Information

Enhanced Simple Remote Protocol for 5 Series, 4 Series, DC/Ti1048, DPA and Delta DSP

Introduction

To allow easy control via third party systems XTA / MC² processors and new amplifiers incorporate a simple serial control protocol. This allows processors to receive serial string from third party systems such as Crestron/Lutron serial control panels to adjust level, mute and recall memories. This protocol is in place in all 5 & 4 Series units, the DC1048 and the MC² Ti1048, plus the latest DPA and Delta DSP amplifiers. It is in addition to the standard more sophisticated protocol used by AudioCore and Icore but with reduced complexity – no checksums or message lengths need to be calculated or appended and no message compression is used.

In Q4 2012 an increment / decrement gain command is being included at customers' request. This allows the increasing or decreasing of gains on specific inputs or outputs. The command additionally includes gain maximum/minimum limits to prevent system misuse.

The protocol allows you to have many units on the network but to make programming easy for users with only one unit, a global unit byte can be used as well as global unit id byte. I.e. the command will talk to all units on the network irrespective of type.

To accompany this TechNote is a macro-enabled spreadsheet to help in the generation of serial commands.

Simply select the appropriate fields from a pull down box on the required page to create your instruction. It is available on-line at http://www.audiocore.co.uk/techsupport.html

Document Summary

Instruction Overview and Command Structure

Header	Device type	Unit ID	Command	Data 1	Data 2	Data 3	Data 4
F4	[DT]	[ID]	[CM]	XX	XX	XX	XX

All commands are 8 bytes long.

All command data in this document is in HEX format – information in parentheses (for example [DT]) denotes a field title (not a hex number)

Header is always F4.

Device Type [DT] determines what model of unit is to be addressed:

7Ah = DP544
79h = DP548
78h = DP448
76h = DP446
74h = DP444
73h = DP426
72h = DP424
71h = Any DP4 Series
10h = DC1048
11h = Ti1048

12h= Delta 40
14h = Delta 80
16h = Delta 100
13h = DPA40
15h = DPA80
17h = DPA100
18h = Any Delta/DPA Series
19h = OEM Delta 40
1Ah = OEM Delta 80
1Ch = OEM Delta 100

Unit ID [ID] determines what individual unit of the specified type is to be addressed:

00 = All IDs
01h – 20h = Individual ID numbers (as set in the unit's interface sub-menu)

Command [CM] determines the action of the message:

01 = Set Gain (Absolute)
02 = Set Mute
03 = Recall Memory / Presets
04 = Increment / Decrement Gain

Specific details for each instruction follow…

Set Gain (Absolute)

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	01	Input/Output	XX	XX	00

Data 1 = Input / Output Channel

Input A	01	Output 1	05	Output 5	09
Input B	02	Output 2	06	Output 6	0A
Input C	03	Output 3	07	Output 7	0B
Input D	04	Output 4	08	Output 8	0C

Attempting to access a channel that does not exist on your unit (for example input C in a DP426) will be ignored.

Data 2, 3 = Absolute Gain Value

The gain is adjustable in 0.1dB increments between –40dB and +15dB.
Range is therefore 0 (-40dB) to 550 (+15dB).
This gives a 10 bit number split over 2 bytes with top bit of Data 3 always being 0.

	MSB	LSB	
Gain in binary	(a.b.c.e.f.g.h.i.j.k)		= Data 2 (00000abc) Data 3 (0efghijk)

Data 4 is not used and should be sent as 00.

Example – set all DP4 units, all IDs, output 1 to 0dB

0dB decimal value = 400 (in 0.1dB steps)

Binary value = 110010000

Split over the two byte this gives Data 2 = 00000011; Data 3 = 10000

Hex values are therefore Data 2 = 03h; Data 3 = 10h

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	01	01	03	10	00

Set Mute

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	02	Input A- D	Output 1 -4	Output 5 - 8	00

Data 1 : Input Mute Select

0 = On, 1 = Mute

(0000dcba) = Inputs (A - D)
a = Input A
b = Input B
c = Input C
d = Input D

Data 2 : Output Mute Select

0 = On, 1 = Mute

(0000dcba) = Outputs (1- 4)
a = Output 1
b = Output 2
c = Output 3
d = Output 4

Data 3 : Output Mute Select

0 = On, 1 = Mute

(0000dcba) = Outputs (5 - 8)
a = Output 5
b = Output 6
c = Output 7
d = Output 8

Data 4 is not used and should be sent as 00.

Example – Set all DP4 units, all IDs, mute input B and outputs 2,3, 7 and 8

Input B set in Data 1 – Remember – bit flags are 0 = normal (on), 1 = muted
Binary value = 00000010 - Hex value = 02h

Similarly for outputs 2 and 3 – set in Data 2
Binary value = 00000110 - Hex value = 06h

Outputs 7 and 8 – set in Data 3
Binary value = 00001100 - Hex value = 12h

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	02	02	06	12	00

Recall Memory / Presets

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	03	00	0A	00	00

Data 1 & Data 2 : Recall memory

Recall memory , valid memories from 1 to 1023.
Memory number 00 is ILLEGAL.
This gives a 10 bit number split over 2 bytes with top bit of Data 2 always being 0.

Data.1 (00000abc) + Data.2 (0defghij) = Memory Number (000000ab.cdefghij)

Data 3 is not used and should be sent as 00.

Data 4 is not used and should be sent as 00.

Example – All DP4 units, all IDs, recall memory 39.

Binary value = 100111

Split over the two byte this gives Data 1 = 00000000; Data 2 = 00100111

Hex values are therefore Data 1 = 00h; Data 3 = 27h

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	03	00	27	00	00

Remember that on 4 Series units, memories may *not* necessarily contain data for the entire signal path – data may only be GEQ settings, or Input EQ settings etc.

Increment / Decrement Gain

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	04	XX	XX	XX	XX

Data 1 = Input / Output Channel

Input A	01	Output 1	05	Output 5	09
Input B	02	Output 2	06	Output 6	0A
Input C	03	Output 3	07	Output 7	0B
Input D	04	Output 4	08	Output 8	0C

Attempting to access a channel that does not exist on your unit (for example input C in a DP426) will be ignored.

Data 2 : Gain Step Size and Direction (Increment or Decrement)

The step size resolution is **0.5dB**.

Gain must be converted to "2's complement" value♦ and masked to set top bit to zero in the byte

Eg Increment 1dB = 02 (decimal)
2's complement of 02 = 02h
02h & 7Fh = 02h

Eg Decrement –1dB = -02 (decimal)
2's complement of –02 = FEh
FEh & 7Fh = 7Eh

Data 3 : Gain Max

The step size resolution is **1.0dB**.

Gain must be converted to "2's complement" value and masked to set top bit to zero in the byte

Eg Gain Max = +6dB
2's complement of 06 = 06h
06h & 7Fh = 06h

Continues over…

♦ In two's complement notation, a non-negative number is represented by its ordinary binary representation; in this case, the most significant bit is 0. The two's complement operation is the negation operation, so negative numbers are represented by the two's complement of the absolute value.
To get the two's complement of a binary number, the bits are inverted, or "flipped", by using the bitwise NOT operation; the value of 1 is then added to the resulting value, ignoring the overflow which occurs when taking the two's complement of 0.

Data 4 : Gain Min

The step size resolution is **1.0dB**.

Gain must be converted to "2's complement" value and masked to set top bit to zero in the byte

Eg Gain Max = -6dB
2's complement of –06h = FAh
FAh & 7Fh = 7Ah

Example 1 – All DP4 units, all IDs, increment input A by 1dB, max gain of +6dB, min gain of –6dB

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	04	01	02	06	7A

Example 2 – All DP4 units, all IDs, decrement input A by 1dB, max gain of +6dB, min gain of –6dB

Header	Device type	Unit id	Command	Data 1	Data 2	Data 3	Data 4
F4	71	00	04	01	7E	06	7A

Note that the maximum and minimum gain values in the string determine the absolute range available for adjustment – so in the above examples the gain cannot be set to a value outside ±6dB. Incrementing or decrementing a channel that is currently set to a value outside of the gain window in the message will cause the gain to snap to the max or min value in the message.

For example, if a channel's gain is set to -14dB and the above decrement message is sent, then the channel will jump to -6dB. If the increment message was sent the gain would jump to -6dB. Subsequent increment messages would then increase this value by 1dB each time up to a maximum of +6dB.