SPLIT SCREEN EFFECTS UNITS UN4/501 AND UN4/501A

UN4/501

The UN4/501 accepts two video signals and provides a single output signal which is switched electronically between the two input signals to provide split-screen special-effects facilities. The unit forms part of the MX1/501 (monochrome) and MX1/501A (colour) O.B. mixers.

In addition to the video input signals the unit requires:

Mixed-sync pulses
Field-drive pulses
A field-control d.c. voltage
A line-control d.c. voltage

The UN4/501 consists of the following units mounted on a CH1/13E chassis:

Field Sawtooth Generator GE1/506
Line Sawtooth Generator GE1/507
Clamp Pulse Generator GE2/505
or GE2/505A*
Switch Pulse Generator GE2/506
Line Pulse Clipper GE2/507
Blanking Pulse Generator GE2/525*
Two-channel Video Switch UN9/514
or UN9/514A*
Power Supplier PS2/503A

*Required for colour working.

UN4/501A

The UN4/501A accepts the same video signals and pulses as the UN4/501 and, additionally, accepts *Foreground* and (B – Y) signals for colour-separation-overlay working.

The UN4/501A differs from the UN4/501 in having two additional units, namely Switch Unit UN21/511 and Caption Pulse Generator GE2/526. Moreover it has a GE2/525A in place of GE2/525 and GE2/506A in place of GE2/506.

General Specification (UN4/501)

Inputs	
Video	1 V p-p
Mixed-sync pulses	2 V p-p ±3 dB
Field-drive pulses	2 V p-p ±3 dB
Outputs	
Main	1 V p-p
Preview	1 V p-p
Impedances	
Video inputs	about 2 kilohms
Pulse inputs	high w.r.t. 75 ohms
Video outputs	75 ohms
Frequency Response	
10 kHz to 5 MHz	±0·1 dB
Non-linearity Distortion	better than 3% (CCIR worst case)
Differential Phase Distortion	not more than 0·4°
Cross-talk	
Unwanted input to output	–75 dB at 100 kHz, –45 dB at 5 MHz
Main output to preview	–30 dB from 100 kHz to 5 MHz
Preview to main output	–70 dB at 100 kHz, –45 dB at 5 MHz
Mains Input	200–250 V, 50 Hz
Relay supply	24 V, 175 mA max.

General Specification (UN4/501A)

Parameters are similar to those given for the UN4/501, but the UN4/501A has two additional inputs, these are:

B – Y	1·3 V p-p max.
Foreground	1 V p-p

General Description

UN4/501

A block diagram of the Split-screen Effects Unit UN4/501 is given in Fig. 1.

The two video input signals are amplified, clamped at blanking level and applied to an electronic switch. The switch is driven by push-pull keying waveforms which are generated in the switch-driver section of the Switch Pulse Generator GE2/506. The waveforms required to operate the switch-driver are derived from other units of the UN4/501. The Blanking Generator GE2/525 applies internally-generated blanking pulses to the line-frequency output of the Line Sawtooth Generator GE2/507 and so prevents the occurence of switching transients during the back-porch and field sync-periods.

To obtain the required wipe patterns, the circuits feeding the switch-driver section of the GE2/506 are switched in and out of circuit as required by a number of relays. These relays are energised, via a diode matrix, from the pattern-selection push-buttons on an associated Control Panel PA6/507 or PA6/507A. The circuit of the matrix is shown in Fig. 2 and the relays that are operated for each pattern are given in Table 1. For the sake of clarity, a rotary switch is shown in Fig. 2 in place of the interlocked pushbuttons that are actually used.

TABLE 1

Pattern (see Fig. 2)	Relays Operated					
	RL1 A/B	RL2	RL3	RL4	RL5	RL6
1) 2) Line Split		X				
3) 4) Field Split			X	X		X
5) 6) Diagonal	X	X		X		
7) 8) Diagonal	X	X				
9) Corner					X	
10) Corner				X		X
11) Corner						
12) Corner				X	X	X

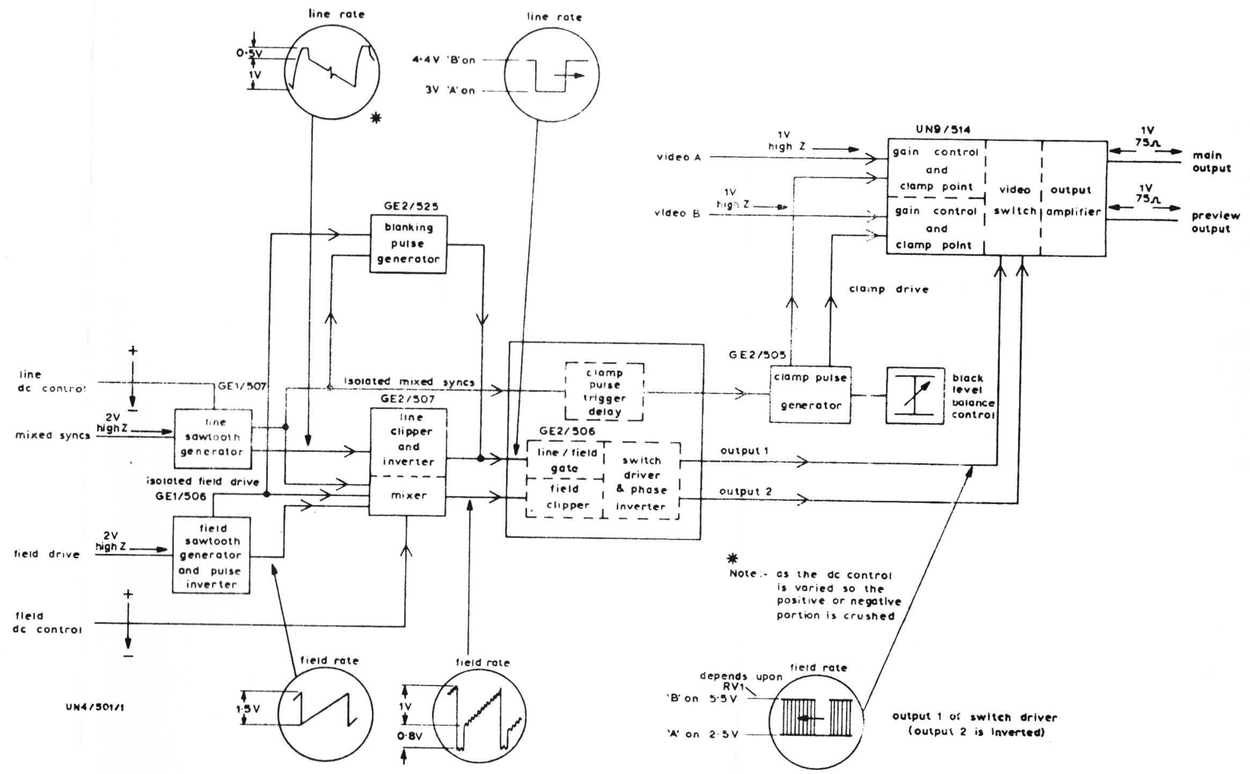


Fig.1 Block Diagram of the Split-screen Effects Unit UN4/501

Relays CQ and CR (not shown in Fig. 2) reverse the polarity of the d.c. feeds to the line-control and field-control potential dividers respectively.

Relay CP (not shown in Fig. 2) inverts the switch-drive waveform before blanking is added and so changes over the A and B components of the output signal.

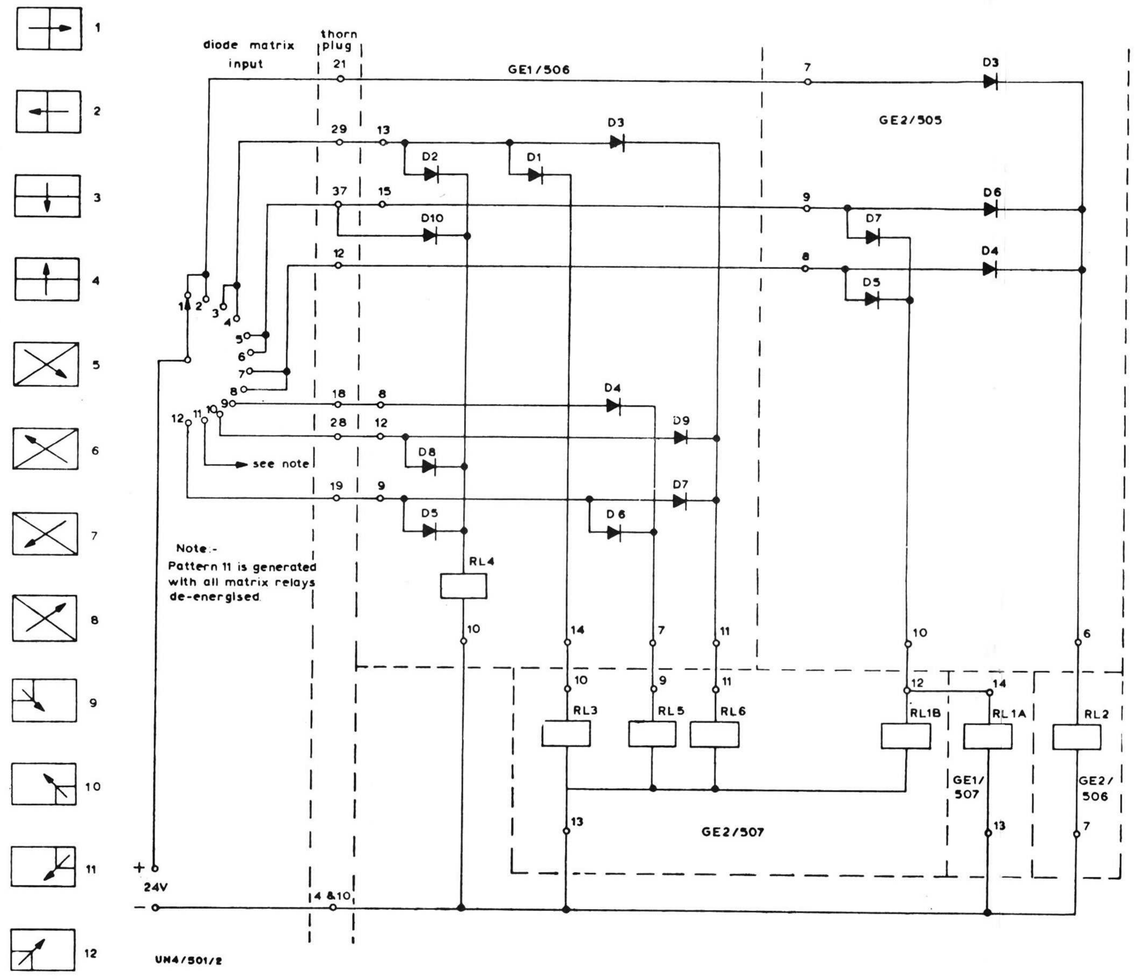


Fig.2 Matrix Circuit in the Split-screen Effects Unit UN4/501

UN4/501A

A block diagram of the UN4/501A is given in Fig. 3. Those parts of the unit which differ from the UN4/501 are described below.

The Caption Pulse Generator GE2/526 is fed from: the Video A input, or the Video B input or (for colour-separation-overlay working) the (B – Y) input; the input used depends on the function required and on which bank is already on-air. The GE2/526 provides an infill output which can be applied to the Video Switch UN9/514A instead of either the Video A or Video B inputs; it provides also a feed of caption-switch pulses which is fed to a caption-effects network in the Switch Pulse Generator GE2/506A.

The relays whose contacts are shown in Fig. 3 are located either on the Switch Unit UN21/511 or on the Blanking Pulse Generator GE2/515A. The conditions for which each relay is operated are given in Tables 2 and 3.

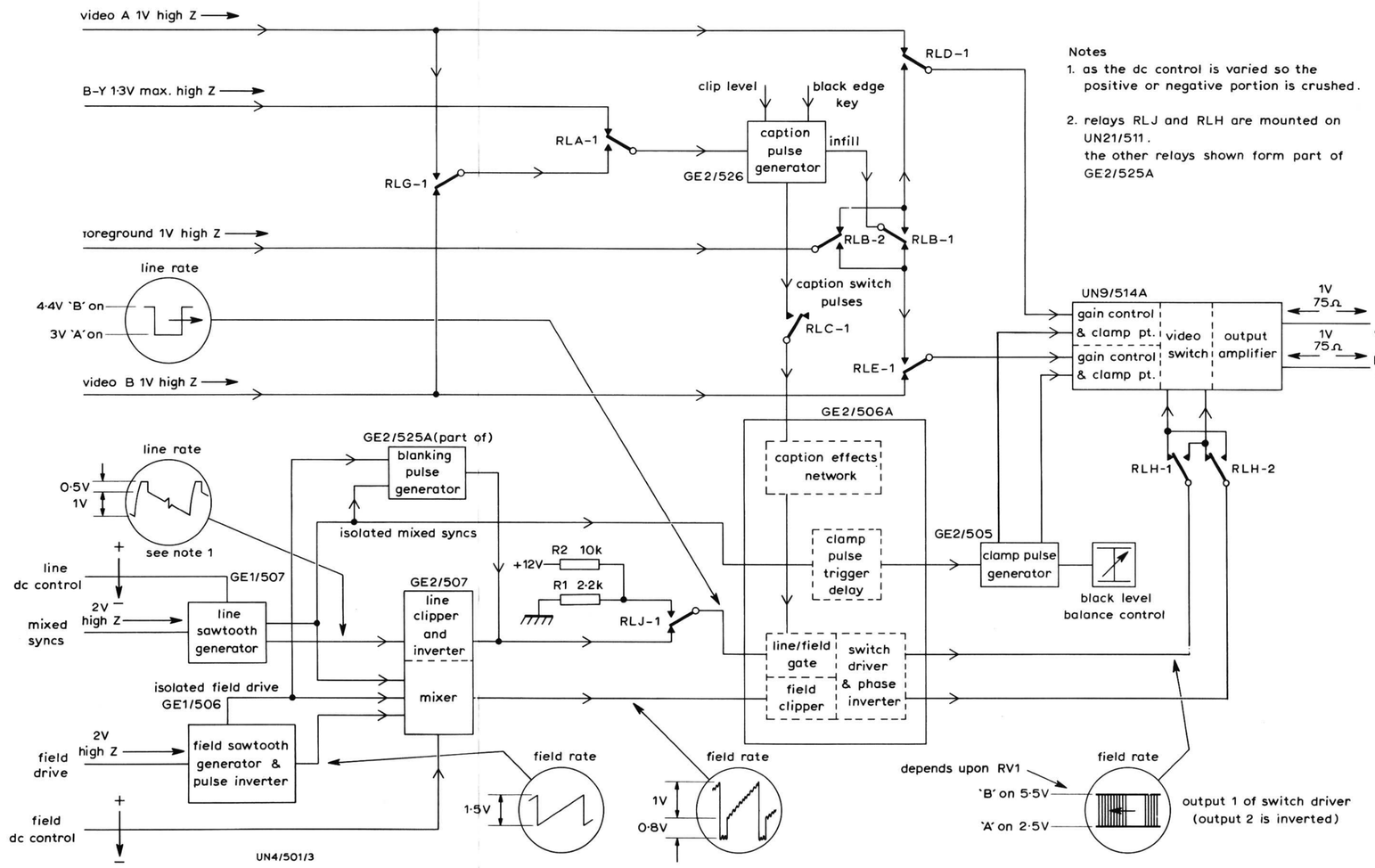


Fig.3 Block Diagram of the Split-screen Effects Unit UN4/501A

TABLE 2
Caption Overlay Operation

Condition	Relays Operated								
	A	B	C	D	E	F	G	H	J
A-bank on-air C.S.O. shot overlaid set-up on B-bank	X		X		X				X
B-bank on-air C.S.O. shot overlaid set-up on A-bank	X		X	X			X		X

TABLE 3
Colour Separation Overlay Operation

Condition	Relays Operated								
	A	B	C	D	E	F	G	H	J
A-bank on-air C.S.O. shot set-up on B-bank			X	X					X
B-bank on-air C.S.O. shot set-up on A-bank		X	X			X	X	X	

ALIGNMENT

The following alignment instructions apply specifically to Split-screen Effects Units modified for colour working; i.e. units which include a GE2/525, a UN9/514A and a GE2/505A. For monochrome-only units the procedure is slightly less complex.

Except where otherwise stated, the alignment is carried out with a picture monitor connected to the *Preview* output and terminated in 75 ohms.

GE1/507 Line Sawtooth Generator

RV1 *Line Sawtooth Amplitude*
Adjust to make the sawtooth component of the waveform at the *Line S/T* monitor socket 1 V p-p. When making this adjustment, set the *Line Wipe* control on the PA6/507A panel so that the sawtooth is not crushed by the action of diodes D3 and D4 on the GE1/507.

RV2 *Line Wipe Limits*
Select a left-to-right line wipe (pattern 1) and disconnect the *Wipe* cable on the PA6/507A. Adjust RV2 to put the wipe just into the blanking period at the left-hand edge of the picture.
Reconnect the *Wipe* cable.

RV3 to RV6 *Horizontal Centering*
Select a left-to-right line wipe (pattern 2) and switch to the *Wipe* mode. Move both faders on the PA6/507A to the A-bank position and then to stop 15. Move the A fader only to 2 and adjust RV6 to position the split at the left-hand side of the picture.
Move the A fader to stop 28 and adjust RV3 to position the split at the right-hand side of the picture. RV6 and RV3 interact, so repeat the two previous adjustments. Move both faders to the B-bank position and then to stop 15. Move the A fader only to stop 2 and adjust RV4 to position the split at the right of the picture. Move the A fader to stop 28 and adjust RV5 to position the split at the left of the picture. RV4 and RV5 interact, so repeat the two previous adjustments.

GE2/507 Line Pulse Clipper

RV1 *Diagonal Slope*
Select a diagonal wipe. Adjust RV1 and the A fader until the line of the wipe passes through opposite corners of the picture.

RV3 *Diagonal Centering*
Set the A fader to stop 15 and adjust RV3 so that the line of the wipe passes through the centre of the picture.
Check the operation of the other diagonal pattern and, if necessary, readjust RV3 for the best compromise setting.

RV2 and RV4 *Vertical Centering*
Select a field-split wipe and disconnect the *Wipe* cable on the PA6/507A. Adjust RV4 to make the A to B transition coincident with field blanking at the bottom of the raster.
Reconnect the *Wipe* cable.
Select the top left-hand corner wipe and set both faders to stop 15.
Note the position of the field transition. Select the bottom left-hand corner wipe and adjust RV4 until the field transition occupies the same position as before.

GE2/506 Switch Pulse Generator

RV2 to RV5 *Field Wipe Limits*
Select the field wipe which moves from top to bottom of the picture (pattern 3). Move both faders to the A-bank position and then to stop 15. Move the B fader only to stop 28 and adjust RV3 to position the split at the top of the picture. Move the B fader to stop 2 and adjust RV4 to position the split at the bottom of the picture.
RV3 and RV4 interact, so repeat the two previous adjustments.
Move both faders to the B-bank position and then to stop 15.
Move the B fader only to stop 2 and adjust RV5 to position the split at the top of the picture.
Move the B fader to stop 28 and adjust RV2 to position the split at the bottom of the picture.
RV2 and RV5 interact, so repeat the two previous adjustments.

RV1 *Video Switch Transients*
Move both faders to the A-bank position and select a line wipe. Monitor at the *Preview* output of the UN4/501 with an oscilloscope terminated in 75 ohms. Small switching transients which are due to clamp action will be seen on the waveform and, as the faders are moved from the end-stop position a larger transient will move through the waveform. Position the faders just off the A-bank end stop so that the larger transient is midway between the two smaller clamp-pulse transients. Note the shape and amplitude of the large transient. Move the faders to the B-bank position and once more position the large transient between the two clamp-pulse transients. Adjust RV1 to minimise the negative-going portion of the large transient for both the A-bank and B-bank

conditions. Check that the p-p transient amplitude is less than 100 mV and that the transient duration is less than 0·3 μs.

UN9/514A Video Switch Unit

RV1 and RV2 *Gain*
RV1 is the A video gain control and RV2 is the B video gain control. Apply a 1-volt p-p sawtooth-and-syncs signal to the two video inputs of the unit. Select a line wipe and adjust the *Line* control on the PA6/507A until the split occurs at the beginning of the sawtooth. Adjust the *Black Level Balance* control on the GE2/505 unit to give the output waveform a smooth slope.
Operate the *Line Wipe* control until the split occurs at the end of the sawtooth and adjust RV1 and RV2 for an output signal amplitude of 1 volt p-p. If the unit has insufficient gain, check diodes D3, D7, D12 and D14. The forward conduction voltages of these diodes must be matched to within ±50 mV when passing 4 mA.

Frequency Response
Apply the output from an Augmented Pulse-and-bar Generator such as the GE2/543 or the GE2/559 to both inputs of the UN9/514A.
Monitor the output of the unit with an oscilloscope and check that the pulse-to-bar ratio is greater than 99%. Adjustment is not provided; poor response indicates a faulty component.

L4 and L5 *Colour Burst Distortion*
Apply a test signal containing a colour-burst component to both inputs of the UN9/514A. Monitor the output of the unit with an oscilloscope and observe the back-porch colour burst. Wipe to the A signal. Monitor at pins 6 and 7 adjust L4 for minimum colour burst at these points. Wipe to the B signal. Monitor at pins 9 and 10 and adjust L5 for minimim colour burst at these points.

L6 *Differential Phase Distortion*
Check the differential phase distortion of the unit with a Remote Signal Analyser EP1M/508 and a Non-linearity Test Signal Generator GE4M/520 (see Instruction EP1/508). Adjust L6 for minimum differential phase distortion, using both the *Bar On* and *Bar Off* conditions.

GE2/505 Clamp Pulse Generator

RV3 *Black Level Balance*
See Gain adjustments for UN9/514A.

RV2 *Coarse Black Level Balance*
Should be adjusted only if sufficient adjustment cannot be obtained by means of RV3.

RV6, RV4, RV5, RV1 *Clamp Pulse Transients*
Monitor at the *Preview* output of the UN9/514A with an oscilloscope.
Observe the back-porch period of the signal and wipe to the A side. Adjust RV6 and RV4 to minimise the clamp-pulse transients. Wipe to the B side and adjust RV5 and RV1 to minimise the clamp pulse transients.

GE2/525 Blanking Pulse Generator

R14, R16 *Line-blanking Duration*
Check that the GE2/525 is receiving mixed-sync pulses from the GE2/506. Use an oscilloscope fitted with a high-impedance probe to monitor the waveform at the base of TR7. Check that it contains positive-going line-frequency pulses.
For 625-line operation, adjust the *625-line Width* control R16 to make the positive-going pulse duration 9·6 μs.
For 405-line operation, adjust the *405-line Width* control R14 to make the positive-going pulse duration 16μs. R16 must always be adjusted before R14.

R27 *Field-blanking Duration*
Check that the GE2/525 is receiving field-drive pulses from the GE2/507. Use an oscilloscope fitted with a high-impedance probe to monitor the waveform at the collector of TR10. Check that the waveform consists of positive-going field-frequency pulses. Adjust R27 to make the half-amplitude pulse duration 1·44 ms.

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