

Contents

Contents	1
1 Introduction	2
2 Interconnections	3
3 Hardware configuration	5
3.1 Switch settings	6
3.1.1 Timing adjustments	6
3.1.2 Configuration switches	7
3.2 Diagnostic LEDs	9
4 Connecting the DVE to a network	10
4.1 Using the configuration tool	10
5 The DVE Move Editor	13
5.1 Installing the DVE Move software	13
5.2 Configuring the Editor	15
5.3 Creating moves	16
5.3.1 Live update	17
5.4 Saving, loading and storing moves	18
5.5 Previewing stored moves	20
6 DVE pre-configured moves	21
7 Problem solving	23
8 Specification	24

1 Introduction

The Pro-Bel 3426 is a self-contained Digital Video Effects unit for Standard Definition video occupying a single ICON card with an associated 100mm rear connector panel. The unit may operate as a standalone device using a control protocol provided by Pro-Bel, either over a serial or Ethernet interface, or it may be integrated into a Pro-Bel TX500 Series Master Control mixer. When used with the TX500, an ICON Framestore card is usually included in the system in order to compensate for the delay introduced by the DVE when it is in circuit. The 1448 rear connector supports both the 3426 DVE and the 3403 Framestore.

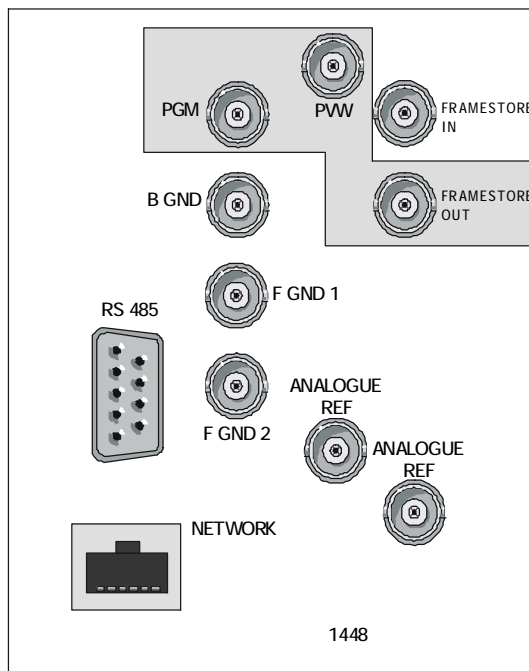
The 3426 DVE is a two channel device, having SDI inputs for two Foregrounds and one Background. As well as a main SDI Program output, there is also a Preview output, allowing sequences to be created and rehearsed before being put to air. Processing is 10 bit field based with sub-pixel motion, providing a wide range of squeeze and warp effects. An Ethernet interface is provided for connection to a TCP/IP LAN, allowing use of the Pro-Bel DVE Move Editor software anywhere on the same LAN. The DVE can store up to 100 sequences locally, which may be loaded remotely across the LAN using the editor application. The first 24 of these sequences can be recalled directly from the TX500 Series Control Panel when integrated into the mixer. The DVE is transparent to ancillary data, including embedded audio, in its main signal path. The unit also has a COSMOS interface, allowing its status to be monitored by Pro-Bel's network management system.

In summary, the 3426 DVE provides the following:

- 2 channel SDV 10 bit Warp DVE
- Standalone or TX500 Series operation
- 100 sequences stored in unit
- Serial and Network control interfaces
- Separate Preview facility
- Passes ancillary data
- DVE Move Editor software supported via network connection
- COSMOS compliant

2 Interconnections

All connections to the DVE are via a 1448 100mm rear connector panel, which will fit into any ICON frame with the available space. The rear connector will also support a 3403 Framestore card, which usually will be included if the DVE is being integrated into a TX500 Series Master Control mixer. It is noted that all connections to the framestore are external, the panel itself does not pass signals between the devices.



1448 rear connector panel for a 3426 DVE, and an optional 3403 Framestore. Outputs are indicated with a gray background.

The connections provided are as follows:

- SDI Inputs for main (F GRND 1), secondary (F GRND 2) and background (B GND)
- SDI Input and Output for optional framestore (FRAMESTORE IN and OUT)
- SDI Outputs for Main (PGM) and Preview (PVW)
- A loop-through connection for an analogue video reference
- A 9 pin serial port (RS 485) for direct connection to the TX500 Series breakout cable, or for customer use with a standalone unit
- An RJ45 Ethernet port (NETWORK) for connection to a TCP/IP LAN



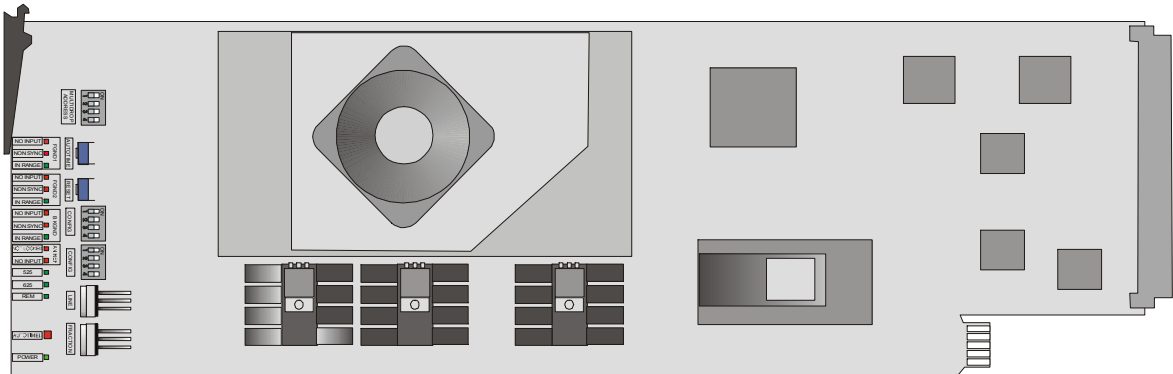
TX500 DVE user guide

The pinout for the serial connection is as follows:

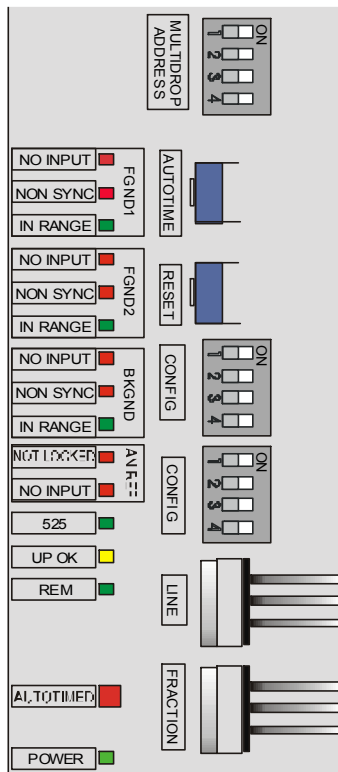
Pin	Function
1	GND
2	TX-
3	RX+
4	GND
5	N/C
6	GND
7	TX+
8	RX-
9	GND

It is noted the protocol required to control the DVE, defined as SW-P-95, is available from Pro-Bel upon request, including the full serial specification.

3 Hardware configuration



The 3426 DVE module has a number of adjustments and settings for configuring the module as well as diagnostic LEDs, all of which are accessible from the front edge of the card, as follows:

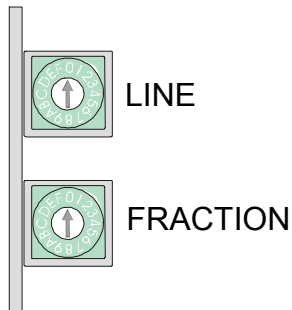


3.1 Switch settings

3.1.1 Timing adjustments

All 3 digital inputs have line synchronisers, which provide up to one line of delay each. This allows the unit to work with signals having a total spread of just less than 1 video line. The internal reference is usually locked to an analogue video reference supplied to the module, the standard of which is auto-detected and displayed on a status LED, see next Section.

The LINE and FRACTION HEX switches are used to delay the incoming reference with respect to the internal reference in order to bring all 3 inputs into the same window. Status LEDs for each input indicate when they within one line of the reference.



LINE and FRACTION switches are used to delay the incoming reference with respect to the line synchronizer internal reference. One position on the FRACTION switch equals 1/8th line.

LINE Output timing	Position
-5 lines early	5
-4 lines early	6
-3 lines early	7
-2 lines early	8
-1 line early	9
In sync	0
+1 line late	1
+2 lines late	2
+3 lines late	3
+4 lines late	4

FRACTION Output timing	Position
Line delay + 1/8	1
Line delay + 1/4	2
Line delay + 3/8	3
Line delay + 1/2	4
Line delay + 5/8	5
Line delay + 3/4	6
Line delay + 7/8	7
Line delay + 7/8	8
Line delay + 7/8	9
Exact line delay	0

Therefore, the procedure for timing the unit is as follows:

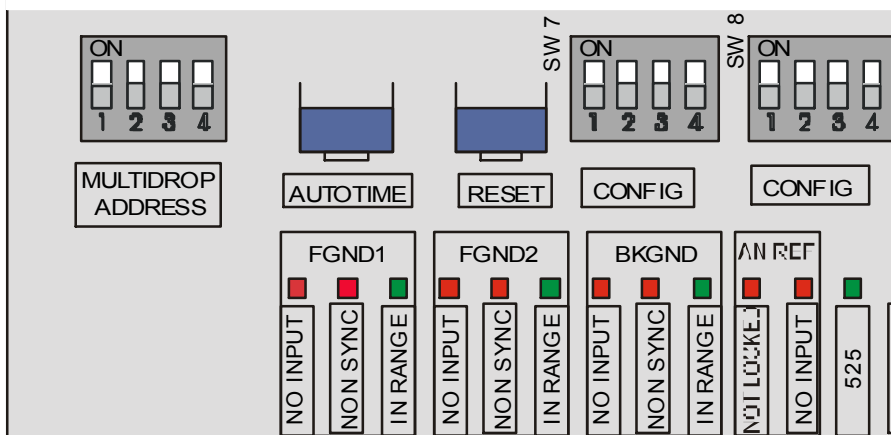
- Connect all required SDV inputs, and an analogue reference
- Check the reference has been detected using the status LEDs
- Check the LINE and FRACTION switches are set to '0'
- If the Green 'IN RANGE' LEDs are lit for all inputs, no further action is required

- Increase the LINE switch until all 'IN RANGE' LEDs are green
- Go back one position on the LINE switch
- Increase the FRACTION switch until all IN RANGE LEDs go green again
- Increase the FRACTION switch until one IN RANGE LED goes off, then go back one position on the FRACTION switch
- If necessary, increase the LINE switch by one, and start the FRACTION switch at zero again

An 'AUTOTIMER' facility is also available. To activate this, set the LINE and FRACTION switches to zero and press the AUTOTIME button. The unit will attempt to bring all inputs into range by inserting an appropriate delay automatically. The AUTOTIME LED will indicate the status of this function, see the next Section.

It is generally recommended that the module timing is configured manually.

3.1.2 Configuration switches



The following switches are present on the module, from Left to Right:

- MULTIDROP ADDRESS: unused
- AUTOTIME: See previous Section
- RESET: Performs a module-wide reset, recovery within 14 seconds
- CONFIG SW 7: Selects which signal is used as a reference:

SW1	SW2	Function
ON	ON	Input 3, Background
ON	OFF	Input 2, Foreground 2
OFF	ON	Input 1, Foreground 1
OFF	OFF	Analogue Reference. This is the recommended setting



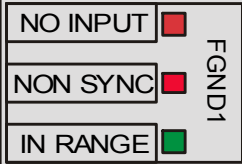
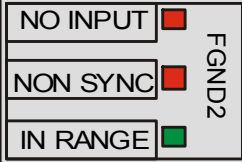
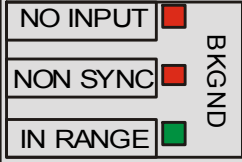

TX500 DVE user guide

SW 3 and 4 are not used

- CONFIG SW 8:

SW	Function
1&2	Not used
3	ON: Processor in normal run mode OFF: Processor in Update mode, used for updating the Beck Chip. The processor will not run in this mode.
4	OFF: Local mode (no COSMOS) ON: Remote mode, for control via COSMOS. Not supported

3.2 Diagnostic LEDs

		LED	COLOUR	FUNCTION WHEN LIT
	FGND1	NO INPUT	RED	No input
		NON SYNC	RED	Not synchronised with ref
		IN RANGE	GREEN	Within timing range of ref
	FGND2	NO INPUT	RED	No input
		NON SYNC	RED	Not synchronised with ref
		IN RANGE	GREEN	Within timing range of ref
	BKGND	NO INPUT	RED	No input
		NON SYNC	RED	Not synchronised with ref
		IN RANGE	GREEN	Within timing range of ref
	AV REF	NOT LOCKED	RED	PLL cannot lock to reference
		NO INPUT	RED	No input
525		525	YELLOW	525 detected (off = 625)
UP OK		UP OK	YELLOW	Processor heartbeat (flashes)
REM		REM	GREEN	In remote configuration mode. Not supported
AUTOTIMED		AUTOTIMED	TRI-COLOUR	See notes below
POWER		POWER	GREEN	+5V and +12V rails OK

AUTOTIMED LED: RED: In reset, or unable to find common timing for all inputs
 ORANGE: Attempting to perform Autotiming operation
 GREEN: Autotiming successful, all inputs within range
 OFF: Autotiming not active

4 Connecting the DVE to a network

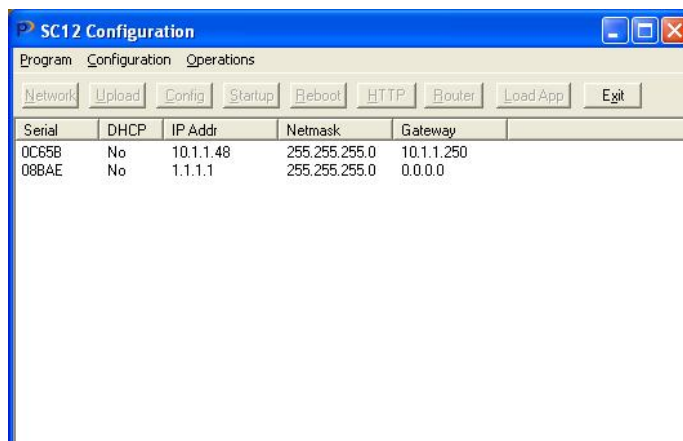
Ethernet support for the 3426 DVE is provided using an embedded 'PC on a chip', which is a 80186 processor system complete with RAM, NVRAM, serial and Ethernet ports all in one package. A software tool is provided with the system in order to test and configure the Ethernet connection.

A standard CAT5 patch cord may be used to connect the DVE Ethernet port to a 10 Base T hub or switch. By default, the embedded PC is configured for DHCP, meaning that a DHCP Server must be present on the same network segment in order for an IP address to be assigned. Without this, the Pro-Bel configuration tool must be used to manually assign an address. The PC chip includes TELNET and FTP servers in order to support the configuration tool.

Whether a fixed or automatically assigned IP address is used, the address must be known by the user in order to configure the DVE Move software.

4.1 Using the configuration tool

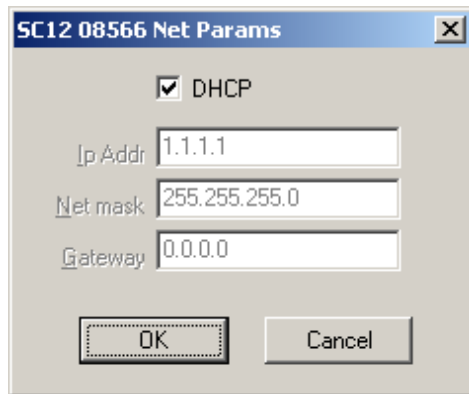
The 'SC12Config.exe' file should be copied into a new directory. The tool may then be launched directly from the 'SC12Config.exe' file, or from a shortcut created from this file. Providing the DVE is on the same network segment, the configuration tool will search the network and show the following:



Serial	DHCP	IP Addr	Netmask	Gateway
0C65B	No	10.1.1.48	255.255.255.0	10.1.1.250
08BAE	No	1.1.1.1	255.255.255.0	0.0.0.0

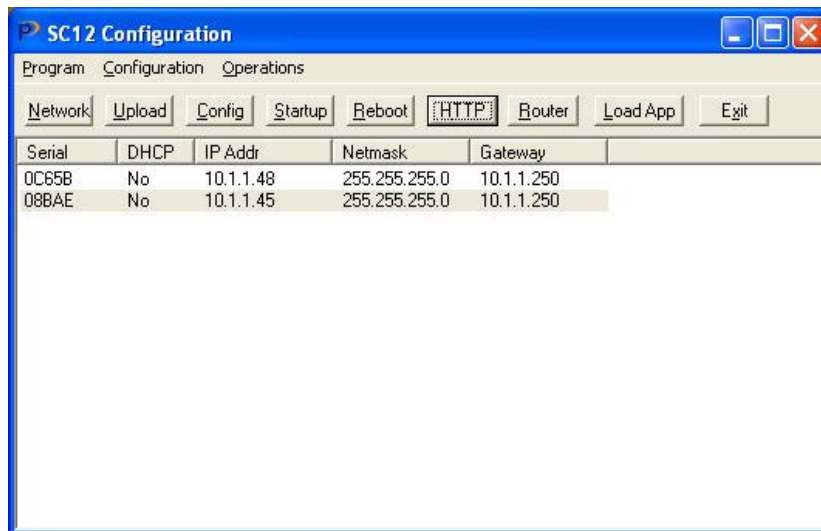
The serial number will match that printed on a barcode label on the embedded PC.

The IP address of 1.1.1.1 means that no address has been assigned to the embedded PC, this must be done by highlighting the required device (if there are more than one), and clicking on 'Network', the following window will appear:

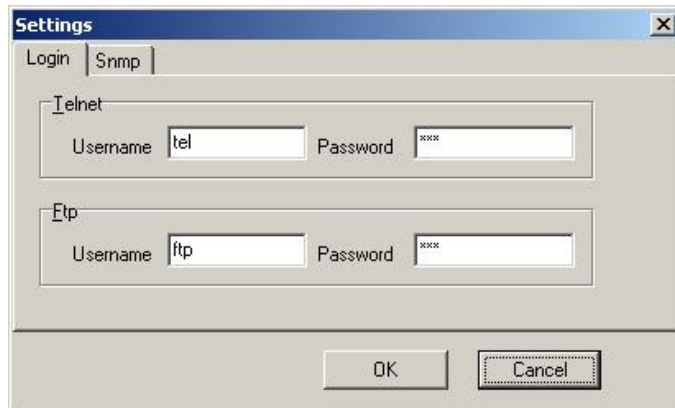


If a DHCP Server is present on the network, leave the box checked. If not, uncheck it and assign a unique IP Address.

Click OK, this will force the embedded PC to fetch an address or take the assigned one. If successful, the following will appear after a few seconds:

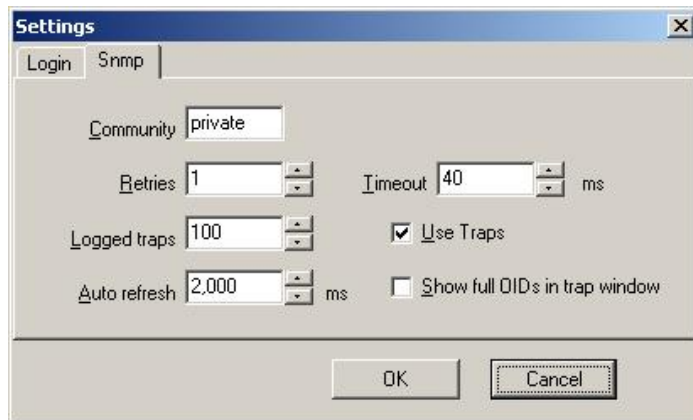


If any problems are encountered up to this stage, the user should check the application settings by selecting Program\Options from the toolbar. The Windows should appear like this:



The image shows a 'Settings' dialog box with the 'Login' tab selected. It contains two sections: 'Telnet' and 'Ftp'. Each section has a 'Username' and 'Password' field. The 'Telnet' Username field contains 'tel' and the Password field contains 'xxxx'. The 'Ftp' Username field contains 'ftp' and the Password field contains 'xxxx'. At the bottom are 'OK' and 'Cancel' buttons.

The passwords for 'tel' and 'ftp' are identical to the usernames



The image shows a 'Settings' dialog box with the 'Snmp' tab selected. It contains several configuration options: 'Community' (text field with 'private'), 'Retries' (spin box with '1'), 'Timeout' (spin box with '40' and 'ms' label), 'Logged traps' (spin box with '100'), 'Auto refresh' (spin box with '2,000' and 'ms' label), 'Use Traps' (checkbox, checked), and 'Show full OIDs in trap window' (checkbox, unchecked). At the bottom are 'OK' and 'Cancel' buttons.

5 The DVE Move Editor

The Pro-Bel DVE Mover Editor software runs on any PC with the following minimum specification:

- Pentium 2, 450 MHz, 128Mb RAM
- CD ROM drive
- 30Mb HDD space
- Windows 2000 or XP operating system
- 10 Base T Ethernet adapter supporting TCP/IP
- graphics card supporting 256 colours, minimum resolution 1024x768

The PC must be connected to the same LAN as the Ethernet port on the 3426 DVE module, and will be used to configure the DVE Ethernet connection as well as running the DVE Move Software.

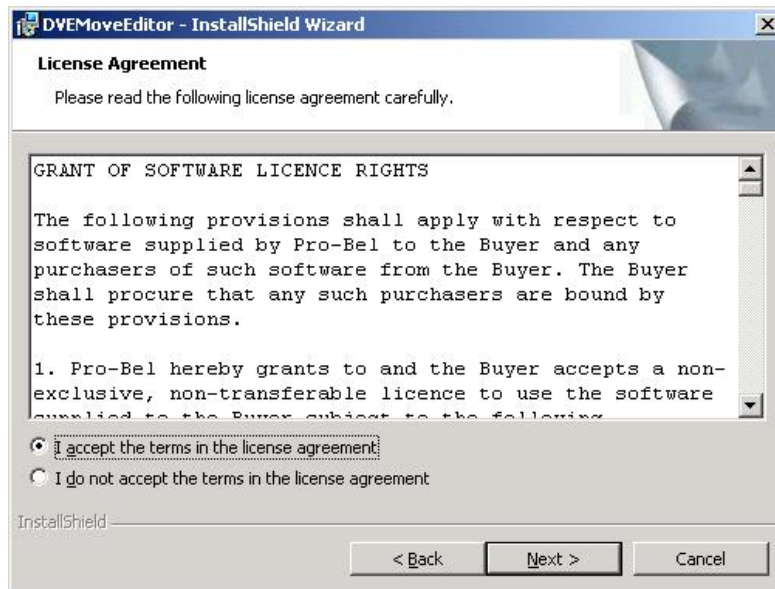
5.1 Installing the DVE Move software

The DVE Move software is supplied with an 'install wizard', so that all the user must do is locate the 'setup.exe' file in the root of the CDs directory, using Windows Explorer, and execute (double click) it.

The following screen will appear:



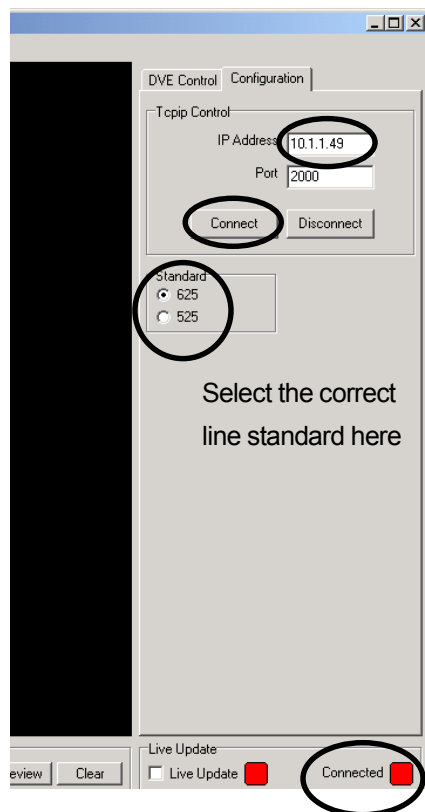
Clicking 'Next' will progress through the installation process, during which the user must accept the licence agreement:



If the default settings are selected, the software will be installed in C:\Program Files\Pro-Bel\DVEMoveEditor, and a shortcut will be placed on the Desktop. When installation is complete, the program can be launched via the desktop shortcut, or from the Start button in the Programs group.

5.2 Configuring the Editor

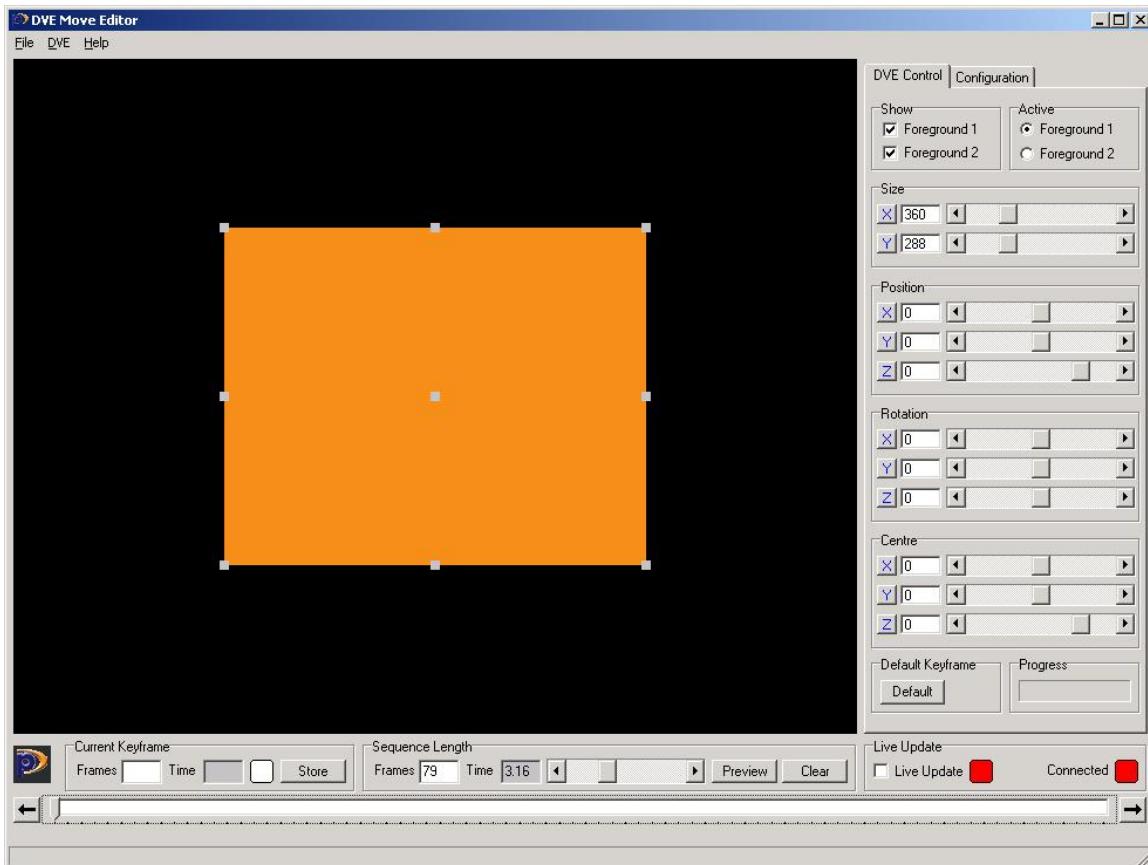
After launching the editor, all configuration settings are on the right side of the screen on the Configuration page. The user must select the appropriate Standard to be 625 or 525, this will determine all timing calculations. The IP address must that of the DVE under control on the same LAN as the PC running the Editor software. See Section 4 for DVE IP address configuration. The Port number must not be changed, and by default matches that used by the DVE. To test the IP configuration, click on Connect and check that the 'Connected' status turns green:



The user must configure the IP address to match that of the DVE under control. To use the Editor 'on-line', click Connect and check that the Connected status is green.

5.3 Creating moves

When first launched, the Editor window will appear as follows:



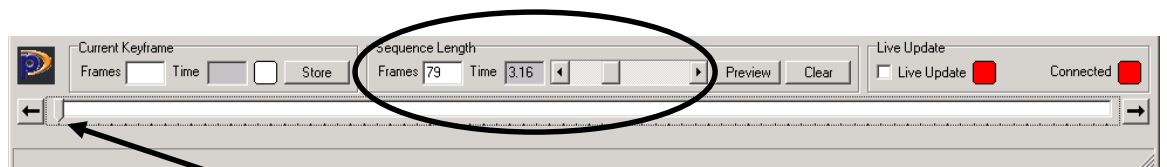
It is useful to note the following:

- The black area is the full screen, and the orange area is the currently Active Foreground (selected as Foreground 1 in the above screenshot)
- The foreground is moved by clicking and dragging anywhere within its boundary
- The foreground dimensions are changed by clicking and dragging on the grey squares around its perimeter
- The grey square in the centre of the foreground is its centre of rotation, which may be dragged anywhere within the full screen
- Any click and drag function may also be implemented by dragging the sliders on the right side of the screen, or by typing in and entering co-ordinates
- The 'Default' button forces the currently active foreground to completely fill the screen, which is usually the starting point for any effect

- The slider at the bottom of the screen represents a 'timeline' of the entire sequence, with a corresponding absolute time in seconds and frames shown above it to the left; the slider may be clicked and dragged with the mouse
- The 'Store' button is clicked to save the current foreground position and shape against the current time as indicated on the timeline, this 'snapshot' is known as a 'Keyframe'
- The finished sequence will interpolate between keyframes, that is, it will move smoothly between them
- A sequence consists of a minimum of 2 keyframes, but may contain many more for complex multiple move sequences
- The arrow buttons at each end of the timeline slider allow the user to step through the sequence one keyframe at a time
- The Preview button will play the entire sequence, on the Editor screen, in real time

To create a new move, the following sequence is used:

- Click 'Clear', first checking that any previous sequence has been saved
- Determine the required sequence duration, up to a maximum of 9.96 seconds (249 frames) and set this on the slider, or type in the number of frames, followed by Enter



Timeline slider

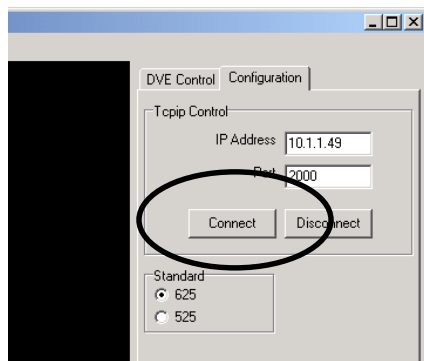
- With the timeline slider at zero (left end), click Default to bring the active foreground to full screen
- Click Store to save this as a keyframe
- Move the timeline slider to the next keyframe position, and adjust the foreground(s) as required
- Click Store to save this as the next keyframe
- Continue with as many keyframes as required, finishing the sequence with a keyframe

5.3.1 Live update

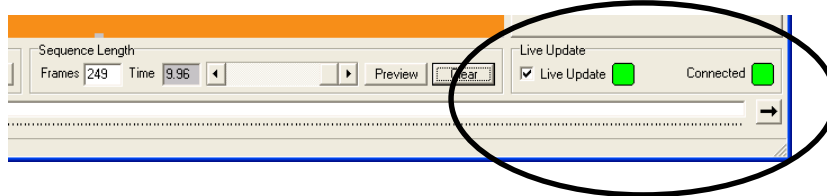
The Live Update feature allows the user to preview entire sequences on a broadcast picture monitor using the Preview and/or Main outputs of the 3426 DVE module. To achieve this, the editor must be 'on-line' with the DVE across a LAN, see Section 4 and 5.2 for details. If the

DVE is part of a TX500 Master Control system, this is a safe operation since the DVE module is only switched into the Programme signal path when the control panel DVE button is pressed.

The mode is enabled by first connecting to the DVE via the LAN, and then by ticking the Live Update box in the main screen. When both indications are green, all moves and sequence previews will be present on both the Preview and PGM outputs of the DVE.

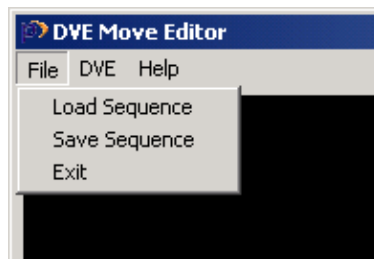


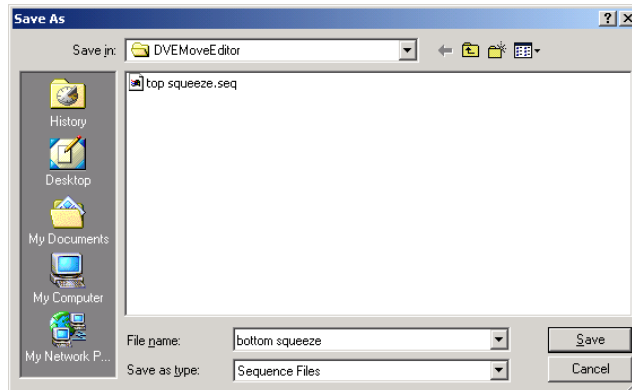
First 'connect' to the DVE, then tick 'Live Update', both status indications must be green for the mode to function.



5.4 Saving, loading and storing moves

When the required sequence has been created it can be saved to the PC's hard drive. This is done from the 'File' menu on the toolbar by selecting Save Sequence. The user will be prompted for a file name, and may change the file location if necessary:



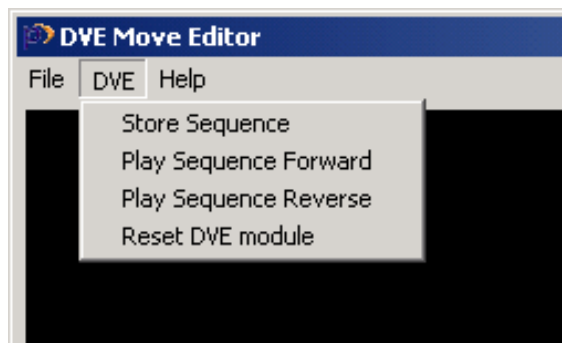


Sequence files are saved to the PC's hard drive with a file extension of .seq

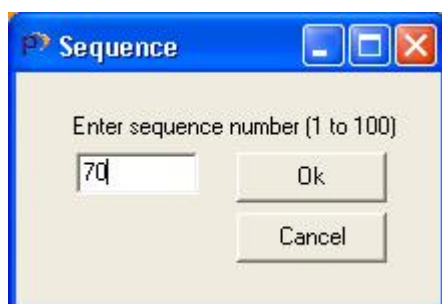
Files may be loaded from the PC into the editor using the Load command.

If the Editor is on-line with the DVE, as indicated by the 'Connected' indication, the currently loaded sequence can be 'Stored' in the DVE module. The DVE can store up to 100 sequences in its non-volatile memory.

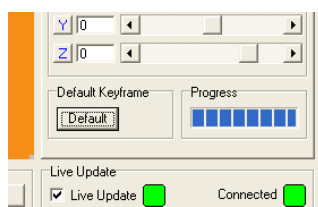
To store a sequence in the DVE module, proceed as follows:



With the required sequence open in the editor, select DVE and Store Sequence from the toolbar



A number between 1 and 100 must be typed into the box. Note that sequence numbers 1 to 24 are accessible from the TX500 control panel. Click OK, this will overwrite that number sequence in the DVE.

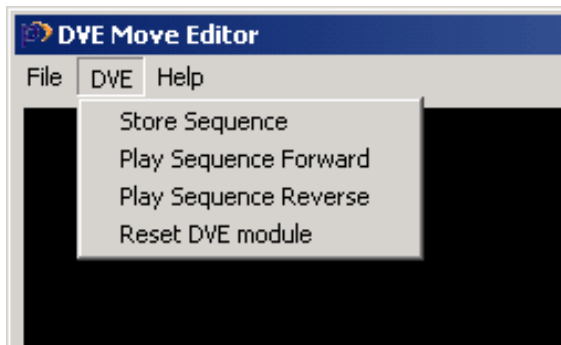


A progress bar will confirm the loading process, at the end of which the screen will return to its initial state

5.5 Previewing stored moves

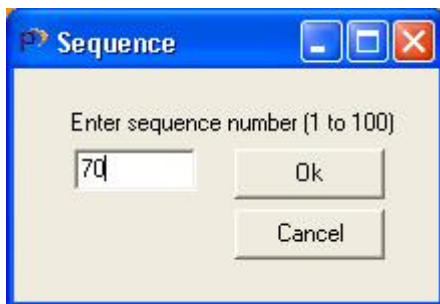
When the Editor software is connected to the DVE, any stored sequence may be recalled and executed on the DVE's main and preview outputs. If the DVE is part of a TX500 Master Control system, this is a safe operation since the DVE module is only switched into the Programme signal path when the control panel DVE button is pressed.

This is performed as follows:



From the toolbar, select DVE and either 'Play Sequence Forward' or 'Play Sequence Reverse'.

The user will be prompted for a sequence number, which must be typed into the box.



Click OK and the selected sequence will be executed on both the main and preview outputs of the module.

6 DVE pre-configured moves

The 3426 DVE module is shipped with 22 pre-configured sequences stored in its memory. When fitted as part of a TX500 Master Control system these sequences may be called up directly from the TX500 control panel screen. When the DVE is connected to a PC running the Move Editor software, these sequences may be overwritten, as detailed in Section 5.4.

The pre-configured DVE sequences are as follows:

Sequence Number	Effect
1	2 sec squeeze to top left
2	2 sec squeeze to top right
3	2 sec squeeze to bottom left
4	2 sec squeeze to bottom right
5	2 sec squeeze to top middle
6	2 sec squeeze to bottom middle
7	2 sec squeeze to top middle + 1 sec bottom rotate Y to 30
8	2 sec squeeze to bottom middle + 1 sec top rotate Y to 30
9	2 sec squeeze to centre ¼ size
10	2 sec squeeze to centre ¼ size + 2 sec clockwise 360° rotation
11	2 sec squeeze to 1/8 size position left bottom rotated to screen in X and Y
12	2 sec squeeze to 1/8 size position right bottom rotated to screen in X and Y
13	6 stages 1 sec each. Squeeze to centre ¼ size, then to each corner clockwise and return to middle.
14	2 sec move screen back to -1800 in z position
15	2 sec flip in y position -720° to -1800 in z position



TX500 DVE user guide

16	4 sec rotate and decrease in size in x and y off screen to top left
17	2 sec FGND 2 pushes FGND 1 off screen right to left
18	2 sec FGND 2 pushes FGND 1 off screen left to right
19	2 sec FGND 2 pushes FGND 1 off screen top to bottom
20	2 sec FGND 2 pushes FGND 1 off screen bottom to top
21	2 sec FGND 2 expands from right FGND 1 contracts to left at 1 sec $\frac{1}{2}$ and $\frac{1}{2}$ on screen.
22	2 sec FGND 1 squeeze to Left half of screen, FGND 2 squeeze to top right of screen $\frac{1}{4}$ size
23	Not configured
24	Not configured

7 Problem solving

This section is intended as a brief guide for diagnosing faults associated with the DVE module. If you need further help, please contact our support department for further information.

There is no output from the DVE and no 'heartbeat' LED indication

- Check mains is connected to the host ICON frame
- Check that the module is fully seated in the frame

The module is active, but there is no output

- Check the status LEDs for valid inputs

The output is unstable

- Check the LEDs for a recognised reference
- Check the switches are set for the correct reference source

When triggered, there is no effect on the output

- There may be no moves loaded into the module, use the Editor software to load an Effect

When used in a TX500 system:

The 'DVE' button on the panel does not light when pressed

- Check that the DVE is included in the video configuration (accessed through the plasma screen)

The picture jumps when the DVE is switched in

- Check that all inputs are within the timing window (see status LEDs)
- Ensure the frame synchroniser is installed and active

The DVE sequence will not change

- Check that the DVE is not active or being previewed

8 Specification

Inputs

Number and type:	3: Serial component digital to SMPTE 259M-C, Foreground 1, Foreground 2, Background
Standard:	Serial EBU Tech 3267E. SMPTE 259M-C
Input Impedance:	75 Ω
Data rate:	270 Mbit/s
Return loss:	>15dB 10MHz to 270MHz
Amplitude:	800mV p-p nominal
DC offset:	<5V
Equaliser (internal router):	Adaptive automatic for up to 250m cable (typ. Belden 8281, PSF 1/2M or equivalent)
Reference:	Analogue video, Looping

Outputs

Number and type:	2: PGM and PVW
Standard:	Serial EBU Tech 3267E. SMPTE 259M-C
Data rate:	270 Mbit/s
Return loss:	>13dB 10MHz to 360MHz
Amplitude:	800mV p-p nominal
DC offset:	<0.5V
Overshoot:	<10%

Timing

For PGM output to be transparent to embedded information, all router inputs must be within 54 μ S of the reference input, and each other. Genlock range with respect to analogue video reference. Between 5 lines early and 4 7/8 lines late

System Delay: 1 Frame and 1 line *

*The system delay is defined with respect to the settings of the card edge switches relative to the analogue reference. i.e. if the switches are set to 0, then the PGM output

TX500 DVE user guide



will be coincidental with the analogue reference.

Performance

Jitter: <0.2UI

Operating temperature

Range: 0°C to 40°C

Cooling: Internal fan and host ICON frame fans