REMOTE SIGNAL ANALYSERS EP1/508 SERIES

Introduction

These units are used to measure differential phase distortion and differential gain distortion. The distortion is measured by analysing the subcarrier component of a colour test waveform signal and displaying the selected output waveform on an oscilloscope.

The units accept a staircase-plus-subcarrier composite video signal[1,2] and provide the following output signals:

(a) an output from a synchronous demodulator (used for measuring differential phase distortion).
(b) a colour subcarrier signal (labelled *Chrominance Out*) which is filtered from the subcarrier component of the staircase input signal (used for measuring differential gain distortion).
(c) a colour subcarrier signal (labelled *Ref. Subcarrier Out*) which is derived from, and locked to, the burst component of the input signal.
(d) mixed synchronising pulses.

Each unit consists of the following sub-units

UN1/540	Sync Separator
OS1/502	Burst Locked Oscillator
UN1/576	Waveform Processor Unit
UN1/541	Colour Signal Analyser
GE2/574	Gate Pulse Generator
PS2/22 B	Power Supplier

together with a printed-wiring panel which is mounted at the rear of the sub-units.

When the component parts of the unit are mounted on a PN3/23 chassis the unit code becomes EP1M/508; when the component parts are contained in a portable box the code becomes EP1M/508P and when the parts are supplied loose for mounting with other apparatus the code becomes EP1L/508.

Signal paths between the sub-units are shown in Fig. 1 and power supply arrangements in Fig. 2. A circuit diagram showing the inter-unit wiring and the components external to the sub-units is given in Fig. 3.

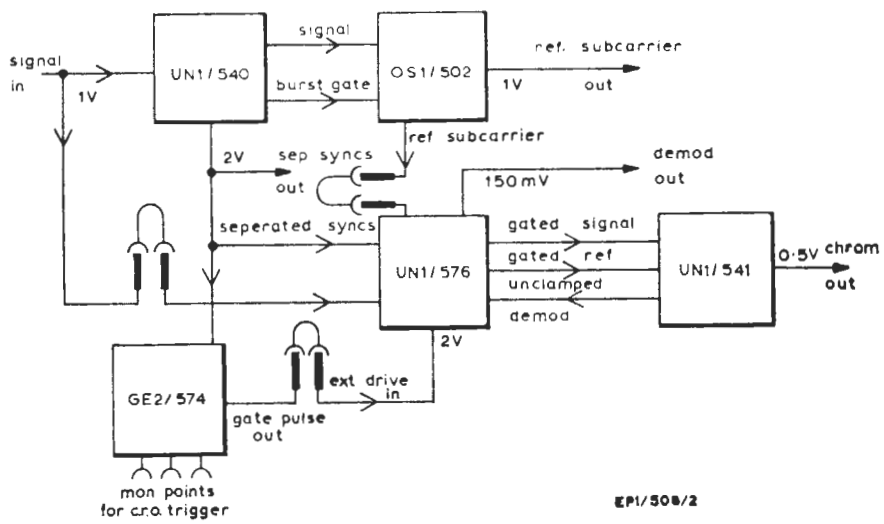

Fig. 1 Signal Interconnections for the EP1/508

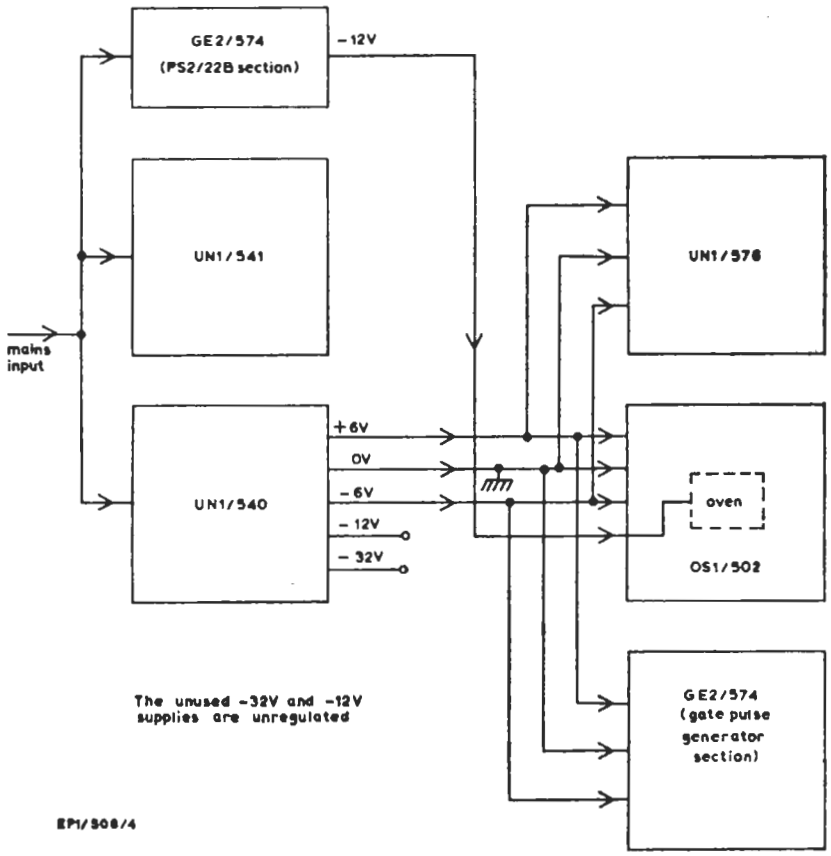

Fig. 2 Power Supply for the Remote Signal Analyser EP1/508

General Specification

Inputs

Composite Video	5-step non-linearity test signal with 140 mV p-p of 4·43-MHz subcarrier on each level

Outputs

Demodulated Output	50 to 80 mV per degree of phase error
Chrominance	300 mV p-p when terminated in a 75-ohm load
Subcarrier	1 V p-p when terminated in a 75-ohm load
Separated Syncs	2 V p-p negative-going
Input Impedances	75 ohms
Output Impedances	75 ohms
Mains Input	240 V, 50—60 Hz
Power Consumption	about 100 mA at 240 V

Operation

Measurement of Differential Phase Distortion

1. Apply the test signal from the remote source to the *Sig. In* plug.
2. Connect the *Demod. Out* plug to the Y input of the associated oscilloscope and terminate in 75 ohms.
   Connect the *Sep. Sync Out* plug to the external-trigger input on the oscilloscope and terminate in 75 ohms.
3. Check that the U-link connecting the *Sig. Out* and *Proc. In* plugs is in position.
4. Set the gating-selection switch on the UN1/576

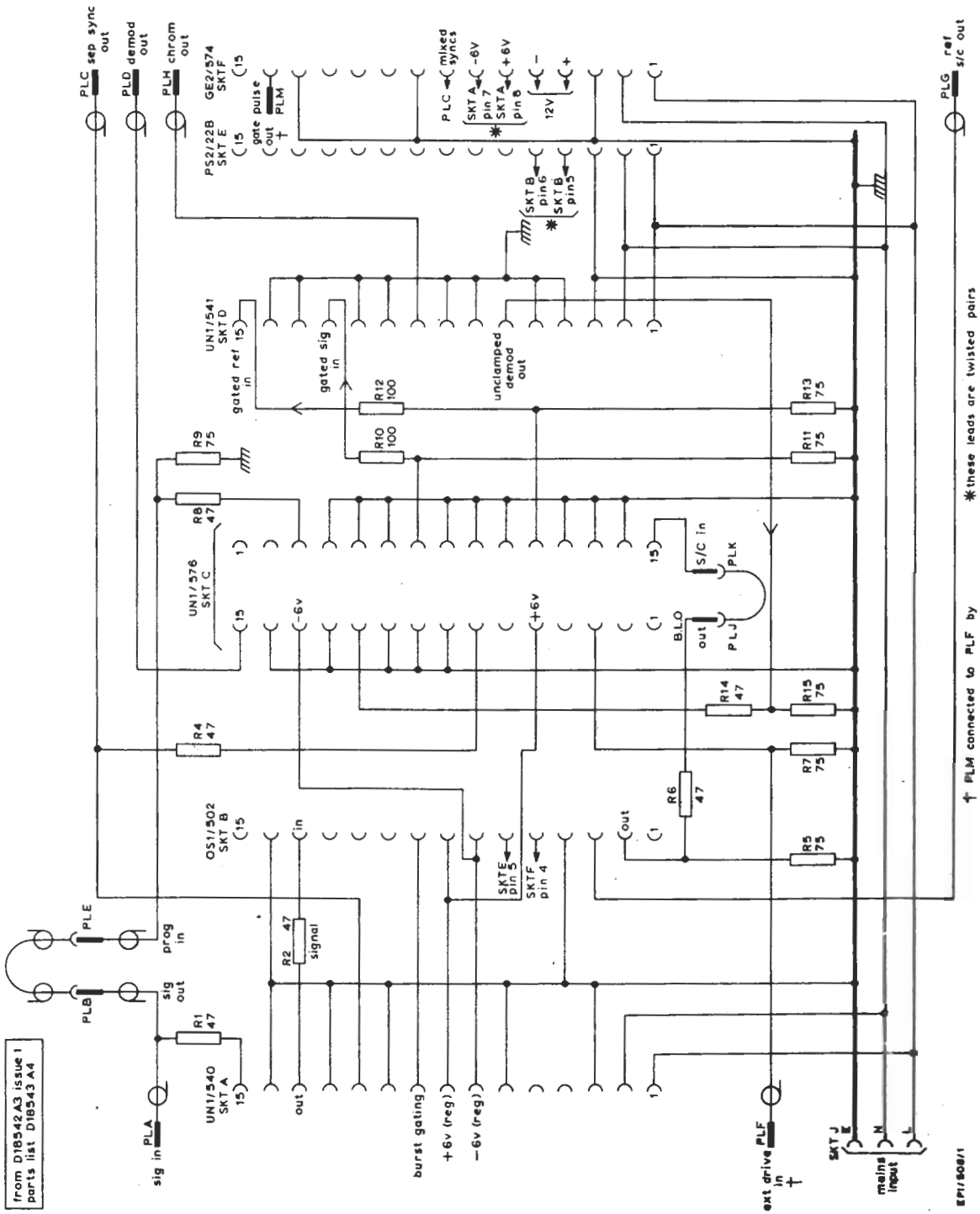

Fig. 3 Circuit of the Remote Signal Analyser EP1/508

sub-unit to *Chroma* and check that the *Gain* control on the UN1/541 sub-unit is set to its mid-position.

5. Adjust the oscilloscope controls to give a display of three or four television lines. The display may have the form shown in Fig. 4(a); if so adjust the phase controls on the UN1/541 sub-unit until the display resembles Fig. 4(b).
6. Adjust the oscilloscope controls to give a single-line display. If differential phase distortion is not present the waveform will be similar to Fig. 4(c); i.e. it will be a straight line with small spikes at those points on the line which correspond to the luminance transitions of the input signal. The disturbances at either end of this line correspond to the blanking periods before and after the active portion of the line under observation; these disturbances will only be apparent on early models of the equipment because on later models they are removed by the operation of the UN1/576 sub-unit.
7. If differential phase distortion is present, the display will be similar either to Fig. 4(d) or to Fig. 4(e). In Fig. 4(d) the distortion is of a linear nature (i.e. all one way) and by adjustment of the *Phase* controls on the UN1/541 sub-unit any step on the waveform can be brought to the same position as the subcarrier at blanking level (i.e. the subcarrier just before the first step). The deviation from the blanking level phase setting required to bring the highest step on the waveform to blanking level gives the differential phase distortion.
   In Fig. 4(e) the distortion is of a non-linear nature with some of the steps positive-going with respect to blanking level and some of the steps negative-going. The differential phase distortion of the waveform is still given by the amount by which the *Phase* controls must be adjusted to bring the maximum phase deviation to the same level as blanking level.

Measurement of Differential Gain Distortion

1. Apply the test signal from the remote source to the *Sig. In* plug.
2. Connect the *Chrominance Out* plug to the Y input of the oscilloscope and terminate in 75 ohms. Connect the *Sep. Sync Out* plug to the external-trigger input of the oscilloscope and terminate in 75 ohms.
3. Adjust the oscilloscope controls to give a display of one or two lines and then increase the gain of the oscilloscope Y-amplifier until the maximum deflection of the trace is obtained.
4. Any differential gain distortion present will produce a variation in the amplitude of the chrominance envelope as shown in Fig. 4(f). The distortion is expressed as a percentage. In Fig. 4(f) the subcarrier amplitudes are labelled a, b and c respectively and the differential gain distortion is either $\left(\frac{100}{a}\right)$ b-a or $\left(\frac{100}{a}\right)$ a-c per cent.

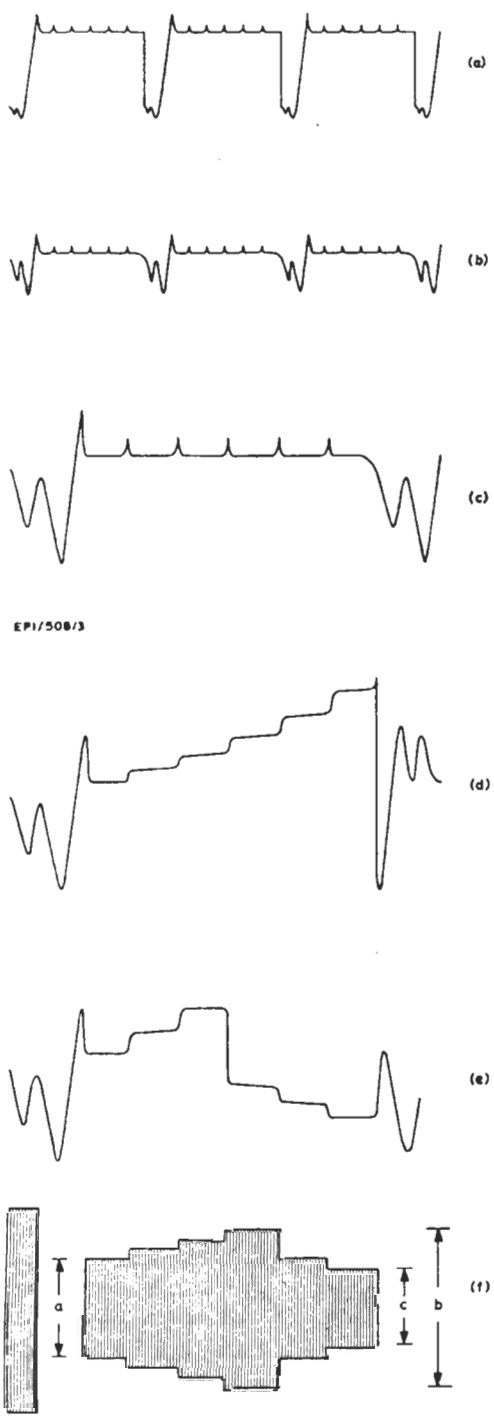

Fig. 4 Typical Waveforms When Using an EP1/508

Using Station Subcarrier instead of Reference Subcarrier

A more stable display can be obtained for differential phase measurements if the feed of reference subcarrier from the OS1/502 sub-unit is replaced by a feed of station subcarrier. To do this, remove the *B.L.O. Out/S-C In* U-link and apply the station subcarrier signal to the *S-C in* plug.

Using the Insertion Test Signal

Insertion test signals (see Fig. 5) are located in the field-blanking period on lines 19 and 332 (for 625-line signals). Only Insertion Test Signal 1 carries a staircase-plus-subcarrier component[3] and this signal contains also pulse-and-bar information; therefore the oscilloscope display will be modified by the presence of unwanted information.

1. Set the gating-selection switch on the UN1/576 sub-unit to *Ext*.
2. Apply suitable gating pulses to the *External Drive* plug.
3. Measure the differential phase and differential gain distortions in the normal way.

Measurement of Phase Difference between two Signal Sources

1. Apply the first of the signals to be compared to the *Sig. In* plug.
   Carry out the first five steps for the measurement of differential phase distortion as described earlier.
2. Note the settings of the Phase controls on the UN1/541 sub-unit.
   Remove the input signal.
3. Apply the second signal to the *Sig. In* plug.
   Carry out the first five steps for the measurement of differential phase distortion.
4. The phase difference between the two signals is given by the amount by which the *Phase* controls must be altered to make the second signal coincident with the first signal.

The unit should be used only for relative phase measurements or for measuring small phase delays because its accuracy is only ±5%.

References

1. GE4/505A Non-linearity Test Signal Generator.
2. GE4/514 Subcarrier Adder.
3. Designs Department Technical Memorandum No. 6.87(70) A Guide to Insertion Test Signal Measurements.

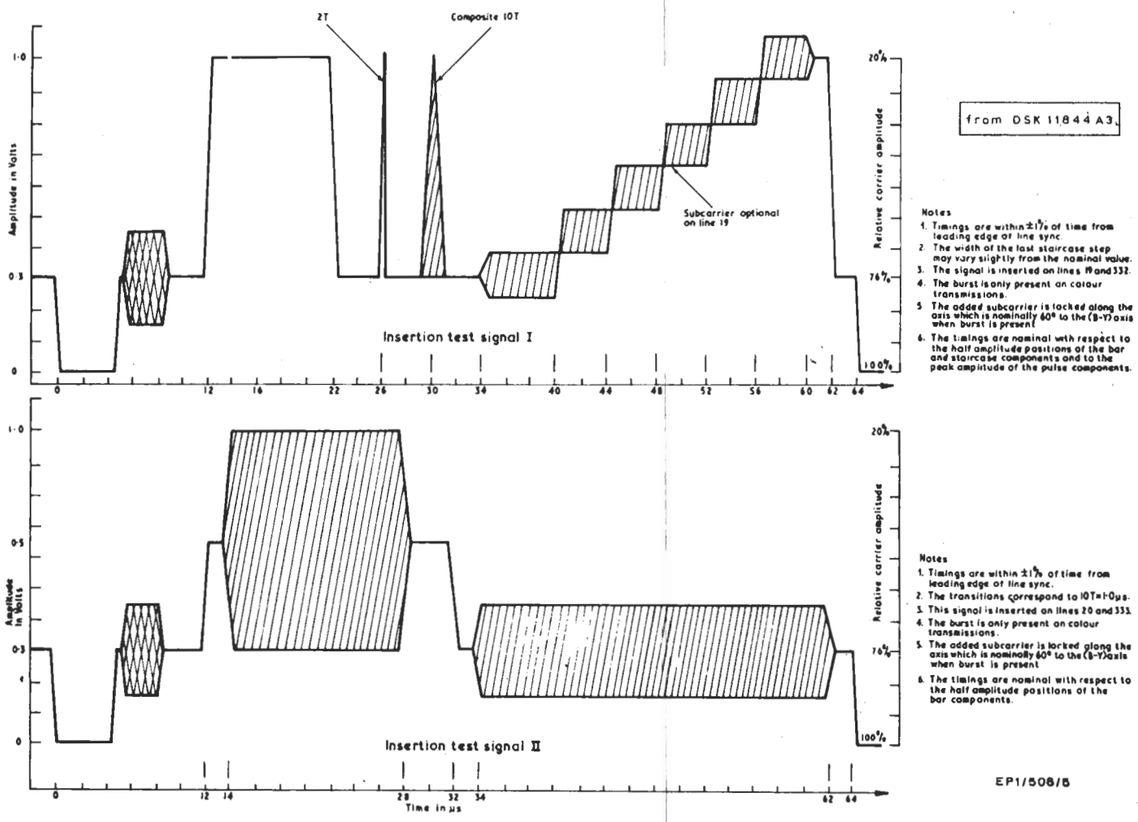

Fig. 5 National Insertion Test-Signal Waveforms

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