

**The SM-1  
Slow Motion Controller**

**Operator's Handbook**

Manufactured in the UK by  
Ash Vale Electronics.

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## **INTRODUCTION**

The SM-1 is a compact Slow Motion Controller for use with VTR machines on the now standard RS422 serial format. Betacam and Betacam SP, MII and 1" are all supported, as well as the digital formats D2 and D3.

Cassette format VTR's are difficult to control with any subtlety from the front panel, even with practice. However, smooth and precise control of tape motion is possible with the SM-1, even by relatively inexperienced operators. The control buttons are large and well spaced out, and are grouped in logical sections for ease of use, especially under 'live' conditions.

Four shuttle modes are provided, allowing the operator to move tape at one third speed, 4x speed, 8x speed, or Full speed. 8x speed is about as fast as most cassette VTR's will go whilst giving a viewable picture. This speed is available by pressing two adjacent buttons simultaneously - no twiddling a knob to try and find 8x. All these shuttle speeds are in addition to the variable play speeds available, both in forward and reverse. This wide range of fixed and variable speeds available enables the operator to locate specific action shots quickly, and replay them at either normal and non-normal speeds. Variable speeds range from -1x to +3x speed, depending upon the VTR under control.

During use, the operator may display either TAPE-TIME or TIMECODE, and the display on the VTR under control is normally made to follow this switch. One of the options on the SM-1 is to disable the timer-follow command. Under these conditions, a danger exists that a VTR in TIMER mode will be commanded to search for a TIMECODE, or vice-versa. Under these conditions, a warning is given to the operator.

Indicator lights tell if a successful RS422 connection has been made, whether or not the VTR is in Remote and whether or not a tape or cassette is present. Warning of Record-Lockout is also given, and on some VTR's a warning of nearing the end of tape is given.

In addition to the immediate cue enter and search facility, there are four independent cue memories available. These can be entered and recalled at any time, and in any order, and are not affected by the main cue system. Typically, these independent cues would be used for storing the times of goals or other important events. These cues will not be erased unless re-entered or the power turned off.

When the VTR comes out of RECORD mode, an 'OUT' cue is automatically entered with 10 frames subtracted. When replaying a 'slo-mo' in VARiable mode, the VTR will stop at this cue point. The primary use for this facility is to prevent running out of replay pictures. However, the cue can be moved, and thus can be used to mark a particular end point to the slo-mo, such as a close up of a goalscorer. On replay, the VTR will stop at the chosen point. The 'OUT' cue may be erased and it may also be ignored.

## **INSTALLATION AND CONNECTION**

Only two connections are needed to use the SM-1 controller: a mains supply and a 9-pin lead to the VTR machine.

A check should first be made that the mains voltage selector is switched to the correct voltage ( 240V or 120V ). The SM-1 is tested down to 100 volts on the 120V setting, and 200 volts on the 240V setting. Mains should then be applied to the IEC connector at the rear, and the unit switched on.

The 'POWER' LED should light, and if no VTR is connected the 8-Digit display will show all dashes ( -- : -- : -- : -- ). If a VTR is connected, the 'COMM' LED should light up. This indicates that a successful connection has been made. The 'TAPE-TIME' or 'TIMECODE' light will also light up and the 8-Digit display will show the correct numbers. If the TIMER lamps flash, then the timer mode on the VTR is different to that of the SM-1. If none of these things occurs, or occurs intermittently, then communication is breaking down, or is non-existent. Refer to the troubleshooting section of the manual. If the VTR is now switched to remote, the 'REM' LED should now light up. This indicates that the SM-1 has control of the machine. Flashing of the REM light indicates that the record lockout is set, or the record tab is off in the cassette.

The 'TAPE' LED will light up if a tape or cassette is present. It will flash near the end of tape on some VTRs.

All four of the previously described LED's are at the left end of the display panel in a vertical line: POWER; COMM; REM; TAPE. It can be seen that a set of four green lights is needed for successful control of a VTR. This 'FOUR-GREENS' display is easy to recognise and after a short period of familiarisation, the operator will not need to look deliberately for this condition.

The type of time display is selected by the switch on the right side of the display panel. LEDs confirm the setting. It is a matter of personal preference whether TAPE-TIME or TIMECODE is selected, and the display on the VTR under control will follow the SM-1 switch setting.

It is possible to disable this automatic following of the display, and further details are given under 'OPTIONS'. When automatic following is disabled, should the VTR's display differ from that of the SM-1, then the TIMER LED will flash until the condition is removed.

## **OPERATION**

Operation of the SM-1 can be divided into three parts: machine control; slow motion replay; cue memories and search.

### **MACHINE CONTROL**

The functions of the transport control buttons on the SM-1 are identical to their counterparts on the VTR machine being controlled. Some of the buttons have additional functions when used in conjunction with one another, as described later.

The buttons are placed in a manner which is comfortable for fast control of tape motion, under conditions of operational pressure. Controls which are not essential for efficient Slow-Motion control have been omitted.

STOP, REWIND, FAST-FORWARD and PLAY all have their normal functions and can be used in any order. Pressing PLAY and RECORD together puts the VTR into 'RECORD' mode as normal. The RECORD button is guarded by mechanical barriers, as is the SEARCH button. This acts both as a defence against accidental pressing, and as an additional tactile confirmation of the button.

When in 'STOP' mode, pressing RECORD only puts the VTR temporarily into 'E/E' mode. Any new command restores 'TAPE' mode. This allows the operator to view the input to the machine whilst parked. This facility is disabled in all modes other than 'STOP' mode. It is available on all VTR's, even those which do not have this facility on their front panel.

The FAST-FORWARD and REWIND buttons are momentary: releasing the button stops the machine. This mode is very helpful in avoiding 'overshuttling' under pressure, as release of all buttons brings the machine to a halt. The facility may be disabled, and instructions for this are given in the 'OPTIONS' section. Full speed means 24x, 32x, 48x or 50x, depending on the VTR machine. Some 1" machines give a visible picture at 50x, whilst BETA SP machines for example, blank out at full speed.

Pressing either FAST-FORWARD or REWIND buttons at the same time as the STOP button results in tape motion at 8x speed. At this speed it is just possible to follow sports such as Soccer and Horse-racing, and all VTR's give a visible picture.

Pressing FAST-FORWARD or REWIND when in STILL, VAR, or FAST VAR results in a shuttle speed of 4x (On D3 VTRs, this speed is 2x). This is an excellent speed for reversing to find a suitable action cue. It is possible at 4x speed to follow fast sports, such as Boxing and Ice Hockey. To engage this speed from RECORD or STOP mode, momentarily press STILL to engage STILL mode, and then press REWIND. The tape will now go at -4x. This method ensures quick return to a replay point when perhaps no cue was entered. On release, STILL mode is resumed. Pressing FF or REW whilst holding down the STILL button gives a speed of approx 0.3. This may be used instead of the T-BAR for replay of slow items, such as a vault in Gymnastics, or a High-Jump or Pole-Vault in Athletics. It is also a most useful speed for locating exact frames; for example, a Footballer celebrating a goal.

## **SLOW MOTION REPLAY**

The controls for slow motion replay are located on the left of the main control panel. There are three buttons and a 'T-Bar'.

The STILL button engages 'STILL' mode. This mode is used when parked prior to replaying an item, or when transmitting a still picture. In this mode, the still command is sent continually to the VTR. The picture will thus stay 'ready' indefinitely. STILL mode is also entered automatically after a 'Search-to-Cue'.

When displaying a still picture, it is important to be in 'STILL' and not 'STOP' mode. On some VTR machines in 'STOP' mode, tape tension is released, and the top of the still picture is impaired. In others, (eg Beta SP), a black or grey 'dropout' bar appears somewhere in the picture.

The VAR button puts the machine in variable play mode. The range of speed available on the 'T-Bar' is from STILL ( at the end nearer the operator ) to NORMAL play speed. ( at the end further away from the operator ).



The 'speed versus position' of the 'T-BAR' is determined in software, and it has been chosen to give good control at both high and low speeds, and a smooth slow down to a stop.

Because the limits of speed in this mode are 0 to +1 times normal, it is impossible to play events either faster than normal or backwards. Although interlocks are useful, it is possible in a panic to override them: the SM-1 system will not allow you to play pictures backwards if you don't intend to! In VARIable mode, the VTR will stop at the time of a previously recorded out cue. This is described more fully under 'cues'. Holding down the VAR button enables the VTR to play past the out cue, even going past the end of your recording if you so wish.

The FAST VAR button also puts the VTR into variable play mode. However, the range of speeds is now increased, and is from -1 times normal to +3 times normal, depending on the VTR under control. These speeds are useful for visual effects and in editing etc. A useful point to note is that with the T-BAR nearest to the operator, pressing the FVAR button results in a speed of -1x. This can be useful if a quick 'reverse' is needed whilst parked waiting for a replay.

As mentioned previously, a speed of +/- 0.3 is available in these variable modes by holding down the STILL button and pressing FF or REW. This can be used as a fixed speed for replay 'on-air'.

## **Cue memories and Search**

There are six memories in the SM-1 controller:

- 1) A single immediate cue and search memory.
- 2) Four individually addressable cue memories.
- 3) An out cue memory.

### **1) Enter and Search to cue**

Two large buttons, ENTER and SRCH, control this function. They are located towards the top right of the main control panel. They are used in conjunction with the PRE-ROLL switches.

When the ENTER button is pressed, the time on the 8-Digit display at that moment, (T/C or Timer) is stored in memory.

When the SRCH button is pressed, the VTR is commanded to search to the time in the memory. (On 1" VTRs only, the machine first reverses a short way. This is to ensure that clean Timecode is under the replay head.)

If the PRE-ROLL ON/OFF switch is on, then the VTR will go to the cue time less the preroll time. The maximum pre-roll is 9 seconds.

The cue point may be displayed by holding down the STOP button and pressing the SRCH button. The display stays until all buttons are released.

### **2) Cue memories**

The SM-1 possesses four cue memories.

These are accessed via the smaller buttons at the top of the control panel marked ST and 1,2,3,4.

To store a time from the current display, simply hold down the ST button and press the memory button of your choice. A memory which has a time stored in it will be illuminated, and any unused memories will not. The last cue to be stored will be brighter than the rest.

To recall a memory, simply press the appropriate button. The machine will search to the recalled time. Pre-roll, if activated, will be applied to the time before a search is initiated. The cue light will flash and stay flashing when parked. Any command will stop the flashing.

Cue times may be displayed as for the main cue: The STOP button + the appropriate cue button.

### **3) Out Cue**

The SM-1 has an 'out' or 'auto-stop' cue which halts the VTR at the cue point in VARiable mode.

This cue is erased whenever the VTR goes into RECORD and is re-entered when the VTR is brought out of RECORD. The actual cue time is the out time less 15 frames. A valid cue time is denoted by the lighting of the ST button.

When replaying the recorded material, the tape will stop at the cue. Note that this auto-stop only works in VARiable mode, and not in FAST VAR or PLAY.

NB. The actual picture at the freeze will not be 100% predictable. This is due to several factors.

Some VTR machines take longer times to stop than others. This will depend on the mechanics of the machine itself and the amount of tape remaining.

The auto-tracking ( AST or DT ) will jump to the nearest FIELD and may not always be predictable.

The Time in the auto-stop cue represents one FRAME and therefore will not define any particular picture.

Be aware of these factors if trying to freeze exactly, on a winning post for example.

The cue can be ignored by holding down the VAR button. In this case, the tape continues as if there were no cue.

The cue can be simply erased by flicking the TIMER switch. This can be done in any mode, with little chance of upsetting the VTR.

The auto-stop cue can be moved or re-entered. This is done by pressing both STILL and ST together. This useful facility can be used to preset the time at which the picture will freeze on replay. The time in the auto-stop cue may be displayed by holding down the STOP button and pressing the ST button.

The VTR may be searched to the out cue time by holding down the ST button and pressing and releasing the main SRCH button. The ST button will flash during the search, and afterwards until another command is entered. Being able to go directly to the end of recording is most useful. This is especially so when over-recording, when the end of recording can be almost impossible to detect at speed.

## **OPTIONS**

There are several options available on the SM-1 controller.

### **Mains supply**

The switch for mains voltage selection is on the rear panel and the two options are marked on the switch.

### **Frames display**

The switch to control this option is on the main processor board. Access to this board can be gained by removing the four screws on the front panel, and 'hingeing' it upwards. The processor board can be seen on the inside face of the rear panel. To the upper centre of the board is a 6-way DIL switch. SW3 (orange) controls the display frame blanking. When OFF, frames are displayed, when ON, frames are blanked. The SM-1 is supplied with SW3 OFF: ie. frames displayed.

### **Shuttle mode**

As described previously, FAST-FORWARD and REWIND can be either latching or momentary. The control of this function is on SW2 (red) of the 6-way DIL switch on the processor board.

OFF selects momentary shuttle, and ON selects latching shuttle.

The SM-1 is supplied with SW1 OFF: ie. momentary shuttle.

### **Remote timer control**

This is controlled by DIL switch 5 (green) on the main board.

With this switch OFF, the display on the VTR machine is switched to correspond with the SM-1.

When ON, the VTR is unchanged, and it is up to the operator to change the SM-1 to the same.

The SM-1 is supplied with SW5 OFF : ie. auto switching of display.

### **VITC request**

Normally the SM-1 requests auto-TC ie. VITC at slow speeds and LTC at faster speeds. This is true for all VTRs except BVH2000 series VTRs and MII.

These are better on LTC only.

Should there be a likelihood of differences between VITC and LTC, the switching on DIL switch 6 (blue) will request only LTC. This will result in poor reading at very slow speeds on some VTRs.

The SM-1 is supplied with SW6 OFF : ie. auto-TC

## **TROUBLESHOOTING**

### **Power LED does not light....**

Check that mains is reaching the rear socket.

Check that mains switch is on and the neon is lit.

Check mains fuse on the rear panel.

Check the two 1 amp fuses on the PSU board. This is located at the bottom right rear of the case, and is easily seen by removing the right hand side cover.

### **COMM. LED does not light....**

When the RS422 socket is connected to a suitable VTR, then the COMM. LED should light. This is true regardless of whether or not the VTR is in remote.

If this LED does not light, or goes out intermittently, then communication is difficult or impossible. Possible causes are:

VTR remote selector in the wrong position : eg. 50-pin remote.

RS422 lead open circuit, short circuit, or wrongly wired.

Two competing controllers trying to control the same machine - many VTR's have remote in and out sockets which are connected in parallel; make sure only one device is connected.

On D3 VTRs check remote mode: use IN socket in mode 1 or IN/OUT socket in mode 3.

### **VTR shuttles to beginning or end of tape during search....**

This is caused by the Timer Display Mode of the VTR being different to that of the SM-1 The Tapetime/Timecode LED on the display panel flashes. To cure, change either the VTR or the SM-1

### **FRAME BAR in picture during VARIABLE speed playback....**

There are two causes of this:..

VTR has R/P head selected instead of D/T head.

VTR is in edit mode, which also selects R/P head.

To cure either of these problems, switch the VTR to LOCAL, rectify the condition, and resume REMOTE mode.

## **QUICK FUNCTION GUIDE**

E/E Mode	... REC button - Any command cancels. (Stop mode only)
8x Shuttle	... STOP + FWD or REW.
4x Shuttle (2x on D3)	... FWD or REW whilst in STILL mode.
0.3x Shuttle	... STILL + FWD or REW.
Store main cue	... ENTER
Search main cue	... SRCH
Display main cue	... STOP + SRCH
Store cue	... ST + cue 1 ( or 2,3,4)
Search cue	... 1 ( or 2,3,4)
Display cue	... STOP + 1 ( or 2,3,4)
Store out cue	... STILL + ST
Search out cue	... ST + SRCH
Display out cue	... STOP + ST
Erase out cue	... move TIMER switch.
Reset tape time	... ST + ENTER ( only in Tape-Time mode)

## **SPECIFICATIONS**

Device : RS422 controller for slow motion replay.

Power supply : 240v OR 120v 47-63 Hz. Max 20W.

Control type : RS422 Transmit/Receive 38,400 baud.

Connector : 9-pin 'D' type.

Dimensions : Width 205mm : Depth 225mm : Height 135mm

Weight : 2.4 Kg

Suitable VTR's : 1" - BVH 2000, BVH3000 series.

MII - AU650, AU750, etc.

Beta & SP. - BVW65, BVW75, BVW85, etc.

Digital Betacam, Super slo-mo.

Also D2 -eg. DVR10,DVR18

Also D3 -eg. AJD350

## **Accessories supplied**

Mains lead - IEC to open end.

RS422 lead - 9 pin to 9 pin - 4 metres.

Operator's handbook.

Spare bulbs & fuses.