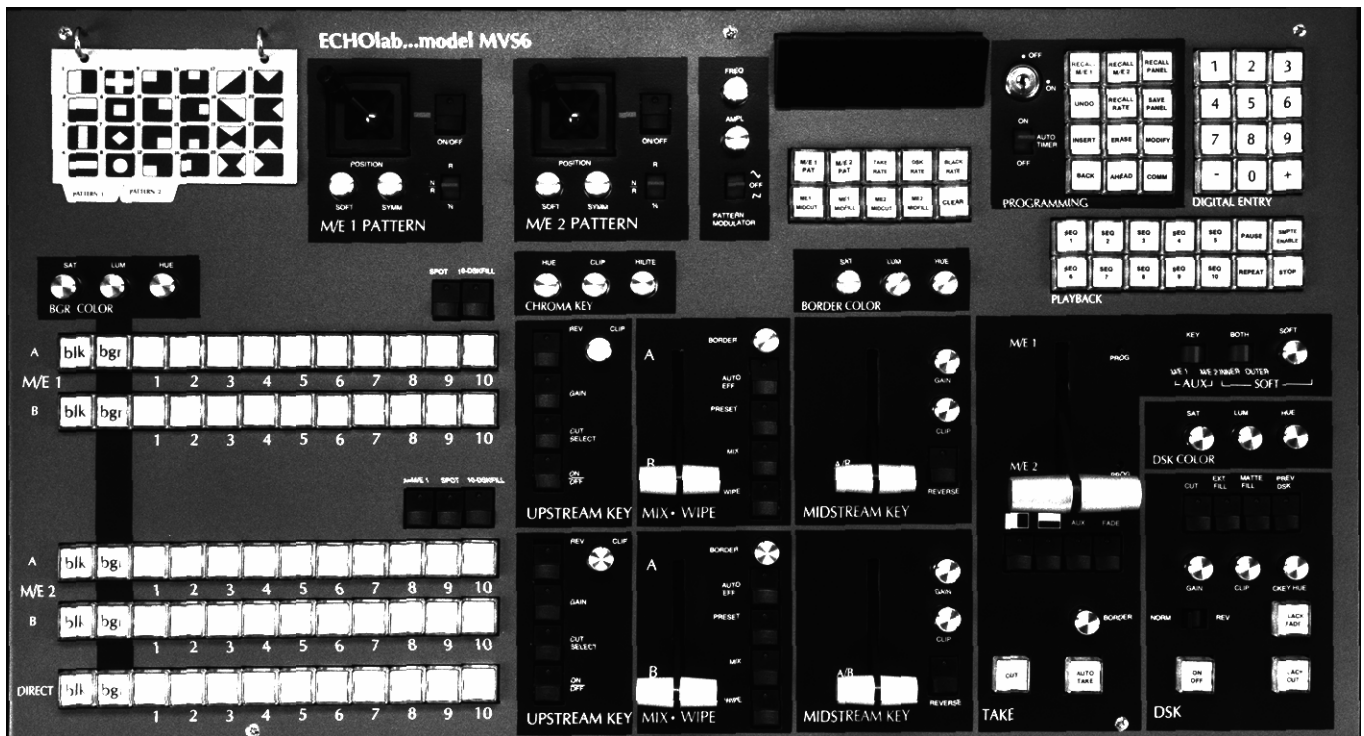


MVS6 Operator's Manual

Revision 1



This manual is intended for use with ECHOLab's model MVS6 broadcast television switcher, with software version 4.x and higher. Last manual revision: 06-30-94

TABLE OF CONTENTS

INTRODUCTION	4
INSTALLATION	5
Rack mounting.....	5
Battery Backup	5
Power	5
Sync.....	6
Video Inputs.....	6
Video Outputs	6
Control Panel connections	6
Keys	7
Key Delay	7
Common installation questions.....	8
1. How do I access the MVS commands and calibrations ?	8
2. How do I genlock and time my switcher?	8
3. Where should I connect my key cuts and fills ?	9
4. What about signal formats ?	10
5. How about options ?	11
6. My control panel shows "DISCONNECTED"	11
7. The serial editing interface does not work.....	11
8. How do the GPI's work ?	12
Edit port connector.....	13
Tally Connector	14
GPIO Connector.....	15
Error lights and messages	16
Options.....	17
PRODUCTION.....	18
Video Functional Diagram.....	18
Overview	19
Control Panel	19
Busses	20
Effects	21
Patterns.....	24
Take.....	26
DSK.....	28
Colors.....	31
Chromakeyer (Optional)	32
Buttons under the display	34
Programming.....	36
Playback.....	39
Pattern modulator.....	41
Commands	42
Calibration commands	48
Colorizers.....	49
Wipe center	49

Dac DC.....	49
Black level	49
System timing	50
Circles	50
Ramp generators	50
Rotary wipes	51
Pattern N/R Calibration	53
Cross pattern Calibration	54
Calibration registers.....	54
Post-production	55
PROGRAMMING	56
Setups.....	56
Sequences.....	58

INTRODUCTION

The MVS6 is a 2-1/2 mix-effects, four-bus switcher, featuring control-panel programming, computer-assisted calibration, and a variety of innovative production features. It is available in composite (-1W), Y/C (-2W), and component analog (-3W) formats.

Along with the normal control system, the MVS6 includes an expanded control set (Commands) with an alphanumeric display for ease of use. A SMPTE-protocol serial link is available for edit controllers.

The MVS6 is built on two to four 12 x 14" printed circuit cards. Computer, sync and key generation circuits are on the lower card; the upper card(s) holds all video circuits. A small daughterboard holds the genlock sync card; an optional card is available for the RGB or YUV chromakey - it is also installed as a daughterboard on the lower card.

The chassis assembly includes a motherboard and a switching power supply. Several trimmer adjustments for gain and phase are accessed by opening this panel.

A remoteable control panel is connected to the electronics chassis through two 75-ohm coax cables and powered by a separate wall-mount transformer. This panel digitizes all switches and potentiometers for serial transmission to the chassis, and has no internal adjustments.

Unpacking

Included with each unit:

- MVS chassis, with any requested options installed
- Power cord
- Control panel
- Wall-mount transformer for control panel
- One Operations manual
- Rack mount hardware
- Spare lamps
- Extender card (option)
- Warranty card

INSTALLATION

Rack mounting

The MVS6 is packaged in a 5 1/4" H x 14" (13.5 x 35 cm) deep rack mount chassis and a 28"W x 2"D x 15.25"H control panel. The chassis is equipped with rear supports which should be used to support the weight of interconnection cables.

When cutting a hole to mount the MVS6 front-panel, it should be noted that the 28"W dimension includes rack-mount ears of 3/4" on either end, which should allow the cutout to be only 26.5"W.

Battery Backup

Because stored-sequence programming and all calibration data is stored in battery-powered memory, several precautions should be observed to avoid accidental memory loss:

1. The CPU (lower) card may be removed without memory loss, but do not set it on a metallic surface.
2. Avoid careless probing of memory and computer signals.
3. Two DL1/3N Duracell batteries are used, wired in parallel. These are mounted on the CPU card. They should be changed at two-year intervals, and replaced ONE AT A TIME so no voltage interruption results. If the unit is continuously powered, the batteries can be changed every five years. Battery voltage can be measured between chassis ground and D6/D7 anodes, just above batteries. Initial voltage is about 3.2 v, and batteries measuring less than 3.0 v should be replaced.

Power

The MVS6 uses approximately 70 watts (composite); 110 watts (Y/C); 150 watts (component) of AC power at 110 or 220 volts. To change from the standard 110 configuration to 220 volt input, remove the AC cable and remove the left side plate of the rack chassis to gain access to the switching power supply. A jumper must be moved from the 110 to the 220v position for European operation.

Sync

A genlock sync generator is built-in to the unit as a standard feature. The genlock input can accept any composite video signal. With the genlock card installed, Command 6 can be used to choose between subcarrier, internal, and genlock modes.

Sync modes - Command 6

MODE	OPERATION
Subcarrier	Horizontal and vertical sync are locked to the external genlock input. Subcarrier is free-running, generated from the internal crystal oscillator.
Internal	Color burst and sync generated internally.
Genlock	Burst and sync are locked to an external NTSC (or PAL) signal connected to the GENLOCK input. Burst phase and horizontal phase are adjustable from the front panel using the calibration commands; see COMMANDS in the Production section.

Video Inputs

Eleven zero-timed terminating video inputs are available for any synchronous or non-synchronous NTSC or monochrome source, composite (preferred) or non-composite.

Video Outputs

One PREV and two PROG outputs are provided in the selected video mode. Also, for monitoring purposes, a composite PREV and PROG output are available at all times. Three BLACK outputs can be used to synchronize genlockable cameras. Optionally, the PREV output can be assigned under software control to be a dedicated M/E1 or M/E2 output. The second program output is also optionally software controlled to display M/E1, M/E2, or to act as a cleanfeed output. This software option is referred to as the POP (Programmable Output Option).

Control Panel connections

Up to 1000' (300M) of 75 ohm coax is used to connect the serial digital data connectors, FA and FB, to the control panel. RS-423 standard data transmission is used for bi-directional communication to the panel. A wall-mount transformer supplies 9-12 volts DC at 1.5 amps to the panel.

Keys

There are five keyers in the MVS6: Upstream ME1 and ME2, Midstream ME1 and ME2, and DSK (downstream). Each keyer can be used with any of the six external key inputs (KEY1 thru KEY5 and CGEN), the optional RGB chromakeyer, as well as with A bus video as a key input. The gain of the all of the keyers can be independently and continuously adjusted from high-gain to linear by use of the appropriate key gain button or knob. All the key inputs will accept 1v standard monochrome key signals.

Two different types of key signals are accepted by the MVS6, high-gain and linear keys.

HIGH-GAIN KEY

This is the conventional key signal, which has been in use for many years. An example is the use of a monochrome camera focused on an art card, with the art traditionally being composed of white letters on a black background. This polarity is less sensitive to camera and lens signal falloff at picture edges and corners. For this use, the signal is nominally 1v p-p, but in practice a keyer gain of ten or more is used to clean up imperfections in the black and white areas. This means that the middle ten percent or so of the camera signal is amplified and used to dissolve from background to foreground.

LINEAR KEY

Electronically generated key signals from equipment such as character generators and digital effects generators usually require a "linear" keyer. The linear keyer has a gain of 1, so a full one volt level will dissolve to the foreground source and a black level will select the background picture. If a high gain keyer is used instead, the key edges will be too hard and cause chroma crawl. Also, if a transparent key is used it will not be reproduced correctly. The upstream keyers can be made linear by pushing the effects KEY GAIN button and using the +/- keys to set the desired softness. The midstream and downstream keyers can be adjusted using their respective key gain knob.

Key Delay

The MVS switcher has a very short overall path delay through the mixer. Worst case path matching inaccuracies are typically less than 35 ns.

Common installation questions

1. How do I access the MVS commands and calibrations ?

The standard commands can be accessed at almost any point by entering the command number followed by the command key, the state of the command is now changed with the + and - keys. Any changes made will stay in the MVS battery backed up memory until they are modified again or a command reset or master reset is performed.

The calibration commands can only be accessed when calibration mode is turned on (100 COMMAND +). Calibration mode should normally be left off to avoid any accidental change of calibration values although factory and your own user defined calibrations can be recalled at any point with command 200 (restore factory calibration) or command 400 (restore user calibration).

When in calibration mode with a cal. command called up the display will show the current value for that command. For the MVS6 the cal. value(s) can be modified with the appropriate chromakey HUE, CLIP, and HILITE knobs. Alternatively the selected cal. value (the active cal. value will have a carat > to it's left) can be trimmed with the + and - keys. For example, command 109 horizontal blank width and phase will look like this in the display.

Horiz 254 clp 784

The chromakey HUE knob will adjust the first calibration value in this command (H phase), the chromakey CLIP knob will remain a clip control, and the chromakey HILITE knob will adjust the remaining cal value (H blank width).

Please note:

The numeric entry command (COMM 29) should be left off. It allows for quick entry of defined calibration values via the numeric keypad but is of no use in normal calibration procedures.

Turning calibration mode off resets the MVS to it's exact panel setup prior to calibration mode being turned on, it basically performs a panel recall to it's pre calibration mode positions.

2. How do I genlock and time my switcher?

The MVS is extremely easy to time as the subcarrier and horizontal phase adjustments are all accomplished with front panel commands, as well as defeating the sync processor and adjusting horizontal and vertical blanking widths.

The MVS must have a valid terminated composite source connected to its genlock input and a valid test signal (preferably color bars) coming into an input from the same reference source (sync generator). Verify that the MVS sync source command #6 is set to genlock (this is its factory default).

Select the reference source (color bars) that you are going to time the MVS to on *all* busses. Turn command 9 off and on to observe the difference between the switchers processed sync and the sources sync.

IMPORTANT: Do not cut between this source and bus black as you may be accustomed to on other switchers, leave your reference source selected on all busses and simply toggle command 9 off and on!

Turn calibration mode on (100 Command +) and select command 107. For NTSC systems adjust the chromakey HILITE knob to change burst phase. For PAL systems this will adjust burst angle. To adjust burst phase in PAL the chromakey CLIP knob must be adjusted. Using the MVS sync proc command 9 to observe any error match the MVS burst phase to the genlock reference.

Adjust the MVS horizontal with calibration command 109. To adjust horizontal phase adjust the chromakey HUE knob.

The MVS SCH phase is set by the relative position of burst phase and horizontal phase. Assuming the reference is in correct SCH phase if the above calibrations have been performed correctly the MVS should be in correct SCH phase. If it is not recheck the calibrations above and / or move the horizontal phase command slightly to achieve proper SCH phase.

For PAL systems only: The MVS PAL phase can be set one of two ways. The burst vectors can be swapped with command 107 or a jumper on the genlock daughter card on the CPU board can be moved. Adjusting command 107 is the method that maintains the integrity of the 8-field sequence.

After the MVS sync proc has been timed to house reference you may want to save these calibrations to the user calibration register. Command 401 will save these and all current calibration values to the user cal area. You will probably want to record these values. One suggestion is to note them on the inside of the chassis door where the factory calibration printout is located.

3. Where should I connect my key cuts and fills ?

The answer to this question, anywhere!, points out some of the outstanding features of the MVS series switcher. The MVS keyers can select any key input, optional chromakey, or bus input for its cut source and any bus input, DSK fill, or internal colorizer for its fill source. There is no need for any external delays,

routing, or distribution as all key and bus inputs are essentially zero timed and can be called up anywhere on the switcher.

- All keyers are gain adjustable from linear to high gain from the control panel.
- Once a source and it's associated key signal are timed to the MVS switcher it can be selected anywhere with no other timing considerations.
- For cut selection there are six terminated external luminance key inputs, KEYS 1-5 and CGEN, available as well as the chromakey option key or any A bus source.
- For fill selection any of the 10 bus inputs, DSK fill, or any internal colorizer can be chosen to fill any keyer.

4. What about signal formats ?

The MVS switcher is upgradeable from composite to Y/C or component or from Y/C to component by adding video board(s) and changing a software command and a few jumpers on the CPU board. It is also possible to change the switcher over from one format to another by changing a command and CPU board jumpers (on revision D and later) providing you have a sufficient number of video boards in the MVS (one for composite, two for Y/C, and three for component). Please note that you should consult ECHOlabs prior to making any upgrades or reconfiguration of your system to verify board compatibility and discuss specifics of areas of concern such as preview/program composite encoder adjustments, colorizer saturation calibrations, and miscellaneous items such as the optional RGB to YUV transcoders.

The MVS is not intended to be an inter-format switcher. You cannot intermix formats, only change the switchers overall format with a few exceptions.

- The composite preview and program outputs always provide a composite output regardless of the format of the MVS (provided the MVS is operating in it's original factory format or the correct modification and calibration has been performed). In composite and Y/C these are full broadcast quality, in component these outputs are intended for monitoring only.
- There is an option for inputs 9 and/or 10 in the component version to transcode from analog RGB to YUV.

5. How about options ?

Most options will be displayed when command four is selected. The current software version and major options will scroll on the display. Most of the options are software options, such as SMPTE editing interface, rotary wipe package, memory expansion, etc., and can be added by entering a code supplied by ECHOlabs. Others, such as Chromakeyer are plug in option cards.

Now for some troubleshooting questions.

6. My control panel shows "DISCONNECTED"

So far you know that there is power to the control panel and it is running. If you press the CLEAR button (underneath the display) on the control panel and it will display switch numbers that you select and their state (on/off) or if you move levers, a joystick, or knobs their value will appear in the display. This means that the panel is functioning (it has its own processor) but not communicating with the chassis. Let's examine other potential causes.

- Check that the chassis has power. The MVS chassis has a power switch that is accessed by hinging open the chassis door. It should be on and illuminated.
- Check that the chassis CPU board is running. There is a bank of four LED's on the CPU board (revision C and later). The left hand LED should be lit solid (+5 VDC) and the right hand LED should be blinking. This indicates the chassis CPU is running. If the LED is not blinking try powering the MVS down and up again, if that fails try resetting the boards, if that fails contact ECHOlabs for assistance.
- Try powering the control panel down and up. The control panel power connector should be strain relieved to make sure it is always making good contact.
- Check that the communication cables are connected correctly and in good working order. Do not hesitate to swap them out for a new set if you suspect they may be bad or intermittent or swap them around if you think they may be reversed (hooking them up backwards will not harm them).

7. The serial editing interface does not work.

This is one of the most common support questions asked and statistically one of the least likely to be caused by a hardware or software fault. The MVS operates under GVG 100 protocol with an RS 422 edit port and command selectable baud rate, parity, and address. Check the following:

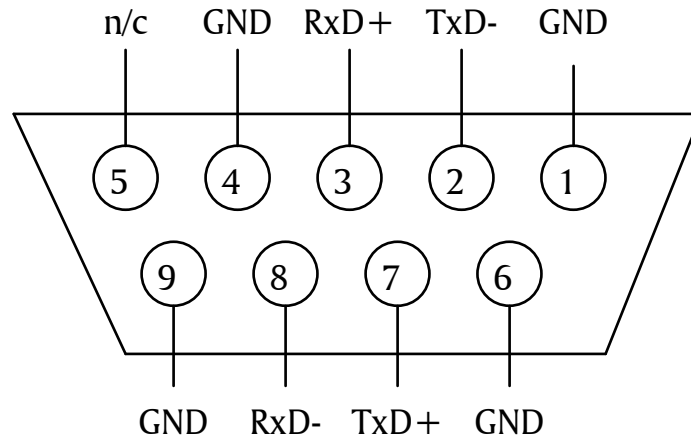
- SMPTE editing interface is an option. Is it installed in the MVS? Check command 4 to see if the option is installed.
- Is the SMPTE enable button lit on the MVS control panel? This turns on and off the interface.
- Is the editor RS422? That is the standard configuration of the MVS edit port.
- Is the MVS and/or the editor selected to the correct baud rate, parity, and address? There is no "correct" setting for this, the editor and MVS must agree. Confirm that the editor is selected to what you believe it is. Often this discrepancy is the problem.
- Check the cable!!!! About half the interface problems are traced down to a mis-wired or incorrect cable.
- Is the editor GVG 100 protocol. Is it selected to GVG 100 protocol?
- Make sure the MVS SMPTE transmit test command (COMM 21) is off.
- Try re-booting the editor after changing any parameter. Some only check for the switcher once on power-up and give up after one try.
- Make sure you are connected to the MVS edit port.
- If all this fails contact ECHOlabs or the edit manufacturer for further assistance.

8. How do the GPI's work ?

There are four GPI inputs on the MVS. Three are dedicated and one is command selectable. The first three are used to trigger autotake, DSK and fade-to-black respectively. The fourth GPI input is programmable - see command 15.

Edit port connector

The edit port connector is a standard female DB-9 connector pinned out as a SMPTE slave. The port supports EIA standard RS-422 communications, and is pinned out as shown below:

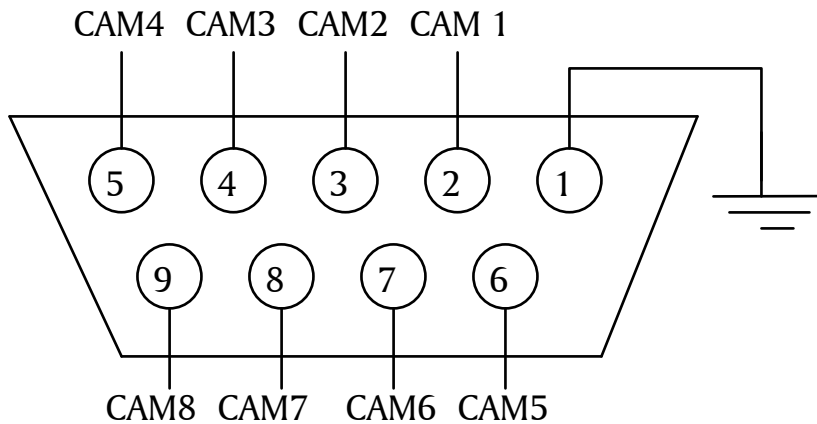


Note: On CPU revision D or later, a jumper in the computer section of the CPU board (just underneath U40) can be moved to the RS-232 position if it is necessary to interface to an RS-232 device. This will cause the MVS6 to transmit an RS-232 response on pin 2 of the edit port connector.

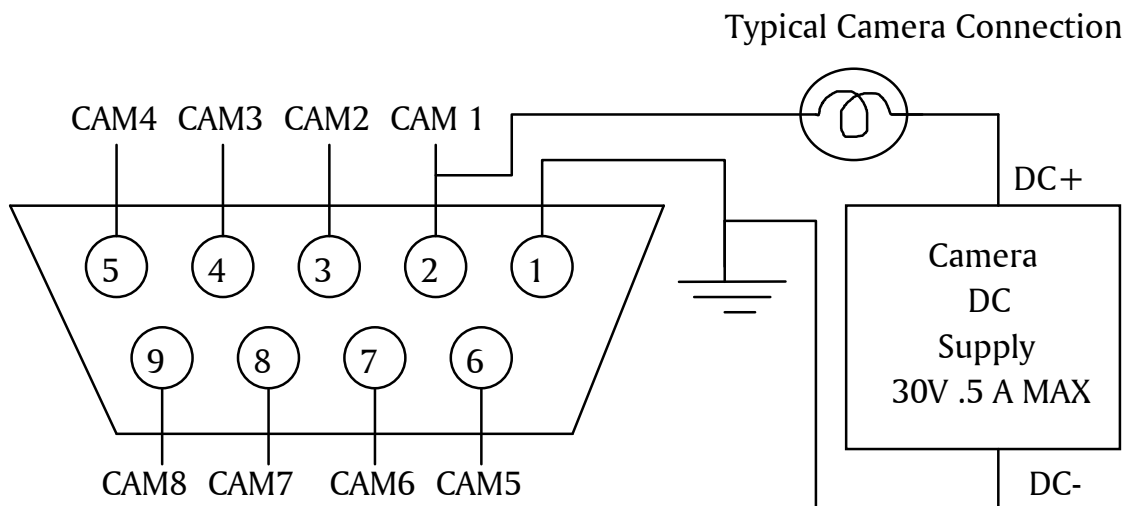
Tally Connector

Tally connections for camera's 1 through 8 are brought out on the nine-pin D connector marked TALLY. The pinout for this connector is shown below. Also shown is a typical wiring topology for using the MVS open-collector tally outputs. The tally connections function by providing an open collector output that provides a short to ground when selected (1/2 amp, 30V max.).

TALLY CONNECTOR INTERNAL WIRING:

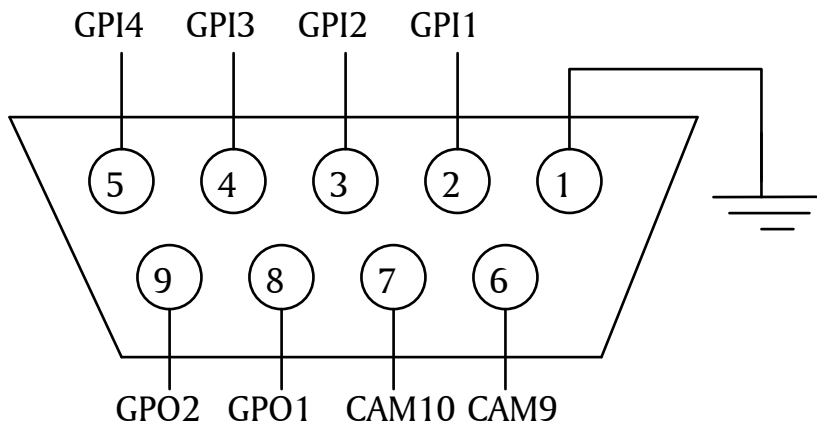


TYPICAL TALLY CAMERA WIRING



GPIO Connector

Connections for GPI's 1 through 4, GPO's 1 and 2, as well as tally connections for cameras 9 and 10 are brought out on the nine-pin D connector marked GPIO. The pinout for this connector is shown below. The GPO and tally connections function by providing an open collector output that provides a short to ground when selected (1/2 amp, 30V max.). The GPI inputs can be triggered by either a short to ground, or a trigger from a TTL or bipolar level signal (+/- 12v max).



Error lights and messages

Four LED lights can be seen at the CPU card edge by lowering the chassis front panel. These monitor, from left to right:

- | | |
|--------|------------------------|
| ERROR | 1. +5v |
| LIGHTS | 2. unused |
| | 3. unused |
| | 4. diagnostic, flashes |

Also, several system malfunctions are reported in the control panel display:

DISPLAY MESSAGE	MEANING
* WARNING * The original factory calibration has been lost.....	See Battery Backup on page 5. This message means that the battery power to the memory has been lost, or the batteries are dead. The calibration register contents have been lost. Replace the batteries if required, restart, and recalibrate if necessary. Calibration register settings as shipped can be found inside the chassis panel.
* Warm Restart *	AC power was lost, but memory was not affected. The system has recovered to its previous setting.
* SYSTEM RESET *	Accidental program crash, possibly due to brownout. Sometimes displayed when power removed and re-applied. Note that a system reset causes a command reset to occur as well as erasing all SETUPS and SEQUENCES.
* DISCONNECTED *	The control panel has lost communication with the chassis. Check the two control panel cables and the chassis power. See page 11 for troubleshooting.

Options

Several hardware and software options are available for the MVS6. Most options are detectable by the CPU. A list of currently installed options is displayed by command 4 (press 4 COMM). The only user-installable hardware option is the chromakeyer. It is installed by removing the lower card and inserting the option card. If specified with the initial order, options will be already installed.

Software options include the rotary wipes, editor interface, and expanded switcher memory. Software options not installed by the factory can be added in the field. Have your dealer call ECHOlabs with the ID number of your MVS6 and a purchase order number. Command 24 displays your unique ID number. ECHOlabs will then give you a nine digit number that will install your desired option...key this number into the display and press COMM. This installation command number is not valid for any other MVS6.

Hardware options

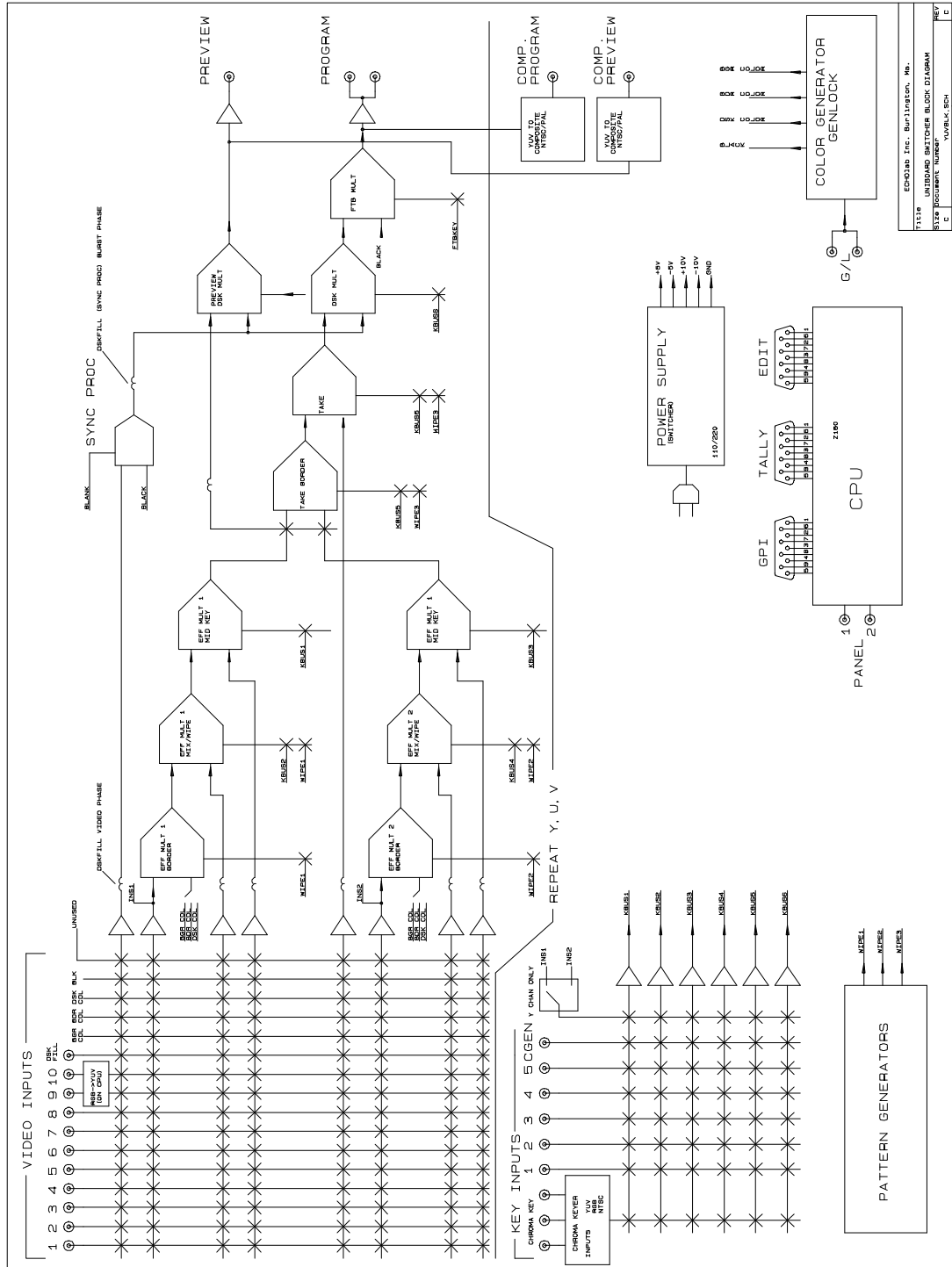
<u>Name:</u>	<u>Description:</u>
RGB-56	Chromakeyer, RGB
YUV-56	Chromakeyer, YUV
INS-56	RGB inputs on 9 and/or 10 (component only)
EXT-56	Extender card

Software options

SMPTE-56	SMPTE Serial Interface to Editors
MEX-56	Memory expansion
RWP-56	Rotary wipes
POP-56	Programmable M/E and clean feed outputs

PRODUCTION

Video Functional Diagram



Overview

Refer to the Video Functional Diagram.

The MVS6 is a 12-input, four-bus switcher with two mix-effects-key systems, a take mix-effects system, and a previewable downstream keyer with fade to black.

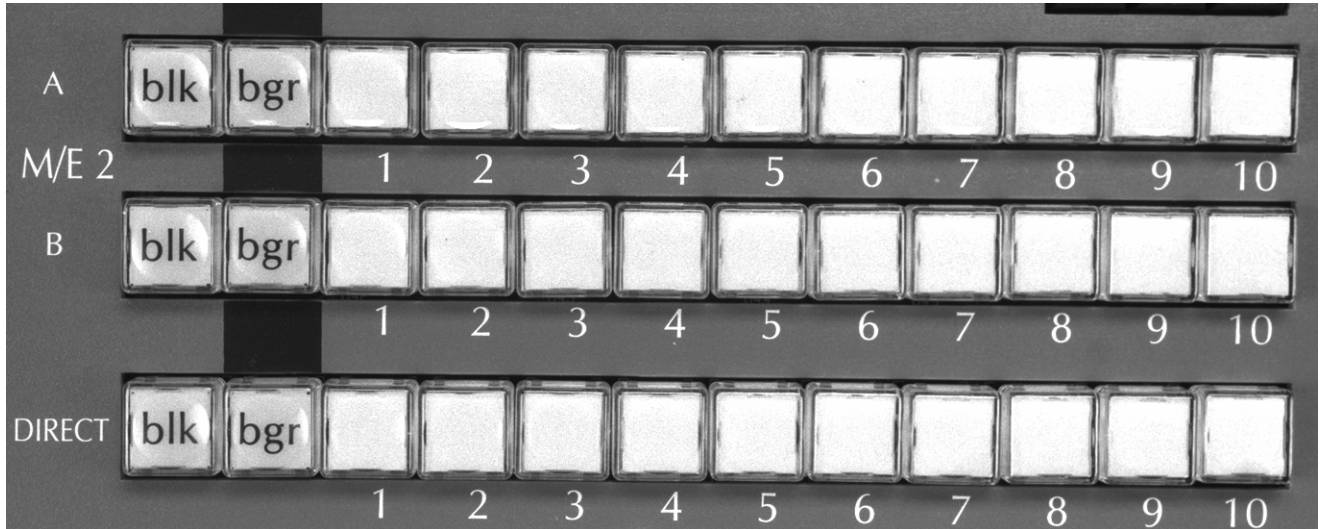
The MVS6 is a flip-flop mixer - most operations are handled by selecting a video source on the preview M/E and taking it on-air by means of the TAKE control group. A previewable downstream keyer is included to add titles or other keys over all other switching or effects.

Control Panel

A 16 character display is included to assist in both production and programming operations. To the right of the display, a 12-key group is used for programming switcher setups for later recall - the buttons in the playback group can also be used to store sequences of operations for later replay. None of these keys, with the possible exception of CLEAR, is used for normal production. A numeric keypad is used for entering wipe patterns, digital rates, colors, and other data.

In normal use, the MVS6 control panel will display all operations on its display. Refer to this display for setting functions such as TAKE SELECT, and to check whether a previously stored operation sequence is being replayed (see PROGRAMMING section).

Busses



DIRECT BUS

The direct bus provides a convenient way of getting a single source on air. When a source is selected on the direct bus, the current on-air M/E switches its B bus to the desired source, the effects lever is electronically returned to the B bus, and any upstream or midstream key is turned off. Also, any take in progress is halted, and the take position is reset to fully show the on-air M/E.

Sometimes it may be desirable to preview a direct source before taking it to the air. To provide for this, command 35 allows the direct bus to operate on the preview rather than the program M/E. This allows the source to be previewed before taking it to the air. To set up this mode of operation, key in the number 35 into the display and press COMM. The display will show <35 Direct = PROG>. This is the normal mode of operation. To change this, press the + key. The display should now show <35 Direct = Prev>. Now when a direct bus button is pressed, the preview M/E will be used rather than program. Note that when in Direct = Prev, any TAKE in progress will not be reset.

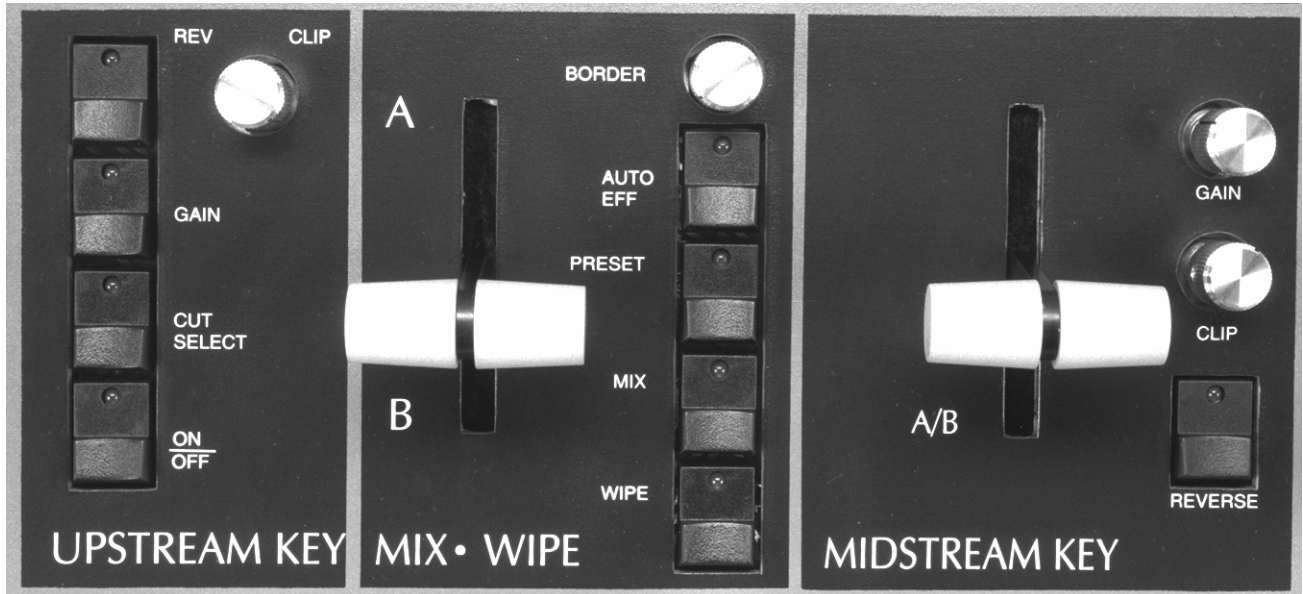
BBUS

The B bus selects the "background" picture on the M/E. BLACK, BGR or one of the ten video inputs can be selected. Pressing any of these buttons selects that source, turns off any other active sources, and illuminates the bus button.

ABUS

The A bus selects the "foreground" picture on the M/E. The foreground will be the video involved in a mix or wipe effect if the upstream keyer is off, or it will be the fill video for the upstream key if the upstream keyer is on.

Effects



The effects generator controls the way the A and B busses are combined on the M/E. The three basic ways that the pictures can be combined are mix, wipe, and key. Also, combinations of these effects are possible. An additional layer of keyed video can also be added through the midstream key block.

I. UPSTREAM KEY

ON/OFF Pressing this button turns the upstream key on and off. The LED on the button will illuminate to indicate that the keyer is on. Move the mix/wipe lever towards the A bus to reveal the key.

CUT SELECT Press this button to display the currently selected key cut source. To select a different key source, press the button again to step to the next key source. Note the digit on the far right hand side of the display. This number can be used to directly access a particular key source. For instance, to select the KEY5 input as the key cut source, key the number 5 into the display and press CUT SELECT. Note that the KEY5 source is now selected. To select chromakey, press 7 followed by CUT SELECT. The following chart shows the available key cut sources:

Display	Key Source
---------	------------

Ucut KEY1:1	KEY1 BNC
Ucut KEY2:2	KEY2 BNC
Ucut KEY3:3	KEY3 BNC
Ucut KEY4:4	KEY4 BNC
Ucut KEY5:5	KEY5 BNC
Ucut CGEN:6	CGEN BNC
Ucut CKEY:7	RGB BNC's
Ucut SELF:8	A BUS of M/E

GAIN Press GAIN to set the key gain of the upstream keyer. Use the + and - keys or key in a number from 0-127. 127 is completely hard (high gain), and lower values make the key gain lower (for linear keys).

REV Press REV to change the polarity of the keyer. The LED on the button will light to indicate that the keyer is in reverse polarity. Normal keyer polarity is white letters on a black background - reverse polarity would be used for black letters on a white background.

CLIP The CLIP controls the intensity of white needed to cut the hole in the background video (B bus). Adjust the CLIP knob until the best and cleanest looking key is obtained.

II. MIX/WIPE

**WIPE
SELECT** When the WIPE button is pressed, the MIX button goes out and the lever wipes in the selected pattern. If the mix lever was in an intermediate position, that level of mix remains on the screen as the wipe progresses. The mix button will flash indicating that the mix action was not completed.

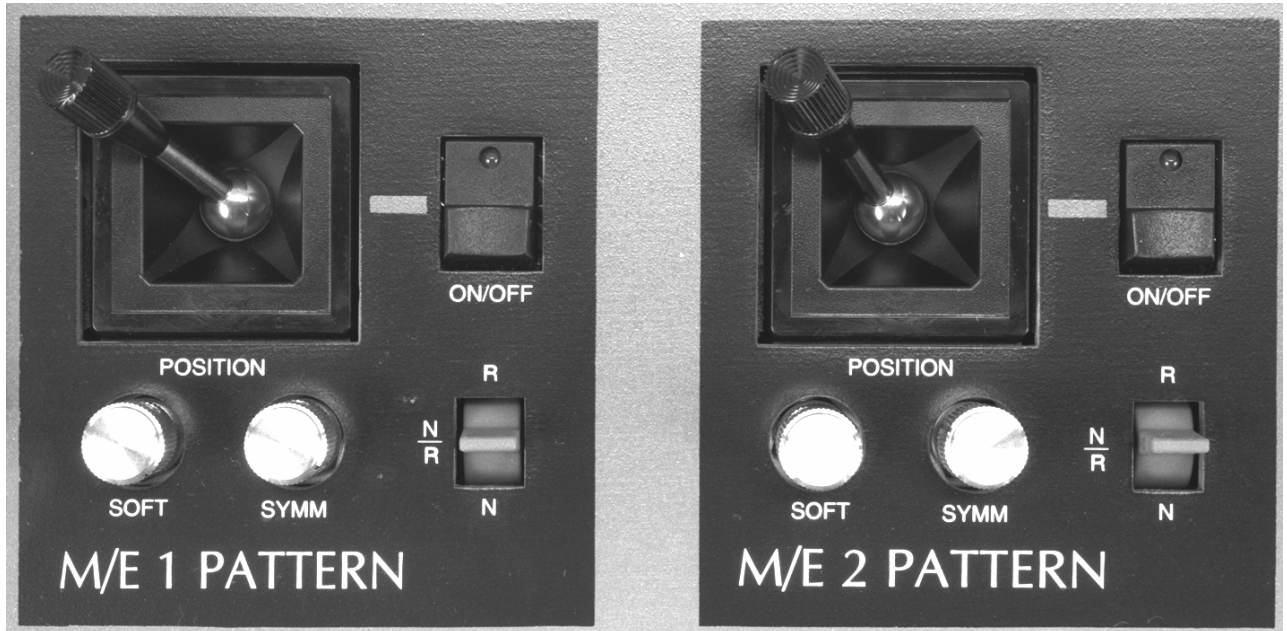
**MIX
SELECT** When the MIX button is pressed, the WIPE button goes out and the lever performs a mix between the A and B busses. If the wipe lever was in an intermediate position, the wipe remains on the screen as the mix progresses. The wipe button will flash indicating that the wipe action was not completed.

PRESET	The PRESET will stop the action of the lever at a predetermined point, even though the lever continues to the stop. To PRESET a wipe size: 1. Make sure the PRESET LED is out 2. Move the wipe lever to bring in a wipe 3. Push PRESET on (the led should illuminate) 4. Return the lever to either stop 5. Move the lever fully to the opposite stop. The wipe (or mix) will stop at the preset position.
AUTO EFFECTS	To set up timed mixes or wipes in the M/E: 1. Push the AUTO EFFECTS button, lighting its LED 2. Move the effects lever to the bus containing the next source 3. When the lever reaches the stop, the auto effect will start 4. To change the effects rate, key in a new rate and press the AUTO EFF button again. The new rate will be displayed. 5. To turn off auto effects, press the button - the LED goes out

III. MIDSTREAM KEY

FADER ARM	The midstream key fader arm is used to dissolve a key in over the desired M/E. To fade a key in, move the lever to the top stop. The CLIP and GAIN knobs may need to be adjusted to make the key visible. Also, the desired key cut and fill video sources need to be selected.
REVERSE	Press REVERSE to change the polarity of the keyer. The LED will light to indicate that the keyer is reverse polarity. Normal keyer polarity is white letters on a black background - reverse polarity would be used for black letters on a white background.
CLIP	Use this knob to adjust the clip level of the midstream key.
GAIN	Use this knob to set the gain of the midstream key.

Patterns



The pattern controls specify the shape and position of wipe patterns.

SOFT The soft knob is used to vary the edge softness of the pattern. Adjust the knob in a counter-clockwise fashion to soften the pattern. Note that the display indicates two identical numbers to indicate the softness level. This is because the MVS6 can *independently* vary the edge softness of a bordered wipe on the inner and outer edges of the wipe. To see this effect, set up a bordered wipe on the desired M/E. Now hold down the currently selected A bus crosspoint, and while holding down the A bus crosspoint, turn the soft knob. Note that only the right hand number changes in the display, and only the inner edge of the bordered wipe is softened. Now try the same experiment, but hold down the B bus crosspoint instead while adjusting the soft knob. Now only the outer edge of the bordered wipe is softened. Each edge can be independently softened, or they can be adjusted together by just turning the knob without holding down any crosspoints.

SYMM The SYMMETRY knob will vary the aspect ratio of the pattern. This can be used to help create new patterns for specific purposes. Experiment with this control to achieve the desired effect.

N/N-R/R SWITCH	This switch changes the direction of the wipe pattern: NORMAL (N): Patterns will start in the center of the screen and wipe to the edges. REVERSE (R): Patterns will start at the edges of the screen and wipe into the center. NORMAL-REVERSE (N-R): Wipe patterns will alternate between the two styles.
JOYSTICK	The joystick control will move the wipe around the screen if a positionable pattern has been selected and the joystick on/off button is on. Note that if a non-positionable pattern is selected, the joystick on/off switch will be turned off, and if the button is pressed, the display will indicate that the current pattern is not positionable.
ON/OFF	This button is used to enable or disable the positioner. Normally, when a new, positionable pattern is selected, this button will illuminate to indicate that the current pattern is positionable. Press the button once to disable the positioner. Press it again to turn it back on.

The MVS6 has a unique feature to minimize wipe deadband. Other switchers will exhibit wipe lever deadbands of up to 50% with some types of wipes such as repositioned square and circle wipes. The MVS6's computer looks at pattern, border, soft, and position settings and recalculates the wipe lever travel correction each frame. Deadband is typically 10% or less.

Take



The take controls perform a transition between the picture currently on the program monitor and the picture on the preview monitor. A variety of transitions can be used.

CUT Press CUT for a one-field cut to the preview picture. The M/E on preview will be switched to program, and the M/E that was on program will be switched back to preview.

AUTO TAKE Press the AUTO TAKE button to perform a take to the preview picture. At the end of the take, the old program picture will appear on the preview monitor. Another AUTO TAKE will switch the pictures back. If AUTOTAKE is pressed while a take is in progress, the take is paused and the AUTOTAKE lamp blinks. The take may be resumed by pressing AUTOTAKE again, or it may be completed manually.

MANUAL TAKE The manual lever can be used instead of the AUTO TAKE; the leds will show which M/E is currently on program.

TAKE BORDER SIZE Adds a border to the take. The default border color used is border color, but either of the other two colorizers can be selected for use with Command 32. See details in the **Commands** section of the manual.

TAKE SOFT The take soft knob is used to vary the edge softness of the take. Adjust the knob in a counter-clockwise fashion to soften the edge. Note that the display indicates two identical numbers to indicate the softness level. This is because the MVS6 can *independently* vary the edge softness of a bordered take on the inner and outer edges. To see this effect, manually set up a bordered take and set the take soft switch to inner. Now adjust the take soft knob, and see that only one edge of the take is softened. Now move the take soft switch to outer and adjust only the outer edge softness. Move the switch back to both to adjust both edges simultaneously.

TAKE SELECT Four buttons are available to select the desired take style. The left hand two buttons select traditional horizontal and vertical ramp patterns respectively. The right most button will select a dissolve. If the take aux style is selected, the take style will be determined by the AUX switch in the upper right corner of the TAKE group. The AUX switch allows the take section to use M/E1 or M/E2's pattern generator, or a take through key. Currently, the take through key option is not supported, and will default to a dissolve transition. A future software revision will support this feature.

Take Pat 1



Take Pat 2



Take Aux

M/E1 or M/E2 patt

Take Fade

dissolves

DSK



CUT SELECT

To add a key to the program picture with the DSK, first select an active key signal using the DSK CUT button. As this button is pressed, the display will cycle through the inputs:

DskCut	Key1	:1	; Key1 BNC
DskCut	Key2	:2	; Key2 BNC
DskCut	Key3	:3	; Key3 BNC
DskCut	Key4	:4	; Key4 BNC
DskCut	Key5	:5	; Key5 BNC
DskCut	Cgen	:6	; Cgen BNC
DskCut	Ckey	:7	; Chromakeyer (Optional)
DskCut	ME1A	:8	; ME1 A bus
DskCut	ME2A	:9	; ME2 A bus

Note that if the cut select choice is not in the display, the first push of the cut select button will display the current source without changing it. The second push will then cycle ahead.

To access a cut source directly without cycling through all choices, key the number after the colon into the display and press the CUT SELECT button once. This same procedure works for all other select functions.

**EXT FILL
SELECT** To fill the key with an external source of video, press the EXT FILL button to cycle through:

DskFil	Cam1	Camera 1
DskFil	Cam2	Camera 2
DskFil	Cam3	Camera 3
DskFil	Cam4	Camera 4
DskFil	Cam5	Camera 5
DskFil	Cam6	Camera 6
DskFil	Cam7	Camera 7
DskFil	Cam8	Camera 8
DskFil	Cam9	Camera 9
DskFil	Cam10	Camera 10
DskFil	DskF	External DSK fill

Note that the led on the EXT FILL button illuminates to indicate that an external fill source is selected.

**MATTE
FILL** To fill the key with a color, press the MATTE FILL button to cycle through:

DskFil	Blk :1	Black
DskFil	Bgr :2	Background color
DskFil	Bdr :3	Border color
DskFil	Dsk :4	DSK color

Note that the led on the MATTE FILL button illuminates to indicate that a matte fill source has been selected. Press the DSK ON/OFF button to turn on the downstream keyer. With the CUT set to Cgen and the fill set to DSK color, change the clip control to bring in a matted CGEN key. Note that the clip level selected is stored by the computer, so that subsequently each time this key is selected the clip level will be correct.

**PREV
DSK** When this button is lit, the downstream keyer appears on the preview screen.

If the PREV DSK button is lit with the DSK off, turning the DSK back on will reset PREV DSK and the key will appear on the program screen.

**DSK
GAIN** Use this knob to set the gain of the downstream keyer. The knob ranges in value from 0 (fully CCW - supersoft) to 999 (fully CW - hard edge keys).

DSK
CLIP

Use this knob to set the clip level of the downstream keyer.

CKEY
HUE

This knob duplicates the function of the HUE knob in the Chromakey group, but it is replicated here to make it easier to fine tune the chromakey for use in the DSK block.

Colors



Three independent color generators are provided with the MVS6. The above picture shows the border color controls.

These are:

BGR	Background colorizer, selectable on the busses
BDR	Border colorizer, used for M/E and Take bordered wipes
DSK	Downstream key colorizer, used as fill for downstream keys

SETTING Each color generator has its own set of three controls to set the saturation, luminance, and hue respectively. Each control sets a value between 0 and 99.

Adjust any of the three controls and all three are shown in the display, with a small carat adjacent to the value being adjusted. The + and - buttons provide for incremental adjustment of the current control.

RESETTING Colors may be entered digitally using the numeric keypad and the MODIFY button. See the description of MODIFY in the "Programming" section of Production.

SAT Saturation controls go from pastel (0) to fully saturated (99). All colors are limited to NTSC or PAL legal values: if luminance is adjusted to maximum, saturation will be proportionately limited to zero.

LUM Luminance controls go from black (0) to white (99).

HUE The hue can be adjusted through 360 degrees of color. The digital number representing a particular hue is set to be the same for all three colorizers through the use of calibration command 114.

Chromakeyer (Optional)



To use the RGB chromakeyer, connect the RGB outputs of the camera with three BNC cables to the RGB inputs of the MVS6. If more than one RGB source is needed, an external routing switcher must be used. Connect the composite/Y-C/component output(s) of the camera to a camera input.

Select the chromakeyer as the cut source on the desired keyer (key a 7 into the display & press the appropriate cut select button.) While setting up the chromakey initially, it is best to start with the keyer in high gain, and the chromakey hilite inhibit should be set to 999 (fully clockwise on the knob.) Also, the key logic works best with the keyer set to reverse.

Now adjust the HUE and CLIP knobs in the CHROMAKEY section to achieve the best looking key. For best results, the scene and lighting are important. The traditional background color is royal blue, but many users are finding that a deep, saturated green (“process green”, for example) gives a “quieter” key, as the camera is more sensitive to green. The background should be lit uniformly and brightly. The chromakey is linear, rather than hard-edge type, and will key through smoke or translucent materials, but deep shadows on the background color should be avoided.

HUE	This knob selects the color on which you will be chromakeying, usually royal blue or green.
CLIP	Use this knob to adjust the clip level of the chromakey
HILITE INHIBIT	If picture highlights are seen as the green or blue background, use this control to lower the highlight threshold to an appropriate value (by rotating the knob <i>slowly</i> counterclockwise.)

KEY
DELAY

The keyed area may be displaced to the right or left of the subject. To correct for this, a switched delay is provided on the front edge of the chromakey card (accessible through the front door of the chassis.) This delay ranges from zero delay (keyed area maximally left) with a setting of 00, to a maximum of 1.45 μ S with a setting of 29. Each step is 50 ns. This adjustment is to compensate for camera encoder delay and is needed only during setup of each new camera. Note that after the delay adjustment has been changed, it may be necessary to re-adjust the key clip setting slightly.

YUV
VERSION

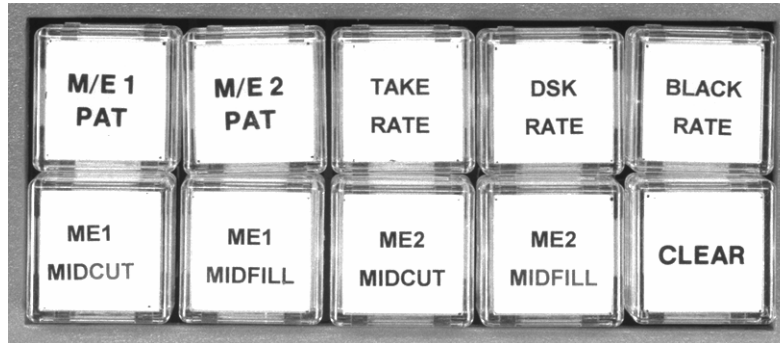
A component (YUV) version of the chromakeyer is also available. This version must be specified at time of order. Its operation is identical to the RGB version.

To connect the YUV signals into the chromakeyer, connect the Y to the chromakey R input, the R-Y to the G input and the B-Y to the B input.

When using the YUV version in a component (MVS6-3W), it will be necessary to externally delay the normal YUV source's outputs to the camera inputs by approximately 200 ns. This is due to the chromakey board's decoder, which when set to its minimum delay still has a delay approximately 200 ns greater than the MVS video path.

The external delay is typically not necessary for the composite and Y-C versions of the MVS because the camera itself typically has an encoder delay greater than or equal to the MVS chromakey decoder, and thus the delay matching can be done with the rotary switches on the chromakey board.

Buttons under the display



PATTERN BUTTONS By pressing the appropriate PAT button, the current wipe pattern will be displayed. To change the pattern, enter the new pattern number using the digital entry keypad, and press the appropriate PAT button. Pattern numbers can be found on the flip card on the upper left corner of the panel.

RATES Press the TAKE RATE button to see the rate at which the TAKE transition will occur. The display is normally in seconds and frames:

Take 01:00

The rate can be changed when in the display by use of the + and - buttons. Or, key in a new rate in seconds and frames using the numeric keypad and press TAKE RATE. If a rate is keyed in as frames only (in the range 1-99) it will be converted to seconds and frames. For example, 45 will appear as 01:15, or Command 2 can be used to display in frames directly. DSK and BLACK RATE work similarly to the TAKE RATE button.

MIDCUT BUTTONS Press this button to display the currently selected midstream key cut source. To select a different key source, press the button again to step to the next key source. Note the digit on the far right hand side of the display. This number can be used to directly access a particular key source. For instance, to select the KEY5 input as the key cut source, key the number 5 into the display and press M/E(1/2) MIDCUT. Note that the KEY5 source is now selected. To select chromakey, press 7 followed by M/E(1/2) MIDCUT.

This button also acts as an indicator to show when the key is in use. Whenever the midstream keyer of either M/E is active (typically caused by moving the midstream fader off the B stop), it's respective MIDCUT button illuminates to indicate that the M/E's midstream keyer is active.

**MIDFILL
BUTTONS** Press this button to display the currently selected midstream key fill source for the desired M/E. Press the button again to cycle to the next source. Note that one button is used here for all internal and external sources, so use the table below to familiarize yourself with the choices available and their order. Use the number shown for direct access to the desired midstream fill source.

Selection	Number
Mfill Blk	1
Mfill Bgr	2
Mfill Cam1	3
Mfill Cam2	4
Mfill Cam3	5
Mfill Cam4	6
Mfill Cam5	7
Mfill Cam6	8
Mfill Cam7	9
Mfill Cam8	10
Mfill Cam9	11
Mfill Cm10	12
Mfill Ext	13
Mfill Bdr	14
Mfill Dsk	15

Midstream Fill Selections

**CLEAR
BUTTON** Blanks out the display. Useful when keying in a number and an incorrect value is entered.

Use CLEAR to remove the timer from the display.

If a sequence is running, the cleared display shows the sequence number and the step being executed.

Programming



PROG KEYSW

Programming is enabled by turning the programming keyswitch on. When off, the MVS6 memory cannot be changed.

AUTO TIMER

The AUTO TIMER is used to start and stop the count-down timer. To set, enter the number of seconds and frames (or all frames), before starting the timer. If no number is entered, then the timer resumes counting from wherever it had been stopped.

If the programming key switch is on and a sequence (see Playback section for more on sequences) is selected, then AUTO TIMER starts and stops the Time Tracker. More on this in the Programming section.

RECALL

These buttons are used to recall a previously saved setup of either an M/E or the whole panel. If a setup has not been saved or has been erased, then recalling it has no effect. Setups are recalled sequentially unless a specific setup number is provided.

SAVE

The SAVE PANEL button is used to save the state of the entire panel. Setups are saved sequentially unless a specific setup number is provided. The programming keyswitch must be on to save setups. 9 panel memories come standard, 99 are available with the memory expansion option.

* UNDO Press UNDO to reset the MVS6 to how it was just preceding the previous button-push or control movement. Even pushes of buttons that perform setup recalls or start sequences playing back can be undone.

Changes made to MVS6 memory, however, cannot be undone. These include SAVE, INSERT, and ERASE.

UNDO may be used several times to keep “backing up” until the MVS6 runs out of “UNDO memories”.

RECALL
RATE The recall rate determines how quickly a recall of a setup occurs. Push RECALL RATE to see the current rate or enter a number and press RECALL RATE to set a new rate.

INSERT This button is used to edit a sequence. INSERT opens up a space in which to save an additional step in the middle of a sequence. The programming key switch must be on and a sequence selected.

ERASE This button nulls one or more setups or sequence steps. One is assumed unless a specific number is entered prior to pressing ERASE.

If the programming switch is on and a sequence is selected, then ERASE erases sequence steps. To erase setups, the programming switch must be on, a sequence not selected, and the desired setup recalled and showing in the display.

BACK
&
AHEAD When the programming keyswitch is ON and a sequence selected, these buttons are used to move back and ahead to allow viewing or editing. These buttons may be held down to move more rapidly back and forth.

COMM Even with so many front panel controls, more would be needed for seldom-used operations. These operations have been assigned command numbers. Enter the number of the desired command and press COMM. Now use the + and - keys to adjust the command to the desired value.

* Note - the UNDO feature is not yet available in version 4.0 software

- * **MODIFY** With **MODIFY** any of the control values can be set digitally. While a control is displayed, enter its new value using the digital entry keypad, and press **MODIFY**. Joysticks and colors are special cases.

For joysticks, both the horizontal and vertical axes may be set simultaneously by entering a six digit number. The first three digits specify the horizontal axis and the second three digits specify the vertical axis.

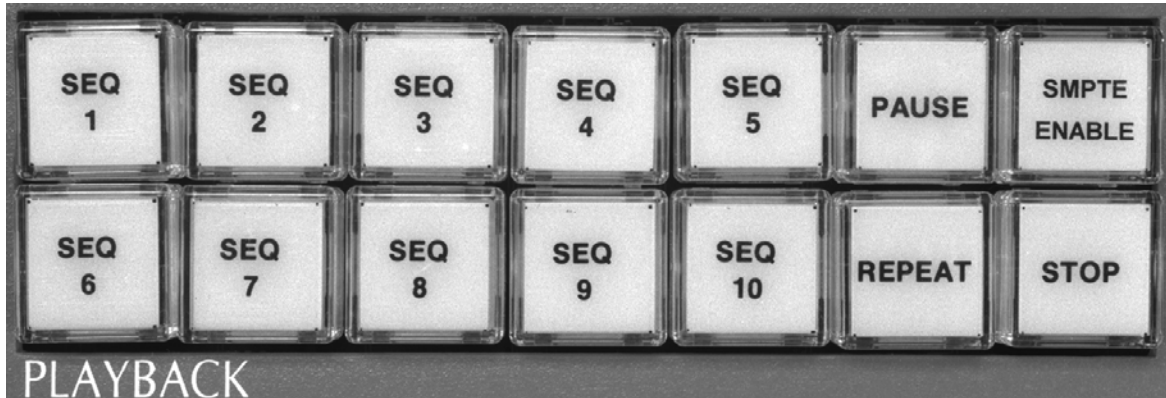
For colors, SAT, LUM, and HUE can all be set at once. The SAT and LUM controls may be specified as single digits, thus many colors may be set using only four digits.

For example, to set a yellow border, move any of the border color controls so that the border color is displayed. Then enter 7845 **MODIFY**. Note that, while the last two digits (45) specified the 2-digit HUE, the first two digits (7 and 8) specified both the SAT and LUM, with each digit becoming the tens-digit, and the units-digit being set to 9. (SAT 79, LUM 89).

Of course, colors may be specified completely by entering all six digits. A slightly different yellow is generated by entering 758745 **MODIFY**. (SAT 75, LUM 87, HUE 45).

- * Note - **MODIFY** of joysticks, softness, and colors is not yet functional with version 4.0 software

Playback



SEQ 1-10 programming key off These buttons playback any of the 10 sequences. If more than one button is pressed, the selected sequences will all be played simultaneously.

While a sequence is running, its button is illuminated. Should a sequence be pressed while lit, playback is paused and the button flashes. Pressing it again resumes playback of that sequence.

SEQ 1-10 programming key on Push a SEQ button to select a sequence to be programmed. The button will illuminate and the first program step will be displayed. Or, to select a particular step of that sequence, key in the desired step before pushing the SEQ button.

To de-select a sequence, press the illuminated SEQ button without first entering a step number. To re-position to another step, enter the step number and press the lit SEQ button.

To position to the first (or next) null step in a sequence (usually the end of the sequence), enter step number 0 and press the SEQ button.

While programming one sequence, pressing other SEQ buttons is allowed. During playback the first sequence waits while the second sequence plays, and then the first sequence continues. A step number entered prior to pressing the second SEQ button causes the second sequence to start playback at a specified step.

Or to play back the second sequence concurrently with the first sequence, enter step number 0 before pressing the second SEQ button (It will start at step 1).

PAUSE	If the programming key switch is on and a sequence selected, this button puts a pause into the selected sequence. A pause causes sequence playback to pause for a specified number of seconds and frames (or all frames) before continuing. To specify the duration of a pause, enter the time before pressing PAUSE. If no number is entered, then the previous delay value is used again. To specify an indefinite delay (waiting for GPI trigger), enter a time of 0.
REPEAT	If the programming key switch is on and a sequence selected, this button places a repeat step into the sequence. The repeat normally starts from the beginning of the sequence, but may be set to start from any other step (even ahead). When sequence playback reaches the repeat, it goes to the step specified. Enter the step number to begin the repeat from, before pressing REPEAT. If no number is entered, step 1 is assumed.
STOP programming key off	The STOP button manually stops sequence playback. If a sequence number is entered before pressing STOP, then only that sequence is stopped. If no number is entered, then all sequences are stopped.
STOP programming key on	While a sequence is selected, pressing STOP places a stop-sequence step into the sequence. When playback reaches this step, playback stops. Pressing STOP also de-selects the sequence for programming. The MVS6, of course, is still in programming mode until the programming key switch is turned off. If a number is entered prior to pressing STOP, then a stop-another-sequence step is placed into the sequence. When playback reaches this step, the other sequence is stopped.
SMPTE ENABLE	Press SMPTE ENABLE to enable the RS-422 editing interface. The button will illuminate to indicate that editor commands will be accepted (if the option is installed.)

Pattern modulator



PATMOD switch

In the center position, the pattern modulator is off regardless of the state of the FREQ and AMPL controls. In the upper position, pattern modulation is applied to M/E1. In the lower position, pattern modulation is applied to M/E2.

Note that on panels silk-screened prior to August 1994, the markings on the switch are incorrectly screened.

FREQ

This control adjusts the frequency of the pattern modulator. Its range is from DC to approximately 25 kHz. Turn the knob clockwise for higher frequencies. Note there are many different nulls where the frequency beats in an almost stationary fashion with the pattern. Experiment for different results.

AMPL

This control adjusts the amplitude of the pattern modulation. At very low values, the pattern is barely disturbed, while at higher values the pattern can become severely distorted. Experiment for best results.

Commands

Many other functions are possible by use of commands. This allows a sort of "expanded panel" for infrequently performed operations, such as recalibration. Enter the command number on the numeric keypad, press COMM, then + or - to make selection.

0	System Reset.....clears sequences and setups and do Comm 1
1	Command Reset.....reset commands to boldface
2	Time Display Mode SSFF /FFFF(SS=secs,FF=fields)
3	Set Source Names default: Cam 1 thru Cam 10
4	Display software revision and installed options
5	Lines of vertical blanking 16 thru 23 (default 20)
6	Set Sync Source subcarrier/internal/ genlock
7	Automatic Pattern Centering off/ on
8	Set Video Mode Composite/Y-C/Component
9	Set Sync Processor.....off/ on
10	Engineering use only
11	Set DSK Blink Rate off /5/10/15/30 fields
12	Set Take Reverse off / on
13	Set controls to panel values
14	Set sequence overwrite mode off/ on
15	Set GPI4 mode autotake/dsk/black/ pause sequence
16	Set chromakeyer highlighting..... 00 thru 99
17	Set SMPTE protocol 38400 /9600 bps, odd /even/no parity
18	Set SMPTE device address 00 thru FE (default 30H)
19	Set SMPTE port to use GVG-100 pattern numbers..... off / on
20	Display SMPTE state..... press any key to stop
21	SMPTE port transmit test off / on
22	Set SMPTE key to redirect to DSK off / on
23	Set sequence auto-link off / on
24	Display ID number for software option installation
25	Set GPO1 mode..... on/ off /pulse/DSK fill tally
26	Set GPO2 mode..... on/ off /pulse/DSK fill tally
27	Continue sequence without wait
28	Unused
29	Digital command re-entry off / on
30	Effects soft limit..... 0 thru 254
31	Take soft limit 0 thru 63
32	Take border fill Blk/Bgr/ Bdr /Dsk
33	Preview out = ... Prv /ME1/ME2
34	Prog 2 out = ... Prog /ME1/ME2/CleanFeed
35	Direct bus = ... Prog /Prev

A more detailed explanation follows:

Comm #	Command name	Command description
0	System reset	Erases setups, sequences, and do command 1 (for protection, CLEAR must also be held down)
1	Command reset	Reset commands to boldface and <u>underlined</u>
2	Time display mode SSFF/FFFF (SS=secs, FF=frames)	Rates can optionally be displayed in frames. Two and a half seconds would appear as 2:15 if displayed as seconds and frames, or as 75 if displayed as frames (assuming NTSC).
3	Set source names default: Cam1 - Cam9	When, for example, input 1 is pressed on any bus, "Cam 1" is displayed. This display can be changed to any four characters by use of Command 3. Enter 3 COMM and change the flashing character with the + and - buttons, then use 0 (or any other digit) to advance to the next character. CLEAR terminates the process.
4	Display revision and options	Software revision number and options installed. Option cards will be interrogated by the computer and displayed.
5	Lines of vertical blank 16 thru 23 (default 20)	This can be adjusted to allow vertical interval test signals to pass through the switcher.
6	Set sync source	This command controls the genlock sync board. Internal uses the internal RS-170A sync generator. Subcarrier mode locks this generator to an external subcarrier reference plugged into the genlock input, with internal horizontal and vertical used, and Genlock locks all signals to the video signal plugged into the Genlock input.
7	Auto pattern centering	Patterns are normally brought in centered; they can also be brought in at the joystick position.
8	Set video mode	This command determines how the switcher will generate its internal sources for distribution to the video board(s). Choices are composite, Y/C, and component. Make sure this selection matches the video format you are working with.

9	Set sync proc on/off	This command determines whether the switcher re-inserts blanking and sync onto its outputs. This command is normally left on, though it can be toggled on and off to help set horizontal system timing.
10	Engineering use only	This command is used for internal test purposes to help align the switcher at the factory. It should normally be left off.
11	Set DSK blink rate	Allows the downstream keyer to blink on and off with various rates from 5 to 30 frames.
12	Set Take reverse	Sets pattern take styles to reverse direction.
13	Set controls to panel settings	After some operations such as replaying stored sequences, the front panel knobs are in a different position than the operation that they are controlling. Command 13 is used to neaten things up.
14	Set sequence overwrite mode	When ON, you are permitted to store a sequence over another previously stored sequence.
15	Set GPI4 mode	The fourth GPI input trigger is command selectable to trigger autotake, DSK fade, BLACK fade, or sequence memory run/pause.
16	Set chromakeyer hilite inhibit	Used to clean up highlight noise on a chromakey
17	Set SMPTE protocol	SMPTE commands, 17-22, are for use when the optional serial interface has been installed. Command 17 sets bit rate and parity. Most edit controllers use the SMPTE bit rate specification of 38Kbps; some use 9.6Kbps.
18	Set SMPTE address	Most edit controllers address a switcher as device 30.
19	SMPTE GVG patterns	With command 19 off, the edit controller can choose all of the MVS6's 40 patterns by number. With command 19 on, the switcher is exactly GVG-100 compatible but only 10 patterns can be selected.

20	Display SMPTE state	Equipment using the SMPTE protocol will have three states of communication activity, idle, active, and selected. Idle means no data has been sent for a few seconds. Active means data is being transmitted, but the switcher hasn't recognized its address. Selected means the switcher has received a valid address and is communicating with the master. Command 20 displays the SMPTE state of the switcher as an aid to communications troubleshooting.
21	SMPTE transmit test	Transmits test signals out the edit port when Command 21 is turned on. Useful for debugging a serial comm link. Make sure to turn it off when finished!
22	Set SMPTE key re-direct to DSK keyer	Redirect editor of effects keyer to use DSK keyer. This allows some editors to mix or wipe behind a key event.
23	Set sequence auto-link	There are 999 steps in a sequence. During sequence programming and execution, this limitation can be avoided. By turning auto-link on, sequences are effectively linked together. This permits very long sequences, up to 9990 steps.
24	Display ID number	Each MVS6 has a unique ID number to permit field installation of software options. This command displays this number.
25	Set GPO1 mode	There are two general purpose output triggers on the MVS6. Each output trigger can be programmed to be on, off, pulsed on (approx. 150 ms pulse), or to act as a tally control line for the 11th input (DSK fill). This command sets the desired mode for the 1st output trigger.
26	Set GPO2 mode	See command 25 above. This command sets the desired mode for the 2nd output trigger.

27	Continue seq without wait	This command can be used to change the way that a running sequence treats rate-controlled buttons (RECALL ME1, RECALL ME2, RECALL PANEL, AUTOTAKE, DSK ON, & BLACK ON). Normally, these buttons cause a sequence to wait for the duration of their rate. To allow the sequence to continue without waiting, enter Command 29 into the sequence directly after the rate-controlled button. This allows several rate-controlled functions to be executed simultaneously from a sequence.
28	UNUSED	
29	Digital cal re-entry	This command is used to facilitate the manual digital re-entry of the calibration values.
30	Effects soft limit	The MVS switchers have an extremely wide range of wipe softness control that can sometimes cause operational confusion. To alleviate this problem, this command has been designed to allow the user to limit the maximum softness of the wipe. The larger the number, the more the softness is limited. Try adjusting it for supersoft effects wipes.
31	Take soft limit	Like the effects wipe softness command described above, this command limits the maximum softness of the take wipes. Try adjusting this command for supersoft take transitions.
32	Take border fill	The MVS6 can use any of its three color generators for TAKE border fill. This command is normally left set to the border color, but background or DSK color can be alternatively selected.
33	Preview output	Normally, the PREV output BNC's are used to display the M/E that is not on program. With this command, the PREV output can be forced to always monitor M/E1 or M/E2 out. This is useful when used in conjunction with command 34 (see below).

34	Prog 2 output	There are two sets of program output BNCs, PROG1 and PROG2. Normally, each of them displays the M/E currently on program. With this command, the second set of program BNCs (PROG2) can be forced to monitor M/E1, M/E2, or to act as a CLEAN-FEED program output.
35	Direct bus mode	Normally, the Direct bus is used for fast program bus switching of the M/E that is on the air. It does this by forcing the on-air M/E back to its B bus, turning off all keys on the M/E, and resetting any takes in progress. While this is useful for hot switching, sometimes it is more useful to be able to preview this “Direct bus” selection before taking it to the air. With this in mind, command 35 has been designed to allow the Direct bus to switch the M/E that is not on air by setting Command 35 to Direct = Prev. This will allow the Direct bus source to be previewed before a take on-air.

Calibration commands

The MVS6 has about 40 computer-generated voltages which substitute for conventional trimmers. The commands below can be used to recalibrate the unit from the front panel. There are four sets of calibration registers. The current set is permanently changed when a calibration command is adjusted, and can be saved in the user set with Command 401. Recall the user set with Command 400. To recall the factory set, use command 200. If the batteries have been discharged, these sets have been lost, and a fourth set will be automatically loaded from ROM.

To perform a calibration, turn calibration ON with 100 COMM +. Then enter the command number and press COMM again. Use the chromakey HUE/CLIP/HILITE controls and +/- to make changes. CLEAR when finished, and turn calibration OFF with 100 COMM - if you want to prevent accidental recalibration.

Comm	Circuit	CK HUE	CK CLIP	CK HILITE
101	BGR color	Null R-Y	Null B-Y	---
102	BDR color	Null R-Y	Null B-Y	---
103	DSK color	Null R-Y	Null B-Y	---
104	Wipe DC	ME1 wipe	ME2 wipe	---
105	Dac center	Offset	---	---
106	Black offset	Offset	---	---
107	Burst	Amplitude	PAL phase	NTSC phase
108	Circle1	ME1 pat 32	ME1 pat 8h	ME1 pat 8v
109	Horizontal	Phase	---	Blank width
110	H ramp	ME1	ME2	Take
111	V ramp	ME1	ME2	Take
112	H 5x	ME1 h-5x	ME2 h-5x	---
113	V 5x	ME1 v-5x	ME2 v-5x	---
114	Zero phase	BGR	BDR	DSK
115	Luminance	BGR	BDR	DSK
116	Saturation	BGR	BDR	DSK
117	Rotary wipes	ME1 pivot	ME2 pivot	---
118	Take	bord size (n)	bord size (r)	---
119	H charge1	ME1 pat 57h	ME1 pat 57v	ME1 pat 59
120	V charge1	ME1 pat 58h	ME1 pat 58v	ME1 pat 60
121	Wipe1	ME1 bord n/r	---	ME1 bord n/r
122	Circle2	ME2 pat 32	ME2 pat 8h	ME2 pat 8v
123	Cross	ME1 pat 5	ME2 pat 5	---
124	H charge2	ME2 pat 57h	ME2 pat 57v	ME2 pat 59
125	V charge2	ME2 pat 58h	ME2 pat 58v	ME2 pat 60
126	Wipe2	ME2 bord n/r	---	ME2 bord n/r

200 Reload original factory calibration.

- 400 Restore user calibration registers
- 401 Save user calibration registers
- indicates that control has its normal function

A more detailed explanation follows:

Colorizers

101	BGR color	Null R-Y	Null B-Y	---
102	BDR color	Null R-Y	Null B-Y	---
103	DSK color	Null R-Y	Null B-Y	---
114	Zero phase	BGR	BDR	DSK
115	Luminance	BGR	BDR	DSK
116	Saturation	BGR	BDR	DSK

The three color generators can be very accurately set to provide precise colors. Use 115 COMM with all three colors on the preview monitor, set all color luminance's to 100 %, and use an oscilloscope and the chromakey HUE/CLIP/HILITE knobs to set all luminance's to 100 IRE. Using a vectorscope, use command 101 to null out any chroma offset in the R-Y or B-Y component of BGR color. Command 102 is for BDR color. Command 103 is for DSK color. Then set all colors to roughly 99 50 0. With a vectorscope on preview, adjust all three colors to full saturation and zero degree phase with commands 114 and 116.

Wipe center

104	Wipe DC	ME1	ME2	---
-----	---------	-----	-----	-----

To adjust the command, set up a diamond wipe on the monitor (pattern 7), and with the wipe in the N/R mode, set the wipe lever to a value of 40. Now adjust this calibration value until the diamond just disappears. Now check the wipe travel at the other end of the lever. The wipe should finish at a count of somewhere between 925 to 975. Use the chromakey HUE knob to adjust ME1's pattern 7 and use the chromakey CLIP knob to adjust ME2.

Dac DC

An oscilloscope is required for this calibration. Scope U25 pin 7 on the CPU board with the scope triggered at a vertical rate. Adjust this calibration until the DAC waveform is within +/- 5 mv of ground during the active raster.

Black level

106	Black offset	Offset	---	---
-----	--------------	--------	-----	-----

While viewing any of the three black burst outputs, adjust command 106 to set the blanking level of the black output to ground.

System timing

107	Burst	Amplitude	PAL phase	NTSC phase
109	Horzizontal	Phase	---	Blank width

Command 107 sets the phase and amplitude of the internally generated black burst which is used for sync re-insertion. The burst can be coarsely calibrated by eye, but for accurate results a vectorscope should be used on the preview output with a colorbar test signal selected on the preview bus. Pal phase sets the zero degree axis of internal color generators to match external sync, and will need a vectorscope for alignment.

Command 109 is used to set horizontal phase and blanking width. Compare the genlock input to the program output with an oscilloscope, and align the leading edges of horizontal sync using the phase (HUE) knob. Set horizontal blank width using the blank (HILITE) knob; 10.7 uS is a typical value.

Circles

108	Circle1	ME1 pat 32	ME1 pat8h	ME1 pat8v
122	Circle2	ME2 pat 32	ME2 pat 8h	ME2 pat 8v

View a circle wipe to adjust these offsets. A small circle should be used.

Ramp generators

110	H ramp	ME1	ME2	Take
111	V ramp	ME1	ME2	Take
112	H 5x	ME1 horz 5x	ME2 horz 5x	---
113	V 5x	ME1 vert 5x	ME2 vert 5x	---

An underscan monitor should be used.

Command 110 is used to center the horizontal ramps. Select effects pattern 3 and adjust the effects ramp frequency (HUE for ME1, CLIP for ME2) so that the pattern goes out equally on the left and right sides of the

monitor. Select take pattern 3 and do the same for the take ramp while adjusting the HILITE knob.

Command 111 is used to center the vertical ramps. Select effects pattern 4 and adjust the effects ramp frequency (HUE for ME1, CLIP for ME2) so that the pattern goes out equally on the top and bottom of the monitor. Select take pattern 4 and do the same for the take ramp while adjusting the HILITE knob.

Rotary wipes

117	Rotary wipes	ME1 pivot	ME2 pivot	---
119	H charge1	ME1 pat57h	ME1 pat 57v	ME1 pat 59
120	V charge1	ME1 pat 58h	ME1 pat 58v	ME1 pat 60
124	H charge2	ME2 pat 57h	ME2 pat 57v	ME2 pat 59
125	V charge2	ME2 pat 58h	ME2 pat 58v	ME2 pat 60

Command 117 is used to calibrate all rotary patterns. When you first enter command 117 you will automatically be on pattern 49, and each time you press the comm button you either move to the ME2 calibration of that pattern or on to the next pattern.

Commands 119 and 120 store four additional small adjustments for ME1 patterns 57-60, commands 124 and 125 store four small adjustments for ME2 patterns 57-60. These are set in step 2c, 2d, 3a, and 3b, and should be in the range 400-550. When beginning calibration from scratch, start with a setting of 505 for each value.

1. Adjust patterns 49-52 to center wipes:

- a) Select pattern 49 in N/R mode on ME1 and ME2. Set border to 000 and soft to 999 in both ME's. Set both wipe levers to 500.
- b) Press 117 COMM, adjust the chromakey HUE knob for centering ME1, use the chromakey CLIP for ME2; note that the +/- keys help fine trim.
- c) Select pattern 50 and adjust chromakey HUE (CLIP for ME2) for centering. The display, Ro50 xxx xxx Hil, will show you the contents of the calibration setting for pattern 50.
- d) Select pattern 51 and adjust chromakey HUE for centering ME1, adjust chromakey CLIP for centering ME2..
- e) Select pattern 52 and adjust chromakey HUE for centering ME1, adjust chromakey CLIP for centering ME2.

2. Adjust patterns 57, 58:

- a) Press the comm button until you reach pattern 57.
- b) Adjust chromakey HUE so points just close on ME1. Use chromakey CLIP for same on ME2.
- c) Press the comm button until you reach pattern 58.
- d) Adjust chromakey HUE so points just close on ME1. Use chromakey CLIP for same on ME2.
- e) Select pattern 57 on ME1 and ME2. Move the ME1 lever down to a count of about 50, select COMM 119, and adjust the chromakey HUE knob so the pattern is symmetrical on ME1 (sets horizontal amplitude offset).
- f) Move the ME1 lever up to a count of about 950 and adjust the chromakey CLIP knob so the pattern is symmetrical on ME1 (sets vertical amplitude offset).
- g) Move the ME2 lever down to a count of about 50, select COMM 124, and adjust the chromakey HUE knob so the pattern is symmetrical on ME2 (sets horizontal amplitude offset).
- h) Move the ME2 lever up to a count of about 950 and adjust the chromakey CLIP knob so the pattern is symmetrical on ME2 (sets vertical amplitude offset).
- i) Select pattern 58 on ME1 and ME2. Move the ME1 lever up to a count of about 950, select COMM 120, and adjust the chromakey HUE knob so the pattern is symmetrical on ME1 (sets horizontal amplitude offset).
- j) Move the ME1 lever down to a count of about 50 and adjust the chromakey CLIP knob so the pattern is symmetrical on ME1 (sets vertical amplitude offset).
- k) Move the ME2 lever up to a count of about 950, select COMM 125, and adjust the chromakey HUE knob so the pattern is symmetrical on ME2 (sets horizontal amplitude offset).
- l) Move the ME2 lever down to a count of about 50 and adjust the chromakey CLIP knob so the pattern is symmetrical on ME2 (sets vertical amplitude offset).

3. Adjust remaining offsets:

- a) Select pattern 59 on ME1 and ME2 and set wipe levers to 50. Select command 119. Adjust chromakey HILITE knob to center pattern on ME1 (horizontal start offset). Select command 124. Adjust chromakey HILITE knob to center pattern on ME2 (horizontal start offset).
- b) Select pattern 60 on ME1 and ME2 and set wipe levers to 50. Select command 120. Adjust chromakey HILITE knob to center pattern on ME1 (vertical start offset). Select command 125. Adjust chromakey HILITE knob to center pattern on ME2 (vertical start offset).

4. Adjust patterns 53, 54, 55, 56, 59, 60 (NOT 57 or 58!)

- a) Select pattern 53 on ME1 and ME2 in N/R mode, set the wipe levers to 005 (NOT 0), select Command 117 and adjust the chromakey HUE knob until the wipe just disappears on ME1. Use the chromakey CLIP knob to do the same for ME2.
- b) Repeat with patterns 54, 55, 56, 59, and 60.

When you have finished with these calibrations, test them with all rotary wipes. If all wipes are good, save user calibration values using Command 401. If calibration is disturbed later, you can restore this set with Command 400.

Pattern N/R Calibration

121	Wipe1	ME1 bord n/r	---	ME1 bord n/r
126	Wipe2	ME2 bord n/r	---	ME2 bord n/r

1. Match patterns and borders between normal and reverse.

- a) Select pattern 1 on both ME's in the normal (N) mode. Select black on all busses. Set softs to 999, and make sure you have a colored border.
- b) Wipe ME1 halfway, and adjust the border to 10. Select command 121 and adjust chromakey HUE until the border just appears.

- c) Wipe ME1 up to 999 and then back down halfway. Adjust chromakey HILITE until the border just appears.
- d) Wipe ME2 halfway, and adjust the border to 10. Select command 126 and adjust chromakey HUE until the border just appears.
- e) Wipe ME2 up to 999 and then back down halfway. Adjust chromakey HILITE until the border just appears.

Cross pattern Calibration

123	Cross	ME1 pat 5	ME2 pat 5	---
-----	-------	-----------	-----------	-----

Set up pattern 5 on both M/E's. Use the chromakey HUE knob to match the horizontal and vertical openings on M/E1 as the pattern closes. Use the chromakey CLIP knob to do the same for M/E2.

Calibration registers

200 Reload original factory calibration

The factory saves a set of calibration values in battery- backed-up RAM. It can be restored with Comm 200 if improper calibration is suspected.

400 Restore user calibration registers

401 Save user calibration registers

If you would like to experiment with a calibration setting without risk of making it worse, first save the current calibration registers with Command 401. Then the 100 series commands are used to recalibrate, and if the result is unacceptable the user set can be recalled with Command 400.

Post-production

The MVS6 is optionally available with a serial editing interface system. This system allows bi-directional data transmission to edit controllers and other broadcast equipment.

A SMPTE-specification link is used, including a 9-pin ribbon cable connector and RS-422 drivers.

The link protocol has been designed for compatibility with the Grass Valley GVG-100 video switcher protocol, so any edit controller with GVG-100 drive capability can be used.

Operating the switcher from the edit controller is simple:

1. Connect a 9-wire cable with DB-9 connectors between MVS6 and edit controller. Pin use is shown on p. 13 of Installation.
2. Enable edit controller for serial interface operation.
3. Edits should now be performed on the MVS6 using the edit controller. Note that manual front panel operations can be done at the same time. If trouble:
4. Check bit rate and parity used by edit controller and use Command 17 to reset if necessary.
5. Check device address used by edit controller and use Command 18 to reset MVS6 address if necessary.
6. Use Command 20 to check that MVS6 cycles through Idle to Active and Selected. This checks out the data path from edit controller to MVS6, and the device address.
7. Use Command 21 to transmit from MVS6 to edit controller to allow tracing data path.

PROGRAMMING

Two kinds of things can be programmed on the MVS6. **Setups** save and recall all the controls on the panel. **Sequences** are a sequence of panel operations and pauses to perform a series of picture transitions.

Setups Nine full panel setups can be saved by the MVS6. The memory expansion option raises this number to 99. A setup stores the state of all controls on the panel, as well as the state of any of the commands that can affect the on-air picture or the preview picture. When a setup is saved, it is always saved as a full panel setup (SAVE PANEL). It can be recalled in two different ways, either as a full-panel setup (RECALL PANEL), or just the M/E part of the setup (RECALL ME1 or RECALL ME2).

SAVING
SETUPS Set up the switcher for the desired picture, make sure the programming key switch is on, and press the SAVE PANEL button. The picture is saved with the next available number, which is displayed. A setup can be assigned a specific number by entering the number before pressing SAVE PANEL.

RECALLING
SETUPS To recall a setup, enter its number 1-9, (or 1-99 with memory expansion option) and press RECALL ME1, RECALL ME2, or RECALL PANEL. To recall several setups back in order, press RECALL repeatedly. Alternatively, the + and - buttons can be used. The display shows the setup being recalled.

RECALL
RATE A recall rate is used to specify how long the recall will take. The default rate is 1 frame.

When a rate other than 1 frame is used, the switches stored in the setup are recalled in the first frame, while lever and knob controls will change linearly from their current positions to the new position at the rate specified.

A special case exists if the RECALL RATE is set to 0 frames. This will cause the PANEL being recalled to be restored *instantly*, in one field.

To view the current recall rate, press the RECALL RATE button. To change the recall rate, enter a number before pressing RECALL RATE.

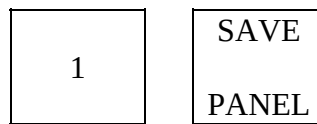
EDITING SETUPS

Recall the setup to be edited by pressing # and RECALL PANEL, where # is the setup number, make the changes desired, and resave the setup.

SETUP EXAMPLE

Save and recall panel setup 1 and 2 as a square and a circle:

1. Set up a square wipe (pattern 6) on ME1, and select the background color on the B bus and BLACK on the A bus of ME1.
2. Make sure the programming key switch is on, and press:



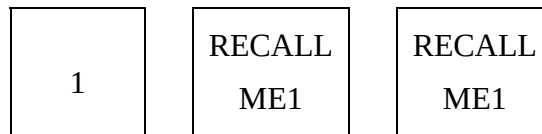
This will save the square as panel 1.

3. Change the pattern to 8 (the circle) on ME1 and press:



This will save the circle as panel 2. Note that if you press SAVE PANEL without a number, it will be saved in the next available empty address.

4. Press



to bring both setups back as an effect. Note that if RECALL PANEL is used instead, the settings of the entire panel (DSK, program bus, etc) will also be recalled.

Sequences A sequence is a series of front panel operations that have been stored into the memory of the MVS6. Each control panel operation is stored as a sequence step. Up to 999 steps may be stored in a sequence.

SAVING SEQUENCES To program a sequence, turn on the programming key switch and press the SEQ1 button in the Playback group. This selects sequence 1 for programming. The button illuminates to remind you that a sequence is being programmed. When finished, press SEQ1 again. The light will go out, indicating a sequence is no longer being programmed. Also, the programming key switch must be turned off before any sequences can be played back.

CLEARING A SEQUENCE To clear a sequence, press, for example, SEQ1 to select it for programming, then press 999 ERASE to erase all 999 sequence steps. If you are in the middle of programming a sequence and clear it, the remaining steps only will be cleared. Note that if no number is supplied in the display, only the current step is cleared.

SAVING STEPS While the SEQ1 button is lit, the left three digits of the display contain the current step number being saved. Initially, the display will contain 001> to indicate step one. Each time a different front panel operation is performed, the MVS6 saves the operation and increments the step number.

TIME TRACKER If the Time Tracker is turned on while saving a sequence, then delays are automatically inserted into the sequence so as to capture the operator's control panel inputs in real time. The Time Tracker can be turned on and off as needed during the programming of a sequence.

PAUSE Delays are programmed into a sequence by entering the number of seconds and frames (or just frames) and pressing PAUSE.

PAUSE with a time of 0 is used to specify an indefinite pause. This allows for manual synchronization of sequence playback. PAUSE with no number set will use the last pause value.

When playback encounters an indefinite PAUSE, the running sequence light begins to blink, and the PAUSE button lights. To restart the sequence, press the blinking sequence button, the lit PAUSE button, or activate a contact closure on the GPI4 input of the GPIO connector. The PAUSE light will go out, and the sequence button will re-light solid, indicating that the sequence is running again.

REPEAT	REPEAT causes playback to repeat from step 1. To repeat from any other step, enter the step number into the display and press REPEAT.
STOP	While saving a sequence, press STOP to add an end-of-sequence step. When playback encounters the end-of- sequence step, it terminates.
SEQUENCE PLAYBACK	Play back a sequence by pressing the desired SEQ button with the programming key switch off. This will run the sequence. Any number of sequences can be played back simultaneously, by pressing more than one sequence button.
STOPPING PLAYBACK	Sequences are usually allowed to play to completion. To stop all sequences, press STOP. To stop a specific sequence, enter its number into the display and press STOP.
EDITING SEQUENCES	Turn on the programming key switch. Select the sequence to be edited by pressing its SEQ button. Reposition within the sequence by keying in the desired step number and pressing the SEQ button again, or use the BACK and AHEAD buttons. They may be held down to move rapidly. The displayed step can be cleared (press CLEAR) to write another step in its place, or any front panel operation will insert a new step and move all higher steps until the first unused memory.

SEQUENCE A series of program bus selections every half- second:
EXAMPLE

1. Select sequence 1 to be programmed by making sure the programming key switch is on and pressing:

SEQ1

2. Select the desired input source on the PROG bus.
3. Program the half-second (15 frame) delay by pressing:

1

5

PAUSE

4. Select another source on the PROG bus
5. Program another half-second delay by

PAUSE

6. Repeat steps 4 and 5 as needed.
7. End the sequence by pressing:

SEQ1

8. Play back the sequence by turning off the programming key switch and pressing:

SEQ1

SEQUENCE A non-linear take.
EXAMPLE

1. Select a sequence to be programmed by turning on the programming key switch and pressing:



2. Select take style FADE.
3. Start Time Tracker by toggling the AUTO TIMER switch on.
4. Transit the TAKE lever as desired.
5. End the sequence by pressing:

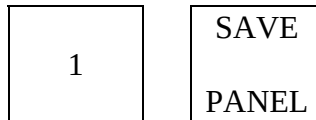


6. Play back the sequence by turning the programming key switch off, moving the take lever back to where it started and pressing:



SETUPS IN SEQUENCES

1. Set up a square wipe between BLACK and BACKGROUND COLOR on ME1. Press:



to save that panel setup as panel 1.

2. Change the pattern to pattern 8, add border, and position it in the lower left corner. Press:



to save it as panel 2.

3. With these two panels stored, they may be recalled by pressing RECALL PANEL or RECALL ME1. The next program shows how to recall them in a sequence.

SEQUENCE
EXAMPLE

A repeating recall of two previously saved panel setups:

1. Select a sequence to be programmed by turning on the programming key switch and pressing:

SEQ3

2. Set the recall rate to 1 second by pressing:

1

0

0

RECALL
RATE

3. Recall setup 1 by pressing:

1

RECALL
PANEL

4. Set the recall rate to 2 seconds by pressing:

2

0

0

RECALL
RATE

5. Recall setup 2 by pressing:

2

RECALL
PANEL

6. Specify the sequence is to be repeated, press:

REPEAT

7. Stop programming the sequence by pressing:

SEQ3

8. Play back the sequence by turning off the programming key switch and pressing:

SEQ3

SEQUENCE
EXAMPLE A series of AUTOTAKES triggered by an external contact closure.
The zero frame pause is a special case of PAUSE; it will suspend the
sequence until a contact closure or a low-going TTL pulse is sensed.

1. Select a sequence to be programmed by turning on the programming key switch and pressing:

SEQ4

2. Set an indefinite pause, an AUTOTAKE, and repeat:

0 PAUSE AUTO
TAKE REPEAT

3. De-select the sequence being programmed by pressing:

SEQ4

4. Turn off the programming key switch and start the sequence running by pressing:

SEQ4

5. Note that the SEQ4 light is blinking, indicating that it is paused and waiting to be re-started, either by a button press or an external trigger. Now a series of autotakes may be performed by an external switch connected to the GPI4 input of the GPIO connector on the rear of the chassis.