

TELEVISION AUTOMATIC MONITOR MAJOR MN2M/506

Introduction

A general introduction to automatic monitoring is provided in BBC Engineering Monograph No. 62, April 1966.

The MN2M/506 monitors automatically a composite video signal by assessing a test-line signal normally provided in the field-blanking period. Noise is also assessed by sampling an unused line during the same period.

The MN2M/506 comprises the following units, mounted from left to right in a double panel PN3/23:

<i>Unit</i>
Upper PN3/23
Power Supplier PS2/50
Sync Separator UN1/540
Periodic Tester TE1/504
Fault Indicator IN5/502
Integrator Unit IN2/501
Lower PN3/23
Black Level Clamp UN13/504
Gating Pulse Generator GE2/552
Gating Unit UN9/534
Bar Detector UN20/503
Pulse-bar Detector UN20/504
Non-linearity Detector UN20/505
Noise Detector UN20/506

General Specification

Input 1 volt p-p composite video signal

Input Impedance greater than 2 kilohms
(when switched on)

Alarm Sensitivities

An alarm is given and its cause indicated if any of the following parameters fall outside the given limits for a period of twenty seconds.

- | | |
|------------------------|---|
| (a) Bar amplitude | ± 1.5 dB with respect to 0.7 volts p-p |
| (b) Pulse-to-bar ratio | 1.0 ± 0.15 |
| (c) Non-linearity | greater than 20 per cent |
| (d) Noise | greater than -30 dB with respect to 0.7 volts p-p |

Outputs

- | | |
|----------------------|---|
| (a) Alarm | c/o relay contact |
| (b) Remote indicator | c/o relay contact for each of the four parameters |
| (c) Pen recorder | binary-coded d.c. |

Testing facilities

- | | |
|---------------|--------------------------------------|
| (a) Automatic | every 15 minutes |
| (b) Manual | <i>Test</i> and <i>Reset</i> buttons |

Operating Instructions

Normal Operation

The layout of the operational controls on the MN2M/506 is shown in Fig. 1. The pushbuttons behave as key-switches. The locking versions must be pressed to be moved both in (operate) and out (release).

The basic operating instructions for the MN2M/506 are shown in Table 1. In this table the fault-indicator-lamp means any one of the four lamps associated with the four Detectors.

Automatic Test

The automatic test occurs every 15 minutes and the sequence of the test is as follows:

1. *Reset*. All indicator lamps are extinguished.
2. *Test*. All four fault lamps and the *Test* indicator lamp light.
3. When all these lamps are lit the test fault is removed and all lamps are extinguished. If several lamps remain alight including the *Test* and *Integrator* lamps, the *Detector* with the extinguished lamp is probably faulty. Press the *Test* button. When the *Integrator* lamp is extinguished, press the *Reset* button and investigate the suspected *Detector*.

Manual Test

Pressing the *Test* button manually initiates the same fault as in the automatic test. The responses to this fault are those given in Table 1.

General Description

A block diagram of the MN2M/506 is shown in Fig. 2. Four Detectors, shown in the middle row, are used to determine whether the four parameters assessed are within tolerance. The units shown in the top row process the input video signal into

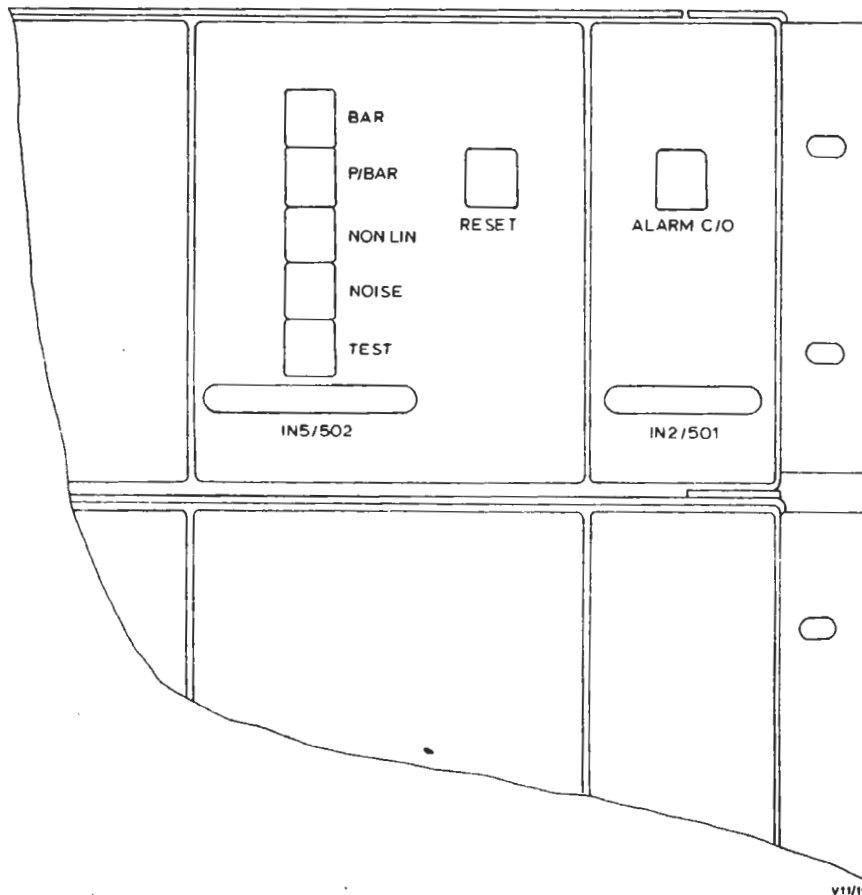


Fig. 1 Controls of the MN2M/506

forms suitable for the Detectors. The units in the lower row carry out the necessary switching functions of the monitor.

The input video signal is fed to a Sync Separator UN1/540 and thence to a Black Level Clamp UN13/504.

The sync pulses from the UN1/540 are fed to the UN13/504 and a Gating Pulse Generator GE2/552 which produces trigger pulses at the start of the noise line and at the start of the test-line-signal line.

The noise-line trigger pulse and the clamped video signal are fed to a Noise Detector UN20/506. The noise is sampled for one active line and peak rectified. If the noise does not exceed -30 dB with respect to 0.7 volts p-p, relay RLA remains operated.

The test-line trigger pulse and the clamped video signal are fed to a Gating Unit UN9/534. In this unit the trigger pulse produces four sequential pulses which are used to gate out portions of the

test-line signal. These portions, shown in Fig. 3, are:

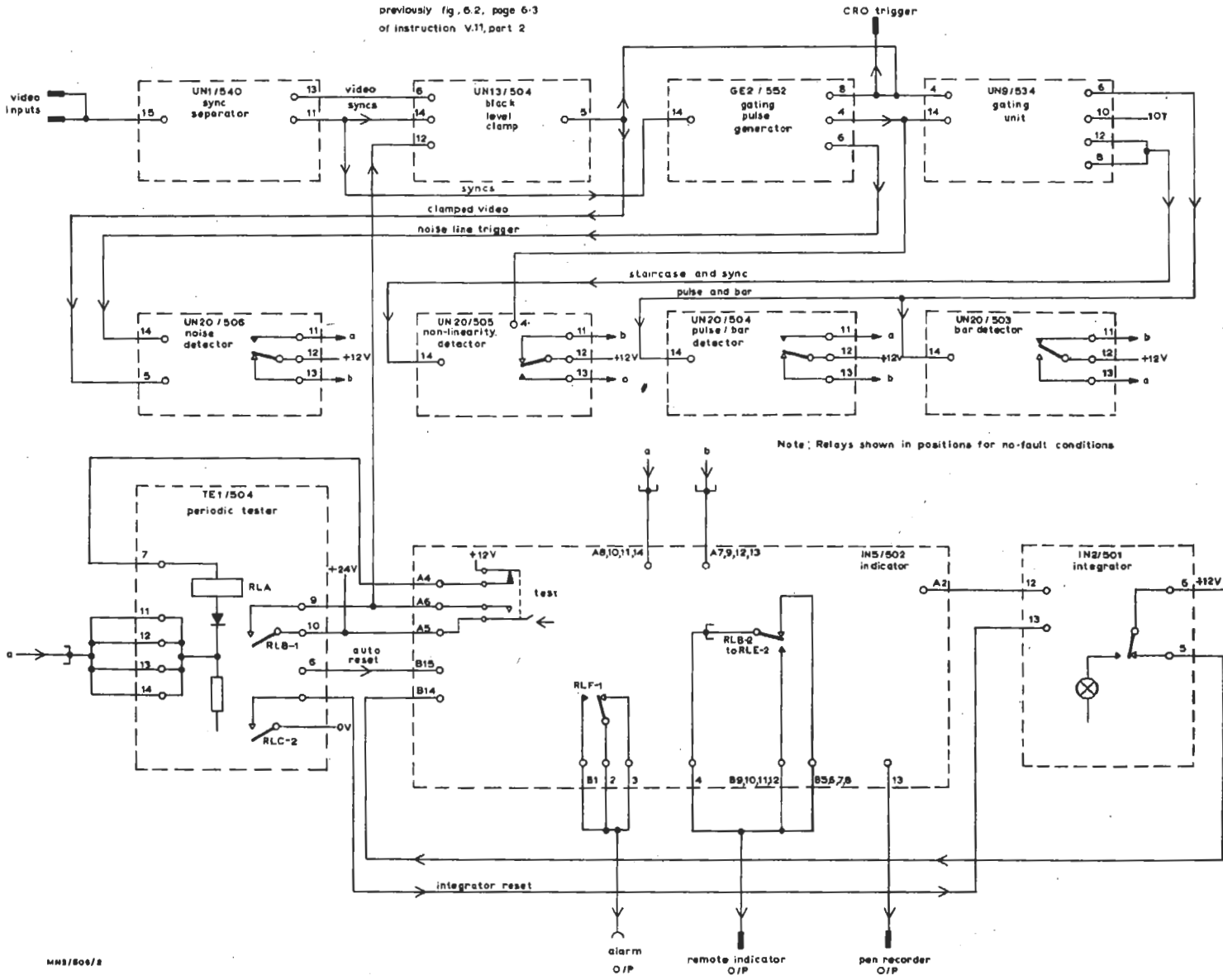
1. Pulse and bar.
2. A short blank portion of the test-line waveform. This output is reserved for a possible 10T colour-test pulse. If this output is to be used, some of the timings in the UN9/534 must be changed.
3. Staircase waveform.
4. The line-sync pulse following the test line.

The sync pulse output is attenuated and mixed with the staircase waveform to give a waveform in which the six positive-going transitions should all have the same amplitude.

The Bar Detector UN20/503 compares the amplitude of the bar waveform with a zener reference voltage and operates a relay if the level of the bar is not within 1.5 dB of 0.7 volts p-p.

The Pulse-bar Detector UN20/504 d.c. restores the positive excursion of the bar waveform. The

previously fig. 6.2, page 6-3
of instruction V.11, part 2



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Fig.2 Block Diagram of the Auto Monitor Major MN2/506

Table 1

Condition	Indicator Lamps			Outputs		Required action	Leads to condition
	Test	Fault	Integrator	Meter	Alarm		
1. Normal	off	off	off	normal	off	none	2
2. Momentary fault	on	on	off	reduced	off	none	1 or 3
3. Fault	on	on	on	reduced	on	operate fault button	4b (or 4a if fault button not pressed)
4a. Fault cleared	off	on	off	normal	on	press <i>Reset</i> button	1
4b. Fault (alarm off)	off	on	off	reduced	off	press <i>Reset</i> button and investigate fault	5
5. Normal (alarm on)	on	off	on	normal	on	release fault button	1

pulse immediately following the bar triggers neither, one or both of two Schmitt trigger circuits. If the pulse-to-bar ratio is 1 ± 0.15 only one Schmitt circuit is triggered and relay RLA is operated.

The staircase and subsequent attenuated sync-pulse are fed to the Non-linearity Detector UN20/505. The transitions in the waveform are converted into pulses by the use of a band-pass filter. The positive-going-transition pulses are rectified and 80 per cent of this voltage (obtained from the greatest transition) is used to back bias a diode. Only transitions within the acceptable range of linearity conduct through the diode. These pulses are counted. If six pulses are counted a relay RLA is operated to indicate that the original input signal is acceptably linear.

If any of the Detectors registers a fault, the appropriate lamp on an Indicator IN5/502 lights. Also a binary-coded d.c. output is available for use with either a pen recorder or a remote meter. At the same time the input to an Integrator IN2/501 is made open circuit.

If the fault persists for a few seconds, the relay in the IN2/501 releases which releases the alarm relay RLF and the appropriate remote indicator relay in the IN5/502.

Every 15 minutes a Periodic Tester TE1/504 executes an automatic test of the Monitor. Relay RLC operates for five seconds resetting the IN2/502. The IN5/502 is reset and +24 volts applied to the

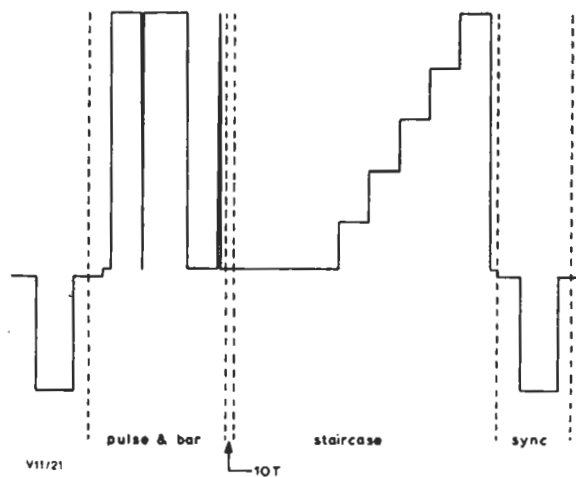


Fig. 3 The Gated Parts of the Test-line Signal

UN13/504 at the end of the five seconds. This produces a bump in the clamped video signal which is sufficient to affect each of the Detectors. If all the Detectors react, relay RLA in the TE1/504 is released and the automatic test is finished.

Pen Recorder Output

A binary-coded d.c. source with a maximum normal current of 2.25 mA is available for an external fault meter or for making a permanent record of faults on a pen recorder.

Table 2 shows how a meter is used to indicate faults.

Table 2

Current (x 1/15 f.s.d.)	Fault Indicated			
	Bar amplitude	Pulse-to-bar	Non-linearity	Noise
0	yes	yes	yes	yes
1	yes	yes	yes	no
2	yes	yes	no	yes
3	yes	yes	no	no
4	yes	no	yes	yes
5	yes	no	yes	no
6	yes	no	no	yes
7	yes	no	no	no
8	no	yes	yes	yes
9	no	yes	yes	no
10	no	yes	no	yes
11	no	yes	no	no
12	no	no	yes	yes
13	no	no	yes	no
14	no	no	no	yes
15	no	no	no	no

Test Procedure

The basic test procedure for the MN2M/506 is outlined in Table 3. Care should be taken in eliminating all possible faults before changing A.O.T. components.

TABLE 3

<i>Unit</i>	<i>Preset or AOT component</i>	<i>Adjustment or measurement</i>
PS2/50	RV1	Set for 24.0 ± 0.2 volts across C6.
UNI/540	RV1	Set for 12.0 ± 0.2 volts across C5.
	RV2	Set for 4.0 ± 0.2 μ s duration of positive-going pulse at TR14 emitter
GE2/552	RV1	Set to give negative-going pulse at TR7 collector a duration approximately equal to half a line period at the end of the line before the selected noise line. Unless otherwise instructed select as noise lines: 405) lines 8 and 210. 625) lines 10 and 323. Check that the positive-going pulse at pin 6 has an amplitude of at least 15 volts.
	RV2	Set to give a similar negative-going pulse on the line before the insertion test-line signal at TR15 collector. Check that the positive-going pulse at pin 4 has an amplitude of at least 15 volts.
	RV3	Not normally used.
UN9/534	C3 AOT	Observe the waveform on pin 6. Check that TR5 is cut off 1.0 ± 0.2 μ s after the 2T pulse.
	RV1	Set to minimise the step in the waveform at the start of the gated period.
	C12 AOT	Observe the waveform on pin 10. Check that TR11 is cut off 1.0 ± 0.2 μ s after the 10T pulse.
	RV2	Set to minimise the step in the waveform at the start of the gated period.

<i>Unit</i>	<i>Preset or AOT component</i>	<i>Adjustment or measurement</i>
	C21 AOT	Observe the waveform at the junction of R69 and C19. Check that TR17 is cut off $1.0 \pm 0.2 \mu\text{s}$ after the end of the staircase waveform.
	RV3	Set to minimise the step in the waveform at the start of the gated period.
	C30 AOT	Observe the waveform at the junction of R92 and C35. Check that TR23 is cut off $2.0 \pm 0.2 \mu\text{s}$ after the end of the sync pulse.
	RV4	Set to minimise the step in the waveform at the start of the gated period.
UN20/503	RV1 and R38 AOT	Hold the <i>Reset</i> button on the IN5/502 pressed and vary the level of the input signal. Check that the range of level indicated as correct is $3.0 \pm 0.5 \text{ dB}$. (R38 AOT). Set RV1 to centre this range about the standard input level.

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