

# **The SM-2a Enhanced Slow Motion Controller**

## **Operator's Handbook**

Software Version C7

Manufactured in the UK by  
Ash Vale Electronics.

## **SM-2a SLOW MOTION CONTROLLER - TABLE OF CONTENTS**

|                                   |     |           |
|-----------------------------------|-----|-----------|
| <b>Introduction</b>               | ... | <b>3</b>  |
| <b>Installation</b>               | ... | <b>5</b>  |
| <b>Operation</b>                  |     |           |
| Machine control...                |     | <b>7</b>  |
| Slow motion replay                | ... | <b>9</b>  |
| <br>                              |     |           |
| <b>Cue Memories &amp; Search</b>  |     |           |
| Enter & search                    |     |           |
| (Normal mode)                     | ... | <b>11</b> |
| (Cue-hold Mode)                   | ... | <b>11</b> |
| Next-cue search                   | ... | <b>12</b> |
| Search to a time                  | ... | <b>13</b> |
| Viewing cues                      | ... | <b>13</b> |
| Changing cue number               | ... | <b>14</b> |
| Erasing cues                      | ... | <b>14</b> |
| Entering cue times                | ... | <b>14</b> |
| Quickstore cues                   | ... | <b>15</b> |
| <b>Temporary cue number</b>       | ... | <b>15</b> |
| <b>Copying cues to a list ...</b> |     | <b>16</b> |
| <b>Out Cue</b>                    | ... | <b>16</b> |
| <br>                              |     |           |
| <b>Working with two VTRs</b>      | ... | <b>18</b> |
| Independent use                   | ... | <b>18</b> |
| Parallel-run                      | ... | <b>18</b> |
| <br>                              |     |           |
| <b>Virtual Recorders</b>          | ... | <b>20</b> |
| <b>Super-Motion VTR's</b>         | ... | <b>20</b> |
| <br>                              |     |           |
| <b>GPI inputs and outputs</b>     | ... | <b>22</b> |
| <br>                              |     |           |
| <b>Options</b>                    | ... | <b>24</b> |
| <br>                              |     |           |
| <b>Transferring cues to a PC</b>  | ... | <b>26</b> |
| <br>                              |     |           |
| <b>Troubleshooting</b>            | ... | <b>28</b> |
| <br>                              |     |           |
| <b>Quick Function Guide</b>       | ... | <b>29</b> |
| <br>                              |     |           |
| <b>Safety Information</b>         | ... | <b>31</b> |
| <br>                              |     |           |
| <b>Specifications</b>             | ... | <b>32</b> |

### **INTRODUCTION**

The SM-2a is an advanced Slow Motion Controller for use with VTR machines on the now standard RS422 serial format. It is intended for use in Broadcast and Professional TV Studios, Outside Broadcast vehicles and similar environments.

Betacam and Betacam SP, MII and 1" are all supported, as well as the digital formats D2, D3, D5 and Digital Betacam. The SM-2a is an enhanced version of the SM-2, developed for use with computer-based disk 'VTRs'. It features 999 cue memories, and external GPI inputs and outputs.

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-2a, 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.

Notable facilities are:

- Jog-Knob, with SHUTTLE, JOG and VARIABLE modes.

- 999 Battery-backed Cues, with flexible control and viewing.

- Ability to control TWO VTR's, separately or ganged.

- Display of Variable speed, even when in STILL mode.

- Four GPI inputs and four GPI outputs, all programmable.

- Transfer of cue memories from and to an IBM compatible PC.

The same four shuttle modes are provided as on the SM-1 and SM-2, 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 shuttle speeds available on the Jog Knob.

The 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. This facility may be disabled.

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.

There are 999 cues available in the SM-2a, and all are retained when the unit is switched off. Each cue entry increments the cue number, which is displayed on a four-digit alphanumeric display. (It is possible to enter cues without incrementing the cue number, in cue-hold mode. See later.) Cues and times may be entered freely, and searched-to, from any mode except Variable modes. All cues are available to both of the controlled VTR machines.

When the VTR comes out of RECORD mode, an 'OUT' cue is automatically entered with 4 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. A separate out cue is memorised for each VTR machine under control.

## **INSTALLATION AND CONNECTION**

**Before using the SM-2a controller, please take time to read the safety information on page 31. Failure to do so may endanger the operator and others.**

Few connections are needed to use the SM-2a controller: a mains supply and a 9-pin lead to each VTR machine. A 15-pin male 'D' connector is needed to access the GPI's, and is supplied.

A check should first be made that the mains voltage selector is switched to the correct voltage ( 240V or 120V ). The SM-2a 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 ( -- : -- : -- : -- ), and the alphanumeric display will show 'SM-2a'. 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. The Alpha Display will show the next cue to be entered. If the TIMER lamps flash, then the timer mode on the VTR is different to that of the SM-2a. The same displays should be present for each of the controlled VTR's. 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-2a 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. (Typically 4 mins on a BVH2000, and five minutes on an AJD350.)

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 yellow lights is needed for successful control of a VTR. This 'FOUR-YELLOWS' 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 time

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-2a 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-2a, then the TIMER LED will flash until the condition is removed.

## **OPERATION**

Operation of the SM-2a can be divided into four parts: machine control; slow motion replay; cue memories and search; out cue.

### **MACHINE CONTROL**

The functions of the transport control buttons on the SM-2a 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. Operators familiar with the SM-1 controller will find a very similar layout, and identical functions.

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 (▶), JOG, SHUTTLE 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 the RECORD button 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, 50x OR 100x, 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, JOG, SHUTTLE, VAR, or FAST/SLOW results in a shuttle speed of 4x (2x on D3 and 3x on BVW9000 VTRs). 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 or JOG knob 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.

The SHUTTLE and JOG modes are identical to those found on the front of the machine. (The range of jog speeds can be limited - see the options section) Because of the quick acceleration of modern VTRs, most operators use the JOG mode in preference to either SHUTTLE or FF/REW. However, it is worth experimenting with the shuttle knob of the SM-2a, as greater latitude has been incorporated around the 4x to 8x speeds.

Because the FF (») and REW («) buttons are not latching, it can be easier to shuttle by 'dabbing' these, than by using SHUTTLE. Some VTRs are very poor at acceleration, and this technique will be useless on those. The way to discover which modes suit any particular VTR is by trial and error.



## SLOW MOTION REPLAY

The main controls for slow motion replay are located towards the left of the 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'. If the STILL button is held down, then the alpha display will indicate the preset speed of the T-bar. The display is in %. This is most useful to predict the initial speed when pressing VAR.

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 white VAR button on the left 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. In this mode, the actual speed of the VTR under control is displayed continuously on the alphanumeric display, again in %. On DVC Pro VTRs, above 50%, only speeds of 75% and 100% are available.

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-2a 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 green FAST/SLOW button also puts the VTR into variable play mode. On this button it is possible to have one of four ranges of speed:

-100% to +300% ; 0 to 50% ; 0 to 33% ; 0 to 25%

To toggle around these settings, press both the STILL and the FAST/SLOW buttons together. The speed range will step along to the next setting.

At switch-on, the SM-2a is in the -1 times normal to +3 times normal mode. These speeds are useful for visual effects and in editing etc. Again, the speed is displayed in percent. A useful point to note is that with the T-BAR nearest to the operator, pressing the FAST/SLOW button results in a speed of -1x. This can be useful if a quick 'reverse' is needed whilst parked waiting for a replay. The 50%, 33% and 25% ranges are most useful for accurate slow motion, especially with the BVW9000 or BVH2700 'Super-Motion' VTR's.

NB. If the VTR under control is a BVW9000, **and** the speed range is 0 to 33%, **and** DIPswitch 3 is ON, then at 33% on the T-bar, the SM-2a will send a PLAY command to the VTR. (See options)

The orange VAR button towards the centre of the controller also engages variable play mode, but now on the JOG knob. The speed range is normally 0 to +100%. As with VAR on the T-bar, the speed is constantly displayed on the alpha display. If the orange VAR button is held down, then the range of available speeds is from -100% to +300%, depending on the VTR under control. There are click stops at 0% and +100%. Release of the VAR button once again restricts the range to 0 to 100%. If the speed is outside this range when the button is released, then the speed is adjusted to bring it within the range.

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

### Previewing Speeds

When in STILL mode:

To preview the Jog-Knob speed Press VAR VIEW

To preview the T-bar VAR speed Press STILL

To preview FAST/SLOW speed Press STILL+ VAR VIEW

When in VARIable mode on the T-bar, it is possible to view the preset speed of the JOG knob by pressing the VAR-VIEW key on the 16 key keypad. This reverse is also true, and pressing VAR-VIEW when in Variable on the knob, will show the T-bar preset speed. It is thus possible to match the speeds and change over in mid-replay.

## CUE MEMORIES AND SEARCH

Use of the memories in the SM-2a can be described in five parts:

- 1) The 999 main cues
- 2) The 9 quick-store memories
- 3) Temporary cue number mode
- 4) Copying cues to a list
- 5) The out cue memory

**N.B.** Please read the section on temporary cue numbers, page 15 - it will help to understand how the cue numbers are displayed.

### 1) THE MAIN CUES

#### a) Enter and search

##### i) Normal mode

Two large buttons, ENTER and SRCH, are the main controls for this function. They are located towards the bottom right of the main control panel. They are used in conjunction with the PRE-ROLL switch, and the 16 key input keypad.

When the ENTER button is pressed, the time on the 8-Digit display at that moment, (T/C or Timer) is stored in memory at the cue number indicated on the alpha display. The cue number is incremented ready for the next cue entry. The numbers will stop incrementing at 999, and the last cue will be overwritten. To change the cue number, see 'Changing cue number'.

When the SRCH button is pressed, the VTR searches to the last cue, which is one before the number indicated. Suppose the display says C046. Pressing SEARCH will search to cue 045. The alpha display will say S045, and the S will flash. The S will stay flashing until any transport button is pressed. The cue number will then stay at 045. It will not revert to the original cue number (in this case 046) until reset by pressing Ret, Set, Enter or Record (see Temporary cue mode, p15).

##### ii) Cue-Hold Mode

Cue-hold mode is entered by holding down the **ST** button and pressing and releasing the **CUE VIEW** button. The letter '**C**' in the cue number display changes to an '**H**'.

In this mode, every press of the **ENTER** button overwrites the existing value in the cue number displayed, and the number *does not increment*. Pressing the **SEARCH** button searches to the cue number displayed.

Whilst in this mode, the cue number being displayed can be incremented by pressing the **SET** button on the numeric keypad, and can be decremented by pressing the **RET** button.

All other cue entry and time entry modes are valid whilst in the cue-hold mode.

Cue-hold mode may be cancelled by pressing once again the **ST** and **CUE VIEW** buttons.

### **Normal & Cue-hold modes**

On 1" VTRs only, the tape will be reversed a short way before searching. This is to ensure that clean Timecode is under the replay head. Then the VTR will search to the time in the memory.

N.B. The VTR will go to the cue time less the preroll time. The maximum pre-roll is 7 seconds. For no preroll, set the thumbwheel switch to 0.

The SM-2a will continue to control the VTR, and park it in the STILL mode, even if the operator switches to the other VTR on the front panel of the SM-2a.

#### **b) 'NEXT' cue facility**

If the green NXT button is pressed, then the cue number will be incremented, the VTR will then search to this new number, and then engage STILL mode. This feature is useful if there is a list of insert cues in memory. Typically, the first cue number would be searched to, and the insert played. Subsequent presses of the NXT button will advance the number and search to that cue. The original permanent cue number will be saved (See below - temporary cue number)

If the ST button is held down while pressing the NXT button, then the cue number is decremented, and search engaged. It is possible to delay the search action on NEXT by approximately 12 frames after the NEXT GPI is sent. This is useful when using virtual recorders. If the GPI is used to activate a DVE, then the picture will have zoomed away, or rotated, before the VTR is searched. See options.

### **c) Searching to a time entry**

The VTR may be sent to a time which is not in memory. Press the TIME-ENT button. The display clears to 00:00:00:00. The desired time may now be entered on the numeric keypad. If eight digits are pressed, then the time is checked to see if it is valid, and if not, then the display is reset. If less than eight digits are entered, then checking is only done on pressing the SEARCH button. If a wrong digit is entered, then pressing RES and then TIME-ENT again will clear the display. Pressing the SEARCH button now prerolls the VTR to the time entered.

### **d) Viewing cues.** (See also under Virtual Recorders)

Cues may be inspected by pressing the CUE-VIEW button on the small keypad. The cue number is displayed on the alpha display, and the time is displayed on the 8-digit display. The cue number displayed may be changed by rotating the JOG knob. The character to the left of the cue number indicates whether the cue was entered from VT-A (↑), VT-B (↓), entered from the keypad (: ) or is an non-existent cue (blank). To cancel cue-view mode press any transport key or the RETurn button. Note that the RETurn button will also cancel temporary cue mode (See below). Whilst in cue-view mode, pressing SEARCH will send the VTR to the indicated cue. The arrow will flash whilst searching, and when parked.

To start the CUE-VIEW from an earlier cue, say cue 75, then simply enter the number (7,5) on the keypad before pressing CUE-VIEW.

If the controller is in permanent cue mode, then the cue number will always revert on exit from cue-view. If in temporary cue mode, then on exit the new cue number will be the last one viewed by the knob.

**N.B.** If the SM-2a is in JOG, VAR or SHTL mode, then the Knob is disengaged when in Cue View mode. The appropriate orange button flashes. To resume JOG, VAR or SHTL, press the button once more.

If the ENTER button is pressed while in CUE-VIEW mode, then the cue which is being displayed will be copied to the next permanent cue location - see 'Copying cues to a list' below.

### **e) Changing cue number**

The number of the next cue to be entered can be changed at any time except in VARiable modes. Enter the cue number desired, and press the SET button on the numeric keypad. This is now the current cue number, and subsequent entries will increment from this number.

Note that cues 1 to 9 may be used as 'Quick-Stores' (See below)

### **f) Erasing cues**

All the cues memories in the SM-2a are retained even when the unit is switched off, as is the current cue number. (memory life 10 years). Eventually the entire memory will be filled up! If the cue number is altered as above, then no memories are erased. However, all the cues above that number may be erased at the same time by holding down the small 'ST' button whilst pressing the SET button. The cue number changes to that indicated, and all subsequent cue memories are erased.

### **g) Entering times**

Times can be entered and placed anywhere in the cue list. To enter a time in the current cue, press TIME-ENT, enter the time, and press ENTER. The cue is entered, and the cue number incremented in the normal way. A cue may also be entered in a specific place. eg. To enter 14:56:00:00 at cue 126. Press 1,2,6 ; the display now reads E126. Press TIME-ENT; the display now reads 00:00:00:00 E126 ; enter the time 1,4,5,6,0,0,0,0 ; press ENTER. The time is entered into cue memory 126, and the cue number reverts to the previous setting.

All the previous operations may be carried out STOP, STILL, PLAY and RECORD modes. Thus it is possible to enter a cue for an incident just passed, or for a quick re-cue, even whilst recording.

It is also important to note that NO interference can be made to the VTR under control by using the 16-key numeric pad. Any machine control has to be made using the main control buttons.

## **2) QUICK STORE MEMORIES**

Ash Vale SM-2a

By pressing and holding the **ST** button and any of the numeric buttons 1 to 9, it is possible to store a time to cue number 1 to 9 directly. This is true regardless of the current cue number. This facility is useful when storing important events, such as goals or falling wickets.

Users of the SM-1 controller will note that the quick-store is similar to the cues on the SM-1, and may be used in the same way.

When stored, the cue has the same status as any other cue, and can be viewed and searched at will. eg. Search cue 4 - Press button 4, then SEARCH.

The quick cues will be remembered when the SM-2a is switched off.

### **3) TEMPORARY CUE NUMBER MODE**

Whenever the SEARCH button is pressed, the controller automatically enters 'Temporary cue number' mode. The cue number is preceded by the letter 'S'. The permanent cue number, preceded by the letter 'C' is saved in memory. In temporary cue mode, the cue number may be changed by:

- a) Using either the NEXT or PREV functions.
- b) Entering CUE-VIEW mode, changing the cue number, and exiting cue-view mode by pressing STILL, or any other transport button.

Permanent cue mode is resumed automatically on pressing the RETURN or SET buttons, or entering RECORD mode. The original cue number is recalled, preceded by the letter 'C'.

Pressing the ENTER key will store a cue at the previous permanent cue number and cancel temporary cue mode. When playing back cues using the NEXT button, for example, it will not be possible to overwrite the cues in the list. Note that pressing ENTER when in CUE-VIEW mode has a different effect - see below.

### **4) COPYING CUES TO A LIST**

If the ENTER button is pressed while in CUE-VIEW mode, then the cue which

currently displayed will be copied to the next permanent cue location. The permanent cue number will be incremented, even in CUE-HOLD mode. This facility may be used to group together important cues to be saved, or to compile a list in memory.

Example: To compile a list starting at 501.....

Enter 5,0,1,SET - the display reads 501. This will be the next cue location to be stored. Press CUE-VIEW and scroll to the first cue to be listed. Press ENTER - the cue is copied to memory 501. The display stays, but the permanent memory number is incremented. Now scroll to the next cue to be listed. Press ENTER. Continue until all cues have been copied. Press RET to return to the permanent cue number.

To play back the list, press 501 and SEARCH. The controller searches to 501. The NXT button will then increment the list.

## **5) OUT CUE**

The SM-2a 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 4 frames (15 on 1" VTRs). 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 point. Note that this auto-stop works only in VARIable mode, either on the knob or on the T-bar, and in FAST/SLOW. However, when DIPswitch 3 is on, and the VTR under control is a BVW9000, the auto-stop will work also in PLAY mode. This is so whether entered via the PLAY button, or via the 33% variable range. (See Super-Motion VTR's)

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.

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 either 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 across and back again. 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. Note that preroll, if selected, will be applied to the cue before searching.

Being able to go directly to the end of recording is most useful, especially when recording over earlier material. If the current end of recording is not followed by blank tape, then it will be almost impossible to detect visually at speed.

## **WORKING WITH TWO VTR MACHINES.**

### **a) Independent VTR's**

The SM-2a can control two VTR's at any time: simply select which VTR to control by moving the VTA/VTB switch. The SM-2a can be considered as TWO slo-mo controllers working independently, but sharing one control panel.

Working with two VTRs is quite straightforward, and should present few problems, as long as a logical approach is made. Each machine has its own identity within the SM-2a, and the individual needs of each type of VTR are satisfied. The SM-2a remembers the mode of each machine, and thus both VTRs can be in any mode. It is possible to have one VTR at say 60% on the VAR knob, and the other at 45% on the VAR knob. A VTR parked at a cue point will continue to indicate so, even if the operator switches away, and operates on the second VTR before switching back.

Separate 'Out' cues are stored for the two VTR's, and each VTR will freeze at its own chosen point. Thus the unselected VTR can be left to stop on its own whilst some other operation is performed on the selected VTR.

There are advantages and disadvantages to being able to control two VTR machines. One operator can control VTRs at opposite ends of a Football pitch, or a Cricket wicket, thereby saving space and money. However, operating this way demands extreme care and clear thinking, both of which tend to diminish under 'live' working conditions.

### **b) Parallel-Running (Gang mode)**

This is a more powerful mode, and is therefore more difficult to operate. The parallel-run mode is engaged by holding down the ST button and pressing the red PAR-RUN button on the keypad. It is released by pressing the red PAR-RUN button only.

In this mode, the SM-2a controls both VTR's simultaneously. Both VT select led's flash. The displays and the lamps in the switches show the status of whichever VTR is selected on the VTA/VTB switch. The other VTR will follow every command given.

Entering a cue will save the time of the VTR selected, but pressing SRCH will command both VTR's to go to that time. It is thus essential that both VTR's have

the same timecode. This will usually be the case, but if not, then there is an alternative. Switch the T/C-T/T switch to T/T, and zero both timers (ST + ENTER). The tape-timers in the two VTR's will now track each other, and parallel-run mode will be successful.

The parallel-run mode will be found most useful when both VTR's have to go back for a slo-mo and run in synchronism every time. Both will search to a cue point, and will stay in step (to within a frame or so) by use of PLAY, VAR & STILL. If no cue has been entered, then jog or move the selected VTR to the chosen point, press ENTER and then SRCH. Both VTR's will search to the chosen point.

If either (or both) VTR's are likely to go back alone, then it is usually better to stay out of parallel-run mode, and use the VTA/VTB switch.

### **Points to note**

Although the SM-2a will happily control dissimilar VTR's, it is unlikely that they will stay in step during parallel variable-speed operation. This is due to the different ways in which various VTR's interpret speed commands.

Out-cues are stored independently for each VTR. If a Slo-mo replay is performed in parallel mode, then both VTR's will freeze at their own selected out points.

**NB.** The parallel-run mode will be **disengaged** if any of the following occurs:

- Communication is lost with a VTR
- A VTR is switched into LOCAL control mode
- A tape or cassette is removed from the VTR

On removal of the problem, then parallel-run may be re-engaged by the normal button presses.

In parallel-run mode, both VTR's will be stopped together, both will be taken out of RECORD together and both will be put into RECORD together. **Great care** must be taken when using this mode!

## **Computer-based Virtual Recorders.**

Working with these devices is similar to tape-based VTRs. The main difference is the ability to search to a cue point almost instantly. Used in conjunction with DVE's and/or external GPIs, a sequence of replays can be compiled and run by a single person.

### **ASC Virtual Recorder (VR)**

JOG control is limited by the ASC Virtual Recorder to +/- 1x speed.

The response time of the ASC VR to the shuttle command is quite poor. To avoid this, the +/- 4x control is initially +/- 110% speed. 'Dabbing' the << or >> buttons while in STILL mode results in immediate response. If the << or >> buttons are held down for longer than 1 second, then the speed is increased to 3x, although this is much more jerky.

Maximum shuttle speed is set in the SM-2a to +/- 100x. Fast forward and rewind speeds are set in the ASC preferences menu.

The VR always searches to Timecode, regardless of the setting of the Tape-time/Timecode switch. Leave this switch in T/C.

**N.B.** It is important that the serial ID of the VR is left at the factory default of AA 00.

### **Tektronix Profile**

For optimum performance with the Tektronix Profile (PDR100,200) the emulation of the Profile must be set to 'BVW emulation'. Even though this has the same Machine ID as a BVW75, detection of the Profile by the SM-2a results in superior performance, in searching and other ways.

If a single panel is used in the same way as a conventional VTR in normal start-stop mode, the SM-2a will behave normally.

It is possible to use the profile in such a way that replays can be performed at the same time as continuous recording. If one panel in profile (Panel A) is set to RECORD, and a second panel (Panel B) is set to replay the same 'clip', then it is possible to use this second panel as an 'instant replay' VTR.

In order to watch the incoming picture when Panel B is in stop mode, it is necessary to enter E/E mode by pressing the **REC** button. In order to 'see' moving timecode, the SM-2a **automatically displays the timecode from the VTA channel.**

This is a most useful feature, but this display of the other VTR's timecode only works under the following conditions:

- and The VTR under control is a Tektronix Profile
- and The SM-2a is switched to VTB
- and The VTR is in E/E mode

Under these conditions, cues may be entered, and searched to as normal. If any transport button other than SEARCH is pressed, then the SM-2a notes the current timecode on channel A, and searches channel B to it. This brings the current picture position 'up to date'.

### **Cue viewing with picture search**

When the VTR under control is a Tektronix Profile, and the SM-2a is in CUE-VIEW mode, then it is possible to view the picture at the cue point, as well as the timecode. Just press the ST button when scrolling the timecode, or when the appropriate code has been reached. The Profile will display the picture at that timecode.

### **SUPER-MOTION VTR's** (BVH2700, BVW9000)

The SM-2a has features which make it useful for these recorders. There are several speed ranges, the most suitable being 0 to 33%.

On the BVW9000 Beta SP recorder, it is possible to set the PLAY mode on the 9-pin remote to be PLAY\_. This is achieved by changing a DIPswitch in the BVW9000 (See Sony Manual). When this is set, it will be useful to enable DIPswitch 3 (see options). When on, at 33% on the 0 to 33% range, the PLAY command is sent, thus locking the capstan at \_ speed and providing the smoothest pictures. Slowing down from 33% on the T-bar re-enters VAR mode.

## GPI's

There are four external GPI inputs on the SM-2a, and four outputs.

Each input can be programmed to activate one of ten commands. Each output can be programmed from the same list of commands.

The commands are:

|   |                              |
|---|------------------------------|
| 0 | STOP                         |
| 1 | STILL                        |
| 2 | VARIABLE SPEED PLAY (T-Bar)  |
| 3 | PLAY                         |
| 4 | RECORD                       |
| 5 | ENTER                        |
| 6 | SEARCH to current cue number |
| 7 | SEARCH then PLAY mode        |
| 8 | SEARCH then VAR mode         |
| 9 | SEARCH to next cue number    |

To view or set GPIs, hold the ST button and press the VAR-VIEW button. The eight timecode digits now represent from left to right GPI i/p 1 to 4 then GPI o/p 1 to 4. (ie. Digit 1 = GPI i/p 1)

The **decimal point** against one of the eight digits indicates that this GPI function is displayed in the right-hand window. Entering a number on the numeric keypad will change the GPI at the decimal point.

By using the << and >> keys, it is possible to move the decimal point left and right, and see the GPI function of all inputs and outputs. Holding down the << or >> or STOP button displays the GPI number in the R-H window.

**Example: To set GPI input 1 as Var(A):** Press ST + VAR VIEW. Now press << or >> to put decimal point against digit 1 (GPI i/p 1). Now press number **7** on the numeric pad. The right hand display changes to VarA. Press STOP to confirm I/P 1.

To exit from GPI set mode, press **ST + VAR-VIEW** again.

Electrical connections to the SM-2a are on the following page.

GPI inputs and outputs are via a 15-pin 'D' connector, as follows:

|        | <u>GPI inputs</u>     | <u>GPI outputs</u> |
|--------|-----------------------|--------------------|
| GPI 1) | pin 5 return 13,14,15 | pins 1,9           |
| GPI 2) | pin 6 return 13,14,15 | pins 2,10          |
| GPI 3) | pin 7 return 13,14,15 | pins 3,11          |
| GPI 4) | pin 8 return 13,14,15 | pins 4,12          |

1) GPI inputs can be enabled or disabled by the red GPI switch on the front panel.

2) GPI inputs are tied to +5V by 4.7K $\Omega$  and must be taken low for at least 40mS.

3) GPI outputs are isolated relay contacts and are active for 100ms when the appropriate command is issued to the VTR.

**The GPI relay contacts are designed for low voltage and signalling only.**

|                        |                       |
|------------------------|-----------------------|
| <u>Maximum voltage</u> | <u>28V DC, 50V AC</u> |
| <u>Maximum current</u> | <u>500mA DC or AC</u> |

**Under no circumstances must mains voltages be connected to the GPI contacts.**

## **OPTIONS**

There are several options available on the SM-2a controller.

### **Mains supply**

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

### **Jog speed range limit**

It may be an advantage to limit the range of the jog function to +/- 100% of normal speed. Switching ON SW1 (brown), of the 4-way DIP switch on the processor board, will limit the speed. Switching it OFF will restore the full range of approx +/- 4x speed. The DIP switch may be found by removing the right side case cover. The processor board is on the rear panel of the SM-2a, and the switch is obvious. Note that some VTRs do not jog faster than +/- 1x anyway eg. MII, ASC Virtual recorder.

The SM-2a is supplied with SW1 off. ie. full-range jog speed.

### **Shuttle mode**

As described previously, FAST-FORWARD (») and REWIND («) can be either latching or momentary. The control of this function is on SW2 (red). OFF selects momentary shuttle, and ON selects latching shuttle.

The SM-2a is supplied with SW2 OFF: ie. momentary shuttle.

### **Play\_ mode (BVW9000 only)**

If the VTR being controlled is a BVW9000, and the DIPswitch 3 (Orange) on the processor board is ON, then the controller assumes that the PLAY command will engage PLAY\_ mode on the VTR.

In this mode, when the T-bar reaches 33% in the 33% range, then the PLAY command will be sent. Moving the T-bar back to less than 33% will re-engage variable mode. The PLAY command at 33% will not be sent for any other VTR type.

The PLAY command sent by the PLAY button is not affected.

VTRs other than the BVW9000 are not affected.

If DIPswitch 3 is on and the VTR under control is a BVW9000, then the automatic stop is also active in PLAY mode. This is so whether entered via the PLAY button, or via the 33% variable range as detailed above.



### **Remote timer control**

This is controlled by SW4 (yellow) on the main board.

With this switch OFF, the display on the VTR machine is switched to correspond with the SM-2a.

When ON, the VTR is unchanged, and it is up to the operator to change the SM-2a to the same.

The SM-2a is supplied with SW4 OFF : ie. auto switching of display.

### **Next command delay after GPI**

When using the NEXT command GPI to enable control of external DVE, it is necessary to delay the search command after issuing the GPI command. This is to enable the DVE to 'fly', or to freeze using the GPI before the picture changes. GPI DIPswitch 1, inside the **left** cover and adjacent to the GPI output socket will delay the search command by approx 12 frames.

## **DOWNLOADING & UPLOADING CUES**

It is possible to transfer cues between the SM-2a and a IBM compatible computer fitted with a serial port. The transfer is achieved via the VTR B connector. Connections are given later. NB. It is not necessary for the VTA port to be connected to a VTR in order to make transfer.

### **FILE FORMAT**

The format of the file from the SM-2a is as follows.

```
<CR><LF>cue number<SP>time<CR><LF>.....cue number<SP>time<CR><LF>@  
eg. <CR><LF>001<SP>12:23:23:01<CR><LF>.....999<SP>13:24:55:23<CR><LF>@
```

The <CR><LF> must be in that order, and the file must end with @. The cues may be in any order, and there may be any number. The time digits must be separated by a colon. If a cue number is followed directly by <CR><LF>, then the cue at that number will be erased.

Times at cue numbers not present will not be affected. It is thus possible to upload one, or several cues to the SM-2a. By using a simple text editor on the cue files, the times may be manually entered, or the cue numbers changed.

The programme TERMINAL, supplied as part of MS WINDOWS, is quite adequate for sending and receiving the cue files.

### **Downloading to the computer.**

- 1 Hold down the ST button and press >> (Fast forward). The VTB serial port changes over to transfer mode, and the cue number display reads SEND.
- 2 On the computer, enter the communications programme and set to receive an ASCII file.
- 3 Press any button on the 16-key pad, and the transfer will start. The cues being transferred will increment on the cue number display. The transfer will finish at the current cue number.
- 4 On the computer, save the file under a suitable name.
- 5 Press any key on the 16-key pad to resume normal working.

## Uploading to the SM-2a.

- 1 Hold down the ST button and press << (Rewind). The VTB serial port changes over to transfer mode, and the cue number display reads RDY.
- 2 On the computer, enter the communications programme and send the ASCII cue file. At the end of the file, the SM-2a will resume normal operation.
- 3 To resume normal operation when no file is sent, or an error occurs, then press any key on the 16-key pad.

**Serial port.** 9600 baud, odd parity, 8 data bits, 1 stop bit

### Connections.

| IBM         |             |       |                  |
|-------------|-------------|-------|------------------|
| 25 pin F/M  | 9-pin F/M   | ..... | SM-2a 9-pin Male |
| 2 ...       | 3           | ..... | 2                |
| 3 ...       | 2           | ..... | 8                |
| 7 ...       | 5           | ..... | 1,4,6,7          |
| short 4,5,6 | short 6,7,8 |       |                  |

In theory, RS422 levels on the SM-2a are not compatible with RS232 levels on a PC serial port. However, the connections above have been found to work with almost all IBM PC serial ports with no level translation.



## **QUICK FUNCTION GUIDE**

|   |     |                                   |
|---|-----|-----------------------------------|
| E/E mode (In STOP)                        | ... | REC button - Any command cancels. |
| Standby mode (Heads)                      | ... | STOP + NXT                        |
| 8x Shuttle                                | ... | STOP + » or «.                    |
| 4x Shuttle (2x on D3)                     | ... | » or « whilst in STILL mode.      |
| 0.3x Shuttle                              | ... | STILL + » or «.                   |
| Display T-bar speed                       | ... | Hold down STILL                   |
| Display Jog-Knob speed                    | ... | VAR VIEW (in STILL)               |
| Display Fast/Slow speed                   | ... | Hold down STILL + VAR VIEW        |
| Display alternate speed                   | ... | VAR VIEW                          |
| Enter main cue                            | ... | ENTER                             |
| Enter quick cue                           | ... | ST + 1 (or 2,3etc)                |
| Copy cue to current                       | ... | ENTER (in CUE-VIEW mode)          |
| Search to last cue                        | ... | SRCH                              |
| Search to cue number                      | ... | (number) ⇒ SEARCH                 |
| Increment cue & Search                    | ... | NXT                               |
| Decrement cue & Search                    | ... | ST + NXT                          |
| Search to Time                            | ... | TIME ENT ⇒ (time) ⇒ SEARCH        |
| Enter Time                                | ... | TIME ENT ⇒ (time) ⇒ ENTER         |
| Enter Time at Cue                         | ... | (cue) ⇒ TIME ENT ⇒ (time) ⇒ ENTER |
| Change cue number                         | ... | (number) ⇒ SET                    |
| Change cue number & erase subsequent cues | ... | (number) ⇒ SET + ST               |

## **QUICK FUNCTION GUIDE** (cont.)

|                     |     |                                  |
|---------------------|-----|----------------------------------|
| Display current cue | ... | CUE VIEW (+ Jog Knob)            |
| Display earlier cue | ... | (number) ⇒ CUE VIEW (+ Jog Knob) |

To also display associated picture on Tektronix profile, hold down ST button in above two modes

|                        |     |   |
|------------------------|-----|---|
| Store out cue          | ... | ST + STILL                                      |
| Search out cue         | ... | ST + SRCH                                       |
| Display out cue        | ... | ST + STOP                                       |
| Erase out cue          | ... | move TIMER switch.                              |
| Reset tape time        | ... | ST + ENTER ( only in Tape-Time mode)            |
| Engage PAR-RUN mode    | ... | ST + PAR-RUN                                    |
| Disengage PAR-RUN      | ... | PAR-RUN   |
| Engage/Dis GPI set     | ... | ST + VAR-VIEW                                   |
| Toggle VAR speed range | ... | STILL + FAST/SLOW<br>⇒ 300% ⇒ 50% ⇒ 33% ⇒ 25% ⇒ |
| Transfer cues to PC    | ... | ST + >> (Fast forward) then keypad              |
| Get cues from PC       | ... | ST + << (Rewind)                                |

## **IMPORTANT SAFETY INFORMATION**

The SM-2a slow-motion controller is designed and built to a high standard. However, care in the use and storage of the unit is essential if reliability and safety are to be maintained.

### **IN USE**

Do not open or otherwise tamper with the controller when power is connected - dangerous voltages exist within the casing.

Do not allow water or other liquids to come into contact with the controller

Always use the controller indoors in a dry place.

Always use a correctly wired and rated mains supply.

Connect the 9-pin sockets only to a suitable video recorder via a properly wired cable.

Use the GPI inputs and outputs only for low voltage (<50V) and signalling purposes - see page 23

Only use the controller for the purpose for which it is designed.

### **WHEN NOT IN USE**

Store the controller in a clean dry place, preferably in a box or case.

When the controller has been stored at very low temperatures, allow time for it to attain room temperature before use.

Do not subject the controller to unnecessary vibration and rough treatment.

## **SPECIFICATIONS**

|                  |  |
|------------------|--|
| Device :         | RS422 controller for slow motion replay.       |
| Power supply :   | 230v OR 115v 47-63 Hz. Max 20W.                |
| Control type :   | RS422 Transmit/Receive 38,400 baud.            |
| VTR Connector :  | 9-pin 'D' type.                                |
| GPI Connector :  | 15-pin 'D' type.                               |
| GPI Contacts :   | 28VDC, 50VAC @ 500mA max                       |
| Serial transfer: | VTB port, 9600, odd parity, 8 bits, 1 stop bit |
| Dimensions :     | W 230mm : D 225mm : H 135mm                    |
| Weight :         | 2.6 Kg   |

### **Accessories supplied**

-----  
Mains lead - IEC to open end.

RS422 lead - 9 pin to 9 pin - 3 metres. (Two supplied)

GPI connector (15 pin 'D' male)

Operator's handbook.

Quick function guide.

Spare fuses & bulbs.

This controller complies with the requirements of the following EC Directives when used in accordance with the above instructions.

CE Electromagnetic Compatibility (89/336/EEC)  
Low Voltage Directive (73/23/EEC)