



# **AVR / Reference (Series I) B&K Components Device Interface Protocol (BKC-DIP) Product Specific Appendices**

For use with:  
AVR 101 and AVR 202  
REF 10 and REF 20

## **Version 2.00.00**

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## Revision History

### **Version 2.00.00**

1. Bumped revision to V2.0 to correspond to changes with respect to BKC-DIP V2.0. Although this device is not V2.0 compliant, the documentation was changed for consistency of the references from the main BKC-DIP document.
2. Added **Appendix P, Override Parameters** and notes. With the introduction of new B&K Components devices and BKC-DIP V2.0, Override Parameters are no longer universal among all devices. Thus each product must include an appendix indicating which Override Parameters it supports.
3. Added **Appendix Q, Status Messages** and notes. With the introduction of new B&K Components devices and BKC-DIP V2.0, Status Messages are no longer universal among all devices. Thus each product must include an appendix indicating which Status Messages it supports.
4. Fixed footer error which incorrectly read “Series II” not “Series I”.

### **Version 1.01.00**

1. This is the first release of this documentation specified by a version number. This document is to be used in conjunction with the “*B&K Components Device Interface Protocol (BKC-DIP) Specification Version 1.02.00*” document. This documentation supercedes all documentation found in “*AVR / Reference Series B&K Components Device Interface Protocol (BKC-DIP) V1.01 Protocol Specific Appendices*” (referred to as Version 1.00.xx, see below for details).
2. Addition of **Appendix L**, Executive Command Appendix.
3. Addition of **Appendix M**, Error Log Appendix.

### **Version 1.00.xx**

1. Documentation earlier than Version 1.01.00 was not specified by a version number. This encompasses all documentation prior to 08/07/00. Specifically, the prior document entitled “*AVR / Reference Series B&K Components Device Interface Protocol (BKC-DIP) V1.01 Protocol Specific Appendices*” which referred to document “*B&K Components Device Interface Protocol (BKC-DIP) V1.01 Protocol Document*”, describing BKC-DIP Version 1.01, is referred to here as Version 1.00.xx.

# Introduction

## Overview

The following is a supplement to B&K Components Device Interface Protocol, BKC-DIP. This document contains the specific BKC-DIP implementation details for the B&K Components' AVR and REF 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 *xxh* 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:**

## Preset Numbering

The AVR and REF products have the concept of Bank A. To calculate the preset number of Bank A preset, add 10 to the preset number. The following table enumerates the first 20 presets:

B&K User Number	BKC-DIP Preset Number	B&K User Number	BKC-DIP Preset Number
0	00h	A0	0Ah
1	01h	A1	0Bh
2	02h	A2	0Ch
3	03h	A3	0Dh
4	04h	A4	0Eh
5	05h	A5	0Fh
6	06h	A6	10h
7	07h	A7	11h
8	08h	A8	12h
9	09h	A9	13h

## Appendix A Preset Parameters

### Preset Zone 1 Parameters

(0,G,P1=FF,0;cs16)      Example of Get Z1 current preset title  
 (0,S,P1=A,1=60;cs16)    Example of Set Z1 Preset 10 volume = 0 dB

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Title	"D"	
01	Volume	6F	Note 1
02	Balance	30	Note 15
03	Current Input	7	Note 3_Z1
04	Tuner Band	1	Note 4
05	Tuner AM Frequency	73, 80	Note 5, 5a
06	Tuner FM Frequency	66, CC	Note 6, 6a
07	Tuner FM Mode	1	Note 7
08	Tuner Surround Mode	6	Note 8
09	Tuner Surround Command	3, 2	Note 9
0A	Tuner Center Level	30	Note 2
0B	Tuner Center Delay	5	Note 10
0C	Tuner Rear Level	30	Note 2
0D	Tuner Rear Delay	F	Note 11
0E	Tuner Sub Level	30	Note 2
0F	V1 Surround Mode	6	Note 8
10	V1 Surround Command	3, 2	Note 9
11	V1 Center Level	30	Note 2
12	V1 Center Delay	5	Note 10
13	V1 Rear Level	30	Note 2
14	V1 Rear Delay	F	Note 11
15	V1 Sub Level	30	Note 2
16	V2 Surround Mode	6	Note 8
17	V2 Surround Command	3, 2	Note 9
18	V2 Center Level	30	Note 2
19	V2 Center Delay	5	Note 10
1A	V2 Rear Level	30	Note 2
1B	V2 Rear Delay	F	Note 11
1C	V2 Sub Level	30	Note 2
1D	TVV3 Surround Mode	6	Note 8
1E	TVV3 Surround Command	3, 2	Note 9
1F	TVV3 Center Level	30	Note 2
20	TVV3 Center Delay	5	Note 10
21	TVV3 Rear Level	30	Note 2
22	TVV3 Rear Delay	F	Note 11
23	TVV3 Sub Level	30	Note 2
24	DVD Surround Mode	6	Note 8
25	DVD Surround Command	3, 2	Note 9
26	DVD Center Level	30	Note 2
27	DVD Center Delay	5	Note 10
28	DVD Rear Level	30	Note 2
29	DVD Rear Delay	F	Note 11
2A	DVD Sub Level	30	Note 2

2B	CD Surround Mode	6	Note 8
2C	CD Surround Command	3, 2	Note 9
2D	CD Center Level	30	Note 2
2E	CD Center Delay	5	Note 10
2F	CD Rear Level	30	Note 2
30	CD Rear Delay	F	Note 11
31	CD Sub Level	30	Note 2
32	SAT Surround Mode	6	Note 8
33	SAT Surround Command	3, 2	Note 9
34	SAT Center Level	30	Note 2
35	SAT Center Delay	5	Note 10
36	SAT Rear Level	30	Note 2
37	SAT Rear Delay	F	Note 11
38	SAT Sub Level	30	Note 2
39	Tape Surround Mode	6	Note 8
3A	Tape Surround Command	3, 2	Note 9
3B	Tape Center Level	30	Note 2
3C	Tape Center Delay	5	Note 10
3D	Tape Rear Level	30	Note 2
3E	Tape Rear Delay	F	Note 11
3F	Tape Sub Level	30	Note 2
40	Tape Monitor	1	Note 12
41	Headphone Mode	1	Note 14

Current Input Aliases Note 13

F3	Current Input Surround Mode	6	Note 8
F4	Current Input Surround Command	3	Note 9
F5	Current Input Center Level	30	Note 2
F6	Current Input Center Delay	5	Note 10
F7	Current Input Rear Level	30	Note 2
F8	Current Input Rear Delay	F	Note 11
F9	Current Input Sub Level	30	Note 2

### **Preset Zone 2 Parameters**

(0,G,P2=FF,0;cs16) Example of Get Z2 current preset title  
(0,S,P2=A,1=60;cs16) Example of Set Z2 Preset 10 volume = 0 dB

<b>Parameter Identifier (in hex)</b>	<b>Description</b>	<b>Parameter Max Values (in hex)</b>	<b>Formatting Notes</b>
00	Title	"D"	
01	Volume	6F	Note 1
02	Balance	30	Note 15
03	Current Input	7	Note 3_Z2
04	Tuner Band	1	Note 4
05	Tuner AM Frequency	73, 80	Note 5, 5a
06	Tuner FM Frequency	66, CC	Note 6, 6a
07	Tuner FM Mode	1	Note 7
08	V2 Monitor	1	Note 12

## Appendix A Parameter Notes (All Zones)

(0,G,P1=FF,0;cs16) Example of Get Z1 current preset title  
(0,S,P1=A,1=60;cs16) Example of Set Z1 Preset 10 volume = 0 dB  
(0,G,P2=FF,0;cs16) Example of Get Z2 current preset title  
(0,S,P2=A,1=60;cs16) Example of Set Z2 Preset 10 volume = 0 dB

(NOTE: hex values denoted by xxh convention)

Note 1: 0h = Mute, 1h = -95 dB, ... 60h = 0 dB, ... 6Fh = +15 dB

Note 2: 0h = -12.0 dB, 1h = -11.5 dB, ... 18h = 0.0 dB, ...  
30h = +12.0 dB

Note 3\_Z1: 0h = Tuner, 1h = V1, 2h = V2, 3h = TVV3, 4h = DVD,  
5h = CD, 6h = SAT.

**NOTE:** Due to special internal logic, to access TAPE, use  
Tape Monitor (Z1 Preset Parameter Identifier 40h).

Setting Tape Monitor "On" leaves the Z1 Current Input  
routed to the Tape Output, but routes Tape Input to  
the Z1 Output.

Setting Tape Monitor "Off" returns the routing of Z1  
Current Input to both the Tape Output and the Z1  
Output.

**NOTE: See BKC-DIP V1.01 Errata document for further  
details.**

Note 3\_Z2: 0h = Tuner, 1h = V1, 2h = INVALID, 3h = TVV3, 4h = DVD,  
5h = CD, 6h = SAT, 7h = TAPE.

**NOTE:** Due to special internal logic, to access V2, use V2  
Monitor (Z2 Preset Parameter Identifier 8h). The V2  
Monitor setting works in the conjunction with the V2  
Line Out setting (System Setting Parameter Identifier  
2Dh).

If V2 Line Out = "Tape"

Setting V2 Monitor "On" leaves the Z2 Current  
Input on the Z2/V2 Output, but routes V2 Input  
to the Z2 Output.

Setting V2 Monitor "Off" returns to routing **Z2  
Current Input** to both Z2/V2 Output and Z2  
Output

Else V2 Line Out = "Line"

Setting V2 Monitor "On" routes **V2 Input** to **both**  
the Z2/V2 Output **and** the Z2 Output.

Setting V2 Monitor "Off" returns the routing of  
**Z2 Current Input** to both the Z2/V2 Output and  
the Z2 Output.

**NOTE:** If Z2 Current Input is attempted to be set to 2h, it  
is ignored by the unit. Subsequent reads of Z2  
Current Input will reflect the state prior to  
attempting to write 2h to the input.

**NOTE: See BKC-DIP V1.01 Errata document for further details.**

- Note 4: 0h = AM, 1h = FM
- Note 5: 10 kHz AM step tuning (USA)  
 $((value * 10) + 520)$  kHz, or  $((AM\_kHz - 520) / 10)$  with  
29h = 930 KHz; FFh 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  
 $((value * 9) + 522)$  kHz, or  $((AM\_kHz - 522) / 9)$  with  
2Dh = 927 KHz; FFh 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)  
 $((value * 0.20) + 87.5)$  MHz, or  $((FM\_MHz - 87.5) / 0.2)$   
with  
4Bh = 102.5 MHz; FFh 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  
 $((value * 0.10) + 87.5)$  MHz, or  $((FM\_MHz - 87.5) / 0.1)$   
with 96h = 102.5 MHz; FFh 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 = Surround, 1h = 3 Hall, 2h = Stereo 3, 3h = Stereo Hall,  
4h = Stereo Front Rear, 5h = Stereo, 6h = Stereo Lt Rt
- Note 9: REF 20 and AVR 202, 0h = Auto, 1h = Lock Analog,  
2h = Lock DTS, 3h = AC3 Compression  
REF 10 and AVR 101, 0h = Auto, 1h = Lock Analog,  
2h = AC3 Compression
- Note 10: 0h to 5h ms
- Note 11: 0h to Fh, 0 to 15 ms non-Pro Logic, 16 to 30 ms in Pro Logic
- Note 12: 0h = Off, 1h = On
- Note 13: Current Input aliases implicitly use the Z1 Current Input  
when referring to source specific parameters
- Note 14: 0h = Normal, 1h = HeadPhone. When HeadPhone, surround mode  
is overridden forcing all source material to L/R Fronts.
- Note 15: 0h = Left 0.0 dB Right -12.0 dB, 1h = Left 0.0 dB Right -11.5  
dB, ... 18h = Centered, ... 2Fh = Left -11.5 dB Right 0.0 dB,  
30h = Left -12.0 dB Right 0.0 dB.

## Appendix B, System Parameters

(0,G,S,14;cs16) Example of Get System LFE Setting  
 (0,S,S,3="LASER";cs16) Example of Set DVD Title to "LASER"

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	V1 Title	"5"	
01	V2 Title	"5"	
02	TVV3 Title	"5"	
03	DVD Title	"5"	
04	CD Title	"5"	
05	SAT Title	"5"	
06	Tape Title	"5"	
07	Power On Title Line 1	"10"	
08	Power On Title Line 2	"10"	
09	Left Level Offset	30	Note 1
0A	Center Level Offset	30	Note 1
0B	Right Level Offset	30	Note 1
0C	Right Rear Level Offset	30	Note 1
0D	Left Rear Level Offset	30	Note 1
0E	Sub Level Offset	30	Note 1
0F	Left/Right Front Setting	1	Note 2
10	Surround Operation	1	Note 3
11	Stereo Setting	2	Note 4
12	Center Setting	2	Note 5
13	Surround Setting	2	Note 5
14	LFE Setting	D	Note 6
15	Sub Bass Setting	2	Note 7
16	Center Delay	5	Note 8
17	Rear Delay	F	Note 9
18	Tuner Level	18	Note 10
19	V1 Level	18	Note 10
1A	V2 Level	18	Note 10
1B	TVV3 Level	18	Note 10
1C	DVD Level	18	Note 10
1D	CD Level	18	Note 10
1E	SAT Level	18	Note 10
1F	Tape Level	18	Note 10
20	Color Scheme	A	Note 11
21	Overlay Scheme	3	Note 12
22	OSD Enable Setting	1	Note 29
23	Monitor Type	1	Note 14
24	Display Level Setting	2	Note 15
25	Z1 Tuner Video Source	8	Note 16
26	Z2 Tuner Video Source	8	Note 16
27	Z1 Max Level	6F	Note 17
28	Z1 Product ID	10	Note 18
29	V1 Line Out	1	Note 30
2A	Z2 Level	6F	Note 17
2B	Z2 Fixed	1	Note 26
2C	Z2 Product ID	10	Note 18
2D	V2 Line Out	1	Note 30

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2E	RS 232 Port Enabled	1	Note 29
2F	RS 232 Baud Rate	9	Note 21
30	BKC-DIP Receive ID	7F	Note 23
31	BKC-DIP Transmit ID	7F	Note 23
32	BKC-DIP Echo Enabled	1	Note 29
33	BKC-DIP Update Enabled	1	Note 29
34	Front Locked	1	Note 27
35	IR Locked	1	Note 27
36	Memory Locked	1	Note 27
37	Advanced Menu Visible	1	Note 28
38	Full Editing Access	1	Note 27
39	Tuner Control Out 1	3	Note 19
3A	Tuner Control Out 2	5	Note 20
3B	Tuner Control Out 3	5	Note 20
3C	Tuner Control Out 4	5	Note 20
3D	V1 Control Out 1	3	Note 19
3E	V1 Control Out 2	5	Note 20
3F	V1 Control Out 3	5	Note 20
40	V1 Control Out 4	5	Note 20
41	V2 Control Out 1	3	Note 19
42	V2 Control Out 2	5	Note 20
43	V2 Control Out 3	5	Note 20
44	V2 Control Out 4	5	Note 20
45	TVV3 Control Out 1	3	Note 19
46	TVV3 Control Out 2	5	Note 20
47	TVV3 Control Out 3	5	Note 20
48	TVV3 Control Out 4	5	Note 20
49	DVD Control Out 1	3	Note 19
4A	DVD Control Out 2	5	Note 20
4B	DVD Control Out 3	5	Note 20
4C	DVD Control Out 4	5	Note 20
4D	CD Control Out 1	3	Note 19
4E	CD Control Out 2	5	Note 20
4F	CD Control Out 3	5	Note 20
50	CD Control Out 4	5	Note 20
51	SAT Control Out 1	3	Note 19
52	SAT Control Out 2	5	Note 20
53	SAT Control Out 3	5	Note 20
54	SAT Control Out 4	5	Note 20
55	Tape Control Out 1	3	Note 19
56	Tape Control Out 2	5	Note 20
57	Tape Control Out 3	5	Note 20
58	Tape Control Out 4	5	Note 20
59	Realtime Enable 0 register	FF	Note 22
5A	Realtime Enable 1 register	FF	Note 22
5B	Realtime Enable 2 register	FF	Note 22
5C	Monitor Aspect Ratio	1	Note 24
5D	Tuner RS232 Control Out State	F	Note 25
5E	V1 RS-232 Control Out State	F	Note 25
5F	V2 RS-232 Control Out State	F	Note 25
60	TVV3 RS-232 Control Out State	F	Note 25
61	DVD RS-232 Control Out State	F	Note 25
62	CD RS-232 Control Out State	F	Note 25

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63 SAT RS-232 Control Out State F Note 25  
 64 Tape RS-232 Control Out State F Note 25

## Appendix B, System Parameter Notes

(0,G,S,14;cs16) Example of Get System LFE Setting  
 (0,S,S,3="LASER";cs16) Example of Set DVD Title to "LASER"

(NOTE: hex values denoted by xxh convention)

- Note 1: 0h = -12.0 dB, 1h = -11.5 dB, ... 18h = 0.0 dB, ...  
 30h = +12.0 dB
- Note 2: 0h = Small, 1h = Large
- Note 3: 0h = Manual, 1h = Auto
- Note 4: 0h = Normal, 1h = Large, 2h = Direct
- Note 5: 0h = None, 1h = Small, 2h = Large
- Note 6: 0h = Off, 1h = -12 dB, 2h = -11 dB, ... Ch = -1 dB,  
 Dh = Normal
- Note 7: 0h = None, 1h = Yes, 2h = Ultra
- Note 8: 0h - 5h ms
- Note 9: 0h - Fh ms
- Note 10: 0h = -6.0 dB, 1h = -5.5 dB, ... Ch = 0.0 dB, ... 18h = +6.0 dB
- Note 11: 0h = Red, 1h = Green, 2h = Blue, 3h = Purple, 4h = Pink,  
 5h = Aqua, 6h = Lilac, 7h = Yellow, 8h = Black,  
 9h = Dark Grey, Ah = White
- Note 12: 0h = Transparent Dark, 1h = Transparent Bright,  
 2h = Opaque Dark, 3h = Opaque Bright
- Note 13: 0h = Off, 1h = On
- Note 14: 0h = Composite, 1h = S-Video
- Note 15: 0h = Low, 1h = Medium, 2h = High
- Note 16: 0h = V1, 1h = V2, 2h = TVV3, 3h = DVD, 4h = CD,  
 5h = SAT, 6h = Tape, 7h = Last, 8h = OFF
- Note 17: 0h = Mute, 1h = -95 dB, ... 60h = 0 dB, ... 6Fh = +15 dB
- Note 18: 0h = Product ID 1, ... Fh = Product ID 16, 10h = Off  
 Z1 and Z2 IDs cannot be the same value
- Note 19: 0h = Off, 1h = Zone 1, 2h = Headphone, 3h = RS-232
- Note 20: 0h = Off, 1h = Zone 1, 2h = Zone 2, 3h = Zone 1 / Zone 2,  
 4h = Remote, 5h = RS-232
- Note 21: 0h = 1200, 1h = 2400, 2h = 9600, 3h = 14400, 4h = 19200, 5h =  
 28800, 6h = 38400, 7h = 57600, 8h = 115200
- Note 22: Is a bit map to enable/disable specific Realtime Status event  
 updates. Each bit represents its corresponding Realtime  
 Status specifier (See **Appendix D**). 0h = disabled, 1h =  
 enabled status for that specifier. For example, Realtime  
 Enable 1 register = 3Eh indicates:

Bit	Specifier	Description	Status
0 (LSB)	8h	Audio Coding	disabled
1	9h	PCM Deemphasis	enabled
2	Ah	OSD Display Update	enabled
3	Bh	FP Display Update	enabled
4	Ch	LED Buffer 0	enabled
5	Dh	LED Buffer 1	enabled
6	Eh	OSD Cursor Row Flashing	disabled

- 7(MSB)Fh                    OSD Cursor Col Flashing disabled
- Note 23: Valid IDs are 00h to 7Fh. Receive IDs must be unique (to avoid ambiguity)
- Note 24: 0h = 4:3, 1h = 16:9
- Note 25: Control Out State is a bit map of all 4 control outs for that specific input.

Bit	Value	Control Out
0	1h	Control Out 1
1	2h	Control Out 2
2	4h	Control Out 3
3	8h	Control Out 4

0 = Off, 1 = On.

For example, DVD Control Out State = Dh and input is DVD:

Control Out 1 on (Bit 0 = 1)

Control Out 2 off (Bit 1 = 0)

Control Out 3 on (Bit 2 = 1)

Control Out 4 on (Bit 3 = 1)

**NOTE: RS-232 Control Out settings are only valid if the particular Control Out Setting for that input is set to RS-232.** For example, assume the following:

Zone 1 is on

Zone 2 is off

Input is DVD

DVD Control Out 1            3h     (RS-232)

DVD Control Out 2            5h     (RS-232)

DVD Control Out 3            2h     (Zone 2)

DVD Control Out 4            0h     (off)

DVD RS-232 Control Out State is Bh

The control outs would be as follows:

Control Out 1            on (RS-232 active, Bit 0 = 1)

Control Out 2            off(RS-232 active, Bit 1 = 2)

Control Out 3            off(Zone 2 is off, DVD Control Out State Bit 2 is ignored because Zone 2 not RS-232 selected)

Control Out 4            off(DVD control Out 4 0h (off), Control Out State Bit 3 is ignored because Off not RS-232 selected)

- Note 26: 0h = Fixed, 1h = Variable
- Note 27: 0h = No, 1h = Yes
- Note 28: 0h = Hidden, 1h = Visible
- Note 29: 0h = Disabled, 1h = Enabled
- Note 30: 0h = Tape Level, 1h = Line Level

## Appendix C Tuner Station Parameters

(0,G,T01,0,1;cs16) Example of Get Tuner Channel 0 AM and FM Frequency settings

(0,S,T12,1=1;cs16) Example of Set Tuner Channel 18 FM frequency to 89.5 MHz (domestic)

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	AM Frequency	73, 80	Note 1 (USA), 1a
01	FM Frequency	66, CC	Note 2 (USA), 2a
02	FM Stereo	1	Note 3

### Appendix C, Tuner Station Parameter Notes

(0,G,T01,0,1;cs16) Example of Get Tuner Channel 0 AM and FM Frequency settings

(0,S,T12,1=1;cs16) Example of Set Tuner Channel 18 FM frequency to 89.5 MHz (domestic)

(NOTE: hex values denoted by xxh convention)

- Note 1: 10 kHz AM step tuning (USA)  
 $((value * 10) + 520)$  kHz, or  $((AM\_kHz - 520) / 10)$  with 29h = 930 KHz; FFh indicates an uninitialized station. For AM 10 kHz step tuning min Freq = 520 kHz, max = 1670 kHz.
- Note 1a: 9 kHz AM step tuning  
 $((value * 9) + 522)$  kHz, or  $((AM\_kHz - 522) / 9)$  with 2Dh = 927 KHz; FFh indicates an uninitialized station. For AM 9 kHz step tuning min Freq = 522 kHz, max = 1674 kHz.
- Note 2: 200 kHz FM step tuning (USA)  
 $((value * 0.20) + 87.5)$  MHz, or  $((FM\_MHz - 87.5) / 0.2)$  with 4Bh = 102.5 MHz; FFh indicates an uninitialized station. For FM 200 kHz step tuning min Freq = 87.5 MHz, max = 107.9 MHz.
- Note 2a: 100 kHz FM step tuning  
 $((value * 0.10) + 87.5)$  MHz, or  $((FM\_MHz - 87.5) / 0.1)$  with 96h = 102.5 MHz; FFh indicates an uninitialized station. For FM 100 kHz step tuning min Freq = 87.5 MHz, max = 107.9 MHz.
- Note 3: 0h = Mono, 1h = Stereo

## Appendix D Realtime Status Parameter

(0,G,R,5;cs16) Example of Get Sample Rate  
 (0,S,S,59=20;cs16) Example of Set Realtime Sample Rate Update

Parameter Identifier (in hex)	Bit/RealTime Register	Description	Parameter Max Values (in hex)	Formatting Notes
00	0/0	Analog Input Presence	1	Note 1
01	1/0	Analog Output Presence	1	Note 1
02	2/0	Digital Mode	2	Note 2
03	3/0	Video Mode	1	Note 15
04	4/0	DSP Mode	A	Note 3
05	5/0	Sample Rate	3	Note 4
06	6/0	Category Code	7F	Note 5
07	7/0	PnP Surround Mode	9	Note 6
08	0/1	Audio Coding Mode	F	Note 7
09	1/1	PCM Deemphasis	1	Note 8
0A	2/1	OSD Display Update	1	Note 9
0B	3/1	Front Panel Display Update	1	Note 9
0C	4/1	LED Buffer 0	FF	Note 10
0D	5/1	LED Buffer 1	FF	Note 10
0E	6/1	OSD Cursor Row Flashing	10	Note 11
0F	7/1	OSD Cursor Column Flashing	1B	Note 11
10	0/2	Front Panel Column Flashing	F	Note 11
11	1/2	BKC DIP Display Override	1	Note 12
12	2/2	Menu Mode	1	Note 13
13	3/2	Zone 1 Power	1	Note 14
14	4/2	Zone 2 Power	1	Note 14
15	5/2	Zone 1 Mute	1	Note 14
16	6/2	Zone 2 Mute	1	Note 14

### Appendix D, Realtime Status Parameter Notes

(0,G,R,5;cs16) Example of Get Sample Rate  
 (0,S,S,59=20;cs16) Example of Set Realtime Sample Rate Update

(NOTE: hex values denoted by xxh convention)

- Note 1: 0h = signal not present, 1h = signal present
- Note 2: 0h = no digital, 1h = coax active, 2h = optical active
- Note 3: 0h = unknown - this is a temporary state during bitstream analysis,  
 1h = unknown digital - this is a temporary state during bitstream analysis,  
 2h = AC3 CD/LD - may also be reported by some DVD players,  
 3h = AC3 RF laserdisc,  
 4h = AC3 DVD,  
 5h = DTS CD/LD = may also be reported by some DVD players,  
 6h = DTS DVD,  
 7h = PCM CD/LD/DVD,  
 8h = Analog LD

- 9h = Analog  
Ah = Noise Calibration
- Note 4: 0 = 44.1kHz, 1 = undefined, 2 = 48kHz, 3 = 32kHz
- Note 5: refer to IEC-958 for a complete listing  
some common codes:  
01h = CD/LD,  
03h = DAT,  
09h = LD RF AC3,  
0Bh = DVHS,  
19h = DVD,  
49h = MD
- Note 6: 0h = Surround, 1h = 3 Stereo Hall, 2h = 3 Stereo,  
3h = Stereo Hall, 4h = Stereo Front/Rear,  
5h = Stereo, 6h = Stereo Lt-Rt, 7h = HeadPhone,  
8h = DTS, 9h = Dolby Digital (AC3)
- Note 7: 0h = 2.0 (dual mono, no center, no rear, no LFE),  
1h = 1.0 (mono, only center, no rear, no LFE),  
2h = 2.0 (stereo, no center, no rear, no LFE),  
3h = 3.0 (stereo, center, no rear, no LFE),  
4h = 3.0 (stereo, no center, mono rear, no LFE),  
5h = 4.0 (stereo, center, mono rear, no LFE),  
6h = 4.0 (stereo, no center, stereo rear, no LFE),  
7h = 5.0 (stereo, center, stereo rear, no LFE),  
8h = 2.1 (dual mono, no center, no rear, LFE),  
9h = 1.1 (mono, only center, no rear, LFE),  
Ah = 2.1 (stereo, no center, no rear, LFE),  
Bh = 3.1 (stereo, center, no rear, LFE),  
Ch = 3.1 (stereo, no center, mono rear, LFE),  
Dh = 4.1 (stereo, center, mono rear, LFE),  
Eh = 4.1 (stereo, no center, stereo rear, LFE),  
Fh = 5.1 (stereo, center, stereo rear, LFE),
- PCM data streams always returns 0h, 2.0.  
DTS data streams always returns Fh, 5.1 (which is not necessarily correct).
- Note 8: 0h = no deemphasis, 1h = deemphasis
- Note 9: 0h = no display update, 1h = display updated.  
Except during explicit BKC-DIP display writes to either the OSD or the Front Panel, the B&K device always updates both displays. To reduce bandwidth requirements of the host, usually enabling the Front Panel Display Update is sufficient for monitoring display refreshes.
- Note 10: Front Panel LED indicating status is mapped into 2 LED Buffers specified as LED Buffer 0 and LED Buffer 1. This bit map represents which LEDs are currently lit. See **Appendix K** for a complete listing of LED mapping.
- More than one LED may be active at a time, so LED Buffer 1 of 81h indicates that both the ZONE 2 LED and the DOWN LEDs are active.
- Note 11: The cursor character is primarily used when editing titles. The cursor coordinates are sent every time the cursor

flashes (at a rate of approximately 2 Hz, twice per second), so it can be used to for both position and timing information.

- Note 12: 0h = Normal Display Content, 1h = BKC-DIP Overriding Display Content
- Note 13: 0h = Overlay Mode (over video if present), 1h = Menu Mode
- Note 14: 0h = Off, 1h = On. To set these global parameters issue (Set) the appropriate IR commands.
- Note 15: 0h = video mode unknown, indicates input changed or lost video  
1h = unknown S-video mode, checking for S-video  
2h = unknown composite mode, checking for composite video  
3h = S-video mode, S-video present  
4h = composite mode, composite present  
5h = no S-video mode, S-video "Blue Screen"  
6h = no composite mode, composite "Blue Screen"

## Appendix E Unit Parameters

<code>(0,G,F4,0;cs16)</code>	Example of Get Unit Name
<code>(0,G,F4,1;cs16)</code>	Example of Get Version
<code>(0,G,F4,C;cs16)</code>	Example of Get BKC-DIP Version

Parameter Identifier (in hex)	Description
00	Unit name
01	Version
02	Number of Zones
03	Number of DSPs
04	DTS (if available)
05	Dolby Digital (if available)
06	Power amp
07	PAL/NTSC
08	AM steps 9kHz/10kHz
09	FM steps 100kHz/200kHz
0A	ADC resolution
0B	DAC resolution
0C	BKC-DIP Version
0D	Software Time Stamp

## Appendix F IR Commands

(0,S,I,1=2;cs16)

Example of Set Zone 1 IR Save

(0,S,I,2=24;cs16)

Example of Set Zone 2 IR Volume +

<b>IR Command (in hex)</b>	<b>IR Description</b>
00	MODE -
02	SAVE
04	(BALANCE) RIGHT
0C	ENTER
14	ALL B&K POWER OFF
15	ALL B&K POWER ON
16	ALL B&K VOLUME +
17	ALL B&K VOLUME -
18	STATION +
19	ALL B&K VOLUME 0 dB
1A	ALL B&K VOLUME -20 dB
1B	ALL B&K VOLUME -40 dB
1D	ALL B&K VOLUME -60 dB
1E	ALL B&K MUTE (TOGGLE)
24	MASTER VOL +
38	TUNE +
3B	OSD OFF
3D	OSD ON
40	POWER ON
44	REAR DLY +
45	POWER (TOGGLE)
48	FREQ
4C	2
52	SAT
54	20 (B)
58	REAR LVL +
5C	8
60	TV-V3
64	MODE +
65	SOURCE +
66	SOURCE -
67	FRONT PANEL DISPLAY OFF
68	CENTER LVL +
69	FRONT PANEL DISPLAY ON
6C	5
6E	AM
70	TUNER
71	FM
74	UP
78	SUB LVL +
7C	0
80	POWER OFF
84	REAR DLY -
8C	1
90	V2
94	+10 (A)

98	REAR LVL -
9C	7
A0	V1
A4	TEST
A8	CENTER LVL -
AC	4
B0	DVD
B4	DN
B8	SUB LVL -
BC	*
C0	MUTE
C4	MASTER VOL -
C8	BAND
CC	3
D0	TAPE (TOGGLE)
D2	PRESET +
D4	30 (C)
D7	STEREO / MONO
D8	TUNE -
DC	9
E8	STATION -
EC	6
F0	CD
F1	MUTE ON
F2	MUTE OFF
F4	MENU
F8	(BALANCE) LEFT
FC	#

## Appendix G, Front Panel Commands

(0,S,F,1=1;cs16)

Example of Set Zone 1 FP Sleep

(0,S,F,2=1;cs16)

Example of Set Zone 2 FP Sleep

Identifier (in hex)	Front Panel Switch	Function
01	SLEEP	Unit Sleep Toggle
02	PRESET	Increment Preset
03	ENTER	Enter
04	MENU	Menu
05	DOWN	Down
06	UP	Up
07	SOURCE	Increment Source
08	MODE	Increment Mode
09	LEVEL	Change Level Focus
0A	VOLUME DOWN	Volume Knob Down
0B	VOLUME UP	Volume Knob Up
0C	CHORD 0: SLEEP + DOWN + UP	Advanced Settings Visible
0D	CHORD 1: SLEEP + DOWN + SOURCE	Restore User Preference Memory
0E	CHORD 2: SLEEP + UP + SOURCE	Factory Reset Unit
0F	CHORD 3: PRESET + ENTER	Front Panel Save

## 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 = LEVEL  
04h = MODE  
08h = SOURCE  
10h = PRESET  
20h = SLEEP  
40h = ENTER  
80h = MENU

LED Buffer 1

01h = DOWN  
02h = <NOT USED>  
04h = CENTER LEVEL  
08h = SUB LEVEL  
10h = MASTER LEVEL  
20h = REAR LEVEL  
40h = ZONE 2  
80h = <NOT USED>

**NOTE:** Due to the front panel electronics, only one of each of the following electrical banks of LEDs should be active at a time:

Electrical Bank A

UP, LEVEL, MODE, SOURCE, PRESET, SLEEP, ENTER, MENU, DOWN

Electrical Bank B

CENTER LEVEL, SUB LEVEL, MASTER LEVEL, REAR LEVEL, ZONE 2

Therefore:

(D, L, T00, 0=48;cs16)	Invalid, both PRESET and ENTER cannot be active
(D, L, T00, 0=04;cs16)	Valid, only MODE active
(D, L, T32, 0=02, 1=01;cs16)	Invalid, both LEVEL and DOWN cannot be active. Different LED buffers, but the same electrical bank
(D, L, T64, 1=41;cs16)	Valid, DOWN and ZONE 2 are in different electrical banks, but the same LED buffer

## 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; 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).

(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

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

**NOTE:** Auto Naming is currently not supported in product, therefore the *autoNameState* parameter is omitted.

### **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".

### **Noise Generator State Command: (receiveID, X, 3, noiseState; cs16)**

B&K Component's built in noise generator can be deactivated or activated using this command. The *noiseState* parameter may take on the values of 0 and 1 meaning "deactivate noise generator" and "activate Noise generator" respectively.

(00, X, 3, 1;cs16)	Noise generator activated
(00, X, 3, 0;cs16)	Noise generator deactivated

**NOTE:** Noise is initially output to the Left Front speaker. The following Noise Steering and Noise Increment commands can be used to control the routing of the noise to various speakers. Each time the noise generator is activated, the noise routing is again reset to the Left Front speaker.

**NOTE:** When the unit is in "Sleep", attempts to activate the noise generator are ignored.

**Noise Steering Command: (receiveID, X, 4, speakerIndex=onOff, ... speakerIndex=onOff; cs16)**

The B&K Components' built in noise generator can be routed to specific speaker outputs. The *speakerIndex* specifies which speaker and *onOff* determines whether noise is or is not routed to that particular speaker.

The speaker index mapping for currently supported speakers is as follows:

0	Left Front
1	Center
2	Right Front
3	Right Surround
4	Left Surround
5	Subwoofer

**NOTE:** Noise routed to multiple speakers simultaneously **is** supported on this B&K Components device.

For example, the following command routes noise simultaneously to the Center and the Left Surround speakers:

(00, X, 4, 1=1, 4=1; cs16)            Noise routed to Center and Left Surround

**NOTE:** Each time the Noise Steering Command is issued, all previous speaker routing states are cleared.

**NOTE:** Off states, "0"s are implicit since every occurrence of the Noise Steering Command clears all speaker routing states (the same as setting them all to "0").

For example if previously noise was routed to Left Front:

(00, X, 4, 0=1; cs16)

And now it is desired to route noise to the Right Surround the command would be:

(00, X, 4, 3=1; cs16)

Notice that the state of the Left Front has implicitly been set to off by the second command explicitly turning on the Right Surround.

**Noise Increment Command: (receiveID, X, 5; cs16)**

This command routes the built in noise generator to the next available speaker in the system. By using the Noise Generator State Command to activate the noise generator, the starting state of the noise routing reset to the Left Front speaker. Which speaker is next available depends on the System settings. Some possible sequences are as follows:

Left and Right Fronts, Center, Left and Right Surrounds, and Subwoofer	
(0,X,3,1;cs16)	Activate noise generator, Noise output Left Front
(0,X,5;cs16)	Increment noise output Center
(0,X,5;cs16)	Increment noise output Right Front
(0,X,5;cs16)	Increment noise output Right Surround
(0,X,5;cs16)	Increment noise output Left Surround
(0,X,5;cs16)	Increment noise output Subwoofer

(0,X,5;cs16)	Increment noise output Left Front
Left and Right Fronts, No Center, Left and Right Surrounds, and Subwoofer	
(0,X,3,1;cs16)	Activate noise generator, Noise output Left Front
(0,X,5;cs16)	Increment noise output Right Front
(0,X,5;cs16)	Increment noise output Right Surround
(0,X,5;cs16)	Increment noise output Left Surround
(0,X,5;cs16)	Increment noise output Subwoofer
(0,X,5;cs16)	Increment noise output Left Front
Left and Right Fronts, No Center, Left and Right Surrounds, and No Subwoofer	
(0,X,3,1;cs16)	Activate noise generator, Noise output Left Front
(0,X,5;cs16)	Increment noise output Right Front
(0,X,5;cs16)	Increment noise output Right Surround
(0,X,5;cs16)	Increment noise output Left Surround
(0,X,5;cs16)	Increment noise output Left Front
Left and Right Fronts, No Center, No Left and Right Surrounds, and No Subwoofer	
(0,X,3,1;cs16)	Activate noise generator, Noise output Left Front
(0,X,5;cs16)	Increment noise output Right Front
(0,X,5;cs16)	Increment noise output Left Front
(0,X,5;cs16)	Increment noise output Right Front

### **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 onOff 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).

### **Unsupported Executive Commands**

The following Executive Commands are **not** supported by AVR / Reference (Series I) Products which conform to BKC-DIP 1.01.00:

- Reinitialize BKC-DIP State Command: (receiveID, X, 8; cs16)
- Test Tone State Command: (receiveID, X, 9, level; cs16)
- Mute State Command: (receiveID, X, A, z=muteState; cs16)

## **Series I BKC-DIP Product Specific Appendices**

**Version 2.00.00**

Updated 04/22/02

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## **Appendix M, Error Logs**

Error Logs are not supported in AVR / Reference (Series I) products as they only conform to BKC-DIP V1.01.00 (Error Logs were added in BKC-DIP V1.02.00).

## Appendix P, Override Parameters

(0,G,0,0;cs16) Example of Get Override Active state  
(0,S,0,4=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	3	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	1	1	Note 4
05	BKC-DIP Update Enabled	1	1	Note 4
06	Front Locked	0	1	Note 1
07	IR Locked	0	1	Note 1
FF	Override Timeout	0	FF	Note 5

### Appendix P, Override Parameters Notes

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

Note 1: 0h = No, 1h = Yes

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 = Enabled

Note 5: 0h = No timeout, 1h = 0.1 second timeout ... FFh = 25.5 second timeout

## Appendix Q, Status Messages

(0,U,S,0="BKC-DIP ACTIVE";05FE)

Example Status Message

Message Number	Message	Indication
0	( <i>receiveID</i> ,U,S,0="BKC-DIP ACTIVE"; <i>cs16</i> )	BKC-DIP interface is active Device is ready to accept BKC-DIP commands