B&K Components Device Interface Protocol (BKC-DIP) Product Specific Appendices

For use with Six Zone A/V Receivers:
CT600.1
CT600.2
CT600.3

For use with Three Zone A/V Receivers:
CT300.1
CT300.2
CT300.3

Version 2.00.06

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Revision History

Version 2.00.06

1. Add Front Panel commands 0x12 and 0x16 - Restore Memory and Backup Memory.
2. Remove 0x0D - Restore User Preference Memory

Version 2.00.05

3. Removed re-initialize BKC-DIP Command (FF,X,8;) from the unsupported executive commands list
4. Remove System Parameter B5 - Rear Panel to Flasher outs.
5. Remove System Parameter F9 - System On Specification
6. Defined executive Bootloader Command (FF,X,B;), Clear Flash Block Command (FF,X,C=xx;) and TFTP Client Load Command: (FF, X, D;) as commands valid only via an Ethernet connection
7. Documented support for executive mute state command (FF,X,A,zz=x;)

Version 2.00.04

1. Modify Macro Parameter 0A value note (re-arrange the send type).

Version 2.00.03

1. Add Parameters 47, 47, 48, 51, and 52 to unit info.

Version 2.00.02

1. Add “note 8” for Appendix A
2. Remove System Parameter F9

Version 2.00.01

3. Add System Parameter FA & FB
4. Fixed System Parameter C9’s reference note from 28 to 20.
5. Modify System Parameter Note 28.
6. Removed System Parameter B5 (Rear Panel to Flasher Outs is no longer supported).
7. Macro Parameter 0A-0D is not currently supported

Version 2.00.00

1. The Initial Release of this document, which is referred to as BKC-DIP V2.00.00 documentation.

Introduction

Overview

The following is a supplement to B&K Components Device Interface Protocol (BKC-DIP) Protocol Document. This document contains the specific BKC-DIP implementation details for B&K Components' CT600.1-3 and CT300.1-3 products.

Document Conventions

All numbers are assumed to be hexadecimal. Hexadecimal (or Hex for short) characters range from 0 to F.

For example:

The number 19 is the hexadecimal number 19 which is $(1 \times 16^1) + (9 \times 16^0)$ or 25 decimal. Similarly, EA is the hexadecimal number EA which is $(14 \times 16^1) + (10 \times 16^0)$ or 234 decimal. For clarity, some descriptions regarding numbers may use the *xx*h notation to remind the reader that the number is implicitly hexadecimal where *xx* are the hexadecimal characters 0 - F. Thus the previous examples would be 19h and EAh respectively, the "h" indicating hexadecimal.

Maximum values appearing in double quotes indicate that the parameter is an ASCII string.

For example:

"D" for the Z1 Title maximum value indicates that the title is a string with a maximum length of 0Dh (13 decimal) characters.

Italics indicate a non-literal string.

For example:

(00,G, P00, 0;*cs16*)

cs16 indicates the calculated checksum and does NOT literally appear in the data stream.

Important concepts are denoted by **NOTE:**

Appendix A, Preset Parameters

(0,G,P1=FF,0;*cs16*) Example of Get Z1 current preset title
(0,S,P1=A,1=24;*cs16*) Example of Set Z1 Preset 10 volume = 0 dB

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes Notes
00	Title	"D"	
01	Volume	28	Note 1
02	Source Input	B	Note 3
03	Audio Input	B	Note 3
04	Video Input	9	Note 8
05	Bass Level	C	Note 2
06	Treble Level	C	Note 2
07	Equalization	2	Note 4
08	Tuner AM Frequency	74, 81	Note 5, 5a
09	Tuner FM Frequency	67, CD	Note 6, 6a
0A	Tuner FM Mode	1	Note 7

Appendix A Preset Parameter Notes

(0,G,P1=FF,0;*cs16*) Example of Get Z1 current preset title
(0,S,P1=A,1=28;*cs16*) Example of Set Z1 Preset 10 volume = 0 dB

(**NOTE:** hex values denoted by *xx*h convention)

Note 1: 0h = -80 dB, 1h = -78 dB ... 28h = +0 dB
Note 2: 0h = -12.0 dB, 1h = -10 dB, ... 6h = 0.0 dB, ...
  Ch = +12.0 dB
Note 3: 0h = FM Tuner, 1h = AM Tuner, 2h = Dedicated, 3h = In1, 4h = In2, 5h = In3, 6h = In4, 7h = In5, 8h = In6, 9h = In7, Ah = In8, Bh = In9
  NOTE: FM Tuner and AM Tuner do not have video sources, so selecting either as a video source will NOT change the current video source (i.e. the video source will remain on the currently selected video source).
  NOTE: Source Input controls Audio and Video Inputs simultaneously, keeping them synchronized.
Note 4: 0h = off, 1h = Loudness, 2h = Auto Level
Note 5: 10 kHz AM step tuning (USA)
  (((*value* – 1) * 10) + 520) kHz, or
  (((AM_kHz - 520) / 10) + 1) with
  2Ah = 930 KHz; 00h indicates an uninitialized frequency.
  If tuner stations programmed, last used station's frequency is used, else 520 kHz.
Note 5a: 9 kHz AM step tuning
  (((*value* – 1)* 9) + 522) kHz, or
  (((AM_kHz - 522) / 9) + 1) with
  2Eh = 927 KHz; 00h indicates an uninitialized station.
  If tuner stations programmed, last used station's frequency is used, else 522 kHz.
Note 6: 200 kHz FM step tuning (USA)
  (((*value* – 1)* 0.20) + 87.5) MHz, or

(((FM_MHz - 87.5) /0.2) + 1) with
4Ch = 102.5 MHz; 00h indicates an uninitialized frequency.
If tuner stations programmed, last used station's frequency
is used, else 87.5 MHz.

Note 6a: 100 kHz FM step tuning
(((*value* – 1)* 0.10) + 87.5) MHz, or
(((FM_MHz - 87.5) /0.1) + 1) with 97h = 102.5 MHz; 00h
indicates an uninitialized frequency. If tuner stations
programmed, last used station's frequency
is used, else 87.5 MHz.

Note 7: 0h = Mono, 1h = Stereo

Note 8: 0h = Dedicated
1h = In1
2h = In2
3h = In3
4h = In4
5h = In5
6h = In6
7h = In7
8h = In8
9h = In9

Appendix B, System Parameters

(0,G,S,17;*cs16*) Example of Get Input 8 Level Setting
(0,S,S,3="LASER";*cs16*) Example of Set Input 4 Title to "LASER"

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Input 1 Title	"5"	
01	Input 2 Title	"5"	
02	Input 3 Title	"5"	
03	Input 4 Title	"5"	
04	Input 5 Title	"5"	
05	Input 6 Title	"5"	
06	Input 7 Title	"5"	
07	Input 8 Title	"5"	
08	Input 9 Title	"5"	
09	Zone A IN Dedicated Title	"5"	
0A	Zone B IN Dedicated Title	"5"	
0B	Zone C IN Dedicated Title	"5"	
0C	Zone D IN Dedicated Title	"5"	
0D	Zone E IN Dedicated Title	"5"	
0E	Zone F IN Dedicated Title	"5"	
0F	Tuner Level	6	Note 1
10	Input 1 Level	6	Note 1
11	Input 2 Level	6	Note 1
12	Input 3 Level	6	Note 1
13	Input 4 Level	6	Note 1
14	Input 5 Level	6	Note 1
15	Input 6 Level	6	Note 1
16	Input 7 Level	6	Note 1
17	Input 8 Level	6	Note 1
18	Input 9 Level	6	Note 1
19	Zone A IN Dedicated Level	6	Note 1
1A	Zone B IN Dedicated Level	6	Note 1
1B	Zone C IN Dedicated Level	6	Note 1
1C	Zone D IN Dedicated Level	6	Note 1
1D	Zone E IN Dedicated Level	6	Note 1
1E	Zone F IN Dedicated Level	6	Note 1
1F	Input 1 Video	1	Note 2
20	Input 2 Video	1	Note 2
21	Input 3 Video	1	Note 2
22	Input 4 Video	1	Note 2
23	Input 5 Video	1	Note 2
24	Input 6 Video	1	Note 2
25	Input 7 Video	1	Note 2
26	Input 8 Video	1	Note 2
27	Input 9 Video	1	Note 2
28	Zone A IN Dedicated Video	1	Note 2
29	Zone B IN Dedicated Video	1	Note 2
2A	Zone C IN Dedicated Video	1	Note 2
2B	Zone D IN Dedicated Video	1	Note 2
2C	Zone E IN Dedicated Video	1	Note 2
2D	Zone F IN Dedicated Video	1	Note 2

2E	Zone A IN Dedicated Selection	1	Note 3
2F	Zone B IN Dedicated Selection	1	Note 3
30	Zone C IN Dedicated Selection	1	Note 3
31	Zone D IN Dedicated Selection	1	Note 3
32	Zone E IN Dedicated Selection	1	Note 3
33	Zone F IN Dedicated Selection	1	Note 3
34	Zone A IN Dedicated Release Time	1A	Note 17
35	Zone B IN Dedicated Release Time	1A	Note 17
36	Zone C IN Dedicated Release Time	1A	Note 17
37	Zone D IN Dedicated Release Time	1A	Note 17
38	Zone E IN Dedicated Release Time	1A	Note 17
39	Zone F IN Dedicated Release Time	1A	Note 17
3A	Zone A Mode	1	Note 4
3B	Zone B Mode	1	Note 4
3C	Zone C Mode	1	Note 4
3D	Zone D Mode	1	Note 4
3E	Zone E Mode	1	Note 4
3F	Zone F Mode	1	Note 4
40	Zone A Page/Event Selection	3	Note 5
41	Zone B Page/Event Selection	3	Note 5
42	Zone C Page/Event Selection	3	Note 5
43	Zone D Page/Event Selection	3	Note 5
44	Zone E Page/Event Selection	3	Note 5
45	Zone F Page/Event Selection	3	Note 5
46	Zone A Tuner Assignment	2	Note 6*
47	Zone B Tuner Assignment	2	Note 6*
48	Zone C Tuner Assignment	2	Note 6*
49	Zone D Tuner Assignment	2	Note 6*
4A	Zone E Tuner Assignment	2	Note 6*
4B	Zone F Tuner Assignment	2	Note 6*
4C	Zone A Left Level Control	1	Note 7
4D	Zone B Left Level Control	1	Note 7
4E	Zone C Left Level Control	1	Note 7
4F	Zone D Left Level Control	1	Note 7
50	Zone E Left Level Control	1	Note 7
51	Zone F Left Level Control	1	Note 7
52	Zone A Left Max Level	28	Note 8
53	Zone B Left Max Level	28	Note 8
54	Zone C Left Max Level	28	Note 8
55	Zone D Left Max Level	28	Note 8
56	Zone E Left Max Level	28	Note 8
57	Zone F Left Max Level	28	Note 8
58	Zone A Right Level Control	1	Note 7
59	Zone B Right Level Control	1	Note 7
5A	Zone C Right Level Control	1	Note 7
5B	Zone D Right Level Control	1	Note 7
5C	Zone E Right Level Control	1	Note 7
5D	Zone F Right Level Control	1	Note 7
5E	Zone A Right Max Level	28	Note 8
5F	Zone B Right Max Level	28	Note 8
60	Zone C Right Max Level	28	Note 8
61	Zone D Right Max Level	28	Note 8
62	Zone E Right Max Level	28	Note 8
63	Zone F Right Max Level	28	Note 8
64	Group a Code Set ID	80	Note 9

65	Group b Code Set ID	80	Note 9
66	Group c Code Set ID	80	Note 9
67	Group d Code Set ID	80	Note 9
68	Group e Code Set ID	80	Note 9
69	Group f Code Set ID	80	Note 9
6A	Group g Code Set ID	80	Note 9
6B	Group h Code Set ID	80	Note 9
6C	Group i Code Set ID	80	Note 9
6D	Group j Code Set ID	80	Note 9
6E	Group k Code Set ID	80	Note 9
6F	Group l Code Set ID	80	Note 9
70	Group m Code Set ID	80	Note 9
71	Group n Code Set ID	80	Note 9
72	Group o Code Set ID	80	Note 9
73	Group p Code Set ID	80	Note 9
74	Group q Code Set ID	80	Note 9
75	Group r Code Set ID	80	Note 9
76	Zone A Rear Remote In Setting	1	Note 10
77	Zone B Rear Remote In Setting	1	Note 10
78	Zone C Rear Remote In Setting	1	Note 10
79	Zone D Rear Remote In Setting	1	Note 10
7A	Zone E Rear Remote In Setting	1	Note 10
7B	Zone F Rear Remote In Setting	1	Note 10
7C	Zone A Control Out	4	Note 11
7D	Zone B Control Out	4	Note 11
7E	Zone C Control Out	4	Note 11
7F	Zone D Control Out	4	Note 11
80	Zone E Control Out	4	Note 11
81	Zone F Control Out	4	Note 11
82	Zone Control 1 Out	D	Note 25
83	Zone Control 2 Out	D	Note 25
84	Zone A Control Out Selected 0-7	FF	Note 12, 28
85	Zone A Control Out Selected 8-11	0F	Note 12, 28
86	Zone B Control Out Selected 0-7	FF	Note 12, 28
87	Zone B Control Out Selected 8-11	0F	Note 12, 28
88	Zone C Control Out Selected 0-7	FF	Note 12, 28
89	Zone C Control Out Selected 8-11	0F	Note 12, 28
8A	Zone D Control Out Selected 0-7	FF	Note 12, 28
8B	Zone D Control Out Selected 8-11	0F	Note 12, 28
8C	Zone E Control Out Selected 0-7	FF	Note 12, 28
8D	Zone E Control Out Selected 8-11	0F	Note 12, 28
8E	Zone F Control Out Selected 0-7	FF	Note 12, 28
8F	Zone F Control Out Selected 8-11	0F	Note 12, 28
90	Common Control 1 Out Select/Act 0-7	FF	Note 12, 28
91	Common Control 1 Out Select/Act 8-11	0F	Note 12, 28
92	Common Control 2 Out Select /Act 0-7	FF	Note 12, 28
93	Common Control 2 Out Select /Act 8-11	0F	Note 12, 28
94	RS-232 Control Out	FF	Note 13
95	Flasher Out	2	Note 26
96	Page/Event 1 Action	A	Note 14
97	Page/Event 1 Activated by Setting	4	Note 16
98	Page/Event 1 Level	28	Note 8
99	Page/Event 1 Turn off delay	1A	Note 17
9A	Page/Event 2 Action	A	Note 14
9B	Page/Event 2 Activated by Setting	4	Note 16

9C	Page/Event 2 Level	28	Note 8
9D	Page/Event 2 Turn off delay	1A	Note 17
A6	Preset Recall Options	2	Note 36
A7	Preset Auto Naming	1	Note 2
A8	Favorite Preset Recall	1	Note 19
A9	RS-232 Port Enabled	1	Note 20
AA	RS-232 Baud Rate	8	Note 21
AB	Serial **(RS-232 and Ethernet)** Receive ID	7F	Note 22
AC	Serial **(RS-232 and Ethernet)** Transmit ID	7F	Note 22
AD	RS-232 Echo Enabled	1	Note 20
AE	Serial Feedback **(RS-232 and Ethernet)**	3	Note 34
AF	RS-232 V2.0 Enabled	1	Note 20
B2	Memory Locked	1	Note 2
B3	Advanced Menu Visible	1	Note 23
B6	OSD Reply Mode	2	Note 27
B7	Front Panel Display Reply Mode	2	Note 27*
B8	Input 1 Input Mode	1	Note 4
B9	Input 2 Input Mode	1	Note 4
BA	Input 3 Input Mode	1	Note 4
BB	Input 4 Input Mode	1	Note 4
BC	Input 5 Input Mode	1	Note 4
BD	Input 6 Input Mode	1	Note 4
BE	Input 7 Input Mode	1	Note 4
BF	Input 8 Input Mode	1	Note 4
C0	Input 9 Input Mode	1	Note 4
C1	Zone A Dedicated Input Mode	1	Note 4
C2	Zone B Dedicated Input Mode	1	Note 4
C3	Zone C Dedicated Input Mode	1	Note 4
C4	Zone D Dedicated Input Mode	1	Note 4
C5	Zone E Dedicated Input Mode	1	Note 4
C6	Zone F Dedicated Input Mode	1	Note 4
C9	Rear Panel Remote Setting	1	Note 20
CA	Page/Event 1 affects Control Out 1	1	Note 2
CB	Page/Event 2 affects Control Out 2	1	Note 2
CC	Stereo Left Calibrate Level Zone A	C	Note 29
CD	Stereo Left Calibrate Level Zone B	C	Note 29
CE	Stereo Left Calibrate Level Zone C	C	Note 29
CF	Stereo Left Calibrate Level Zone D	C	Note 29
D0	Stereo Left Calibrate Level Zone E	C	Note 29
D1	Stereo Left Calibrate Level Zone F	C	Note 29
D2	Stereo Right Calibrate Level Zone A	C	Note 29
D3	Stereo Right Calibrate Level Zone B	C	Note 29
D4	Stereo Right Calibrate Level Zone C	C	Note 29
D5	Stereo Right Calibrate Level Zone D	C	Note 29
D6	Stereo Right Calibrate Level Zone E	C	Note 29
D7	Stereo Right Calibrate Level Zone F	C	Note 29
D8	Page/Event 1 Assert Macro Number	FF	Note 30
D9	Page/Event 1 Deassert Macro Number	FF	Note 30
DA	Page/Event 2 Assert Macro Number	FF	Note 30
DB	Page/Event 2 Deassert Macro Number	FF	Note 30
DC	Zone A IN Dedicated Assert Macro Number	FF	Note 30
DD	Zone A IN Dedicated Deassert Macro Number	FF	Note 30
DE	Zone B IN Dedicated Assert Macro Number	FF	Note 30
DF	Zone B IN Dedicated Deassert Macro Number	FF	Note 30
E0	Zone C IN Dedicated Assert Macro Number	FF	Note 30

E1	Zone C IN Dedicated Deassert Macro Number	FF	Note 30
E2	Zone D IN Dedicated Assert Macro Number	FF	Note 30
E3	Zone D IN Dedicated Deassert Macro Number	FF	Note 30
E4	Zone E IN Dedicated Assert Macro Number	FF	Note 30
E5	Zone E IN Dedicated Deassert Macro Number	FF	Note 30
E6	Zone F IN Dedicated Assert Macro Number	FF	Note 30
E7	Zone F IN Dedicated Deassert Macro Number	FF	Note 30
E8	Auto BKC-DIP Set IR Generate Enable	1	Note 20
E9	Auto BKC-DIP Set IR Mask	3F	Note 31
EA	Auto BKC-DIP Set IR Transmit ID	80	Note 24
EB	Page/Event Activation Bitmap	3	Note 35
EC	RS232 Keypad Receive ID	FF	Note 32
ED	FM RS232 Keypad Page/Device	B4	Note 33
EE	AM RS232 Keypad Page/Device	B4	Note 33
EF	Dedicated RS232 Keypad Page/Device	B4	Note 33
F0	Input 1 RS232 Keypad Page/Device	B4	Note 33
F1	Input 2 RS232 Keypad Page/Device	B4	Note 33
F2	Input 3 RS232 Keypad Page/Device	B4	Note 33
F3	Input 4 RS232 Keypad Page/Device	B4	Note 33
F4	Input 5 RS232 Keypad Page/Device	B4	Note 33
F5	Input 6 RS232 Keypad Page/Device	B4	Note 33
F6	Input 7 RS232 Keypad Page/Device	B4	Note 33
F7	Input 8 RS232 Keypad Page/Device	B4	Note 33
F8	Input 9 RS232 Keypad Page/Device	B4	Note 33
FA	Rear Panel IR Routing Bitmap LSBits	FF	Note 38, 39
FB	Rear Panel IR Routing Bitmap MSBits	3F	Note 38, 39

Appendix B System Parameter Notes

(0,G,S,17;*cs16*) Example of Get Input 9 Level Setting
(0,S,S,3=”LASER”;*cs16*) Example of Set Input 4 Title to “LASER”

(**NOTE:** hex values denoted by *xx*h convention)

Note 1: 0h = -6.0 dB, 2h = -4.0 dB, ... 3h = 0.0 dB, ... 6h = +6.0 dB
Note 2: 0h = No, 1h = Yes
Note 3: 0h = Manual, 1h = Auto
Note 4: 0h = Mono, 1h = Stereo
Note 5: 0h = None, 1h = Page/Event 1, 2h = Page/Event 2, 3h = Both
Note 6: 0h = Tuner 1, 1h = Tuner 2, 2h = Tuner 3
***NOTE:** No of Tuners, 1 in CTxxx.1, 2 in CTxxx.2 and 3 in CTxxx.3

Note 7: 0h = Fixed, 1h = Variable
Note 8: 0h = -80 MUTE dB, 1h = -78 dB ... 28h = +0 dB
Note 9: 0h = Group Disabled, 1h = Zone ID of 1, … 80h = Zone ID of 128
Note 10: 0h = Off, 1h = On,
Note 11: 0h = RS-232, 1h = Zone On, 2h = Zone Active, 3h = Zone Off, 4h = Selected Input
Note 12: (represents LSB, see note 28 for MSB) Set Zone Control Out setting to Selected Input or Common Control Active Input, a 1 in the following bitmap position (which corresponds to the various inputs) will assert the control output when the appropriate input is selected (active):

Bit Position (LSB)	Word	Description
0	Selected 0-7	FM Tuner
1	Selected 0-7	AM Tuner
2	Selected 0-7	Dedicated
3	Selected 0-7	Input 1
4	Selected 0-7	Input 2
5	Selected 0-7	Input 3
6	Selected 0-7	Input 4
7	Selected 0-7	Input 5
(MSB)		
0	Selected 8-11	Input 6
1	Selected 8-11	Input 7
2	Selected 8-11	Input 8
3	Selected 8-11	Input 9
4-7	Selected 8-11	Reserved

For example,
(0,S,S,7E=4,88=01,89=04;*cs16*)

7E=4 indicates Zone C's control out state is based on the Selected Input

88=01 and 89=04 indicates that the control out state of Zone C will be on if the input is AM Tuner or Input 8, and off for all other selected inputs.

Note 13: Set Control Out to RS-232 (0h), a 1 in the following bitmap position (which corresponds to the various inputs) will assert the control output when the appropriate input is selected:

Bit Position	Description
0	Zone A Control Out
1	Zone B Control Out
2	Zone C Control Out
3	Zone D Control Out
4	Zone E Control Out
5	Zone F Control Out
6	Common 1 Control Out
7	Common 2 Control Out

For example,
(0,S,S,7E=0,94=04;*cs16*)

7E=0 indicates Zone C's control out state is based on the RS-232 Control out register (94h)

94=04 indicates that Zones A, B, D, E, and F control out will be off (only if their appropriate Control Output settings (identifiers 7Ch – 81h) are set to use RS-232), and that Zone C's control output would be On (since its Control Output setting 74h = 0, RS-232) and bit 2 of the RS-232 Control out register (94h) is set.

Note 14: 0h = Off
1h = switch to Input 1
2h = switch to Input 2
3h = switch to Input 3
4h = switch to Input 4
5h = switch to Input 5
6h = switch to Input 6
7h = switch to Input 7
8h = switch to Input 8
9h = switch to Input 9
Ah = Reduce Volume

Note 15: 0h = Audio only, 1h = Video only, 2h = Audio and Video

Note 16: *0h = Audio sense
*1h = Video sense
*2h = Audio or Video sense
3h = Common Control (1 for Page/Event 1, 2 for Page/Event 2)
4h = RS-232
***Note:** 0h, 1h and 2h are not valid Page/Event Activation settings while the Page/Event Action is set to Ah "Reduce Volume" see Note 14 listed above.

Note 17: Release Time in 1 second increments.
0h = 0 seconds, 1h = 1 second, 2h = 2 seconds, … 19h = 25 seconds, 1Ah = forever

Note 18: Not Applicable.

Note 19: 0h = "ENTER" Button required to recall Favorite Preset,
1h = Automatically recall Favorite Preset

Note 20: 0h = Disabled, 1h = Enabled

Note 21: 0h = 1200
1h = 2400
2h = 9600
3h = 14400
4h = 19200
5h = 28800
6h = 38400
7h = 57600
8h = 115200

Note 22: Valid IDs are 00h to 7Fh. Receive IDs must be unique (to avoid ambiguity)

Note 23: 0h = Hidden, 1h = Visible

Note 24: 00h to 7Fh map directly to Transmit IDs 00h to 7Fh. 80h maps to the Global Transmit ID FFh.

Note 25: 0h = RS-232
1h = Any Zone On
2h = All Zones Off
3h = Selected Input
4h = Active Input
5h = Not Applicable.
6h = Common Control In 1 On
7h = Common Control In 1 Off
8h = Common Control In 2 On
9h = Common Control In 2 Off
Ah = Any Zone On OR Control In X* On
* **NOTE:** X = 1 → Control Out 1, X = 2 → Control Out 2

NOTE: Common Control 2 not valid for a CT300.1-3.

NOTE: Values 8h = Common Control In 2 On and 9h = Common Control In 2 Off are not valid for CT300.1-3.

Note 26: 0h = Off, 1h = Selected Input, 2h = All Inputs

Note 27: 0h = BKC-DIP V1.0 compliant, 1h = BKC-DIP V2.0 compliant with no attributes, 2h = BKC-DIP V2.0 compliant with attributes

NOTE: This parameter is reset to 0h after a cold/warm boot.

Note 28: (represents MSB → continuation for MSB bit map value) See note 12

Note 29: 0h = -12.0 dB, 1h = -10 dB, ... 6h = 0.0 dB, ... Ch = +12.0 dB

NOTE: The Stereo Left/Right Calibration Level is ignored by the unit when it's corresponding Zone Mode is set to Mono.

Note 30: 0h = Serial Macro 0, 1h = Serial Macro 1, … FDh = Serial Macro 253, FEh = Serial Macro 254, FFh = No Macro.

NOTE: If there is no corresponding valid Serial Macro, the end result is the same as if set to FFh = No Macro.

Note 31: Bitmap indicating which Hardware Zones (Zones A, B, C, D, E or F) to allow RS-232 data to be output. If the bit is set, the data will be output.

Zone A	01h
Zone B	02h
Zone C	04h
Zone D	08h
Zone E	10h
Zone F	20h

Thus an output mask of 2Bh would allow serial port data to be output on Zone A, Zone B, Zone D and Zone F, but NOT on Zone C and Zone E.

NOTE: The serial port data is always transmitted out the "primary" serial port connection, i.e. the RJ45 connector. An output mask of 00h will mask all data to the Hardware Zone outputs, but the data will still be transmitted to the primary serial port.

Note 32: 0h = 0, 1h = 1, … FDh = 253, FEh = 254, FFh = Global Receive ID. Note: while a Zone is set for MONO operation, all RS-232 feedback status messages use ID 0 for Mono Left and ID 1 and for Mono Right. Please set the Keypad or feedback reception ID correctly for use with MONO zone operation.

Note 33: Page and Device are merged together into a single byte, where Page occupies the 3 most significant bits, and Device occupies the 5 least significant bits:

ppp ddddd

The maximum valid page is 4h (Page 5).
The maximum valid device is 13h (Device 20).

00h = Main 1, Device None
01h = Main 1, Device 1
02h = Main 1, Device 2
: : :
13h = Main 1, Device 19
14h = Main 1, Device 20
15h – 1Fh = invalid Page/Device combination

20h = Main 2, Device None
21h = Main 2, Device 1
22h = Main 2, Device 2
: : :
33h = Main 2, Device 19
34h = Main 2, Device 20
35h – 3Fh = invalid Page/Device combination

40h = Page 1, Device None
41h = Page 1, Device 1
42h = Page 1, Device 2
: : :
53h = Page 1, Device 19
54h = Page 1, Device 20
55h – 5Fh = invalid Page/Device combination

60h = Page 2, Device None
61h = Page 2, Device 1
62h = Page 2, Device 2
: : :
73h = Page 2, Device 19
74h = Page 2, Device 20
75h – 7Fh = invalid Page/Device combination

80h = Page 3, Device None
81h = Page 3, Device 1
82h = Page 3, Device 2
: : :
93h = Page 3, Device 19
94h = Page 3, Device 20
95h – 9Fh = invalid Page/Device combination

A0h = Page 4, Device None

A1h = Page 4, Device 1
A2h = Page 4, Device 2
 :   :   :
B3h = Page 4, Device 19
B4h = Page 4, Device 20

Decomposing one of the above for clarification:
53h = Page 1, Device 19

53h = 010 10011 binary

Page = Most significant 3 bits: 010 binary, 2h = Page 3 (Note Page is offset by 1)
Device = Least significant 5 bits: 10010 binary, 12h = Device 19 (Note Device is offset by 1).

Note 34: 0h = Disabled, 1h = Update, 2 = Reply, 3 = Both (Update and Reply). Note: while a Zone is set for MONO operation, all RS-232 feedback status messages use ID 0 for Mono Left and ID 1 and for Mono Right. Please set the Keypad or feedback reception ID correctly for use with MONO zone operation.

Note 35: Bitmap indicating state Page/Events via BKC-DIP. If the bit is set, the Page/Event will be asserted, if it is clear the Page/Event will be deasserted. Note: assumes the Page/Event Activated System Parameter (97 or 9B) is set 4 (use RS-232).

Page/Event 1	01h	enabled if 97h is set to 4
Page/Event 2	02h	enabled if 9Bh is set to 4

Note 36: 0h = Input/Tone, 1h = Input/Tone/Volume, 2h = Input Only

Note 37: 0h = Any Zone On
1h = Any Zone On OR Control In 1 On
2h = Any Zone On OR Control In 2 On
3h = Any Zone On OR Control In 1 On OR Control In 2 On

Note 38: (represents LSB, see note 39 for MSB) Set Rear Panel IR Router, a 1 in the following bitmap position (which corresponds to the various inputs) will assert the control output when the appropriate input is selected (active):

Bit Position (LSB)	Word	Description
0	Selected 0-7	unused (FM)
1	Selected 0-7	unused (AM)
2	Selected 0-7	unused (dedicated)
3	Selected 0-7	IR 1
4	Selected 0-7	IR 2
5	Selected 0-7	IR 3
6	Selected 0-7	IR 4
7	Selected 0-7	IR 5

(MSB)

0	Selected 8-13	IR 6
1	Selected 8-13	IR 7
2	Selected 8-13	IR 8
3	Selected 8-13	IR 9
4	Selected 8-13	IR All
5	Selected 8-13	RP local control of CT
6	reserved	
7	reserved	

Note 39: (represents MSB → continuation for MSB bit map value)
See note 38

RS-232 Feedback Selection set to Reply

Continuous Parameter Feedback

With firmware 2.01 and greater, System Parameter AE has been changed to RS-232 Feedback Selection. Setting the RS-232 Feedback Selection to "Reply" allows the CT600.1-3/300.1-3 to automatically generate BKC-DIP Reply messages for changes to Volume, Bass, Treble, Equalization, Source and Tuner Frequency.

Below is an example of how the RS-232 Feedback Selection Reply may be used as Volume Feedback from the CT600.1-3/300.1-3 for use with an external controller.

Step 1)
First, set the CT600.1-3/300.1-3 system parameter AE = 2, RS-232 Feedback Selection set to Reply.

Next, initiate a Master Volume change by one of the following methods:

B&K code set 11 (Logical Zone 11) IR Master Volume Up
B&K code set 11 (Logical Zone 11) IR Master Volume Down
Front Panel Volume Encoder up or down while set to Logical Zone 11

The CT600.1-3/300.1-3 will automatically generate the following BKC-DIP Reply message command:

(0,R,P0B=FF,1=28;) Logical Zone 11 current Preset Parameter Volume value is set to 28 hex or 0dB (assumes 0dB is the current setting).

Step 2)
The external control device should be set to Poll for any BKC-DIP Reply messages and parse out the specific logical zone and current Preset Parameter value of interest, in this case the current Preset Parameter Volume value for Zone 11.

Step 3)
The external controller should use the CT600.1-3/300.1-3 Zone 11 current Preset Parameter Volume value of "28" hex to update its GUI or status in an appropriate fashion.

RS-232 Feedback Selection set to Update

Previous to 2.01, BKC-DIP messages "Update", "Get" and "Reply" commands were necessary for feedback. All current preset parameters for all logical zones in the CT600.1-3/300.1-3 are available at anytime. Typically, an external controller will use the Update message generated in response to a Front Panel button press or received B&K IR code-set, to formulate a BKC-DIP Get command. The returned BKC-DIP Reply message data may be used to extract the desired current Preset Parameter(s) and value(s) for use with updating its display requirements.

Below is an example of how the RS-232 Feedback Selection Update may be used to allow Volume Feedback from the CT600.1-3/300.1-3 for use with an external controller.

Step 1)
First, set the CT600.1-3/300.1-3 System Parameter AE = 1, RS-232 Feedback Selection set to Update.

Next, initiate a Master Volume change by any one of the following methods:

B&K code set 11 (Logical Zone 11) IR Master Volume Up B&K code set 11 (Logical Zone 11) IR Master Volume Down Front Panel Volume Encoder up or down while set to Logical Zone 11

Using an IR remote control set to B&K code set 11 (Logical Zone 11) a user presses the Master Volume + (Up) button.

The CT600.1-3/300.1-3 will generate the following BKC-DIP Update message command:

(0,U,I,0B=C4;) Update from Zone 11 via an IR message.

Step 2)
The external control device should be set to Poll for any BKC-DIP Update messages and parse out the specific BKC-DIP message of interest, in this case a Zone 11, IR Master Volume + (1=C4) "U,I,0B=C4". Note if another means of Master Volume up is used, such as the Front Panel Encoder Up, this would require a different message "U,F,0B=0B".

Step 3)
The external controller should generate a CT600.1-3/300.1-3 Get command for the specific current Preset Parameter of interest, in this case the current Preset Parameter Volume value. The command would look like the following BKC-DIP Get message:

(0,G,P0B=FF,1;) Get Zone 11 Volume setting.

Step 4)
Once the CT600.1-3/300.1-3 receives the above Get message it will generate a Reply message with the requested parameter, in this case the Reply for the current Preset Parameter Volume value for Zone 11. The command would look like the following BKC-DIP Reply message command:

(0,R,P0B=FF,1=28;) Zone 11 current Preset Volume value is set to 28 hex or 0dB.

Step 5)
The external controller may then use the CT600.1-3/300.1-3 Zone 11 current Preset Parameter Volume value of "28" hex to update its GUI or status in an appropriate fashion.

In addition to RS-232 Feedback Selections of Update and Reply, Disable and Both (Update and Reply) allow further versatility to set the best interface for the CT600.1-3/300.1-3 to an external controller.

Appendix C Tuner Station Parameters

Tuner stations are not supported in the CT600.1-3/300.1-3.

Appendix D Realtime Status Parameter

Real-time Status Parameters are not currently supported in the CT600.1-3/300.1-3.

Appendix E Unit Parameters

(0,G,F4,0;*cs16*) Example of Get Unit Name
(0,G,F4,1;*cs16*) Example of Get Version
(0,G,F4,C;*cs16*) Example of Get Active BKC-DIP Version

Parameter Identifier (in hex)	**Description**	**Notes**
00	Unit name	Note 1
01	Version	Note 2
02	Zone Description	Note 3
06	Amplifier Description	Note 4
07	Video Scan Rate (NTSC/PAL)	Note 5
08	AM steps 9kHz/10kHz	Note 6
09	FM steps 100kHz/200kHz	Note 7
0C	Active BKC-DIP Version	Note 8
0D	Software Time Stamp	Note 9
10	Serial Number	Note 10
11	Highest BKC-DIP Version Available	Note 11
12	Active Logical Zone Numbers	Note 12
13	Number of Inputs	Note 13
14	Number of Zones	Note 14
15	Number of Dedicated Inputs	Note 15
16	Number of Tuners	Note 16*
17	Number of Control Outputs	Note 17
18	Number of Control Inputs	Note 18
19	Number of Page/Events	Note 19
1A	Number of Input Boards	Note 20
1B	Number of Output Boards	Note 21
1C	Number of External Inputs	Note 22
1D	Number of Zones and Detectors	Note 23
1E	Receive ID	Note 24
1F	Transmit ID	Note 24
20	Input Bitmap LSB	Note 25
21	Input Bitmap MSB	Note 25
22	Output Bitmap LSB	Note 26
23	Output Bitmap LSB	Note 26
24	Dedicated Input Bitmap LSB	Note 27
25	Dedicated Input Bitmap LSB	Note 27
26	Serial Macro Free Space MSB	Note 28
27	Serial Macro Free Space LSB	Note 28
28	RF Remote	Note 29
29	Group Code Set List	Note 30
2A	Audio Input Detect Bitmap LSB	Note 31
2B	Audio Input Detect Bitmap MSB	Note 31
2C	Video Input Detect Bitmap LSB	Note 31
2D	Video Input Detect Bitmap MSB	Note 31
2E	Control Input Detect Bitmap	Note 32
2F	Control Output Status Bitmap	Note 33
30	Tuner Detect Status Bitmap	Note 34
40	MAC Address	Note 35
41	IP Address	Note 36**
42	Subnet Mask	Note 36**

```
43          Gateway                                 Note 36**
44          Host Name                               Note 37**
45          Domain / Workgroup                      Note 37**
46          Primary DNS                             Note 36**
47          Secondary DNS                           Note 36**
48          Use DHCP                                Note 39**
51          TFTP Server IP Address                  Note 36**
52          TFTP Server File Name                   Note 38**

** Read/Write Unit Info Parameters.
      (0,S,F4,48=1;)          Example of Set to use DHCP
```

Appendix E, Unit Info Parameter Notes

Note 1: String indicating Name
Note 2: String indicating software version
Note 3: String indicating Zone capabilities
Note 4: String describing amplifier capabilities
Note 5: String describing Video scan rate (“NTSC” or “PAL”)
Note 6: String describing AM Step size (“9kHz” or “10kHz”)
Note 7: String describing FM Step size (“100kHz” or “200kHz”)
Note 8: String describing currently active BKC-DIP version. This may not necessarily be the most sophisticated (highest) version of BKC-DIP the device can support, but the unit can be forced to communicate using older more restrictive forms of BKC-DIP for backwards compatibility.
Note 9: String indicating date/time which software was compiled
Note 10: String containing Unit’s Serial Number
Note 11: String indicating highest BKC-DIP version unit can support. This can be different than the currently active BKC-DIP version, as the unit can be forced to communicate using older more restrictive forms of BKC-DIP for backwards compatibility.
Note 12: String containing list of all active Logical Zone Numbers in the unit. Each logical zone is delimited by white space, and the values are in hexadecimal.

For example:
“0 1 2 3 4 5 6 7”
indicates that there are 8 Logical zones, 0-7 currently present in the unit.

As another example
“0 3 6 9 C 1D”
indicates that there are 6 Logical zones (0h, 3h, 6h, 9h, Ch, and 1Dh) currently present in the unit.

Note 13: Number of Inputs (including AM and FM if any tuners present)
Note 14: Number of Hardware Zones (CT600.1-3 = 6, CT300.1-3 = 3)
Note 15: Number of Dedicated Inputs(CT600.1-3 = 6, CT300.1-3 = 3)
Note 16: Number of Tuners (could be 0) *(max 3 in CT600.3/300.3)
Note 17: Number of Control Outputs
Note 18: Number of Control Inputs
Note 19: Number of Page/Events (CT600.1-3 = 2, CT300.1-3 = 1)
Note 20: Number of Input Boards
Note 21: Number of Output Boards (CT600.1-3 = 2, CT300.1-3 = 1)
Note 22: Number of External Inputs (excluding AM and FM)

Note 23: Number of Zones and Detectors
Note 24: Current Serial (RS-232 and Ethernet) Receive/Transmit ID, shadows System setting
Note 25: Bitmaps indicating which inputs are valid with the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Input Represented
LSB	0	FM
LSB	1	AM
LSB	2	Zone Dedicated IN
LSB	3	In 1
LSB	4	In 2
LSB	5	In 3
LSB	6	In 4
LSB	7	In 5
MSB	0	In 6
MSB	1	In 7
MSB	2	In 8
MSB	3	In 9

For example, a fully loaded CT600.3 (3 input boards, 2 output boards, and 3 tuner modules) would have the following return values:

20=FF Indicates FM, AM, Zone Dedicated IN, In 1-5 valid
21=F Indicates In 6-9 valid

In a minimal CT600.0 configuration (2 input boards, 1 output board, and no tuner modules), the return value would be

20=FC Indicates Zone Dedicated Input and In 1-5 valid, No FM, AM
21=01 Indicates In 6 valid, No In 7-9

Note 26: Bitmaps indicating which outputs are valid with the current hardware configuration. If the bit is set (i.e. 1) that particular output is valid.

LSB/MSB Word	Bit	Output Represented
LSB	0	Zone A
LSB	1	Zone B
LSB	2	Zone C
LSB	3	Zone D
LSB	4	Zone E
LSB	5	Zone F
LSB	6	unused
LSB	7	unused

For example, a fully loaded CT600.3 (3 input boards, 2 output boards, and 3 tuner modules) would have the following return values:

22=3F Indicates Zones A-F valid
23=0 Always 0

In a minimal CT600.0 configuration (2 input boards, 1 output board, and no tuner modules), the return value would be

```
22=07      Indicates Zones A-C valid, No D-F
23=00      Always 0
```

NOTE: The MSB currently is always 0 as there is a maximum of 6 possible Zone outputs in the CT series. This parameter is provided in the protocol for future expandability should there be more than 8 Zone outputs.

Note 27: In the current CT series there is a Dedicated Zone input associated with each Zone Output. Thus, these values are the same as the Output Bitmap parameters. They are provided in the protocol for future expandability should there be a difference between Zone Dedicated inputs and Zone Outputs.

Note 28: The MSB and LSB form a 16 bit value indicating how much Serial Macro free space currently remains in the unit.

```
26=8       (MSB)
27=0       (LSB)
```

Indicates 800h (2048 decimal) bytes free remaining serial macro space.

```
26=1       (MSB)
27=E4      (LSB)
```

Indicates 1E4h (484 decimal) bytes free remaining serial macro space.

Note 29: 0h = No RF Remote support, 1h = RF Remote supported

Note 30: String containing list of all Group Code Sets (Zone IDs)in the unit. Each Code Set (Zone ID) is delimited by white space, and the values are in hexadecimal.

For example:
"0 B C D E F 10 0 0 0 0 0 0 0 0 0 0"

indicates that there are 17 Groups with Code Sets (Zone IDs):

Group	Code Set (Zone ID)
0	0h
a	3h
b	4h
c	Bh
d	Ch
e	Dh
f	Eh
g	10h
h	0h
i	0h
j	0h
k	0h
l	0h
m	0h

```
n           0h
o           0h
p           0h
q           0h
r           0h
```

Note 31: Bitmaps indicating the current Audio or Video Input Detect status for all valid audio and video inputs in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Audio or Video Input Represented
LSB	0	Dedicated IN A
LSB	1	Dedicated IN B
LSB	2	Dedicated IN C
LSB	3	Dedicated IN D
LSB	4	Dedicated IN E
LSB	5	Dedicated IN F
LSB	6	In 1
LSB	7	In 2
MSB	0	In 3
MSB	1	In 4
MSB	2	In 5
MSB	3	In 6
MSB	4	In 7
MSB	5	In 8
MSB	6	In 9

For example, a fully loaded CT600.3 (3 input boards, 2 output boards, and 3 tuner modules) would have the following return values:

Audio Input Detect

2A=FF	Indicates audio detected on Dedicated Zone Inputs A thru F and Inputs 1 thru 9
2B=1F	Indicates audio detected on Dedicated Zone Inputs A thru F and Inputs 1, 2, and 3.

Video Input Detect

2C=FF	Indicates video detected on Dedicated Zone Inputs A thru F and Inputs 1 thru 9
2D=1F	Indicates video detected on Dedicated Zone Inputs A thru F and Inputs 1, 2, and 3.

Note 32: Bitmaps indicating the current Control Input Detect Status for all valid control inputs in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Control Input Represented
LSB	0	Control IN 1
LSB	1	Control IN 2

Control Input Detect

2E=3	Indicates control in detected on both Control IN 1 and IN 2.

Note 33: Bitmaps indicating the current Control Output Status for all valid control outputs in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Control Output Represented
LSB	0	Control OUT A
LSB	1	Control OUT B
LSB	2	Control OUT C
LSB	3	Control OUT 1
LSB	4	Control OUT D
LSB	5	Control OUT E
LSB	6	Control OUT F
LSB	7	Control OUT 2

Control Output Status

2F=8	Indicates control out 1 is set.
2F=F0	Indicates control out 2 is set.

Note 34: Bitmaps indicating the current Tuner Detect Status for all valid tuners in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Tuner Status Represented
LSB	0	Station Detect for Tuner 1
LSB	1	Stereo Detect for Tuner 1
LSB	2	Station Detect for Tuner 2
LSB	3	Stereo Detect for Tuner 2
LSB	4	Station Detect for Tuner 3
LSB	5	Stereo Detect for Tuner 3

Tuner Input Detect

30=3	Indicates Tuners 1 is receiving a Stereo station and the Station Detect signal is set.
30=F	Indicates Tuners 1 and 2 are both receiving a Stereo station and both tuners are receiving a valid Station Detect signal strength.
30=3F	Indicates Tuners 1 and 2 and 3 are all receiving a Stereo station and the Tuners are receiving a valid Station Detect signal strength.

Note 35: Unit's MAC Address
Format is xx:xx:xx:xx:xx:xx

Note 36: IP Address / Subnet Mask / Gateway / DNS format
Format as xxx.xxx.xxx.xxx
Unit IP is obtained from DHCP
Unit Subnet Mask is obtained from DHCP
Gateway IP Address is obtained from DHCP
Primary DNS (DHCP Option 6)
Secondary DNS (DHCP Option 6)
TFTP Server IP (DHCP Option 150 (default option 54))*

* Assigned by an external PC application and is only to be used with the flashloader utility.

Note 37: String containing Domain Name
Domain Name (DHCP Option 15)

Note 38: String containing TFTP File Name *

* Assigned by an external PC application and is only to be used with the flashloader utility.

Note 39: 0h = Off (use static IP address), 1h = On (get IP from DHCP)

Appendix F IR Commands

(0,S,I,1=2;*cs16*) Example of Set Zone 1 IR Save
(0,S,I,1=24;*cs16*) Example of Set Zone 1 IR Volume +

IR Command (in hex)	IR Description
02	SAVE
04	(BALANCE) RIGHT
0C	ENTER
14	ALL B&K POWER OFF
15	ALL B&K POWER ON
16	ALL B&K VOL DOWN
17	ALL B&K VOL UP
18	STATION +
19	ALL B&K 0 dB VOL
1A	ALL B&K -20 dB VOL
1B	ALL B&K -40 dB VOL
1D	ALL B&K -60 dB VOL
1E	ALL B&K MUTE
21	TUNER 2
22	TUNER 3
24	MASTER VOL +
38	TUNE +
3F	OSD MENU 1
40	POWER ON
41	OSD MENU 2
42	OSD MENU 3
43	OSD MENU 4
45	POWER (TOGGLE)
48	FREQ
4C	2
52	INPUT 6
54	EQ
5A	ZONE_DIRECT_INPUT
5B	ANALOG SOURCE -
5C	8
5D	ANALOG SOURCE +
5E	VIDEO SOURCE -
5F	VIDEO SOURCE +
60	INPUT 3
63	PRESET -
65	SOURCE -
66	SOURCE +
6C	5
6E	AM
70	TUNER 1
71	FM
74	UP
76	INPUT 9
7C	0
80	POWER OFF
8C	1
90	INPUT 2
94	+10
9C	7
9E	TREBLE -
9F	TREBLE +

A0	INPUT 1
A6	BASS -
A7	BASS +
AC	4
B0	INPUT 4
B4	DOWN
BE	EXIT
C0	MUTE
C4	MASTER VOL -
C8	BAND
CC	3
CD	SLEEP
CF	RIGHT
D0	INPUT 7
D1	LEFT
D2	PRESET +
D7	STEREO / MONO
D8	TUNE -
DC	9
E0	INPUT 8
E8	STATION -
EC	6
F0	INPUT 5
F1	MUTE ON
F2	MUTE OFF
F3	LOUDNESS (TOGGLE)
F4	MENU
F8	(BALANCE) LEFT
FC	ZONE

Appendix G, Front Panel Commands

(0,S,F,1=1;*cs16*) Example of Set Zone 1 FP Sleep
(0,S,F,1=A;cs*16*) Example of Set Zone 1 FP Volume Down

Identifier (in hex)	Front Panel Button/Switch	Function
01	POWER TOGGLE	Unit Power Toggle
02	PRESET	Increment Preset
03	ENTER	Enter
04	SAVE	Save
05	DOWN	Down
06	UP	Up
07	SOURCE	Increment Source
08	MENU	Menu
09	ZONE	Increment Zone
0A	ENCODER DOWN	Vol/Encoder Knob Down
0B	ENCODER UP	Vol/Encoder Knob Up
0C	CHORD 0: SLEEP + DOWN + UP	Advanced Settings Visible
0E	CHORD 2: SLEEP + UP + ZONE	Factory Reset Unit
12	CHORD 1: SLEEP + DOWN + SOURCE	Restore User Memory
16	CHORD 1: SLEEP + DOWN + SAVE	Backup User Memory

Appendix H, Valid ASCII Display Characters

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789 -+/?='

Appendix I, Special Display Characters

Character (in hex)	Description
0B	blank space
64	no tick symbol (long dash)
65	left 1/4 tick symbol
66	left middle 1/4 tick symbol
67	right middle 1/4 tick symbol
68	right 1/4 tick symbol
72	1/6 of solid vertical bar
73	2/6 of solid vertical bar
74	3/6 of solid vertical bar
75	4/6 of solid vertical bar
76	5/6 of solid vertical bar
77	6/6 of solid vertical bar
6E	satellite symbol
79	G clef symbol
7A	right facing arrow
7B	left facing arrow
7C	upward facing arrow
7D	downward facing arrow
7E	key symbol
71	heart symbol

Appendix J, ASCII Table

Decimal	Hex	ASCII	Decimal	Hex	ASCII
0	0	xx	64	40	@
1	1	xx	65	41	A
2	2	xx	66	42	B
3	3	xx	67	43	C
4	4	xx	68	44	D
5	5	xx	69	45	E
6	6	xx	70	46	F
7	7	xx	71	47	G
8	8	xx	72	48	H
9	9	xx	73	49	I
10	A	xx	74	4A	J
11	B	xx	75	4B	K
12	C	xx	76	4C	L
13	D	xx	77	4D	M
14	E	xx	78	4E	N
15	F	xx	79	4F	O
16	10	xx	80	50	P
17	11	xx	81	51	Q
18	12	xx	82	52	R
19	13	xx	83	53	S
20	14	xx	84	54	T
21	15	xx	85	55	U
22	16	xx	86	56	V
23	17	xx	87	57	W
24	18	xx	88	58	X
25	19	xx	89	59	Y
26	1A	xx	90	5A	Z
27	1B	xx	91	5B	[
28	1C	xx	92	5C	\
29	1D	xx	93	5D	]
30	1E	xx	94	5E	^
31	1F	xx	95	5F	_
32	20		96	60	`
33	21	!	97	61	a
34	22	"	98	62	b
35	23	#	99	63	c
36	24	$	100	64	d
37	25	%	101	65	e
38	26	&	102	66	f
39	27	'	103	67	g
40	28	(	104	68	h
41	29	)	105	69	i
42	2A	*	106	6A	j
43	2B	+	107	6B	k
44	2C	,	108	6C	l
45	2D	-	109	6D	m
46	2E	.	110	6E	n
47	2F	/	111	6F	o
48	30	0	112	70	p
49	31	1	113	71	q
50	32	2	114	72	r
51	33	3	115	73	s
52	34	4	116	74	t
53	35	5	117	75	u
54	36	6	118	76	v
55	37	7	119	77	w
56	38	8	120	78	x
57	39	9	121	79	y
58	3A	:	122	7A	z
59	3B	;	123	7B	{
60	3C	<	124	7C	|
61	3D	=	125	7D	}
62	3E	>	126	7E	~
63	3F	?	127	7F	xx

NOTE: xx indicates non printable character

Appendix K, LED Mapping

```
LED Buffer 0
01h = UP
02h = ZONE
04h = MENU
08h = SOURCE
10h = PRESET
20h = SLEEP
40h = ENTER
80h = SAVE

LED Buffer 1
01h = DOWN
02h = <NOT USED>
04h = <NOT USED>
08h = <NOT USED>
10h = <NOT USED>
20h = <NOT USED>
40h = <NOT USED>
80h = <NOT USED>
```

NOTE: Due to the front panel electronics, all LEDs are in the same electrical bank. Only one of the LEDs should be active at a time.

NOTE: Due to the lack of front panel electronics, LEDs commands do not apply to a CT600.1-3/300.1-3.

Appendix L, X (executive) Commands

The following is a list of the supported Executive commands and details regarding their usage:

Recall Preset Command: (*receiveID*, X, 0, *z=nn*; *cs16*)

Zone *z* Preset *nn* is recalled to the current preset. Similar to the "G" get and "S" set commands, *nn* can range from 00h – FDh, however it **CANNOT** be FFh for the current preset (as recalling the current preset has no meaning).

NOTE: *nn* of FE is reserved for future expansion.

(00, X, 0, 1=4;*cs16*)	Recall Zone 1 Preset 4 to current preset
(00, X, 0, 2=7;*cs16*)	Recall Zone 2 Preset 7 to current preset

Save Preset Command: (*receiveID*, X, 1, *z=nn*, *autoNameMode*; *cs16*)

The current preset is saved to Zone *z* Preset *nn*. . Similar to the "G" get and "S" set commands, *nn* can range from 00h – FDh, however it **CANNOT** be FFh for the current preset (as saving the current preset has no meaning).

NOTE: *nn* of FE is reserved for future expansion.

(00, X, 1, 1=3;*cs16*)	Save current preset to Zone 1 Preset 3
(00, X, 1, 2=9;*cs16*)	Save current preset to Zone 2 Preset 9

The *autoNameMode* specifier can take on the following values with the following meanings:

0	Auto Name Preset, based upon state of System parameter Preset Auto Naming
1	Do not Auto Name, regardless of System parameter Preset Auto Naming
2	Force Auto Name, regardless of System parameter Preset Auto Naming

(00, X, 1, 1=8, 0;*cs16*)	Save current preset to Zone 1 Preset 8 Auto Name based on Preset Auto Naming parameter
(00, X, 1, 1=8, 1;*cs16*)	Save current preset to Zone 1 Preset 8 Do not Auto Name, preserve Preset Title
(00, X, 1, 1=8, 2;*cs16*)	Save current preset to Zone 1 Preset 8 Force Auto Naming, overwriting Preset Title

NOTE: If Preset Auto Naming is active, the preset title will be overwritten.

NOTE: The *autoNameMode* specifier is optional. If it is omitted its value defaults to 0, so the preset title is Auto Named based on the state of the System parameter Preset Auto Naming.

Power State Command: (*receiveID*, X, 2, *z=onOff*; *cs16*)

Zone *z*'s power state may be controlled using this command. The *onOff* parameter may take on the values of 1 or 0 for "on" or "off (Sleep)" respectively.

(00, X, 2, 1=1;*cs16*) Turn Z1 power on (unit not in Sleep)
(00, X, 2, 2=0;*cs16*) Turn Z2 power off (unit in Sleep)

NOTE: A Power State Command "on" is referred to as a "Warm Boot".

Cold Boot Command: (*receiveID*, X, 6; *cs16*)

This forces the unit to do a "Cold Boot", which is the same sequence of events that occur when the unit is turned on from the power on/off switch. This differs from a "Warm Boot" (Power State Command with On/Off state of 1) in that all of the unit's hardware is re-initialized.

NOTE: After issuing a Cold Boot command, the unit's communication port is reinitialized. Communication will have to be re-established. The unit cannot receive BKC-DIP commands until the Update Unit "BKC-DIP ACTIVE" reply has been transmitted by the unit (see Update Command below for further details).

Factory Reset Command: (*receiveID*, X, 7; *cs16*)

This command executes the factory-reset sequence in the unit. The factory reset returns the state of the unit to its original factory settings.

WARNING!: Issuing a Factory Reset Command will destroy all user modified data in the unit (preset, system settings, etc.).

NOTE: After issuing a Factory Reset command, the unit's communication port is reinitialized. Communication will have to be re-established. The unit cannot receive BKC-DIP commands until the Update Unit "BKC-DIP ACTIVE" reply has been transmitted by the unit (refer to the Update Command in the **BKC-DIP Specification** for further details).

Reinitialize BKC-DIP State Command: (*receiveID*, X, 8; *cs16*)

There are certain parameters and settings that are only available via BKC-DIP. On cold boot, these states are reset. It may be desirable to reset these states without performing a cold boot. The Reinitialize BKC-DIP State does the following:

1. Exits Override mode (setting Active to False), resets the acknowledge timeout to 0, and resets all other override parameters to their corresponding System Settings (i.e. the Override Baud Rate is reset to the System Baud Rate)
2. Disables all Realtime events
3. Restores Audio/Video linked on all zones
4. Resets all RS232 control out states for all inputs to off

NOTE: This command does not reset the state of the BKC-DIP parser.

Mute State Command: (*receiveID*, X, A, *z=muteState*; *cs16*)

This command is used to mute/unmute particular zones where *z* is the zone number and *muteState* is 0 or 1 (unmuted or muted).

(0, X, A, 1=1; *cs16*) Mute Zone 1
(0, X, A, 1=0; *cs16*) Unmute Zone 1
(0, X, A, 2=1; *cs16*) Mute Zone 2
(0, X, A, 2=0; *cs16*) Unmute Zone 2

NOTE: This mute is the same as muting from an IR command. It also follows the same logic, specifically that a Volume Up message on a specific zone will unmute that zone.

Initiate Flashloader Command: (receiveID, X, B; cs16)

This command initiates a flashloader mode to allow flash B&K firmware updates via TFTP. The "initiate flashloader command" will disconnect all active telnet connections and will start the B&K flashloader application. Once the unit is in the flashloader mode, the unit will start a new telnet connection after the DHCP is assigned. After the telnet connection is reestablished, TFTP Flash Load can be started with "TFTP Client Load Command: *(receiveID, X, D;* cs16)".
This executive command is used only on bootloader, and only valid when transmitted via an Ethernet connection.

Clear Flash Block Command: (*receiveID*, X, C=xx; *cs16*)

This command initiates an erase of flash memory starting at the specified flash block.
Example (FF,X, C=41;) Clears the 64k flash block starting at 0x410000.
This executive command is used only on bootloader, and only valid when transmitted via an Ethernet connection.

TFTP Client Load Command: (*receiveID*, X, D; *cs16*)

This command initiates a TFTP client with the server name and information set under Unit Info Parameters 51 and 52 (see Appendix E Unit Parameters). The TFTP client load will load a new "Flash Upgrade" file.
Status responds with a error log (see Appendix M, Error Logs) parameter 0A = 0 or 1. 0 = bad and 1 = good.
This executive command is used only on bootloader, and only valid when transmitted via an Ethernet connection.

WARNING!: Issuing a TFTP Client Load Command will destroy all user modified data in the unit (preset, system settings, etc.).

Unsupported Executive Commands

The following Executive Commands are **not** supported by the CT600.1-3/300.1-3:

Noise Generator State Command: (*receiveID*, X, 3, *noiseState; cs16*)
Noise Steering Command: (*receiveID*, X, 4, *speakerIndex=onOff*, ... speakerIndex=*onOff*; *cs16*)
Noise Increment Command: (*receiveID*, X, 5; *cs16*)
Test Tone State Command: (*receiveID*, X, 9, *level*; *cs16*)

Appendix M, Error Logs

(0,G,E,0;*cs16*) Example of Get Primary Preset Errors
(0,S,E,0=0;cs*16*) Example of Set Primary Preset Errors

Identifier (in hex)	Description	Note
00	Primary Preset Error Log	Note 1
01	Secondary Preset Error Log	Note 1
02	Primary System Error Log	Note 2
03	Secondary System Error Log	Note 2
04	Primary Preserved Error Log	Note 3
05	Secondary Preserved Error Log	Note 3
06	Serial Number Error Log	Note 4
07	Signature Error Log	Note 5
08	Non Volatile Write Error Log	Note 6
09	Block Memory Erase Error Log	Note 7
0A	Flash Memory Load Error Log	Note 8
0B	Undefined Command Error Log	Note 9

Appendix M, Error Logs Parameter Notes

General Note 1: If error is detected in the primary preset memory, the error is logged as a primary error, then the settings are recovered from the secondary (backup) settings. If the secondary settings are corrupted, the error is logged as a secondary error, and the settings are forced to their default value.

General Note 2: Error Logs are not reset by factory reset. To clear error logs, the value of 0 must explicitly be written to each identifier via a BKC-DIP set (S), command.

Note 1: Indicates data corruption in Preset primary/secondary settings.
Note 2: Indicates data corruption in System primary/secondary settings.
Note 3: Indicates data corruption in Preserved primary/secondary settings.
Note 4: Indicates data corruption of one of the redundant serial number entries.
Note 5: Indicates data corruption of one of the redundant signature entries.
Note 6: Indicates general low level write error to non-volatile memory device.
Note 7: Indicates data corruption during flash block erase command.
Example (FF,R,E,09=0;) Block successfully erased.
Example (FF,R,E,09=41;) Error erasing flash block 41.
This executive command is used only on bootloader
Note 8: Indicates data corruption during the flash block load command.
Example (FF,R,E,0A=00;) Flash memory successfully loaded.
Example (FF,R,E,0A=42;) Error loading flash block 42.
This executive command is used only on bootloader

Note 9: Indicates an undefined command sent during flash memory load.
Example (FF,R,E,0B=01;) Error undefined command.
This executive command is used only on bootloader

Appendix N, Zone Specific Parameters

(0,G,Z1,0;*cs16*) Example of Get Zone 1 Title
(0,S,Z9,2=3;*cs16*) Example of Set Zone 9 Audio Input Power On Preference to In 1

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Title	"B"	
01	Audio Input Power On Setting	1	Note 1
02	Audio Input Power On Preference	B	Note 2
03	Video Input Power On Setting	1	Note 1
04	Video Input Power On Preference	9	Note 12
05	Volume Power On Setting	1	Note 1
06	Volume Power On Preference	28	Note 3
07	Bass Power On Setting	1	Note 1
08	Bass Power On Preference	C	Note 4
09	Treble Power On Setting	1	Note 1
0A	Treble Power On Preference	C	Note 4
0B	Equalization Power On Setting	1	Note 1
0C	Equalization Power On Preference	2	Note 5
0D	AM Frequency Power On Setting	1	Note 1
0E	AM Frequency Power On Preference	74,81	Note 6,6a
0F	FM Frequency Power On Setting	1	Note 1
10	FM Frequency Power On Preference	67,CD	Note 7,7a
11	FM Stereo Mode Power On Setting	1	Note 1
12	FM Stereo Mode Power On Preference	1	Note 8
13	Zone List	"2F"	Note 10
14	Favorite Presets 0-7 Indicators	FF	Note 9
15	Favorite Presets 8-15 Indicators	FF	Note 9
16	Favorite Presets 16-23 Indicators	FF	Note 9
17	Favorite Presets 24-31 Indicators	FF	Note 9
18	Favorite Presets 32-39 Indicators	FF	Note 9
19	Favorite Presets 40-47 Indicators	FF	Note 9
1A	Favorite Presets 48-55 Indicators	FF	Note 9
1B	Favorite Presets 56-63 Indicators	FF	Note 9
1C	Favorite Presets 64-71 Indicators	FF	Note 9
1D	Favorite Presets 72-79 Indicators	FF	Note 9
1E	Favorite Presets 80-87 Indicators	FF	Note 9
1F	Favorite Presets 88-95 Indicators	FF	Note 9
20	Favorite Presets 96-99 Indicators	0F	Note 9
21	Absolute/Relative Setting	1	Note 11
22	Left (Stereo) Hardware Group Mask	3F	Note 13
23	Right Hardware Group Mask	3F	Note 13
24	Zone Power State	1	Note 15
25	Zone Mute State	1	Note 16

Appendix N, Zone Specific Parameter Notes

```
      (0,G,Z1,0;cs16)   Example of Get Zone 1 Title
      (0,S,Z9,2=3;cs16) Example of Set Zone 9 Audio Input Power On
                        Preference to In 1
Note 1:  0h = Last Used
         1h = Preferred Value
Note 2:  0h = FM Tuner
         1h = AM Tuner
         2h = Dedicated Zone In
         3h = In1
         4h = In2
         5h = In3
         6h = In4
         7h = In5
         8h = In6
         9h = In7
         Ah = In8
         Bh = In9
Note 3:  0h = -80 dB, 1h = -78 dB ... 28h = +0 dB
Note 4:  0h = -12.0 dB, 1h = -10 dB, ... 6h = 0.0 dB, ... Ch = +12.0 dB
Note 5:  0h = Off, 1h = Loudness, 2h = Auto Level
Note 6:  10 kHz AM step tuning (USA)
            (((value – 1) * 10) + 520) kHz, or
            (((AM_kHz - 520) / 10) + 1) with
            2Ah = 930 KHz;  00h indicates an uninitialized frequency.
            If tuner stations programmed, last used station's frequency
            is used, else 520 kHz.
Note 6a: 9 kHz AM step tuning
            (((value – 1)* 9) + 522) kHz, or
            (((AM_kHz - 522) / 9) + 1) with
            2Eh = 927 KHz;  00h indicates an uninitialized station.
            If tuner stations programmed, last used station's frequency
            is used, else 522 kHz.
Note 7:  200 kHz FM step tuning (USA)
            (((value – 1)* 0.20 ) + 87.5) MHz, or
            (((FM_MHz - 87.5) /0.2) + 1) with
            4Ch = 102.5 MHz; 00h indicates an uninitialized frequency.
            If tuner stations programmed, last used station's frequency
            is used, else 87.5 MHz.
Note 7a: 100 kHz FM step tuning
            (((value – 1)* 0.10 ) + 87.5) MHz, or
            (((FM_MHz - 87.5) /0.1) + 1) with 97h = 102.5 MHz; 00h
            indicates an uninitialized frequency.  If tuner stations
            programmed, last used station's frequency
            is used, else 87.5 MHz.
Note 8:  0h = Mono
         1h = Stereo
Note 9:  The Favorite Preset Indicators are bitmaps.  Each register
         represents 8 presets.  The lowest preset number of the 8
         presets corresponds to the least significant bit (right-most
         bit, bit 0), while the highest preset number of the 8
         corresponds to the most significant bit (left-most bit, bit
         7).  If a bit is set (i.e. a "1" in that position) the
         corresponding preset is a Favorite for that Logical Zone.
```

For example, given the following Favorite Preset Indicator settings:

Identifier	Value	Comment
14	01h	Preset 0 is Favorite
15	80h	Preset 15 is Favorite
16	87h	Preset 16, 17, 18, and 23 Favorite
17	C0h	Preset 30 and 31 Favorite
18	E0h	Preset 37, 38, and 39 Favorite
19	F0h	Preset 44, 45, 46, and 47 Favorite
1A	03h	Preset 48 and 49 Favorite
1B	07h	Preset 56, 57, and 58 Favorite
1C	0Fh	Preset 64, 65, 66, and 67 Favorite
1D	00h	No Favorites in Presets 72-79
1E	11h	Presets 80 and 84 Favorite
1F	FFh	Preset 88, 89, 90, 91, 92, 93, 94, and 95 Favorite
20	0Fh	Preset 96, 97, 98 and 99 Favorite

Specifically looking at the Preset 16-23 Favorite Indicator (identifier 15h) as an example given its value of 87h:

Bit	Value	Comment
0	1	Preset 16 is Favorite
1	1	Preset 17 is Favorite
2	1	Preset 18 is Favorite
3	0	Preset 19 is not Favorite
4	0	Preset 20 is not Favorite
5	0	Preset 21 is not Favorite
6	0	Preset 22 is not Favorite
7	1	Preset 23 is Favorite

Note 10: The Zone List is a string indicating the Zone Hardware (Zones A, B, C, D, E or F) associated with the particular Logical Zone. The format of the string is Zone Hardware specifiers delimited by whitespace. Each Zone Hardware specifier has the format:

ZoneLetter.channelSpecifier

Where *ZoneLetter* can be A, B, C, D, E, or F, seperated by a period (referred to a "dot"), and the *ChannelSpecifier* can be L or R (signifying the Left or Right hardware channel).

An example of a Zone List is:

"A.L A.R C.L D.R F.L F.R"

In this example, this particular logical zone encompasses Zone A Left and Right, Zone C Left, Zone D Right, and Zone F Left and Right.

Note 11: 0h = relative, 1h = absolute

Note 12: 0h = Dedicated
1h = In1
2h = In2
3h = In3
4h = In4
5h = In5
6h = In6
7h = In7
8h = In8
9h = In9

Note 13: Bitmaps indicating which hardware zone outputs are associated with the Group which has this Zone (code set). If the bit is set (i.e. 1) that particular hardware zone output is valid.

Bit	Output Represented
0	Zone A
1	Zone B
2	Zone C
3	Zone D
4	Zone E
5	Zone F
6	unused
7	unused

NOTE: If hardware zone is configured in Stereo Mode, the appropriate bits of the Right Group Mask are ignored, and the Left Group Mask bits determine the grouping for both the Left and Right sides of the hardware zone.

Note 14: Bitmaps indicating which hardware zone outputs are associated with the Group which has this Zone (code set). If the bit is set (i.e. 1) that particular hardware zone output is valid.

Note 15: 0h = power off, 1h = power on

Note 16: 0h = volume mute off, 1h = volume mute on

Appendix O, Macro Parameters

```
(0,G,M0=16,5;cs16)          Example of Get Serial Macro 16 Message
(0,S,M0=1,5="Hello";cs16)   Example of Set Serial Macro 1 Message
```

Supported Macro Types

Type	Description
0	Serial Macro Type

Serial Macro Parameters

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Serial Macro Trigger ID	80	Note 1
01	Serial Macro Trigger Code	FF	Note 2
02	Serial Macro Scrollable	1	Note 3
03	Serial Macro Baud Rate	8	Note 4
04	Serial Macro Output Mask	3F	Note 5
05	Serial Macro Message	2000	Note 6
06	Serial Macro Message Size MSB	20	Note 7
07	Serial Macro Message Size LSB	FF	Note 7
08	Serial Macro Free Space MSB	20	Note 8
09	Serial Macro Free Space LSB	FF	Note 8
0A	Serial Macro Send Type	2	Note 9
0B	Serial Macro Logic	1	Note 10
0C	Serial Macro Event Trigger	5D	Note 11
0D	Serial Macro IP Address	"16"	Note 12

General Notes Regarding Serial Macros

All the parameters of a serial macro are stored with that particular macro. If every identifier is not specified, default settings are used. The following documents the default settings used for the particular identifiers:

Parameter (in hex)	Description	Default Value
00	Serial Macro Trigger ID	0
01	Serial Macro Trigger Code	0
02	Serial Macro Scrollable	0
03	Serial Macro Baud Rate	*
	**Same as System Parameter AAh, the System RS-232 Baud Rate*	
04	Serial Macro Output Mask	3F
05	Serial Macro Message	"EMPTY"

Serial Macro Parameter Notes

(0,G,M0=10,5;*cs16*) Example of Get Serial Macro 16 Message
(0,S,M0=1,5=”Hello”;*cs16*) Example of Set Serial Macro 1 Message

Note 1: 0h = Zone ID of 0, 1h = Zone ID of 1, … 80h = Zone ID of 128
Note 2: 0h = IR Code 0, 1h = IR Code 1, … FFh = IR Code 255
Note 3: 0h = No
1h = Yes
Scrollable indicates that a Serial Macro Messages will be transmitted every time an IR code Trigger Code is received. Non-scrollable indicates that a single Serial Macro Message will be transmitted when an IR code Trigger Code is received, but subsequent messages will not be transmitted until the user releases the IR remote and presses it again.
Note 4: 0h = 1200
1h = 2400
2h = 9600
3h = 14400
4h = 19200
5h = 28800
6h = 38400
7h = 57600
8h = 115200
Note 5: Bitmap indicating which Hardware Zones (Zones A, B, C, D, E or F) to allow RS-232 data to be output. If the bit is set, the data will be output.

Zone A	01h
Zone B	02h
Zone C	04h
Zone D	08h
Zone E	10h
Zone F	20h

Thus an output mask of 2Bh would allow serial macros to be output on Zone A, Zone B, Zone D and Zone F, but NOT on Zone C and Zone E.

NOTE: The serial macro is always transmitted out the “primary” serial port connection, i.e. the RJ45 connector. An output mask of 00h will mask all data to the Hardware Zone outputs, but the macro will still be transmitted to the primary serial port.

Note 6: There is 2000h, 8192 decimal, bytes allocated in non-volatile memory for use by the serial macros. Each macro consumes:

1 byte	Macro Number
2 bytes	Macro Length
1 byte	Macro Trigger ID
1 byte	Macro Trigger Code
1 byte	Macro Scrollable and BaudRate
1 byte	Macro Output Mask
+	
x bytes	Macro Message Length

As an example, a macro message of "Hello World" would consume 7 + 11 bytes of memory.

Thus the amount of memory available for a macro is variable, depending upon what other macros currently exist. In the one extreme case of the largest single message, one could create a single macro with a message length of 8185 characters.

NOTE: Although the Serial Macro structures can accommodate very large string lengths, the practical limit for macro message length is approximately 2000 bytes. This is due to the fact that the receive buffer in the unit is only 2048 (2k) bytes long, and processing of the message cannot occur until the entire message is received. Thus it is not possible to send a valid BKC-DIP message to a CT600.1-3/300.1-3 of length longer than 2048 bytes. Taking into account the syntax overhead of BKC-DIP (receive ID, checksum, open/close parenthesis, etc.) leaves approximately 2000 bytes for an actual Serial Macro message. Should this become an issue, create 2 independent macros with the same trigger IDs and trigger codes. The macro number will determine the priority of the macros with matching trigger conditions, with lower macro numbers having the higher priority.

In the other extreme case of maximum number of macros (255, macro numbers 0h through FEh), each macro would have a message length of 25 characters.

NOTE: If a macro is too large for the available space, it is not accepted. Monitoring the maximum free space is recommended by reading the Macro Free Space MSB and LSB (see Note 8 below) to indicate how much available macro space is available before attempting to write a macro message.

Special Escape Character \:

- Time → \\Txy (xy is in hexadecimal with 0.1 second increment)

  ie. \\TFF is 25.5 seconds delay
  \\T01 is 0.1 seconds delay
  \\T02 is 0.2 seconds delay
  \\T03 is 0.3 seconds delay

- Hexadecimal data interpretation → \\xy (xy is transmitted as a single Hex data byte instead of two ASCII bytes).
- BKC-DIP String message → \" allows quotes to be used for building BKC-DIP strings messages. Note: every \QUOTE requires a closing \QUOTE for the BKC-DIP string parser to know when to end string message.
  i.e. \"HELLO WORLD\"

Note 7: **READ ONLY PARAMETER** indicating size of the specified serial macro. Since the macro's size can be greater than 255 bytes, 2 bytes are required to represent the size, MSB (most significant byte) and LSB (least significant byte). To form the size, perform the following calculation:

Size = (MSB Value * 256) + LSB Value

As an example, assume the MSB and LSB return values were 10h and F3h respectively.

Size = (10h * 256) + F3h
Size = (16 * 256) + 243 = 4339 bytes

The other way to form the complete size is to concatenate the MSB and the LSB hexadecimal characters. Using the above example:

Size = 10F3h = 4339 bytes

Note 8: **READ ONLY PARAMETER** indicating remaining free space in the serial macro area. Since the free space in the serial macro area can be greater than 255 bytes, 2 bytes are required to represent the size, MSB (most significant byte) and LSB (least significant byte). To form the size, perform the following calculation:

Size = (MSB Value * 256) + LSB Value

Or by concatenating the MSB and LSB hexadecimal characters together. See Note 6 above for examples.

Note 9: 0h = RS-232, 1h = Internal, 2h = UDP,
3h = TCP **(TCP currently not supported)**

Note 10: 0h = AND, 1h = OR

Note 11: 00 = NONE
01 = SYSTEM ON
02 = SYSTEM OFF
03 = ZONE A ON
04 = ZONE A OFF
05 = ZONE B ON
06 = ZONE B OFF
07 = ZONE C ON
08 = ZONE C OFF
09 = ZONE D ON
0A = ZONE D OFF

0B = ZONE E ON
0C = ZONE E OFF
0D = ZONE F ON
0E = ZONE F OFF
0F = CONTROL IN 1 ON
10 = CONTROL IN 1 OFF
11 = CONTROL IN 2 ON
12 = CONTROL IN 2 OFF
13 = PAGE EVENT 1 ON
14 = PAGE EVENT 1 OFF
15 = PAGE EVENT 2 ON
16 = PAGE EVENT 2 OFF
17 = DEDICATED IN A ON
18 = DEDICATED IN A OFF
19 = DEDICATED IN B ON
1A = DEDICATED IN B OFF
1B = DEDICATED IN C ON
1C = DEDICATED IN C OFF
1D = DEDICATED IN D ON
1E = DEDICATED IN D OFF
1F = DEDICATED IN E ON
20 = DEDICATED IN E OFF
21 = DEDICATED IN F ON
22 = DEDICATED IN F OFF
23 = INPUT 1 AUDIO SENSE
24 = INPUT 1 VIDEO SENSE
25 = INPUT 1 A V SENSE
26 = INPUT 2 AUDIO SENSE
27 = INPUT 2 VIDEO SENSE
28 = INPUT 2 A V SENSE
29 = INPUT 3 AUDIO SENSE
2A = INPUT 3 VIDEO SENSE
2B = INPUT 3 A V SENSE
2C = INPUT 4 AUDIO SENSE
2D = INPUT 4 VIDEO SENSE
2E = INPUT 4 A V SENSE
2F = INPUT 5 AUDIO SENSE
30 = INPUT 5 VIDEO SENSE
31 = INPUT 5 A V SENSE
32 = INPUT 6 AUDIO SENSE
33 = INPUT 6 VIDEO SENSE
34 = INPUT 6 A V SENSE
35 = INPUT 7 AUDIO SENSE
36 = INPUT 7 VIDEO SENSE
37 = INPUT 7 A V SENSE
38 = INPUT 8 AUDIO SENSE
39 = INPUT 8 VIDEO SENSE
3A = INPUT 8 A V SENSE
3B = INPUT 9 AUDIO SENSE
3C = INPUT 9 VIDEO SENSE
3D = INPUT 9 A V SENSE
3E = INPUT A AUDIO SENSE
3F = INPUT A VIDEO SENSE
40 = INPUT A A V SENSE
41 = INPUT B AUDIO SENSE

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42 = INPUT B VIDEO SENSE
43 = INPUT B A V SENSE
44 = INPUT C AUDIO SENSE
45 = INPUT C VIDEO SENSE
46 = INPUT C A V SENSE
47 = INPUT D AUDIO SENSE
48 = INPUT D VIDEO SENSE
49 = INPUT D A V SENSE
4A = INPUT E AUDIO SENSE
4B = INPUT E VIDEO SENSE
4C = INPUT E A V SENSE
4D = INPUT F AUDIO SENSE
4E = INPUT F VIDEO SENSE
4F = INPUT F A V SENSE
50 = SYSTEM CONTROL IN 1 SENSE
51 = SYSTEM CONTROL IN 2 SENSE
52 = ZONE A CONTROL IN 1 SENSE
53 = ZONE A CONTROL IN 2 SENSE
54 = ZONE B CONTROL IN 1 SENSE
55 = ZONE B CONTROL IN 2 SENSE
56 = ZONE C CONTROL IN 1 SENSE
57 = ZONE C CONTROL IN 2 SENSE
58 = ZONE D CONTROL IN 1 SENSE
59 = ZONE D CONTROL IN 2 SENSE
5A = ZONE E CONTROL IN 1 SENSE
5B = ZONE E CONTROL IN 2 SENSE
5C = ZONE F CONTROL IN 1 SENSE
5D = ZONE F CONTROL IN 2 SENSE00 = NONE
01 = SYSTEM ON
02 = SYSTEM OFF
03 = ZONE A ON
04 = ZONE A OFF
05 = ZONE B ON
06 = ZONE B OFF
07 = ZONE C ON
08 = ZONE C OFF
09 = ZONE D ON
0A = ZONE D OFF
0B = ZONE E ON
0C = ZONE E OFF
0D = ZONE F ON
0E = ZONE F OFF
0F = CONTROL IN 1 ON
10 = CONTROL IN 1 OFF
11 = CONTROL IN 2 ON
12 = CONTROL IN 2 OFF
13 = PAGE EVENT 1 ON
14 = PAGE EVENT 1 OFF
15 = PAGE EVENT 2 ON
16 = PAGE EVENT 2 OFF
17 = DEDICATED IN A ON
18 = DEDICATED IN A OFF
19 = DEDICATED IN B ON
1A = DEDICATED IN B OFF
1B = DEDICATED IN C ON
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1C = DEDICATED IN C OFF
1D = DEDICATED IN D ON
1E = DEDICATED IN D OFF
1F = DEDICATED IN E ON
20 = DEDICATED IN E OFF
21 = DEDICATED IN F ON
22 = DEDICATED IN F OFF
23 = INPUT 1 AUDIO SENSE
24 = INPUT 1 VIDEO SENSE
25 = INPUT 1 A V SENSE
26 = INPUT 2 AUDIO SENSE
27 = INPUT 2 VIDEO SENSE
28 = INPUT 2 A V SENSE
29 = INPUT 3 AUDIO SENSE
2A = INPUT 3 VIDEO SENSE
2B = INPUT 3 A V SENSE
2C = INPUT 4 AUDIO SENSE
2D = INPUT 4 VIDEO SENSE
2E = INPUT 4 A V SENSE
2F = INPUT 5 AUDIO SENSE
30 = INPUT 5 VIDEO SENSE
31 = INPUT 5 A V SENSE
32 = INPUT 6 AUDIO SENSE
33 = INPUT 6 VIDEO SENSE
34 = INPUT 6 A V SENSE
35 = INPUT 7 AUDIO SENSE
36 = INPUT 7 VIDEO SENSE
37 = INPUT 7 A V SENSE
38 = INPUT 8 AUDIO SENSE
39 = INPUT 8 VIDEO SENSE
3A = INPUT 8 A V SENSE
3B = INPUT 9 AUDIO SENSE
3C = INPUT 9 VIDEO SENSE
3D = INPUT 9 A V SENSE
3E = INPUT A AUDIO SENSE
3F = INPUT A VIDEO SENSE
40 = INPUT A A V SENSE
41 = INPUT B AUDIO SENSE
42 = INPUT B VIDEO SENSE
43 = INPUT B A V SENSE
44 = INPUT C AUDIO SENSE
45 = INPUT C VIDEO SENSE
46 = INPUT C A V SENSE
47 = INPUT D AUDIO SENSE
48 = INPUT D VIDEO SENSE
49 = INPUT D A V SENSE
4A = INPUT E AUDIO SENSE
4B = INPUT E VIDEO SENSE
4C = INPUT E A V SENSE
4D = INPUT F AUDIO SENSE
4E = INPUT F VIDEO SENSE
4F = INPUT F A V SENSE
50 = SYSTEM CONTROL IN 1 SENSE
51 = SYSTEM CONTROL IN 2 SENSE
52 = ZONE A CONTROL IN 1 SENSE
```

53 = ZONE A CONTROL IN 2 SENSE
54 = ZONE B CONTROL IN 1 SENSE
55 = ZONE B CONTROL IN 2 SENSE
56 = ZONE C CONTROL IN 1 SENSE
57 = ZONE C CONTROL IN 2 SENSE
58 = ZONE D CONTROL IN 1 SENSE
59 = ZONE D CONTROL IN 2 SENSE
5A = ZONE E CONTROL IN 1 SENSE
5B = ZONE E CONTROL IN 2 SENSE
5C = ZONE F CONTROL IN 1 SENSE
5D = ZONE F CONTROL IN 2 SENSE

Note 12: Standard IP format in String. i.e. “255.255.255.255:65535”

Appendix P, Override Parameters

(0,G,O,0;*cs16*) Example of Get Override Active state
(0,S,O,4=1;*cs16*) Example of Set Echo Enabled

Parameter Identifier (in hex)	Description	Default Values (in hex)	Parameter Max Values (in hex)	Formatting Notes
00	Override Active	0	1	Note 1
01	RS-232 Baud Rate	2	8	Note 2
02	BKC-DIP Receive ID	00	7F	Note 3
03	BKC-DIP Transmit ID	00	7F	Note 3
04	BKC-DIP Echo Enabled	0	1	Note 1
05	BKC-DIP Feedback Selection	0	3	Note 4
08	RS-232 V2.0 Enabled	0	1	Note 1
09	OSD Reply Mode	0	2	Note 7
0A	Front Panel Display Reply Mode	0	2	Note 7
0B	Auto BKC-DIP Set IR Generate Enable	1	1	Note 4
0C	Auto BKC-DIP Set IR Mask	3F	3F	Note 8
0D	Auto BKC-DIP Set IR TX ID	80	80	Note 6
FF	Override Timeout	0	FF	Note 5

Appendix P, Override Parameters Notes

(0,G,O,0;*cs16*) Example of Get Override Active state
(0,S,O,4=1;*cs16*) Example of Set Echo Enabled

Note 1: Not Applicable.
Note 2: 0h = 1200, 1h = 2400, 2h = 9600, 3h = 14400, 4h = 19200, 5h = 28800, 6h = 38400, 7h = 57600, 8h = 115200
Note 3: Valid IDs are 00h to 7Fh. Receive IDs must be unique (to avoid ambiguity)
Note 4: 0h = Disabled, 1h = Update, 2h = Reply, 3h = Both
Note 5: 0h = No timeout, 1h = 0.1 second timeout … FFh = 25.5 second timeout
Note 6: 00h to 7Fh map directly to Transmit IDs 00h to 7Fh. 80h maps to the Global Transmit ID FFh.

Note 7: 0h = BKC-DIP V1.0 compliant, 1h = BKC-DIP V2.0 compliant with no attributes, 2h = BKC-DIP V2.0 compliant with attributes.

Note 8: Bitmap indicating which Hardware Zones (Zones A, B, C, D, E or F) to allow RS-232 data to be output. If the bit is set, the data will be output.

```
Zone A   01h
Zone B   02h
Zone C   04h
Zone D   08h
Zone E   10h
Zone F   20h
```

Thus an output mask of 2Bh would allow serial port data to be output on Zone A, Zone B, Zone D and Zone F, but NOT on Zone C and Zone E.

NOTE: The serial port data is always transmitted out the "primary" serial port connection, i.e. the RJ45 connector. An output mask of 00h will mask all data to the Hardware Zone outputs, but the data will still be transmitted to the primary serial port.

Appendix Q, Status Messages

`(0,U,S,0="BKC-DIP ACTIVE";05FE)` Example Status Message

Message Number	Message	Indication
0	(*receiveID*,U,S,0="BKC-DIP ACTIVE";*cs16*)	BKC-DIP interface is active an the Device is ready to accept BKC-DIP commands
4	(*receiveID*,U,S,4="*za zb … zn*";*cs16*)	String containing current Logical Zones in system, delimited by whitespace. For example default CT600.3 zones: (0,U,S,4="0 B C D E F 10";)
5	(*receiveID*,U,S,5="P*z=nn*"; *cs16*)	Logical Zone *z* Preset *nn* updated, where *z* can range from 0h – 80h, and *nn* 0h – FEh
5	(*receiveID*,U,S,5="S";*cs16*)	System parameters updated

Appendix R, Zone Adjustment Parameters

(0,G,H,0C;*cs16*) Example of Get Zone A Room EQ Treble Gain
(0,S,H,3=30;*cs16*) Example of Set Zone D Room EQ Bass Gain to +6dB

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Zone A Room EQ Bass Gain	30	Note 1
01	Zone B Room EQ Bass Gain	30	Note 1
02	Zone C Room EQ Bass Gain	30	Note 1
03	Zone D Room EQ Bass Gain	30	Note 1
04	Zone E Room EQ Bass Gain	30	Note 1
05	Zone F Room EQ Bass Gain	30	Note 1
06	Zone A Room EQ Bass Frequency	38	Note 2
07	Zone B Room EQ Bass Frequency	38	Note 2
08	Zone C Room EQ Bass Frequency	38	Note 2
09	Zone D Room EQ Bass Frequency	38	Note 2
0A	Zone E Room EQ Bass Frequency	38	Note 2
0B	Zone F Room EQ Bass Frequency	38	Note 2
0C	Zone A Room EQ Treble Gain	30	Note 1
0D	Zone B Room EQ Treble Gain	30	Note 1
0E	Zone C Room EQ Treble Gain	30	Note 1
0F	Zone D Room EQ Treble Gain	30	Note 1
10	Zone E Room EQ Treble Gain	30	Note 1
11	Zone F Room EQ Treble Gain	30	Note 1
12	Zone A Room EQ Treble Frequency	8C	Note 3
13	Zone B Room EQ Treble Frequency	8C	Note 3
14	Zone C Room EQ Treble Frequency	8C	Note 3
15	Zone D Room EQ Treble Frequency	8C	Note 3
16	Zone E Room EQ Treble Frequency	8C	Note 3
17	Zone F Room EQ Treble Frequency	8C	Note 3
18	Zone A Notch 1 Gain	25	Note 4
19	Zone B Notch 1 Gain	25	Note 4
1A	Zone C Notch 1 Gain	25	Note 4
1B	Zone D Notch 1 Gain	25	Note 4
1C	Zone E Notch 1 Gain	25	Note 4
1D	Zone F Notch 1 Gain	25	Note 4
1E	Zone A Notch 1 Frequency	8C	Note 5
1F	Zone B Notch 1 Frequency	8C	Note 5
20	Zone C Notch 1 Frequency	8C	Note 5
21	Zone D Notch 1 Frequency	8C	Note 5
22	Zone E Notch 1 Frequency	8C	Note 5
23	Zone F Notch 1 Frequency	8C	Note 5
24	Zone A Notch 1 Width	6	Note 6
25	Zone B Notch 1 Width	6	Note 6
26	Zone C Notch 1 Width	6	Note 6
27	Zone D Notch 1 Width	6	Note 6
28	Zone E Notch 1 Width	6	Note 6
29	Zone F Notch 1 Width	6	Note 6
2A	Zone A Notch 2 Gain	25	Note 4
2B	Zone B Notch 2 Gain	25	Note 4
2C	Zone C Notch 2 Gain	25	Note 4
2D	Zone D Notch 2 Gain	25	Note 4

2E	Zone E Notch 2 Gain	25	Note 4
2F	Zone F Notch 2 Gain	25	Note 4
30	Zone A Notch 2 Frequency	8C	Note 5
31	Zone B Notch 2 Frequency	8C	Note 5
32	Zone C Notch 2 Frequency	8C	Note 5
33	Zone D Notch 2 Frequency	8C	Note 5
34	Zone E Notch 2 Frequency	8C	Note 5
35	Zone F Notch 2 Frequency	8C	Note 5
36	Zone A Notch 2 Width	6	Note 6
37	Zone B Notch 2 Width	6	Note 6
38	Zone C Notch 2 Width	6	Note 6
39	Zone D Notch 2 Width	6	Note 6
3A	Zone E Notch 2 Width	6	Note 6
3B	Zone F Notch 2 Width	6	Note 6
3C	Zone A Notch 3 Gain	25	Note 4
3D	Zone B Notch 3 Gain	25	Note 4
3E	Zone C Notch 3 Gain	25	Note 4
3F	Zone D Notch 3 Gain	25	Note 4
40	Zone E Notch 3 Gain	25	Note 4
41	Zone F Notch 3 Gain	25	Note 4
42	Zone A Notch 3 Frequency	8C	Note 5
43	Zone B Notch 3 Frequency	8C	Note 5
44	Zone C Notch 3 Frequency	8C	Note 5
45	Zone D Notch 3 Frequency	8C	Note 5
46	Zone E Notch 3 Frequency	8C	Note 5
47	Zone F Notch 3 Frequency	8C	Note 5
48	Zone A Notch 3 Width	6	Note 6
49	Zone B Notch 3 Width	6	Note 6
4A	Zone C Notch 3 Width	6	Note 6
4B	Zone D Notch 3 Width	6	Note 6
4C	Zone E Notch 3 Width	6	Note 6
4D	Zone F Notch 3 Width	6	Note 6

Appendix R Zone Adjustment Parameter Notes

(0,G,H,0C;*cs16*) Ex. Get Zone A Room EQ Treble Gain
(0,S,H,03=30;*cs16*) Ex. Set Zone D Room EQ Bass Gain to +6dB

(**NOTE:** hex values denoted by *xx*h convention)
Note 1: 0h = -12.0 dB, 1h = -11.5 dB,..., 18h = 0.0 dB, 30h = +12.0 dB
Note 2: 0h = 20 Hz, 1h = 25 Hz, ...,37h = 300Hz
Note 3: 0h = 2.0 kHz, 1h = 2.1 kHz, ...,8Ch = 16.0 kHz
Note 4: 0h = -Inf dB, 1h = -18.0 dB, ..., 25h = 0.0 dB
Note 5: 0h = 20 Hz, 1h = 22 Hz, ..., 8Ch = 300 Hz
Note 6: The width is measured in Q, "Quality Factor". The higher the Q, the narrower the notch. Thus, the Notch Width Q settings are:

0h = 21.0, 1h = 18.0, ..., 6h = 3.0

As a more intuitive way of representing width, the Q and the center frequency can be used to calculate the frequency width of the notch. The equations for this are:

$Freq_{Low} = Freq_{Center} * (1 - (1/(2*Q)))$
$Freq_{High} = Freq_{Center} * (1 + (1/(2*Q)))$

Where $Freq_{Center}$ is the center frequency and Q is the quality factor of the filter.