

BROADCAST[®]
t o o l s **INC**
PROBLEM SOLVED

Installation and Operation Manual



DTD-16 + G2
16 Channel DTMF Tone/Sequence Decoder

Manual update: 10/20/2022

Firmware Version: 2.02

If you need a firmware upgrade, contact Broadcast Tools[®]

No part of this document may be reproduced or distributed without permission.
ALL SPECIFICATIONS AND FEATURES FOR THIS PRODUCT ARE SUBJECT TO
CHANGE WITHOUT NOTICE

NOTE: We recommend the use of Chrome, Firefox or Safari as your browser.

Due to the dynamic nature of product design, the information contained in this document is subject to change without notice. Broadcast Tools, Inc., assumes no responsibility for errors and/or omissions contained in this document. Revisions of this information or new editions may be issued to incorporate such changes.

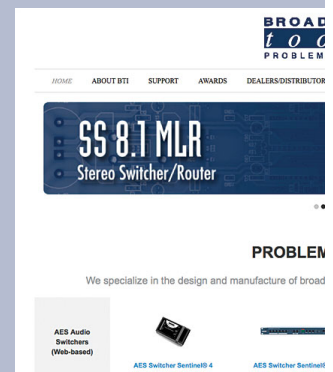
*Broadcast Tools[®] is a registered trademark of Broadcast Tools, Inc.
All Sentinel[®] labeled products are registered trademarks of Broadcast Tools, Inc.
Copyright[®] 1989 - 2022 by Broadcast Tools, Inc. All rights reserved.
No part of this document may be reproduced or distributed without permission.*

Visit www.broadcasttools.com for important product update information.

Table of Contents

Section Title	Page #
Introduction	3
Safety Information	3
Who to Contact for Help	3
Product Overview	4
Features/Benefits	4
Inspection	4
Installation/Operation	5
Power	5
Surge Protection	5
UPS Standby Power System	5
LED Indicators	6
Program Button	6
USB/RS232 Serial Ports	6
Relay Outputs	7
Open Collector Outputs	7
Audio Input Connection	7
Programming	8
Programming Ports	8
Programming	9
Output Modes	10
Dip-switch Settings	11
Restoring Factory Defaults	11
Specifications	12
Warranty	13
Front and rear panel drawings	Appendix
Connector and configuration jumper layout	Appendix

WEBSITE:
Visit our web site for product updates and additional information.



INTRODUCTION

Thank you for your purchase of the DTD-16 + G2 DTMF Tone Decoder, which we will refer to throughout the manual as the DTD-16 + G2. We are confident this product will give you many years of dependable service. This manual is intended to give you all the information needed to install and operate the Broadcast Tools® DTD-16 + G2.

SAFETY INFORMATION

Only qualified technical personnel should install the DTD-16 + G2. Any attempt to install this device by a person who is not technically qualified could result in a hazardous condition to the installer or other personnel or damage to the DTD-16 + G2 or other equipment. Please ensure that proper safety precautions have been taken before installing this device. If you are unfamiliar with this type of equipment, please contact a properly qualified engineer to handle the installation and setup of the DTD-16 + G2. Broadcast Tools, Inc., is unable to support NON-Broadcast Tools software, hardware or NON-Broadcast Tools computer/hardware/software problems. If you experience these problems, please research your hardware/software instruction manuals or contact the manufacturers technical support department.

WHO TO CONTACT FOR HELP

If you have any questions regarding your product or you need assistance, please contact your distributor from whom you purchased this equipment. If you would like more information about BROADCAST TOOLS® products, you may reach us at:

Broadcast Tools, Inc.

131 State Street
Sedro-Woolley, WA 98284-1503 USA
Voice: 360.854.9559
Fax: 866.783.1742

Internet Home Page: www.broadcasttools.com
E-mail: support@broadcasttools.com

**THANK YOU FOR CHOOSING
BROADCAST TOOLS® BRAND PRODUCTS!**

Broadcast Tools is a Veteran Owned Business



Designed, Assembled and Supported in WA State, USA



CAUTION!

Broadcast Tools® Products, as with any electronic device, can fail without warning. Do not use this product in applications where a life threatening condition could result due to failure.

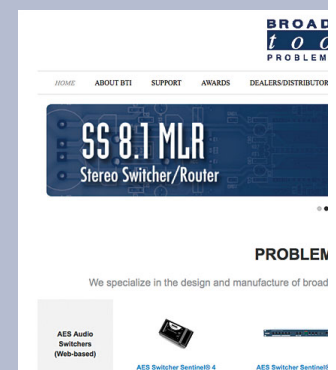


NOTE:

This manual should be read thoroughly before installation and operation.

WEBSITE:

Visit our web site for product updates and additional information.



Product Overview

The DTD-16 + G2 is a full-featured DTMF tone/sequence decoder that is user programmable to decode single tones or sequences up to six tones in length which can be assigned to any one of eight SPST normally open relays, eight open collectors and the USB/RS-232 serial ports.

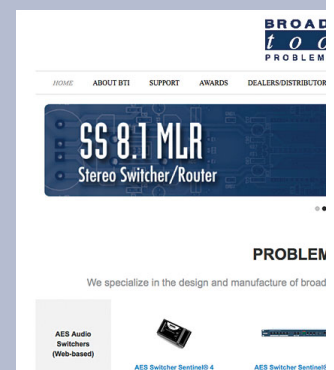
The DTD's relay and open collector outputs can be programmed to close for the duration of tone, pulse immediately after completion of detection, wait a programmed (up to 9.99 seconds) length of time after detection, or latch/unlatch. Programming is performed using a non-dedicated PC's USB or RS-232 serial port equipped with a serial terminal program like HyperTerminal, Tera Term, or PuTTY.

Features/Benefits

- Decodes all 16 DTMF tones or user-programmed tone sequences.
- 8 SPST relay outputs and 8 open collector outputs triggered by tones or tone sequences.
- Front panel tone audio input level control with a range of -20 to +24dbu
- Adjustable tone detection time.
- Front panel relay status, power, tone activity, program mode, and activity LEDs.
- Programmed via USB or RS-232 serial connection.
- Mode configuration via front panel dip-switches.
- Relay, open collector, and tone audio connections on removable euro-block screw terminal connectors to simplify wiring and service, mating plugs are supplied.
- Fully RFI proofed.
- Surge protected internal power supply, 9 VDC universal desktop power adapter with IEC inlet included.
- Up to three units may be mounted on the optional RA-1 rack shelf, using four supplied Velcro feet. Desktop and wall mounting is also possible.

WEBSITE:

Visit our web site for product updates and additional information.



Inspection

Please examine your DTD-16 + G2 carefully for any damage that may have been sustained during shipping. If any damage is present, please notify the shipper immediately and retain the packaging for inspection by the shipper. The package should contain the DTD-16 + G2, a power supply, a USB-A/B cable, and an “S9” RJ11-to-DB9 cable. Manuals may be downloaded from our web site.

Installation/Operation

Power

Connect the 2.1mm barrel type center positive power connector into the unit and the 9 to 12 VDC power supply with domestic connector into a 120 Vac 50-60 Hz power source.

NOTE: Never use any type of power supply other than the specified/supplied power supply. Check the power jack on the back of the unit to determine which power supply is required.

Surge Protection

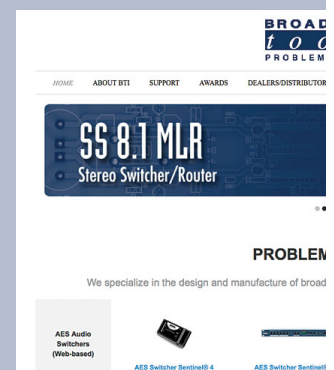
The DTD-16 + G2 has built-in resistance to voltage changes; we recommend that you use a power surge protector or line conditioner on the incoming AC line. Lightning strikes and/or other high voltage surges may damage your DTD-16 + G2 and connected equipment if it is not properly protected. For lightning protection devices, check out www.polyphaser.com and www.itwlinx.com.

UPS Standby Power System

We recommend that you connect your DTD-16 + G2 to a UPS standby power system. A UPS helps minimize the risk to the DTD-16 + G2 and provides power during a power outage.

WEBSITE:

Visit our web site for product updates and additional information.



Installation/Operation

LED Indicators

- “PWR”: Power LED (Green).
- “DV” LED: Indicates valid DTMF tone detection (Yellow).
- “PGM” LED: Flashes when in Programming Mode (Red).
- “DAT” LED: Indicates serial data transfer (Red).
- “K1”- “K8” Relay LEDs: Lit when the corresponding relay is on.

Program (PGM) button

Used to toggle in and out of programming mode. See the “Programming” section of this manual for more information.

Audio Input Gain Adjustment

The front panel “INPUT LVL” control may be used to adjust the DTMF tone detection sensitivity from -20dBu to +24dBu. This control should be adjusted for solid DV LED indication while DTMF tone audio is present.

DTMF Tone Detection Jumper Settings

JP1 = DTMF Tone detection jumper (Guard time)

The DTD is equipped with a 4-position jumper, labeled “JP1” on its PCB. This is used to adjust how quickly DTMF tones are detected. The settings are as follows:

Fast = 50ms ON / 50ms OFF

Medium = 100ms ON / 100ms OFF. (Default)

Slow = 150ms ON / 150ms OFF.

USB PGM Port

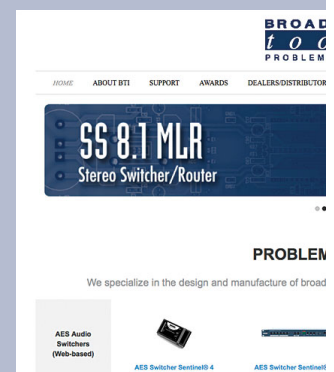
This type B USB port is used to connect the DTD-16 + G2 to a computer for configuration via a virtual COM port. See the “Programming” section of this manual for more information.

RS-232 Serial PGM Port (RJ-11 Jack):

This RJ-11 jack is used to connect the DTD-16 + G2 to a computer’s COM port for configuration via RS-232 serial using the included reverse modular cable with 9-pin “S9” female D-sub adapter. See the “Programming” section of this manual for more information.

WEBSITE:

Visit our web site for product updates and additional information.



Relay Outputs

The eight relays are SPST normally open/dry. Make your connections to the desired relays K1 A/B thru K8 A/B. Front panel LEDs indicate when a relay is active.

(Top row, J01)

K1A	K1B	K3A	K3B	K5A	K5B	K7A	K7B
K2A	K2B	K4A	K4B	K6A	K6B	K8A	K8B

(Bottom row, J01)

Open Collector Outputs

The open collectors are labeled OC9 thru OC16. Make your connection between the desired open collector and ground “GND”. The open collector (OCx) output for the selected channel will go low to ground (GND) providing a return for a PIP/trigger input, TTL/CMOS logic, or relay. External pull-up resistors may be required in some installations. NOTE: The open collectors are rated at up to 6 VDC @ 50 mA.

(Top row, J04)

OC9	OC11	OC13	OC15	AUD-	AUD+
OC10	OC12	OC14	OC16	GND	CGND

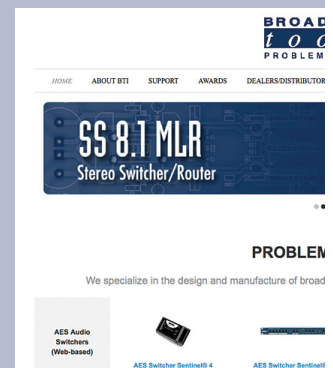
(Bottom row, J04)

Audio Input Connection

Connect the audio feed supplying DTMF tone audio for your equipment to the “AUD-“ and “AUD+” removable screw terminals on the J04 top terminal block connector. See above for pinouts. The input is Hi-Z, active balanced and adjustable via the front panel “INPUT LVL” trim pot.

WEBSITE:

Visit our web site for product updates and additional information.



Programming

The DTD can be programmed from a computer via its USB serial, or RS-232 serial interfaces.

Connecting via the USB Serial “PGM” port:

1. Connect the supplied USB A/B cable from the “USB PGM” jack on the DTD rear panel to an available USB port on your PC. When you first plug the DTD into your PC, it should automatically install the correct FTDI USB Serial “Virtual COM port” drivers which will allow you to access the DTD on a COM port.

NOTE: If the DTD’s FTDI USB Serial “Virtual COM port” drivers do not automatically install they may be downloaded here: <http://www.ftdichip.com/Drivers/VCP.htm>

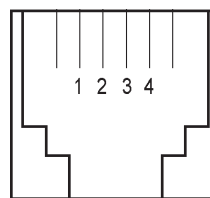
2. Start a serial terminal application like PuTTY, Tera Term or HyperTerminal configured for the connected COM port set to 9600 baud, 8, N, 1, flow control to NONE, Emulation set to ANSI, and local character echo enabled.

Connecting via the RS-232 Serial “PGM” port:

1. Connect the supplied “S9” RJ11 to DB9 adapter cable from the RJ11 PGM jack on the DTD rear panel to an available RS232 serial COM port on your PC.
2. Start a serial terminal application like PuTTY, Tera Term or HyperTerminal configured for the connected COM port set to 9600 baud, 8, N, 1, flow control to NONE, Emulation set to ANSI, and local character echo enabled.

“S9” RJ11 to DB9 adapter pinout:

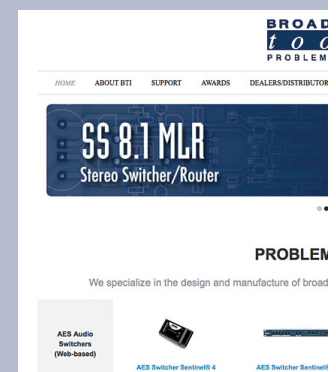
RJ-11 Adapter Pin	DB-9 D-SUB Pin #	Product’s point of view Function Name.
4	3	RS-232 Receive
3	2	RS-232 Transmit
2	5	Ground



Modular Jack Pin Numbers

WEBSITE:

Visit our web site for product updates and additional information.



Programming Steps

1. Press the recessed front panel PGM button or type “p” in the terminal to enter Program Mode. The red front panel PGM LED will blink to indicate the DTD is in Program mode and the Program Menu will be displayed in the terminal window:

```
DTD-16+ VER 2.02

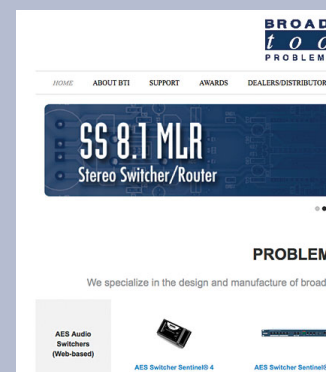
OUT-CMD ON/OFF CODES
01-0-0.00-1111/
02-0-0.00-2222/
03-0-0.00-3333/
04-0-0.00-4444/
05-0-0.00-5555/
06-0-0.00-6666/
07-0-0.00-7777/
08-0-0.00-8888/
09-0-0.00-9999/
10-1-0.10-101/
11-0-0.00-****/
12-0-0.00-####/
13-0-0.00-AAAA/
14-0-0.00-BBBB/
15-0-0.00-CCCC/
16-0-0.00-DDDD/
SELECT 01-16 & ENTER 0=MOM, 1=LATCH, 2=XLATCH
DELAY 000-999 (0.00-9.99 SEC), MOM OR ON CODE
/ OFF CODE :
```

2. Type the output channel number, 01 through 16, a “-” (dash) will be displayed after the number are entered along with a new line.
3. Type the single command digit to set the output mode: “0” for momentary, “1” for Latch or “2” for Exclusive Latch. A “-” (dash) will be displayed after the command digit and a new line will be displayed.
4. Enter a time delay value of 0.00 to 9.99 seconds as a three-digit value (000-999). Do not enter the “.”, it will be entered automatically. This is the time that will elapse after a command is received and before the output is activated. Default time delay before activation is 0.00 seconds. A “-” (dash) will be displayed after the command digit and a new line will be displayed.
5. Enter the DTMF tone or string value(s) you want to use to operate the selected output. The default values are listed in above.

To exit Program mode, press the ESC key. Program mode will be exited automatically after 60 seconds of inactivity. When Program mode is exited the DTD will list the current program values and perform a reset.

WEBSITE:

Visit our web site for product updates and additional information.



Output Modes

Momentary

If you have selected the momentary function for this output channel, you can program two codes up to 5 digits for the first code and 6 digits for the second code that can be used to activate that output. If your code is shorter than 5 digits enter a “/” at the end of the first data string. This will cause a new line to be displayed. Enter the second code you want to momentarily trigger. If the string is less than 6 digits press the “Enter” key. The codes for that output will now be saved and you can go on to programming another output. The momentary output closure duration is 1 second.

Momentary Programming Example: To program output 1 for momentary for code 123 and 321 with a time delay of 4.25 seconds before activation:

```
01
0
425
123/ 321(CR)
```

Latch

For the Latch function, the first code will be used to latch the output on, and the second code to turn latch it off. Program the “ON” code, from 1 to 6 digits. If it is shorter than 5 digits, terminate with the “/” character. A new line will be displayed. Now enter the code you want to use to turn OFF that output. It must be from 1 to 6 digits long. If it is shorter than 6 digits terminate with the “Enter” key. You cannot enter the same code to latch an output on and turn it off.

Latch Programming Example:

To program output 2 for 456 latch on, 654 latch off with no time delay:

```
02
1
0.00
456/654(CR)
```

Exclusive Latch

For the Exclusive Latch function, the first tone/code will be used to latch the output on, and the second tone/code to turn it OFF, if desired. You do not need to enter an OFF code. In Exclusive latch mode, when any exclusive latch output is selected, all other exclusive latch outputs will be reset. Enter the “ON” code, from 1 to 5 digits. If it is shorter than 6 digits terminate with the “/” character. A new line will be displayed. Now enter the code you want to use to turn off that output. It must be from 1 to 6 digits long. If it is shorter than 5 digits terminate with the “Enter” key. You cannot enter the same code to latch an output on and turn it OFF.

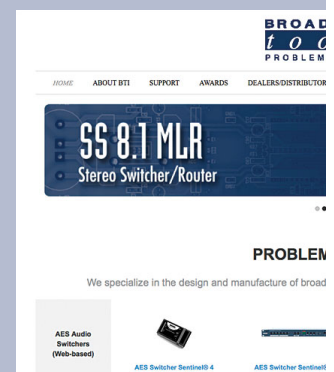
Exclusive Latch Programming Example:

To program output 2 for 789 x-latch on with time delay of .10 second:

```
02
2
010
789(CR)
```

WEBSITE:

Visit our web site for product updates and additional information.



Dip-switch Settings

By default, all four dip-switches are in the up/off position which sets the DTD to its normal operating mode and programming. The following alternate operating modes are available via the front panel configuration dip-switches:

DIP-1

If DIP-1 is turned ON; all momentary outputs will become key-follow outputs. This means that the selected output will turn ON when the last digit of the momentary code is decoded and stay on for as long as that digit is being decoded. This is useful for remote pan-tilt camera control.

DIP-2

When DIP-2 is ON, the “#” character will be translated to a CR/LF (0Dh 0Ah) on the ASCII RS-232 output. This allows you to use the “#” as an “Enter” key and is useful for using DTMF to remotely control equipment that requires a CR/LF termination.

DIP-3

When DIP-3 is ON, codes programmed into odd channels, 1,3,5,7, etc., will operate relay one. Even channels, 2,4,6,7, etc., will operate relay 2. Relays 1 and 2 can be programmed to with any mode; momentary, latching, or exclusive latching.

DIP-4

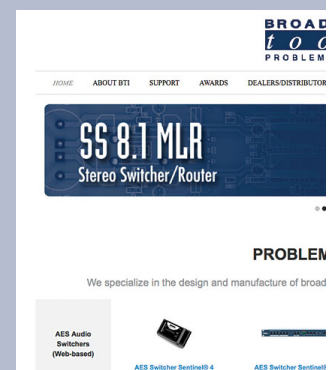
When DIP-4 is ON, Relays will be engaged on the trailing edge of the DTMF signal in both momentary and latching modes.

Restoring to factory defaults:

The default program values may be reloaded at any time by removing power from the DTD-16 + G2, holding down the PGM button and plugging in the power and then releasing the PGM button after a few seconds. The PGM LED will blink once after the defaults are loaded.)

WEBSITE:

Visit our web site for product updates and additional information.

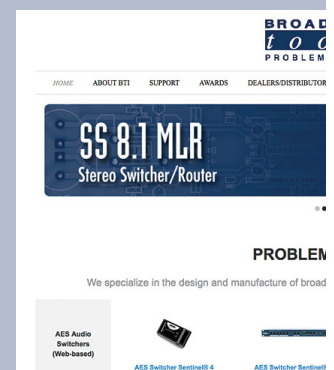


Specifications

Input Level:	-20dBu to +24dBu.
Input Impedance:	200K Ω balanced, 100K Ω unbalanced.
Relay Outputs:	Eight SPST, normally open dry contacts. 30 VDC @ 1 amp max.
Open Collector Outputs:	Eight, sinking up 6 VDC / 50 mA max to ground.
RS-232 Serial:	9600, 8,N,1 / RJ11 jack. Reverse module cable and RJ11 to DB9 adapter (S9) included.
USB Serial:	9600, 8,N,1 / USB type B female. FTDI Chipset.
I/O Connectors:	Audio Inputs, relays, and open collector outputs. Removable screw terminal blocks.
Power:	9-12 VDC, greater than 500 mA. 2.1mm ID x 5.5mm OD coaxial connector, center positive, surge protected. Universal switching power supply with domestic connector supplied. International power supply optional.
Dimensions:	6 x 5.25 x 1.63 in (W x L x H)
Options:	RA-1 Rack Shelf. 1 RU. Accommodates up to 3 units, filler panels supplied. Note: Velcro is provided to secure the product to the RA-1 shelf.

WEBSITE:

Visit our web site for product updates and additional information.



LIMITED WARRANTY

The term "Buyer" as used in this document refers to and includes both (but only) (a) any person or entity who acquires such an item for the purpose of resale to others (i.e., a dealer or distributor of an item), and (b) the first person or entity who acquires such an item for such person's or entity's own use.

Broadcast Tools warrants to each Buyer of any item manufactured by Broadcast Tools that the item will be free from defects in materials and workmanship at the time it is shipped by Broadcast Tools if the item is properly installed, used and maintained.

EXCLUSIVE REMEDIES

If Broadcast Tools is notified, in writing, of a failure of any item manufactured by Broadcast Tools to conform to the foregoing Limited Warranty within one (1) year following the date of the Buyer's acquisition of the item, and if the item is returned to Broadcast Tools in accordance with Broadcast Tools' instructions for confirmation by inspection of the defect (which at Broadcast Tools' election may include, without limitation, a requirement that the Buyer first obtain a Return Authorization number from Broadcast Tools, that the Buyer furnish proof of purchase in the form of an invoice and/or receipt, and that the Buyer prepay all freight charges associated with any return of the item to Broadcast Tools using such freight service as Broadcast Tools reasonably may specify), Broadcast Tools will repair or replace the defective item, or will refund the purchase price paid by the Buyer for the item. Broadcast Tools shall have the exclusive right to choose between these alternative remedies.

NO OTHER WARRANTIES OR REMEDIES

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, BROADCAST TOOLS AND ITS SUPPLIERS DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE; AND THE FOREGOING ALTERNATIVE REMEDIES SHALL BE EXCLUSIVE OF ALL OTHER REMEDIES. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE/JURISDICTION TO STATE/JURISDICTION.

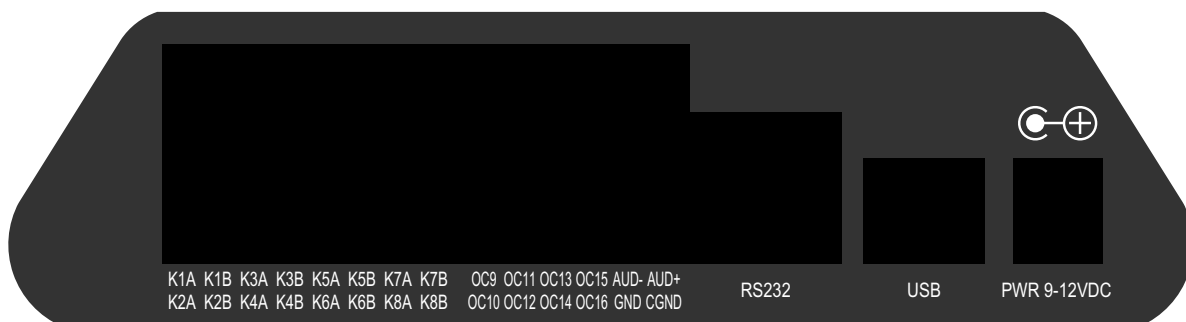
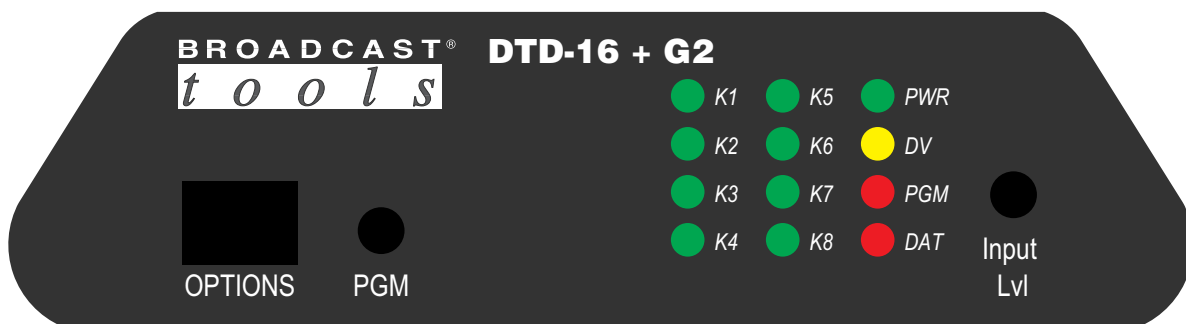
NO LIABILITY FOR CONSEQUENTIAL DAMAGES

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, NEITHER BROADCAST TOOLS NOR ANY OF ITS SUPPLIERS SHALL HAVE ANY LIABILITY FOR ANY SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, ANY DAMAGES FOR LOST PROFITS, BUSINESS INTERRUPTION, LOSS OF DATA OR INFORMATION, COST OF CAPITAL, CLAIMS OF CUSTOMERS, OR ANY OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR THE INABILITY TO USE ANY ITEM SUPPLIED BY BROADCAST TOOLS, EVEN IF BROADCAST TOOLS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES HAVE ANY LIABILITY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY OR PUNITIVE DAMAGES. THIS LIMITATION OF LIABILITY APPLIES WHETHER A CLAIM IS ONE ALLEGING BREACH OF A CONTRACT OR WARRANTY, NEGLIGENCE OR OTHER TORT, FOR THE VIOLATION OF ANY STATUTORY DUTY, THE FAILURE OF ANY LIMITED OR EXCLUSIVE REMEDY TO ACHIEVE ITS ESSENTIAL PURPOSE, OR ANY OTHER CLAIM OF ANY NATURE. BECAUSE SOME STATES AND JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, THIS LIMITATION MAY NOT APPLY TO YOU.

Broadcast Tools, Inc.

131 State Street
Sedro-Woolley, WA 98284 • USA

360.854.9559 **voice** • 866.783.1742 **fax**
support@broadcasttools.com **e-mail**
www.broadcasttools.com **website**



Component Layout

