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DTS Timecode Preamplifier
Model E376

Installation and Operation Manual

October 25, 2001
(Manual P/N 9301E37600A)

www.dtsonline.com

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DTS Timecode Preamplifier
Model E376

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INTRODUCTION

The E376 is an accessory to the DTS system and is designed to optimize the readability of DTS timecode that is not recorded in the standard manner. Typically, DTS timecode is recorded with a DTS exposure head and printed on either 35mm or 70mm film. These tracks are easily read with the standard DTS timecode reader head (TCRH). However, when DTS timecode is recorded on videotape or any other media, there is potential for readability problems such a loss of low frequency or incorrect level. The E376 is able to optimize any DTS timecode source for flawless playback in a DTS digital system when the use of a DTS timecode reader is impractical.

DTS 16MM

When using the DTS system with 16mm film, the standard optical sound track is not printed on the film. Instead, DTS timecode is printed in the optical sound track area and read by the projector's standard optical head. Just like DTS 35mm film, the soundtrack is contained on DTS CD-ROMs and played on a DTS player. For DTS 16mm film, the E376 is standard equipment and is designed to be a permanent install. The E376 allows you to change between standard 16mm optical and DTS digital playback.

Generally, the audio output of the projector is sent directly to the cinema processor for distribution in the auditorium. The E376 is installed between the projector's sound optics and the DTS player. For DTS playback, the E376 is switched into the Active Mode. This mode "conditions" the timecode from the 16mm optical sound head and routes it to the DTS player. "Conditioning" of the timecode includes adding a low frequency boost, if needed, and ensuring an output of 4-volts peak to peak. When the E376 is switched into the Bypass Mode, the standard optical signal is routed directly to the cinema processor without any loading on the audio line.

SPECIFICATIONS

J1 and J2 source inputs are typically from the projector's sound head at either cell or line level. There are dedicated connectors for up to two projectors (or sources). JP2 & JP3 jumpers on the E326 board must be set for the input level ("CELL IN" or "LINE IN").

- Cell input is from 7mV to 200mV RMS.
- Line level input is from 240mV RMS to 7.74V RMS

Power input is 5V DC and comes in at J4 when connected to the DTS digital player's TIMECODE connector(s). Pin-outs for the timecode cable is shown on D477 (page 14).

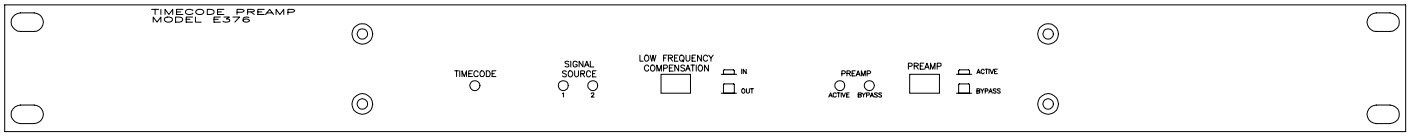
J1 and J2 signal outputs are typically connected to the cinema processor. When in "BYPASS" the J1 & J2 source inputs are routed directly to this output. When "ACTIVE", there is no output at these connectors (to ensure that timecode signal is not heard in the auditorium).

Timecode signal output connects to the timecode input of the DTS player. When in "BYPASS", the TCRH input(s) is sent directly to this output. When "ACTIVE", the conditioned timecode signal from J1 & J2 is sent to the DTS player.

Physical Dimensions

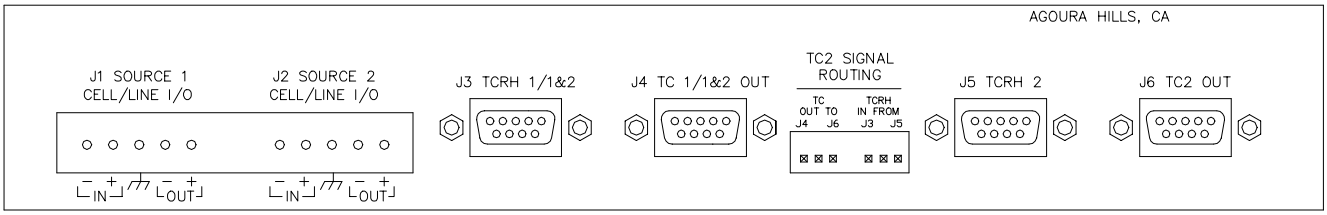
- Height: 1.75" = one rack unit (4.45cm)
- Depth: 6" (15.24cm)
- Width: 19" (48.26cm) rack mount
- Weight: 1.70 Lbs. (0.77kg)

FRONT PANEL



TIMECODE	Illuminates green when good timecode is detected.
SIGNAL SOURCE 1 - 2	Illuminates yellow when timecode signal is detected and displays which projector is delivering the signal.
LOW FREQUENCY COMPENSATION	Push-button switch. • Press "IN" when a low frequency boost is required to read timecode • Press "OUT" when a boost is not needed to read good timecode The use of this switch greatly depends on the frequency range of the output signal from optical sound preamplifier (if used). If the signal is rolled off below 200Hz, a low frequency boost is required for good timecode to be read.
PREAMP (L.E.D.S)	"ACTIVE" illuminates blue when the E376 preamplifier is active. "BYPASS" illuminates green when the E376 preamplifier is bypassed.
PREAMP (switch)	Push-button switch. • Press in to select "ACTIVE". Activates the E376 preamplifier and the input signal(s) from J1 & J2 are "conditioned" and sent to the TC out connector(s). • Press out to select "BYPASS". When in Bypass mode, the input signals are connected directly to the J1 & J2 outputs.

REAR PANEL



CELL/LINE I/O (J1 & J2)

These **in/out** terminals provide a balanced input connector for DTS timecode sources. They also provide loop through output to a cinema processor or mixing board. JP2 & JP3 jumpers on the E326 board must be set for the correct input level ("CELL IN" or "LINE IN").

- Cell input is from 7mV to 200mV RMS.
- Line level input is from 240mV RMS to 7.74V RMS

TCRH 1/1&2 (J3)

This **input** is dedicated to DTS timecode reader heads, which are installed on 35mm & 70mm film projectors. When two projectors are being used for change-overs, a "Y" cable must be used to feed both signals to this input. When the E326 is in "BYPASS", this signal is routed directly to the DTS player via the TC1/1&2 OUT.

TC 1/1&2 OUT (J4)

This **output** connects directly to a DTS player when using (1) a single projector **-or-** (1&2) two projectors using a timecode "Y" cable. When two projectors (change-over) are being used with DTS-6/-6D players, Proj1 TC IN must be on pin 1 and Proj2 TC IN must be on pin 2 of the player's "TIMECODE" connector.

TCRH 2 (J5)

This **input** is dedicated to DTS timecode at a second projector when <u>not</u> using a "Y" cable. It allows the timecode signal from the reader to pass through the E376 to the DTS-6AD when the "PREAMP" switch is set to "BYPASS".

TC2 OUT (J6)

This **output** is dedicated to DTS timecode at a second projector and connects directly to a DTS-6AD "PROJ 2 TC" input. It is used when each projector has it's own dedicated timecode reader and cable – <u>the DTS "Y" cable cannot be used</u>. The DTS-6AD needs to see TC for Proj2 on pin 1 of "PROJ 2 TC" connector and TC for Proj1 on pin 1 of "PROJ 1 TC" connector.

<u>"TC2 SIGNAL ROUNTING" jumper selections</u>

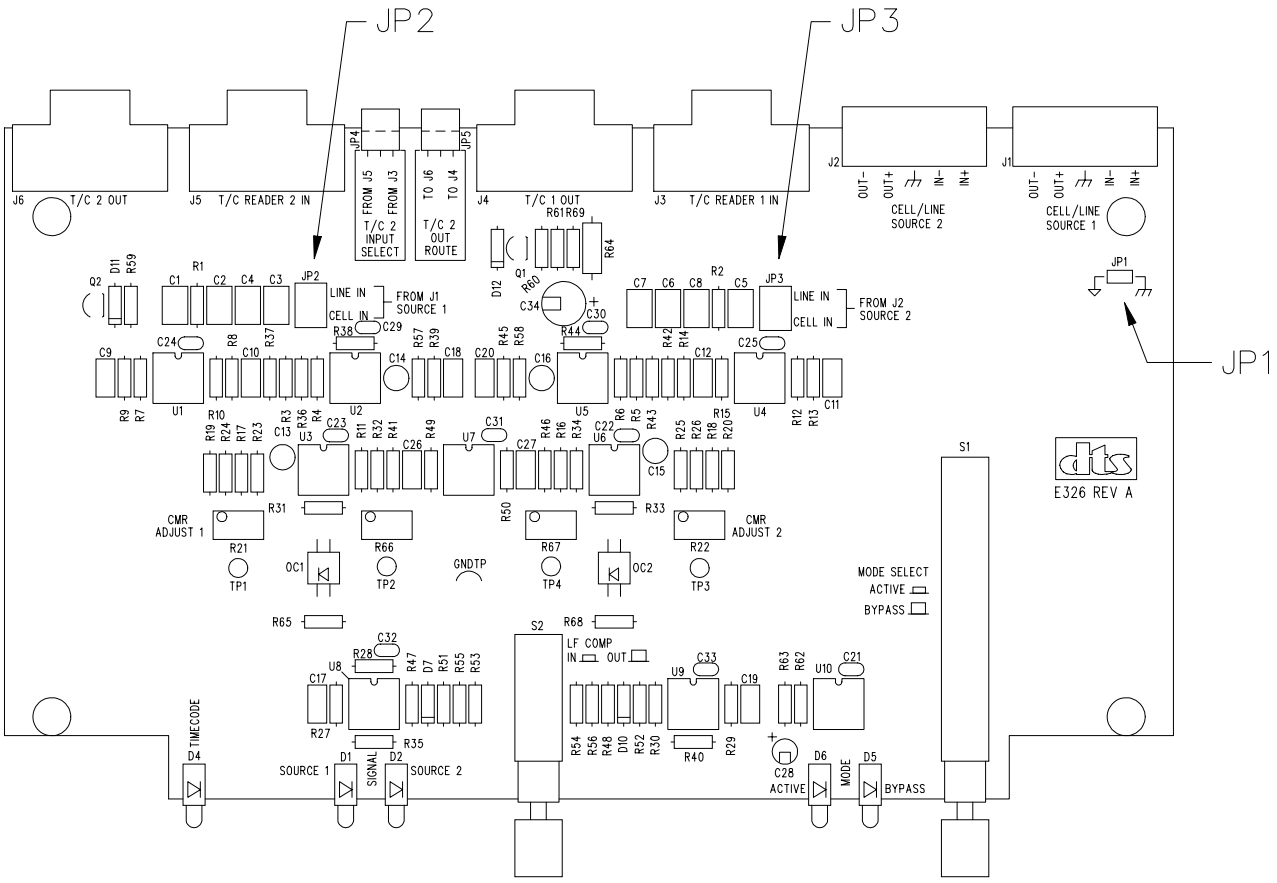
<u>"TC OUT TO"</u>

"J4"	Routes Proj2 source signal to DTS-6/-6D player "TIMECODE" input on pin 2
"J6"	Routes Proj2 source signal to DTS-6AD "PROJ 2 TC" input on pin 1

<u>"TCRH IN FROM"</u>

"J3"	Takes TCRH #2 input signal at J3 (from timecode "Y" cable) on pin 2 (for DTS-6/-6D)
"J5"	Takes TCRH #2 input at J5 (from single timecode cable) on pin 1 (for DTS-6AD)

(Internal) CIRCUIT BOARD, E326



Internal Jumpers

JP1 Used to tie power ground and chassis ground together. The jumper is normally connected.

JP2 This jumper needs to be set by the installer to match the timecode signal input level of J1. Choices are "LINE IN" or "CELL IN". See SPECIFICATIONS for details.

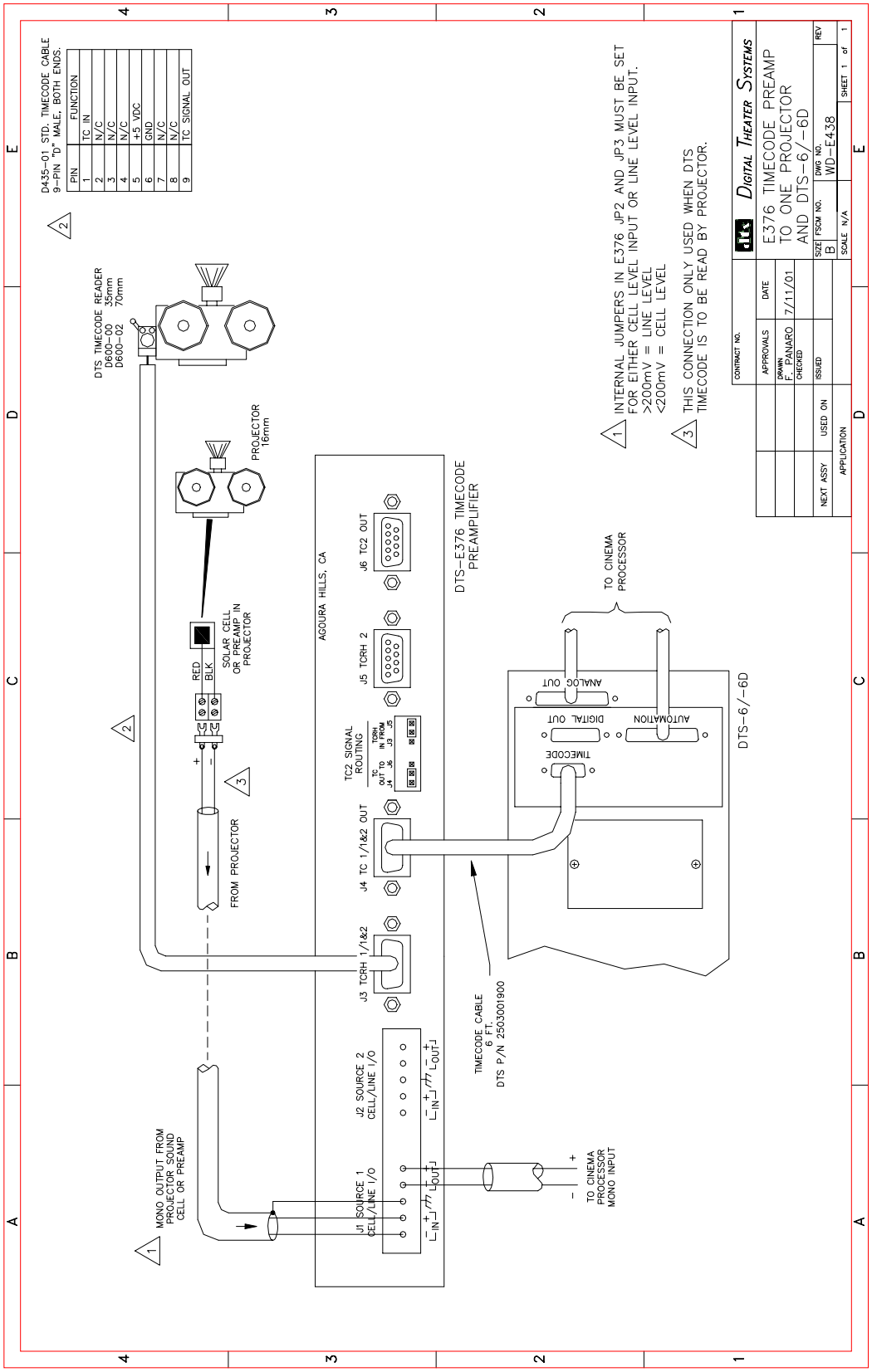
JP3 This jumper needs to be set by the installer to match the timecode signal input level of J2. Choices are "LINE IN" or "CELL IN". See SPECIFICATIONS for details.

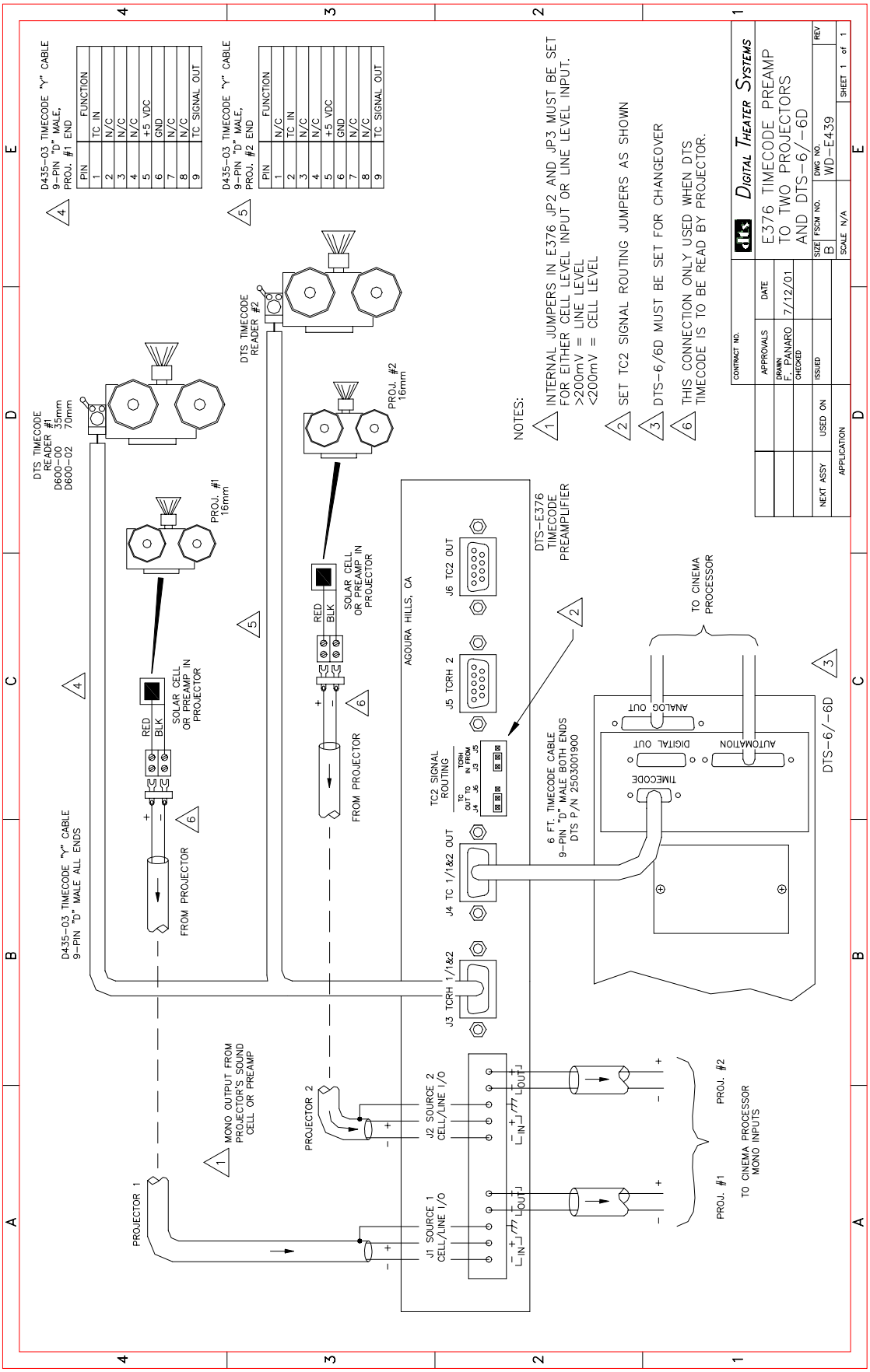
INSTALLATION PROCEDURE

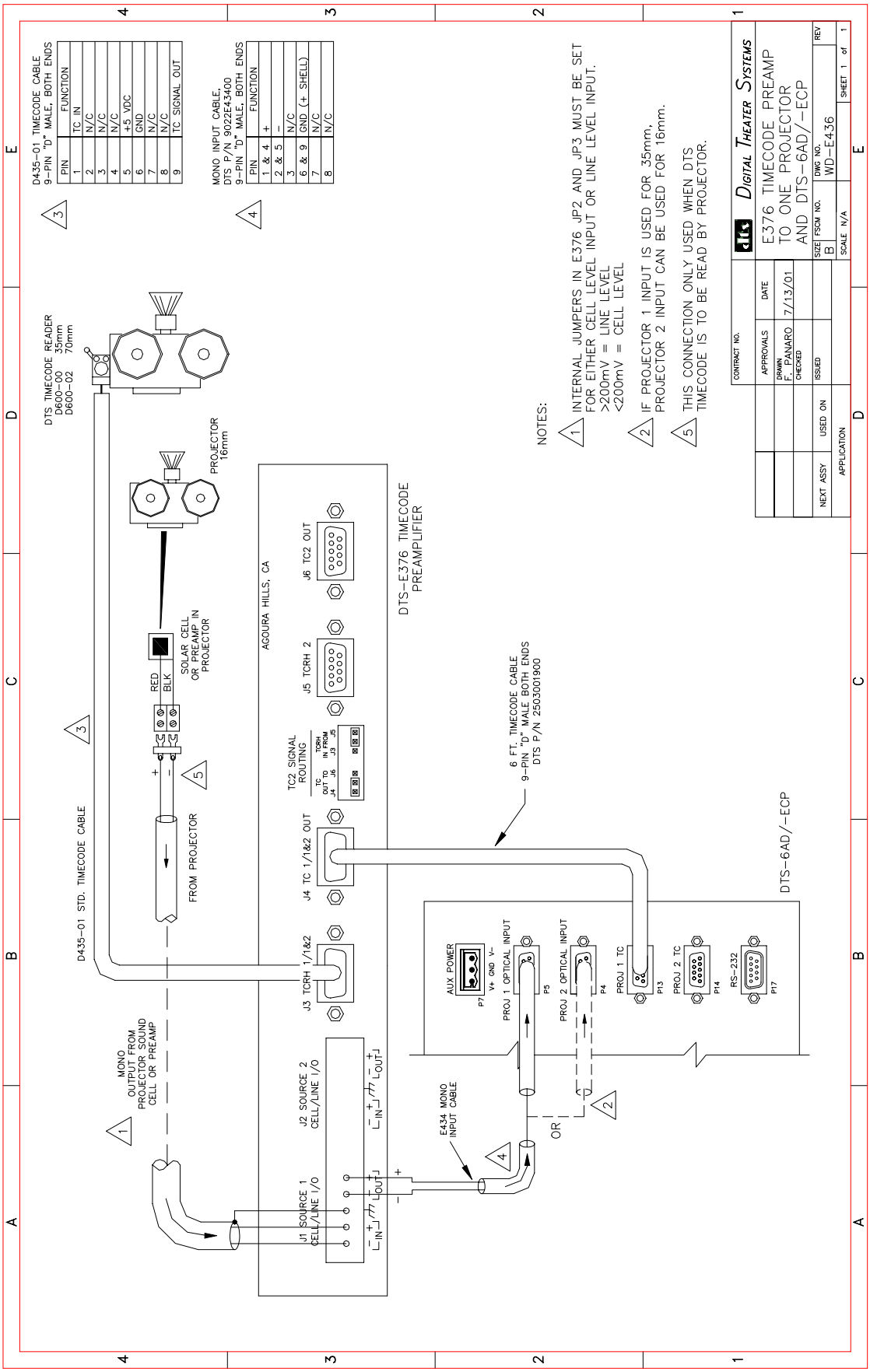
Use the installation procedure that matches the existing projection and sound equipment. It is assumed that a six-channel cinema processor, speakers, amplifiers, and a DTS digital player are part of the cinema sound system.

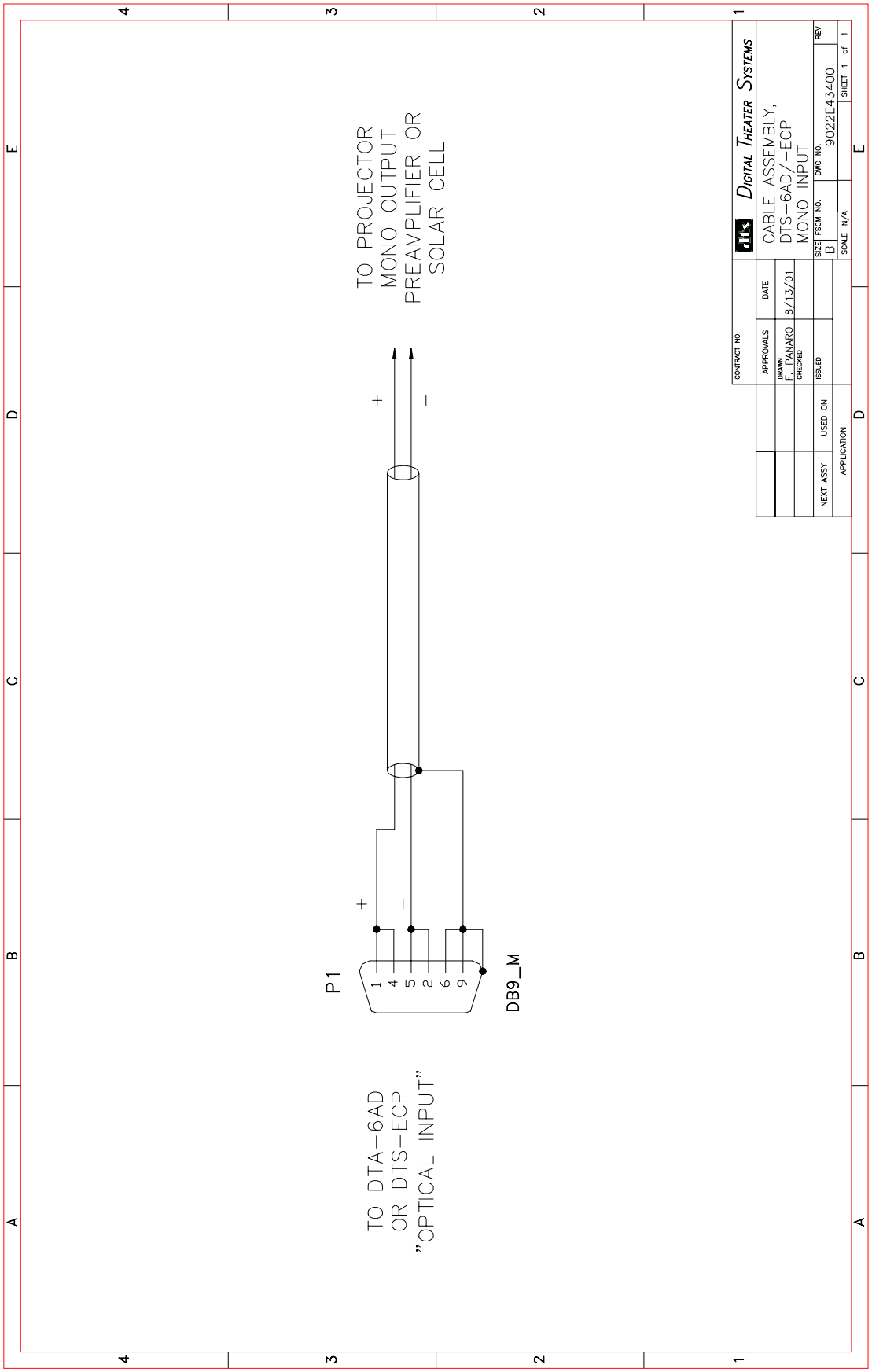
1. Set internal jumpers on E326 board, JP2 & JP3. You must first determine the input lvel of the DTS timecode audio on J1/J2:
   - A "**cell level**" output is from 7mV to 200mV RMS. For cell level, set the internal jumpers at JP2 & JP3 to "Cell In".
   - A "**line level**" output is from 240mV to 7.74V RMS. For line level, set the internal jumpers at JP3 & JP4 to "Line In".
2. Mount the E376 in the sound rack. Keep within 6 feet of the DTS player.
3. Connect the timecode source to J1/J2 inputs. If the timecode source is a 16mm projector and the sound head is already connected to a cinema processor, it is necessary to break this connection.
   - Observing polarity, connect the audio/optical lines from the projector to the E376 J1 input connections**:** "CELL/LINE I/O (1)" at "IN +" and "IN-".
   - Matching the input polarity, connect the audio/optical lines from the cinema processor to the E376 J1 output connections**:** "CELL/LINE I/O (1)" at "OUT +" and "OUT –".
   - Repeat I/O connections on J2 if a second projector is used.
4. Disconnect the existing timecode cable from rear of the DTS player and instead**:**
   - For the DTS-6/-6D, connect TCRH cable (single or "Y") to E376 J3, "TCRH 1/1&2" connector.
   - For the DTS-6AD, connect Proj1 TCRH cable to E376 J3, "TCRH 1/1&2" connector. If a second projector is used, connect it's TCRH cable to E376 J5 connector.
5. Connect the timecode out cables supplied with the E376**:**
   - For the DTS-6 or DTS-6D, connect cable from player's TIMECODE connector to E376 J4, "TC 1/1&2 OUT" connector.
   - For the DTS-6AD, connect cable from player's "PROJ 1 TC" to E376 J3, "TCRH 1/1&2" connector. If a second projector is used, connect the second cable from player's "PROJ 2 TC" to E376 J6 "TC 2 OUT" connector.
6. Set the E376 rear panel "TC2 SIGNAL ROUTING" jumpers**:**
   - For the DTS-6/-6D, set "TC OUT TO" for middle pin and "J4", and set "TC IN FROM" for middle pin and "J3".
   - For the DTS-6AD, set "TC OUT TO" for middle pin and "J6", and set "TC IN FROM" for middle pin and "J5".
7. If this is a new DTS installation and two projectors are used with the DTS-6/-6D, verify the payer is programmed for "change-over" operation. See player manual.

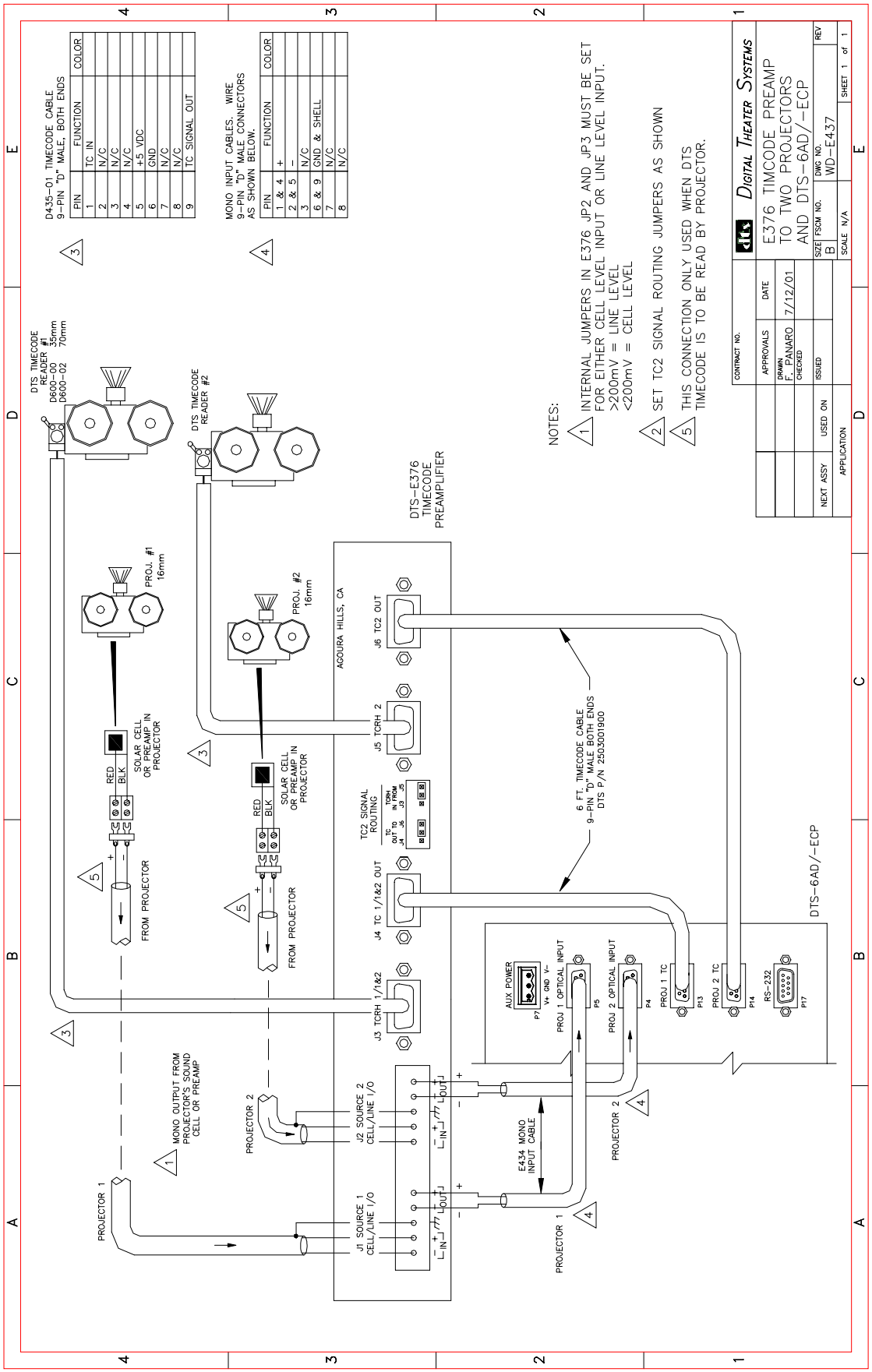
INSTALLATION DIAGRAMS

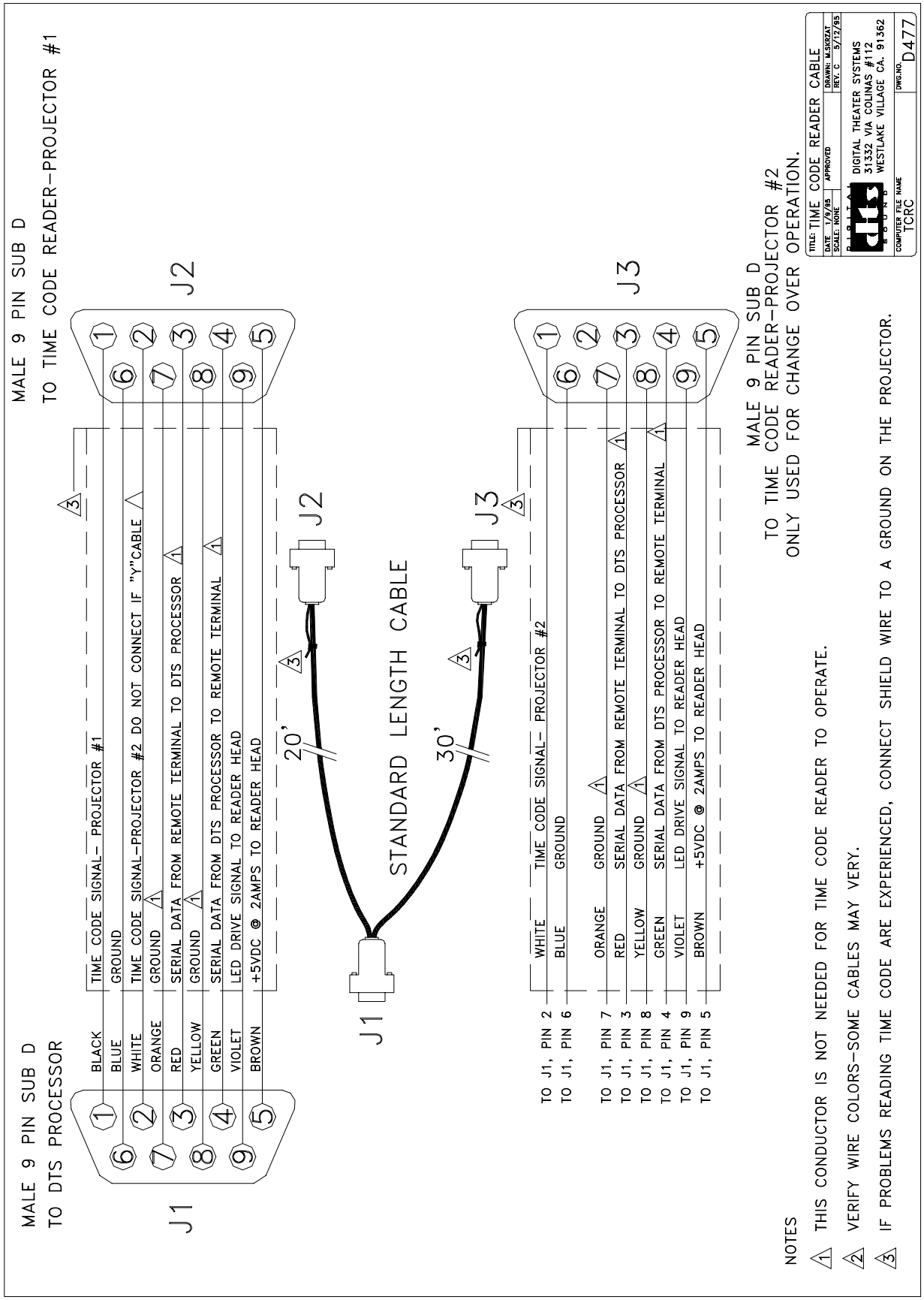



D435-03 TIMECODE "Y" CABLE
9-PIN "D" MALE,
PROJ. #1 END
PIN FUNCTION
1 TC IN
2 N/C
3 N/C
4 N/C
5 +5 VDC
6 GND
7 N/C
8 N/C
9 TC SIGNAL OUT
D435-03 TIMECODE "Y" CABLE
9-PIN "D" MALE,
PROJ. #2 END
PIN FUNCTION
1 N/C
2 TC IN
3 N/C
4 N/C
5 +5 VDC
6 GND
7 N/C
8 N/C
9 TC SIGNAL OUT
NOTES:
1 INTERNAL JUMPERS IN E376 JP2 AND JP3 MUST BE SET FOR EITHER CELL LEVEL INPUT OR LINE LEVEL INPUT.
>200mV = LINE LEVEL
<200mV = CELL LEVEL
2 SET TC2 SIGNAL ROUTING JUMPERS AS SHOWN
3 DTS-6/6D MUST BE SET FOR CHANGEOVER
6 THIS CONNECTION ONLY USED WHEN DTS TIMECODE IS TO BE READ BY PROJECTOR.
DTS TIMECODE READER #1 D600-00 35mm D600-02 70mm
DTS TIMECODE READER #2
PROJ. #1 16mm
PROJ. #2 16mm
SOLAR CELL OR PREAMP IN PROJECTOR
RED
BLK
FROM PROJECTOR
D435-03 TIMECODE "Y" CABLE 9-PIN "D" MALE ALL ENDS
AGOURA HILLS, CA
DTS-E376 TIMECODE PREAMPLIFIER
J1 SOURCE 1 CELL/LINE I/O
J2 SOURCE 2 CELL/LINE I/O
J3 TCRH 1/1&2
J4 TC 1/1&2 OUT
J5 TCRH 2
J6 TC2 OUT
TC2 SIGNAL ROUTING
TO CINEMA PROCESSOR
6 FT. TIMECODE CABLE 9-PIN "D" MALE BOTH ENDS DTS P/N 2503001900
TIMECODE
AUTOMATION
DIGITAL OUT
ANALOG OUT
DTS-6/-6D
PROJECTOR 1
PROJECTOR 2
MONO OUTPUT FROM PROJECTOR'S SOUND CELL OR PREAMP
TO CINEMA PROCESSOR MONO INPUTS
PROJ. #1
PROJ. #2
CONTRACT NO.
APPROVALS DATE
DRAWN F. PANARO 7/12/01
CHECKED
ISSUED
USED ON
NEXT ASSY
APPLICATION
DIGITAL THEATER SYSTEMS
E376 TIMECODE PREAMP TO TWO PROJECTORS AND DTS-6/-6D
SIZE B
FSCM NO.
DWG NO. WD-E439
REV
SCALE N/A
SHEET 1 of 1


D435-01 TIMECODE CABLE
9-PIN "D" MALE, BOTH ENDS
PIN | FUNCTION
1 | TC IN
2 | N/C
3 | N/C
4 | N/C
5 | +5 VDC
6 | GND
7 | N/C
8 | N/C
9 | TC SIGNAL OUT
MONO INPUT CABLE,
DTS P/N 9022E43400
9-PIN "D" MALE, BOTH ENDS
PIN | FUNCTION
1 & 4 | +
2 & 5 | –
3 | N/C
6 & 9 | GND (+ SHELL)
7 | N/C
8 | N/C
NOTES:
1 INTERNAL JUMPERS IN E376 JP2 AND JP3 MUST BE SET FOR EITHER CELL LEVEL INPUT OR LINE LEVEL INPUT.
>200mV = LINE LEVEL
<200mV = CELL LEVEL
2 IF PROJECTOR 1 INPUT IS USED FOR 35mm, PROJECTOR 2 INPUT CAN BE USED FOR 16mm.
5 THIS CONNECTION ONLY USED WHEN DTS TIMECODE IS TO BE READ BY PROJECTOR.
DTS TIMECODE READER
D600-00 35mm
D600-02 70mm
PROJECTOR 16mm
SOLAR CELL OR PREAMP IN PROJECTOR
RED
BLK
FROM PROJECTOR
D435-01 STD. TIMECODE CABLE
AGOURA HILLS, CA
DTS-E376 TIMECODE PREAMPLIFIER
J1 SOURCE 1 CELL/LINE I/O
J2 SOURCE 2 CELL/LINE I/O
J3 TCRH 1/1&2
J4 TC 1/1&2 OUT
J5 TCRH 2
J6 TC2 OUT
TC2 SIGNAL ROUTING
TC OUT TO J4 J6
TCRH IN FROM J3 J5
6 FT. TIMECODE CABLE
9-PIN "D" MALE BOTH ENDS
DTS P/N 2503001900
AUX POWER
P7
V+ GND V-
PROJ 1 OPTICAL INPUT
P5
PROJ 2 OPTICAL INPUT
P4
PROJ 1 TC
P13
PROJ 2 TC
P14
RS-232
P17
DTS-6AD/-ECP
E434 MONO INPUT CABLE
OR
MONO OUTPUT FROM PROJECTOR SOUND CELL OR PREAMP
DIGITAL THEATER SYSTEMS
E376 TIMECODE PREAMP TO ONE PROJECTOR AND DTS-6AD/-ECP
CONTRACT NO.
APPROVALS
DRAWN F. PANARO
CHECKED
ISSUED
DATE 7/13/01
NEXT ASSY
USED ON
APPLICATION
SIZE B
FSCM NO.
DWG NO. WD-E436
REV
SCALE N/A
SHEET 1 of 1


TO PROJECTOR
MONO OUTPUT
PREAMPLIFIER OR
SOLAR CELL
+
–
P1
1
4
5
2
6
9
DB9_M
TO DTA-6AD
OR DTS-ECP
"OPTICAL INPUT"
Digital Theater Systems
CABLE ASSEMBLY,
DTS-6AD/-ECP
MONO INPUT
CONTRACT NO.
APPROVALS
DATE
DRAWN
F. PANARO
8/13/01
CHECKED
ISSUED
NEXT ASSY
USED ON
APPLICATION
SIZE
B
FSCM NO.
DWG NO.
9022E43400
REV
SCALE N/A
SHEET 1 of 1


D435-01 TIMECODE CABLE
9-PIN "D" MALE, BOTH ENDS
PIN FUNCTION COLOR
1 TC IN
2 N/C
3 N/C
4 N/C
5 +5 VDC
6 GND
7 N/C
8 N/C
9 TC SIGNAL OUT
MONO INPUT CABLES. WIRE 9-PIN "D" MALE CONNECTORS AS SHOWN BELOW.
PIN FUNCTION COLOR
1 & 4 +
2 & 5 -
3 N/C
6 & 9 GND & SHELL
7 N/C
8 N/C
NOTES:
1 INTERNAL JUMPERS IN E376 JP2 AND JP3 MUST BE SET FOR EITHER CELL LEVEL INPUT OR LINE LEVEL INPUT. >200mV = LINE LEVEL <200mV = CELL LEVEL
2 SET TC2 SIGNAL ROUTING JUMPERS AS SHOWN
5 THIS CONNECTION ONLY USED WHEN DTS TIMECODE IS TO BE READ BY PROJECTOR.
DTS TIMECODE READER #1 D600-00 D600-02 35mm 70mm
DTS TIMECODE READER #2
PROJ. #1 16mm
PROJ. #2 16mm
SOLAR CELL OR PREAMP IN PROJECTOR
RED BLK
FROM PROJECTOR
DTS-E376 TIMECODE PREAMPLIFIER
AGOURA HILLS, CA
J1 SOURCE 1 CELL/LINE I/O
J2 SOURCE 2 CELL/LINE I/O
J3 TCRH 1/1&2
J4 TC 1/1&2 OUT
J5 TCRH 2
J6 TC2 OUT
TC2 SIGNAL ROUTING
AUX POWER
V+ GND V-
PROJ 1 OPTICAL INPUT
PROJ 2 OPTICAL INPUT
PROJ 1 TC
PROJ 2 TC
RS-232
6 FT. TIMECODE CABLE 9-PIN "D" MALE BOTH ENDS DTS P/N 2503001900
E434 MONO INPUT CABLE
MONO OUTPUT FROM PROJECTOR'S SOUND CELL OR PREAMP
PROJECTOR 1
PROJECTOR 2
DTS-6AD/-ECP
CONTRACT NO.
APPROVALS DATE
DRAWN E. PANARO 7/12/01
CHECKED
ISSUED
NEXT ASSY USED ON
APPLICATION
DIGITAL THEATER SYSTEMS
E376 TIMCODE PREAMP TO TWO PROJECTORS AND DTS-6AD/-ECP
SIZE B FSCM NO. DWG NO. WD-E437 REV
SCALE N/A SHEET 1 of 1


MALE 9 PIN SUB D
TO DTS PROCESSOR
J1
J2
BLACK TIME CODE SIGNAL- PROJECTOR #1
BLUE GROUND
WHITE TIME CODE SIGNAL-PROJECTOR #2 DO NOT CONNECT IF "Y"CABLE
ORANGE GROUND
RED SERIAL DATA FROM REMOTE TERMINAL TO DTS PROCESSOR
YELLOW GROUND
GREEN SERIAL DATA FROM DTS PROCESSOR TO REMOTE TERMINAL
VIOLET LED DRIVE SIGNAL TO READER HEAD
BROWN +5VDC @ 2AMPS TO READER HEAD
MALE 9 PIN SUB D
TO TIME CODE READER-PROJECTOR #1
20'
STANDARD LENGTH CABLE
30'
J2
J3
WHITE TIME CODE SIGNAL- PROJECTOR #2
BLUE GROUND
ORANGE GROUND
RED SERIAL DATA FROM REMOTE TERMINAL TO DTS PROCESSOR
YELLOW GROUND
GREEN SERIAL DATA FROM DTS PROCESSOR TO REMOTE TERMINAL
VIOLET LED DRIVE SIGNAL TO READER HEAD
BROWN +5VDC @ 2AMPS TO READER HEAD
TO J1, PIN 2
TO J1, PIN 6
TO J1, PIN 7
TO J1, PIN 3
TO J1, PIN 8
TO J1, PIN 4
TO J1, PIN 9
TO J1, PIN 5
MALE 9 PIN SUB D
TO TIME CODE READER-PROJECTOR #2
ONLY USED FOR CHANGE OVER OPERATION.
NOTES
1 THIS CONDUCTOR IS NOT NEEDED FOR TIME CODE READER TO OPERATE.
2 VERIFY WIRE COLORS-SOME CABLES MAY VERY.
3 IF PROBLEMS READING TIME CODE ARE EXPERIENCED, CONNECT SHIELD WIRE TO A GROUND ON THE PROJECTOR.
TITLE: TIME CODE READER CABLE
DATE 1/9/95 APPROVED DRAWN: M.SKRZAT
SCALE: NONE REV: C 5/12/95
DIGITAL THEATER SYSTEMS
31332 VIA COLINAS #112
WESTLAKE VILLAGE CA. 91362
COMPUTER FILE NAME TCRC
DWG.NO. D477

SYSTEM TEST

This assumes that the cinema processor and DTS player have been correctly calibrated.

1. Use the installation diagram (pages 7-12) that matches the equipment required for the installation. Verify the E376 is properly installed and that the internal JP2 & JP3 jumpers are correctly set (page 2, "J1/J2 INPUTS").

2. If two-projectors are used, verify "TC2 SIGNAL ROUTING" rear panel jumpers are correctly set. See Table page 5.

3. Power on the sound rack. Verify the cinema processor, speaker amplifiers, DTS player are all powered. Verify one of the E376 front panel "PREAMP" lights are illuminated. The E376 gets it's power (5 volts DC) from the DTS player (timecode connector).

4. Set the E376 "PREAMP" switch to "ACTIVE". The "ACTIVE" blue light should be illuminated.

5. Set "LOW FREQUENCY COMPESTATION" switch to "OFF".

6. Cue the DTS timecode source machine. If using DTS 16mm film, thread the projector. The film must have DTS timecode where the optical (analog sound) track normally resides.

7. Load the matching discs into the DTS player. Wait for the DTS player to fully boot up (the player's SYSTEM light will flash)

8. Run the timecode source machine or start film. While the E376 is in the Active mode, timecode is being read at J1/J2. If the "TIMECODE" light does not illuminate, switch "ON" the "LOW FREQUENCY COMPESTATION". Leave the switch in this position if the "TIMECODE" light stays on.
   - The DTS player's "TIMECODE" light should illuminate. The DTS player should be automatically playing the DTS digital sound track (on discs) and the cinema processor should have automatically pulsed to the DTS digital format.

9. Verify the E376 "SOURCE SIGNAL" yellow light illuminates to indicate sufficient signal level.

10. The DTS player should be playing the disc(s) and the DTS digital sound track should be heard playing in the auditorium.

11. If there are two timecode sources (change-over), repeat test for the second source.

12. Put the E376 in Bypass Mode and perform the following tests:
    - If the loop through is used at J1/J2 inputs, run the timecode source machine wired to J1/J2 inputs. Preferably, with an audio track instead of timecode, to confirm the signal is being looped.
    - Next, run the 35mm or 70mm projector with standard timecode and confirm that the timecode light on the DTS player comes on.

13. When playing the standard 16mm, 35mm, or 70mm format, make certain the E376 is in the Bypass Mode.

OPERATION

When playing the standard 35mm or 70mm DTS format, make certain the E376 is in the Bypass Mode. This allows the existing DTS timecode reader(s) to connect to the DTS player. Also, for 16mm applications, allows the standard optical track to pass through the E376 without any loading on the line.

When using the E376 preamplifier to read timecode from a source other than standard DTS readers, set the "PREAMP" switch to "ACTIVE". This switches the E376 in circuit and routes J1 & J2 inputs to the DTS player.

Be sure to leave the "LOW FREQUENCY COMPENSTATION" switch in the position selected during installation. It is used when the timecode input on J1/J2 rolls off the low frequencies.

TROUBLESHOOTING

No lights on E376

- Verify the DTS player is powered. Use a volt meter to verify +5V DC on pin 5 (ground is pin 6) on the TIMECODE cable from the DTS player.
- Verify the timecode cable wires are not shorted or broken.

E376 "TIMECODE" light does not illuminate

- Verify the E376 "PREAMP" switch is set for "ACTIVE" and the blue "ACTIVE" light is illuminated.
- Verify DTS timecode is on the J1/J2 inputs. For 16mm, visually inspect the film for timecode. (DTS 16mm formatted film has the timecode track placed where the mono track normally resides).
- Verify all timecode connections.
- If the E376 is in the Active mode, try switching the "LOW FREQUECNY COMPENSTATION" switch.

DTS player will not play DTS digital sound track.

- If running film with DTS timecode located where the optical sound track normally resides, verify the E376 "PREAMP" switch is in the Active mode.
- If running standard 35mm (with optical sound and DTS timecode tracks) verify film is threaded through the DTS reader(s) and that the E376 is in the Bypass mode.
- Be sure the show discs are loaded into the DTS player and the player is fully booted up.
- If the "TIMECODE" lights are blinking, see Appendix A (page 18) for troubleshooting help.

Second projector isn't working

- If no 16mm optical sound, verify wiring of the second projector at J2. E376 must be in Bypass Mode.
- If no timecode, verify the DTS-6/-6D is set for change-over. Verify E376 "TC2" jumper settings.

No 16mm optical sound

- Verify the E376 "PREAMP" switch is set for "BYPASS" and the "BYPASS" light is illuminated.
- Verify the optical/cell wiring is correct and all wires are intact. See installation diagrams, pages 7-12.
- Verify the (projector's) exciter lamp is powered.

DTS TECHNICAL SUPPORT

TELEPHONE: (800) 959-4109 *or* (818) 706-3525 **FAX:** (818) 879-2746
DTS engineers are available to assist you. If an emergency occurs after business hours, please leave a message with the answering service. Your call will be returned as soon as possible.

INTERNET users may email DTS Technical Support at: `cinematech@dtsonline.com`

DTS Web Site `http://www.dtsonline.com`

REPLACEMENT PARTS LIST

For single projector or DTS-6AD

9-pin male D-conn. both ends

2503 0019 00	6 ft. Timecode Cable
D435-01	30 ft. Timecode Cable *standard*
D435-02	40 ft. Timecode Cable
D435-05	45 ft. Timecode Cable
D435-06	60 ft. Timecode Cable

9-pin male D-conn. to bare wires

E434	Mono Input Cable for DTS-6AD (*one cable per projector)*

For dual projectors and DTS-6 or DTS-6D

9-pin male D-conn. all ends

D435-08	Timecode Y Cable, 20ft. / 30ft. *standard*.
D435-09	Timecode Y Cable, 40 ft. / 50ft
D435-10	Timecode Y Cable, 60 ft. / 60 ft.

DTS Timecode Reader Heads

D600-00	DTS Timecode Reader Head, 35mm
E108	Auxiliary Roller assembly kit, 35mm
D600-02	DTS Timecode Reader Head, 70mm
E163	Auxiliary Roller assembly kit, 35mm

Miscellaneous

2011 1X05 00	Terminal Block, 5-position, 5.08 spacing
2006 1X02 00	2-position shunt (jumper)

APPENDIX A: BLINKING DTS TIMECODE READER LED

The timecode reader LED should remain bright and not flash more than a few times a minute. Excessive flashing indicates a problem and should be fixed as soon as possible. The optics on the reader should be blown off with compressed air at least once a day, but **never adjust the lens**.

Excessive blinking can cause drop-outs (if the 4-second flywheel is exceeded). Drop-outs can produce wow, edits, and repeated sound track.

There are four things that can cause the reader LED to blink:

1) **Bad/poor timecode.** This is usually limited to a single reel or trailer, and is encountered infrequently. If seeing bad reels regularly, check for other problems.

2) **Film instability/speed.** This is caused by film bouncing through the reader or a projector that is running at the far end of the DTS player's speed range. The reader requires some film back-tension to read properly.

3) **Electrical noise/grounding problems**. One cause it the projector's chassis not being earth grounded.

4) **DTS equipment problem.** This is caused by either the reader or the player. If another reader can be borrowed from a working screen, try swapping.

Bad/Poor Timecode

See "DTS Encoded Film" specifications at the end of Section 7.

Film Instability/Speed

- Check the speed of the projector. It should run at 24 fps +/-5%.
- Make sure the reader's auxiliary roller (back with an adjustable arm) is installed and provides as much wrap as possible on the incoming silver roller. It should be pivoted towards the cable end of the reader and be back as far as possible.
- Watch the film run through the reader. If aligned properly, the film should contact each side of the roller evenly.
- Gently squeeze the edges of the film between two fingers as it enters the reader, pull back slightly and allow your fingers to act as shock absorbers. Repeat on the exit side of the reader. If the LED stabilizes, try to find the source of instability. The following are possible sources of instability:
    - Poor reader alignment
    - Too much tension
    - Bad rollers(s)
    - Bad platter center piece
    - Bad projector belt, gear, or sprocket
    - Bent reel
    - Too little tension
    - Reel clutch
    - Platter center piece spring removed (AW-3)

Electrical noise/grounding problems

- Electrical noise on the timecode input(s) can confuse the timecode reader circuit. This causes the LED to blink and, in some cases, cause sound wow, edits, and dropouts. First, make sure the projector(s) and the DTS chassis are earth grounded.
- The current reader cables (from the DTS factory) have a shield wire shrink-wrapped to the cable's jacket, on the reader end. Cut the shrink-wrap away and connect the wire to one of the screws that hold the reader to its bracket. Check for any change in operation.
- If you have made your own cable or modified the factory cable in any way, be sure the shield is connected to the conductive connector shells **at both ends**.
- Do not run the timecode cable along power lines, over florescent light fixtures, or near motor controllers. Cable must be shielded.
- If the timecode reader-head board is Rev. F or lower, replace the reader with a newer revision board. The board revision can be viewed by tilting the reader and looking just below the 9-pin connector.

DTS equipment problem

- Borrow a known good reader from another screen. If this fixes the problem, replace the reader.
- Check the timecode cable. Verify continuity and physical integrity.
- Check firmware inside the player.

Checking DTS Timecode with an Oscilloscope

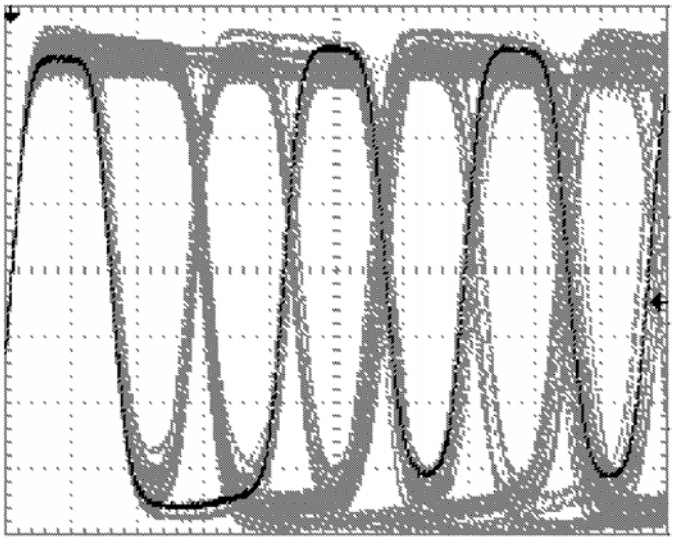
Connect option 1 — Remove the timecode reader cable's connector shell from the reader end. Connect the scope probe to Pin 1 and the scope ground to Pin 6.

Connect option 2 — If using the "DTS timecode reader to oscilloscope adapter" (DTS P/N D929), simply disconnect the timecode cable from the reader head. Connect the adapter to the reader head (male DB9) and connect the timecode cable to the other end of the adapter (female DB9). Then, connect the BNC to the oscilloscope.

Set the scope to 0.5V/division, sweep at 0.5mS/division, and the trigger to internal.

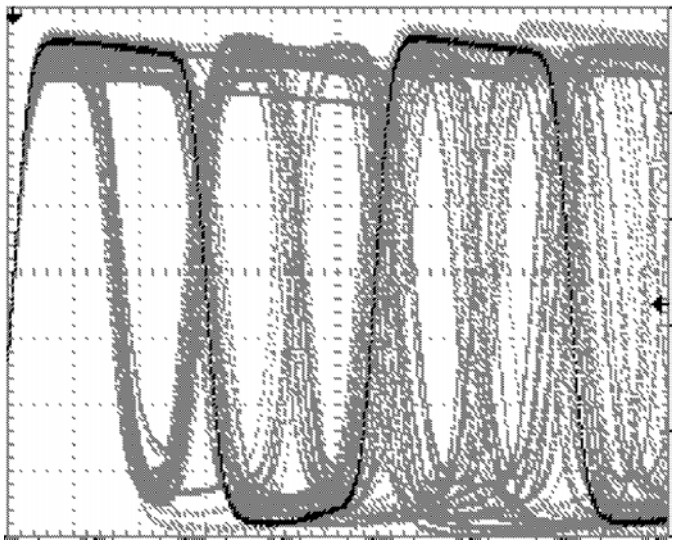
Run a reel of time-coded film (BILL AND BUZZ reel preferred) and observe the timecode cells. The amplitude should be constant, and approximately 4 Volts Peak-to-Peak. The cells should be visible all the way to the right of the scope screen. The cross-points ("X"s) should be well defined (FIG. 1). Poorly defined cells are shown in FIG. 2. They are caused by film bounce and jitter through the projector or from the platter/reel.

FIG. 1 GOOD TIMECODE



500mV/DIV .5mS/DIV

FIG. 2 POOR TIMECODE



500mV/DIV .5mS/DIV