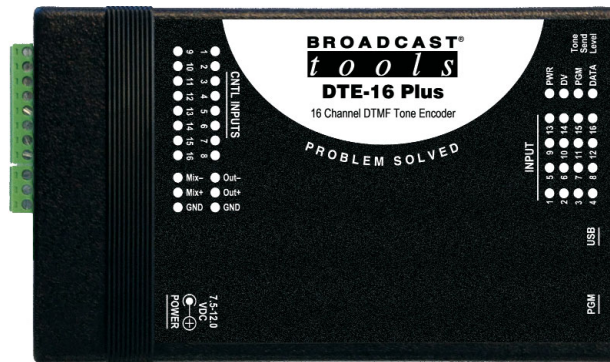




PROBLEM SOLVED

## *Installation and Operation Manual*



### **DTE-16 Plus 16 Channel DTMF Tone/Sequence Encoder**

Manual update: 06/24/2013

For firmware versions equal to or greater than: 2.01

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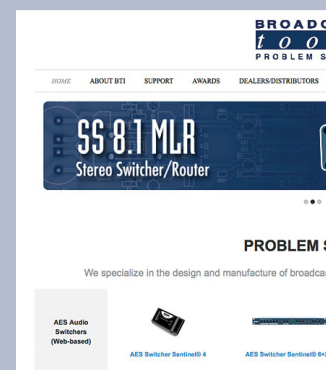
Visit [www.broadcasttools.com](http://www.broadcasttools.com) for important product update information.

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## INTRODUCTION

Thank you for your purchase of a DTE-16 Plus is a web enabled transparent three input, single output stereo switcher/router (referred to as the DTE-16 Plus throughout this manual). We're confident that 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 DTE-16 Plus.

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Only qualified technical personnel should install Broadcast Tools products. 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 Broadcast Tools product 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 Broadcast Tools product.

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If you would like more information about Broadcast Tools® products, you may reach us at:

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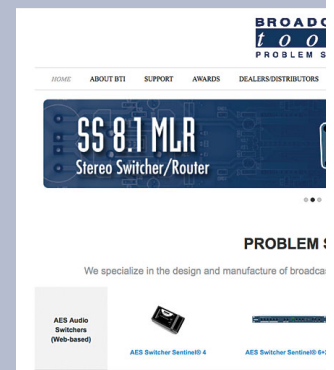


## **NOTE:**

This manual should be read thoroughly before installation and operation.

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## **INTRODUCTION**

## Product Overview

The DTE-16 Plus is a feature rich DTMF tone/sequence encoder that is user programmable to encode tone sequences up to 15 characters in length or a single tone via any one of 16 contact closure inputs and/or commands from the USB COM port. Each input may be programmed to generate a tone for the duration of the closure or tone burst immediately on command. A passive mixing network is provided to mix both program input audio and tone encoder audio if required. Programming is performed using a non-dedicated PC's USB port equipped with Windows HyperTerminal or PuTTY.

## Features

- Encodes all 16 DTMF tones or programmable tone sequences up to 15 characters in length.
- Adjustable tone generation time.
- Output level adjustable from +4 dBu to off.
- Passive program mixer input.
- Balanced low Z output
- Front panel status LEDs for all 16 inputs, power, tone activity, program mode, and serial data activity.
- Programmed via USB connection.
- All connections except for the USB type B connector and a coaxial DC jack are on removable euro-block screw terminal connectors to simplify wiring and service, mating plugs are supplied.
- Fully RFI proofed.
- Surge protected power supply. Domestic power supply provided.
- Up to four units may be mounted on the optional RA-1 rack shelf, using four supplied Velcro feet. Desk top and wall mounting is also possible.

## Inspection

Please examine your DTE-16 Plus carefully for any damage that may have been sustained during shipping. If any damage is noted, please notify the shipper immediately and retain the packaging for inspection by the shipper. The package should contain the DTE-16 Plus, a 7.5 to 12 VDC wall transformer and a USB A/B cable. Manuals may be downloaded from our web site.

## Installation

The DTE-16 Plus interfaces to external equipment through removable euroblock screw terminals. The terminals accommodate wire sizes from 16 - 28 AWG solid or stranded wire. Before installing a wire, remove the euroblock screw terminal plug and turn each capture screw fully counterclockwise. Strip each conductor to a length of 0.25" and insert the conductor fully into the terminal. Turn the capture screw fully clockwise to secure the conductor.

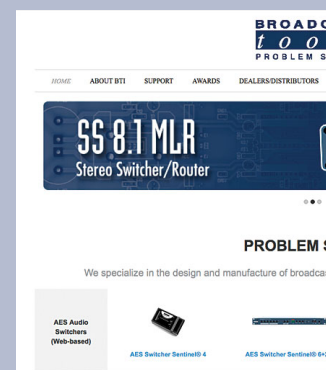


## CAUTION!

Installation of the DTE-16 Plus in high RF environments should be performed with care. The station ground should be connected to the designated chassis ground terminal using a 20 to 24-gauge wire.

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### Surge Protection/RF Filtering

The DTE-16 Plus 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 DTE-16 Plus and connected equipment if it is not properly protected. For lightning protection devices, check out [HYPERLINK "http://www.polyphaser.com" www.polyphaser.com](http://www.polyphaser.com) and [HYPERLINK "http://www.itwlinx.com" www.itwlinx.com](http://www.itwlinx.com).

### UPS Standby Power System

We recommend that you connect your DTE-16 Plus to a UPS system. A UPS helps minimize the risk to the DTE-16 Plus and provides power during a power outage.

### Channel Control Inputs

Connect a normally open dry contact closure between the “GND” terminal and any of the 16 channels. The channels are labeled 1 thru 16. The DV led will light when tones are generated.

### Mixed/Tone Output

The mix balanced audio output includes the encoded tone audio mixed with the mix audio input, if present. Connect Out -, Out + and GND to your input device.

**NOTE: Expect a mixing loss thru the mix network.**

### MIX Input

This audio input is resistively mixed with the output of the internal DTMF tone encoder. Connect your program audio source equipment to the rear panel screw terminals labeled Mix -, Mix + and GND.

### Power Input

2.1mm coaxial DC power jack, 7.5 - 12 VDC, center positive.

### PGM Button

This recessed momentary pushbutton places the DTE in and out of Program mode.

### USB Port

This type B USB port is used to connect the DTE to a computer for programming and computer control. If the DTE is being used as a stand-alone tone encoder, this only needs to be connected to a computer for setup/programming.

### LED Indicators

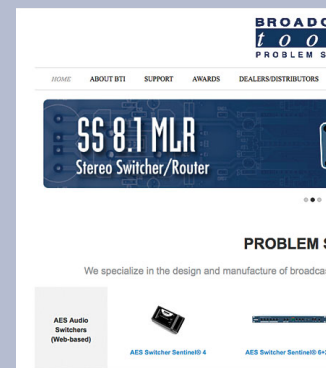
Input LED's:	Each input's LED (1-16) will illuminate when active.
“PWR” LED:	Lit when powered up.
“DV” LED:	Lit when tone(s) are generated.
“PGM” LED:	Blinks when in program mode.
“DATA or DAT” LED:	Blinks to indicate data activity (USB COM port.)

### Tone Send Level

The front panel “Tone Send Level” control trimmer may be used to adjust the mixed/DTMF tone output from off to +4 dBu.

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### Programming

To program the DTE-16 Plus, you must connect it to the USB port of a PC running a serial terminal program such as HyperTerminal, or PuTTY. When you first plug the DTE-16 Plus into your PC it should automatically install the correct FTDI USB Serial port drivers which will allow you to access the DTE on a COM port. Set the terminal program to 9600,8,N,1, flow control to NONE. Character Echo should also be turned ON.

Once the DTE is connected and a serial terminal session is open there are two ways to activate Program mode. Either press the recessed “PGM” button on the front panel or send an ASCII “p” over the USB serial port from the terminal program. Once program mode is entered, the “PGM” LED will begin to flash and current data will be displayed:

(The factory default has single digits corresponding to each input, 1 for 1, 2 for 2, etc. Input 10 is DTMF zero, 11 = \*, 12 = #, 13 = A, 14 = B, 15 = C, 16 = D.

Factory default values can be reloaded at any time by removing power from the DTE-16 Plus, holding down the PGM button and plugging in the power. Release the PGM button after a few seconds. The PGM LED will blink once after the defaults are loaded.

To change an input value enter a channel number (01-16) followed by the DTMF sequence to be output when that input is activated. Up to 15 digits can be entered for each input channel. Press the Carriage Return to store the data after entering your character string.

You may then enter another channel number to enter data for that input. Program mode can be exited at any time by pressing the ESC key. Pressing the ESC during data entry, before pressing the carriage return, will cause the old data for that input to be retained, the new data will not be saved. If one minute passes without any data entry the DTE will automatically exit program mode. Backspace can be used to erase and re-enter DTMF data.

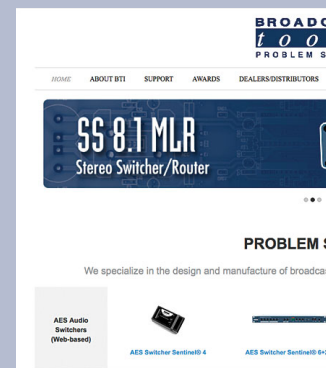


#### NOTE:

*If the DTE-16 Plus's FTDI USB Serial “Virtual COM port” drivers do not automatically install they may be downloaded here:  
<http://www.ftdichip.com/Drivers/VCP.htm>*

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## Function Modes

There are four DTMF transmit modes selectable via the four-position DIP-switch package on the DTE's printed circuit board. These modes control the tone duration and spacing when triggered from the channel control inputs.

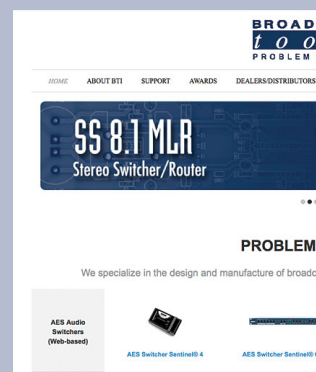
	SW-1	SW-2	SW-3	SW-4
Tones sent at 100ms tone, 100ms spacing (def.)	Off	Off	Off	Off
Tones sent at 50ms tone, 50ms spacing	Off	Off	On	Off
Single Tone sent as long as the input is closed. The first tone stored for that input would be sent. Used for pan/tilt camera control etc.	Off	On	Off	Off
Tones sent at 500ms tone, 100ms spacing	Off	On	On	Off

## Example:

(Off, On, On, Off)  
500ms tone, 100ms spacing.

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## Operation

### Channel Control Inputs

Connect a normally open dry contact closure between the “GND” terminal and any of the 16 channel inputs. These are labeled 1 thru 16. The input LED will light to indicate the input is active. The “DV” LED will light to indicate valid tone generation.

### Computer Control Command Syntax

To control the DTE-16 Plus from a computer, it must be connected to the USB port on a PC running a serial terminal program such as HyperTerminal, or PuTTY. When you first plug the DTE in to your PC it should automatically install the correct FTDI USB Serial port drivers which will allow you to access the DTE on a COM port. Set the terminal program to 9600,8,N,1, flow control to NONE. Character Echo should also be turned ON. Once the DTE is connected and a serial terminal session is open commands can be sent to trigger tones either as a string of tones or as individual tones with the duration controlled by user written software. Commands must be terminated with a carriage return (<cr>).

### Short Duration

Generates 50ms tones with 50ms spacing (10 digits per second.)

Command syntax: @Snnnn<cr>

Where @ is the beginning of the string, S is the command, and nnnn is the desired tone or tone sequence, up to 60 digits.

Command example: @S1234<cr>

Sends the sequence “1234” with 50ms tone duration and spacing.

### Medium Duration

Generates 100ms tones with 100ms spacing (5 digits per second.)

Command syntax: @Lnnnn<cr>

Where @ is the beginning of the string, L is the command, and nnnn is the desired tone or tone sequence, up to 60 digits.

Command example: @L1234<cr>

Sends the sequence “1234” with 100ms tone duration and spacing.

### Long Duration

Generates 500ms tones with 100ms spacing.

Command syntax: @Xnnnn<cr>

Where @ is the beginning of the string, X is the command, and nnnn is the desired tone or tone sequence, up to 60 digits.

Command example: @X1234<cr>

Sends the sequence “1234” with 500ms tone duration and 100ms spacing.

### Single Latched Tones

Generates a single tone at a length defined by your software.

Command syntax: @Tn<cr>(desired tone duration)<cr>

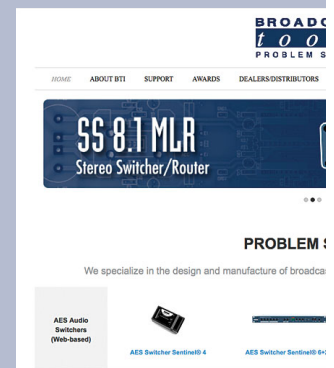
Where @ is the beginning of the string, T is the command, and n is the desired tone. The tone will start with the first carriage return (<cr>) and remain latched on until a second carriage return is received. This allows the user’s software to control the duration of the tone.

Command example: @T4<cr>(wait 5 seconds)<cr>

Generates the DTMF 4 tone from the first carriage return to the second (5 seconds.)

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## Specifications

Mix Input Level: Nominal program audio level.

**NOTE: Expect a mixing loss thru the mix network.**

Mix Input Impedance: 100 ohms balanced.

Output/Tone Audio Level: 0 dBu nominal, +4dBu max, @ 100 ohms, balanced.

Output Impedance: 100 ohms balanced.

Channel Control Inputs: Triggered by dry contact closures to ground.

USB Serial: 9600, 8,N,1 / USB type B female.

Connectors: Audio input and output, and channel inputs use removable screw terminal blocks.

Required power supply: 7.5 to 12.0 VDC only, greater than 200 ma. 2.1mm ID x 5.5mm OD coaxial connector, center positive, surge protected. Domestic PS supplied.

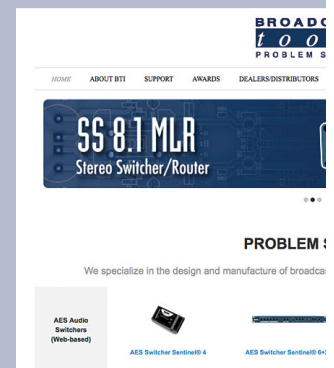
Size: 6.18" x 3.70" x 1.42" (L,W,H)

Weight: 1.5 lb.

Options: CE certified universal power supply.  
RA-1, 1-RU rack shelf. Note: Velcro may be used to secure the product to the RA-1 shelf.

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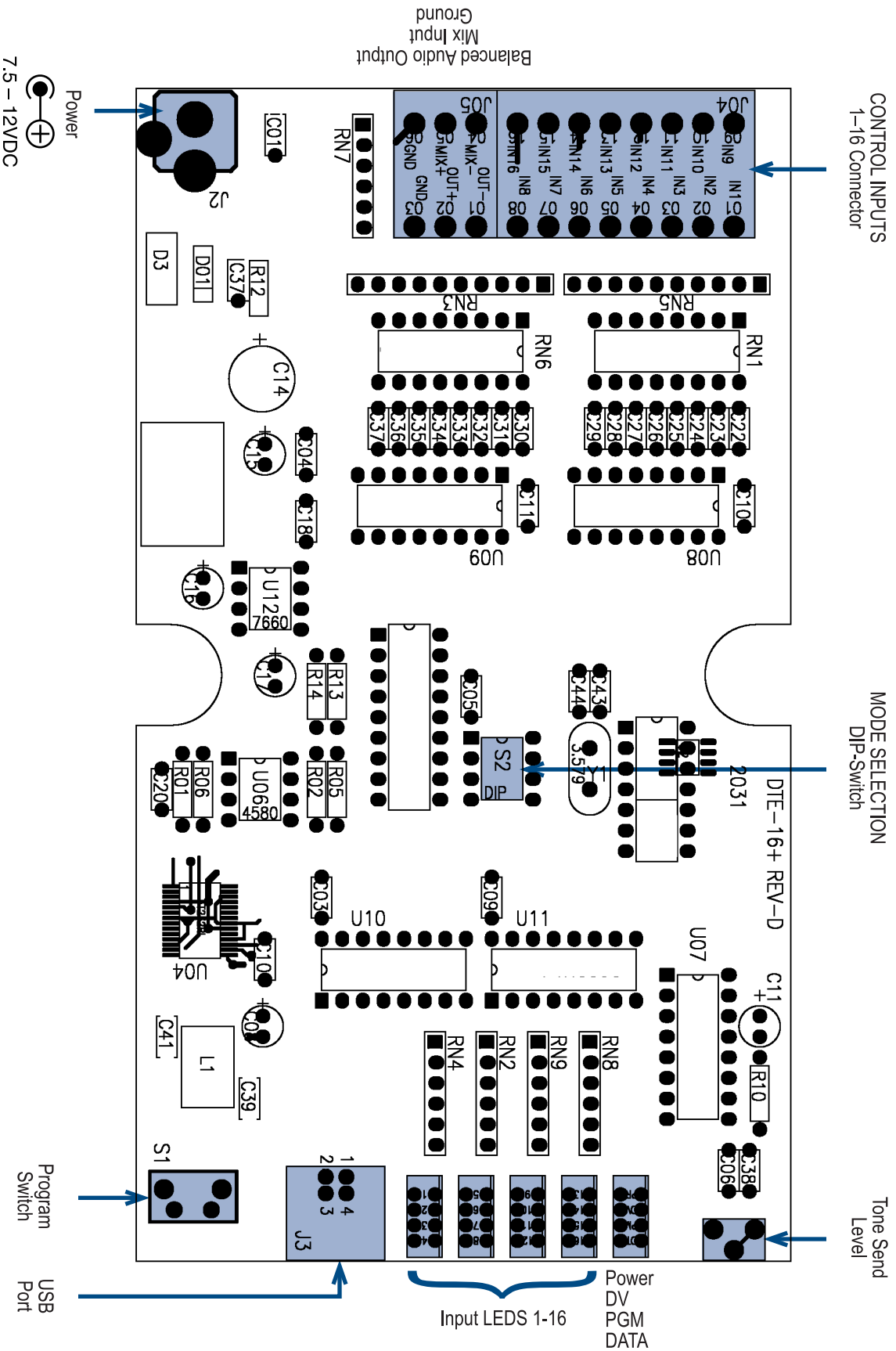


# Broadcast Tools® DTE-16 Plus

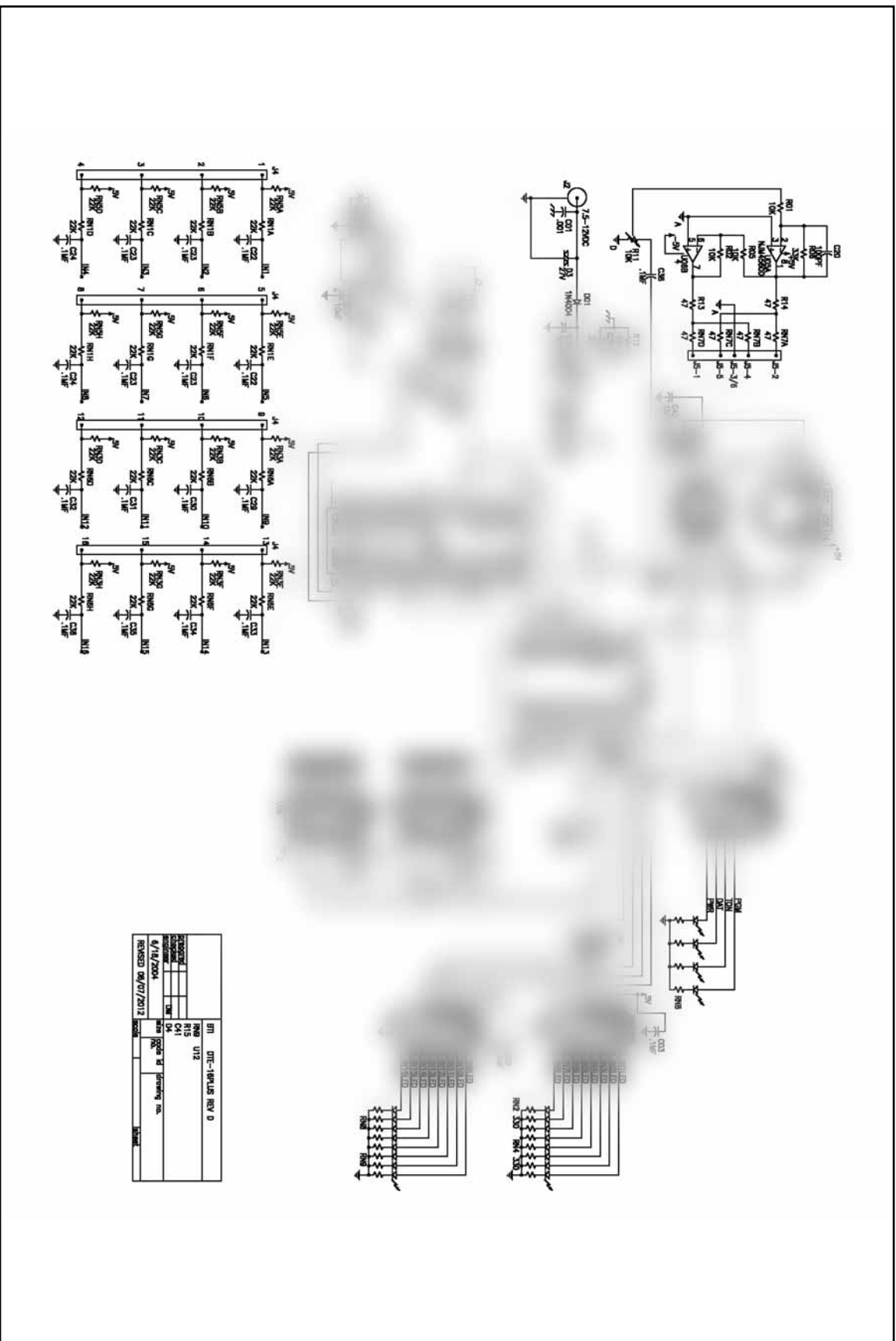
## Connector and Indicator Layout

APPENDIX

11



### Fractional Schematic



## Functional Diagram

The 16 selection inputs may be activated by pulling the input to ground. External sources can be contact closures, open collectors or 5, 12, 15 and 24-volt logic-level sources. The input impedance of each input is 22 K ohms. Supplied with Plug-in euroblock connectors.

