

Construction manual

for a measurement adapter (light-to-voltage converter) for oscilloscopes

This construction manual describes a simple and inexpensive method of building an adapter for measuring brightness variations on video screens.

Measuring brightness variations on video screens (in order to determine reaction time or AV delay, for example) requires light-to-voltage conversion with as little delay as possible, in order to achieve a correct representation of the variation on an oscilloscope.

In most cases with these measurements, it is also important for the adapter to have very short switching times.

These requirements led the independent measurements laboratory [AV T.O.P. Messtechnik GmbH](#) to build the measurement adapter described here.

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1 Overview

This construction manual describes a simple and inexpensive method of building an adapter for measuring brightness variations on video screens.

The following factors are important if the adapter is to function correctly:

- fast reaction time
- linear response
- correct wavelength region
- usable output voltages

The independent measurements laboratory AV T.O.P. Messtechnik (www.avtop.com) uses the adapter described here when carrying out measurements on televisions for industry clients and online and print publications.

The document is structured as follows:

- Chapter 2: Necessary components and possible suppliers.
- Chapter 3: Construction of the measurement adapter.

2 List of components

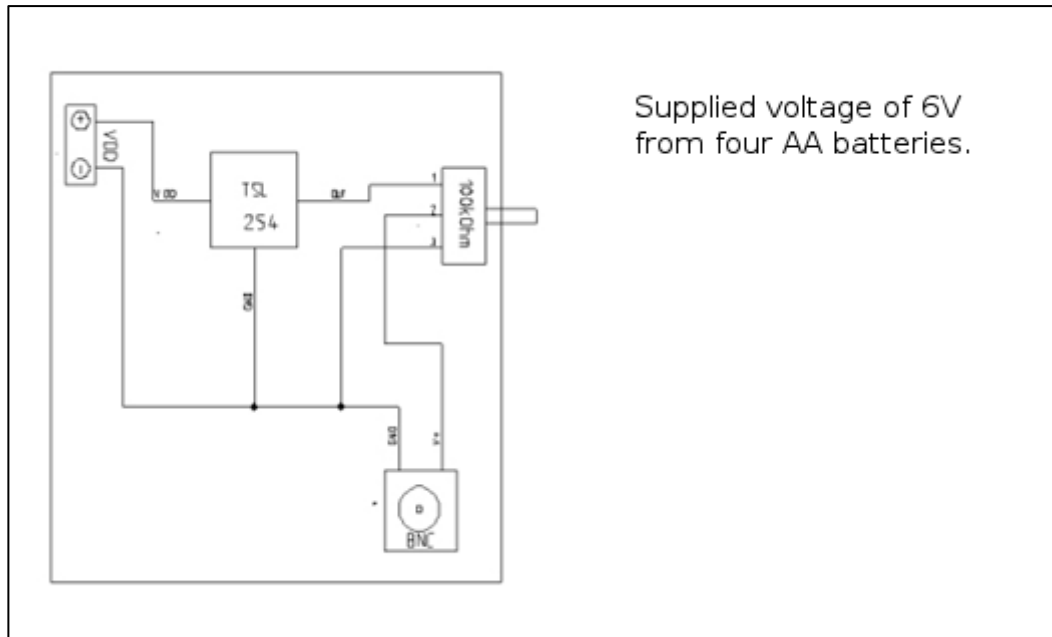
Component:	Description:	Supplier:	Additional information:
TAOS TSL254R	Optical sensor	Getronic GmbH www.getronic.de	Datasheet: www.taosinc.com
Potentiometer 100kΩ	Rotary potentiometer for calibration of the output voltage.	Conrad Elektronik www.conrad.de	Order number: 430897
BNC plug	For connecting to the measuring cable.	Conrad Elektronik www.conrad.de	Order number: 748377
Battery holder	6V power supply	Conrad Elektronik www.conrad.de	Bestellnummer: 615560
Battery clip	Power supply	Conrad Elektronik www.conrad.de	Order number: 624691
Casing		Conrad Elektronik www.conrad.de	Order number: 522244
Felt mat	To protect against scratching	Bauhaus	
Microphone stand	To hold the sensor	Conrad Elektronik www.conrad.de	Order number: 303979
Gooseneck	For mounting the sensor	Conrad Elektronik www.conrad.de	Order number: 301680
Power connector	For power supply	Conrad Elektronik www.conrad.de	Order number: 733946
DC power cable	For power supply	Conrad Elektronik www.conrad.de	Order number: 734183

The construction and the chosen components proved effective, but are only intended as a suggestion, especially since the available of these specific components cannot be guaranteed. Other components are capable of fulfilling the same purpose.

Four AA batteries are the ideal power supply, since mains power supplies or power conditioners can introduce inaccuracies.

3 Construction

3.1 Circuit diagram



3.2 Construction





The back of the adapter holds the power socket and the BNC connection for the oscilloscope. Below these is the attachment for the gooseneck.



Four AA batteries supply the adapter's power.



The adapter connects to the oscilloscope via a standard BNC cable (RG 59). A microphone stand is ideal for positioning the adapter.

4 Literature

- [1] Bauelemente und Grundschaltungen der Mikroelektronik
Frohn Oberthür Siedler Wiemer Tastrow
Pflaum Verlag, 2003
ISBN: 3-7905-0900-0

- [2] Taschenbuch der Elektrotechnik und Elektronik
Lindner Brauer Lehmann
Hanser Publishers, 2007
ISBN: 978-3-446-41458-7

5 Additional information

Our documents are regularly revised and updated. Check for any changes at www.avtop.com.

Please send any comments and suggestions about this construction manual to messtechnik@avtop.de.

About AV T.O.P. Messtechnik GmbH

Operating since 1999 and certified according to ISO 9001:2008, AVTOP is an independent measurements laboratory for consumer electronics. We conduct tests and measurements for publishers and industry clients, as well as assisting in product optimisation. Working together with major manufacturers in the measurements industry, our goal is to drive the field of audio and video measurement technology towards delivering ever more meaningful testing in the consumer-electronics sector.