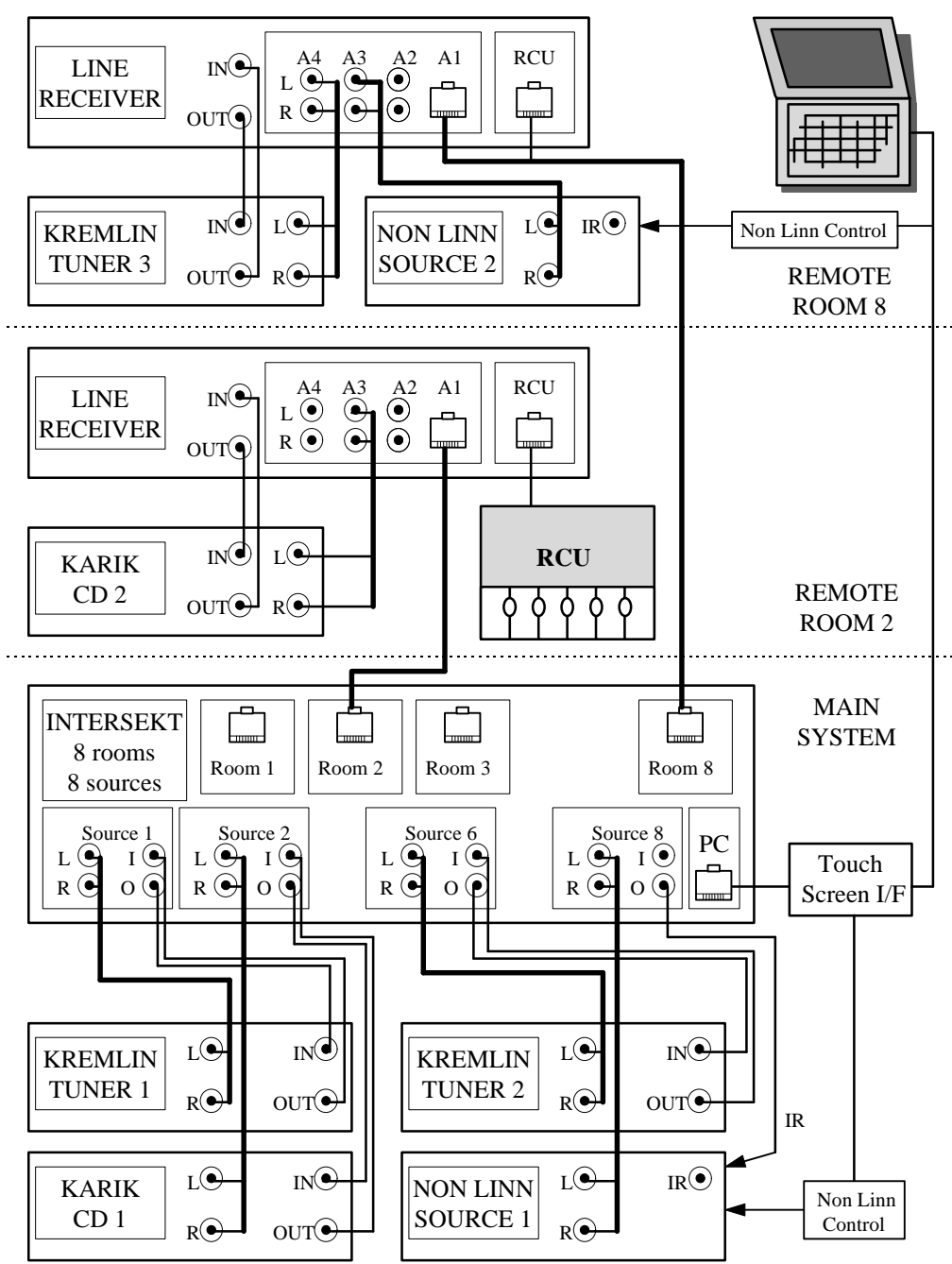
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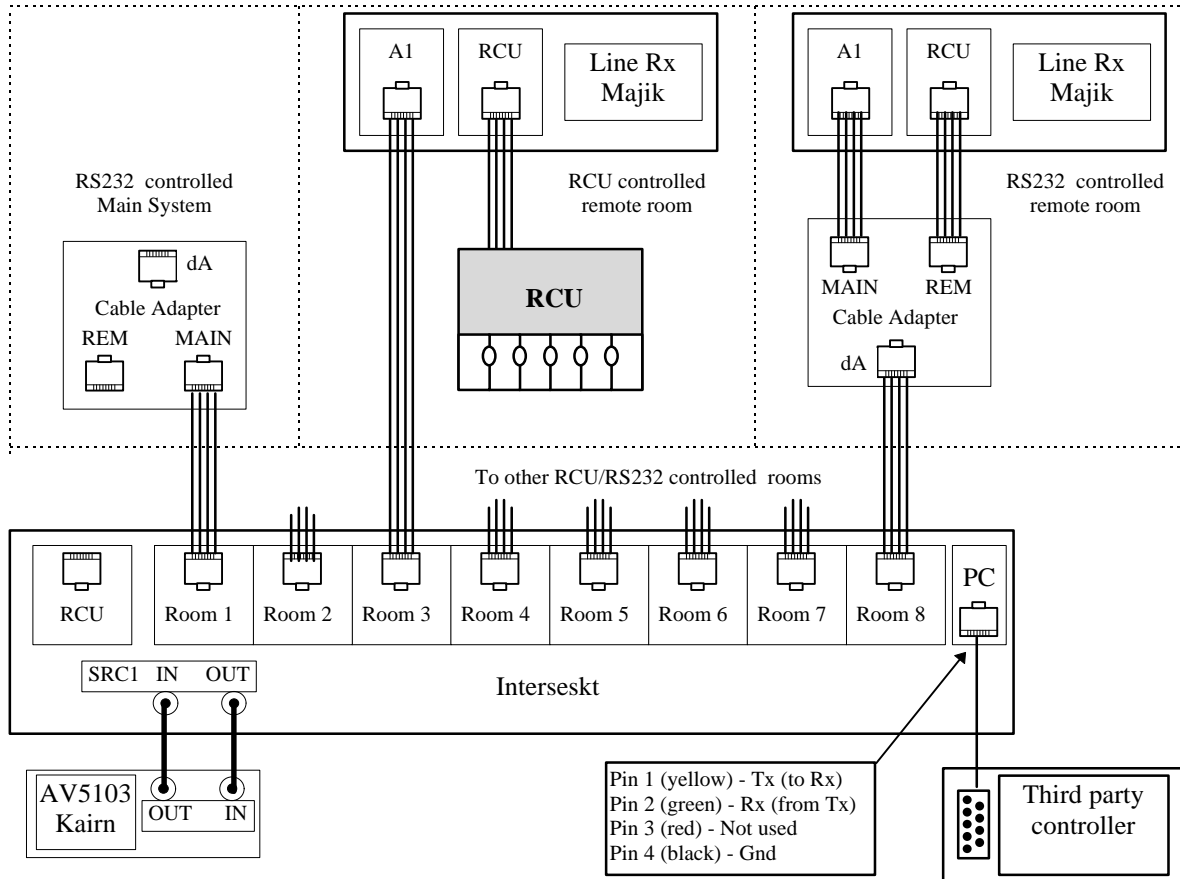
OVERVIEW

The RS232 Knekt Interface allows third party devices, such as intelligent touch screen controllers, to replace the function of the RCU in one or more rooms of an Intersekt based multi-room system. The block diagram shows a typical system configuration. The Linn equipment situated at the main system, or in the remote room where the RCU is being replaced, can be controlled and monitored using a simple text-based (ASCII) command set via the RS232 port on the Intersekt. Operation of any non-Linn equipment, normally controlled by the RCU, either at the main system or in the remote room, is the responsibility of the third party controlling device. Other RCU controlled rooms in the Knekt system are unaffected, and operate both Linn and non-Linn sources in the normal way.



INSTALLATION

The diagram shows the wiring of a typical system configuration. The Intersekt is connected to other Linn equipment using 8 way cable terminated with RJ45 plugs. The RS232 port of the of the third party controlling device is connected to the PC port of the Intersekt using a 4 way cable terminated with a RJ11 plug (Linn part CONN229 - 9 way 'D' type socket to RJ11).



RCU CONTROLLED ROOMS

The RCU controlled rooms are connected as normal, and installed via the Linn installation utility as if they were the only rooms in the system.

RS232 CONTROLLED ROOMS

Line receiver / Majik remote room

The cable from the ROOM port of the Intersekt is connected to the dA port of the cable adapter (Linn part PCAS187) in the remote room. The adapter routes the audio signals from its MAIN port to the Balanced Audio input of the Line receiver / Majik, and the bi-directional control signals from its REM port to the RCU port. If local Linn sources are used in the remote room, they are connected as normal.

AV5103 / Kairn Parallel main system

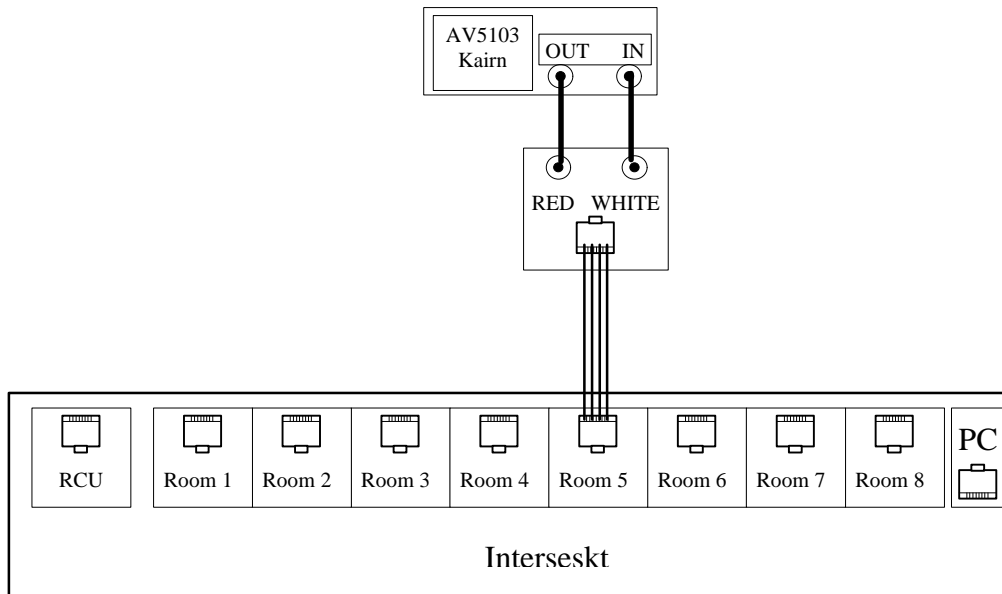
The cable from the RCU port, or the ROOM 1 port, of the Intersekt is connected to the MAIN port of the cable adapter to terminate the bi-directional control signals. The remote in/out of the parallel AV5103 / Kairn is connected to the remote out/in of source 1 on the Intersekt. The audio from the main system sources is connected to the appropriate Intersekt and AV5103 / Kairn audio inputs, as required. Note that the mapping between an Intersekt source and the associated AV5103 / Kairn source is selectable, and does not need to be "one to one". It is also possible to connect local sources

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to the AV5103 / Kairn which are not part of the main system i.e. they do not need an associated Intersekt source. Local Linn sources (one cd and one tuner) should be connected into the AV5103 / Kairn remote in/out loop.

AV5103 / Kairn “hybrid” Parallel main system

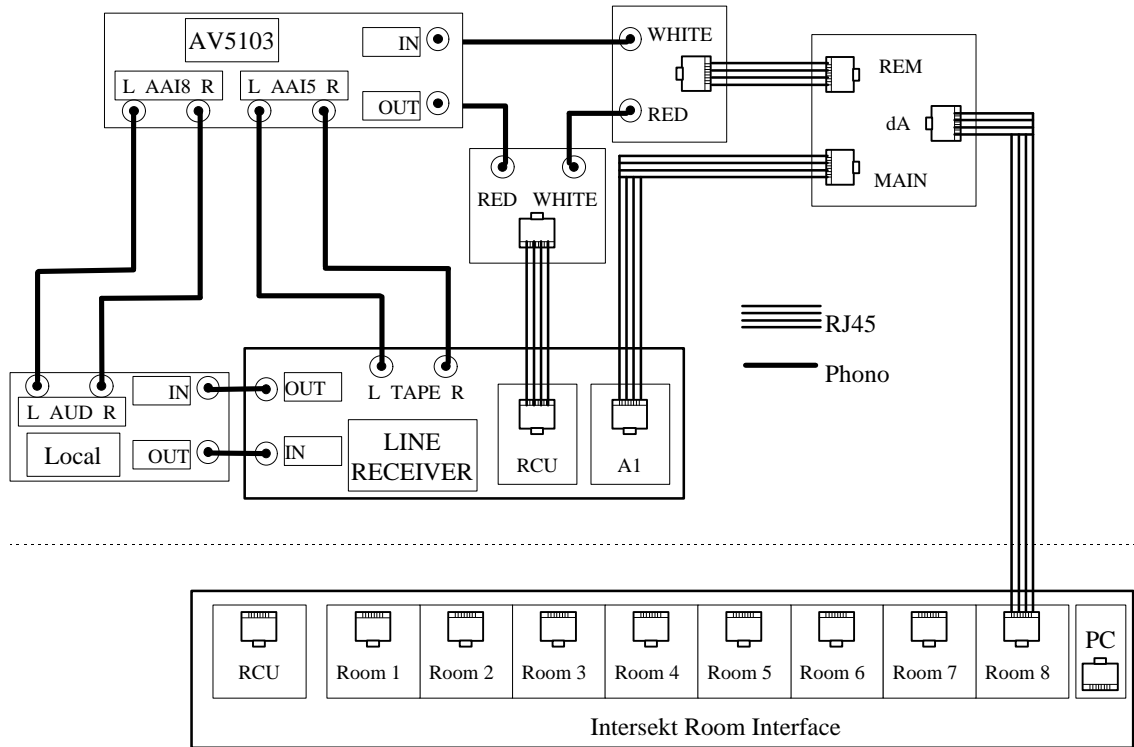
This configuration allows the remote in/out of the AV5103 / Kairn to be connected to any of the Intersekt ROOM ports via an upload converter (Linn part PCAS180), which adapts the remote in/out phono connections to the required RJ45 format. The rest of the parallel system is connected as above. Since source 1 is no longer being used to control the parallel amplifier, it can be used as a normal source.



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AV5103 remote room

The cable from the ROOM port of the Intersekt is connected to the dA port of the cable adapter (Linn part PCAS187) in the remote room. The adapter routes the audio signals from its MAIN port to the Balanced Audio input of the Knekt line receiver. The left and right TAPE OUT channels from the line receiver are routed to one of the Analogue Audio Inputs (AAI) of the AV5103. The bi-directional control signals from the REM port of the cable adapter are connected to the AV5103 and the Knekt Line Receiver in a REMOTE IN/OUT loop using two upload converters (Linn part PCAS180), as shown in the diagram. The REMOTE IN/OUT of a local Linn source should be connected to the REMOTE OUT/IN of the line receiver, with its audio going to an AAI of the AV5103. If no local Linn source is used, the REMOTE IN of the line receiver must be looped to its REMOTE OUT via a single phono lead.

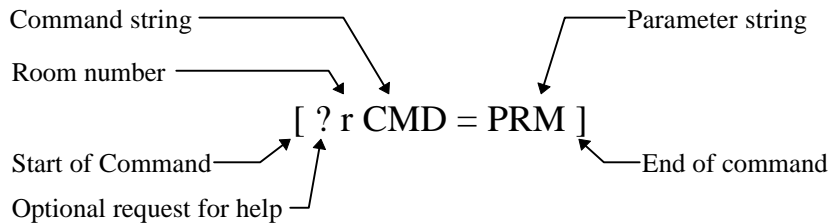


SYSTEM OPERATION

The following sections define the operation of an Intersekt based multi-room Knekt system when one or more rooms are controlled and monitored via the RS232 port on the Intersekt using its ASCII command language.

COMMAND SYNTAX

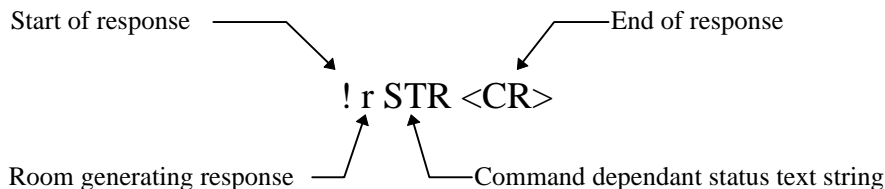
The Intersekt provides a simple text-based (ASCII) command set to control and monitor the Linn equipment normally controlled by an RCU. All commands have the following generic format.



Each ASCII command must be contained within [and] brackets. All characters received “outside” the brackets are ignored. If access to the on-line help is required (see page 9) a “?” is used as the first character of the command. Otherwise, with the exception of a few system commands, the first character of the command must be a digit representing the room number being controlled. The command and parameter strings can use either upper case or lower case characters, with an optional “=” character separating the two strings. For example [8VOL50], [8vol50], [8VOL=50] or [8vol=50] could be used to set the volume level in room 8.

RESPONSE SYNTAX

The Intersekt returns an upper case ASCII response for each ASCII command received, with the following generic format.



All responses begin with the “!” character followed by a digit, r, representing the room number being controlled and generating the response. A status text string, STR, relevant to the received command may then be return. If the command was not recognised, or if one of its parameters was out of range, the “?” character is returned as the status text string, to say that the command was not understood. For example [8VOL=ABC] would return the response !8?<CR>. If the room being controlled is not available to process the command, the character “B” is returned to say that the room is busy. If the Intersekt expects the room to acknowledge receipt of the command (see Command-Response Timing on page 10), and it does not acknowledge, the character “T” is returned to say that a communication time-out occurred. If the command was a request for status (see Monitoring Equipment on page 9), the status text string is formatted as the received command. For example, the command [8VOL=?] would return the response !8VOL=value<CR>, where “value” represents the current volume level in room 8. All responses are terminated with the ASCII carriage return character, which not only informs the controlling device that the response is complete, it also makes the display more readable when a simple ASCII terminal is used to transmit the commands during the installation and debug process.

ENABLING ASCII COMMAND MODE

The ASCII command mode is enabled when the Intersekt receives the command <CR><LF>[REMOTE]<CR><LF>. The first <CR><LF> character sequence ensures that the receive buffer within the Intersekt does not contain spurious characters, while the second terminates the command. To return from the ASCII command mode, the Intersekt must be reset by removing power.

CONTROLLING EQUIPMENT

Before a device can be controlled, its ASCII command set must be selected. Each room selects the command set of both an “amplifier” device and a “source” device. The “amplifier” device is selected using the [rAMP=p] system command. For example, [8AMP=LNRCV] selects the Knekt line receiver as the “amplifier” device for room 8. The “source” device is selected using the [rSRC=p] system command. For example, [8SRC=KARIK] selects the Karik CD player as the “source” device for room 8. The selected devices can then be controlled when commands from their respective ASCII command tables are received. For example, the command [8MODE=PAUSE] would pause the CD, and [8VOL50] would set the volume level. Any commands received for an “amplifier” or “source” device not currently selected will result in the “!r?<CR>” response being returned, to say that the command was not understood.

MONITORING EQUIPMENT

To minimise both the RS232 communications between the Intersekt and the controlling device, and the communications between the Intersekt and the Linn equipment being controlled, a two stage monitoring system has been implemented.

The current “amplifier” or “source” device status is read into data buffers within the Intersekt when the system commands [rSTAT=AMP] or [rSTAT=SRC] are received, or when a command which automatically reads the current device status is received. The response from these commands are delayed due to the time required to initiate and complete the communication between the Intersekt and the device being monitored (see Command-Response Timing on page 10).

The “amplifier” and “source” device ASCII commands that provide a “?” parameter are defined as specific status commands, and return the current state of the parameter they are monitoring. Rather than reading the device status directly, the information returned is based on the contents of the Intersekt data buffers. Since these commands do not require communication between the Intersekt and the device being monitored, the response is returned immediately.

For example, if the Kairn is the selected “amplifier” device for room 1, issuing the command [1STAT=AMP] would read the current amplifier status into the Intersekt data buffer. The volume and balance levels, and the selected listen input, could then be returned by issuing the [1VOL?], [1BAL?] and [1LIS?] specific status commands in sequence.

ON-LINE HELP

Instead of returning some form of help when a command is not understood, the on-line “help text” responses are only returned when an explicit request for help is made. This prevents unexpected responses, possibly containing a large number of characters, being returned while the user is running application code to control devices.

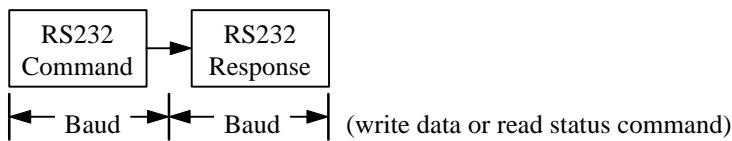
When the [?] command is received, the top level of help text is returned. Further requests for help are made by preceding any of the listed commands with a question mark. For example, if the Karik

CD player has been selected as the “source” device for room eight, sending the command [?8MODE] would return the list of MODE command/parameter combinations available.

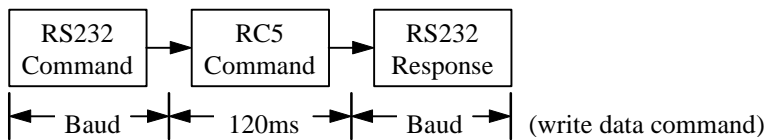
COMMAND-RESPONSE TIMING

The time interval between receiving a command and the response being returned is dependant on both the type of command, and on the individual equipment the command is destined for. The timing of the RS232 communications between the Intersekt and the controlling device is set by the baud rate, and the number of characters in the command/response. The communications protocol between the Intersekt and the controlled device is based on the RC5 standard, and the time depends on the particular command sequence required to perform the requested task. The diagram shows the communication transactions and maximum timings required for each command type.

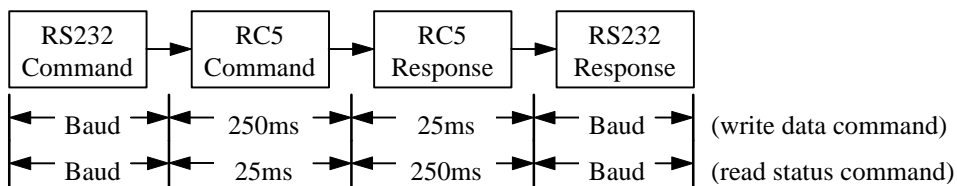
1. INTERNAL - no Intersekt to “amplifier” or “source” device communications



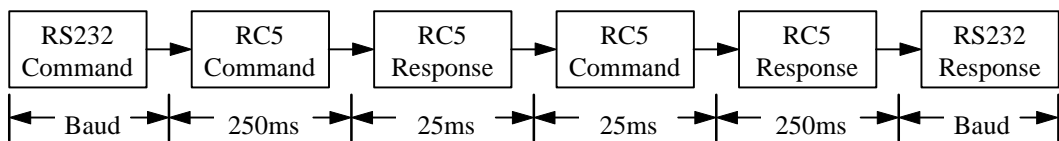
2. STANDARD - “amplifier” or “source” device does not acknowledge Intersekt RC5 command



3. EXTENDED - “amplifier” or “source” device acknowledges Intersekt RC5 command



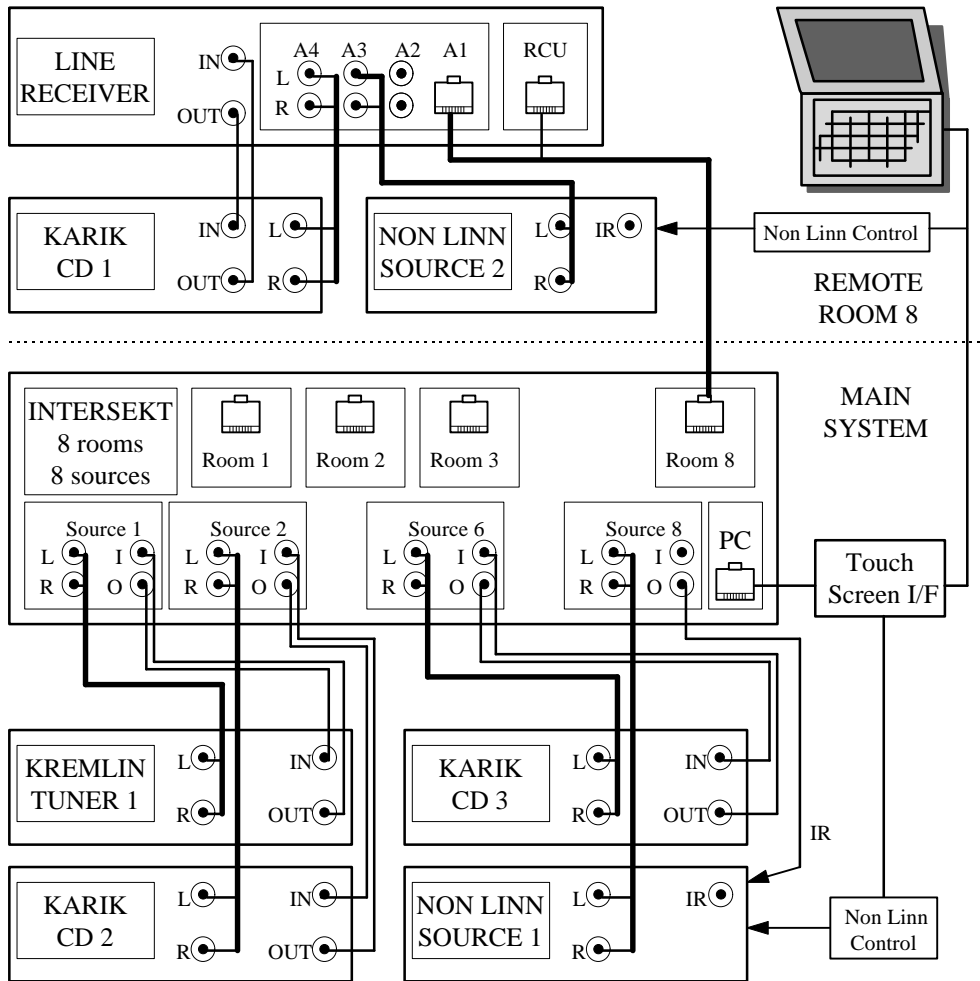
4. AUTO - extended command with following automatic read of “amplifier” or “source” device status



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EXAMPLE

The following diagram shows a typical system configuration and the command/response sequence for controlling room 8 via the RS232 port of the Intersekt.



Command	Response	Comment
<CR><LF>		ensure Intersekt receive buffer is clear
[remote]<CR><LF>	!<CR>	put Intersekt in RS232 remote control mode
[8amp=lnrcv]	!8<CR>	select the line receiver as the "amplifier" device
[8mute=y]	!8<CR>	mute the audio output
[8lis4]	!8<CR>	select AUDIO IN 4 on the line receiver
[8mute=n]	!8<CR>	unmute the audio output
[8src=karik]	!8<CR>	select the Karik CD player as the "source" device
[8mode=play]	!8<CR>	start the CD playing
[8trk4]	!8<CR>	select track 4 of the CD
[8stat=src]	!8<CR>	read "source" device status
[8trk?]	!8TRK=4<CR>	return current track number
[8mute=y]	!8<CR>	mute the audio output
[8mlis1]	!8<CR>	select main listen source 1 on Intersekt
[8lis1]	!8<CR>	select AUDIO IN 1 (dA) on the line receiver
[8mute=n]	!8<CR>	unmute the audio output
[8src=krmln]	!8<CR>	select the Kremlin tuner as the "source" device
[8stat=src]	!8<CR>	read "source" device status
[8tune?]	!8TUNE=102.50<CR>	return the current tuned frequency

ASCII COMMAND TABLES

The following sections define the ASCII command sets provided by the Intersekt via its RS232 port. All room specific commands are preceded with “r”, representing the room number the command is destined for, and must be in the range 1 to 8.

SYSTEM COMMANDS

The following commands are used to configure and control the Intersekt.

[rINUSE=value?]

Returns the status of the Intersekt source. represented by value. Valid source numbers are values in the range 1 to 16.

Command	Response	Description
[rINUSE=value?]	!rN<CR> !rL<CR> !rR<CR>	Return main source status as not in use (N), in use for listening (L) or record (R)

[rPWRDWN]

Instructs the Intersekt to inform all RCU controlled rooms to power down their local systems. An unsolicited !PWRDWN<CR> response is generated when an RCU controlled room instructs the Intersekt to inform the RS232 controlled rooms to power down their local systems.

Command	Response	Description
[rPWRDWN]	!r<CR> !PWRDWN<CR>	power down RCUs rooms power down RS232 rooms

[rDATE=p]

Sets or reads the system date. The date is in the format ddMMMyy, where dd and yy are digits representing the day of month and year respectively, and MMM represents the first 3 letters of the month (e.g. 31JUL97).

Command	Response	Description
[rDATE=ddMMMyy]	!r<CR>	Sets the system date
[rDATE=?]	!rDATE=ddMMMyy<CR>	Reads the system date

[rTIME=p]

Sets or reads the system time. The time is in the format hh:mm:ss, where hh, mm and ss are digits representing the hours, minutes and seconds respectively (e.g. 22:42:30).

Command	Response	Description
[rTIME=hh:mm:ss]	!r<CR>	Sets the system time
[rTIME=?]	!rTIME=hh:mm:ss<CR>	Reads the system time

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[BAUD=p]

Sets the RS232 baud rate to the specified value. The default baud rate after power up is 9600. The RS232 port remains configured to operate with 7 data bits, 1 stop bit and even parity.

Command	Response	Description
[BAUD=rate]	!r<CR>	Sets the baud rate and returns the response at the new rate. rate = 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 or 38400

[PC=p]

Sets or reads the PC port address of the room interface card. The maximum number of room interface cards allowed is 16, providing 128 rooms.

Command	Response	Description
[PC=numOFmax]	!<CR>	Sets the PC port address
[PC=?]	! PC=numOFmax <CR>	Reads the PC port address

[rAMP=name]

Selects the “amplifier” device command set, or returns the name of the currently selected “amplifier” device.

Command	Response	Description
[rAMP=LNRCV]	!r<CR>	Selects Knekt line receiver commands
[rAMP=MAJIK]	!r<CR>	Selects Majik/Wakonda commands
[rAMP=KAIRN]	!r<CR>	Selects Kairn commands
[rAMP=AVPREvalue]	!r<CR>	Selects AV5103 preamp commands and address (value = 0 to 9)
[rAMP=RC5]	!r<CR>	Selects generic RC5 commands
[rAMP=?]	!rAMP=name<CR>	Returns the selected command set name

[rSRC=name]

Selects the “source” device command set, or returns the name of the currently selected “source” device.

Command	Response	Description
[rSRC=KARIK]	!r<CR>	Selects Karik/Mimik CD commands
[rSRC=KRMLN]	!r<CR>	Selects Kremlin tuner commands
[rSRC=KUDOSvalue]	!r<CR>	Selects Kudos tuner commands and the AM / FM frequency ranges (value = 0 (Europe), 1 (USA) or 2 (Japan))
[rSRC=CSWTvalue]	!r<CR>	Selects Knekt circuit switcher commands and address (value = 0 to 255)
[rSRC=AVPREvalue]	!r<CR>	Selects AV5103 preamp commands and address (value = 0 to 9)
[rSRC=RC5]	!r<CR>	Selects generic RC5 commands
[rSRC=?]	!rSRC=name<CR>	Returns the selected command set name

[rSTAT=p]

Reads the current “amplifier” or “source” device status into data buffers within the Intersekt.

Command	Response	Description
[rSTAT=AMP]	!r<CR>	Reads “amplifier” device status
[rSTAT=SRC]	!r<CR>	Reads “source” device status

[rMLIS=p]

Connects room “r” (audio and control) to an Intersekt source as its main system listen input. Only 1 source can be selected per room at any time: making a new connection breaks any previous connection to that room.

Command	Response	Description
[rMLIS=value]	!r<CR>	Select main system listen source 1-16
[rMLIS=D]	!r<CR>	Disconnect from all main sources
[rMLIS=?]	!rMLIS=value<CR> !rMLIS=D<CR>	Returns which main listen audio source is currently selected

[rMCTRL=p]

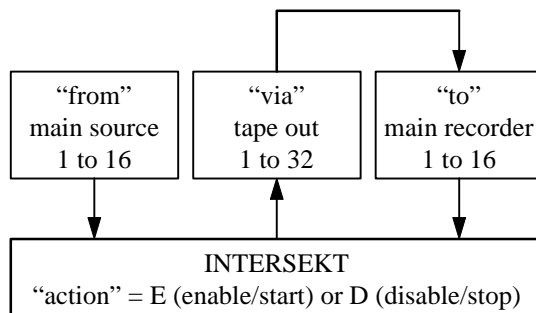
Connects (disconnects) room “r” to (from) the control path of an Intersekt source without affecting the current audio path, or re-connects the control path to the currently selected Intersekt audio source, if any.

Command	Response	Description
[rMCTRL=value]	!r<CR>	Connects room to control path of main system source 1-16
[rMCTRL=D]	!r<CR>	Disconnect room from control path of all main sources
[rMCTRL=A]	!r<CR>	Connects room to control path of current main audio source, if any
[rMCTRL=?]	!rMCTRL=value<CR> !rMCTRL=D<CR>	Returns which main source is currently being controlled

[rMREC=p]

Sets up a record path for a main system source. The main system source can be recorded on a main system recording device, or on a recording device local to the room. On expanded Intersekt systems that have 2 or more room interface cards (PC ports) installed, the “via” tape out connectors are numbered in sequence from room interface card 1 (i.e. card 1 (pc=1ofmax) contains tape out 1 and 2, card 2 (pc=2ofmax) contains tape out 3 and 4, etc.).

Command	Response	Description
[rMREC=from,to,via,action]	!r<CR>	Main source to main recorder path
[rMREC=from,action]	!r<CR>	Main source to local room recorder path
[rMREC=to?]	!rMREC=from<CR> !rMREC=D<CR>	Returns which “from” main source is connected to the “to” main recorder, if any



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[rMAIN=p]

Sets or reads if room 1 operates in parallel to main system, or as a normal room. Note that only room 1 can set the MAIN status, while any room can read it.

Command	Response	Description
[1MAIN=Y]	!1<CR>	Operate room 1 in parallel to main system
[1MAIN=N]	!1<CR>	Operate room 1 as normal room (default)
[rMAIN=?]	!rMAIN=Y <CR> !rMAIN=N <CR>	Returns MAIN status of room 1

KNEKT LINE RECEIVER COMMANDS

The following commands are used to control the Knekt line receiver “amplifier” device.

[rVOL=p]

Sets or returns the current volume level.

Command	Response	Description
[rVOL=>]	!r<CR>	Increase volume till stop received or 30secs elapse
[rVOL=+]	!r<CR>	Step up volume by 1
[rVOL=<]	!r<CR>	Decrease volume till stop received or 30secs elapse
[rVOL=-]	!r<CR>	Step down volume by 1
[rVOL=S]	!r<CR>	Stop increase/decrease of volume
[rVOL=C]	!r<CR>	Continue current increase/decrease of volume (reset 30sec timer)
[rVOL=value]	!r<CR>	Set volume level, value = 0 to 60
[rVOL=?]	!rVOL=value<CR>	Return current volume level

[rBAL=p]

Sets or returns the current balance level.

Command	Response	Description
[rBAL=R]	!r<CR>	Shift balance 1 step to right
[rBAL=L]	!r<CR>	Shift balance 1 step to left
[rBAL=value]	!r<CR>	Set balance to centre, value = 0
[rBAL=?]	!rBAL=value<CR>	Return balance, -9 (max left) to +9 (max right)

[rLIS=p]

Selects or returns the current audio input.

Command	Response	Description
[rLIS=value]	!r<CR>	Select the audio input, value = 1 to 4
[rLIS=+]	!r<CR>	Selects the next audio input in sequence
[rLIS=-]	!r<CR>	Selects the previous audio input in sequence
[rLIS=?]	!rLIS=value<CR>	Returns the current audio input

[rMUTE=p]

Sets the audio output mute status.

Command	Response	Description
[rMUTE=N]	!r<CR>	Unmutes the audio output
[rMUTE=Y]	!r<CR>	Mutes the audio output

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[rFADE=p]

Sets the audio output fade muting status for subsequent [rMUTE=p] commands.

Command	Response	Description
[rFADE=N]	!r<CR>	Disable fade muting (i.e. enable abrupt muting)
[rFADE=Y]	!r<CR>	Enable fade muting

[rMONO]

Toggles between stereo and mono operation.

MAJIK / WAKONDA COMMANDS

The following commands are used to control the Majik and Wakonda “amplifier” devices.

[rVOL=p]

Sets or returns the current volume level.

Command	Response	Description
[rVOL=>]	!r<CR>	Increase volume till stop received or 30secs elapse
[rVOL=+]	!r<CR>	Step up volume by 1
[rVOL=<]	!r<CR>	Decrease volume till stop received or 30secs elapse
[rVOL=-]	!r<CR>	Step down volume by 1
[rVOL=S]	!r<CR>	Stop increase/decrease of volume
[rVOL=C]	!r<CR>	Continue current increase/decrease of volume (reset 30sec timer)
[rVOL=value]	!r<CR>	Set volume level, value = 0 to 60
[rVOL=?]	!rVOL=value<CR>	Return current volume level

[rBAL=p]

Sets or returns the current balance level.

Command	Response	Description
[rBAL=R]	!r<CR>	Shift balance 1 step to right
[rBAL=L]	!r<CR>	Shift balance 1 step to left
[rBAL=value]	!r<CR>	Set absolute balance, value = -9 to +9
[rBAL=?]	!rBAL=value<CR>	Return balance, -9 (max left) to +9 (max right)

[rLIS=p]

Selects or returns the current audio listen input.

Command	Response	Description
[rLIS=A2]	!r<CR>	Select AUX2 listen input
[rLIS=TU]	!r<CR>	Select TUNER listen input
[rLIS=CD]	!r<CR>	Select CD listen input
[rLIS=A1]	!r<CR>	Select AUX1 listen input
[rLIS=T1]	!r<CR>	Select TAPE1 listen input
[rLIS=T2]	!r<CR>	Select TAPE2 listen input
[rLIS=DA]	!r<CR>	Select dA (balanced audio) listen input
[rLIS=+]	!r<CR>	Select next listen input in sequence
[rLIS=-]	!r<CR>	Select previous listen input in sequence
[rLIS=?]	!rLIS=name<CR>	Return current listen input

[rREC=p]

Selects or returns the current audio record input.

Command	Response	Description
[rREC=A2]	!r<CR>	Select AUX2 record input
[rREC=TU]	!r<CR>	Select TUNER record input
[rREC=CD]	!r<CR>	Select CD record input
[rREC=A1]	!r<CR>	Select AUX1 record input
[rREC=T1]	!r<CR>	Select TAPE1 record input
[rREC=T2]	!r<CR>	Select TAPE2 record input
[rREC=DA]	!r<CR>	Select dA (balanced audio) record input
[rREC=+]	!r<CR>	Select next record input in sequence
[rREC=-]	!r<CR>	Select previous record input in sequence
[rREC=?]	!rREC=name<CR>	Return current record input

[rMUTE=p]

Sets or returns the current audio output mute status.

Command	Response	Description
[rMUTE=N]	!r<CR>	Unmutes the audio output
[rMUTE=Y]	!r<CR>	Mutes the audio output
[rMUTE=?]	!rMUTE=N<CR> !rMUTE=Y<CR>	Returns current mute status

[rFADE=p]

Sets the audio output fade muting status for subsequent [rMUTE=p] commands.

Command	Response	Description
[rFADE=N]	!r<CR>	Disable fade muting (i.e. enable abrupt muting)
[rFADE=Y]	!r<CR>	Enable fade muting

[rMONO]

Sets or returns the current mono status.

Command	Response	Description
[rMONO=N]	!r<CR>	Disable mono operation (i.e. enable stereo)
[rMONO=Y]	!r<CR>	Enable mono operation
[rMONO=?]	!rMONO=N<CR> !rMONO=Y<CR>	Returns current mono status

KAIRN COMMANDS

The following commands are used to control the Kairn “amplifier” device.

[rVOL=p]

Sets or returns the current volume level.

Command	Response	Description
[rVOL=>]	!r<CR>	Increase volume till stop received or 30secs elapse
[rVOL=+]	!r<CR>	Step up volume by 1
[rVOL=<]	!r<CR>	Decrease volume till stop received or 30secs elapse
[rVOL=-]	!r<CR>	Step down volume by 1
[rVOL=S]	!r<CR>	Stop increase/decrease of volume
[rVOL=C]	!r<CR>	Continue current increase/decrease of volume (reset 30sec timer)
[rVOL=value]	!r<CR>	Set volume level, value = 0 to 100
[rVOL=?]	!rVOL=value<CR>	Return current volume level

[rBAL=p]

Sets or returns the current balance level.

Command	Response	Description
[rBAL=R]	!r<CR>	Shift balance 1 step to right
[rBAL=L]	!r<CR>	Shift balance 1 step to left
[rBAL=value]	!r<CR>	Set absolute balance, value = -30 to +30
[rBAL=?]	!rBAL=value<CR>	Return balance, -30 (max left) to +30 (max right)

[rLIS=p]

Selects or returns the current audio listen input.

Command	Response	Description
[rLIS=PH1]	!r<CR>	Select PHONO1 listen input
[rLIS=PH2]	!r<CR>	Select PHONO2/AUX2 listen input
[rLIS=TUN]	!r<CR>	Select TUNER listen input
[rLIS=CD]	!r<CR>	Select CD listen input
[rLIS=AX1]	!r<CR>	Select AUX1 listen input
[rLIS=TP1]	!r<CR>	Select TAPE1 listen input
[rLIS=TP2]	!r<CR>	Select TAPE2 listen input
[rLIS=+]	!r<CR>	Select next listen input in sequence
[rLIS=-]	!r<CR>	Select previous listen input in sequence
[rLIS=?]	!rLIS=name<CR>	Return current listen input

[rREC=p]

Selects or returns the current audio record input.

Command	Response	Description
[rREC=PH1]	!r<CR>	Select PHONO1 record input
[rREC=PH2]	!r<CR>	Select PHONO2/AUX2 record input
[rREC=TUN]	!r<CR>	Select TUNER record input
[rREC=CD]	!r<CR>	Select CD record input
[rREC=AX1]	!r<CR>	Select AUX1 record input
[rREC=TP1]	!r<CR>	Select TAPE1 record input
[rREC=TP2]	!r<CR>	Select TAPE2 record input
[rREC=+]	!r<CR>	Select next record input in sequence
[rREC=-]	!r<CR>	Select previous record input in sequence
[rREC=?]	!rREC=name<CR>	Return current record input

[rMUTE=p]

Sets or returns the current audio output mute status.

Command	Response	Description
[rMUTE=N]	!r<CR>	Unmutes the audio output
[rMUTE=Y]	!r<CR>	Mutes the audio output
[rMUTE=?]	!rMUTE=N<CR> !rMUTE=Y<CR>	Returns current mute status

[rFADE=p]

Sets or returns the current audio output fade muting status for subsequent [rMUTE=p] commands.

Command	Response	Description
[rFADE=N]	!r<CR>	Disable fade muting (i.e. enable abrupt muting)
[rFADE=Y]	!r<CR>	Enable fade muting
[rFADE=?]	!rFADE=N<CR> !rFADE=Y<CR>	Return current fade muting status

[rMONO]

Sets or returns the current mono status.

Command	Response	Description
[rMONO=N]	!r<CR>	Disable mono operation (i.e. enable stereo)
[rMONO=Y]	!r<CR>	Enable mono operation
[rMONO=?]	!rMONO=N<CR> !rMONO=Y<CR>	Returns current mono status

KARIK / MIMIK COMMANDS

The following commands are used to control the Karik and Mimik CD “source” devices.

[rDSPLY]

Scrolls through the front panel display options.

Command	Response	Description
[rDSPLY]	!r<CR>	Scrolls front panel display

[rINDX=p]

Selects or returns the current CD track index number. If the current track does not contain index coding, the command is ignored. If the value received exceeds the maximum index number, the maximum index number is selected.

Command	Response	Description
[rINDX=value]	!r<CR>	Select index number, value = 1 to 99
[rINDX=+]	!r<CR>	Select next index number
[rINDX=-]	!r<CR>	Select previous index number
[rINDX=?]	!rINDX=value<CR>	Return current index number

[rOPEN]

Toggles between opening and closing the CD tray door.

Command	Response	Description
[rOPEN]	!r<CR>	Opens/closes CD tray door

[rMODE=p]

Sets or returns the current operating mode.

Command	Response	Description
[rMODE=STOP]	!r<CR>	Stops CD playing
[rMODE=PLAY]	!r<CR>	Starts CD playing
[rMODE=PAUSE]	!r<CR>	Pauses CD
[rMODE=?]	!rMODE=mode<CR> !rMODE=NODISC<CR>	Returns current mode

[rSKIP=p]

Skips to the next or previous track.

Command	Response	Description
[rSKIP=+]	!r<CR>	Skip to next track on disk
[rSKIP=-]	!r<CR>	Skip to previous track on disk

[rSRCH=p]

Searches forward or backward through the CD.

Command	Response	Description
[rSRCH=>]	!r<CR>	Start search forward till stop received or 30secs elapse
[rSRCH=<]	!r<CR>	Start search backward till stop received or 30secs elapse
[rSRCH=S]	!r<CR>	Stop search forward/backward operation
[rSRCH=C]	!r<CR>	Continue current search operation (reset 30sec timer)

[rDAO=p]

Sets or returns the current Digital Audio Output status.

Command	Response	Description
[rDAO=Y]	!r<CR>	Enables the Digital Audio Output
[rDAO=N]	!r<CR>	Disables the Digital Audio Output
[rDAO=?]	!rDAO=Y<CR> !rDAO=N<CR>	Returns the current DAO status

[rRPT=p]

Sets or returns the current repeat function status.

Command	Response	Description
[rRPT=Y]	!r<CR>	Enables the repeat function
[rRPT=N]	!r<CR>	Disables the repeat function
[rRPT=?]	!rRPT=Y<CR> !rRPT=N<CR>	Returns the current repeat function status

[rTRK=p]

Selects or returns the current CD track number. If the value received exceeds the maximum track number on the disc, the last track is selected.

Command	Response	Description
[rTRK=value]	!r<CR>	Select track number, value = 1 to 99
[rTRK=?]	!rTRK=value<CR>	Returns current track number

KREMLIN COMMANDS

The following commands are used to control the Kremlin Tuner “source” device.

[rTUNE=p]

Selects or returns the current tune frequency. A Kremlin designed for Europe or USA will accept FM frequencies (MHz) in the range 87.50 to 108.50. A Kremlin designed for Japan will accept FM frequencies in the range 75.50 to 90.50 .

Command	Response	Description
[rTUNE=E]	!r<CR>	Enable tune mode
[rTUNE=value]	!r<CR>	Select tune frequency, value in valid range
[rTUNE=>]	!r<CR>	Increase tune frequency till stop received or 30secs elapse
[rTUNE=+]	!r<CR>	Step up tune frequency
[rTUNE=<]	!r<CR>	Decrease tune frequency till stop received or 30secs elapse
[rTUNE=-]	!r<CR>	Step down tune frequency
[rTUNE=S]	!r<CR>	Stop current increase/decrease operation
[rTUNE=C]	!r<CR>	Continue current increase/decrease operation (reset 30sec timer)
[rTUNE=?]	!rTUNE=value<CR>	Return current tune frequency

[rSCAN=p]

Scans through the FM frequency band and stops when a station is found. See [rTUNE=p] command for valid frequency band ranges for “value”.

Command	Response	Description
[rSCAN=E]	!r<CR>	Enable scan mode
[rSCAN=S]	!r<CR>	Stop (abort) current scan operation
[rSCAN=>]	!r<CR>	Scan up through frequency band
[rSCAN=<]	!r<CR>	Scan down through frequency band
[rSCAN=?]	!rSCAN=value<CR>	Return current scan frequency

[rRFINP=p]

Selects or returns the current RF input.

Command	Response	Description
[rRFINP=AERIAL]	!r<CR>	Select the Aerial RF input
[rRFINP=CABLE]	!r<CR>	Select the Cable RF input
[rRFINP=?]	!rRFINP=name<CR>	Return the selected RF input

[rMTHR=p]

Sets the mute threshold level. When the signal strength falls below the set level, the audio output is muted.

Command	Response	Description
[rMTHR=E]	!r<CR>	Enable mute threshold mode
[rMTHR=value]	!r<CR>	Set mute threshold level, value = 3 to 80

[rMNO=p]

Sets or returns the current mono status.

Command	Response	Description
[rMNO=N]	!r<CR>	Disable mono operation (i.e. enable stereo)
[rMNO=Y]	!r<CR>	Enable mono operation
[rMNO=?]	!rMNO=N<CR> !rMNO=Y<CR>	Returns current mono status

KUDOS COMMANDS

The following commands are used to control the Kudos Tuner “source” device.

[rTUNE=p]

Selects or returns the current tune frequency. A Kudos designed for Europe will accept AM frequencies (KHz) in the range 144 to 279 (LW) and 522 to 1611 (MW), and FM frequencies (MHz) in the range 87.50 to 108.50. A Kudos designed for USA will accept AM frequencies 530 to 1750 and FM frequencies in the range 87.50 to 108.50. A Kudos designed for Japan will accept AM frequencies in the range 530 to 1750 and FM frequencies in the range 75.5 to 90.5.

Command	Response	Description
[rTUNE=E]	!r<CR>	Enable tune mode
[rTUNE=valueAM]	!r<CR>	Select AM tune frequency
[rTUNE=valueFM]	!r<CR>	Select FM tune frequency
[rTUNE=>]	!r<CR>	Increase tune frequency till stop received or 30secs elapse
[rTUNE=+]	!r<CR>	Step up tune frequency
[rTUNE=<]	!r<CR>	Decrease tune frequency till stop received or 30secs elapse
[rTUNE=-]	!r<CR>	Step down tune frequency
[rTUNE=S]	!r<CR>	Stop current increase/decrease operation
[rTUNE=C]	!r<CR>	Continue current increase/decrease operation (reset 30sec timer)
[rTUNE=?]	!rTUNE=value<CR>	Return current tune frequency

[rSCAN=p]

Scans through the current frequency band (AM or FM) and stops when a station is found. See [rTUNE=p] command for valid frequency ranges for “value”.

Command	Response	Description
[rSCAN=E]	!r<CR>	Enable scan mode
[rSCAN=S]	!r<CR>	Stop (abort) current scan operation
[rSCAN=>]	!r<CR>	Scan up through frequency band
[rSCAN=<]	!r<CR>	Scan down through frequency band
[rSCAN=?]	!rSCAN=value<CR>	Return current scan frequency

[rBAND=p]

Selects or returns the current frequency band.

Command	Response	Description
[rBAND=AM]	!r<CR>	Select the AM frequency band
[rBAND=FM]	!r<CR>	Select the FM frequency band
[rBAND=?]	!rBAND=name<CR>	Return the current frequency band

[rNARROW=p]

Sets or returns the current narrow function status.

Command	Response	Description
[rNARROW=N]	!r<CR>	Disable narrow function operation
[rNARROW=Y]	!r<CR>	Enable narrow function operation
[rNARROW=?]	!rNARROW=N<CR> !rNARROW=Y<CR>	Return current narrow function status

[rMNO=p]

Sets or returns the current mono status.

Command	Response	Description
[rMNO=N]	!r<CR>	Disable mono operation (i.e. enable stereo)
[rMNO=Y]	!r<CR>	Enable mono operation
[rMNO=?]	!rMNO=N<CR> !rMNO=Y<CR>	Returns current mono status

CIRCUIT SWITCHER COMMANDS

The following commands are used to control the Knekt Circuit Switcher “source” device.

[rRLY=p]

Operates or returns the status of individual relays.

Command	Response	Description
[rRLY=valueON]	!r<CR>	Switch relay on, value = 1 to 6
[rRLY=valueOFF]	!r<CR>	Switch relay off, value = 1 to 6
[rRLY=value?]	!rRLY=valueON<CR> !rRLY=valueOFF<CR>	Returns state of selected relay

[rGRP=p]

Operates a group of relays. The relays in the group are defined by “value”, the sum of the binary values assigned to each relay in the group. For example, [rGRP=42ON] would switch relays 2, 4 and 6 on together. The state of relays not defined in the group remain unchanged.

Command	Response	Description
[rGRP=valueON]	!r<CR>	Switch group on
[rGRP=valueOFF]	!r<CR>	Switch group off
[rGRP=ALLON]	!r<CR>	Switch all on
[rGRP=ALLOFF]	!r<CR>	Switch all off
[rGRP=?ON]	!rGRP=valueON	Return group on
[rGRP=?OFF]	!rGRP=valueOFF	Return group off

Relay Number	Binary Value
1	1
2	2
3	4
4	8
5	16
6	32

[rAUX=p]

Operates or returns the current status of the AUX output.

Command	Response	Description
[rAUX=OFF]	!r<CR>	Switch AUX output off
[rAUX=ON]	!r<CR>	Switch AUX output on
[rAUX=?]	!rAUX=OFF<CR> !rAUX=ON<CR>	Returns state of AUX output

AV5103 SYSTEM CONTROLLER COMMANDS

This section defines the ASCII command set of the AV5103 System Controller. The commands that are available depend on whether the command set was selected as an “amplifier” or “source” device. All commands are available when called as an “amplifier” device. A subset of these commands are available when called as a “source” device, as shown in the following table. If a command which is not currently available is received the !r?<CR> response is returned, to say that the command was not understood.

“amplifier” commands	“source” commands
[rSEL=p]	[rAINP=p]
[rVAL=p]	[rVINP=p]
[rMUTE=p]	[rDINP=p]
[rNORM]	[rDREC=in,rou]t
[rAINP=p]	[rSREC=ain,vin,rou]t
[rVINP=p]	[rROUT=p]
[rDINP=p]	
[rDREC=in,rou]t	
[rSREC=ain,vin,rou]t	
[rROUT=p]	
[rSTBY=p]	
[rOSG=p]	
[rQUIET=p]	
[rSURR=p]	

The input select commands, [rAINP=p], [rVINP=p] and [rDINP=p] operate on different audio and video outputs, depending on whether they are called as an “amplifier” or “source” device. The “amplifier” device commands route the selected audio and video components to the main output connectors, while the “source” device commands route their output to the multi-room connectors, as shown in the following table.

Input	“amplifier” device Output	“source” device Output
Analogue Audio Input (AAI)1-10 Digital Audio Inputs (DAI)1-5	Analogue Audio Out 1-3, SURR L, SURR R CENTRE, SUB	MRAA (Multi-Room Analogue Audio)
CVBS Input (CVI)1-8	Watch CVBS Output	MULTIRM CVBS Output
S-VHS Input (VHS)1-2	Watch S-VHS Output	Not available

When the AV5103 is installed in a system, its audio and video inputs and record outputs are defined as audio only (A), video only (V) or video with linked audio (AV). An AV pair is selected by referring to its video connector, the linked audio connector being selected automatically by the AV5103 (see [rDINP=p] and [rDREC=in,out] commands).

[rSEL=p]

Selects the operating mode, and automatically reads back status. After selecting a new mode, the [rSEL=?] command should be used to ensure that the new mode was successfully selected.

Command	Response	Description
[rSEL=VOL]	!r<CR>	Select speaker volume mode
[rSEL=FRNT]	!r<CR>	Select front speaker balance mode
[rSEL=CNTR]	!r<CR>	Select centre speaker balance mode
[rSEL=REAR]	!r<CR>	Select rear speaker balance mode
[rSEL=SUB]	!r<CR>	Select sub-woofer speaker balance mode
[rSEL=NXT]	!r<CR>	Select next speaker mode in sequence
[rSEL=INPREC]	!r<CR>	Select input/record mode
[rSEL=?]	!rSEL=name<CR>	Return selected mode

[rVAL=p]

Sets or returns the value of the current operating mode variable, selected by the [rSEL=p] command. For example, if the front speaker balance mode is selected, [rVAL=+] would shift the balance 1 step to the right.

Command	Response	Description
[rVAL=>]	!r<CR>	Increase value till stop received or 30secs elapse
[rVAL=+]	!r<CR>	Step up value by 1
[rVAL=<]	!r<CR>	Decrease value till stop received or 30secs elapse
[rVAL=-]	!r<CR>	Step down value by 1
[rVAL=S]	!r<CR>	Stop increase/decrease of value
[rVAL=C]	!r<CR>	Continue current increase/decrease of value (reset 30sec timer)
[rVAL=value]	!r<CR>	Set absolute value, between upper and lower limits
[rVAL=?]	!rVAL=value<CR>	Return current value
[rVAL=+?]	!rVAL=value<CR>	Return current upper (maximum) limit
[rVAL=-?]	!rVAL=value<CR>	Return current lower (minimum) limit

[rMUTE=p]

Sets the current audio output mute status.

Command	Response	Description
[rMUTE=N]	!r<CR>	Unmutes the audio output
[rMUTE=Y]	!r<CR>	Mutes the audio output
[rMUTE=?]	!rMUTE=N<CR> !rMUTE=Y<CR>	Returns current mute status

[rNORM]

Restores the default volume / balance settings.

Command	Response	Description
[rNORM]	!r<CR>	Restores the default settings

[rAINP=p]

Selects an audio input without affecting the current video input, and automatically reads back status. After selecting an input, the [rAINP=?] command should be used to ensure that the input was successfully selected.

Command	Response	Description
[rAINP=NONE]	!r<CR>	Disconnects the current audio input
[rAINP=AAIvalue]	!r<CR>	Select Analogue Audio Input 1-10
[rAINP=DAIvalue]	!r<CR>	Select Digital Audio Input 1-5
[rAINP=?]	!rAINP=name<CR>	Returns the selected audio input

[rVINP=p]

Selects a video input without affecting the current audio input, and automatically reads back status. After selecting an input, the [rVINP=?] command should be used to ensure that the input was successfully selected. When called as a “source” device, the S-VHS inputs are not available.

Command	Response	Description
[rVINP=NONE]	!r<CR>	Disconnects the current video input
[rVINP=VHSvalue]	!r<CR>	Select S-VHS input 1-2
[rVINP=CVIvalue]	!r<CR>	Select CVBS input 1-8
[rVINP=?]	!rVINP=name<CR>	Returns the selected video input

[rDINP=p]

Selects a direct audio or video input, and automatically reads back status. After selecting an input, the [rDINP=?] command should be used to ensure that the input was successfully selected. When an audio input is selected, the current video input is disconnected. When a video input is selected, its linked audio input is also selected. If there is no linked audio, the current audio input is disconnected. When called as a “source” device, the S-VHS inputs are not available.

Command	Response	Description
[rDINP=NONE]	!r<CR>	Disconnects all audio and video inputs
[rDINP=AAIvalue]	!r<CR>	Select Analogue Audio Input 1-10
[rDINP=DAIvalue]	!r<CR>	Select Digital Audio Input 1-5
[rDINP=VHSvalue]	!r<CR>	Select S-VHS input 1-2
[rDINP=CVIvalue]	!r<CR>	Select CVBS input 1-8
[rDINP=?]	!rDINP=name<CR>	Returns the selected direct input

[rDREC=in,rout]

Sets up a direct audio or video record path, and automatically reads back status. Immediately after selecting a record path, the [rDREC=?] command should be used to ensure that the record path was successfully set up. When a video input is selected, its linked audio input is also selected. If there is no linked audio input, no audio input is selected. When a video output is selected, its linked audio output is also selected. The record path specified by “in” is cleared (disconnected) when “rout” is set to NONE. If the specified record path can not be set up, “?” is returned for “rout”.

Command	Response	Description
[rDREC=in,rout]	!r<CR>	Route the audio or video input to the record output, where in=AAIvalue, DAIvalue, VHSvalue or CVIvalue, and rout=NONE, RDAO, RAAO1-3, RCVO1-2, or RVHS
[rDREC=?]	!rDREC=in,rout<CR>	Return the result of the above command

[rSREC=ain,vin,rout]

Sets up a split audio and video record path, and automatically reads back status. Immediately after selecting a record path, the [rSREC=?] command should be used to ensure that the record path was successfully set up. The record path specified by ain and vin is cleared (disconnected) when rout is defined as NONE. If the specified record path can not be set up, “?” is returned for rout.

Command	Response	Description
[rSREC=ain,vin,rout]	!r<CR>	Route the audio and/or video inputs to the record output, where ain=NONE, AAIvalue or DAIvalue, vin=NONE, VHSvalue or CVIvalue, rout=NONE, RDAO, RAAO1-3, RCVO1-2, or RVHS
[rSREC=?]	!rSREC=ain,vin,rout<CR>	Return the result of the above command

[rROUT=p]

Reads the status of a record output connector to determine which audio and/or video inputs are connected to it. The [rROUT=rout] command should be immediately followed by the [rROUT=?] command to return the requested status.

Command	Response	Description
[rROUT=rout]	!r<CR>	Read the status of the specified record output, where rout=RDAO, RAAO1-3, RCVO1-2 or RVHS
[rROUT=?]	!rROUT=ain,vin,rout<CR>	Return the result of the above command, where ain=NONE, AAIvalue or DAIvalue, vin =NONE, VHSvalue or CVIvalue, rout=RDAO, RAAO1-3, RCVO1-2, or RVHS

[rSTBY=p]

Sets or returns the current standby status.

Command	Response	Description
[rSTBY=N]	!r<CR>	Bring AV5103 out of standby
[rSTBY=Y]	!r<CR>	Put AV5103 into standby
[rSTBY=?]	!rSTBY=N<CR> !rSTBY=Y<CR>	Return current standby status

[rOSG=p]

Sets or returns the current On-Screen Graphics status.

Command	Response	Description
[rOSG=N]	!r<CR>	Disable on-screen graphics
[rOSG=Y]	!r<CR>	Enable on-screen graphics
[rOSG=?]	!rOSG=N<CR> !rOSG=Y<CR>	Return current on-screen graphics status

[rQUIET=p]

Sets or returns the QUIET (mid-night movie) status of an AC-3 source.

Command	Response	Description
[rQUIET=N]	!r<CR> !r?<CR>	Disable Quiet mode of AC-3 source Not an AC-3 source
[rQUIET=Y]	!r<CR> !r?<CR>	Enable Quiet mode of AC-3 source Not an AC-3 source
[rQUIET=?]	!rQUIET=N<CR> !rQUIET=Y<CR> !rQUIET=?<CR>	Return current Quiet status of AC-3 source Not an AC-3 source

[rSURR=p]

Selects or returns the Surround mode.

Command	Response	Description
[rSURR=STE]	!r<CR>	Selects Stereo surround mode
[rSURR=STES]	!r<CR>	Selects Stereo Sub surround mode
[rSURR=PRL]	!r<CR>	Selects ProLogic surround mode
[rSURR=PRLP]	!r<CR>	Selects ProLogic Phantom surround mode
[rSURR=PRLS]	!r<CR>	Selects ProLogic 3 Stereo surround mode
[rSURR=AC3]	!r<CR>	Selects AC-3 surround mode
[rSURR=AC3P]	!r<CR>	Selects AC-3 Phantom surround mode
[rSURR=AC3S]	!r<CR>	Selects AC-3 3 Stereo surround mode
[rSURR=LIM5]	!r<CR>	Selects Linn LIMBIK 5 surround mode
[rSURR=LIM3]	!r<CR>	Selects Linn LIMBIK 3 surround mode
[rSURR=PRTY]	!r<CR>	Selects Linn party surround mode
[rSURR=NXT]	!r<CR>	Selects next surround mode in sequence
[rSURR=?]	!rSURR=name<CR>	Returns current surround mode

GENERIC RC5 COMMANDS

The following commands, which are only used for test purposes, provide a means of controlling “amplifier” or “source” devices with primitive (low level) RC5 commands.

[rSTD=p]

Sends a primitive standard RC5 command. The parameters are defined in hex, and represent the device address (aa), the command to send (cc) and the number of times to repeat the command (rr).

Command	Response	Description
[rSTD=aacc]	!r<CR>	Sends command to room once
[rSTD=aaccrr]	!r<CR>	Sends command to room “rr” times
[rSTD=S]	!r<CR>	Stops command repeat (sets repeat to 0)
[rSTD=C]	!r<CR>	Continues command repeat (sets repeat to “FF”)

[rEXT=p]

Sends a primitive extended RC5 command. The parameters are defined in hex, and represent the device address (aa), the command to send (cc) and 5 bytes of data (d1 to d5).

Command	Response	Description
[rEXT=aaccd1d2d3d4d5]	!r<CR>	Sends extended data to room
[rEXT=aacc]	!rEXT=d1d2d3d4d5<CR>	Returns extended data from room