VERTICAL APERTURE CORRECTOR EP1/516A,B

Introduction

The EP1/516 is a Vertical Aperture Corrector employing two glass-block one-line delay units [1,2].

It will provide correction for any standard-level video signal which is timed to crystal-controlled pulses. It must not be used with mains-locked video signals.

The Corrector will accept either composite or non-composite video signals but composite input signals should be avoided if possible because the Corrector will distort field syncs to a degree dependent upon the level of correction used. Ideally if a composite input is used, some form of processing (e.g. a mixer stabilising amplifier) should be employed at a point after the Corrector to re-insert the sync pulse waveform.

Two versions of the Corrector are available; the EP1/516A is suitable for 625-line signals only and the EP1/516B is suitable for 525-line signals only. The delay units used in both versions have a very low temperature coefficient of delay and so oven temperature control of the glass blocks is not necessary.

A 50-volt relay in the device allows the Corrector to be by-passed when correction is not required.

The EP1/516 consists of the following units:

UN14/507A	Video one-line delay (2) (EP1/516A only)
UN14/507B	Video one-line delay (2) (EP1/516B only)
UN3/519	Vertical Aperture Corrector Processing Unit
NE4/509	Trimming Delay Network
PS2/13F	Stabilised Power Supply

These units are mounted on a PN3A/16D termination panel.

General Specification

Input Level	1 volt p-p (Composite) or 0·7 volt p-p (non-composite)
Input Impedance	75 ohms
Output Level	as Input Level
Output Impedance	75 ohms
Signal-to-noise ratio (noise-free input signal)	better than 50 dB
2T pulse-and-bar response	better than 1% k-rating
Gain/Temperature stability	better than 0·01 dB/°C
Operating temperature range	0°C to 50°C
Power requirements	240 volts 100 mA a.c.

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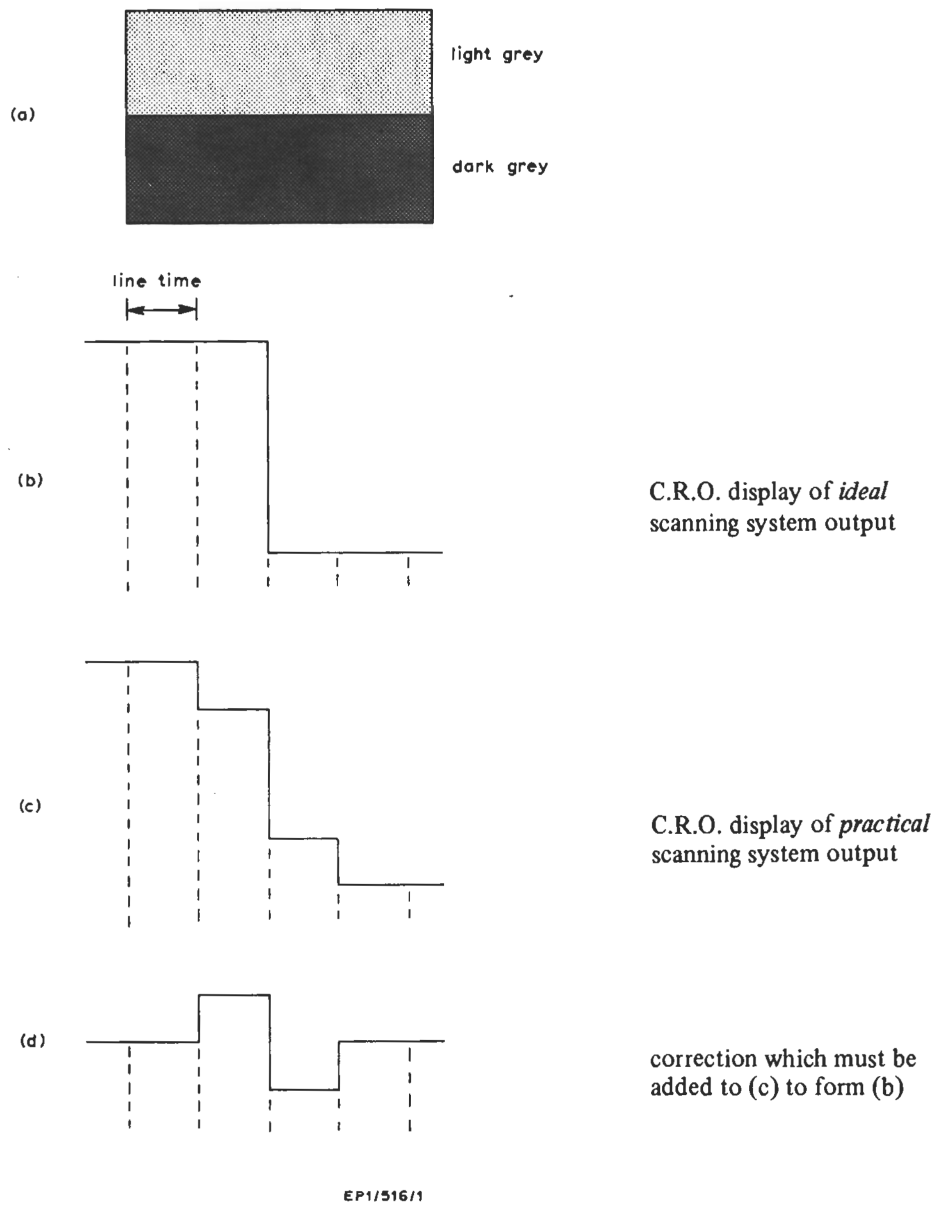

Fig. 1. Vertical Aperture Loss

Design Philosophy

Vertical Aperture Correction is used to sharpen vertical definition in a picture produced by a scanning beam of larger than ideal cross-section.

Consider a scene consisting of half light-grey, half dark-grey as shown in Fig. 1(a). A C.R.O. display of the output of an ideal scanning system viewing such a scene would be as shown in Fig. 1(b). In practice, due to the finite size of the scanning beam, the output has the general form shown in Fig. 1(c). The correction required, i.e. the signal which must be added to correct the degraded output, is as shown in Fig. 1(d).

A correction approximating to that shown in Fig. 1(d) can be derived either by the use of two line delays or by the less satisfactory method of re-circulating through a single delay. The EP1/516 uses the first of these two methods.

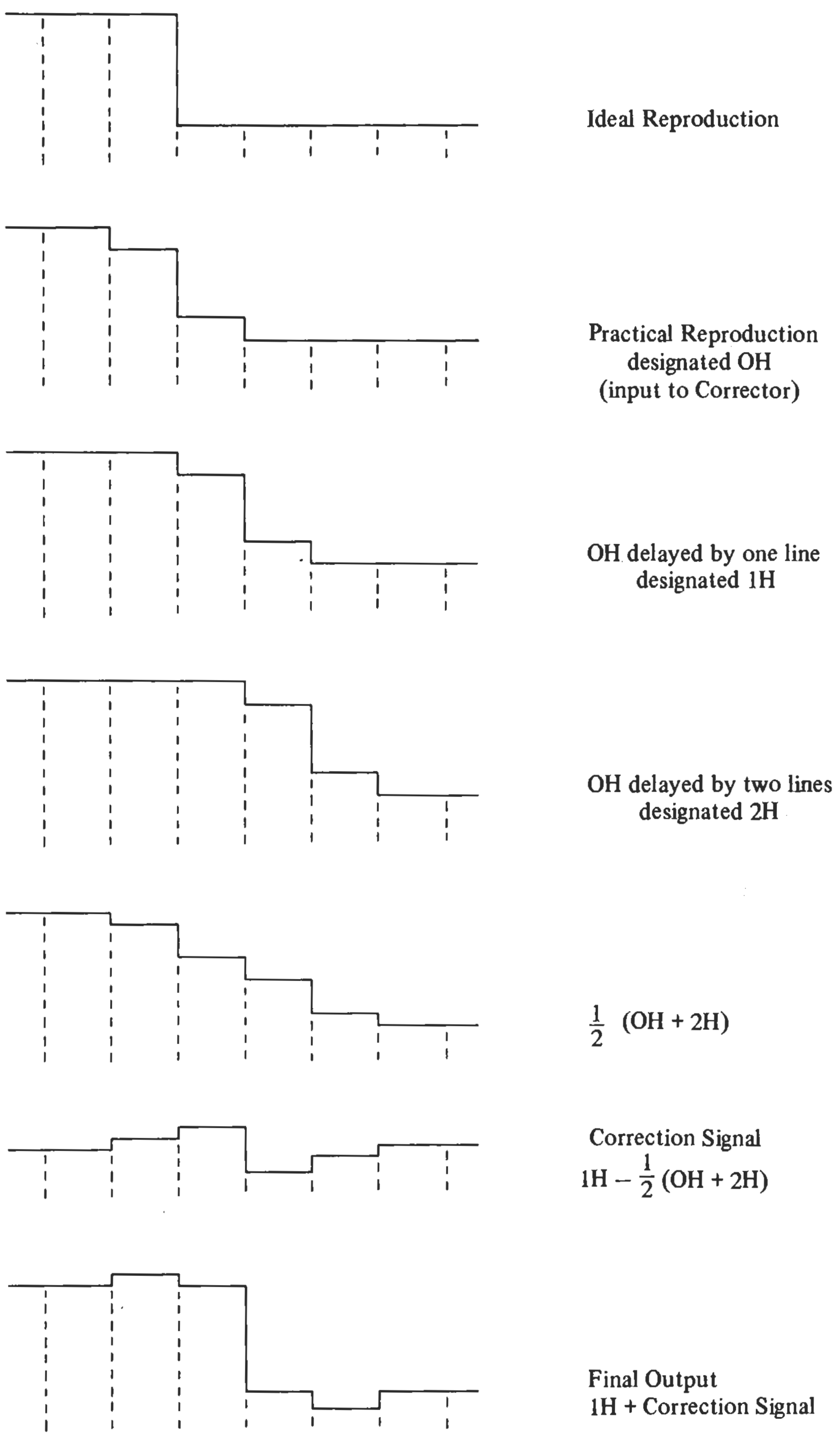

Fig. 2. Production of a Vertical Aperture Corrected signal from the direct and delayed signals.

General Description

Fig. 2 shows how the correction signal is derived from the input signal (designated OH), the input signal delayed by one line (designated 1H) and the input signal delayed by two lines (designated 2H).

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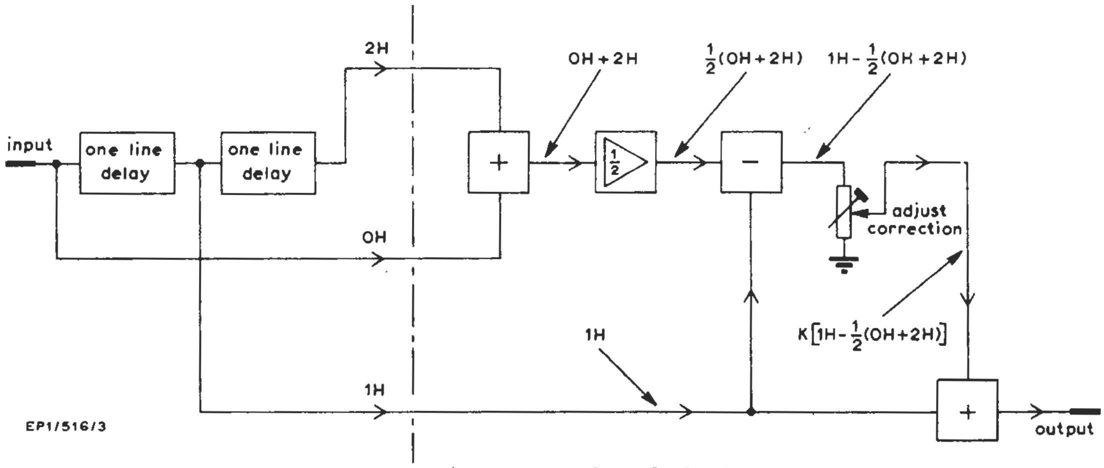


Fig. 3. EP1/516: Simplified Block Diagram

Fig. 3 is a simplified block diagram of the EP1/516 showing how the correction signal is derived and added to the 1H signal. The level of the correction signal can be adjusted before addition to the 1H signal and this has the effect of varying the amount of correction applied.

A unit interconnection diagram of the EP1/516 is shown in Fig. 4. The UN14/507 delay lines each provide slightly less than one complete line delay and the small additional delay necessary to make a total delay of exactly one line is provided by an NE4/509 Trimming Delay Network which is mounted inside the back panel of the Corrector. The NE4/509 has two separate delay sections; one associated with each UN14/507. The delay provided by each section is adjusted on manufacture to match the particular UN14/507 Delay Units used. Consequently the UN14/507 Delay Units must not be interchanged or exchanged with Units from another Corrector.

The low-pass filter formed by L1, C1 and C2 filters off extraneous high-frequency noise from the input signal.

Back-panel wiring of the EP1/516 is shown in Fig. 5.

Alignment

Apparatus Required

Oscilloscope

One 75-ohm termination

Feed of crystal-derived mixed syncs or any crystal-locked composite video signal

Feed of field drive.

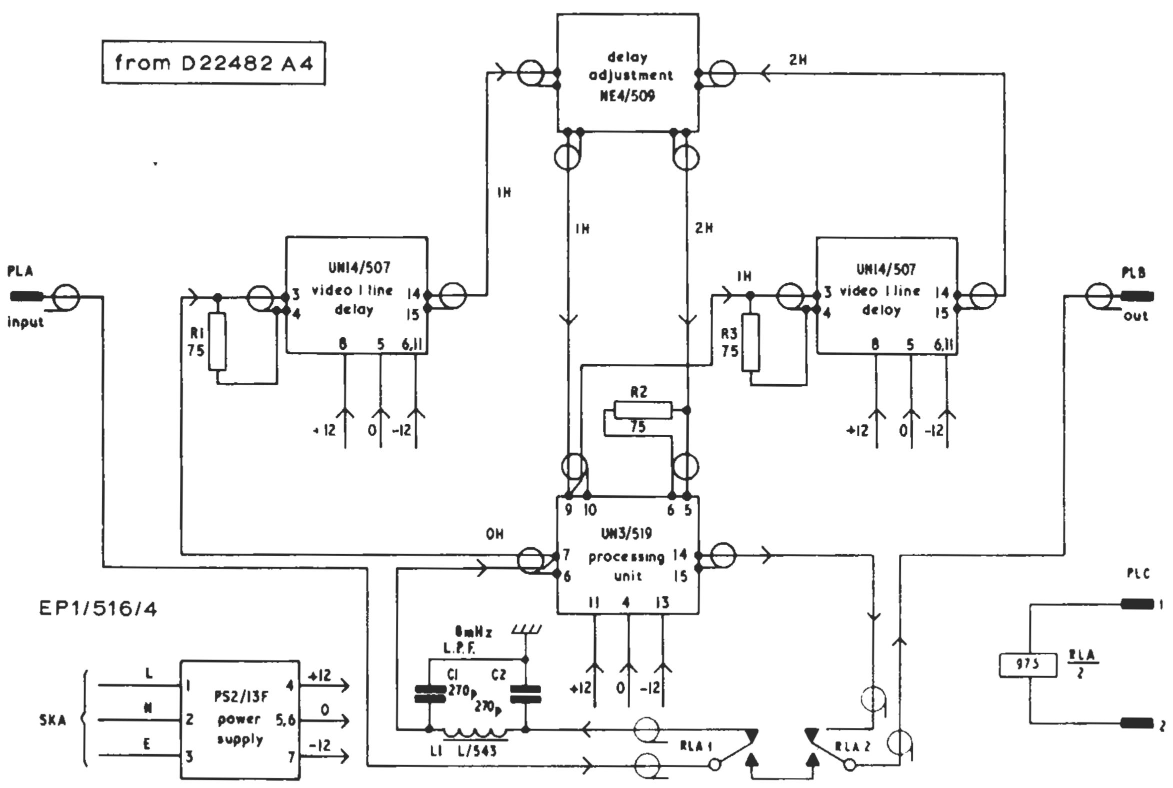
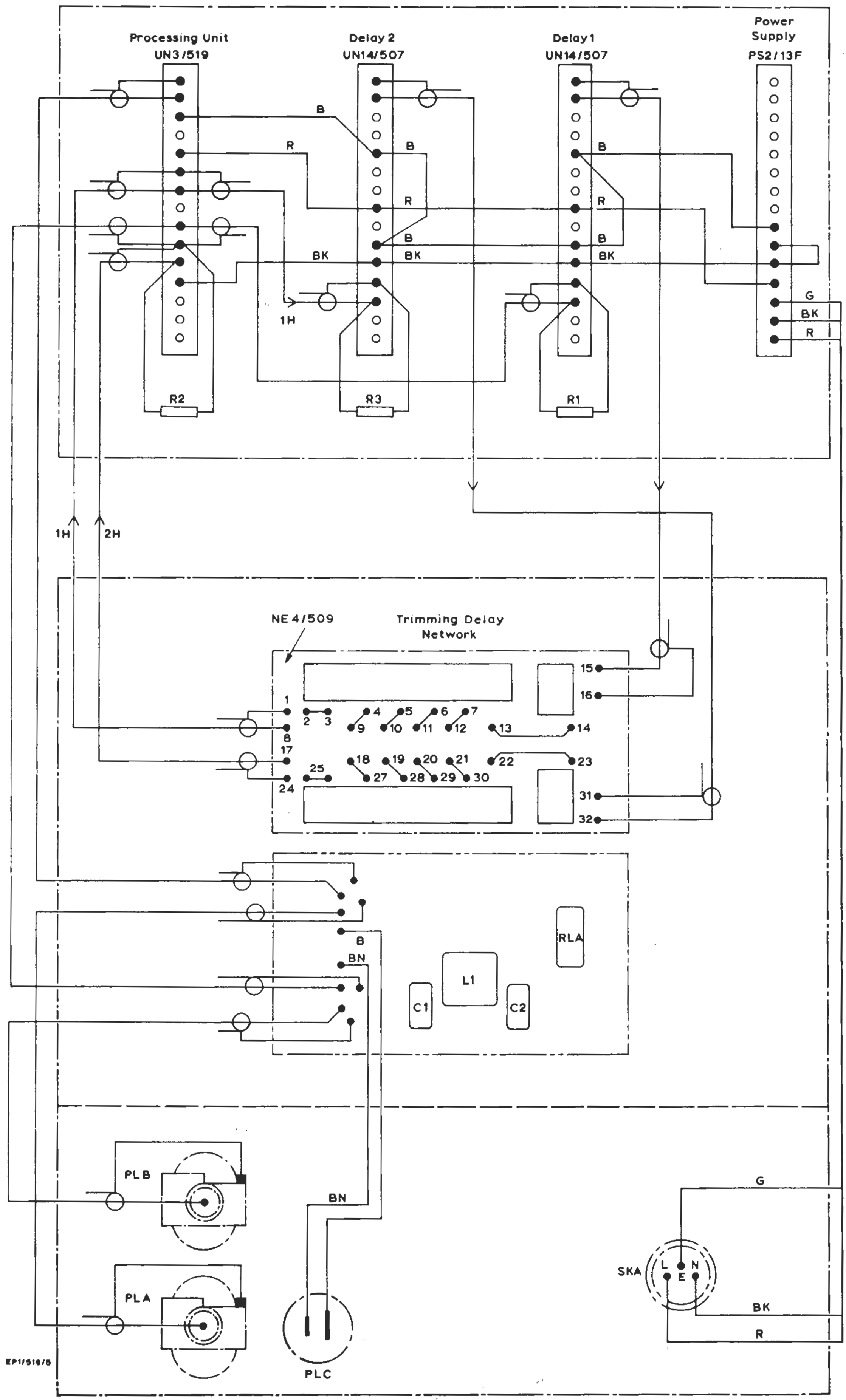
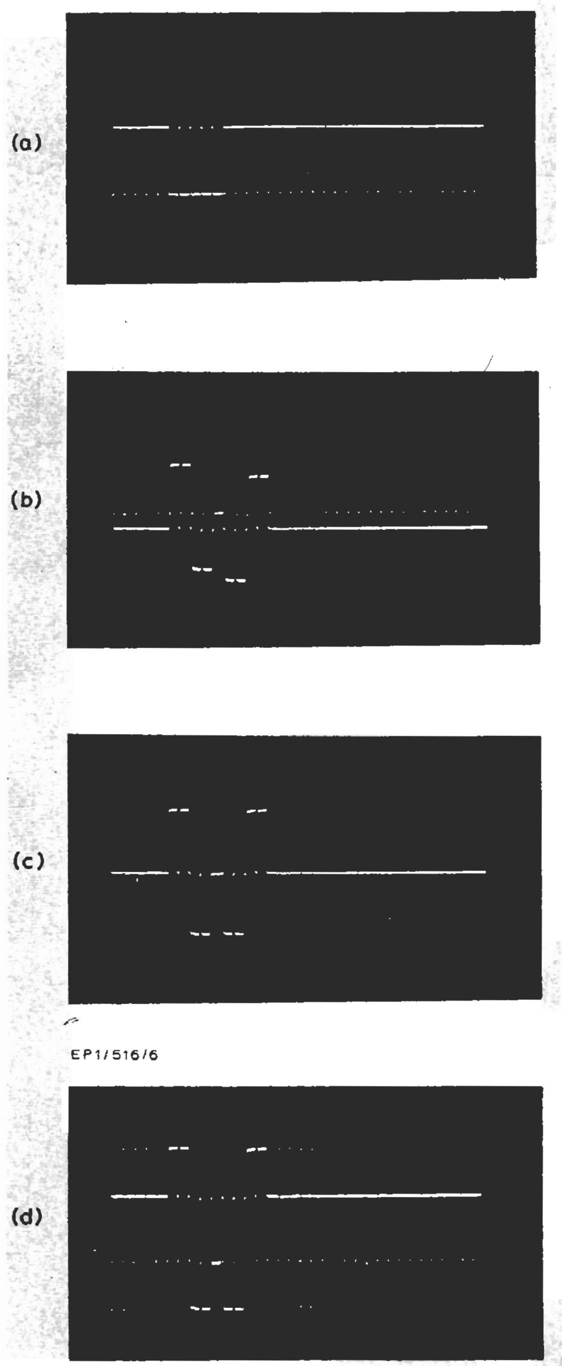


Fig. 4. EP1/516: Unit Interconnection Diagram



Back Panel Wiring

Fig. 5. Back Panel Wiring of the EP1/516



(a) Input Syncs
0·3V p-p

(b) Correction Signal
(Corrector properly
aligned)

(c) Correction Signal
(Corrector out of
alignment)

(d) Output Signal
(Correction gain at
maximum)
Overshoots ≥ 0·15 volts
each side.

Fig. 6. EP1/516 Alignment Waveforms

Procedure

1. Connect the mixed syncs or video signal to the input of the corrector and use the oscilloscope to monitor the waveform at the *correction* monitor point on the UN3/519.
2. Trigger the oscilloscope from the leading edge of field drive.
3. A display similar to that shown in Fig. 6(b) indicates unequal gains in the UN14/507 delay lines. In this event adjust the R46 *set gain* controls in *both* UN14/507 delay lines to give a symmetrical display as shown in Fig. 6(c). There is only one setting for each of these controls where a fully symmetrical correction signal can be obtained.
4. Transfer the oscilloscope to the output of the Corrector (*not* to the *output* monitor point) and terminate in 75 ohms.
5. Set the *correction gain* control on the UN3/519 Processing Unit to maximum.
6. Measure the positive-going excursions from black level and the negative-going excursions from the bottom of syncs. Check that these are equal and at least of amplitude 0·15 volt.
7. Apply a video signal to the Corrector and adjust the output level control (R50) in the UN3/519 so that the output level with the Corrector in circuit is the same as with the Corrector by-passed. If the Corrector has been removed from its bay an external 50-volt supply will be required to energise the by-pass relay, RLA, to make this adjustment.

Setting the Correction Level

The amount of correction available is continuously variable and can be adjusted using the *correction gain* control on the UN3/519. With the EP1/516 connected to the output of the device to be corrected (e.g. a camera channel) adjust the *correction gain* control until horizontal edges on the displayed picture are sharpened to the point where additional correction would produce objectional overshoot. A test chart with the top half light grey and the bottom half dark grey can be used for this adjustment. The output of the Corrector can then be viewed at field rate on an oscilloscope and the *correction gain* control adjusted for best rise time of the transition edge without undue overshoot. If this technique is used, however, the Corrector output *must* be viewed on both fields. It may not be possible to obtain the correct waveform on one field or the other depending upon the relative positions of the transition edge and the scanning lines. If, for example, on one line the scanning beam scans the transition edge *exactly* then a half-amplitude output can be expected for this line even when the Corrector is properly aligned. If such a situation occurs do not be tempted to adjust the Corrector to remove the half-amplitude line; adjust for the correct waveform on the other field.

In general the *correction level* control can be satisfactorily set by viewing pictures directly and adjusting for optimum subjective effect.

Setting the Coring Level[3]

1. Set up the device to be corrected and adjust its controls to give a black-level output (e.g. in the case of a camera channel cap up the lens).
2. Feed the output of the device into the EP1/516 and monitor with an oscilloscope at the *correction* monitor point on the UN3/519.
3. Adjust the *coring level* control on the UN3/519 so that noise is *just* removed from the centre of the correction waveform.

References

1. Instruction P3, Section 1.
2. Engineering Training Department Information Sheet *Vertical Aperture Correction* (J.R. Kirkus).
3. See Instruction on UN3/519 for an explanation of *Coring*.

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