

J C F A U D I O
TE2

TE2 MANUAL 1.1



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TE2

Safety Information

Do not repair, modify, service this device except in the manner in which it is described in this manual. Doing so can void the warranty.

JCF Audio, LLC accepts no responsibility for legal actions or for direct, incidental, or consequential damages that may result from improper installation, configuration, or use of the TE2.

Overview

The TE2 is a High-Resolution 2 channel Analog to Digital converter for the 500 series format that draws on some of the history of the Latte and some of the history of the AD8.

The unit is a two-slot device and transmits the industry standard AES/EBU protocol through both 500 series outputs or as a dual-wire set at the behest of a jumper setting. The TE2 can derive its sync source from an internal reference at the 3 common multiples of both families of speeds, an AES/EBU input source on the Pin 6 buss, an external AES/EBU signal entering through the rear, USB software control, or optionally an incoming a word clock source. The left-hand side of the unit's AES/EBU output becomes an input in when directed to receive sync from the rear jack. "R" denoting "Rear", not "Right". A simple XLR adapter can be used to do this in the case of XLR connections. Patchbays need none.

PEP processing is standard on the TE2 and can be applied to the conversion result or not. Input data from a pin 6 AES/EBU stream, the external AES/EBU input stream, or the USB return data can be processed in “D/D PEP” mode.

The analog inputs on the TE2 are available in two different forms. Differential (with an operational amplifier of choice) OR both a fully floating transformer input in addition to the differential input. In the “both” model the input style is chosen with jumpers. Both input styles provide isolation and good common-mode rejection figures essential for studio environments. When using the transformer coupled input configuration with the TE2 polarity should not be inverted with unbalanced sources by feeding pin 3. A small amount of high frequency loss will occur.

There are a number of digital input options that are available to get data into PEP for loop processing that are covered in the data graph further into the manual.

0 dBu is referenced to 0.775 vrms for this manual

Front Panel Controls

Level - These level adjustments at the top of both sides of the unit control the sensitivity of the A/D input in 1dB steps. Accompanying these controls are two vernier trimmers accessible through holes in the front panel. The trimmers provide approximately 1dB of adjustment in each direction to center the scale. The 6 step scale covers a sensible range of calibration levels for both transformer and differential input styles. Calibration level details are listed in the **Specifications** section.

Clock - The lower right hand switch selects the clock source of the unit. The selections are the 6 standard pro audio speeds with an internal time-base, clock derived from a bi-phase input on 500 series pin 6, clock derived from a bi-phase input through the left hand side output, clock as prescribed from the driver of the USB connection, or Word Clock/Off (with optional card). If the Word input card is not installed the unit will either output AES with all zeroes for data at 44.1kHz or halt operation completely depending on the setting of J1. It's important to note that this control sets the clock for the TE2 only. It has no bearing on data flow or where it is routed internally. All external sync modes are set-and-forget which means there are no physical adjustments to make when changing speeds.

Data - The lower left hand switch selects the operable data mode for the unit. "A/D" selects for the ADC conversion result passed directly to the available digital output streams. "A/D PEP" selects for the ADC conversion result passed to PEP and then passed to the available digital output streams. "D/D PEP" selects for a digital input stream to be passed to PEP and then back out to at least one digital output as available under the current mode. The data flow graph section details this.

Clip Indicators - This indicates that the ADC conversion block has been over-modulated. Per channel indication with a sensible reset time. Important to note that an over on either channel will restart the reset time for both channels.

Frequency Indication LEDs - These indicate what speed the unit is operating at whether selected from internal time references or external.

SE - This **Sync Error** LED indicates that the sync source selected is invalid and data from the unit is not to be used.

Word Clock Input - This BNC jack (if present) accepts a standard TTL level word clock input. The input is 75 ohm terminated and differential with a high impedance common reference. The input signal is reasonably well-conditioned and doesn't really have a preference of shape or duty cycle. A hole plug is present if the Word Clock module is not installed.

Edge Connections

- Pin 1: Chassis
- Pin 2: Digital Input/Output +
- Pin 3: n/c
- Pin 4: Digital Input/Output -
- Pin 5: Circuit Common
- Pin 6: Digital Input/Output
- Pin 7: n/c
- Pin 8: Analog Input -
- Pin 9: n/c
- Pin 10: Analog Input +
- Pin 11: n/c
- Pin 12: +16v
- Pin 13: Circuit Common
- Pin 14: -16v
- Pin 15: n/c

Specifications

A/D Calibration Range

MIN	MAX
Level fully counterclockwise	Level fully clockwise
+22dBu = 0dBFS	+17dBu = 0dBFS
+4dBu = -18dBFS	+4dBu = -13dBFS

Emphasis is not used in the TE2.

Power Consumption:

< 7 Watts

Input Impedance:

Differential amp input path: 40k(CM)

Transformer input path: ~2k7

THD+N: Differential Amp mode / Internal Reference at stated family

(no measurement filters 1x)

1kHz +4dBu yielding -18dBFS : <= -69 dB (.027%)

1kHz +14dBu yielding -8dBFS : <= -77 dB (.011%)

(no measurement filters 2x)

1kHz +4dBu yielding -18dBFS : <= -68 dB (.031%)

1kHz +14dBu yielding -8dBFS : <= -76 dB (.012%)

(no measurement filters 4x)

1kHz +4dBu yielding -18dBFS : <= -56 dB (.11%)

1kHz +14dBu yielding -8dBFS : <= -66 dB (.04%)

(400Hz and 30k BW lim 1x)

1kHz +4dBu yielding -18dBFS : <= -77 dB (.011%)

1kHz +14dBu yielding -8dBFS : <= -84 dB (.005%)

(400Hz and 30k BW lim 2x)

1kHz +4dBu yielding -18dBFS : <= -73 dB (.017%)

1kHz +14dBu yielding -8dBFS : <= -74 dB (.015%)

(400Hz and 30k BW lim 4x)

1kHz +4dBu yielding -18dBFS : <= -59 dB (.09%)

1kHz +14dBu yielding -8dBFS : <= -69 dB (.03%)

Frequency Response (relative to 0 dB @ 1k):

48kHz : 20Hz -0.1dB
 20kHz -1.4dB

96kHz: 20Hz -0.1dB
 20kHz -0.1dB
 30kHz -0.2dB
 40kHz -1.5dB

192kHz 20Hz -0.1dB
 20kHz -0.1dB
 50kHz -0.2dB
 70kHz -2.2dB

Shipping weight

4 lbs. 11"X 11"X 6"

RESULTS-> CLOCK SW SETTING	AES L	AES OUT R	PIN 6	USB OUT
Internal 44100	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPinput (DW Mono L when output)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPoutput (DW Mono L)	Off*
Internal 48000	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPinput (DW Mono L when output)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPoutput (DW Mono L)	Off*
Internal 88200	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPinput (DW Mono L when output)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPoutput (DW Mono L)	Off*
Internal 96000	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPinput (DW Mono L when output)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPoutput (DW Mono L)	Off*
Internal 176400	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPinput (DW Mono L when output)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPoutput (DW Mono L)	Off*
Internal 192000	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPinput (DW Mono L when output)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPoutput (DW Mono L)	Off*
Ext 6	Output A/D: ADCopt A/DPEP: ADCPEPopt D/DPEP: PEPoutput (DW Mono L)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: SyncIn A/DPEP: SyncIn D/DPEP: Sync in and data to PEP	Off*
ExtR	Input A/D: SyncIn A/DPEP: SyncIn D/DPEP: Syncin and data to PEP	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	Off*

RESULTS-> CLOCK SW SETTING	AES L	AES OUT R	PIN 6	USB OUT
USB	A/D: ADCopt A/DPEP: ADCPEPop D/DPEP: PEPoutput (DW Mono L)	A/D: ADC A/DPEP: ADCPEP D/DPEP: dUSBIn to PEPo (DW Mono R) OR* dUSBIn	Output dUSBIn out to Pin 6	A/D: ADC A/DPEP: ADCPEP D/DPEP: dUSBIn to PEPo (DW Mono R)
WC/0	Off/AESno data 44.1k/ Word: A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPinput (DW Mono L when output)	Off/AESno data 44.1k/ Word: A/D: ADC A/DPEP: ADCPEP D/DPEP: PEPoutput (DW Mono R)	Off/AESno data 48k opt/ Word: A/D: Output AESOutL copy A/DPEP: Output AE- SOutL copy D/DPEP: Input data	Off*

*see Usage and Jumpers section below

Notes:

Using PEP

Two channels of PEP come standard with the TE2. PEP is discussed in detail in the AD8 manual. Users seeking guidance should consult it. Usage is approximately the same although there are only two channels applicable with the TE2. The process and hardware unit are as far as PEP is concerned exactly the same.

Usage

AES/EBU outputs are industry standard and can be attached to many pro devices and consumer interfaces with ease. It's important to note that S/Pdif and AES/EBU, whilst having differing operating levels and characteristic impedances by the book, can be used interchangeably in most situations.

The optical output jack outputs the 2 channel format (not ADAT) and is not guaranteed to operate past 176.4kHz in all conditions due to data rate limitations with the transmitter and plastiTOS. It usually does, though. This jack also outputs the right-channel stream in dual-wire modes despite it being located on the left side of the unit.

The 500 format pin 6 was initially specified for interconnecting two or more modules together usually for exchanging side-chain information in stereo processing. Since most modern racks have the ability to segment the pin 6 buss however the user desires, it is employed here as a generic single connection buss for exchanging digital data and sync information. The USB return stream is output on this buss for easy passage of monitor/output information to the companion LAT D/A converter. Some older racks without this functionality may either have their entire buss tied across the whole rack with or without the ability to user to adjust. If a situation arises where pin 6 cannot be used or is occupied for other reasons, there is an on-board jumper to disconnect the TE2 from buss/pin 6. It is located on the left-hand side card near edge connector pin 6.

The USB operation is disabled if the clock source is not set to USB as configured new. This is for simplicity of operation. If USB output is absolutely needed under other internal or external reference modes, email us for how to do that as it is rather complicated and unfortunately cumbersome. The unit will do a very good job under software control and it's a lot easier to use that way if one is using USB connectivity. Set the driver control control panel to "Internal clock". The USB connection is Class 2.0 compliant so no software is needed on MacOS platforms. Email us about drivers on others.

For the single input version (without input xfmr), the factory-fitted amp can be used or substituted with a DIP or 990-style amp in both the old and new footprints. Sockets such as Mill-Max 0344-2-19-15-34-27-10-0 can be used if desired. If an external amp or sockets are installed, the transformer cannot then be because of space considerations. If an external amp is to be used, one must open the 4 solder bridges connecting the on-board amp on the rear of each card. We are always available by email to help.

Jumper Controls

J0 - J4 are accessible from the bottom edge of the unit on the left-hand side card.

J0 - Left position - Stereo mode (default).

J0 - Right position - Mono mode.

J1 - Left position - If no word option installed, output 44.1k blank data (default).

J1 - Right position - If no word option installed, halt operation.

J2 - Left position - USB mode R AES output set - normal operation (default).

J2 - Right position - USB mode R AES output set - output USB return directly.

J3 - Left position - Future expansion.

J3 - Right position - Future expansion.

Feature list

- Low group delay without PEP engaged
- Highly configurable clocking
- Sleek Dual 500 slot design
- Two different input styles
- ~7W consumption
- PEP processing standard
- 2 Year Limited Warranty

FCC Compliance:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Warranty

JCF Audio 2-Year Limited Warranty

JCF Audio LLC. "JCF Audio" warrants this product to be free of defects in material and assembly for a period of two years for parts and labor from the date of original purchase. This warranty is enforceable only by the original retail purchaser and cannot be transferred or assigned without express permission of JCF Audio.

During the warranty period JCF Audio shall, at its exclusive option, either repair or replace free of charge any product that proves to be defective on inspection by JCF Audio or its authorized service representative. In all cases disputes concerning this warranty shall be resolved as prescribed by law. To obtain warranty service, the purchaser must contact JCF Audio to obtain instructions where to send the unit for service. All authorized returns must be sent to JCF Audio or an authorized JCF Audio repair facility postage prepaid, insured and properly packaged. This warranty does not cover claims for damage due to abuse, neglect, modification or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.

Proof of purchase must be verified in the form of a bill of sale or some other positive proof that the product is within the warranty period upon JCF Audio's request.

JCF Audio reserves the right to update any unit returned for repair. JCF Audio reserves the right to change or improve design of the product at any time without prior notice.

Any implied warranties including implied warranties of merchantability and fitness for a particular purpose are limited in duration to the length of this limited warranty. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

JCF Audio will not be liable for incidental, consequential, indirect or other damages resulting from the breach of any express or implied warranty, including damage to property, damage based on inconvenience, downtime, loss of personal property, and to the extent permitted by law, damages for personal injury or death.

Some states do allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

This warranty only applies to products sold in the United States of America. The terms of this warranty shall only apply within the country of sale. Without limiting the foregoing, repairs

under this warranty shall be made only by a duly authorized JCF Audio service representative or by JCF Audio itself. For warranty information in other countries, please refer to the dealer or distributor.