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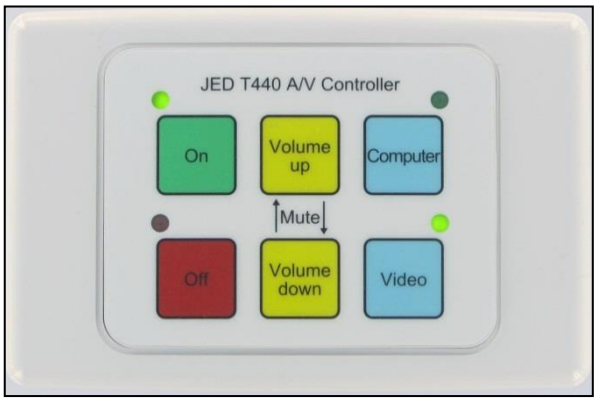
T440 Simple Projector Controller user's manual version V169 (part A)

(Ed Schoell rev: 13th. Mar 2025)



The T440 is a wired (RS232) remote controller for video projectors and flat panels, allowing simple On-Off control, channel/source selection and optionally, audio level control or freeze/mute functions.

Ease of setup and installation has been an important design criterion, and this has been achieved by providing a data-base of pre-coded projector code families in all units, so all have identical software (which is field up-dateable). At install time, or whenever options (or projectors) are changed in a room, the changes are made by selecting device families with the "**Program select**" hex switches on the back of the unit.

The range of keyboards at the end of this manual is coded for identification, and this code number is set on the "**Kbd Select**" hex switch.

A **DIP switch** allows installers to quickly select several extra options.

Several variables can be setup at install time, allowing for variable warm-up and cool-down times, timeout time for automatic turnoff, and allocation of a wide range of computer or video channels to the front-panel keys.

Except for a major code upgrade for totally new devices, a laptop is never needed at install/setup time. There is ¼ Mbyte of memory in the unit for data-base storage. A boot loader is included in the CPU, located in upper memory, so no special programming dongles are needed; it just needs a PC with a serial port (or a USB to serial adaptor.)

Operation of the T440

A number of coloured LEDs are associated with keys, and these are steady or flashed to signal to the user the current state of the system. Pressing keys moves the operation through these various states.

There are two groups, or "styles" of keyboards:

- **Separate ON and Channel keys:** This has one Green, ON key and Blue, Channel keys (Video, Computer). In rev 22, it is possible to toggle between two computer or two video channels with either key; and
- **Combo On/Channel keys:** This group has one or three Green keys which are marked with a Channel function as well as "/ On".

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Off state (Blink codes)

In the OFF state, the red LED by this key glows continuously. A built-in test function is provided, which can be actuated by pressing the OFF key in this OFF state. This sends a test signal to the connected projector and blink codes show:

- If the red LED flashes ONCE, it indicates that communications was established correctly, and the reply was as expected;
- If the red LED flashes THREE times, it indicates a communications error, i.e. a disconnected or powered-off projector, or a wrongly-set "Program select" switch on the back;
- If there is NO flash, it indicates that this particular projector normally has no response in the standby state, or an example projector has not had timing measurements done yet, so polls aren't tried;
- After none, one or three flashes, the red LED glows continuously.

T441/T461 communications test: A second communications test is done to the optional T441/T461 audio switcher-attenuator. If this is selected (via the Option8 switch), connected and responding correctly, the **green LED** by the ON button (above or to the left of the OFF key) blinks once. (There is no blink if no T441/T461 response is detected.)

Turnon

With "Separate On Key" keyboard: Pressing the ON key starts the T440 warm-up cycle. This will send the "start-up" code to the projector.

The **green LED** by the ON button will flash once per second, for the pre-set warm-up time. As well, the last used channel will be indicated by a green LED glowing steadily by one of the blue "Channel" keys, showing what channel command will be sent to the projector at the end of the warm-up period.

Channel pre-select: Pressing one of the Video or Computer "Channel" keys will switch the preselection to a changed channel. The green LED by that key will then glow, while the ON LED keeps flashing.

With "Combo On-key" keyboard: Pressing any one of the several green Channel/On keys starts the T440 warm-up cycle. This will send the "start-up" code to the projector. The green LED for the selected channel will flash once per second, for the pre-set warm-up time.

Channel pre-select: Pressing a different green Channel/On key during warm-up will switch the preselection to a changed channel. The green LED by that key will then flash for the rest of the warm-up period.

Warm-up

The warm-up time is preset and varies from projector family to family. The time can be altered at setup time to suit individual models in a manufacturer's range over a range of 1 to 159 seconds. See the following section: "Constant setting" for instructions on how to do this.

Screen down control and Power control ON

If screen control is enabled in the "Constant setting" process, when the/an ON key is pressed, the screen "down" driver, Relay1 (RL1 on J10) is activated, either pulsed or direct drive. Depending on the drive mode set, if a turn-off for the "screen down" function is needed and selected, it happens at the end of the set warm-up time. (By altering the set "warm-up" time, the screen-down time can be altered. There is no separate down time setting for the screen down in the T440.) See the following screen mode setting instructions.

Constant:D (see later, page 6) controls Relay 3, an N-channel FET output. By default, (Constant:D=0), Relay3 tracks Computer2 (Used by the JED 439 switcher). If Constant:D =1, Relay 3 is actuated by the On key (and Off by the Off key) … this can be used to turn on external audio equipment (powered speakers, etc) via an isolation relay, such as Boolean Engineering's "Easyswitch". The two screw terminals on the Easyswitch connect to the RL3 and Gnd on the T440, J11. See: http://www.booleanengineering.com/expeasy/ It can also be used for 12v triggers to screens or screen casings. Connect the "+" of the screen to +12v and "–" to Relay 3.

Run mode

At the end of the warmup time, the selected channel LED will then flash for a short "lockout" period, and the chosen "channel select" command is sent to the projector. If a "volume" key is included on the keyboard, and an absolute volume mode is provided, a volume setting command is then sent to the projector (or T441/T461, if that is in use) as well. This lockout period is variable, and is preset in the internal tables.
Pressing a different channel key will send the appropriate code to the projector, (and also an associated volume level, if absolute volume mode is used). The selected channel green LED will then flash for the same "lockout" period as above.

Volume control (and two-key mute)

On a keyboard with Volume up/down keys, "volume up" and "volume down" messages are sent to the projector as keys are pressed. (In some cases, two, three or more "Volume Increment/Decrement" messages are sent with each key press, so that off to full volume takes typically 20 to 30 key presses, rather than 63 to 100 which might be needed to cover the 0-63 or 0-100 range sometimes used.) The volume keys also auto-increment/decrement if held down.

If the projector control is "absolute" (i.e. an absolute setting is sent) only one volume message is sent for each button push (or pulse from the auto-inc/dec function), but the actual value sent could be incremented by a number larger than one, again, to limit the range from 0-20 to 0-30. If a T441/T461 audio controller is used, its range is 0-20.

If absolute control is used (by projector or T441/461) the last volume used for a channel is remembered after the projector is turned off, and restored at the next ON. As channels are changed, the volume is saved on exit and restored.

Two-key mute mode: If both volume keys are pressed together, "mute" mode is entered, and picture and sound mute messages are sent to the projector (and T441/T461, if used), and the current channel LED commences a slow flash. Normal picture and sound are restored by pressing the channel key (or the ON key). (Not all projectors allow this.)

Mute, Freeze and Aspect keys

When the MUTE key is pressed, the projector goes into picture mute mode, and the current channel LED commences a slow flash. (No audio is assumed in a system with a Freeze/Mute keyboard). Pressing the MUTE key again, or the current channel key, exits "mute" mode, and the channel LED returns to a continuous glow. (Some projectors don't have absolute modes for "mute" so pressing the key just toggles the projector mute mode without any blinking LED display.)

When the "Freeze" key is pressed, the picture is frozen (if the feature is supported by the projector). Pressing it again exits "freeze" mode.

Pressing the "Aspect" key toggles between 4:3 and 16:9 ratios, if absolute setting mode is available, else it rolls between a number of ratios, whatever the sequence provided by the display device provides.

Closedown

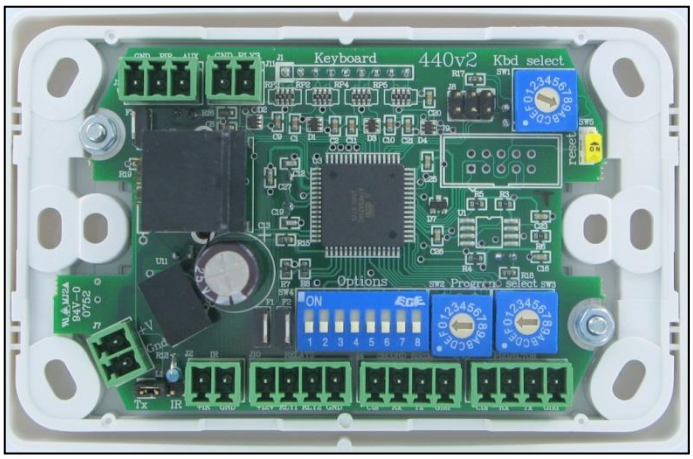
When the OFF key is pressed, the following actions happen:

- The projector is sent the "Powerdown" message;
- If enabled, the screen-up Relay2 (RL2 on J10) actuates, either as a single pulse or a direct ON for the length of the cooldown period, or till a pulse on RL1 stops the screen drive;
- The Power On Relay3 turns OFF; and
- The OFF red LED starts flashing once per second.

At the end of the Cooldown period, the system returns to the OFF state above. (The actual Cooldown period (and hence screen-up time) can be programmed by a constant setup (see later).

Rear-view of the T440

Looking at the back of the T440 shows the connections and the setup switches.



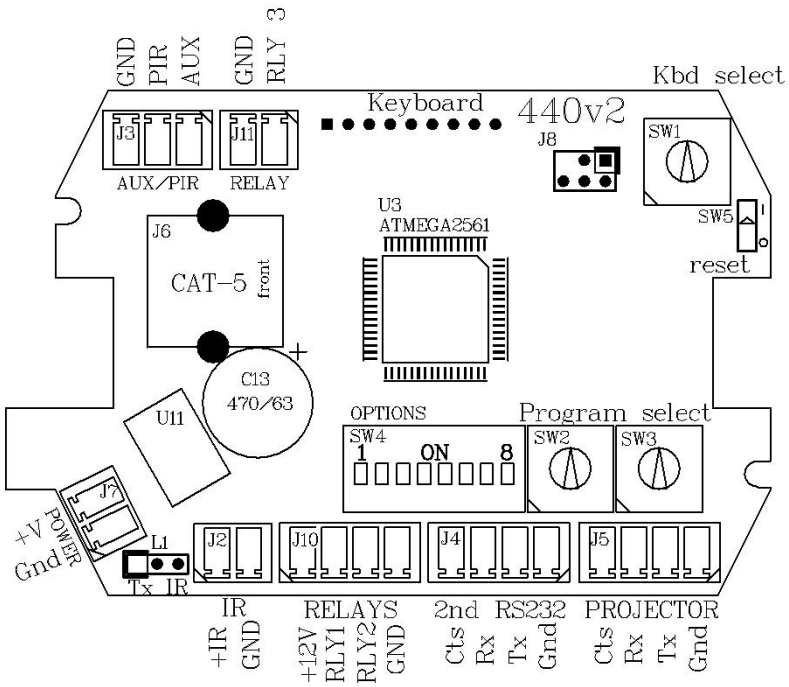
T440 Connections:

Across the bottom, right-to-left, are Phoenix plug-in screw terminals for wiring to the outside world:

- Projector RS232 serial connection: same pinout as the T460, with Ground, Tx (data out), Rx (projector reply) and CTS (optional, infrequently used);
- Auxiliary RS232 serial connection: used for download and serial connections, e.g. to the T441/T461 audio controller;
- At the far left is the power input, in the range of 9 to 25 volts. Current is under 50mA but depends on voltage;
- Optional: Relay drive out, intended for screen control. Optional: IR transmitter output: (Code 1 keyboard only);

At the top left is three-terminal connection J3, with two inputs, one for the PIR input the other is unallocated at the moment. Next to it is connection J11 for Relay 3, a "power on", USB switcher or aux screen/dipper relay drive.

Just below this input connector is a CAT5 socket. This is a quick wiring option for the communications /power/PIR to the T467 "cable-top" box which provides terminations to the projector (DB9), power in socket, and PIR screw terminals. (It is NOT an Ethernet connection.)



T440 Switches:

- One hex switch (at the top-right) selects the keyboard type by code;
- Two hex switches provide "Program Select" to select an entry in the data-base of projector/flat panels. It needs a screwdriver to select codes from 00 to FF;
- An 8-position "Option" switch, allows installers to select options, e.g. alternate video source, auto-send of pixel align, T441/T461 use, etc.;
- One push-button "Reset" switch.

Setting up the T440 switches

Selection of keyboard type

This is done using the "Kbd select" hex switch, and selecting the code of the keyboard style. This allocates the key closures to T440 functions, and makes the T440 design extremely flexible in application. At the end of this manual is a table of keyboard drawings and their codes. The code number below each keyboard is simply entered onto the switch by setting the arrow on the switch to a code with a small screwdriver. Normally, this is pre-set at the time of manufacture, and would not need to be altered in the field.

Selection of Options

An 8-switch options selection switch (SW4) is used to select install-time options.
NOTE: The OFF (default) position is with all sliders DOWN (by the switch numbers and green connectors).
Moving a switch to the ON position selects the option, as defined in this table:

Switch	On Function	Switch	On Function
OPT1	Swap Video 1 and Video 2 sources, i.e. use S-Video or HDMI as main "video" source.	OPT5	Swap Computer 1 and Computer 2 sources.
OPT2	Set automatic sending of Auto Pixel Align after any Computer key selection. (Time after Computer command is Constant:7)	OPT6	Use S-Video instead of HDMI where available. (For some devices S-Video is default, and OPT6 selects HDMI.)
OPT3	Off: allows pre-setting of channels, etc. prior to use of Timer/Card Swipe/PIR auto/remote start On: Lock out keyboard and use auto/remote ON	OPT7	Enable projector state sensing, and turn T440 off if OFF or COOLDOWN sensed
OPT4	On: Enables toggle mode between, e.g. two computer or two video channels when there are no specific 1 or 2 keys.	OPT8	Use T441/T461 for audio switching & control. (Also allows for setting DPA-22 amp.)

Selection of the program/projector

SW2 and SW3, the "Program select" switches shown in the T440 rear view, are normally used to select a family and/or make of projector. These switches are read on Reset (pressing the "Reset" switch) or power on, and determine what codes are sent to the projector as front panel keys are pressed.

(In this documentation, when a code "2A" for example, is quoted, it means the first hex digit, "2" is set onto the left-hand switch, SW2, and the second hex digit, "A" is set onto the right-hand switch, SW3.)

Codes from 00 to DF are used for projector program selection: use the projector tables in the "Projector data" section of this manual to choose a program code and set it into these two switches.

(Codes from E0 to FD are used for setting pre-set constants (such as warm-up time), code FE is used for a "Restore factory pre-sets", and FF is used as a test and diagnostic mode.)

Setting of constants in the T440

The T440 has built-in non-volatile memory (i.e. it maintains its contents even if power goes down).

This memory is used to save the series of constants (typically set or adjusted at T440 install time), for example:

- Altered Cooldown and Warmup and AutoPixelAlign delay times;
- Select a particular non-default channel (e.g. a Component or HDMI channel in place of the default Composite Video);
- Set the timeout for the internal timer used to turn off the projector if everyone leaves the room; or
- Enable and set the mode of operation for the screen control relay outputs.

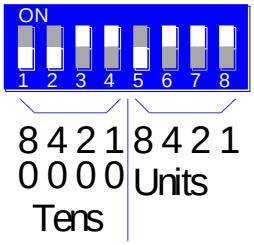
The constant setting process

To set a non-volatile constant, several steps are done in sequence:

1. Setup the DIP switch called "Options" to a value to be loaded into that constant;
2. Setup the "Program select" hex switches to address the constant. The constants are addressed by setting the switches to a number in the range E0 to FD, allowing for 30 constants. The meaning of a particular constant and its hex (switch) address is listed in the following tables; and
3. Press the push-button "Reset" switch.

   If this is done properly, the green LED in the ON position will glow for 2 seconds and then turn off. No other LEDs will be on, in this constant-setting mode, even after the 2-second blink. The 2-second blink indicates that the constant was setup and saved correctly.

Setting a value into the Options switch

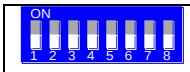
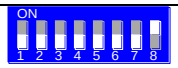
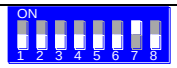
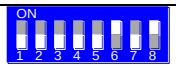
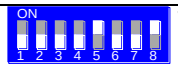
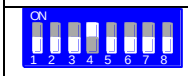
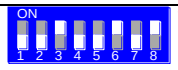
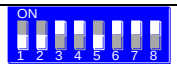
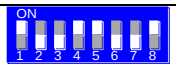
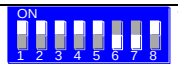


A decimal value in the range 0 to 159 can be set on the "Options Switch". The switch is divided into two groups of four switches.

ON is the position with the slider moved UP, and is shown in WHITE in these drawings.

The first (right) four (switches 5, 6, 7 and 8) are coded into the "units" part of the number as a BCD setting from 0 to 9.

The second (left) four (switches 1, 2, 3, and 4) are coded into the "tens" part of the number, extended to set a value from 0x to 15x. **NOTE: This means value:11 is set by OPT4 and OPT8 both ON, (NOT hex 0B, OPT5,7 & 8).**

 Value 0 0	 Value 0 1	 Value 0 2	 Value 0 5	 Value 0 9
 Value 1 0	 Value 2 5	 Value 3 7	 Value 9 9	 Value 159

Program select switch setup for constant setting

Constant	Program select switch setting		Usage	Range for units	Comments
	SW2	SW3			
Constant:0	E	0	"Computer 1" key message	1->20	Main, or "Computer 1" key
Constant:1	E	1	"Computer 2" key message	1->20	Second, or "Computer 2" key
Constant:2	E	2	"Video 1" key message	1->20	Main, or "Video 1" key
Constant:3	E	3	"Video 2" key message	1->20	Second, or "Video 2" key
Constant:4	E	4	Disable keys	Bits mask Comp 1 & 2, Video keys, val. = 1, 2, 4	
Constant:5	E	5	Warmup time	1->159 seconds	
Constant:6	E	6	Cooldown time	1->159 seconds	
Constant:7	E	7	AutoPixelAlign time delay	1->159 seconds	(after Computer message), **Defaults to 30 sec. if value is 0**
Constant:8	E	8	Closedown timer	0->15 hrs, 54 mins in 6 min steps	"01" = 6mins, "45" is 4 h, 30 m. **Factory Default of "00" sets 30min.**
Constant:9	E	9	Screen relay mode setting	0, 1= one pulse, 2, 3= 2 pulses, 4= direct drive, 5= 1 relay. Adding 10 sends commands to T462 via Ser2 (10, 11 … 15) AS WELL. Adding 20 sends screen commands to T462 ONLY, allowing on-board relays to be used for switcher control. **Default is 1 pulse mode to suit ScreenTechnics.**	
Constant:A	E	A	Lower TV channel	"0" assumed if not set to value	
Constant:B	E	B	Upper TV channel	"10" assumed if not set to value	
Constant:C	E	C	Enable/start/stop mode setting for key/timer/Aux or PIR input.	(OPT3 switch OFF is normal, ON enables these functions.) 0= Aux-In close starts on last input (keyboard ON disabled); 1= Aux-In close starts, PIR-In stops; 2= Aux-In close starts e.g. swipe card reader, pushbutton; 3= Aux-In enables ON button e.g. from key-switch;	

Constant	Program select switch setting		Usage	Range for units	Comments
	SW2	SW3			
			See Page 9/10 for detail.	4= Aux-In Starts & Stops, from an external timer contact; 5= PIR starts, closedown timer stops; 6= PIR starts, PIR extends On time, closedown timer stops. 7=Aux-In pulse starts, Aux-In stops from ext. push button.	
Constant:D	E	D	Control of Relay3 439 / Pwr. control	0= Relay3 tracks Computer2, 1= Relay3 On/Off on Power up/down (e.g. to operate audio amp / casing / dipper)	
Constant:E	E	E	TV channel cmd.	0= Use DTUP/DTDW, 1=Use CHUP/CHDW	
Constant:F	E	F	Audio system & switcher options via SER2	00=T441/T461, 11...18=PTN DPA-22, 20=WVG2A 24: AVlink HRM-2214, 25: AV link MRM-701, 30/31: Lightwave, 35: APart Concept1, 40/41/42 Kramer VP-440.	
Constant:10	F	0	RS232 Relay 1 … 8 control via second serial port sending On/Off commands to T441/T461or JED 439 USB switcher	On/two relays selected by high/low nibble for Computer 1	
Constant:11	F	1		On/two relays selected by high/low nibble for Computer 2	
Constant:12	F	2		On/two relays selected by high/low nibble for Video 1	
Constant:13	F	3		On/two relays selected by high/low nibble for Video 2	
Constant:14	F	4		On/two relays selected by high/low nibble for TV	
Constant:15	F	5	On-board Relays 1 … 3 selected by numbers 1 … 3 in low nibble of constant. (Use IR pin for screen control or send to T462. See $F9.)	On-board Relay selected for Computer 1 (for switcher)	
Constant:16	F	6		On-board Relay selected for Computer 2 (for switcher)	
Constant:17	F	7		On-board Relay selected for Video 1 (for switcher)	
Constant:18	F	8		On-board Relay selected for Video 2 (for switcher)	
Constant:19	F	9		On-board Relay selected for TV (for switcher)	
Constant:1A	F	A	Chan->Vol. Secs	Over-ride time after channel send to volume send.	
Constant:1B	F	B	Unused		
Constant:1C	F	C	Interbyte Tx delay	Over-ride time between bytes transmitted. Setting of 00 uses presets. Setting 1->100 (01->A0) sets 10's of microseconds (i.e. 10->1000uSec. Setting 101->159 (A1->F9) sets 1 to 59 milliseconds interbyte Tx delay.	

Special notes for Code 6 option of T440

This option allows what is normally a T430 keyboard to be used on a T440 hardware board. This would only be done when the T440 range is not suitable because no audio control is needed. This is done to allow:

1. The second serial interface on the T440 to send serial messages to external RS232 devises such as a 439 USB switcher; and
2. Relays for screen control (Relays 1, 2) and hardware 439/ power (i.e. audio system) or dipper control via Relay 3.

When this option is used, the switches used for channel setting option on a T430 are allowed on a T440. This table, for a **KB1 keyboard ("On" and "Off" keys only)** shows what options are selected by Option switches 1, 5 and 8:

Note: In the following tables, OPT2 (Auto Pixel Align) and OPT7 (reply mode) are NOT included in the settings:

Source (single)	Option settings	Source (single)	Option settings
Computer 1	All OPTs Off	Video 1 (Comp)	All OPTs Off except OPT8: On

Computer 2	All OPTs Off except OPT5: On	Video 2 (See part B manual for Video 2 allocation.)	All OPTs Off except OPT1: On, and OPT8: On

The following table is for **KB3 keyboards ("Off" and "On/Source")**

Note: In the following tables, OPT2 (Auto Pixel Align) and OPT7 (reply mode) are NOT included in the settings:

Sources (dual)	Option settings	Sources (dual)	Option settings
Computer 1 & Computer 2	All OPTs Off except OPT4:On	Video 1 (Comp) & Video 2 (S-Vid)	All OPTs Off except OPT4: On, and OPT8: On
OPT6 ON for all following with split Computer / Video (Computer channel is default)		**OPT6 ON for all following with split Computer / Video (Computer channel is default)**	
Computer 1 & Video 1	All OPTs Off except OPT4:On and OPT6: On	Computer 1 & Video 2	All OPTs Off except OPT1: On, OPT4: On and OPT6: On
Computer 2 & Video 1	All OPTs Off except OPT4:On OPT5: On and OPT6: On	Computer 2 & Video 2	All OPTs Off except OPT1: On, OPT4:On,OPT5:On, OPT6:On
OPT6 ON and OPT8 ON for all following with split Computer / Video 1 (Video channel is default)		**OPT6 ON and OPT8 ON for all following with split Computer / Video 2 (Video channel is default)**	
Video 1 & Computer 1	All OPTs Off except OPT4:On OPT6: On, OPT8:On	Video 2 & Computer 1	All OPTs Off except OPT1:On, OPT4: On OPT6: On, OPT8:On
Video 1 & Computer 2	All OPTs Off except OPT4:On OPT5:On,OPT6: On,OPT8:On	Video 2 & Computer 2	All OPTs Off except OPT1:On, OPT4: On OPT5: On,OPT6: On, OPT8:On

Note: When changing selection, you will have to press the RESET button to cause the system to read the switches, and cycle the system between the choices (with the ON button) to make sure they are setup, and then press the OFF button to save the selections.

Key masking using Constant:04

This option allows individual keys to be masked off if they are not needed in a particular install. (This might be if a "portrait" T440 is needed, but not all three channels are needed.) Channels correspond to bits in Constant:04 as per the following table. Setting a bit to "1" will disable that key. It is only available for keyboards with two or three channels: single channel controllers don't need it. One or two bits can be set at the same time: don't set any more than ONE less bit as there are channel select keys, as then the T440 will do nothing!

Bit settings: Constant: 04	**Keyboard availability**	**Bit settings: Constant: 04**	**Keyboard availability**
No bits set. Value = 00	All keyboards operate as normal	Bit 0&1 set. Value = 03 Turn off Comp 1&2 keys.	Code 5: Only Video avail. Code B: Only Video avail
Bit 0 set. Value = 01 Turn off Computer 1 keys.	Code0: Only Video avail. Code8: Only Laptop avail. Code 9, A: Only Video avail. Code E: Only Video and TV.	Bit 2 set: Value = 04 Turn off Video key.	Code 1: Only Computer avail. Code 5: Only Computer 1&2. Code A: Only Computer avail. Code B: Only Computer 1&2. Code E: Only Computer and TV

Hardware interfaces of the T440

Screen control (relay) interfaces Relays 1 and 2 (also send to T462 relay box)

Four-pin screw terminal connector J10 is used to interface to screen control relays or control interfaces (like the "Control" interface released by ScreenTechnics, or the Somfy ILT CD4 interface.) The interface provides:

- A Ground pin for connection to the common of a system like the CD4 or ScreenTechnics;
- A +12 volt pin to provide power for the top of isolation relays driven by the outputs;
- Relay 1, used for "screen-down" function, (or with "12v trigger" mode, down and up); and
- Relay 2, used for "screen-up" function.

The Relay 1 and 2 lines are driven by a 10 A, 60V N-channel power FETs, which provides a low resistance to ground when turned on. These lines can connect to a CD4 or Screen-Technics controller, simulating a switch connection to common ground. (Don't use the 12 volt power connection with these two screen controllers.)

Screen relay mode setting

Constant:[9] holds a number, setting the screen control mode, shown in the following table. For timed drive, screen down time is set by "Warm-up time", set by Constant:[4]. Screen up time is set by "Cool-down time" settings, set by Constant:[5].

If "10" is added to the constant, serial commands are sent to a JED T462 plugged into the second serial port as well. (This was added because some screen control systems (e.g. Somfy IB+ 1 AC Motor Controller WM/PCB 100-240 V AC) do not allow the common line to the grounded to the T440 common. The older Somfy CD4 did allow this.)

Constant:9 value	Function	Screen Down: ON key	Screen Up: OFF key
0, 1/10,11	ScreenTechnics mode (*not ViewMaster Pro Use IR LED)	Relay 1 pulse starts down when ON key pressed. Motor stops automatically with internal limit switches	Relay 2 pulse starts up when OFF key pressed. Motor stops automatically with internal limit switches
2/12	Somfy CD4 mode	Relay 1 pulse starts down, Relay 2 pulse stops at end of Warm-Up time set	Relay 2 pulse starts up, Relay 1 pulse stops at end of Cool-down time set
3/13	Somfy CD4 & ILT mode	Relay 1 pulse starts down, Relay 1 & 2 pulse together stops at end of Warm-Up time set	Relay 2 pulse starts up, Relay 1 & 2 pulse together stops at end of Cool-down time set
4/14	Direct drive mode: 2-line	Relay 1 runs "Down" motor when on for length of Warm-Up time set	Relay 2 runs "Up" motor when on for length of Cool-down time set
5/15* ** See also "IR LED" below for alt. drive	Direct drive "12v Trigger" mode: 1-line	Relay 1 runs "Down" motor until limit switch stops. Relay stays On	Relay 1 OFF starts "Up" motor until limit switch stops.
* This mode assumes an opto-isolated "Trigger" screen input. Connect "+" to +12v and "-" to Relay 1 out, both on J10			

**IR LED driver (also provides a Screen trigger +5 volt driver: eg for ViewMaster Pro)

Connector J2 is optionally a drive to an IR LED transmitter. See Epson X5/X6 for details of implementation. If **not** used for IR, this output defaults to send +5 volts out (which can command Screen Down) when "On" is pressed, and pressing Off commands screen Up.

If commanding a screen, use the "Trigger" input … this is usually called "12V trigger" but we have always found it operates down to about 3 volts reliably, so 5 volts drive is OK. The "Trigger" input usually has two lines (labelled + and -). Connect the "+" to the +IR out connection, and the "-" to Ground alongside.

This does NOT need a "Constant:9" setting, and can be used with user choice of relay functions on the Relay connector. (This output can also be used for power control, actuating an optical isolated power relay, or could operate a dipper or screen casing when relays 1 and 2 are used for actual screen control.)

Relay3 (USB/VGA switch drive, power control relay or dipper control)

Connector J11 is for Relay 3, an N-channel FET output. This is used for control of ancillary equipment.

There are two functions allocated to this relay:

Default (Constant:D=0): Relay3 tracks "Computer2" selection. This is typically to drive a USB switch controlling which computer drives the USB port of an Electronic White-Board (ELB), (and possibly a VGA and audio switch.) JED has a USB switching device in design, the 439. Call for details.

Selected (Constant:D=1): When the ON key is pressed, Relay3, is actuated … this can be used to turn on external audio equipment (powered speakers, etc) via an isolation relay, such as Boolean Engineering's "Easyswitch".

The drive to Relay3 is turned OFF when the OFF key is pressed.

The two screw terminals on the Easyswitch connect to the RL3 and Gnd on, J11.
See: http://www.booleanengineering.com/expeasy/

It is also possible to drive a normal magnetic or opto-isolated zero-crossing 240vAC relay from this output, by connecting the positive end of the relay to the +12 volts connection on power input, connector J7.

Projector Dipper / Aux screen or casing control: This can drop and raise a ceiling projector dipper or a screen casing. **Note: If the dipper or casing needs two relays pulsed for Down and Up, use a JED T462 Opto to relay converter.**

Closedown Timer and PIR (Passive Infra-Red) input for automatic turnoff

Connector J3 is used as two contact-close/open inputs.

A PIR infra-red "people-detector" senses whether all the class and presenter has left the building, leaving the video equipment running.

The time-out is set as Constant:8. **If left at the default of 0, the default time of 30 mins (setting of 05) is assumed. This default was first introduced in rev 017. No timeout is actioned UNLESS J3 "PIR In" is grounded either via a piece of wire or a PIR "normally-closed" relay contact.**

The number placed into Constant:8 is a time-out count of 6-minute intervals, and a Constant:8 value of 10, for example, is one hour. The maximum count is 159, i.e. 15 hours and 54 minutes. (9 x 6 mins= 54 mins)

This timeout is reset by any key operation, i.e. a channel change, a volume, mute or freeze setting, or even re-pressing the current channel button or the ON key.

The timeout only operates when the input on the PIR pin is shorted to ground by the NORMALLY-CLOSED relay output of the PIR detector. When the PIR senses a person in its sensor beam, the relay opens, and the PIR input pin is pulled up by a resistor on the T440. This clears the counter in the same way a key-press does, and the counter restarts.

Test mode: Dialling FF (hex) on the code switches and pressing "Reset" enables a test mode where the red "OFF" LED shows the PIR input state, and the Green LED above it (normally On or Video) follows the Aux input state. As you walk around the room, the LED shows the area covered, and the mount angles can be adjusted to the normally occupied area.

Note: This function can be used without the PIR, just as an OFF-timer. When the timer is about the close the system down, the current channel LED and the OFF LED flash alternately for 30 seconds before closedown. Pressing the current channel key will cancel the timer and restore operation for a further timer preset period. If using without a PIR, the PIR screw terminal must be shorted to the Gnd screw terminal via a short piece of wire.

OPT3: AUX/PIR input for remote enable/start/stop mode setting for key/timer/PIR in

There is a number stored in Constant:C which is used to determine the mode for external control inputs into Connector J3's Aux input is for auxiliary inputs, e.g. a card swipe reader, key switch, a programmable timer or a simple "Push-to-start" customer push button for system enabling or starting (and optionally, stopping) Constant:C also controls use of the PIR input to Connector J3 to automatically start projector operation (and optionally continue it, if there are repeated PIR pulses).

NOTE: These functions are only enabled when OPT3 switch is turned ON.
If this switch is turned OFF, the T440 ON keys(s) can be used, allowing easy setup of default channels and other testing. Then turn OPT3 switch ON to engage these control functions (and disable the ON key(s)). After an Aux/PIR initiated turn-on, the starting channel is the saved, (last used) one before turnoff.

The value set into Constant:C determines these remote enabling and control functions (only with **OPT3 = ON**):

- **Constant:C = 00: (Default): Switch-ON mode, either a keyboard ON key or an external push button to AUX:** This modes allows an external contact closure wired into the J3:AUX terminal to operate exactly the same as pressing the "ON" keyboard key. This could be a customer "Push-to-start-show" switch.

  The projector turns OFF when either the OFF button is pressed or, if used, the PIR and the internal Closedown timer (set at Constant:8) times out.

- **Constant:C = 01: Switch-ON/OFF mode, either keyboard ON/OFF keys or external push buttons to AUX and PIR:** Same as 00 above, except OFF can be either keyboard OFF key or contact **close** on PIR input;

- **Constant:C = 02: Switch-ON mode, no keyboard ON allowed (eg security card reader):**
  This modes allows an external contact closure wired into the J3:AUX terminal to operate exactly the same as pressing the "ON" keyboard key. This could be a customer "Push-to-start-show" switch, a contact closure from a RFID, a Swipe-card reader or a Dallas security key/button scanner or a key-operated switch (in the mode where operating the switch momentarily "ON" starts the projector. (Input sources can be changed on the keyboard when the projector is running.)

  The key/switch input can be turned OFF and removed and the projector does NOT turn OFF immediately, in this mode. The projector turns OFF when either the OFF button is pressed or, if used, the PIR and the internal Closedown timer (set at Constant:8) times out;

- **Constant:C = 03: Switch-Enable mode:** This mode allows an external contact closure wired into the J3:AUX terminal to ENABLE the "ON" keyboard button(s). (The J3:AUX contact can be turned OFF after the ON button(s) press, (i.e. the external key can be turned OFF and removed) and the projector does NOT turn OFF immediately in this mode.) The OFF LED blinks off momentarily every 5 seconds in this mode while disabled, and has no blinks in the enabled state.

  The key/switch input can be turned OFF and removed and the projector does NOT turn OFF immediately, in this mode. The projector turns OFF when either the OFF button is pressed or, if used, the PIR and the internal Closedown timer (set at Constant:8) times out;

- **Constant:C = 04: Switch/Timer On/Off mode:** This mode controls both the ON and the OFF from the J3:AUX terminal. Typically this allows a remote switch (e.g. the output contact of a small LCD timer such as the JED "**460-Timer-12V**" unit) or an external ON/OFF switch to control the whole ON **and OFF** operation, not just the ON function. The PIR input and the internal Closedown timer does NOT operate in this mode.

  The T440 keyboard is still operational (even with OPT3 ON), so pressing ON in the OFF-state will turn the projector ON manually, and the OFF key will turn it OFF manually. If a programmed ON cycle occurs when it is already ON, it remains ON, but will turn OFF automatically if the timer turns it OFF before it is manually turned OFF. If the timer had turned it ON, the OFF key will turn it OFF, terminating a cycle. It will stay OFF until the timer has cycled OFF, but will turn ON again at the next automatic timer ON event. (It can also be re-turned-ON manually);

- **Constant:C = 05: PIR start, Timer stop mode:** This mode uses a contact OPENING on the J3:PIR in exactly the same way as pressing the "ON" keyboard key, and the projector starts. The PIR contact is not tested again, and the projector turns OFF when either the OFF button is pressed or the internal Closedown timer (set at Constant:8) times out. (The ON key can also allow a manual start.)

  The effect of this is that after a person is detected, the projector runs for a fixed time (i.e. Closedown time) and the timer is not reset by PIR detections;

- **Constant:C = 06: PIR start, PIR extend, Timer stop mode:** This mode uses a contact OPENING on the J3:PIR in exactly the same way as pressing the "ON" keyboard key, and the projector starts. The PIR contact IS tested again, and the projector turns OFF when either the OFF button is pressed or the internal Closedown timer (set at Constant:8) times out. The PIR input is tested, and it resets the timeout on a contact opening. (The ON key can also allow a manual start.)

  The effect of this is that the PIR can turn on a projector and keep it on continuously (i.e. time is extended) while people are being detected, then the Closedown timer closes it down when no more interrupts are detected.

- **Constant:C = 07: AUX-In pulse start, AUX-In pulse stop:** This mode uses a momentary contact closing on the J3:AUX-in exactly the same way as pressing the "ON" keyboard key, and the projector starts. The J3:AUX-in contact is tested continuously, and the projector turns OFF when J3:AUX-in contact closes again momentarily. (The ON button and the OFF button can also allow a manual start and stop.)

  The effect of this is that one pushbutton on a wall or panel can turn the system ON when pressed once, and OFF again when it is pressed again.

Software aspects of the T440

Serial port 2 access to T440 setting information

If a T440 installer wishes to check the program version, examine switch settings and meanings, Constant settings, keyboard settings etc., a test/debug mode can be entered. To do this:

- Connect a T440/460 "reprogramming" cable from the "Second" T440 serial port, (i.e. a Phoenix to DB9 cable) to a PC serial port (or USB to RS232 cable);
- Load and run a terminal emulation program such as Docklight (JED's favourite), "Bray Terminal" or Hyperterminal;
- Set a baud rate of 38400 8N1 and connect on-line;
- Set the "Program select" switch to FF hex; and
- Push the "Reset" switch.

The terminal display looks like:

```
Hello World from JED T440V154P ← Note version number
This build at: 2134 on: 3/06/2021
Hardware design and software (c) JED Microprocessors 2008 to 2021
To exit, select a non-FF switch setting and reset using reset switch
```

LEDs flash for LED test at this point

```
Non-volatile flags: D0 = 00000000b<CR><LF>
Non-volatile flags: D1 = 00000000b<CR><LF>
Non-volatile flags: D2 = 00000000b<CR><LF>
etc
Non-volatile constant: E0 = 00h
Non-volatile constant: E1 = 00h
Non-volatile constant: E2 = 00h
etc to
Non-volatile constant: FC = 00h
Non-volatile constant: FD = 00h
Option switches: 00h, 0
Program select: FFh     Test mode
Keyboard type:  09h     KB6:Computer, KB1:Video, KB2:VolUp, KB3:VolDn, KB4:Off,
KB7:On
```

Rotating the program select switches will show the loaded projector selections by the Program Switch hex settings.

PIR and Aux Test mode: FF (hex) on the code switches enables a test mode where the red "OFF" LED shows the PIR input state, and the Green LED above it (normally On or Video) follows the Aux input state. As you walk around the room, the LED shows the area covered, and the mount angles can be adjusted to the normally occupied area.

Factory Reset of constants

If a system needs to have all constants reset to 00 (i.e. the default settings):

- Set the "Program select" switch to FE hex;
- Turn on all Option-switches; and
- Push the "Reset" switch.

The green LED alongside the ON Key glows for **5** seconds. You will then need to reset the Option and SW2/3 switches.

NOTE: Because all the flags are reset by this operation, the "Flag F" (addressed at "DF), which determines the choice between "Projector" and "Flat Panel" control, is reset to "00", the value selection "Projector". This must be set to "01" if the controller needs to run a flat panel.

Readout of Software Version Number

(The version number display changed after rev V100 to allow for a three-digit version number display. Three digits are now displayed as a Green-Red-Green sequence for Hundreds-Tens-Units of the version no, and a "zero" in the number is shown as a very brief "blip" (2-milliseconds), whereas a digit is ½ a second with a ½ second gap.)

- Set the “Program select” switch to FE hex;
- Turn off all Option-switches; and
- Push the “Reset” switch.

A green LED flashes for the Hundreds of the version number, then the Red Off LED flashes for the Tens, then a Green flashes again for the UNITs of the version number. Flashes are 1 second apart.

The green LED also shows whether the loaded software is for a projector or a flat panel. If the green LED flashes on for 5 seconds after the three flash periods above, it is a flat panel setting, if NO green for 5 seconds, it is a projector setting.

You will then need to reset the Option and SW2/3 switches (and press RESET again).

OPT1: Swap Video:1 and Video:2 sources

If Option Sw1 is ON, Video:2 (normally S-Video) is used as the primary “Video” source”, and vice versa.

OPT5: Swap Computer:1 and Computer:2 sources

If Option Sw5 is ON, Computer:2 (normally RGB-2) is used as the primary “Computer” source”, and vice versa.

OPT4: Selection of toggle-mode for Computer & Video keys

If Option Sw4 is ON, then repeat pressing of the “Computer” keys toggles between Computer 1 and 2 and repeat pressing of the “Video” key toggles between Video 1 and 2 (usually Composite Video and S-Video channels). When switching to a Computer or Video channel from the other, the Computer 1 and Video 1 are selected as defaults, and so the way to get to the secondary channels is by pressing the Computer or Video keys again after the green LEDs have stopped flashing. Watch the label on the projected image to see the selected channel.

Note: On Code 9 or A keyboards, if one needs two computer channels but only one video, set both Video constants to the same setting. Setting OPT1 switch ON will swap Composite Video and S-Video, so S-Video becomes the default.)

OPT7: Detection of projector shutdown

If Option Sw7 is ON, then the projector will be polled by the T440 every 5 seconds for its run state. If the projector has been turned OFF (either manually via the projector-top buttons, the projector IR remote or because of a timeout with no signal, etc) the T440 will detect this and will also follow state to show the OFF LED glowing. To test this, select SW7 on, do a “reset” via the reset switch and then run the system. Then disconnect the projector, and the system should close down after three failed polls (15-20 seconds). OPT7 reply mode only starts after the system has been ON for 6 minutes, to allow for slow warmup or projectors that have fast turnoff, but then delay turnon.

OPT8: JED T441 or T461 audio control (Needs Constant:$F= 00 (default)

The T440 software supports the use of the T441/T461 to give absolute control of audio switching and level. These are used if Option Switch 8 is ON. When connected, and the OFF key pressed, the green ON LED flashes momentarily. (See the separate T441 manual for details using the T441.) The T441/T61 is driven from the T440 second serial port.

For the 4-channel T461, the channel allocations are:

- Channels “Computer:1” and “Computer:2” use T461 channels 1 and 2; and
- Channels “Video:1” and “Video:2” use T461 channels 3 and 4.

If a two-stereo-channel T441 is used, switches on its end panel allow it to be used in several configurations:

- As two stereo channels, allocated as one for Computer:1 and one for Video:1;
- As two stereo channels, allocated as one for Computer:1 and one for Computer:2;
- As 4 mono channels, one for each of Computer:1 & 2 and one for each of Video:1 & 2; and
- As a split mode system, with a mono channel each for Computer 1 and 2, and a stereo channel for Video 1.

(See below for relay setups via T461/T462). Coms is at 38400 baud

When Off is pressed in the OFF state, as well as the Red OFF LED blinks showing projector communications OK, the Green LED above it (On) will blink briefly showing T441/T461audio controller comms OK.

OPT8: PTN DPA-22 audio control (Needs Constant:$F= 11 … 18)

This amplifier/attenuator/switcher can be controlled via the second T440 serial port under control of the number loaded into Constant $F.

Communications is at 9600, and a simple three wire cross connection is all that is needed (Tx, Rx, Ground.)

(A microphone channel is also available, which can be level set using the keyboard/LEDs on the DPA-22 lid.)

There are eight channel allocations available for the two channels selectable on this device: they are setup using the 1/2/3/4 units digit of the Constant:$F.

Because the two audio connectors of the DPA-22 are different (Input 1 is 2 x RCA, and Input 2 is 3.5mm jack), it is sometimes more convenient to swap the sources because of cabling convenience. This is done by selecting group 15/16/17/18 rather than 11/12/13/14.

Constant:$F=11	Computer:1 selects DPA-22 **Input1**, Computer:2 selects DPA-22 **Input2**, no audio on Video:1 or 2
Constant:$F=12	Computer:1 selects DPA-22 **Input1**, Video:1 selects DPA-22 **Input2**, no audio on Computer:2 or Video:2
Constant:$F=13	Computer:1or 2 selects DPA-22 **Input1**, Video:1 or 2 selects DPA-22 **Input2**
Constant:$F=14	Video:1 selects DPA-22 **Input1**, Video:2 selects DPA-22 **Input2**, no audio on Computer:1 or 2
Constant:$F=15	Computer:1 selects DPA-22 **Input2**, Computer:2 selects DPA-22 **Input1**, no audio on Video:1 or 2
Constant:$F=16	Computer:1 selects DPA-22 **Input2**, Video:1 selects DPA-22 **Input1**, no audio on Computer:2 or Video:2
Constant:$F=17	Computer:1or 2 selects DPA-22 **Input2**, Video:1 or 2 selects DPA-22 **Input1**
Constant:$F=18	Video:1 selects DPA-22 **Input2**, Video:2 selects DPA-22 **Input1**, no audio on Computer:1 or 2

When Off is pressed in the OFF state, as well as the Red OFF LED blinks showing projector communications OK, the Green LED above it (On) will blink briefly showing DPA-22 audio controller comms is OK.

Note: Some early releases of this audio device have incorrect software … make sure it has a corrected version.

Configuring the T440: Using the projector channel codes:

In part B of this manual, hex or ASCII commands strings are shown for each available source in a projector/panel.

You don't ever have to put the hex strings into the device ... they are just shown for illustration and so you can compare them against the strings in a projector manual. (We do this because often projectors call things by different names on different models. Having the strings helps you choose an appropriate string, when they need setting.)

New system for source string naming: All channels are called "Inputs", NOT Computer 1,2 and Video 1,2. This is done at Rev40 to allow ANY string to be used with ANY function across both Computer AND Video channels. (This is useful for sources like HDMI, which can be used BOTH for Computer and Video sources.)

We preset the strings used for the "Input1" and "Input2" keys as defaults to be the first two entries in the Computer strings table on the page for each projector family:

So to use the Sony example, the first two strings are:

Input1 := A9 + 00 + 01 + 00 + 00 + 02 + 03 + 9A; // Computer1Input A VGA analog-RGB
Input2 := A9 + 00 + 01 + 00 + 00 + 03 + 03 + 9A; // Computer2 Input B or Component

and these are the defaults for the "Computer1" and "Computer2" keys . Whenever there is a DB15 connector we make this "Computer 1".

Same with video: their default strings are:

Input3 := A9 + 00 + 01 + 00 + 00 + 00 + 01 + 9A; // Video1 Composite Video RCA
Input4 := A9 + 00 + 01 + 00 + 00 + 01 + 01 + 9A; // Video2 S-Video

so the default Video1 key is just about always Composite on a RCA connector and Video2 (if there is one) is S-Video.

So the default first two "Computer" and "Video" strings are automatically setup WITHOUT HAVING TO SET ANYTHING INTO ANYWHERE!

Bonus : To make it VERY easy to swap S-Video for Composite Video, we have setup the OPT1 switch to just swap over Video1 and Video2 allocations. Set the switch and toggle the reset switch. At Rev V053, OPT6 replaces S-Video with HDMI (when available) More recent releases actually default Video2 to HDMI, and OPT6 selects S-Video. See individual device tables in PartB manual. (On some LCDs, this swaps Composite Video for a second HDMI channel for Video.) Setting OPT1 AND OPT6 simultaneously will select HDMI as "Video".

In a similar way, setting OPT5 switch swaps Compter1 and Computer2 sources.

We always put all the strings we can find for a particular family into the internal system data base, and one can just select which one of the pre-coded strings you want to use, by PUTTING ITS INDEX NUMBER **ALONE** INTO THE CONSTANT LOCATIONS 0, 1, 2 AND 3.

So if you want the string called: *Input4 := A9 + 00 + 01 + 00 + 00 + 05 + 05 + 9A; // Input D or DVI*

to be the string used for the Computer1 key on a T440, simply put its index (i.e. "4") into the "Constant:0" location (as shown on page 4 of the manual, using a switch setting of E0 on the Program Select switch and 00000100 on the Options switch).

If you have a keyboard with TWO computer keys, the second key is programmed for one of the other "Input" choices by putting its index number into Constant:1 (program select switch = E1).

Configuring the T440: Setting up relay drives for video or USB switching, via SER2

There are three functions and JED peripherals which are affected by the relay drive signals which can be set up by constants 10…13. These relays can be used to drive external equipment, lighting, video conferencing, RGA/VGA or Composite/S-Video/Video Component switches.

If, for example, a projector has only one VGA input, but the user is installing a system which needs two VGA channels, a simple relay-controlled switcher can be installed to feed one VGA to the one available projector channel, but have the T440 switch between these VGA channels.

Note: If using a video switcher feeding one video (projector) channel for two buttons (switched externally) it is necessary to modify the channel selection constants at E0 … E3 so the same projector channel is selected for both, i.e. both on VGA or both on Composite Video (or whatever) by setting Constant:0 = Constant:1 or Constant:2 = Constant:3.

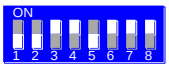
These are per-channel functions:

1. If a **T461** with the **–R8 option** installed is connected to SER2, these options allow one or two relays out of the eight installed relays to be automatically actuated when different Computer 1 & 2 and Video 1 & 2 selections are made;
2. Similarly if a **T462-2** or **T462-4** is connected to SER2, one or two relays per channel can be selected; and
3. The **JED 439** USB switch can be controlled by these constants so either USB Device A or B or none can be selected for any of the different Computer 1 & 2 and Video 1 & 2 selections. (Note Relay 3 drive for Computer:2 is available as well.)

Note: If no selections are made manually, the default is set so that RS232 control of a JED 439 USB switcher is available with no setting up required. This places "07" into constant 10 (Computer 1 selection of Device A), and "08" into constant 11 (Computer 2 selection of Device B). No settings for video channels or TV are made by default, so in Video or TV modes the USB connection is not made when the whiteboard is just being used as a white screen.

If it is still desired to operate external relays (in T461 or T462 boxes) when USB switching is desired, these can still be selected in the high nibble of constants 10 … 13. (Low nibble are switches 5 … 8 and the high nibble are 1 … 4.)

This relay setup allows TWO relay selections per constant/channel, so if "37" is setup in Constant:10, when Computer1 is selected, Relay 3 operates and USB Device A is selected.



Constant:10	F	0	Relay 1:8 control via Second serial port sending On/Off commands to T461/T462 or JED 439 USB switcher.	Two relays selected by high/low nibble for Computer 1
Constant:11	F	1		Two relays selected by high/low nibble for Computer 2
Constant:12	F	2		Two relays selected by high/low nibble for Video 1
Constant:13	F	3		Two relays selected by high/low nibble for Video 2
Constant:14	F	4		Two relays selected by high/low nibble for TV

Configuring the T440: Setting up PTN WVG2A VGA/audio/USB switcher from SER2

This device is serially controlled at 9600 baud and has a simple 3-wire connection (Tx, Rx, Gnd)

It is setup by loading Constant:$F with a value of 20. It has a simple mode of operation: Channel 1 is selected with a Computer:1 channel on the T440, and Channel 2 is selected with Computer:2.

Coms OK shows a green flash on the ON / top left LED after pressing the OFF button.

Note: When using a video switcher feeding one video (projector) channel with two VGA channels switched in the WVG2A, it is necessary to modify the channel selection constants at E0 and E1 so the same projector channel is selected for both, i.e. both on a single VGA projector channel. (So Constant:1 = Constant:0)

Configuring the T440: Setting up AVlink quad HDMI switcher HRM-2214F from SER2

This switcher handles four HDMI inputs to one HDMI output to a projector or panel. As an active channel is plugged in, a corresponding green LED lights. As a channel is selected a red LED illuminates. A channel is only selectable if a signal is active on that channel, and an active target device is plugged in to the output … it is quite fussy in this regard!

This device is serially controlled at 9600 baud and has a simple 3-wire connection (Tx, Rx, Gnd)

Coms OK shows a green flash on the ON / top left LED after pressing the OFF button.

It is setup by loading Constant:$F with a value of 24. It has a simple mode of operation: Channels 1->4 are selected with a Computer:1/2 then Video: 1/2 channel on the T440.

Note: When using an HDMI switcher feeding one HDMI (projector) channel with up to four HDMI channels switched in the HRM-2114F, it is necessary to modify the channel selection constants at E0 ->E3 so the same projector HDMI channel is selected for all switched channels. See: http://www.avglue.com.au/hrm-2214f.html

Configuring the T440: Setting up AVlink MRM-701 switcher/scalar from SER2

This switcher is set up to handle four inputs (VGA, Video, and 2 x HDMI) to one HDMI output to a projector or panel. As a channel is selected, a red channel LED illuminates.

This device is serially controlled at 9600 baud and has a simple 3-wire connection (Tx, Rx, Gnd)

Coms OK shows a green flash on the ON / top left LED after pressing the OFF button.

It is setup by loading Constant:$F with a value of 25. It has a simple mode of operation:

Computer1Mode: (Send code: 20 + 01 + 01 + 04 + 7E); // Input 4 VGA selected

Computer2Mode: (Send code: 20 + 01 + 01 + 02 + A3); // Input 2 HDMI 2 selected

Video1Mode : (Send code: 20 + 01 + 01 + 06 + C2); // Input 6 Comp Video selected

Video2Mode: (Send code: 20 + 01 + 01 + 01 + 41); // Input 1 HDMI 1selected

Channels 1->4 are selected with a Computer:1/2 then Video: 1/2 channel on the T440.

Note 1: Setting switches 5 and 1 inverts 1 and 2 selection for Computer and Video respectively, so HDMI2 can become the prime Computer channel, and HDMI1 can become prime Video channel.

Note 2: When using an HDMI switcher feeding one HDMI (projector) channel with up to four HDMI channels switched in the MRM-701, it is necessary to modify the channel selection constants at E0 ->E3 so the same projector HDMI channel is selected for all switched channels. See: http://www.avglue.com.au/mrm-701.html

Configuring the T440: Setting up Lightwave UMX-TP-TX100 from SER2

This device is serially controlled at 57600 baud and has a simple 3-wire connection (Tx, Rx, Gnd) It has an HDMI input with embedded audio, and a PC:VGA (and audio) input. Data is transmitted via a CAT5 cable to a receiver by the projector or display device.

Channel selected	**Constant:$F = 30**	**Constant:$F = 31**
Computer 1	HDMI	PC:VGA
Computer 2	PC:VGA	HDMI

Note: When using a video switcher feeding one video (projector) channel with two VGA channels switched in the WVG2A, it is necessary to modify the channel selection constants at E0 and E1 so the same projector channel is selected for both, i.e. both on a single VGA projector channel. (So Constant:1 = Constant:0)

Configuring the T440: Setting up APart Concept1 / T1 from SER2

This is a 2 x 80 watt amplifier with microphone input as well as 4 stereo line inputs (A, B, C and D). The /T option has 100v line transformers, otherwise is identical. APart is a Belgian company represented in Australia by Sennheiser. It is a surprisingly economical device.

This device is serially controlled at 19200 baud and has a simple 3-wire connection (Tx, Rx, Gnd). The DB9 wiring is to a female socket on the box, and data goes in to pin3 of the connector. Coms OK shows a green flash on the ON / top left LED after pressing the OFF button.

The control software for driving the Apart Concept1 or T1 from a T440 is enabled by **setting a value of 35 decimal into Constant:F.** The T440 driver turns the unit On and Off, sets channels as per the following table, and sets audio volume by channel in 20 steps, corresponding to a -80 (off) to 0 dB range of 4dB per step.

T440Channel selected	**Concept1 Source**
Computer 1	Source Input A
Computer 2	Source Input B
Video 1 Composite	Source Input C
Video 2 / HDMI. Note: This becomes the prime Video source if OPT1 is set on the DIP switch	Source Input D

Configuring the T440: Setting up Kramer Protocol 3000, e.g. VP-440 switcher/scalar from SER2

This switcher is set up to handle two PC (VGA) inputs and four HDMI inputs to an HDMI and an HDBaseT in parallel.

This device is serially controlled at 9600 baud and has a simple 3-wire connection (Tx, Rx, Gnd)

Coms OK shows a green flash on the ON / top left LED after pressing the OFF button.

Audio level can be controlled in the Kramer by setting SW8 ON. Otherwise it is controlled in the projector/panel.

It is setup by loading Constant:$F with a values of 40, 41 and 42.

Setting 40: two PC for "Computer" and two HDMI for "Video":

Computer1Mode: (Send code: '#ROUTE 12,1,4'+ 0D); // Input #4, PC1selected

Computer2Mode: (Send code: '#ROUTE 12,1,5'+ 0D); // Input #5, PC2selected

Video1Mode : (Send code: '#ROUTE 12,1,0'+ 0D); // Input #0, HDMI 1 selected

Video2Mode: (Send code: '#ROUTE 12,1,1'+ 0D); // Input #1, HDMI 2 selected

Channels 1->4 are selected with a Computer:1/2 then Video: 1/2 channel on the T440.

Setting 41: one PC for "Computer1" or "Computer 2", one Computer, HDMI3 and two HDMI for "Video":

Computer1Mode: (Send code: '#ROUTE 12,1,4'+ 0D); // Input #4, PC1selected

Computer2Mode: (Send code: '#ROUTE 12,1,2'+ 0D); // Input #2, HDMI 3selected

Video1Mode : (Send code: '#ROUTE 12,1,0'+ 0D); // Input #0 HDMI 1 selected

Video2Mode: (Send code: '#ROUTE 12,1,1'+ 0D); // Input #1 HDMI 2 selected

Note 1: Setting switch 5 inverts 1 and 2 selection for Computer, so HDMI3 can become the prime Computer channel1and PC1 for secondary computer.

Channels 1->4 are selected with a Computer:1/2 then Video: 1/2 channel on the T440.

Setting 42: two HDMI (3 and 4) for "Computer" and two HDMI (1 and 2) for "Video":

Computer1Mode: (Send code: '#ROUTE 12,1,2'+ 0D); // Input #2, HDMI 3selected

Computer2Mode: (Send code: '#ROUTE 12,1,3'+ 0D); // Input #3, HDMI 4selected

Video1Mode : (Send code: '#ROUTE 12,1,0'+ 0D); // Input #0, HDMI 1 selected

Video2Mode: (Send code: '#ROUTE 12,1,1'+ 0D); // Input #1, HDMI 2 selected

Channels 1->4 are selected with a Computer:1/2 then Video: 1/2 channel on the T440.

Note 2: When using an HDMI switcher, it is necessary to modify the channel selection constants at E0 ->E3 so the same projector HDMI (or HDBaseT) channel is selected for all switched channels.

See http://k.kramerav.com/downloads/manuals/vp-440_rev_7.pdf

Configuring the T440: Setting up using UserFlags[0 ... F] (loaded at $D0->$DF)

At Rev 3.11, the ability of setting up aspect ratios via flags at D0 hex to DF hex was added.

UserFlags are addressed in memory in the same way as Constants covered earlier: The flags $0 … $F are selected with the program/projector selection switches SW2 and SW3. Flags are set up with the Option DIP switches.

e.g. To load flags at UserFlags:A with Flags 1, 3 and 7:

- Set "D" on SW2, "A" on SW3;
- Set Option switches OPT1, OPT3, OPT7 all On, with the rest Off;
- Press the "Reset" switch. Then notice the green LED (above the OFF red LED) flash for 2 seconds.

Switch setup for UserFlags[0 … F] setting (loaded at $D0->$DF)

UserFlag	**Program select switch setting**			OPT 1	OPT 2	OPT 3	OPT 4	OPT 5	OPT 6	OPT 7	OPT 8
	SW2	**SW3**	**Usage**	Asp. Ratio	Asp. Ratio	Asp. Ratio	Asp. Ratio	Asp. Ratio	Asp. Ratio	Asp. Ratio	Asp. Ratio
				Aspect ratio enable bits by channel							
UserFlag:0	D	0	Computer:1	#1	#2	#3	#4	#5	#6	#7	#8
UserFlag:1	D	1	Computer:2	#1	#2	#3	#4	#5	#6	#7	#8
UserFlag:2	D	2	Video:1	#1	#2	#3	#4	#5	#6	#7	#8
UserFlag:3	D	3	Video:2	#1	#2	#3	#4	#5	#6	#7	#8
UserFlag:4	D	4	TV	#1	#2	#3	#4	#5	#6	#7	#8
				Bit to select Channel Change auto-sent Aspect Ratio							
UserFlag:5	D	5	Computer:1	#1*	#2	#3	#4	#5	#6	#7	#8
UserFlag:6	D	6	Computer:2	#1*	#2	#3	#4	#5	#6	#7	#8
UserFlag:7	D	7	Video:1	#1*	#2	#3	#4	#5	#6	#7	#8
UserFlag:8	D	8	Video:2	#1*	#2	#3	#4	#5	#6	#7	#8
UserFlag:9	D	9	TV	#1*	#2	#3	#4	#5	#6	#7	#8

			Bits to select channels with On-button aspect select allowed						**Bits to select set default start channel**		
UserFlag:A	D	A	Allow bits / Default start channel	Comp 1	Comp 2	Vid 1	Vid 2	TV	Set for master of master / remote	Def. Bit 1	Def. Bit 2
UserFlag:B/C	Unused										
UserFlag:D	D	D	If #8 = 0, 2-button mute. If #8 = 1, two button freeze.								#8
UserFlag:E	D	E	If #8 = 0, no audio in standby. If #8 = 1, volume keys control audio in standby. If #7 = 0, no prestart msg. If #7 = 2, send prestart msg, e.g. HDBaseT ctrl. En.								#8 #7
UserFlag:F	D	F	If #8 = 0, system controls projectors. If #8 = 1, system controls flat panels. If #7 = 0, Ops Tx normally, if #7 = 2, system does NOT Tx source & Volume								#8 #7

* Set this bit to enable "Roll aspect ratio by channel". (Location F, Bit 0 is used for projector (0) or panel(1)

Configuring the T440: Setting up aspect ratios using UserFlags(0 ... A)

This setup allows setting aspect ratios for projectors and flat panels.

There are two modes of Aspect Ratio Control for projectors and flat panels:

1. **Roll Aspect Ratio:** This mode is the same as pressing the "Aspect" button on an IR remote, in that each time it is pressed the Aspect Ratio or Zoom rolls on to the next available one, e.g. 4:3, 16:9, 16:10, Zoom1, Zoom2 and back to 4:3, with no absolute control of aspect ratios set or rolled through. If "Roll Aspect Ratio" is the only mode available, this is indicated in the projector/panel tables in Part B of the T440 manual, and is still usable with these control flags, to send a "Roll Aspect Ratio" command to channels that have had it enabled for;
2. **Absolute Aspect Ratio:** This mode sends absolute aspect setting commands to the projector or panel. Because it is more precise, this software allows individual aspect ratios to be enabled selectively channel by channel.

"Roll Aspect" Setup

In this mode, the "Roll Aspect" command can be selectively allowed or dis-allowed channel by channel by setting up UserFlags[0 … 4] with an OPT1 bit set on channels "Roll Aspect" is allowed, and making sure all OPT1… OPT8 bits are cleared on channels being dis-allowed.

On keyboards with a discreet "ON" key (not combo keys such as "Computer/On" etc.) the ON key will then send a "Roll Aspect" each time it is pressed, for channels where it has been specifically enabled. The "Computer" key will send a "Pixel Align" command if OPT4 is NOT set, or will send a "Computer:2" command if OPT4 is set to allow double-hitting on the source buttons. This will roll the aspect ratios through ALL the provided ones.

(Note: On a keyboard with a discrete ON key, if no Aspect ratio send is setup for the On key, the default message when the On key is pressed again is to send another "Power On" message. This has been added because some NEC projectors go into a very deep sleep mode with no input signal, and this is the only way to wake them up again.

"Roll Aspect" example

For example, say we are using a Code:E keyboard (8 key, with TV key as well as Compuer and Video, and we wanted to allow extra presses of the TV key to roll aspect ratios through the provided range (maybe 4 or 5), setup UserFlag:4 with OPT1 On (this allows aspect ratio control for the TV channel only), and then setup UserFlag:A with OPT5 On (this allows the TV button to be used for Aspect Ratio sending. (Don't forget to press RESET after each setting and when you are back on the selected projector/flat panel channel.)

"Absolute Aspect" Setup

Absolute Aspect commands can be setup to be sent automatically, immediately after a source is selected, or aspect can be altered after a channel is selected, either by using the ON key (for keyboards with an exclusive ON key) or by using the "combo" keys (Computer(1 or 2)/On, Video/On or TV/On), or both an initial setting **and** an alterable one. This can be setup by channel (i.e. not selected ever, only preselected, or alterable dynamically at any time from the preselected one.)

The aspect ratio strings are numbered #1 … #8, with the ratio for each string, for each device, (in the device tables in Part B of the manual, these aspect ratios are shown for each display device.). Each string is selected and referred to by one bit in the control bytes, with OPT1 selected bit corresponding to Aspect-string #1 and so on. (Selecting a non-assigned string will not send anything.)

There are three fields of flags to be set up:

- **Aspect ratio enable bits by channel, UserFlags: 0, 1, 2, 3, and 4** correspond to the five "sources" available on a T440, Computer 1&2, Video 1&2 and TV, respectively.

  Note: "Aspect ratio enable bits" MUST be enabled here as well as "auto-sent" bits in the next block of flags.

  On a keyboard with a sole-use **ON** key (eg code 0, 8, 9 and A keyboards), this ON key rolls through the (enabled) aspect ratios.

  In each of these five UserFlag bytes are eight "enable" bits, with the first aspect ratio string (Aspect:1 in the projector/flat panel tables in Part B) corresponding to OPT1 being set, etc.

  So if any aspect ratio is to be available for any "source" it MUST be pre-enabled for that source by having a bit set for that source in the UserFlags 0 … 4. For example, Computer:1 might be just using 4:3 (one bit), and Computer:2 might have 4:3 and 16:9 enabled (2 bits). Video might have 3 bits set (4:3 or 16:9 or 16:10), S-Video might have just 16:9 but the TV source might have up to 8 bits set (4:3small, 16:9, 16:10, 4:3 large, Auto, Full, Zoom1, Zoom2).
  This would look like:
  UserFlag:0: Bits 1000 0000 (Computer:1, 4:3 only enabled.)
  UserFlag:1: Bits 1100 0000 (Computer:2, 4:3, 16:9 enabled.)
  UserFlag:2: Bits 1110 0000 (Video:1, 4:3,16:9 and 16:10 enabled.)
  UserFlag:3: Bits 0100 0000 (S-Video:2, 16:9 only enabled.)
  UserFlag:4: Bits 1111 1111 (TV, all 8 aspect ratios enabled.) TV key can roll between all aspect ratios.

(Note: On a keyboard with a discrete ON key, if no Aspect ratio send is setup for the On key, the default message when the On key is pressed again is to send another "Power On" message. This has been added because some NEC projectors go into a very deep sleep mode with no input signal, and this is the only way to wake them up again.

- **Bit to select Channel Change auto-sent Aspect Ratio, UserFlags:5, 6, 7, 8 and 9** also correspond to the five "sources" in order, and a **single bit** in each of these bytes selects which default "Aspect-string" is sent on selecting a "source" by pressing a channel button. This means that the channel always starts with the same, pre-selected, aspect ratio.

  Note: "Auto-sent" bits MUST be enabled here as well as "aspect ratio enable bits" in the previous block of flags. If only one aspect ratio is needed, set one flag here and one in the previous group. (If multiple bits are set in the first group of flags, then the ON key or a select key can roll between them, but they always start on the pre-selected one from this group of flags.)

  So if Aspect-string:1 (say, "set 4:3") is to be selected as Computer:1 default, then address UserFlags:5 (at "D5" on SW2/SW3), set OPT1 and press "RESET".

  Then if Aspect-string:2 (say, "set 16:9") is to be selected for Video:1, set UserFlags:7 (at "D7" on SW2/SW3), set OPT2 and press "RESET".

  This would look like:
  UserFlag:5: Bits 1000 0000 (Computer:1, 4:3 is default.)
  UserFlag:6: Bits 1000 0000 (Computer:2, 4:3 is default.)
  UserFlag:7: Bits 0100 0000 (Video:1, 16:9 is default.)
  UserFlag:8: Bits 0100 0000 (S-Video:2, 16:9 is default.)
  UserFlag:9: Bits 0100 0000 (TV, 16:9 is default.)

- **Enable bits for allowing combo (Channel/On) keys to roll Aspect ratios in UserFlag[A].** Bits set with OPT1 through OPT5 select sources Computer:1/2, Video:1/2 and TV in that order.

  A bit set enables that button/source for setting aspect ratios. Without a bit set, that button/source is NOT enabled.

  Note that because the second press of a channel button can be only interpreted in one way, there is a hierarchy of functions possible:

  1. If it is a "Computer" button and no aspect setup and OPT4 is NOT selected, pressing it a second or more times sends a "Pixel align" code;
  2. If it is a "Computer" button and OPT4 is ON, then pressing it a second time sends a Computer:2 code;
  3. If OPT is not set, but an Aspect ratio message is enabled in UserFlags:A, then second and subsequent presses send an Aspect Ratio message which rolls through all allowed as setup in UserFlag0 (above).

Note: Bits 0 and 1 of UserFlag[A] are used for Default Source setting. They are set up at the same time as OPT1 … OPT5 used from this function. Bit2 of UserFlag[A] is used for remote connections.

Configuring the T440: Setting up default source UserFlags[A] for Code 0, 8, 9 and A

(This default source-setting function is only applicable to keyboards with a separate **ON** key (keyboards Codes 0, 8, 9 and A) … keyboards with combo-keys (Computer/On, Video/On, TV/On) select the channel selected by the combo key pressed, and so cannot be setup with a default source.)

This setup allows setting a default channel for the T440. This is setup with two OPT bits in UserFlags[A]

Right-most two bits from UserFlags[A] are used

OPT7	OPT8	
0	0	No defaults set
1	0	Computer:1
0	1	Video:1

If neither bit is set, there are no defaults active, and on the next start, the initial source command sent is the last one used.

To load flags at UserFlags:A with OPT7 on:

- Set "D" on SW2, "A" on SW3;

- Set Option switch OPT7 On, with the rest Off;
- Press the “Reset” switch. Then notice the green LED (above the OFF red LED) flash for 2 seconds.
- Don’t forget to dial up projector code number and press Reset again.

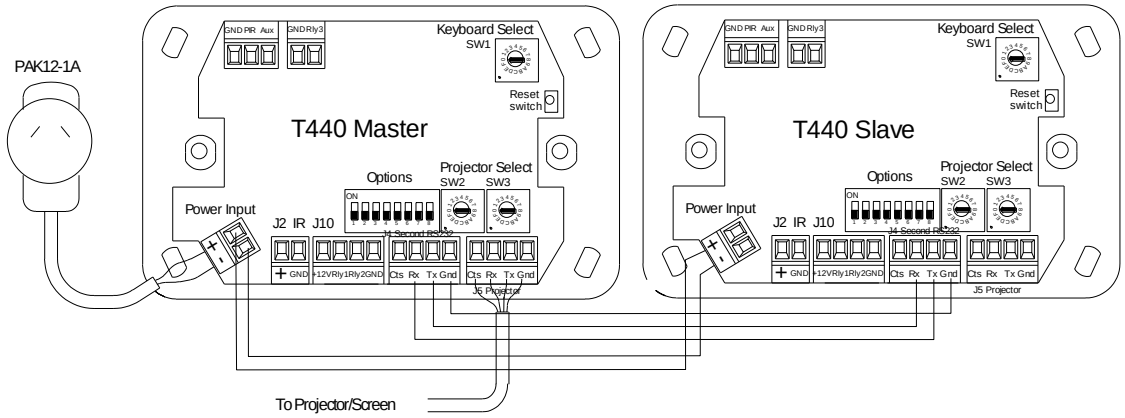
Note: The first 5 bits of UserFlag[A] are used for Aspect Ratio button enabling. They are set up at the same time as OPT7 and OPT8 used from this function.

Configuring the T440: Setting up Master / Slave between two T440s.

Two T440s can be wired to operate in tandem as a Master and Slave. Key presses and LED illumination are shared between the two units. Thus both units and controls are used identically, with keys having the same functions and LEDs showing the same status.

Note that both T440s must have the identical keyboard and firmware.

Setup



On the Master T440

- Set SW2 =D, SW3 = A
- Turn ON Option switch 6 only – all others OFF.
- Push reset
- Then set SW2 and SW3 to suit the Projector used

On the Slave T440

- Set SW2 = C, SW3 = F, Option switches OFF

Test LED green flash

If wired and configured correctly, pressing the OFF button in standby will flash the green LED above the OFF button (On/TV/Video key). On a two key Code-6 the “ON” LED will flash.

Other connections

Screen functions to the screen relay connection work the same as before, but no other devices can be connected to the 2nd RS232. The 439 switcher can still be driven by the master T440 Relay-3 output, switching to USB channel B when Computer-2 is selected.

Master T440		Slave T440
Power pin positive + from plug-pack	Green / Green white twisted together	Power pin positive
Power pin negative - from plug-pack	Orange / Orange white twisted together	Power pin negative
SER2 Tx RS232 from T440 master to remote	Blue/white	SER2 Rx
Ground	Blue (twisted with above)	Ground
SER2 Rx in RS232 from slave T440	Brown/white	SER2 Tx
Ground	Brown (twisted with above)	Ground

Reprogramming the T440 CPU

The T440 allows easy updates of the firmware to be downloaded from a PC using the JED AV Downloader 1.1 program. The connections to a female D9 to the computer serial port are:

T440 2nd RS232 port	**D9 serial port connection to computer**
Ground	Pin 5
Tx	Pin 2
Rx	Pin 3

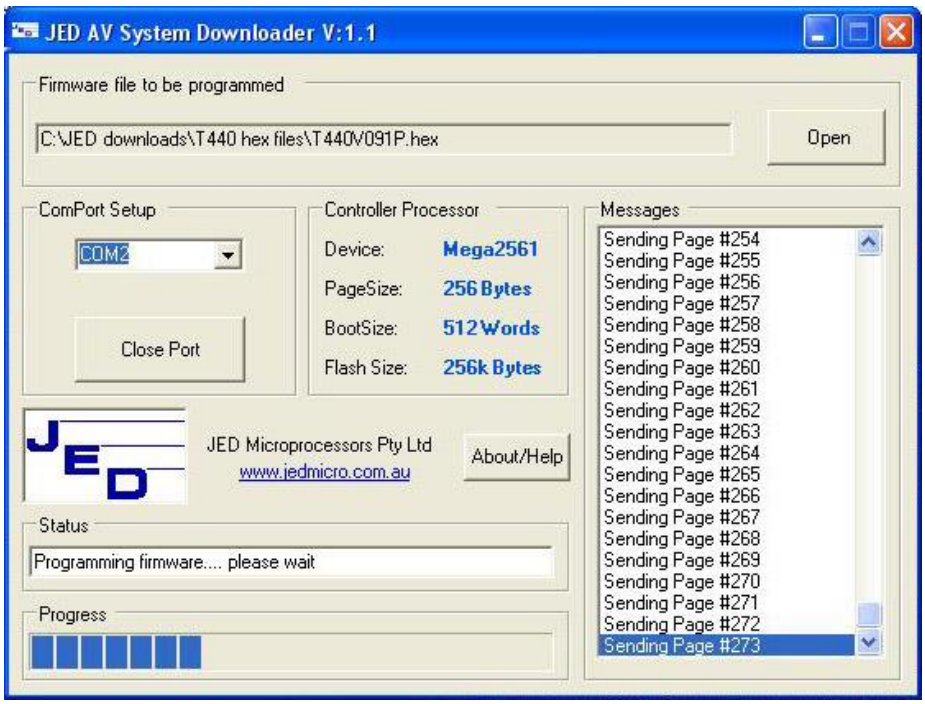
Initial PC setup for downloading

The following steps need to be performed to setup your PC for the reprogramming task :

1. Download and install the JED AV Downloader 1.1 from http://www.jedmicro.com.au/T440.html
   Note the Microsoft .NET Framework software will need to be installed on the PC
2. Email or call JED at tech_support@jedmicro.com.au for the latest T440Vxxx.hex or T430 firmware file

Doing the reprogramming

1. Open the JED AV Downloader 1.1 icon on your desktop to run the downloader:



2. In the window "Firmware file to be programmed", click on "Open" and navigate to the saved firmware file.
3. In the "ComPort Setup" window select the COM port number on your PC that you have connected to the T440. *The COM port can be found under "My Computer" - "Properties" - "Hardware" - "Device Manager" - "Ports(COM & LPT).*
4. The status window should show "Ready, Waiting for AV Controller";
5. Plug the cable into the T440 2nd port.
6. Momentarily press the T440 "Reset" switch
7. In the "Messages" window, the "Sending Page #nnn" scrolls as each 128 byte page is erased, sent and verified. The final message should be: "Firmware Prog Done".

If it fails to program or stops prematurely, push the RESET switch again.

NOTE: The T440 settings may be reset to the default Projector control. Change Flag F if Flat panel/LCD control is required.

Wiring the T440

There is a wiring diagram on the last page of this manual (Part A): It shows the use of the optional T461 audio box as well. (If there is no T461, a plug pack is used instead, as shown.)

Use of CAT5 wiring plugged into RJ45 socket J6 (See page 4 diagram)

Most commonly, CAT5 cable is used for T440 to projector wiring. It is important to use the CAT5 as a series of pairs, where there is an active line (solid colour) paired with a twisted mate (same colour with white). Please make sure the ground pins of signal cable pairs are connected **at both ends, particularly with RS232 TX and TX lines.**

Use the following coloured wires for the listed functions, as in the following table: (**Note: This allocation has changed from earlier recommendations but is now preferred so as to match the new T447 "Cable Top Box" automatic pair allocations using a standard EIA568-A cable, either using an off-the-shelf cable with a CAT-5 connector at BOTH ends, or if a cable is cut, the following are the colour codes this cable should pin out with. Please switch to using this even if it is NOT plugged into the T440 CAT-5, J6 connector, so as to stay compatible.** We have occasionally seen what claims to be an EIA568-A cable actually having different colours, so please do a quick multimeter check on continuity back to the T440 to make sure of coding, e.g. check Gr/Wh goes to power positive In, and check coms from Blue/Wh to J5 Tx out and Brown/Wh to J5 Rx In. Check grounds to Blue, Brown and Green.

If plugging directly into a T447 CAT5 to CAT5 obviously colour does NOT matter, but don't use a crossover CAT-5.

Green/white	+ supply feed via CAT5	Green	Ground to 2-pin power connector
Orange/white	CTS (+9 volts) from T440 to proj. *** **ALWAYS include to future-proof the installation**	Orange	PIR link for people-sensing. The PIR relay connects to ground and OPENs when people are detected.
Blue/white	Tx RS232 from T440 to proj. (or IR LED positive if link L1 is in IR position)	Blue	Ground to Proj. RS232
Brown/white	Rx RS232 from Proj. To T440	Brown	Ground to Proj. RS232

Trouble-shooting guide to setting up a T440

These notes are to guide debugging if an installation does not come to life on initial hook-up.

Firstly: Make sure the switches are set correctly.

Initial test using "blink codes"

1. A basic self-test is included in most projector/panel drivers, and this can be actioned simply by pressing the **OFF** key when in the OFF state (just the red LED lit and the projector OFF.
   If this self-test mode is available, the notes for the projector included on the particular projector page is indicated by the following message: "*Power on panel connection blink codes are provided*"
2. If "blink codes" are available, the red LED should blink just once, and then show a steady OFF. This means the projector has been polled for status by the T440 and it has replied with a correct "*I'm here and I'm OFF*" message.
3. If "blink codes are available, and the red LED blinks three times and then shows a steady OFF, it indicates there is a communication error, and the correct reply was NOT received back from the projector.

(If there are no "blink codes" provided for that projector, the red LED just comes on steady at all times after reset or pressing OFF. If the red LED comes on continuously, but the projector **does** have blink codes, you may have a wrong or invalid projector code set on SW2/SW3.)
Rev18 and later: **If all 4 LEDs flash in step, this indicates an invalid SW2/3 program select setting.**

Projector baud rate setting

Successful RS232 communications requires that both the controller and the projector are set up with the same baud rate (i.e. communications speed.)

In the Part B manual, we specify what baud rate the controller assumes … this is normally the default baud rate as a projector is unpacked from the factory. If this has been altered because the projector was possibly used for a demonstration, on a network rather than via RS232 or if the projector has not been manually set from some much higher baud rate **YOU WILL HAVE TO SET THE BAUD RATE BEFORE USE.**

On some others, you will need to select **RS232** from the choice of **"RS232 or USB"** control, or from **"RS232 or network"** control.

Note particularly:

NEC projectors often have three or four rates, and are sometimes delivered with different rates. Sometimes two different rates are specified on two different versions of the "installation guide" from NEC. Check the menu.

Sony have some with different parity settings, so make sure the correct controller code is used.

BenQ (especially older ones) sometimes have to have the RS232 enabled in a hidden menu accessible only via a secret "factory setup" menu.

Taxan projectors need the baud rate reset to a lower value before use. See the part B manual for codes to do this.

Projector "Eco" etc settings

New energy-saving regulations require manufacturers to have low power consumption in the standby (or Off) state, and some projector makers actually disable RS232 communications in this low-power state, which makes it hard to wake it up and turn it on!

Installers must disable these low power options to successfully turn a unit on. Check the projector manual for these settings. Basically, you must choose the lowest-powered setting that works.

Voltage tests on projector RS232 connection

You will need a multimeter as a basic piece of test equipment.

1. Set MM to "Volts" and with the black lead on Gnd (far right, back view), check voltages on "Tx" and "Rx". It should be -5 to -9 volts on almost all projectors. (exceptions are projectors with clamp diodes on their serial ports. If you have one of those, you will get about -0.5 to – 1 volts on these lines);
2. If only ONE line is at -5 to -9 volts, suspect a wiring fault. Correct the wiring and try again. Maybe Tx & Rx swap.
3. If voltages are correct, unplug the cable from the Phoenix connector and measure voltage from the Tx line to ground. If this is still negative of more than a few millivolts, check wiring for a short to the projector's Tx line. Else measure resistance to Gnd … it should be 4 to 7 KOhms. If it is only a few ohms, suspect a short to ground. If it is high or open circuit, you are NOT connected to the projector RS232 input. Correct the wiring and try again.
4. Some (very few) projectors need a CTS line set at a +9 voltage. This may be the problem, but is most unusual.

All lights flashing: What's the problem?

If you find this happening the problem is simply that you have not selected a valid projector code on Sw3/4. This warning tells the installer to select a valid code from the Part-B of the manual.

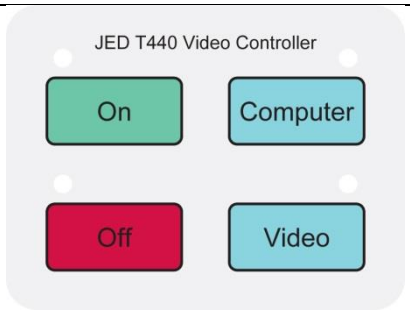
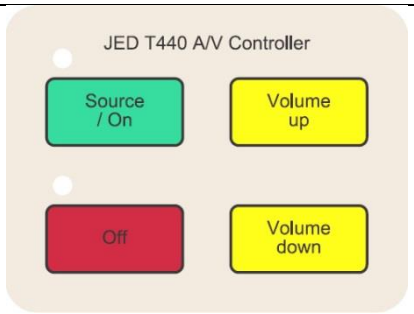
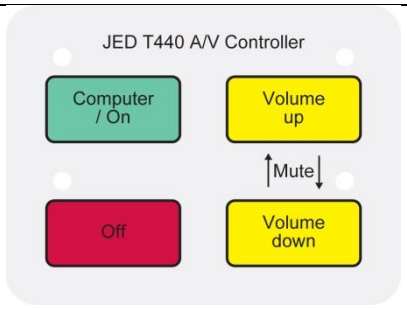
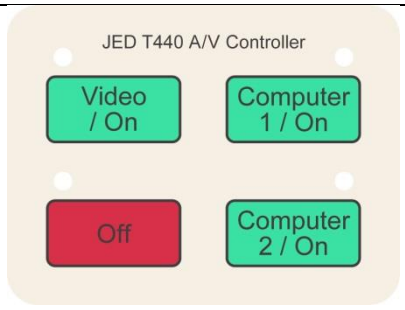
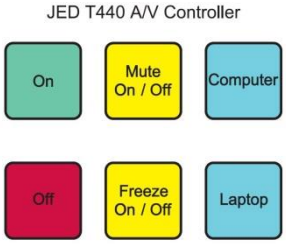
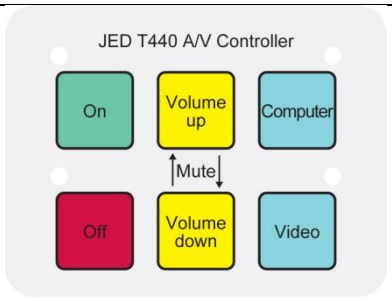
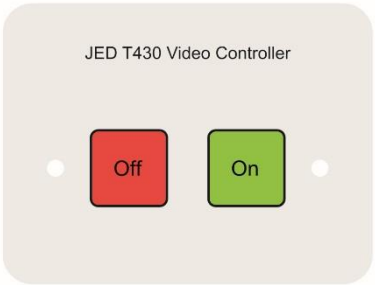
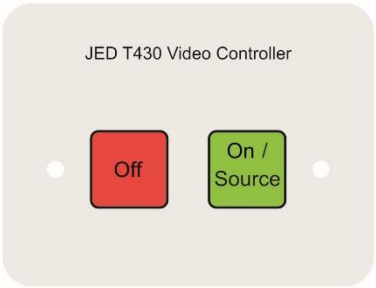
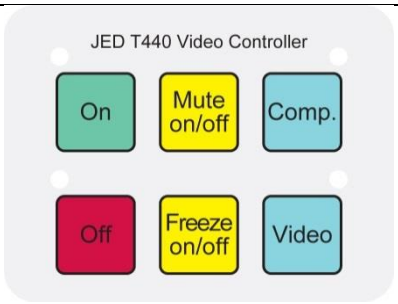
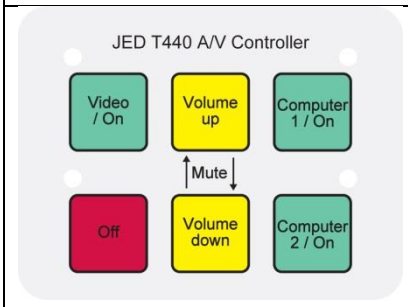
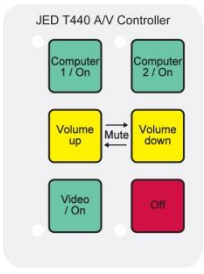
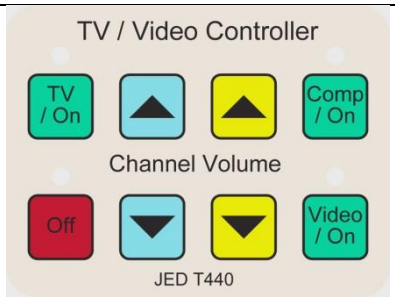
Projector "Source lock" and "Auto-search" settings

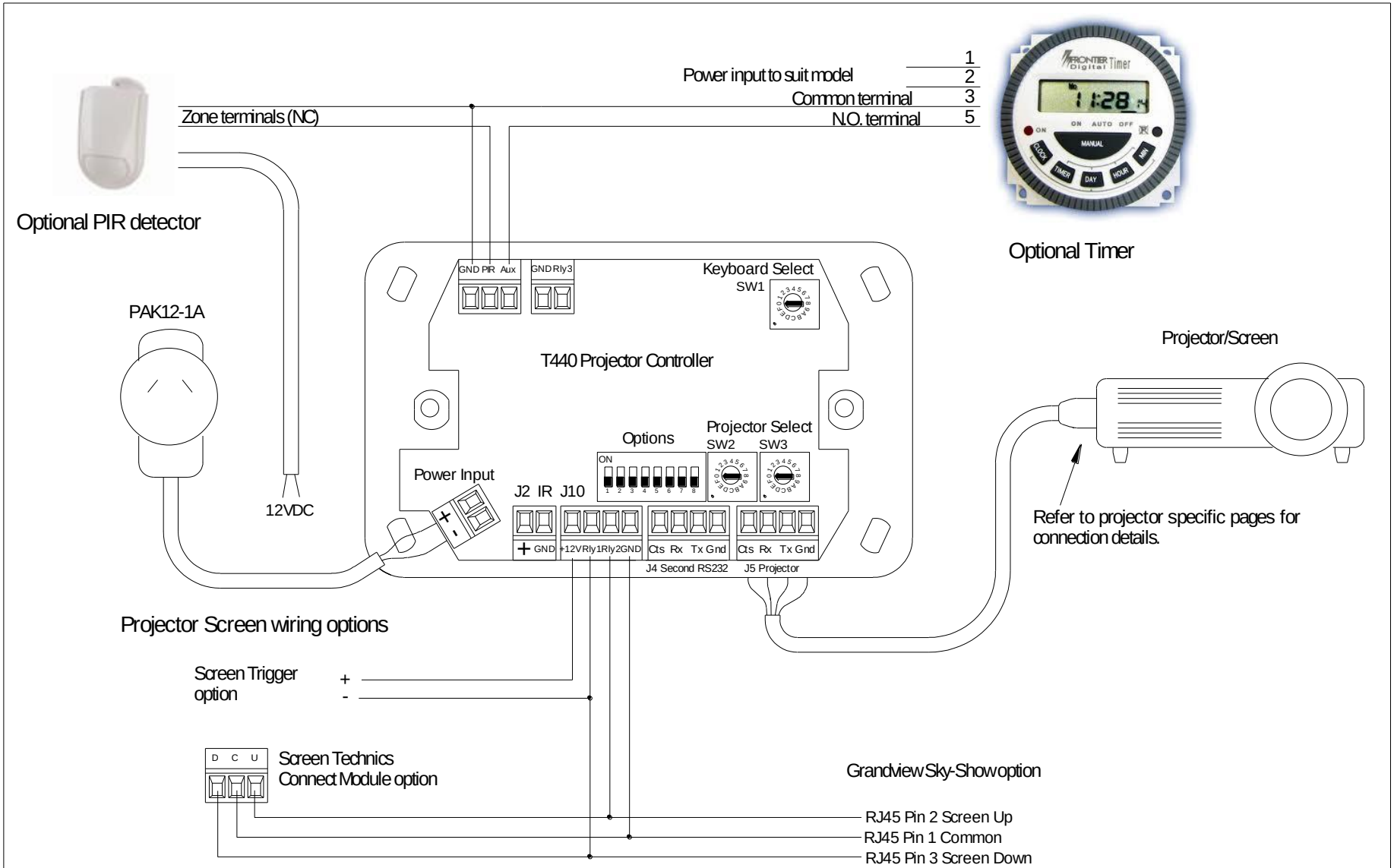
Successful RS232 communications requires the projector does NOT use its own decision-making to change channels.

If a selection item in the projector menu called **"Source Lock"** exists, it should be set to **ON,** which means that the projector will stay on a selected channel when set via RS232 to that channel (and not wonder off to find some other channel with a signal and lock onto that.)

If a selection item in the projector menu called **"Auto-search"** exists it should be set to **OFF** (as we are commanding sources from the JED controller).

T440 keyboard options (Note: OPT4 switch now allows code 0, 9 and A keyboards to toggle between Computer 1/2 and Video 1/2, and Code E keyboards to toggle computer and video keys in a similar way (TV does not toggle)).

		
Four key, code 0 (Portrait version of this now available, called Code-0 Vert)	Four key, code 1 (IR only)	Four key, code 2 (Portrait version of this now available, called Code-2 Vert)
		
Four key, code 5	Six key, code 8	Six key, code 9 (HDMI version of this also available, replacing “Video”)
		
T440-Code 6: KB1	T440-Code 6: KB3	Four key, code A
		
Six key landscape, code B-L Also available in silver keys/background as Code BLM	Six key Vertical, code B-Vert	Eight-key TV controller, Code E



NO	DATE	DESCRIPTION	BY
1	24/04/08	Original	RN

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VICTORIA AUSTRALIA
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CLIENT

PROJECT

TITLE: T440 Projector Screen Wiring Detail

ENGINEER
DRAWN
DATE
SCALE
FILE NAME

DRAWING NUMBER

SHEET NUMBER