# LANCe DESIGN

# TDC-100
# TD'S DISK CONTROLLER

## WITH USB PORT

Installation and Operation Manual

**Software Version 3.5**

Lance Design / 27 Fairview Avenue / Ridgefield, Connecticut  06877
Tel: 203-894-8206 / Fax: 203-894-8207

www.lancedesign.com

**CAUTION!  HAZARDOUS  VOLTAGES  ARE EXPOSED  WHEN THE TOP COVER OF THE RACK FRAME IS  REMOVED.   DO NOT APPLY POWER WITH THE UNIT DISASSEMBLED.**

# Table of Contents

# QUICK OPERATION GUIDE

- **To enable a device** press the corresponding 'device enable' button

- **To enable more than one device**, press multiple 'device enable buttons at the same time. The first one pressed will be the displayed machine, and will flash

- **To manually learn the 'device enable' data (gang)** into the current register, select the devices as above, and while still holding the 'device enable' buttons down, press SET on the keypad. The display will say "Now Enabled: XXXX", indicating the enabled machines for this register.

- **To select a register**, press REG #, then enter three digits on the keypad (000-299). You can also press and hold the REG # key, and use the '+' and '-' keys to scroll through the registers. The register number is indicated in the lower right corner of the display.

- **To clear the current register**, press and hold the REG # key, and press CLR. The display will say 'Register Cleared'. This clears all data from the current register.

- **To clear ALL registers** (or a group of registers), press and hold the REG# button, the MARK IN button, and the MARK OUT button at the same time (3 buttons at once). The display will say 'CLR To Clear All!'. If you press the CLR key (while holding down the above three buttons) the TDC-100 will start clearing registers at the current register, and ascending until you either press the STOP button, or it reaches the last register (299). This operation is deliberately awkward in order to minimize the chance of doing it accidentally. This function may be inhibited by turning on Dipswitch #1 on the rear of the rack mount frame.

- **To copy the current register** to another, press REG #, then SET. The display will say "Copy Reg To?". Enter three digits for the destination register. All register data will be copied from the current register to the new register.

- **To mark an in time,** press MARK IN. All enabled machines will be marked from their current time code (or timer) values.

- **To mark an out time**, press MARK OUT.

- **To enter an in or out time from the keypad**, key in the time, press SET, and press MARK IN (for in time) or MARK OUT (for out time). Note: if multiple machines are selected, the time will be entered only on the currently-displayed machine. The others will not be affected.

(continued)

- **To recall an in or out time to the display**, press FCN, then MARK IN or MARK OUT. The corresponding time value will be recalled to the display and the scratchpad register, so you can do arithmetic with it if desired (add and subtract). If you 'double-click' the REG # button it will recall the in time of the current register (or clip name), for the currently-displayed machine. If there is no value stored in the register, the display will be all asterisks, indicating no value.

- **To recall the stored clip name to the display**, press FCN, then REG #. If there is a stored clip name for the current device, it will be recalled to the second line of the display, for the purpose of checking it.

- **To Trim an in time**, recall time to display as above (FCN, MARK IN), press '+' or '-', enter the trim value on the keypad, press SET, and press MARK IN to resave it. **Outtimes** work the same way, with the MARK OUT key. You can set a known clip duration the same way: recall the in time, press '+', enter the desired duration, press 'SET', press 'Mark Out'. This takes the in time, adds a duration value to it, and stores it in the out register.

- **To display the duration of a register** (difference between in point and out point), press TM key. If either of the registers is clear, the display will be all asterisks, indicating no value.

- **To manually learn a speed preset** hold down the VAR button and press SET. The display will confirm that the speed has been learned. This speed will be recalled when the register is recalled. If you do a learn from the switcher, the current var speed will be learned into the register.

- **To Cue Directly to a Keyed-In Time Value** enter the time value on the keypad, press 'SET', and press 'CUE'. The device will cue to the entered time. The time value will not be stored anywhere. Remember that you must press 'SET' before pressing 'CUE'. This validates the keypad entry before attempting to send the machine to that position.

- **To Adjust TBC Levels** press 'FCN', then 'MENU'. This will put the controller into the TBC adjust mode. Use the '+' and '-' keys to select the function, and the knob to adjust. To exit this mode, press 'FCN' then 'MENU' again. The MENU button will flash when in the TBC adjust mode. If there is no number value displayed after the function, then the selected device does not support these commands.

(continued)

- **To Do a Loop Play**  define the loop by entering an inpoint and an outpoint.  The minimum duration is 1:15 [one and one-half seconds].  The loop play may be initiated by either Pbus trigger 5, or by pressing <FCN> the <PLAY> on the front panel.  You may simulate the Pbus trigger by pressing <FCN>, then <5> on the keypad.  The loop will run until either a STOP, RECUE or RECALL command is received.   If you turn on LOOP PRESERVE in the menu, only a STOP command will halt the loop.  You can recall another register without disturbing the loop playback.

- **To Do a Multi-point Loop Play** set the initial start point in the inpoint of a register number between 000 and 099 (first 100 registers).  You may also set an outpoint if desired, although it isn't required.   The 'inner loop' points should be entered in a register 100 higher.  For example, if your 'outside points' are in register 25, your 'inside points' should be in register 125.   Minimum duration for the inside loop is one and one-half seconds.   The multi-point loop play may be initiated by Pbus trigger 8, or from the front panel by pressing <FCN>, then <8>. The ddr will start at the initial start point, then loop between the 'inner loop' points.  If you send a Pbus trigger 9 [<FCN> <9> from the keypad], the controller will stop looping at the first opportunity, and play to the 'outside' outpoint [register 25 outpoint in the above example].

- **To Do an Automatic Transfer (Dub)** from a vtr:  Set inpoints for both the vtr (playback) and the ddr (record) channels.  Press and hold the device button for the ddr, then press the vtr's device button.  Both should be lit, with the ddr's button flashing.  This is the recorder.   Press <FCN>, then <REC>.  The vtr will cue back 3 seconds from the inpoint and roll.  The ddr will go into record at the proper time.

- **To Add an Offset to All Registers** first select the register number where you'd like to start [usually 000], and select the channels you want to modify [A, B, C, D] by lighting up the device buttons.    Press <FCN>, then <TM>.   The controller will prompt you to 'Enter Offset Time'.  Enter the time using the keypad.  If you want to offset by a negative number, enter a minus sign first.  Press <SET>, then <TM>.  The TDC will start modifying both the inpoints and outpoints of all selected channels.  You can stop the process by pressing STOP.

- **To Display Pbus Data** for diagnostic purposes, turn on Item 30 in the menu, PBUS DATA DISPLAY.    This will cause the ASCII Pbus data to be displayed on line two of the panel.  If the Pbus data is incorrectly formatted (invalid command) a 'Pbus Format Error' message will be displayed.  Note that this menu item is turned off each time the TDC-100 is powered up.

- **To Use USB Port for Cue/Menu Offline Storage** see the USB section on page 21 of this manual.

# GENERAL DESCRIPTION

The Lance Design TDC-100 is designed to provide control of multiple channels of video disk recorder(s) or other devices via P-Bus II interface to Grass Valley Group, Sony, or other production switchers.

This combination allows the user to do the following:

1) Mark playback inpoints when learning an emem effect on the switcher.

2) Recall (cue) the playback device to these cues when effects are recalled.

3) Trigger (roll) the playback device in response to an emem timeline run, loop, or other trigger.

In addition to these functions which are driven from the production switcher, the control panel provides full manual control of the devices, providing normal shuttle, jog, variable play, record, cue, and other commands.


# CONTROL PANEL DESCRIPTION

The TDC-100 control panel provides the following controls (left to right on the panel):

- **Numeric Keypad** - for entry of numeric data, register numbers, timecodes, etc.

- **Plus and Minus Keys** - for timecode arithmetic, and for use as up/down keys for scrolling through the menu items.

- **FCN Key** - for selecting alternate functions of some keys.  Press and release the FCN key, then press the key whose alternate function you want.

- **SET Key** - operates like an 'equals' or 'enter' key.  To enter a timecode number from the keypad, for example, you would key in the time, press SET, and press MARK IN.  The SET key tells the controller to use the keypad time instead of marking from the current disk position

- **TM Key** - used for displaying durations of registers (outpoint minus inpoint).  If you have both an inpoint and outpoint set, pressing TM will show you the duration between them.  This key is also used to enter time values into the timer or timecode generator of the controlled device, if this capability is supported.

- **CLR Key** - Clear function.  Clears numeric entry and other modes.  Functions somewhat like a 'cancel' or 'escape' key.  Also used to clear registers - see below.

- **REG#** - used to select the active register from the 300 available registers. Press this key (it lights), and enter a 3-digit register number on the keypad. The active register number is displayed in the lower right corner of the display as 'R 299', for example. This key is also used to clear a register (all inpoints and outpoints). Hold the 'REG #' key down and press 'CLR'. The current register will be cleared.

- **MARK IN** - pressing this key will put the current disk timecode into the IN register, for all enabled devices. Pressing this key after pressing SET will put the keyed-in timecode value into the IN register (for the displayed device only). Pressing FCN, then MARK IN will recall the current in time to the display. The MARK IN button will be lighted when ever there is an inpoint stored. If the inpoint is cleared, the button will be dark. If CLIP STORE/RECALL is on in the menu, and there is a timecode inpoint but no clip name stored in the regitser, the MARK IN button will flash. This serves as an indicator of the missing clip name.

- **MARK OUT** - same as above for outpoints.

- **MENU ON** - turns on and off the menu mode. Menu items are displayed on the lower line of the display. Use the knob or the +/- keys to scroll through the items. Also selects the TBC Adjust function if pressed after the "FCN" key. In this mode, the menu button light will flash.

- **MENU SET** - used to change the menu items. Pressing this key will toggle the menu choices if there are only two. If there are more than two, it will step through them. If you hold this key down, you can use the knob to adjust the menu setting.

- **CLIP LIST** - used to display the clip directory of the disk recorder. If supported by the disk recorder, the clip names present will be displayed. The numbers on the left side of the display provide an index, for example 04/12 means this is clip 4 of 12. The names can be scrolled via the +/- keys or the knob.

- **CUR CLIP** - Loads the displayed clip, when "Clip List" above is active.

- **ENBL PBUS** - when this key is lighted, PBUS control from the production switcher is enabled. If not lighted, control is inhibited. This button will flash each time a valid Pbus command is received. If it's off, it will flash on. If it's on, it will flash off.

- **ENBL LEARN** - when this key is lighted, the LEARN function from the production switcher is active; that is, when an emem effect is learned on the switcher, the disk inpoints will be marked from the current positions. If you have the disk inpoints set, and don't want to mark them each time you learn an emem, you can turn this function off (key dark). Recall and Trigger functions are not affected. The ENBL PBUS (above) must be on for this function to operate.

- **PLAY, RECORD, STOP, CUE, SHTL, JOG, VAR** - standard transport controls. When in variable mode, the speed is displayed in the upper right corner of the display. When pressed by itself, the REC button will put the device into EE mode.

Pressing REC again, or pressing STOP will cancel EE mode.   The REC button flashes to indicate that the device is in EE mode.

- **DEVICE ENABLE (A,B,C,D)** - four device enable keys corresponding to the four control ports on the TDC-100.  Any lighted key is enabled, and will be sent all transport commands and PBUS commands.  If more than one is enabled, the one that is flashing is the currently-displayed one.  The currently-displayed device is also tallied by the letter (A,B,C,D) in the upper left corner of the display.

- **BIG KNOB** - used for transport control (jog, shuttle, variable) and for scrolling and setting menu,  and for TBC adjustment of devices which support this function.

## MENU ITEMS

**01      REGISTER LOCK (OFF/ON)**
Prevents modification to any registers.  The intention is to turn the register lock on after all registers are loaded for a show to prevent inadvertent changes.    If you try to mark, copy, trim, etc. any registers with the lock turned on, you'll get a 'Registers Locked' error message.

**02      PANEL RECALL (ONLY or  w/CUEUP)**
When set to 'ONLY', recalling a register from the control panel will only recall the register information; it won't cue the disks to those times.  When set to 'w/Cueup', the controller will recall the register and immediately cue the disks to the register inpoints.  P-bus recalls will always cue the disks, regardless of this menu setting. This would normally be set to 'Only' when loading the times into the registers, and perhaps to 'w/Cueup' if you're checking the registers from the panel, or using the TDC-100 to do manual playback.

**03      OUTCUE ACTION (NONE, STOP, or RECUE)**
This item tells the controller what to do when it reaches an outcue. If set to 'None' no action is performed; the machines just keep playing past the outcue.  If set to  'Stop', the machines will stop when they reach the outcue, and if set to 'Recue' they will immediately recue to the inpoint and stop.

**04      CLIP STORE/RECALL  (ON/OFF)**
If this item is turned off, the TDC-100 cues machines based only on timecode (or timer).   The clip name isn't relevant.  If this item is turned on, the name of the current clip is stored when you do a MARK IN, SET IN, or  PBUS  LEARN,  and  this clip will be loaded and cued automatically when the register is recalled or cued. Operation of the store/recall function requires that the controlled devices support Odetics protocol.   The manual clip list/load functions on the control panel operate regardless of this menu setting.

**05      CLIP LIST MODE (INT / EXT)**
This item selects the clip list mode that the TDC-100 uses to access the list of available clips on the ddr.  The INT mode builds the list within the TDC-100, and will operate with any ddr which supports Odetics protocol.  In this mode the list is limited to 99 clips.   In the EXT mode, the TDC-100 uses special commands added to the Odetics protocol to directly access the clip list in the ddr itself.  In this mode there is no limit to the number of clips available.   This mode does require that the additional commands be supported by the ddr, and so only works properly on certain ddrs (EVS Spotbox).

**06      CLIP FILTER (Off, Char = 0-9)**
The filter only operates in the INT list mode.  When this item is off, all available clip names will be listed, up to the TDC's limit of 99 clips.  When this item is set to a digit (0-9), only clips whose names have a matching first character (0-9) will be listed.

**07      RECALL DISPLAYS (NAME / TIME)**
This item applies only if Item 04 is turned on.  If this item is set to NAME, the clip name will be displayed when a register is recalled.  If this item is set to TIME, the In Time is displayed when the register is recalled.  This menu item only affects the display,  all other operation is the same.

**08      TIME REFERENCE = (TC/TMR)**
Selects 'Tape Timer' counter or timecode as time reference.  May not be  supported by all disk devices.  Global command selects mode for all  devices.    Note: Odetics mode on the Profile makes the timecode numbers relative to the start of the clip.  I find this very confusing, and if the clips don't start at 00:00, you might want to use the TMR mode to avoid this confusion.

**09      TIMER MODE = (12/24)**
Selects 12 or 24-hour mode for timer.

**10      PANEL RECORD LOCK = (ON/OFF)**
When ON, prevents all devices from being placed into record mode from the controller front panel.

**11      P-BUS RECORD LOCK = (ON/OFF)**
When ON, prevents all devices from being placed into record mode via a P-bus command.

**12      RECORD TRIM  XX FRAMES**
Used to set record timing for automatic dub operation.  Typically set to 2  frames

**13      PANEL BUZZER (OFF/ON/ERR ONLY)**

Enables or disables the panel buzzer.  'Off' is completely off.  'On' is on for both error messages, and register changes like Marks and Learns.    'Err Only' is on for error messages only, off for everything else.


**14      PRESERVE LOOP CHA (OFF/ON)**

When this item is turned on, a loop which is playing on channel A will not be disturbed by a register recall.   The loop will continue to play until it is explicitly stopped.  If the item is off, recalling a register will abort the loop, and cue the ddr to the new time, if the new register has an intime for the looping channel.  If no intime, the loop will continue (starting with software version 3.2), even if Preserve Loop is not turned on.


**15      PRESERVE LOOP CH B**             Same as above for the other channels
**16      PRESERVE LOOP CH C**
**17      PRESERVE LOOP CH D**


**18      DEVICE NUM FOR A = (00-23, --)**

Sets PBUS device number (ID) for the A device.  This machine will respond when this number matches the device number sent from the switcher.  For commands involving multiple machines, if the device number(s) from the switcher match any of the enabled machines, the commands will be sent to all enabled machines.  Setting this item to '—' assigns no device number to channel A, and disables Pbus control of this channel (unless ganged).


**19      DEVICE NUM FOR B =**      Same as above for the other channels
**20      DEVICE NUM FOR C =**
**21      DEVICE NUM FOR D =**


**22      CH A STATUS (CHECKED / IGNORED)**
**23      CH B STATUS (CHECKED / IGNORED)**
**24      CH C STATUS (CHECKED / IGNORED)**
**25      CH D STATUS (CHECKED / IGNORED)**

These cause the TDC-100 to either check or ignore the status returned from the machine.  If checked, the controller will make sure a machine is present before trying to cue it, and will wait until cued before rolling in play (if a cueup command has been issued).  If set to IGNORE, the controller will send the commands regardless of what the machine is doing.   It may be useful to set one or more of these to IGNORED if a machine is powered down, or disconnected.  This would allow you to rehearse your effects without modifying the registers.  These menu items are set to 'CHECKED' each time the TDC-100 is powered up, and this is the setting that should normally be used.

**26      GPI INPUTS (DISABLED/ENABLED)**

Enables the (5) GPI Inputs available on the 'RS-232/GPI' connector on the rear panel of the rack frame.  These GPI inputs have the following functions:

>        GPI 0 - Stop
>        GPI 1 - Play
>        GPI 2 - Recue
>        GPI 3 - Recall Register 000
>        GPI 4 - Recall Register 001

**27      GPI OUTPUTS  (DISABLED/ENABLED)**

Enables the (5) GPI Outputs available on the RS-232/GPI connector.  The GPI outputs are triggered when the TDC exits a multi-loop and begins playing the roll-out (or tail) of a multi-loop animation.   These GPI outputs have the following functions:

>        GPI Out 0 - Triggered when Channel A exits a Multi-loop
>        GPI Out 1 - Triggered when Channel B exits a Multi-loop
>        GPI Out 2 - Triggered when Channel C exits a Multi-loop
>        GPI Out 3 - Triggered when Channel D exits a Multi-loop
>        GPI Out 4 - Triggered when any of the four channels exits a Multi-loop

**28      GPI OUTPUTS ACTIVE (LOW/HIGH)**

Selects the polarity of the GPI outputs.  If item is set to LOW, the outputs will rest high, and will be pulled low when triggered.  If item is set to HIGH, they will rest low and will be pulled high when triggered.   This item is generally set to LOW.

**29      SWITCHER TYPE (GVG / SONY)**

Selects type of production switcher TDC-100 is used with.  Affects the trigger function numbers (swaps functions 0 and 1).

**30      P-BUS PARITY (NONE/ODD/EVEN)**

Sets parity mode of P-bus port.  Should be set to match production switcher.  Baud Rate is always 38.4K

**31      PBUS DATA DISPLAY (OFF/ON)**

Turning this item on enables a display of received Pbus commands on the TDC's display, to assist in troubleshooting Pbus problems.  This item is always set to OFF at power up.

**32      VIDEO FRAME RATE (25/30)**

Selects the video standard being used, in frames per second.  For NTSC, 525/60 SDI, and any high-def formats that use 30 frames/sec, or 29.97 frames/sec set this item to '30'.  For PAL, 625/25 SDI or other 25 frame/sec standards, select '25'.  This setting must match the video frame rate being used in the ddrs.  The controller will operate with the wrong standard selected, but all time calculations will be wrong, and confusing things will happen.

There are two more items which may be selected in the menu.  These are not menu items, but are just information displays (they can't be set by the users).

**DEVICE:**  Displays the type of controlled device, to the extent that the TDC can determine it.  If a Profile or Fast Forward is in 'BVW' mode, this item will identify them as 'Sony VTR'.  If they are in Non-BVW modes, the TDC will try to report what protocol is selected.  The frame rate of the controlled device will also be displayed.

**TDC FIRMWARE VERSION:**  Displays the installed firmware in the TDC frame.  This manual applies to version 3.5 firmware.

---

With the exception of the Status Check items which are always turned on at power-up, and the Pbus Data Display, which is always turned off, all menu items are retained in non-volatile memory and will not change when the controller is turned off.

---

# GENERAL OPERATION

## WHAT IS A REGISTER?

In this controller, a register refers one set of these items:

| | | |
|---|---|---|
| Device A Inpoint | Device A Outpoint | Device A Clip Name (if enabled) |
| Device B Inpoint | Device B Outpoint | Device B Clip Name (if enabled) |
| Device C Inpoint | Device C Outpoint | Device C Clip Name (if enabled) |
| Device D Inpoint | Device D Outpoint | Device D Clip Name (if enabled) |

Device Enable Data (which machines are enabled)
Variable-Play Speed Data (Global)

There are 300 registers, stored in non-volatile memory in the controller. They're numbered 000-299. The register numbers correspond to the switcher's pbus register numbers 000-299. When you do learn or recall operations from the switcher (with P-bus enabled), these registers are automatically selected. On most switchers these correspond directly to the switcher emem numbers. On TDC software versions prior to 3.1, the pbus-accessable numbers were restricted to 00-99. With version 3.1 all 300 registers are accessible for pbus recalls and learns, if the switcher supports the larger range.

## SWITCHER-INITIATED FUNCTIONS

The production switcher can do the following things:

**1)     Issue LEARN commands**. This happens when you do a emem learn, with learn/recall enabled in the 'emem peripheral buss triggers' menu on the switcher. ('Enable Pbus and Enable Learn buttons must also be lit on the controller panel).

When you do an emem learn on the switcher, here's what happens in the controller:

- The controller selects the register whose number matches the emem number
- The inpoints of all enabled devices are marked (stored) from current positions
- The DEVICE ENABLE status is stored, so that when you recall the register, the same machines will be selected
- The current VAR Speed value is stored in the selected register.

Important note:  If you DON'T want these things to happen when you learn an emem, but you want the rest of Pbus control to work, turn off 'Enable Learn' on the controller. This might be useful when your disk cues are fine, but you just want to modify an emem effect. Having this button off will prevent remarking the disk cues.

(continued)

General Operation - continued

**2)      Issue RECALL commands**.  This happens when you recall an emem, again with learn/recall enabled on the switcher, and 'Enable Pbus' lit on the controller. Enable Learn does not have to be lit for recall to work.

When you recall an emem on the switcher, here's what happens in the controller:

- The controller selects the register whose number matches the emem number
- The DEVICE ENABLE status is recalled, so the right machines are enabled
- Each machine is cued to it's respective inpoint, awaiting playback.

**3)      Issue TRIGGER commands**.  This happens when you have a pbus trigger In an effect timeline, or push the 'Fire' button on the switcher menu, or otherwise cause the switcher to send a trigger.

When the switcher sends a TRIGGER, all enabled machines are sent a command corresponding to the 'Function Number' specified for that trigger in the switcher menu.  The function numbers are as follows:

**When TDC-100 is in the GVG (Grass Valley) mode:**

| Function Number | Command |
|---|---|
| 0 | Normal Play |
| 1 | Recue |
| 2 | Variable Play (using displayed speed, which can be learned and recalled) |
| 3 | Reverse Play at 100% |
| 4 | Stop |
| 5 | Loop Play |
| 6 | Record |
| 7 | Normal Play |
| 8 | Multi-Point Loop Start |
| 9 | Multi-Point Loop Exit |
| 10 | Select Bank 0 [Registers 000-099] |
| 11 | Select Bank 1 [Registers 100-199] |
| 12 | Select Bank 2 [Registers 200-299] |
| 13 and above | Normal Play |

**When TDC-100 is in the Sony mode:**

| Function Number | Command |
|---|---|
| 0 | Recue |
| 1 | Normal Play |

All others the same as GVG above.

The **SELECT BANK [0,1,2] triggers** are new with version 3.0 software, and allow a single emem effect to recall up to three different playbacks per channel.  If you have an effect in Emem 25 for example, register 025 will be recalled on the TDC when you recall that effect.   If you send a Trigger 11 from within that effect, register 125 will be recalled.  If you send a Trigger 12 register 225 will be recalled.

Note that these recalls are just like normal register recalls, in that they affect all channels.  Most triggers affect only machines which have valid device numbers, or are ganged.  These do not – they recall the registers regardless of device numbers.  Only machines which have valid inpoints and valid device numbers will be cued.

Starting with version 3.2 firmware, all 300 registers are directly accessible from P-bus, if the switcher supports this expanded access.   This may make the use of SELECT BANK triggers unnecessary.


The other new triggers are 8 and 9, which are related to Multi-Point Loops.  Please see the detailed operational information section for an explanation of these triggers.

# MULTI - DEVICE CONTROL RULES

This section describes how the controller handles various combinations of multiple machines and device enable numbers

- **The controller front panel** controls enabled machines; ones with lighted Device Enable buttons.  Some front panel functions affect only the Displayed machine - the one whose letter is in the upper left corner of the display. These single-machine functions are Inpoint and Outpoint Setting (not marking),  Clip Listing and Loading,  and TBC Adjustment.

- When the controller receives a P-bus **Recall command**, it first recalls the gang configuration for that register.  It then attempts to cue all machines that have a valid device number, whether they are part of the gang or not.   In addition, as long as at least one machine in the gang has a valid device number, all machines in the gang will be cued.  Non-ganged machines can be cued, so long as their device number is enabled on the switcher.  The only exceptions to the above are any channels which are playing loops, and have PRESERVE LOOP turned on in the menu (for that channel).  These loops will be left playing during a register recall.

  Generally there is no need to send a 'recue' trigger on the first keyframe of your effect, since just recalling the effect (and thus the TDC register) will cue the machines.  If you do put this trigger in your effect you may be causing two 'cueup' commands to be sent to the DDR at almost the same time, and this might actually slow the cueing process, or cause other DDR problems.

- **Trigger functions** work the same way as the Recall command.  The command corresponding to the function number is sent to any device with a valid device number.  In addition, the command is sent to all members of the ganged group, so long as one member of the gang has a valid device number.

  Note that non-ganged machines may be triggered independently.   You can control all 4 ports, even if they're not part of a gang.  You just need to send appropriate triggers with the right device numbers enabled.  Note also that these triggers can come at different times.   It's easy, for example, to cue and play a key/fill pair, and while they're playing, cue and start a loop on another channel, and while that's all happening, cue and play another clip on the forth channel, all independently, via the P-bus.

  One consideration to be aware of is that if you send multiple triggers at the same time (on the same keyframe), the TDC100 will stack them, and execute them as it can.   This means that you may see some delay in executing multiple commands that are sent at one time.  If you really want accurate control, it's best to send no more than one trigger per keyframe.

- **Outcue Actions** are independent, and based on each machine's individual outpoints.   If you want both a Key and a Fill channel to recue, you must set an outpoint for each of them.   This is a change from earlier versions of software.

# Detailed Operational Information

**Using Auto-Dub Feature to Transfer Material From VTR to Disk**

1. Connect the vtr's remote (9-pin) connector to one of the device control ports on the TDC-100. (e.g. Device Port D)

2. Connect the DDR that you want to record onto to another port (it's probably already there. For the example, let's say it's on port A)

3. Load the tape, and route audio and video from the vtr output to the DDR input.

4. Mark an Inpoint for the VTR. This should be at the start of the material you want to transfer, of course. Use the MARK IN button, as you normally would, or enter a time on the keypad, press SET, then MARK IN.

5. Mark an Inpoint for the DDR in the same way. This will be the point where the recording starts.

6. You can also set an outpoint on the DDR if desired. The recording will stop at this point. If there is no outpoint, the recording will be open-ended.

7. Enable both machines using the device enable buttons, with the desired recorder being the flashing button (current machine). Do this by first pressing down the recorder enable button (A in our example), and while holding it down, press the player (vtr) button (D in our example). THIS IS AN IMPORTANT POINT: the controller determines which is the player and which is the recorder based on which device enable button is flashing. Make sure that the device that you want to record onto is the flashing one, or you can put the vtr into record! For this reason, I STRONGLY recommend that you set the record lockout tab on the playback tape or REC LOCK on the vtr, just in case of finger errors.

8. To start the dub, press FCN, then RECORD (by itself). The controller will cue both devices (including a 3-second preroll on the vtr), play the vtr, and put the DDR in record at the proper time. The recording will continue until the recorder outpoint is reached, or until you press the STOP button.

   That's all there is to it. Note that it isn't possible to record onto two channels (two DDRs) at the same time - you'll have to do it in two operations.

   One other note: there is a menu item called **RECORD TRIM**. This allows adjustment of the recorder timing relative to the playback. It is typically set at 2 frames, to compensate for various latencies. If your transfers aren't frame-accurate, you can adjust this value until they are.

**Using Multipoint Loops**

Version 3.0 software has the capability to do multi-point loops, where for example you play a lead-in, loop an internal portion, then (upon receipt of a 'exit loop' trigger) play a tail out.    Doing this requires four time values.

Start Point --- Loop In --- Loop Out --- End Point

The way the controller accomplishes this is to use a pair of registers.   The first register must be in the range 000-099.   This register contains the Start Point, and the End Point (the two 'outside' times).    The second register is in the range 100-199.   It contains the Loop In and Loop Out times (the two 'inside' times).   <u>You select the lower register to run the loop.</u>   The controller will always look at that number + 100 for the two inside times,  i.e., if the lower register is 025, the controller will look at register 125 for the two inside times.

The inside loop must have a minimum duration of 1:15, just like a normal loop, and must have both an inpoint and an outpoint.  The Start Point must be at least as early as the Loop In point.  There are no requirements placed on the End Point.  There need not be a time in that register.  If you do want to play a tail out (4-point loop) the End Point must be later than the Loop Out.

Once the Start and Loop times are entered, you can start the Multi-point loop (or MLoop, as it's displayed on the TDC) by sending a Pbus Trigger 8, or by pressing <FCN>, then <8> on the keypad.  This will cue the disk to the Start Point, if it isn't there already, and begin playing.  When the disk gets to the Loop Out point, it will jump back to the Loop In point (the inner loop).  It will continue to run this loop until you do any one of the following:

- Stop the loop with a STOP trigger or button press
- Recue the loop with a RECUE trigger or button press
- Recall another register (with PRESERVE LOOP turned off)
- Send a MULTI-LOOP EXIT Pbus Trigger (trigger 9), or press <FCN>, then <9>.

If you send a MULTI-LOOP EXIT trigger, or press <FCN, then <9>, the disk will exit the loop at the first opportunity, and play until it reaches the End Point. If there is no End Point defined, it will play until stopped.  Also, a GPI output will be triggered at the time that the disk actually exits the loop.  This GPI output may be used to trigger a switcher effect timed to the tail out portion of the playback, if desired.

Multi-Point Loops do not automatically recue.  To play the sequence again, you must first issue a recue command, or recall the register again.

**OPERATIONAL TIP:**   Setting up Multi-point loops requires entering times in two registers, 0XX and 1XX.  You can easily go between the two by pressing <FCN>, then <+> to go up 100, and <FCN>, then <-> to go down 100.  This prevents having to enter the three-digit register numbers repeatedly.

## TBC CONTROL WITH THE TDC-100

The TDC-100 can control VTR/Disk TBC or output video processor levels and timing. This is possible only for vtrs or disk recorders which allow these levels to be controlled via the standard RS-422 machine control port, via the standard Sony protocol.

Machines which allow this include:

| | | |
|---|---|---|
| | Panasonic | AJ-D350 |
| | | AJ-D351 |
| | | AJ-D360 |
| | | AJ-D580 |
| | | DVC PRO |
| | Sony | DVR-10 |
| | | DVR-18 |
| | | DVR-20 |
| | | DVR-28 |
| | | DVW-500 |
| | | IMX VTRs |
| | | MAV-555 |

Any Sony VTR equipped with
Lance Design AIF-422 adapter

Drastic Technologies VVCR Disk

Fast Forward Omega (timing only)

To access this control, just select the device that you want to adjust, and press and release the 'FCN' button, then press the 'Menu' button. Select the parameter that you want by using the '+' and '-' keys on the keypad to scroll through the functions.

If there is no number displayed after the parameter label, then the selected device does not support this control protocol.

Levels are adjusted with the jog knob, and may be set to UNITY by pressing the "CLR' (clear) button on the keypad. This sets only the selected parameter to unity.

This level adjustment data is stored in the device, not in the panel, so that there is no need to re-set levels if machine assignments are changed.

## PANEL USB PORT INFORMATION AND OPERATION

### DESCRIPTION

Version 3.5 firmware supports the operation of Control Panels equipped with a USB host port for use with a USB flash or 'thumb' drive for the storage of register (cues) data and menu settings. Using a USB drive eliminates the need for an external computer for uploading/downloading cue lists and menu data.

The register data is stored in files with a ".td2" extension. These files are identical to and fully compatible with those created by both the Windows and the Mac versions of the 'Cueman' applications. Files may be freely interchanged between the USB flash drives and the Cueman applications.

The menu data is stored in files with a ".tds" extension. Again, these files are fully compatible with Cueman files.

### USB MEDIA

The cue files (.td2) and menu files (.tds) are stored on a standard USB flash drive ('thumb drive') in DOS format text file.

The flash drive must be formatted in the **FAT32 format**. The TDC-100 is not capable of formatting the drives. Drives formatted in FAT32 format are compatible with both Windows and Mac operating systems. Some drives may come formatted with the 'FAT' format (FAT16). These may work to some extent but may not be reliable, and the drives are easily reformated with a computer to be FAT32.

The .td2 and .tds files require very little space; a 2GB drive can hold more cue/menu files than you'll ever need. We suggest using a basic 2GB drive without 'smart drive' applications or other such stuff on it, although larger drives will work ok.

### FILE RESTRICTIONS

The TDC-100 can only see .td2 and .tds files in the root directory, and has no means of navigating through a directory structure. _All TDC files must be in the root directory_.

Also, the filenames are restricted to the old 8.3 filename convention. In other words, the filename can only be 8 characters long, with a .td2 extension, indicating a Cueman file, or a .tds extension, indicating a menu file.. If you have existing files with longer names, just rename them. The TDC will see longer names, but they will be truncated according to 8.3 convention. For example, LONGFILENAME.TD2 will appear as LONGFI~1.TD2.

(continued)

**USB OPERATION**

The operation of the USB-equipped panel is straight-forward.

If there is no USB drive inserted into the socket, the panel operates exactly as it has in the past, and there should be no difference to the users.

If a USB drive is inserted, the panel will recognize the drive and switch to a USB function menu of eight items. The items can be selected by using the jog knob. Once the desired function is scrolled to with the knob, it may be selected by pressing the MENU SET button (just below the MENU button).

You may return to the main menu at any time (except when a file read/write is in progress) by pressing the MENU button.

The eight main menu functions are:

**1- Read .TD2 File to TDC**
This is used to read cues from a file on the USB drive into the TDC-100 Registers. Once this function is selected, you'll be able to select the file name from all available .td2 files.   Select the filename with the jog knob, and press MENU SET when the proper file is selected.   You will also be able to select a range to be uploaded.
The range choices are selected with the knob, and are either 'Entire File' or a numerically-entered range.  If you select 'Enter Range:" you should then enter a three-digit starting register number and a three-digit ending number, using the keypad.  These numbers are inclusive.   When entry is complete, press the MENU SET button again.  Only the registers within the entered range (assuming they exist in the file) will be uploaded to the TDC-100.


**2- Overwrite .TD2 File**
This is used to overwrite an existing file on the USB drive with the current register data from the TDC-100.  Once this function is selected, you'll be able to select the file name from all available .td2 files.  Select the filename with the jog knob, and press MENU SET when the proper file is selected.   There is also a range selection, either 00-99 or 000-299.


**3- Write to New .TD2 File**
This is used to create a new file of register data on the USB drive.  Once the function is selected, you will be able to enter an eight-character (or fewer) filename, and select the range of cues you want to save (0-99 or 0-299).  Once in this mode, the characters may be selected by the jog knob, and stepped from one to the next by the '+' and '-' buttons on the keypad.   Once the name is entered press the MENU SET button to go to the next step.

Note that the filename entered must meet the criteria for 8.3 filenames in that spaces are not allowed.   The .td2 extension will be appended automatically.

**4- Read Menu File to TDC**

This is used to read a .tds file containing menu settings to the TDC-100.  These files contain information about the firmware version of the TDC-100 frame from which the file was written.  The version number in the file is compared with the current version of firmware in the frame of the TDC-100, and warning is displayed if the versions differ.  This is because menu items may have changed between different versions and the file may not give you the settings you expect.

The menu items in versions 3.4 and 3.5 are the same, and version 3.4 files may be safely loaded into a TDC running version 3.5.


**5- Overwrite Menu File**

Replaces an existing .tds file on the drive with the current menu data


**6- Write New Menu File**

Writes a new .tds file to the drive.   Name entry works the same way as in (3) above.


**7- Set Time**

Since any files written to the USB drive are time and date stamped, the TDC-100 must now have a clock which must be able to be set.   This function provides that capability.  The clock will continue to run for about two weeks when the TDC-100 is powered off, so it will maintain accurate time so long as the TDC-100 is powered up from time to time.

The current time will be displayed on the top line, and you can enter a time on the bottom line with the numeric keypad.   Press MENU SET to transfer the keyed-in time to the clock.


**8- Set Date**

Same as above for the date.   Date data is displayed and entered in the mm-dd-yy format.


Any time a file is open on the USB drive (reading or writing), the **red LED** next to the drive socket will be lit.  You should not remove the drive until this LED is off.

# INSTALLATION AND CONNECTIONS

The TDC-100 consists of two pieces: the rack-mounted electronics frame (1RU) and the control panel.  They are interconnected by the supplied 9-conductor cable, which provides data communications between the two, and power from the frame to the control panel.

All other connections are made to the electronics frame.  The connectors on this frame are:

- DEVICE A         - port for disk or vtr A.  Standard RS-422 (Sony 9-pin) format
- DEVICE B
- DEVICE C
- DEVICE D        - same as above for devices B, C, D.
- P-BUS IN         - P-bus II connection to production switcher - 38.4K Baud
- P-BUS LOOP     - Pin-to-pin looping connection to P-Bus IN connector for extending P-bus connections to other devices.
- CONTROL PANEL - Connection to TDC-100 Control Panel (special cable)
- RS-232 / GPI     - RS-232 port for PC upload/download of register data, and GPI  input and output connections.
- EXT REF IN      - Looping BNC connectors for reference (analog) video. This reference is required for accurate control.
- POWER          - 95-250 volts, 50/60 Hz.  Power consumption is <10W



TDC-100 FRAME  REAR PANEL

## GPI  INPUT  CONNECTIONS

The GPI inputs can be enabled in the menu, and have the following fixed assignments:

> GPI 0 - Stop
> GPI 1 - Play
> GPI 2 - Recue
> GPI 3 - Recall Register 000
> GPI 4 - Recall Register 001

Electrically, the inputs are a 74HC - series input (will accept 'TTL' levels), pulled up to +5 volts with a 4.7K resistor.  These should be pulled to ground to activate, with either an open-collector or TTL output, or a dry relay closure.

*DO NOT apply external voltage greater than +5 volts to the GPI inputs, or permanent damage may result.*

## GPI  OUTPUT  CONNECTIONS

The GPI Output connections also appear on the 15-pin RS-232/GPI connector. These outputs are 74HC-series outputs.  _They may be used to drive CMOS or TTL-compatible 5-volt inputs only._  They are not suitable for pulling down 24v, driving relays (other than low-power 5v relays), or other types of interface.

There are five outputs, with the following assignments:

>    GPI Out 0 -    Triggered when Ch A exits a multi-point loop
>    GPI Out 1 -    Triggered when Ch B exits a multi-point loop
>    GPI Out 2 -    Triggered when Ch C exits a multi-point loop
>    GPI Out 3 -    Triggered when Ch D exits a multi-point loop
>    GPI Out 4 -    Triggered when A,B,C or D exits a multi-point loop

## DIPSWITCH FUNCTIONS

There is an 8-position DIP Switch on the rear of the rack-mount frame.   These should all normally be in the OFF or down position.   The functions of these switches are described below.

Sw 1 - ON inhibits the CLEAR ALL register function from the control panel
Sw 2 - ON causes menu items to be reset to defaults when all reg are cleared
Sw 3 - On inhibits the 'No Ext Reference' message on the panel display
Sw 4 - not used
Sw 5 - not used
Sw 6 - not used
Sw 7 – When SW7 and SW8 are both on, the TDC will do a complete memory
Sw 8 – clear to all zeros at power-up.  This is a factory test feature.

# CONNECTOR PIN-OUTS;  INTERCONNECT INFORMATION

Connector pinouts for the frame and panel D connectors are listed below.

Connections to the devices are standard RS-422 links.

The connection between the frame and control panel is also RS-422, but includes power for the control panel.  All 9 pins (of the D-9) must be connected, and the maximum length using #22 conductors is 150'.  If the panel must be extended beyond this length, it should be locally powered.  Contact Lance Design for details.

*Do NOT use Cat5 or similar cable*; the voltage drop will be too great.

**Device A,B, C, D Ports**

| Pin # | Function |
|-------|----------|
| 1 | Ground |
| 2 | -RX Data (from device) |
| 3 | +TX Data (to device) |
| 4 | Ground |
| 5 | (no connection) |
| 6 | Ground |
| 7 | +RX Data (from device) |
| 8 | -TX Data (to device) |
| 9 | Ground |

**P-Bus In and P-Bus Loop**

| Pin # | Function |
|-------|----------|
| 1 | Ground |
| 2 | Loop to other connector |
| 3 | +RX Data(from switcher) |
| 4 | Ground |
| 5 | (no connection) |
| 6 | Ground |
| 7 | Loop to other connector |
| 8 | -RX Data (from switcher) |
| 9 | Ground |

**GPI / RS-232**

| Pin # | Function |
|-------|----------|
| 1 | Ground |
| 2 | RS-232 RX (to TDC100) |
| 3 | RS-232 TX (from TDC100) |
| 4 | GPI In 1 |
| 5 | GPI In 3 |
| 6 | GPI Out 0 |
| 7 | GPI Out 2 |
| 8 | GPI Out 4 |
| 9 | Ground |
| 10 | Ground |
| 11 | GPI In 0 |
| 12 | GPI In 2 |
| 13 | GPI In 4 |
| 14 | GPI Out 1 |
| 15 | GPI Out 3 |

**RS232 INTERFACE CABLE (FOR PC UPLOAD/DOWNLOAD OF CUES)**

| TDC-100 RS232/GPI | | PC COM PORT |
|-------------------|---|-------------|
| DB-15 MALE | | DB-9 FEMALE |
| PIN 1 | SIGNAL GROUND | PIN 5 |
| PIN 2 | DATA FROM PC TO TDC-100 | PIN 3 |
| PIN 3 | DATA FROM TDC-100 TO PC | PIN 2 |

**Control Panel (Frame End)**          **Control Panel (Control Panel End)**

| Pin # | Function | | Pin # | Function |
|-------|----------|------|-------|----------|
| 1 | Ground | ----- | 1 | Ground |
| 2 | -TX Data (to panel) | ----- | 2 | -RX Data (from frame) |
| 3 | +RX Data (from panel) | ----- | 3 | +TX Data (to frame) |
| 4 | Ground | ----- | 4 | Ground |
| 5 | +5 Volts DC | ----- | 5 | +5 Volts DC |
| 6 | (no connection) | | | |
| 7 | (no connection) | | | |
| 8 | (no connection) | | | |
| 9 | +5 Volts DC | ----- | 6 | +5 Volts DC |
| 10 | +TX Data (to panel) | ----- | 7 | +RX Data (from frame) |
| 11 | -RX Data (from panel) | ----- | 8 | -TX Data (to frame) |
| 12 | Ground | ----- | 9 | Ground |
| 13 | (no connection) | | | |
| 14 | (no connection) | | | |
| 15 | (no connection) | | | |

end