

ControlSpace® Serial Control Protocol v3.1



ControlSpace ESP-88/00 engineered sound processor
PowerMatch™ PM8500N configurable professional power amplifier

The purpose of this document is to provide a technical understanding of the ControlSpace Serial Control Protocol and how it can be used to provide communication between ControlSpace devices and 3rd party control products such as; AMX, Crestron, or any other controller capable of following this protocol.

The ControlSpace Serial Control Protocol is supported by ControlSpace ESP-88/00 engineered sound processors and the PowerMatch™ PM8500N configurable professional power amplifiers (Note that the PM8500 version does not have the Ethernet port and therefore cannot be controlled remotely).

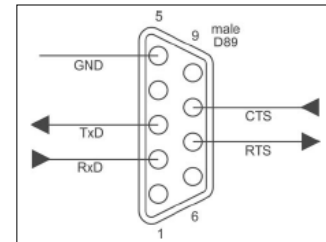
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1 Connection

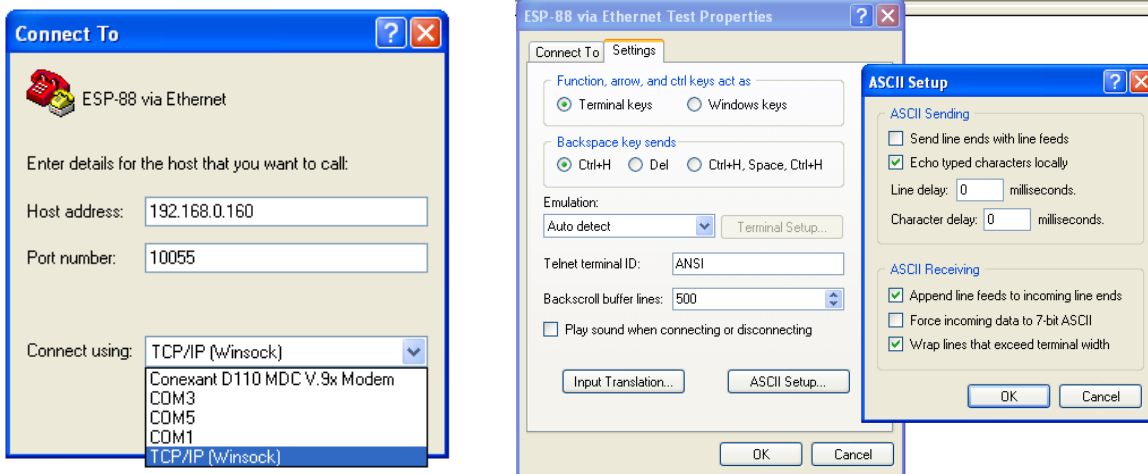
Using the RS232C Serial Port (ESP only)

A 3-wire connection is sufficient to communicate with the ESP, although CTS/RTS pins can also be used if desired. A crossover cable will be required to connect the ESP to a PC. The default serial port settings are 38,400 baud, 8-bits, 1 stop bit, no parity and no flow control. If required these settings can be changed using the Network Setup tool in ControlSpace Designer.



Using Serial-over-Ethernet (ESP and PM8500N)

Both the ESP-88/00 and the PM8500N can be controlled by serial commands sent over Ethernet using a TCP/IP connection. Communication is via the same physical Ethernet connection used for ControlSpace Designer and system communication but a dedicated port for is provided for 3rd party control allowing them to operate simultaneously. A fixed port number of '10055' is used and will support a single 3rd party connection. With the ESP, once a connection is established to '10055' port, all serial communication is routed through it and the physical RS232C serial port is disabled. The port is automatically reset when the device is rebooted, or when sending and receiving configuration files via ControlSpace Designer and so the 3rd party connection will need to be re-established. Using 'Hyperterminal' configured for TCP/IP (as shown below) is a convenient way to test these commands.



2 Command Format

All commands and responses are sent in ASCII, terminated with a <CR> (carriage return, ASCII 0x0D). There is no time limit between characters of a command so it is possible to enter commands using a “dumb terminal”. The available commands are divided into three categories according to their scope.

System Commands	(Parameter Sets, Groups ..)
Device Commands	(Inputs, Outputs, Set IP address ..)
Module Commands	(Signal processing parameters ..)

System and Device Commands

Numerical values for System and Device Commands are entered using hexadecimal ASCII. For example, 16 (decimal) is entered as 10 (hex) and 34 (decimal) is entered as 22 (hex).

- > Command should be 2 capital letters
- > A space after the command is optional (SS 10 or SS10 are both acceptable)
- > A comma “,” is used as the separator
- > Hexadecimal values do not require a suffix (“A3h” not allowed – should be “A3”)
- > Hexadecimal values can be sent in upper or lower case (SS A or SS a are both acceptable, but responses are always in lower case)
- > All commands are terminated with a <CR> (Carriage Return – ASCII 0x0D)
- > No acknowledgement is sent, following a ‘Set’ command with a ‘Get’ is a convenient method for confirming the command was successful.

Module Commands:

Numerical values for Module Commands are entered as simple ASCII text. For example, -28dB is entered simply as “-28”

- > Command should be 2 capital letters
- > A space after the command is optional (SS 10 or SS10 are both acceptable)
- > Module name must be unique and should always be enclosed in quotes (“Module Name”)
- > Command may have 1 or 2 Indices separated by “>” (ASCII 0x3E)
- > Set commands and Get responses always end with “=” (ASCII 0x3D) followed by the parameter Value
- > Numerical values are entered as simple ASCII text without the units (e.g. -28dB is simply entered as “-28”)
- > Multiple commands sent on a single line are separated by a semi-colon (ASCII 0x3B)
- > All commands are terminated with a <CR> (Carriage Return – ASCII 0x0D)
- > Device will respond with ‘ACK’ (ASCII 0x06) if successful or ‘NAK nn’ if received but unsuccessful where nn is a 2 digit error code.

3 System Commands

System commands are used to invoke changes across multiple devices simultaneously and use constructs programmed via ControlSpace Designer (such as Parameter Sets and Groups). System commands sent to one ControlSpace device will automatically be echoed to all other devices on the network (assuming they are correctly connected to the same network).

System commands use hexadecimal notation for numerical values and only 'Get' commands generate a response. Following a 'Set' command with a 'Get' is a useful way to confirm command success.

- 3.1 Set/Get Parameter Set (SS, GS)
- 3.2 Set/Get Group Master Level (SG, GG)
- 3.3 Set Group Volume Increment/Decrement (SH)
- 3.4 Set/Get Group Master Mute (SN/GN)
- 3.5 Set/Get Preset (SP, GP) [ESP Only – not supported in v3.0 or later]

3.1 Set/Get Parameter Set (SS, GS)

To recall or invoke Parameter Set *n*:

SS *n* <CR> where *n* is the Parameter Set number, 1 - FFh (1-255 decimal)

To query for the last invoked Parameter Set

GS <CR>

Response:

S *n* <CR> where *n* = 0 – FF (n = 0 if no Parameter Set recalled, e.g. after power-up)

EXAMPLES:

SS5<CR>	<i>Recall Parameter Set 5</i>
GS<CR>	<i>Query for last invoked Parameter Set</i>
S 5<CR>	<i>Response indicating Parameter Set 5 was invoked last</i>

3.2 Set/Get Group Master Level (SG, GG)

Groups of ESP inputs, outputs or gain blocks have a range of -60dB to +12dB, whereas the PM8500N Amplifier Outputs do not have gain and therefore have a maximum level of 0dB (78h).

To set the master level of Group *n* to level *l*:

SG *n,l*<CR> where *n* is the Group number, 1 – 40h (1-64 decimal)
l is the level, 0h(-60dB) to 90h(+12dB) in 0.5dB steps (0-144 dec)
 or PM8500N, 0h(-60dB) to 78h(0dB) in 0.5dB steps (0-120 dec)

To query the level of Group *n*

GG *n*<CR> where *n* is the Group number, 1 – 20h (1-32 decimal)

Response:

GG *n,l* where *n,l* are the same as above.

EXAMPLES:

SG 2, 78<CR>	Set level for Group 2 to 0dB
GG 2<CR>	Query the level for Group 2
GG 2,78<CR>	Response indicating Group 2 is set to 0dB

3.3 Set Group Level Increment/Decrement (SH)

To increment (or decrement) the master level of Group *n* by *x* number of 0.5dB steps:

SH *n,d,x*<CR> where *n* is the Group number, 1 – 40h (1-64 decimal)
d is the direction, 1=up or 0=down
x is the number of 0.5dB steps in hexadecimal (e.g. 5dB = A)

EXAMPLES:

SH 5,1,6<CR>	Increase the level of Group 2 by 3dB
SH 7,0,3<CR>	Decrease the level of Group 7 by 1.5dB

3.4 Set/Get Group Master Mute (SN, GN)

To set or change the Mute state for Group *n*:

SN *n,m*<CR> where *n* is the Group number, 1 – 40h (1-64 decimal)
m is the state, M = Mute, U = Un-mute, T = Toggle mute state

To query the Mute state of Group *n*

GN *n*<CR> where *n* is the Group number, 1 – 40h (1-64 decimal)

Response:

GN *n,m* where *n,m* are the same as above.

EXAMPLES:

SN 4,M<CR>	Engage Mute for Group 4
GN 4<CR>	Query the Mute status for Group 4
GN 4,M<CR>	Response indicating Group 4 is Muted

3.5 Set/Get Preset (SP, GP)

With ControlSpace Designer v3.0 or later Presets are no longer supported and hence this command should not be used. It is provided here as reference for older ESP installations only.

To recall or invoke Preset *n*:

SP *n* <CR> where *n* is the Preset number, 1 - 10h (1-16 decimal)

To query for the last invoked Preset

GP <CR>

Response:

P *n* <CR> where *n* = 0 – 10h (*n* = 0 if no Preset recalled, e.g. after power-up)

EXAMPLES:

SP1<CR>	<i>Recall Preset 1</i>
GP<CR>	<i>Query for last invoked Preset</i>
P 1<CR>	<i>Response indicating Preset 1 was invoked last</i>

4 Device Commands

Device commands can only be issued directly to a ControlSpace device and will invoke changes locally within the connected device. Device commands use hexadecimal notation for numerical values and generally only 'Get' commands generate a response. Following a 'Set' command with a 'Get' is a useful way to confirm the success of a command.

- 4.1 Set/Get Input/Output Volume (SV, GV)**
- 4.2 Set Volume Increment/Decrement (SI)**
- 4.3 Set/Get Input/Output Mute (SM, GM)**
- 4.4 Get Signal Level (GL)**
- 4.5 Set/Get IP Address (IP)**
- 4.6 Set/Get Standby Status (SY, GY) [PM8500N Only]**
- 4.7 Get Configuration (GC) [PM8500N Only]**
- 4.8 Set/Get Fault Status (SF, GF) [PM8500N Only]**
- 4.9 Clear Fault/Alarms (CF) [PM8500N Only]**
- 4.10 Get/Clear Alarm History/Log (GH, CH) [PM8500N Only]**
- 4.11 Set/Get Alarm Reporting/Status (SR, GR) [PM8500N Only]**

The Volume (SV, GV, SI) and Mute (SM, GM) commands allow control of input/output levels and mutes directly, referenced by slot and channel number according to the physical architecture of the device, rather than by Module name. Whilst these commands are still currently supported it is recommended that Module commands (SA, GA) be used to control the input and output levels for new projects.

The ESP has 8 audio card slots and each card can support up to 8 channels, although many cards only have 4 channels and do not use channels 5-8. Surround decoder cards do not support these commands, but can be controlled directly via Module commands (SA/GA).

It is also possible to control the outputs of a PM8500N via these commands but the amplifier outputs only have attenuation, hence their maximum level is 0dB (78h). Outputs 1-4 of the PM8500N are referenced as Slot 2, channels 1-4 and Outputs 5-8 are referenced as Slot 4, channels 1-4 (similar to the stock configuration of an ESP-88).

4.1 Set/Get Input/Output Volume (SV, GV)

Input and output volume levels are referenced by slot and channel numbers according to the physical architecture of the device. The PM8500N only supports control of the outputs and is configured with Outputs 1-4 on slot 2, channels 1-4 and Outputs 5-8 on slot 4, channels 1-4.

Note: Set Volume commands will be ignored if the channel is muted.

To set the input/output volume of slot **s**, channel **c**, to level **l**:

SV s,c,l<CR> where **s** is the slot number, 1 – 8 (for ESP), 2 or 4 (for PM)
c is the channel number, 1 – 8 (for ESP), 1 - 4 (for PM)
l is the level, 0h(-60dB) to 90h(+12dB) in 0.5dB steps (0-144 dec)
 or PM8500N, 0h(-60dB) to 78h(0dB) in 0.5dB steps (0-120 dec)

To query the input/output level of slot **s**, channel **c**:

GV s,c<CR> where **s** is the slot number, 1 – 8 (for ESP), 2 or 4 (for PM)
c is the channel number, 1 – 8 (for ESP), 1 - 4 (for PM)

Response:

GV s,c,l where **s,c,l** are the same as above.

EXAMPLE:

SV 1,3,50<CR>	<i>Set volume for slot 1, channel 3 to -20dB</i>
GV 2,1<CR>	<i>Query the volume level for slot 2, channel 1</i>
GV 2,1,78<CR>	<i>Response indicating the level for slot 2 channel 1 is set to 0dB</i>

4.2 Set Volume Increment/Decrement (SI)

Input and output volume levels are referenced by slot and channel numbers according to the physical architecture of the device. The PM8500N only supports control of the outputs and is configured with Outputs 1-4 on slot 2, channels 1-4 and Outputs 5-8 on slot 4, channels 1-4.

Note: Set Volume Increment/Decrement commands will be ignored if the channel is muted.

To increment (or decrement) the level of slot **s**, channel **c**:

SI s,c,d,x<CR> where **s** is the slot number, 1 – 8 (for ESP), 2 or 4 (for PM)
c is the channel number, 1 – 8 (for ESP), 1 - 4 (for PM)
d is the direction, 1=up or 0=down
x is the number of 0.5dB steps in hexadecimal (e.g. 5dB = A)

EXAMPLE:

SI 2,3,1,6<CR>	<i>Increase the level of slot 2, channel 3 by 3dB</i>
SI 4,1,0,3<CR>	<i>Decrease the level of slot 4, channel 1 by 1.5dB</i>

4.3 Set/Get Input/Output Mute (SM, GM)

Input and output mutes are referenced by slot and channel numbers according to the physical architecture of the device. The PM8500N only supports control of the outputs and is configured with Outputs 1-4 on slot 2, channels 1-4 and Outputs 5-8 on slot 4, channels 1-4.

To set or change the Mute status for slot **s**, channel **c**:

SM s,c,m<CR> where **s** is the slot number, 1 – 8 (for ESP), 2 or 4 (for PM)
c is the channel number, 1 – 8 (for ESP), 1 – 4 (for PM)
m is the state, M = Mute, U = Un-mute, T = Toggle mute state

To query the Mute status for slot **s**, channel **c**:

GM s,c<CR> where **s** is the slot number, 1 – 8 (for ESP), 2 or 4 (for PM)
c is the channel number, 1 – 8 (for ESP), 1 – 4 (for PM)

Response:

GM s,c,m where **s,c,m** are the same as above.

EXAMPLE:

SM 2,1,M<CR>	Engage Mute for slot 2, channel 1
GM 3,2<CR>	Query the Mute status for slot 3, channel 2
GM 3,2,U<CR>	Response indicating slot 3, channel 2 is un-muted

4.4 Get Signal Level (GL)

This command can be used to return the current signal levels from an input or output card in the ESP-88/00 or the input and output levels of a PM8500N. The levels returned for ESP inputs and outputs, and PM inputs are dBFS in hexadecimal format. To convert to dBu, first convert to decimal and then add 24dB. For PM outputs the levels returned are dBVmax in hexadecimal format. For a mono channel Vmax (0dB/78h/120d) = 71V and for a bridged/quad channel Vmax (0dB/78h/120d) = 141V.

To query the current signal level for channels in slot **s**:

GL s<CR> where **s** is the slot number, 1 – 8 for ESP, 1 for PM input, 2 for PM output

Response:

GL s[1,2,3,4,5,6,7,8] **s** is the slot number, 1 – 8
1-8 are the dBFS levels for each channel (ESP/PM input)
 or dBVmax for each channel (PM output)
 0h(-60dB) to 78h(0dB) in 0.5dB steps (0-120 decimal)

Note: 4 channel cards will only return 4 values.

EXAMPLE:

GL 1<CR>	Query signal levels for slot 1
GL 1 [78,1,40,64]<CR>	Response indicating levels are 0,-59.5,-28,-10dBFS
GL 2<CR>	Query signal levels for PM8500N output levels
GL 2 [0,0,0,0,0,0,64,64]<CR>	Response indicating ch7& 8 are at -10dBVmax

4.5 Set/Get IP Address (IP)

The Set and Get IP address commands provide an alternative method for querying and changing the IP address of ControlSpace Devices should the Network Setup utility in ControlSpace Designer not be available, in particular for the ESP when the IP address is unknown (the IP address for the PM8500N can be found on the front panel).

To query the current IP address for the device:

`IP<CR>`

Response:

`IP xxx.xxx.xxx.xxx <CR>`

To set or change the IP address for the device:

`IP xxx.xxx.xxx.xxx<CR>`

EXAMPLE:

<code>IP<CR></code>	<i>Query the current IP address for the device</i>
<code>IP 192.168.0.160<CR></code>	<i>Response indicating an IP address of 192.168.0.160 is set</i>
<code>IP 192.168.1.160<CR></code>	<i>Command changing the IP address to 192.168.1.160 (after boot)</i>

Note: When using the IP command to change IP address, the changes do not take effect until after the device has been re-booted.

4.6 Set/Get Standby Status (SY, GY) [PM8500N Only]

The Set and Get Standby Status commands allow the power status of an individual PowerMatch PM8500N to be controlled remotely. Since entering or exiting standby is not immediate, adequate time should be allowed for the process to complete.

Alternatively the power status can be controlled via Parameter Set using the device's 'Standby' property. This option allows multiple PowerMatch PM8500Ns to be controlled together.

Note: This command is not supported on the ESP-88/00.

To set or change the standby state for a PM8500N

`SY s <CR>` where **s** is the state, S = Standby, N = Normal

To query the current standby state for the device:

`GY<CR>`

Response:

`GY s <CR>` where **s** is the state, S = Standby, N = Normal

EXAMPLE:

<code>SY S<CR></code>	<i>Put the PM8500N into standby mode</i>
<code>GY<CR></code>	<i>Query the current standby state</i>
<code>GY N<CR></code>	<i>Response indicating PM8500N is in Normal (ON) mode</i>

4.7 Get Configuration (GC) [PM8500N Only]

The Get Configuration (GC) command returns the current output configuration of a PowerMatchPM8500N amplifier. Knowledge of the output configuration can be useful when using the module (SA/GA) commands to change parameters.

To query the current output configuration

GC<CR>

Response:

GC 1,2,3,4,5,6,7,8<CR>

where **1-8** is the configured state for each channel of the amplifier: IN= Independent (Mono), BL = Bridged (LoZ), B7 = Bridged (70v), B1 = Bridged (100v), PA = Parallel, QL = Quad (LoZ), Q7 = Quad (70v), Q1 = Quad (100v)

EXAMPLE:

GC <CR>

GC IN,IN,BL,BL,Q7,Q7,Q7,Q7<CR>

Query the current output configuration

Response indicating channels 1&2 are

Independent, 3&4 are Bridged (Lo-Z) and 5-8 are in Quad (70v) mode.

4.8 Set/Get Fault Status (SF, GF) [PM8500N Only]

The Get Fault Status (GF) command queries the current state of the Fault Output on a PowerMatch PM8500N amplifier, whilst the Set Fault status (SF) command enables or disables unsolicited transmission of changes to the Fault Output state. The format of the unsolicited message is the same as the response to the Get Fault status (GF) command.

Note: The Set Fault status (SF) preference is not retained on power down and will default to 'Off' each time the amplifier is powered up.

To set (enable or disable) unsolicited notification of Fault Output state changes:

SF n<CR> where **n** is the notification state, O = ON, F = OFF

To query the current Fault status:

GF <CR>

Response:

GF f<CR> where **f** is the current Fault status, F= Fault, C = No Fault

EXAMPLE:

SF O<CR>

GF<CR>

GF F<CR>

Enable unsolicited output of Fault Output state changes

Query the current status of the Fault Output

Response indicating that the PM8500N is currently in a Fault state

4.9 Clear Fault/Alarms (CF) [PM8500N Only]

The Clear Fault/Alarms (CF) command clears any currently active alarm conditions and resets the Fault Output on a PM8500N. Note that if any alarm or fault conditions are still present after the reset, the alarm status and Fault output will automatically be set again.

To clear currently active alarm conditions/Fault output:

CF<CR>
Response:
 <ACK><CR>

EXAMPLE:

CF<CR>	<i>Command to clear active alarms/reset fault state</i>
<ACK><CR>	<i>Response indicating action was successful</i>

4.10 Get/Clear Alarm History/Log (GH, CH) [PM8500N Only]

The Get Alarm History (GH) command requests a dump of the internal alarm history/log to the serial output, whilst the Clear Alarm History (CH) command causes the internal alarm log to be cleared.

Note: The alarm log is returned in a similar format to the front panel display or the alarm panel in ControlSpace Designer.

To query/request the alarm log:

GH<CR>
Response:
 GH [Time, Date, Description<CR>
 Time, Date, Description<CR>

 Time, Date, Description]<CR>

To clear the internal alarm history/log

CH<CR>
Response:
 <ACK><CR>

EXAMPLE:

CH<CR>	<i>Request Alarm log be cleared</i>
<ACK><CR>	<i>Response indicating command was successful</i>

4.11 Set/Get Alarm Reporting/Status (SR, GR) [PM8500N Only]

The Get Alarm Status (GR) command queries the current alarm/fault status for a channel of the PowerMatch PM8500N amplifier, whilst the Set Alarm Reporting (SR) command enables or disables unsolicited transmission of alarm and fault events when they occur. The format of the unsolicited message is the same as the response to the Get Alarm Status (GR) command.

Note: The Set Alarm Reporting (SR) preference is not retained on power down and will default to 'Off' each time the amplifier is powered up.

To set (enable or disable) unsolicited notification of alarm/fault notifications:

SR *n*<CR> where *n* is the notification state, O = ON, F = OFF

Note: 'Optional' alarm conditions such as 'Open' or 'Limiting' will only be reported if checked in the 'Alarm Setup' dialog for the device In ControlSpace Designer

Unsolicited notification format:

GR *c,s,t,x*<CR> where *c* is the channel number, 1 – 8 (or 0 for non-channel specific alarms such as Digital Audio Loss or AC Mains Loss)
s is the severity; W=Warning, F=Fault, S= System
t is the alarm type; N=No Alarm, O=Open, S=Short, A=ACLoss, D=Digital Audio Loss, I=I-Share Jumper Missing, L=Limiting, C=Clip (Input), P=Protection, Z = Other
x is the condition; S=Set, C=Clear

To query the current alarm status for a single channel:

GR *c*<CR> where *c* is the channel number, 1 – 8

Response:

GR *c,s,t,x*<CR> where *c* is the channel number, 1 – 8
s is the severity; W= Warning, F=Fault, S= System, N=No Alarm
t is the alarm type; N=None, O=Open, S=Short, I=I-Share Jumper Missing, Z = Other

Note: In the event that multiple alarms/faults exist for the same channel the one with the highest severity will be returned.

The transient nature of alarms such as limiting or clipping means they cannot be queried manually, to receive such alarms turn on the automatic notification.

EXAMPLE:

SR O<CR>	Enable unsolicited notification of Alarm/Fault conditions
GR 5,F,I,S<CR>	Unsolicited notification that ch5/6 I share jumper is missing
GR 6,F,I,S<CR>	
GR 4<CR>	Query the current alarm/fault status for channel 4
GR 4,F,S<CR>	Response indicating that ch4 has a 'FAULT-SHORT'

5 Module Commands

Module commands allow control of parameters for a specific signal processing module on a specific device.

Set/Get Module Parameter (SA,GA)

The Set and Get Module Parameter command provides access to virtually any parameter, within any signal processing module, within any ControlSpace device. Devices and Modules are referenced by their 'Label' assigned via the ControlSpace Designer application. Unlike the ESP, where all signal processing module Labels are user-definable, only Input and Amplifier Output modules can be renamed on the PM8500. All other signal processing module Labels are currently fixed, their assigned Label can be found in the Properties window of ControlSpace Designer.

Note: If two modules within the same device have the same Label the SA and GA commands will not work. For example; if an output module is named "Left" and a PEQ module is also named "Left", neither module will respond to the SA or GA commands.

In combination with the module label, the parameter to change or query is identified using 1 or 2 indices. These indices are unique to each type of module and are detailed at the end of this section.

In addition to requesting a parameter value using the GA command it is also possible to receive automatic notification when a module's parameters change by prefixing the module name with "#" in ControlSpace Designer. For example; by renaming module "Hall" to "#Hall" a GA (Get Module Parameter) response will be transmitted over the serial connection when any of the parameters for the module are changed by a CC-16 or CC-64 etc. A response will not be sent if the change is made via serial command.

To set or change a module parameter (SA)

SA "Module Name">Index 1>Index 2=Value<CR>

where "Module Name"	is a unique Label set using ControlSpace Designer
>	'greater than' (ASCII 0x3E) is the separator between indices
Index 1	Index 1 is the primary index (all modules)
Index 2	Index 2 is a secondary index (some modules)
=	'equals' (ASCII 0x3D) indicates Value follows
Value	Value of parameter referenced by Module/Indices

Response:

ACK	if command is successful (ASCII 0x06)
<or>	
NAK nn	if command is received but unsuccessful (ASCII 0x15), where nn is a 2 digit error code, detailed in table below:

Code	Error
01	Invalid Module Name (no match found for module name)
02	Illegal Index (index value or quantity incorrect for specified module)
03	Value is out-of-range (value is not out-of-range for the specified parameter)
99	Unknown error

To query a module parameter (GA)

GA "Module Name">Index 1>Index 2<CR>

where "Module Name" is a unique Label set using ControlSpace Designer
> 'greater than' (ASCII 0x3E) is the separator between indices
Index 1 Index 1 is the primary index (all modules)
Index 2 Index 2 is a secondary index (some modules)

Response:

GA "Module Name">Index 1>Index 2>=Value<CR>

When using ESPs it is possible to send a module command to a different device than the device on which the module resides, provided the ESPs are correctly networked together.

Note: This facility is not currently available for the PM8500N so commands should be sent to each device individually.

To set or change a module parameter on a different Device (SA)

SA @ "Device Name" "Module Name">Index 1>Index 2=Value<CR>

where @ 'at' (ASCII 0x40) indicates command is for a different Device
"Device Name" is a unique Label set using ControlSpace Designer

Response:

ACK if command is successful (ASCII 0x06)

<or>

NAK nn if command is received but unsuccessful (ASCII 0x15),
where nn is a 2 digit error code – same as above

To query a module parameter on a different Device (GA)

GA @ "Device Name" "Module Name">Index 1>Index 2 <CR>

where @ 'at' (ASCII 0x40) indicates command is for a different Device
"Device Name" is a unique Label set using ControlSpace Designer

Response:

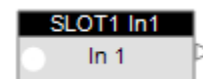
GA "Module Name">Index 1>Index 2>=Value<CR>

5.1 ESP-88/00 Module Indices



5.1.1 INPUT Module

There are 5 parameters which can be set for this module selected simply by using the appropriate value for **Index 1**.



			Value	Range
Index 1	1	Type	M,L	M=Mic, L=Line
	2	Gain	NN	0,14,24,42,48,54,64
	3	Level	NN.N	-999 to +12.0dB, 0.5dB step
	4	Mute	O,F,T	O=On, F=Off, T=Toggle
	5	Phantom	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

SA"In 1">3=-21<CR>	Set the level for Input module "In 1" to -21dB
SA"In 1">4=O<CR>	Set the mute for Input module "In 1" to On
GA"In 2">5<CR>	Query whether phantom is active for Input module "In 2"
GA"In 2">5=F<CR>	Response indicating phantom for "In 2" is currently Off

5.1.2 OUTPUT Module

There are 3 parameters which can be set for this module, selected simply by using the appropriate value for **Index 1**.



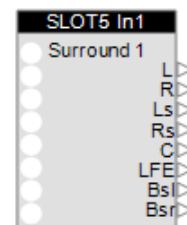
			Value	Range
Index 1	1	Level	NN.N	-999 to +12.0dB, 0.5dB step
	2	Mute	O,F,T	O=On, F=Off, T=Toggle
	3	Polarity	O,F,T	O=On, F=Off, T=Toggle
	4	Reserved		

EXAMPLES:

SA"Out Main">1=-3.5<CR>	Set the level for Output module "Out Main" to -3.5dB
SA"Output L">2=F<CR>	Set the mute for Output module "Output L" to Off
GA"Out 1">1<CR>	Query the current level for Output module "Out 1"
GA"Out 1">1=-6<CR>	Response indicating "Out 1" is currently set to -6dB

5.1.3 SURROUND INPUT Module

In total there are 11 parameters which can be accessed for this module, selected simply by using the appropriate value for **Index 1**. By their nature Output Format and Room Type will be read-only.



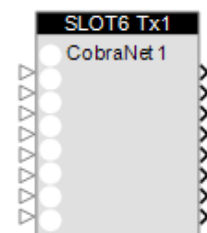
			Value	Range
Index 1	1	Input Source	O,C	O=Optical, C=Coaxial
	2	Output Format (read-only)	XXXXX	N=No Signal, PCM16=PCM, DD51=Dolby5.1, DTS51=DTS5.1, ES61D=DTS6.1 Discrete ES61M=DTS6.1 Matrix DD1=Dolby1.0, DD2=Dolby2.0, DTS1=DTS1.0, DTS2=DTS2.0, DTS21=DTS2.1, DTS30=DTS3.0, DTS40=DTS4.0, DTS50=DTS5.0
	3	Room Type (read-only)	S,L,N	S=Small, L=Large, N=None
	4	Left Front Level	NN.N	-60.5 to 12.0, 0.5 step
	5	Right Front Level	NN.N	-60.5 to 12.0, 0.5 step
	6	Left Surround Level	NN.N	-60.5 to 12.0, 0.5 step
	7	Right Surround Level	NN.N	-60.5 to 12.0, 0.5 step
	8	Center Level	NN.N	-60.5 to 12.0, 0.5 step
	9	LFE (Sub) Level	NN.N	-60.5 to 12.0, 0.5 step
	10	Back Surround Left Level	NN.N	-60.5 to 12.0, 0.5 step
	11	Back Surround Right Level	NN.N	-60.5 to 12.0, 0.5 step

EXAMPLES:

<code>SA"Surround 1">1=C<CR></code>	Select the coaxial input for Surround card "Surround 1"
<code>SA"Surround 1">8=-5<CR></code>	Set the center channel level for "Surround 1" to -5dB
<code>GA"Surround 1">2<CR></code>	Query the current Output Format from the digital stream
<code>GA"Surround 1">2=DD51<CR></code>	Response indicating current format is Dolby Digital 5.1

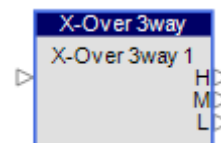
5.1.4 COBRANET I/O Modules

Direct control of CobraNet Input and Output modules via serial command is not currently supported, instead parameters can be changed indirectly using Parameter Sets.



5.1.5 CROSSOVER Module

Available parameters for the Crossover vary per section (Low, Mid and High) and depending on the type of Crossover there can be 2, 3 or 4 sections.



Index 1 is used to select the Crossover section to control according to the Crossover type as shown in the table below:

Type	2 Way	3 Way	4 Way
Index 1	1 LOW	LOW	LOW
	2 HIGH	MID	LO MID
	3 -	HIGH	HIMID
	4 -	-	HIGH

Index 2 is then used to select the parameter to change dependant on the Crossover section selected by Index 1 as illustrated in the tables below:

LOW			Value	Range
Index 2	1	Type	*1	→
	2	Frequency	NNNNN	20Hz to 20000Hz
	3	Reserved		
	4	Polarity	O,F,T	O=On, F=Off, T=Toggle
	5	Mute	O,F,T	O=On, F=Off, T=Toggle

HIGH			Value	Range
Index 2	1	Type	*1	→
	2	Frequency	NNNNN	20Hz to 20000Hz
	3	Reserved		
	4	Polarity	O,F,T	O=On, F=Off, T=Toggle
	5	Mute	O,F,T	O=On, F=Off, T=Toggle

MID			Value	Range
Index 2	1	Type (HPF)	*1	→
	2	Frequency	NNNNN	20Hz to 20000Hz
	3	Type (LPF)	*1	→
	4	Frequency	NNNNN	20Hz to 20000Hz
	5	Reserved		
	6	Polarity	O,F,T	O=On, F=Off, T=Toggle
	7	Mute	O,F,T	O=On, F=Off, T=Toggle

*1 Filter type descriptions

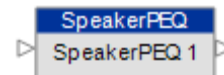
	Slope	Strings
Butterworth	6dB/oct	But6
	12dB/oct	But12
	18dB/oct	But18
	24dB/oct	But24
	36dB/oct	But36
Bessel	48dB/oct	But48
	12dB/oct	Bes12
	18dB/oct	Bes18
	24dB/oct	Bes24
	36dB/oct	Bes36
Linkwitz-Reilly	48dB/oct	Bes48
	12dB/oct	Lin12
	24dB/oct	Lin24
	36dB/oct	Lin36
	48dB/oct	Lin48

EXAMPLES:

SA"X-Over">1>2=80<CR> Set the freq. for the Low section of "X-Over" to 80Hz
 SA"X-Over">1>1=But24<CR> Set filter type for the Low section of "X-Over" to Butterworth 24dB/octave
 GA"X-Over 2">4>5<CR> Query mute status of the High section of 4way "X-Over 2"
 GA"X-Over 2">4>5=F<CR> Response indicating High section of "X-Over 2" is unmuted

5.1.6 SPEAKER PARAMETRIC EQ Module

The Speaker Parametric EQ module has 9 bands of parametric EQ, a band-pass filter and alignment delay. The same parameters are adjustable for each parametric EQ band. **Index 1** is used to select the EQ band to adjust (1-9) or setting **Index 1** to 0 accesses the Band Pass, Alignment Delay and EQ Gain parameters. **Index 2** is then used to select the desired parameter to adjust according to the tables below. Parameters indicated as 'Reserved' should not be used.



Index 1: Selects the desired EQ Band (1-9) or 0 for Band Pass/Delay/EQ Gain

Band Pass, Alignment Delay & EQ Gain (Index 1 = 0)

Band Pass/Align Delay/EQ Gain		Value	Range
Index 2	1	Reserved	
	2	Reserved	
	3	Gain	+/- NN.N -15.0dB to +15.0dB, 0.5dB step
	4	Align Delay	NNN 0 to 480 as number of samples
	5	Type (HPF)	*1
	6	Frequency	NNNNN 20 to 20000Hz
	7	Type LPF)	*1
	8	Frequency	NNNNN 20 to 20000Hz
	9	HP Bypass	O,F,T O=On, F=Off, T=Toggle
	10	LP Bypass	O,F,T O=On, F=Off, T=Toggle

*1 Filter type descriptions

	Slope	Strings
Butterworth	6dB/oct	But6
	12dB/oct	But12
	18dB/oct	But18
	24dB/oct	But24
	36dB/oct	But36
Bessel	48dB/oct	But48
	12dB/oct	Bes12
	18dB/oct	Bes18
	24dB/oct	Bes24
	36dB/oct	Bes36
Linkwitz-Reilly	48dB/oct	Bes48
	12dB/oct	Lin12
	24dB/oct	Lin24
	36dB/oct	Lin36
	48dB/oct	Lin48

Parametric EQ Band (Index 1 = 1 – 9)

PEQ Band		Value	Range
Index 2	1	Frequency	NNNNN 200 to 20000Hz
	2	Q	NN.N 0.10 to 10.0, 0.1 step
	3	Gain	+/-NN.N -20.0dB to +20.0dB, 0.1dB step
	4	Reserved	
	5	Type	XX B=Band, HS=High Shelf, LS=Low Shelf, N=Notch
	6	Bypass	O,F,T O=On, F=Off, T=Toggle

The parameters in use for each band will be dependent on the Type of filter selected as illustrated in the table below:

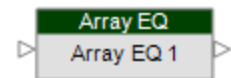
Type	Freq.	Q	Gain	Bypass	Strings
Band	o	o	o	o	B
High shelf	o		o	o	HS
Low shelf	o		o	o	LS
Notch	o	o	o	o	N

EXAMPLES:

SA"SPEQ 1">0>5=Bes36<CR> Set the HP Filter type for "SPEQ 1" to Bessel 36dB/oct
 SA"Array L">2>1=200<CR> Set the frequency for PEQ band 2 of "Array L" to 200Hz
 GA"Array L">0>3<CR> Query the EQ gain SPEQ module "Array L"
 GA"Array L">0>3=2<CR> Response indicating the EQ gain is currently at +2dB

5.1.7 ARRAY EQ Module

Index 1 should always be set to 1 to access this module. There are 7 parameters which can be set for the Array EQ module on the ESP selected by using the appropriate value for **Index 2**. By the nature of the module you would not use the Array parameters (7 & 8) and the Advanced parameters (1,2 & 3) at the same time. Parameter 4 is reserved and should not be used.



Index 1: Selects module (always=1)

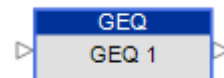
			Value	Range
Index 2	1	Cntr Freq	NNN	220 to 700Hz
	2	Tilt	NN.N	0.0 to 10.0. 0.1 step
	3	Gain	+/-NN.N	-12.0dB to +2.0dB, 0.1dB step
	4	Reserved		
	5	Bypass	O,F,T	O=On, F=Off, T=Toggle
	6	Advanced	O,F,T	O=On, F=Off, T=Toggle
	7	# Modules	N	2 to 8, 1 step
	8	Vert. Angle	NN	20-100, 5 step

EXAMPLES:

SA"Array EQ 1">1>7=6<CR> Set the qty of RoomMatch™ modules for "Array EQ 1" to 6
 SA"Main L">1>8=80<CR> Set the Vertical coverage angle for "Main L" to 80 deg
 GA"Array EQ">1>5<CR> Query the current state of Bypass for "Array EQ"
 GA"Array EQ">1>5=O<CR> Response indicating Bypass for "Array EQ" is currently On

5.1.8 1/3 OCTAVE 31-BAND GRAPHIC EQ Module

Each of the 31 bands can be adjusted individually and is selected simply by using the appropriate value for **Index 1**. In addition there is also a “Bypass all” function selected by setting **Index 1** to 32.



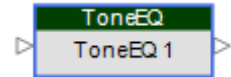
		<i>Freq.</i>	<i>Value</i>	<i>Range</i>
Index 1	1	20Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	2	25Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	3	31.5Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	4	40Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	5	50Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	6	63Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	7	80Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	8	100Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	9	125Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	10	160Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	11	200Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	12	250Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	13	315Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	14	400Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	15	500Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	16	630Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	17	800Hz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	18	1kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	19	1.25kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	20	1.6kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	21	2kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	22	2.5kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	23	3.15kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	24	4kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	25	5kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	26	6.3kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	27	8kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	28	10kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	29	12.5kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	30	16kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	31	20kHz	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	32	Bypass All	O,F,T	O=On, F=Off, T=Toggle
	33	Reserved		

EXAMPLES:

SA"GEQ 1">18=-3.5<CR>	Reduce the 1kHz band of GEQ module "GEQ 1" by 3.5dB
SA"GEQ 1">24=5<CR>	Increase the 4kHz band of GEQ module "GEQ 1" by 5dB
GA"GEQ Bar">11<CR>	Query the current level for the 200Hz band of "GEQ Bar"
GA"GEQ Bar">11=-6<CR>	Response indicating the 200Hz band is currently at -6dB

5.1.9 TONE CONTROL EQ Module

Each of the 3 bands can be adjusted or can be bypassed by simply selecting the appropriate value for **Index 1** as shown in the table:



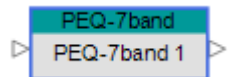
			Value	Range
Index 1	1	L-Gain	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	2	L-Bypass	O,F,T	O=On, F=Off, T=Toggle
	3	M-Gain	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	4	M-Bypass	O,F,T	O=On, F=Off, T=Toggle
	5	H-Gain	+/-NN.N	-15.0dB to +15.0dB, 0.1dB step
	6	H-Bypass	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

SA"ToneEQ L">1=-4<CR>	Set the Low band of ToneEQ module "ToneEQ L" to -4dB
SA"Hall EQ">6=O<CR>	Bypass the High band of ToneEQ module "Hall EQ"
GA"ToneEQ 1">3<CR>	Query the current level for the Mid band of "ToneEQ 1"
GA"ToneEQ 1">3=-3<CR>	Response indicating the Mid band is currently at -3dB

5.1.10 PARAMETRIC EQ Module

Parametric EQ modules are available with 3, 5, 7 or 9 bands. The same parameters are adjustable for each band. **Index 1** is used to select which band to adjust (1-9) and **Index 2** is used to select the parameter to adjust according to the table below:



Index 1: Selects desired Parametric EQ band 1-9

			Value	Range
Index 2	1	Frequency	NNNNN	20 to 20000Hz
	2	Q	NN.N	0.10 to 10.0, 0.1 step
	3	Gain	+/-NN.N	-20.0dB to +20.0dB, 0.1dB step
	4	Slope	-NN	0,-6,-12dB/oct
	5	Type	XX	*1
	6	Bypass	O,F,T	O=On, F=Off, T=Toggle

The parameters in use for each band will be dependent on the Type of filter selected as illustrated in the table below:

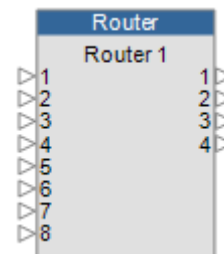
*1: Parameters are enabled according to Band type						
Type	Freq.	Q	Gain	Bypass	Slope	String
Band	o	o	o	o		B
High shelf	o		o	o		HS
Low shelf	o		o	o		LS
High cut (Low Pass)	o			o	o	HC
Low cut (High pass)	o			o	o	LC
Notch	o	o	o	o		N

EXAMPLES:

SA"PEQ 1">1>1=2000<CR> Set the frequency for band 1 of module "PEQ 1" to 2kHz
 SA"Room EQ">2>5=LC<CR> Use a 'Low Cut' (High Pass) filter for band 2 of "Room EQ"
 GA"House L">5>3<CR> Query the gain for band 5 of PEQ module "House L"
 GA"House L">5>3=-2<CR> Response indicating band 5 of "House L" is at -2dB

5.1.11 ROUTER Module

The Router module is available in a number of different input/output combinations, but the command format is essentially the same. **Index 1** is used to select the output channel and the Value indicates the desired input to be routed to that output.



Index 1: Output number: 1-16

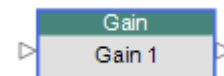
Value: Input number: 0-16 where 0 = Off (no input routed)

EXAMPLES:

SA"Router 1">1>5<CR> Set output 1 of Router module "Router 1" to input 5
 SA"Router 2">3>0<CR> Set output 3 of Router module "Router 2" to Off (no input)
 GA"Select">4<CR> Query which input is routed to output 4 of "Select"
 GA"Select">4>2<CR> Response indicating output 4 of "Select" is set to input 2

5.1.12 GAIN Module

Level or Mute parameter can simply be selected by using **Index 1** as shown in the table below:



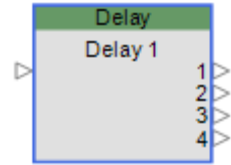
			Value	Range
Index 1	1	Level	+/-NN.N	-999.0dB to +12.0dB, 0.5dB step
	2	Mute	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

SA"Gain 1">1>-30<CR> Set the level of Gain module "Gain 1" to -30dB
 SA"Main Volume">2>F<CR> Set mute state of Gain module "Main Volume" to un-muted
 GA"Gain 4">1<CR> Query the current level of Gain module "Gain 4"
 GA"Gain 4">1>3<CR> Response indicating level of "Gain 4" is currently 3dB

5.1.13 DELAY Module

Delay modules are available with 1, 2, 4 or 8 output taps. The delay time for each tap can be adjusted individually or bypassed. **Index 1** is used to select the desired tap and **Index 2** is used to select the parameter to adjust as shown in the table below:



Index 1: Selects the desired Delay output tap (1-8)

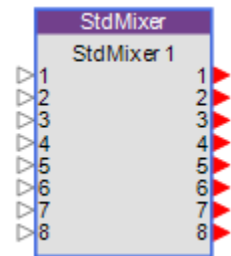
			Value	Range
Index 2	1	Delay time	NNNNNN	0 to 144000 as number of samples
	2	Bypass	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

SA"Delay 1">4>1=2592<CR> Set the delay time for tap 4 of module "Delay 1" to 54msec
(54msec = 0.054sec, $0.054 \times 48000 = 2592$ samples)
SA"Out Delay">2>2=F<CR> Set bypass for tap 2 of Delay module "Out Delay" to Off
GA"Delay 2">1>1<CR> Query the current delay time for tap 1 of "Delay 2"
GA"Delay 2">1>1=9600<CR> Response with delay time for tap 1 of "Delay 2" is 200ms
(9600 samples, $9600/48000 = 0.2\text{sec} = 200\text{msec}$)

5.1.14 STANDARD MIXER Module

The Standard Mixer module allows control of input level/mute, output level/mute and cross-point routing. Cross-point routing can be set using two different methods; the first routes all the outputs for a particular input with a single command, the second allows an individual cross-point (input,output) to be controlled directly.



Index 1 is used to select whether an input, output or a cross-point (and the cross-point method) is being controlled according to the table below:

		Parameters	Notes
Index 1	1	Input	Set Input Parameters
	2	Output	Set Output Parameters
	3	Cross-Point 1	Route Input to Multiple Outputs
	4	Cross-Point 2	Set Cross-Point On/Off Directly

Index 2 is then used to select the parameter to set or query dependant on whether an input, output or cross-point was selected by the first index. In the following tables M = # of inputs and N = # of outputs in the module.

Input (Index 1=1)			Value	Range
Index 2	1	Input 1 Level	NN.N	-999 to +12.0dB, 0.5 step
	2	Input 1 Mute	O,F,T	O=On, F=Off, T=Toggle
	::			
	Mx2-1	Input M Level	NN.N	-999 to +12.0dB, 0.5 step
	Mx2	Input M Mute	O,F,T	O=On, F=Off, T=Toggle

Output (Index 1=2)			Value	Range
Index 2	1	Output 1 Level	NN.N	-999 to +12.0dB, 0.5 step
	2	Output 1 Mute	O,F,T	O=On, F=Off, T=Toggle
	::			
	Nx2-1	Output N Level	NN.N	-999 to +12.0dB, 0.5 step
	Nx2	Output N Mute	O,F,T	O=On, F=Off, T=Toggle

Cross-point 1 – Routing an input to multiple outputs with a single command (Index 1=3)

CrossPoint 1 (Index 1=3)			Value	Range
Index 2	1	Input 1 Routing	XXXXXXXX	Hex representation of routing
	2	Input 1 Routing	XXXXXXXX	Hex representation of routing
	::			
	M	Input M Routing	XXXXXXXX	Hex representation of routing

The desired output routing for an input is sent as an array of eight Hex values, where each Hex value represents the routing for 4 channels converted from Binary. This allows the routing for 32 outputs to be set in a single command. Even when the Standard Mixer module used has less than 32 outputs all 8 Hex values should be sent.

Example: To route input 1 to outputs: 1,6,9,12,15,18,21,22,23,24,27,28,29 & 31 the array of Hex values would be '84924F3A' as illustrated below:

	Output channel																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
In 1	0	-	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	0	0	0	-	-	0	0	0	-	0	-	
HexValue	8				4				9				2				4				F				3				A			

Cross-point 2 – Controlling a cross-point (input,output) directly (Index 1=4)

Index 2: (input,output)
Value: O=On,F=Off,T=Toggle

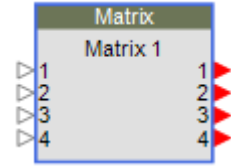
EXAMPLES:

SA"StdMixer 1">1>1=-3<CR> Set the level for input 1 of module "StdMixer 1" to -3dB
 SA"My Mixer">2>16=O<CR> Set mute state for output 8 of module "My Mixer" to On
 SA"Mix">3>2=C0000000<CR> Route input 2 to outputs 1&2 on "Mix" using Cross-point 1
 SA"Theatre">4>(4,5)=O<CR> Route input 4 to output 5 on "Theatre" using Cross-point 2
 GA"Mix">3>4<CR> Query the routing for input 4 of "Mix" using Cross-point 1
 GA"Mix">3>4=03000000<CR> Response indicating input 4 is routed to outputs 7&8
 GA"Theatre">4>(6,8)<CR> Query whether input 6 is routed to output 8 on "Theatre"
 GA"Theatre">4>(6,8)=F<CR> Response indicating input 6 is not routed to output 8

5.1.15 MATRIX MIXER Module

The Matrix Mixer module allows cross-points to be switched on/off or the level at the cross-point to be adjusted.

Index 1 is used to select whether the cross-point state (on/off) or level will be adjusted according to the table below:



		<i>Parameter</i>	<i>Notes</i>
Index 1	1	On/Off	Set Cross-Point On/Off
	2	Level	Set Level

Index 2 is then used to select which cross-point is to be controlled; stepping through available outputs for input 1, then through the outputs for input 2 and so on. **Index 2** will be the same irrespective of whether the state (on/off) or level is being controlled, but **Index 1** and the **Value** will change. In the following tables M = # of inputs and N = # of outputs in the module.

On/Off			<i>Value</i>	<i>Range</i>
Index 2	1	Cross Point(1,1)	O,F,T	O=On, F=Off, T=Toggle
	2	Cross Point(1,2)	O,F,T	O=On, F=Off, T=Toggle
	Index 2 = (Input # -1) x Size of Matrix + Output #:			
	MxN	Cross Point(M,N)	O,F,T	O=On, F=Off, T=Toggle

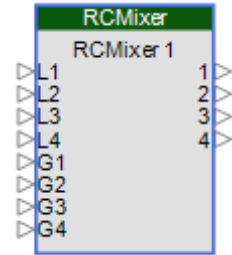
Level			<i>Value</i>	<i>Range</i>
Index 2	1	Cross Point(1,1)	NN.N	-999 to 0.0dB, 0.5 step
	2	Cross Point(1,2)	NN.N	-999 to 0.0dB, 0.5 step
	Index 2 = (Input # -1) x Size of Matrix + Output #:			
	MxN	Cross Point(M,N)	NN.N	-999 to 0.0dB, 0.5 step

EXAMPLES:

SA"Matrix 1">1>2=O<CR>	Set cross-point 2 (input 1, output2) for "Matrix 1" to On
SA"Mix">2>8=-20<CR>	Set level for cross-point 8 (in2,out4 for 4x4) "Mix" to -20dB
GA"My Matrix">1>16<CR>	Query the current state for cross-point 16 (in4,out4 for 4x4)
GA"My Matrix">1=16=F<CR>	Response indicating cross-point 16 is currently Off

5.1.16 ROOM COMBINER MIXER Module

The Room Combiner module allows a number of rooms to operate independently or to be combined such that the combined rooms play the same sources at the same volume. The parameters for each room can be controlled individually along with the room combination switches.



Index 1 is used to select the Room to be controlled or if set to the number of rooms +1 it indicates that the room combine switches are to be controlled as described in the table below:

		Parameters	Notes
Index 1	1	Room 1	Set Room 1 Parameters
	2	Room 2	Set Room 2 Parameters
	::		
	n	Room n	Set Room n Parameters
	n+1	Room Joins	Set Room Joins

Index 2 is then used to select the room parameter or room combine switch to control according to the tables below, dependent on the value selected for Index 1.

Room (Index 1=1 to n)			Value	Range
Index 2	1	Local In Level	NN.N	-999 to +12.0dB, 0.5 step
	2	Local In Select	O,F,T	O=On, F=Off, T=Toggle
	3	Global In Level	NN.N	-999 to +12.0dB, 0.5 step
	4	Global In Select	N	Selected Ch #, 0=Off

Room Joins (Index 1=n+1)			Value	Range
Index 2	1	Join 1	O,F,T	O=On, F=Off, T=Toggle
	2	Join 2	O,F,T	O=On, F=Off, T=Toggle
	::			
	n-1	Join n-1	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

SA"RCMix 1">1>1=-10<CR>	Set local input level for Room 1 of "RCMix 1" to -10dB
SA"Rooms">3>4=2<CR>	Select global input 2 for Room 3 of module "Rooms"
SA"RCMix 1">5>1=O	Set combine switch for Rooms 1&2 on "RCMix 1" to On (assuming 4 room module)
GA"ConfRms">2>3<CR>	Query current global input level for Room 2 of "ConfRms"
GA"ConfRms">2>3=0<CR>	Response indicating global input level for Room 2 is 0dB

5.1.17 SIGNAL GENERATOR Modules

The available parameters for Signal Generator modules vary according to the type (Sine, Noise and Sweep), but the same command format is used.

Index 1 is used to select the type of Signal Generator module being controlled according to the table below.

		Signal
Index 1	1	Sine Wave
	2	White Noise
	3	Pink Noise
	4	Sweep



When a Noise module is used it is possible to switch between White or Pink noise by setting **Index 1** to values 2 or 3 respectively without additional indices (e.g. SA "Noise 1">1=3 to set Pink Noise)

Index 2 is then used to select the parameter to change dependant on the Generator type selected by Index 1 as illustrated in the tables below:

Sine Wave			Value	Range
Index 2	1	Frequency	NNNNN	20 to 20000Hz
	2	Gain	NN.N	-999 to +12.0dB, 0.5 step
	3	Mute	O,F,T	O=On, F=Off, T=Toggle

White/Pink Noise			Value	Range
Index 2	1	Gain	NN.N	-999 to +12.0dB, 0.5 step
	2	Mute	O,F,T	O=On, F=Off, T=Toggle

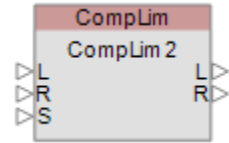
Sweep			Value	Range
Index 2	1	Gain	NN.N	-999 to +12.0dB, 0.5 step
	2	Slow/Fast	S,F	S=Slow, F=Fast
	3	Repeat	O,F	O=On (repeat), F=Off (no repeat)
	4	Start/Stop	O,F	O=On (start), F=Off (stop)

EXAMPLES:

SA"Sine 1">1>500<CR>	Set the frequency for Sine Generator "Sine 1" to 500Hz
SA"Noise 1">1=2<CR>	Set Noise Generator "Noise 1" to White noise
SA"Noise 1">2=2=O	Set the Mute state of White noise gen "Noise 1" to Muted
GA"Sweep 1">4>2<CR>	Query whether module "Sweep 1" is set to Slow or Fast
GA"Sweep 1">4>2=F<CR>	Response indicating "Sweep 1" is currently set to Fast

5.1.18 COMPRESSOR/LIMITER Module

There are 6 parameters which can be set for this module, selected simply by using the appropriate value for **Index 1**. For a mono Compressor module set the Detection Input to 'L' (Left) to use the Signal input or 'S' to use the Sidechain input, 'R' and 'M' are unused.



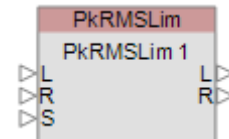
			Value	Range
Index 1	1	Detect Input	L,R,M,S	L=Left, R=Right, M=Mix, S=Sidechain
	2	Threshold	NN.N	0 to -40dBFS, 0.5 step
	3	Ratio	NN.N	1 to 20, 0.1 step
	4	Attack	NNN.N	0.5 to 100ms, 0.5 step
	5	Release	NNNN.N	1 to 1000ms, 0.5 step
	6	Bypass	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

SA"CompLim 1">1=M<CR> Set the detection input for module "CompLim 1" to Mix
 SA"CompLim 1">2=-20<CR> Set the threshold for module "CompLim 1" to -20dBFS
 GA"Main Out">6<CR> Query the current state of the bypass for "Main Out"
 GA"Main Out">6=F<CR> Response indicating bypass for "Main Out" is currently Off

5.1.19 PEAK/RMS LIMITER Module

There are 8 parameters which can be set for this module, selected simply by using the appropriate value for **Index 1**. For a mono Peak/RMS Limiter module set the Detection Input to 'L' (Left) to use the Signal input or 'S' to use the Sidechain input, 'R' and 'M' are unused. Parameters indicated as 'Reserved' should not be used.



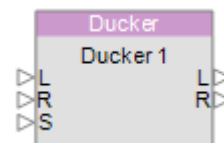
			Value	Range
Index 1	1	Detect Input	L,R,M,S	L=Left, R=Right, M=Mix, S=Sidechain
	2	PK Threshold	NN.N	0 to -40 dBFS 0.5 Step
	3	Reserved		
	4	Reserved		
	5	Reserved		
	6	Bypass	O,F,T	O=On, F=Off, T=Toggle
	7	RMS Threshold	NN.N	0 to -40 dBFS 0.5 Step
	8	RMS Attack	NNNNN	500 to 10,000ms, 100 step
	9	RMS Release	NNNNN	500 to 10,000ms, 100 step
	10	Reserved		

EXAMPLES:

SA"PkRMSLim 1">1=R<CR> Set the Detect Input for stereo "PkRMSLim 1" to R(ight)
 SA"Limiter 1">7=-20<CR> Set the RMS limiter threshold for "Limiter 1" to -20dBFS
 GA"Array L">2<CR> Query the Peak limiter threshold for "Array L"
 GA"Array L">2=-6<CR> Response indicating the Peak limiter threshold is -6dBFS

5.1.20 DUCKER Module

There are 6 parameters which can be set for this module, selected simply by using the appropriate value for **Index 1**. Index 1=1 is reserved and should not be used.



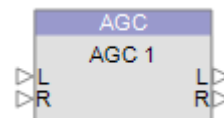
		Value	Range
Index 1	1	<i>Reserved</i>	
	2	Threshold	NN.N 0 to -40 dBFS 0.5 Step
	3	Range	NN.N 0 to -70dBFS, 0.5 step
	4	Attack	NNN.N 0.5 to 100ms, 0.5 step
	5	Hold	NNNN 0 to 1000ms, 1 step
	6	Decay	NNNNN 5 to 50000ms, 1 step
	7	Bypass	O,F,T O=On, F=Off, T=Toggle

EXAMPLES:

SA"Ducker 1">2=-5<CR>	Set the threshold for module "Ducker 1" to -5dBFS
SA"Ducker 1">3=-60<CR>	Set the range (attenuation) for "Ducker 1" to -60dBFS
GA"Page Over">7<CR>	Query the current state of the bypass for "Page Over"
GA"Page Over">7=O<CR>	Response indicating bypass for "Page Over" is On

5.1.21 AGC Module

There are 3 parameters which can be set for this module, selected simply by using the appropriate value for **Index 1**. The mono AGC module does not have Detector selection and hence Index 1=1 would not be used. Index 1=3-5 are reserved and should not be used for either module.



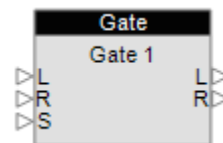
		Value	Range
Index 1	1	Detector (stereo)	L,R,M L=Left, R=Right, M=Mix
	2	Threshold	NN.N 0 to -40 dBFS 0.5 Step
	3	<i>Reserved</i>	
	4	<i>Reserved</i>	
	5	<i>Reserved</i>	
	6	Bypass	O,F,T O=On, F=Off, T=Toggle

EXAMPLES:

SA"AGC 1">1=M<CR>	Set the detector of stereo AGC module "AGC 1" to Mix
SA"AGC 1">2=-20<CR>	Set the threshold for AGC module "AGC 1" to -20dBFS
GA"BGM">6<CR>	Query the current state of the bypass for "BGM"
GA"BGM">6=F<CR>	Response indicating bypass for module "BGM" is Off

5.1.22 GATE Module

There are 7 parameters which can be set for this module, selected simply by using the appropriate value for **Index 1**. For a mono Gate module set the Detector to 'L' (Left) to use the Signal input or 'S' to use the Sidechain input, 'R' and 'M' are unused.



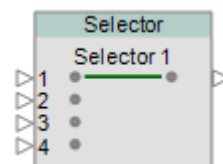
			Value	Range
Index 1	1	Detector	L,R,M,S	L=Left, R=Right, M=Mix, S=Sidechain
	2	Threshold	NN.N	0 to -40 dBFS 0.5 Step
	3	Range	NN.N	0 to -70dBFS, 0.5 step
	4	Attack	NNN.N	0.5 to 100ms, 0.5 step
	5	Hold	NNNN	0 to 1000ms, 1 step
	6	Decay	NNNNN	5 to 50000ms, 1 step
	7	Bypass	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

<code>SA"Gate 1">6=2000<CR></code>	Set the Decay time for module "Gate 1" to 2000ms
<code>SA"Gate 1">7=T<CR></code>	Toggle the state of the Bypass for module "Gate 1"
<code>GA"Gate1">7<CR></code>	Query the current state of the Bypass for "Gate 1"
<code>GA"Gate 1">7=F<CR></code>	Response indicating Bypass for module "Gate 1" is Off

5.1.23 SOURCE SELECTOR Module

The Source Selector module available in both mono and stereo versions and with different quantities of inputs, but the command format is essentially the same. **Index 1** is always 1 and the **Value** is used to select the input.



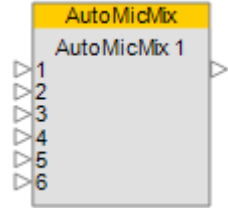
Index 1: Channel (always =1)
Value: Input number: 1-16

EXAMPLES:

<code>SA"Selector 1">1=5<CR></code>	Set Source Selector module "Selector 1" to input 5
<code>GA"Bar">1<CR></code>	Query which input is currently selected for module "Bar"
<code>GA"Bar">1=2<CR></code>	Response indicating input 2 is currently selected

5.1.24 AUTOMATIC MIC MIXER Module

Automatic Mic Mixer modules are available with 4, 6 or 8 inputs. The same parameters are adjustable for each of the inputs. **Index 1** is used to select the input (1-8) and **Index 2** is used to select the parameter to adjust according to the table below. In addition there are some output parameters that may be adjusted by setting **Index 1** = 0. Some parameters are only relevant for particular detection modes (such as Push-to-talk) and would otherwise be unused. Parameters that are indicated as 'Reserved' should not be used in any mode.



Index 1: Selects desired Input (1-8) or 0 for Output

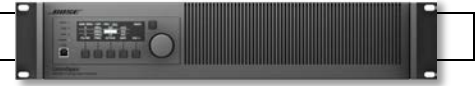
Output (Index 1 = 0)			Value	Range
Index 2	1	Gain	NN.N	-999 to 0.0 dB, 0.5 step
	2	NOM	O,F,T	O=On, F=Off, T=Toggle
	3	Mute	O,F,T	O=On, F=Off, T=Toggle

Input (Index 1 = 1-8)			Value	Range
Index 2	1	Priority	O, F, T	O=On, F=Off, T=Toggle
	2	Gain	NN.N	-999 to 0.0 dB, 0.5 step
	3	Detection	N	1=Threshold, 2=LastOn, 3=PushToTalk, 4=Bypass
	4	Threshold	NN.N	-80.0 to 0.0 dB, 0.5 step
	5	Gate Depth	NN.N	-70.0 to 0.0 dB, 0.5 step
	6	Hold	NNNNN	1 to 50000 ms, 1 step
	7	Ducking Depth	NN.N	-60.0 to 0.0 dB, 0.5 step
	8	Decay	NNNNN	5 to 50000 ms, 1 step
	9	Reserved		
	10	High Pass	NNNN	20 to 1000 Hz
	11	Low Pass	NNNNN	1000 to 20000 Hz
	12	RMS Avg.	NNN	1 to 500 ms, 1 step
	13	Reserved		
	14	Attack	NN.N	0.5 to 100.0ms, 0.5 step
	15	Push to Talk	O, F, T	O=On, F=Off, T=Toggle
	16	Mute	O, F, T	O=On, F=Off, T=Toggle

EXAMPLES:

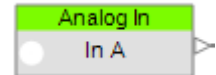
SA"AMM 1">0>3=T<CR>	Toggle the state of the output mute for module "AMM 1"
SA"AMM 1">6>4=-40<CR>	Set the Threshold for input 6 of "AMM 1" to -40dB
SA"AMM 1">4>3=2<CR>	Set the Detection mode for input 4 of "AMM 1" to Last On
GA"AMM 1">3>1<CR>	Query the current state of Priority for input 3 of "AMM 1"
GA"AMM 1">3>1=O<CR>	Response indicating input 3 of "AMM 1" is set to Priority

5.2 PowerMatch™ Module Indices



5.2.1 INPUT Module

There are 3 parameters which can be set for this module selected simply by using the appropriate value for **Index 1**.



Note: Digital Sensitivity is global and can only be set via the PM8500/N properties.

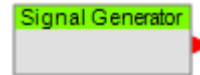
			Value	Range
Index 1	1	Analog Sensitivity	NN.N	0,4,12,24dBu
	2	Mute	O,F,T	O=On, F=Off, T=Toggle
	3	Source	O,F,T	O=Digital, F=Analog, T=Toggle

EXAMPLES:

SA"In A">1=4<CR>	Set the Input Sensitivity for "In A" to 4dBu
SA"Desk L">3=O<CR>	Select Digital input source for input "Desk L"
GA"In D">2<CR>	Query the current Mute state for "In D"
GA"In D">2=F<CR>	Response indicating that "In D" is currently un-muted

5.2.2 SIGNAL GENERATOR Module

Index 1 should always be set to 5 to access this module. The 8 parameters which can be set for this module are selected by using the appropriate value for **Index 2**.



Note: The routing for the Signal Generator is set via the Matrix Mixer module, where the Signal Generator appears as input 9.

Index 1: PM8500 Signal Generator (always=5)

			Value	Range
Index 2	1	Level	NN.N	-999 to 12.0dB, 0.5 step
	2	Repeat	O, F	O=On (Repeat), F=Off
	3	Mute	O,F,T	O=On, F=Off, T=Toggle
	4	Type	*1	→
	5	Tone Freq	NNNNN	20 to 20000Hz
	6	Start Freq	NNNNN	20 to 20000Hz
	7	End Freq	NNNNN	20 to 20000Hz
	8	Duration	N	1 to 5s, step 1

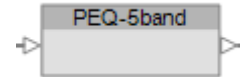
*1 Sig Gen Type	
1	Pink Noise
2	White Noise
3	Tone
4	Sweep

EXAMPLES:

SA"SigGen 1">5>4=1<CR>	Set the Signal Generator "SigGen 1" to output Pink Noise
SA"SigGen 1">5>1=-10<CR>	Set the level for Signal Generator "SigGen 1" to -10dB
GA"SigGen 1">5>3<CR>	Query the current Mute state for module "SigGen 1"
GA"SigGen 1">5>3=O<CR>	Response indicating that "SigGen 1" is currently muted

5.2.3 INPUT PARAMETRIC EQ Module

The Input Parametric EQ modules have 5 bands. The same parameters are adjustable for each band. **Index 1** is used to select the band to adjust (1-9) and **Index 2** is used to select the parameter to adjust according to the table below:



Index 1: Selects desired Parametric EQ band 1-5

			Value	Range
Index 2	1	Frequency	NNNNN	20 to 20000Hz
	2	Q	NN.N	0.10 to 10.0, 0.1 step
	3	Gain	+/-NN.N	-20.0dB to +20.0dB, 0.1dB step
	4	Slope	-NN	0,-6,-12dB/oct
	5	Type	XX	*1
	6	Bypass	O,F,T	O=On, F=Off, T=Toggle

The parameters in use for each band will be dependent on the Type of filter selected as illustrated in the table below:

*1: Parameters are enabled according to Band type						
Type	Freq.	Q	Gain	Bypass	Slope	String
Band	o	o	o	o		B
High shelf	o		o	o		HS
Low shelf	o		o	o		LS
High cut (Low Pass)	o			o	o	HC
Low cut (High pass)	o			o	o	LC
Notch	o	o	o	o		N

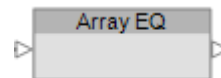
Note: Labels for the PM8500 Signal Processing modules (other than Input and Amp Output) are fixed and cannot be changed in the same way as ESP modules. Assigned module labels are visible in the Properties window in ControlSpace Designer.

EXAMPLES:

SA"PEQ-5band A">1>1=2000<CR>	Set the frequency for band 1 of channel A to 2kHz
SA"PEQ-5band D">4>5=HS<CR>	Use a 'High Shelf' filter for band 4 of channel D
GA"PEQ-5band F">3>6<CR>	Query the Bypass state for band 3 of channel F"
GA"PEQ-5band F">3>6=F<CR>	Response indicating Bypass for band 3 is Off

5.2.4 ARRAY EQ Module

Due to the internal architecture of the PM8500 the Array EQ module is currently addressed as band 6 of the Input Parametric EQ module, hence **Index 1 = 6**. **Index 2** is then used to select the parameter to adjust according to the table below. Parameters that are indicated as 'Reserved' should not be used.



Index 1: Selects Array EQ band of Input Parametric module (always=6)

			<i>Value</i>	<i>Range</i>
Index 2	1	Cntr Freq	NNN	220 to 700Hz
	2	Tilt	NN.N	0.0 to 10.0. 0.1 step
	3	Gain	+/-NN.N	-12.0dB to +2.0dB, 0.1dB step
	4	Array	M.VVV	M=2 to 8, VVV=20 to 100, 5 step
	5	<i>Reserved</i>		
	6	Bypass	O,F,T	O=On, F=Off, T=Toggle
	7	Advanced	O,F,T	O=On, F=Off, T=Toggle

Note: Labels for the PM8500 Signal Processing modules (other than Input and Amp Output) are fixed and cannot be changed in the same way as ESP modules. Assigned module labels are visible via the Properties window in ControlSpace Designer.

EXAMPLES:

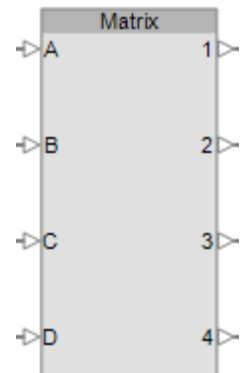
<code>SA"PEQ-5band A">6>4=4.080<CR></code>	Set the Array settings for channel A, Array EQ module to 4x modules & 80 deg vertical coverage
<code>SA"PEQ-5band C">6>3=-6<CR></code>	Set the Gain for channel C Array EQ to -6dB
<code>GA"PEQ-5band E">6>6<CR></code>	Query the Bypass state for Array EQ on channel E
<code>GA"PEQ-5band E">6>6=O<CR></code>	Response indicating Bypass for channel E is On

5.2.5 MATRIX MIXER Module

The Matrix Mixer module allows cross-points to be switched on/off or the level at the cross-point to be adjusted.

Index 1 is used to select whether the cross-point state (on/off) or level will be adjusted according to the table below:

		Parameter	Notes
Index 1	1	On/Off	Set Cross-Point On/Off
	2	Level	Set Level



Index 2 is then used to select which cross-point is to be controlled; stepping through available outputs for input 1, then through the outputs for input 2 and so on. **Index 2** will be the same irrespective of whether the state (on/off) or level is being controlled, but **Index 1** and the **Value** will change. In the following tables M = # of inputs and N = # of outputs in the module.

On/Off			Value	Range
Index 2	1	Cross Point(1,1)	O,F,T	O=On, F=Off, T=Toggle
	2	Cross Point(1,2)	O,F,T	O=On, F=Off, T=Toggle
	Index 2 = (Input # -1) x 8 + Output #:			
	72	Cross Point(9,8)	O,F,T	O=On, F=Off, T=Toggle

Level			Value	Range
Index 2	1	Cross Point(1,1)	NN.N	-60.5 to 0.0dB, 0.5 steps
	2	Cross Point(1,2)	NN.N	-60.5 to 0.0dB, 0.5 steps
	Index 2 = (Input # -1) x 8 + Output #:			
	72	Cross Point(9,8)	NN.N	-60.5 to 0.0dB, 0.5 steps

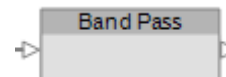
Note: Labels for the PM8500 Signal Processing modules (other than Input and Amp Output) are fixed and cannot be changed in the same way as ESP modules. Assigned module labels are visible in the Properties window in ControlSpace Designer.

EXAMPLES:

SA"Matrix 1">1>26=O<CR>	Set cross-point 26 (Input D, Output2) on "Matrix 1" to On
SA"Matrix 1">1>65=O<CR>	Set cross-point 65 (SigGen, Output1) on "Matrix 1" to On
GA"Matrix 1">2>4<CR>	Query the current level for cross-point 4 (Input A, Output 4)
GA"Matrix 1">2>4=F<CR>	Response indicating cross-point 4 is currently Off

5.2.6 BAND PASS Module

Index 1 should always be set to 1 to access this module. The 6 parameters that can be set for this module are then selected by using the appropriate value for **Index 2**. Parameters that are indicated as 'Reserved' should not be used.



Index 1: Selects module (always=1)

		Value	Range
Index 2	1	Type(HPF)	*1
	2	Frequency	NNNNN 20 to 20000Hz
	3	Type(LPF)	*1
	4	Frequency	NNNNN 20 to 20000Hz
	5	Reserved	
	6	Reserved	
	7	Reserved	
	8	HP Bypass	O,F,T O=On, F=Off, T=Toggle
	9	LP Bypass	O,F,T O=On, F=Off, T=Toggle

*1 Filter type descriptions

	Slope	Strings
Butterworth	6dB/oct	But6
	12dB/oct	But12
	18dB/oct	But18
	24dB/oct	But24
	36dB/oct	But36
	48dB/oct	But48
Bessel	12dB/oct	Bes12
	18dB/oct	Bes18
	24dB/oct	Bes24
	36dB/oct	Bes36
	48dB/oct	Bes48
Linkwitz-Reilly	12dB/oct	Lin12
	24dB/oct	Lin24
	36dB/oct	Lin36
	48dB/oct	Lin48

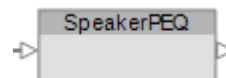
Note: Labels for the PM8500 Signal Processing modules (other than Input and Amp Output) are fixed and cannot be changed in the same way as ESP modules. Assigned module labels are visible in the Properties window in ControlSpace Designer.

EXAMPLES:

SA"Band Pass 1">1>3=But24<CR>	Set LP filter for channel 1 to Butterworth 24db/oct
SA"Band Pass 5">1>2=80<CR>	Set frequency for channel 5 high-pass to 80Hz
GA"Band Pass 7">1>9<CR>	Query the Bypass state for LPF on channel 7
GA"Band Pass 7">1>9=F<CR>	Response channel 7 LPF Bypass is currently Off

5.2.7 SPEAKER PARAMETRIC EQ Module

The Speaker Parametric EQ module has; 9 bands of parametric EQ, a band-pass filter and alignment delay, but on the PM8500 the Band Pass is addressed as a separate module (see above). The same parameters are adjustable for each parametric EQ bands. **Index 1** is used to select the EQ band to adjust (1-9) or setting **Index 1** to 0 accesses the EQ Gain parameter. **Index 2** is then used to select the desired parameter to adjust according to the tables below. Parameters indicated as 'Reserved' should not be used.



Index 1: Selects the desired EQ Band (1-9) or 0 for EQ Gain

EQ Gain (Index 1=0)		Value	Range
Index 2	1	Reserved	
	2	Reserved	
	3	Gain	+/-NN.N
	4	Align Delay	NNN
			-15.0B to +15.0dB, 0.5dB step
			0 to 480 as number of samples

PEQ Band (1-9)		Value	Range
Index 2	1	Frequency	NNNNN
	2	Q	NN.N
	3	Gain	+/-NN.N
	4	Reserved	
	5	Type	XX
	6	Bypass	O,F,T
			20 to 20000Hz
			0.10 to 10.0, 0.1 step
			-20.0dB to +20.0dB, 0.1dB step
			B=Band, HS=High Shelf, LS=Low Shelf, N=Notch
			O=On, F=Off, T=Toggle

The parameters in use for each band will be dependent on the Type of filter selected as illustrated in the table below:

Type	Freq.	Q	Gain	Bypass	Strings
Band	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	B
High shelf	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	HS
Low shelf	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	LS
Notch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	N

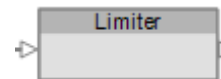
Note: Labels for the PM8500 Signal Processing modules (other than Input and Amp Output) are fixed and cannot be changed in the same way as ESP modules. Assigned module labels are visible in the Properties window in ControlSpace Designer.

EXAMPLES:

SA"SpeakerPEQ 1">6>5=LS<CR>	Set type for PEQ band 6 of Channel 1 to Low-Shelf
SA"SpeakerPEQ 4">2>1=200<CR>	Set the freq. for PEQ band 2 of Channel 4 to 200Hz
GA"SpeakerPEQ 6">0>3<CR>	Query the EQ gain for Channel 6 SPEQ module
GA"SpeakerPEQ 6">0>3=2<CR>	Response indicating the EQ gain is currently +2dB

5.2.8 LIMITER Module

Index 1 should always be set to 0 to access this module. The 6 parameters that can be set for this module are then selected by using the appropriate value for **Index 2**. Parameters indicated as 'Reserved' should not be used.



Index 1: Selects module (always=0)

			Value	Range
Index 2	1	Peak Threshold	NN.N	0.5 to 71.0 V (or 142.0 for bridged), 0.5 Step
	2	RMS Threshold	NN.N	0.5 to 71.0 V (or 142.0 for bridged), 0.5 Step
	3	RMS Attack	NNNNNN	500 to 10,000ms, 100 step
	4	RMS Release	NNNNNN	500 to 10,000ms, 100 step
	5	Link Group	N	0=No Link Group, 1-4= Link Group 1-4
	6	Reserved		
	7	Reserved		
	8	Reserved		
	9	Reserved		
	10	Reserved		
	11	Reserved		
	12	Reserved		

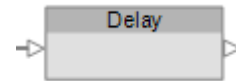
Note: Labels for the PM8500 Signal Processing modules (other than Input and Amp Output) are fixed and cannot be changed in the same way as ESP modules. Assigned module labels are visible in the Properties window in ControlSpace Designer.

EXAMPLES:

SA" Limiter 3">0>1=50<CR>	Set the Peak limiter threshold for channel 3 to 50V
SA" Limiter 1">0>2=25<CR>	Set the RMS limiter threshold for channel 1 to 25V
GA" Limiter 5">0>5<CR>	Query whether channel 5 is part of a limiter Link Group
GA" Limiter 5">0>5=2<CR>	Response indicating ch 5 is a member of Link Group 2

5.2.9 DELAY Module

The Delay module for the PM8500 has a single tap and hence **Index 1** is always 1. **Index 2** is then used to select the parameter to adjust as shown in the table below:



Index 1: Selects Delay tap (always=1)

			Value	Range
Index 2	1	Delay time	NNNNN	0 to 144000 as number of samples
	2	Bypass	O,F,T	O=On, F=Off, T=Toggle

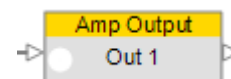
Note: Labels for the PM8500 Signal Processing modules (other than Input and Amp Output) are fixed and cannot be changed in the same way as ESP modules. Assigned module labels are visible in the Properties window in ControlSpace Designer.

EXAMPLES:

SA"Delay 1">1>1=2592<CR> Set the delay time for channel 1 to 54msec
(54msec = 0.054sec, 0.054x48000 = 2592 samples)
SA"Delay 6">1>2=F<CR> Set Delay bypass for channel 6 to Off
GA"Delay 2">1>1<CR> Query the current delay time channel 2
GA"Delay 2">1>1=9600<CR> Response with delay time for channel 2 is 200ms
(9600 samples, 9600/48000 = 0.2sec = 200msec)

5.2.10 AMP OUTPUT Module

There are 3 parameters which can be set for this module, selected simply by using the appropriate value for **Index 1**.



			Value	Range
Index 1	1	Level	NN.N	-60 to 0.0dB, 0.5dB step
	2	Mute	O,F,T	O=On, F=Off, T=Toggle
	3	Polarity	O,F,T	O=On, F=Off, T=Toggle

EXAMPLES:

SA"Out Main">1=-3.5<CR> Set the level for Output module "Out Main" to -3.5dB
SA"Output L">2=T<CR> Toggle the mute state for Amp Output "Output L"
GA"Out 1">1<CR> Query the current level for channel 1 Amp Output
GA"Out 1">1=-6<CR> Response indicating channel 1 is currently set to -6dB

6 Revision History

v1.1

- added increment amount to set volume Increment/Decrement
- added comma delimiters between parameters and space after command
- added command format section (3).

v1.2 (requires firmware version 3135 or greater)

- Set/Get volume parameter range changed to "0- 90h" from "1-90h"

v1.3 (requires firmware version 3240 or greater)

- Added Get Level (in dBFS) command

v1.4 (requires firmware version 1.1 or greater)

- added Set Group volume commands
- added start-up strings when ESP boots.
- added comment re: crossover cable needed to connect PC.

v2.0

- Added SA, GA command and description of each algorithm.
- Added AMX device discovery command

v2.3

- Removed Speaker EQ & Meter from SA/GA commands
- Added type change of signal generator in SA/GA command.
- Change Error codes. ('00' ->'01', '01' -> '02', '02' ->'03')

v2.3d November 9, 2007

- Removed '#' from the examples. In general, you would not use '#' in most commands since '#' is only needed on those modules for which you want automatic feedback.
- Clarified that quotation marks "" are required on all module names.

v2.4 December 3, 2007

- Added 4.8 & 4.9 Group Master volume Increment/Decrement & Mute

v2.4b March 17, 2008

- Various text changes

v2.5 July 7, 2008, requires firmware 2.040 or later

- Added surround module & automatic mic mixing module commands
- Added multi-ESP addressing

v2.6 September 25, 2008, requires firmware 2.050 or later

- Added IP address commands
- Added two surround module commands (Index 2&3)

v2.6a February 20, 2009

- Noted SA/GA commands won't work when 2 modules have same name
- Added firmware versions required to the change history

v2.6b March 17, 2009, requires firmware 2.075 or later

- Added Serial-over-Ethernet connection details
- Various text and formatting changes

v2.6c October 5, 2009, requires firmware 2.075 or later

- Clarified that Hexadecimal values can be sent in upper or lower case but will always be returned in lower case
- Corrected SA/GA examples in 'Error Codes' and 'Multicast-ESP Communication' sections
- Various text and formatting changes

v3.0 October 12, 2011, requires firmware ESP = 3.04 or later, PM = 1.04 or later

- Major re-format of document to include PowerMatch in addition to ESP
- Commands divided into System, Device and Module categories
- Addition of PowerMatch module indices
- Examples re-formatted to clearly distinguish between commands and responses.
- Removed AMX device discovery command
- Set/Get Preset commands now only supported on legacy systems

v3.1 March 16, 2012, requires firmware ESP = 3.07 or later, PM = 1.09 or later

- Addition of PM8500N Device commands:
 - Set/Get Standby Status (SY, GY)
 - Get Configuration (GC)
 - Set/Get Fault Status (SF, GF)
 - Clear Fault/Alarms (CF)
 - Get/Clear Alarm History/Log (GH, CH)
 - Set/Get Alarm Reporting/Status (SR, GR)
- Added PM8500N support for Get Signal Level (GL)