STABILISING AMPLIFIER AM18/504

Introduction

The AM18/504 is a television stabilising amplifier with a feedback clamp. It accepts a 1 volt p-p composite video signal, monochrome or colour, and reduces any linear low-frequency distortion and any added low-frequency interference present on the signal. It also enables the sync pulse amplitude to be stabilised if required. A bypass switch is fitted.

The amplifier consists of seven plug-in sub-units on CH1/12 chassis and mounted on a PN3/23 panel. It has its own power supplier. Connectors type P.O. Coax No.1 are used for the signal; F and E type EP-4-14S are used for the power input. The subunits are:

CO4/502 Sync Pulse Stabiliser
GE2/502A Sampling Pulse Generator
AM3/501 Error Signal Amplifier
AM18/506 Video Amplifier
UN13/501 Stabiliser Pre-amplifier and Video Delay
UN3/503 Automatic Time Constant Control Delay Corrector Card
PS2/10A Stabilised Power Supplier

General Specification

Signal Input (composite video, picture component)	0·7 V p-p ±3 dB
Sync Pulse Input (locked)	2 V p-p ±6 dB
Signal Output (composite video)	1 V p-p
Picture/Sync Ratio Allowable at Input	70/15 to 70/60
Picture/Stabilised Sync Ratio at Output	70/29 to 70/32
Input and Output Impedance (video)	75 ohms
Return Loss	not less than 29 dB
Maximum Allowable Deviation from Ground Potential of Back-porch at Input	±5 V
Deviation from Ground of Back-porch at Output	less than +0·3 V
Maximum 50-Hz Interference Level at Input	0·7 V p-p
Maximum Reduction of 50-Hz Sinusoidal Interference	27±2 dB
Signal Change at Output for Mains Input Voltage Step of ±6%	less than 0·5% of peak white
k-rating on 625-line 2T Pulse and Bar	less than 0·5%
Non-linearity Distortion (at normal Level and at 3 dB Overload)	less than 1%
Differential Gain Distortion 4·43 MHz (normal level and at 3 dB overload)	less than 1·5%
Differential Phase Distortion 4·43 MHz (without sync stabilisation)	
Normal input	less than 0·3°
3-db overload	less than 0·4°
Luminance/Chrominance Gain Inequality	less than 1%
Luminance/Chrominance Delay Inequality	less than 5ns
Weight	20 lb
Power consumption	14 W at 200-250 V 50 Hz.

General Description

The principle underlying the operation of the AM18/504 is that a video signal, which has suffered distortion by the loss of the d.c. component or by the addition of hum or other low-frequency interference in transmission through a linear system, may be considered as the original signal with an added error signal. The feedback clamp abstracts the error signal by sampling the video signal during the back porch period. After amplification and invertion, the error signal is fed back continuously in parallel with the original signal.

Circuit Description

A block diagram of the Unit is given in Fig. 1. The bypass switch, which is part of the *Features Stabilised* switch, is mounted on the front panel of the CO4/502 and enables the clamp to be cut out of circuit completely.

The video path is through the AM18/506 and the delay line in the UN13/501 as indicated on the block diagram by the heavy lines. The back-porch sampling is carried out at the output of the input amplifier stages of the AM18/506 and the correction is fed back at the input of the same stages.

The GE2/502A uses internal or locked external syncs to develop 2 sets of line frequency pulses (double line frequency pulses during the broad pulse period) for the sampling and demodulating bridges in the AM3/501 and for the sync stabilising side chain in the UN13/501 and CO4/502. The action of the sync stabilising chain can be inhibited if necessary.

The UN3/503 provides automatic control of the clamping time constant as an alternative, under noisy conditions, to a fixed time-constant with long, medium or short settings.

The power for all sub-units is supplied by the PS2/10A.

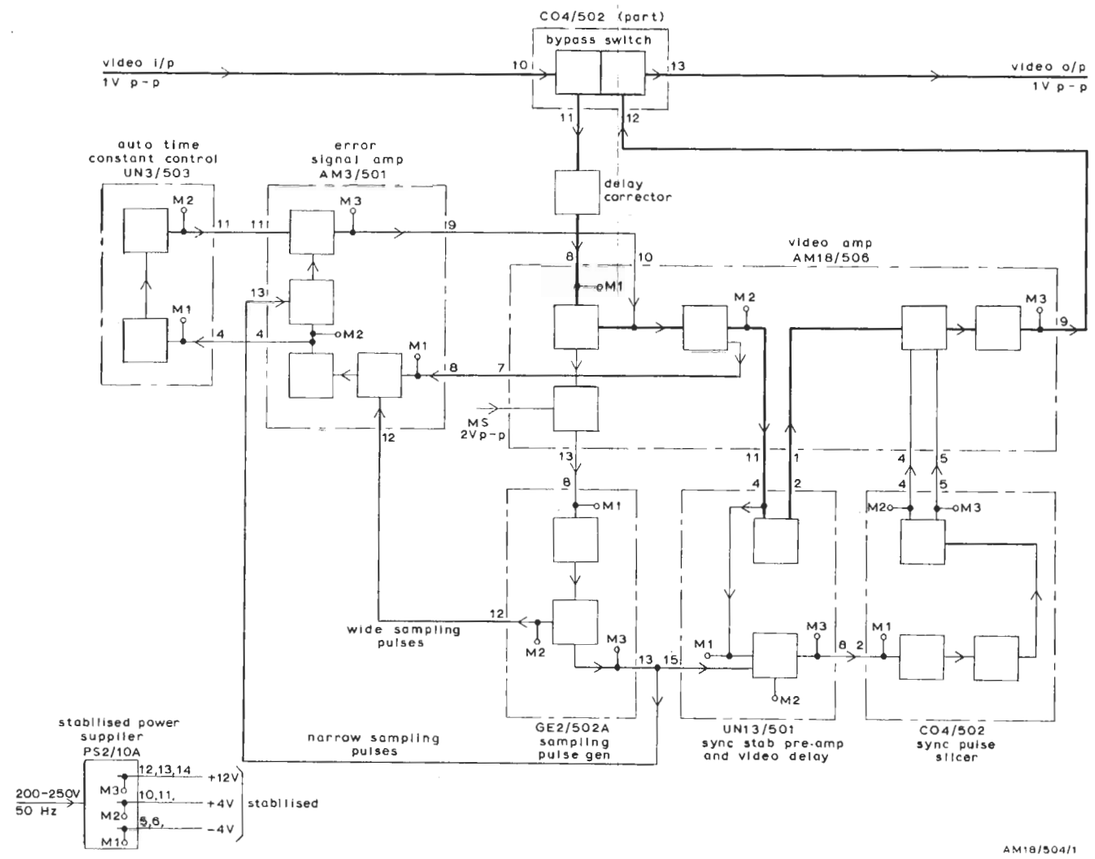
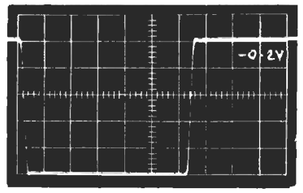
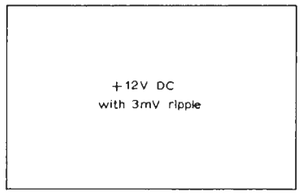


Fig.1 AM18/504: Block Diagram

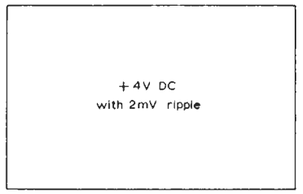


Input signal 0·3V peak to peak
625 L 2T puls & bar

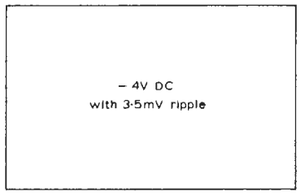
PS2/10A



M1

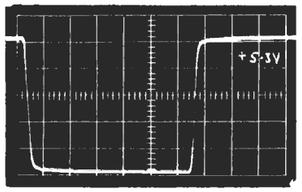


M2

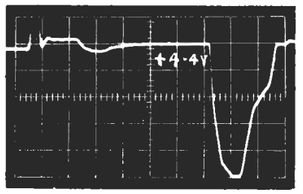


M3

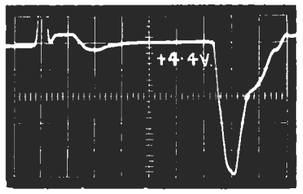
GE2/502A



M1 0·23V

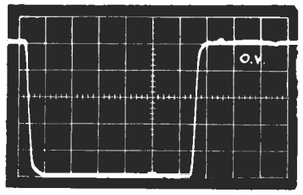


M2 2·3V

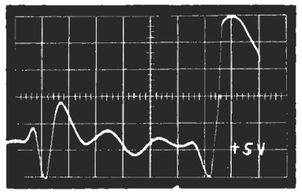


M3 2·2V

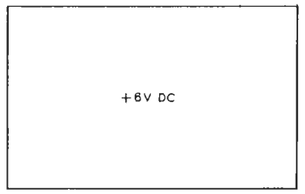
AM3/501



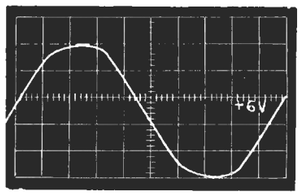
M1 0·5V



M2 0·1V/square (long time constant)



M3



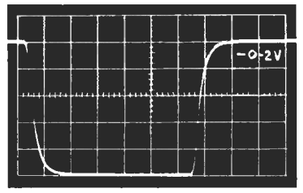
M3 with test key at BP 0·2V/square
2ms/square

Note 1. Time scale 1μs/square except as stated.
2. Monitor point voltages are p-p values.

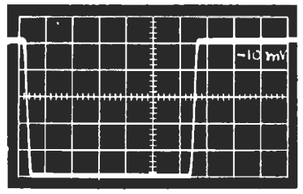
AM18/504/2

Fig.2 AM18/504: Typical wavetorms

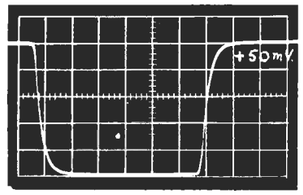
AM18/506



M1 0·3V

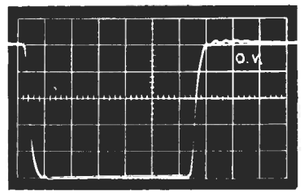


M2 0·5V

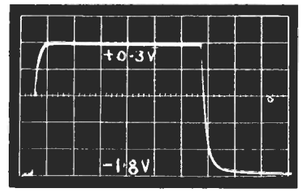


M3 0·3V

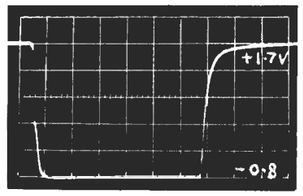
C04/502



M1 1·1V

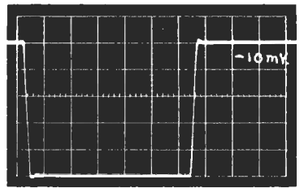


M2 2V

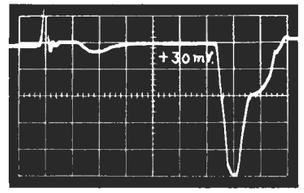


M3 2·5V

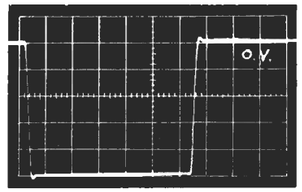
UN13/501



M1 0·5V

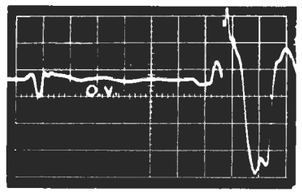


M2 1·8V

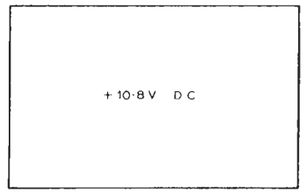


M3 1·2V

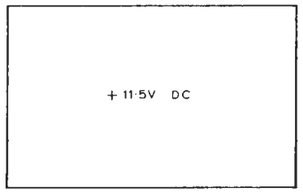
UN3/503



M1 0·5V (clamp on short time constant)



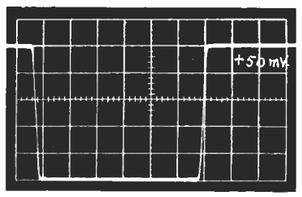
M2



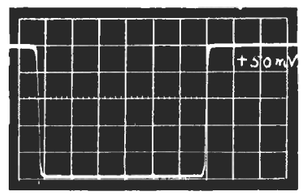
M3

see note on Fig 2

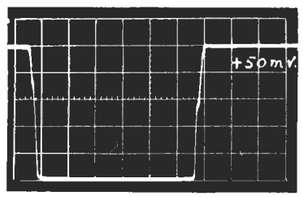
AM18/504 output signals 0·3V



back porch stabilised



sync amp stabilised



sync amp stabilised with test switch at SA

AM18/504/3

Fig.3 AM18/504: Typical waveforms

Maintenance

Routine maintenance is not required and, assuming properly aligned sub-units, adjustment of the preset controls should not be necessary during normal use. If trouble develops, the following tests may be applied. The waveforms to be expected at the various test points during normal working are as given in Figs. 2, 3 and 4.

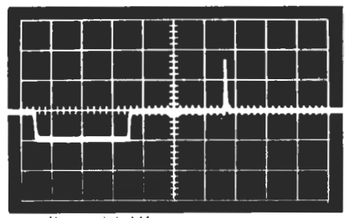
1. To *check the clamping action,* set the test key (AM18/506) to the *BP* position and the time constant switch (AM3/501) to *Short;* the level of 50-Hz signal at the output of the AM18/504 should not exceed 40mV p-p.
2. To *check the sync stabilising* action, set the *Features Stabilised* switch (CO4/502) and the *Test* key (AM18/506) to their *SA* positions. This should result in less than 3% reduction of sync amplitude.
3. To *check the clamp feedback loop* (AM3/501), the loop must be opened by setting switch S1 (AM3/501) to the *0 volts* position. With an oscilloscope and high impedance probe monitor the various points as follows:
   a) Between each end of T1 secondary and earth, the pulse amplitude should be about 4 volts and the duration 4μs for 405 lines and 2 μs for 625 lines.
   b) At M2 test point there should be less than 0·3 V of pulse. With S1 in the −10 mV position the pulse amplitude should be about 1 V.
   c) The pulse drive to the demodulator from T3 can be examined by temporarily earthing M2. The pulses should have an amplitude of about 3·5 V and a duration of 3·6 μs for 405 lines and 1·6 μs for 625 lines.
   d) Remove the temporary earth on M2; there should be a steady potential of about +5 volts at M3 with S1 in the *0 volts* position. This should increase to about +6 volts with S1 in the *−10 mV* position.

References

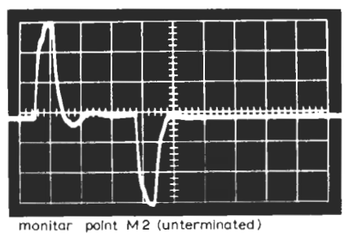
1. Designs Department Specification No.6.103(65)
2. Designs Department Technical Memorandum No.6.58(65)
3. Technical Publications Reprint Article A37: *Clampers in Video Transmission*
4. I.E.E. Conference Report June 1962 pp. 251 to 258.

AIB 1/72

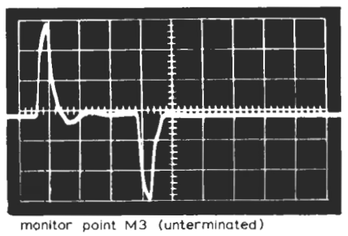
GE2/502A 625 line 1T pulse and bar 1·0V/cm



monitor point M1

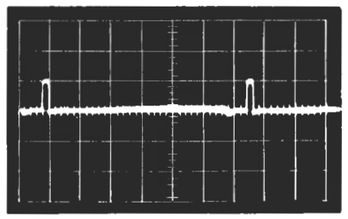


monitar point M2 (unterminated)

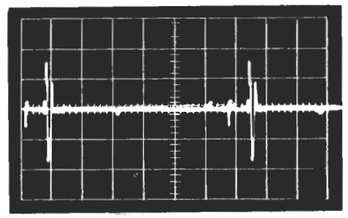


monitor point M3 (unterminated)

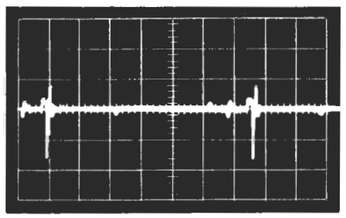
AM3/501 625 line 1T pulse and bar 2·5V/cm



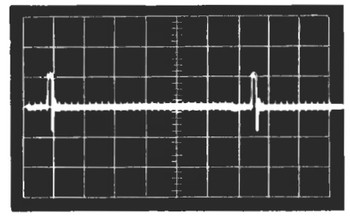
driving pulses at C2



TR1 collector



monitor point M2



driving pulses at C12

AM18/504/4

Fig.4 AM18/504: Typical waveforms