TELEVISION AUTOMATIC MONITOR (TRANSMITTER) MN2M/505

Introduction

The MN2M/505 is a comparison type automatic monitor for use with unattended television transmitters. It accepts for comparison a video signal from line and a second video signal which is obtained by demodulating a sample of the output vision signal. The unit either gives an alarm if a transmitter fault of sufficient severity occurs or it may be used to initiate executive action such as a change-over to a spare transmitter. An alarm is given also if the monitor itself develops a fault.

The monitor consists of seven plug-in units mounted on a PN3/23 panel:

- Equalising Amplifier EQ1/509
- Attenuation and Delay Unit UN1/565
- Black-level Clamp and Compression Unit UN13/503
- Processing and Comparator Unit UN20/501
- Fault Indicator Unit IN5/501
- Integrator and Alarm Unit IN2/501
- Stabilised Power Supplier PS2/9 or PS2/49

General Specification

Input Level	
(*picture positive*)	0·5 to 2·0 volts p-p
Nominal Alarm Sensitivity	
Level changes at white-level and 0·6 white-level	1 ± ·5 dB
Hum or l.f distortion (p-p values)	−25 dB relative to white level
Impulsive interference (white level 0·7 V)	
0·3 μs pulses, 150 mV	13,000 p.p.s.
0·3 μs pulses, 450 mV	80 p.p.s.
Differentiated square wave 600 mV (3·5 μs time constant),	15 p.p.s.
White noise	−22 dB w.r.t. 0·7 V p-p

Description

The MN2M/505, a block diagram of which is given in Fig. 1, compares the vision-transmitter input signal (the reference signal) with the demodulated output signal (the compared signal) and gives an alarm if the compared signal becomes noticeably degraded owing to level changes, low-frequency distortion and hum, impulsive interference or noise. The sensitivity to level changes is fairly constant over a range of signal amplitudes owing to the non-linear transfer characteristic of the monitor. The nominal input level is 1 volt p-p but provision is made for level adjustment over the range 0·5 to 2·0 volts p-p.

The compared signal, in passing through the transmitter, is delayed with respect to the reference signal. Part of this delay is off-set before comparison by delay lines in the EQ1/509 and UN1/565. The remainder of the delay is rendered innocuous by a process of rectification and integration in the UN20/501.

Because distortion of the high-frequency components of a picture is less important subjectively than distortion of the low-frequency components, 6-dB per octave weighting networks are included in both channels of the UN1/565 to make the monitor insensitive to high-frequency unblance.

The compared signal is taken usually from a diode probe in the aerial feeder and, because of the vestigial nature of the vision signal, equalisation is necessary. This is provided in the EQ1/509; the equalising components are removed if a properly-equalised signal is available from a receiver.

The two signals are compared in the UN20/501 and any error signals, which result from differences between the two channels, are passed through two bridge rectifiers. One rectifier feeds a balance-to-unbalance amplifier which, in turn, feeds the main alarm circuit in the IN5/501. The second rectifier feeds an auxiliary alarm circuit in the IN5/501; a meter in parallel with this circuit gives a visual indication of any unbalance that exists between the channels.

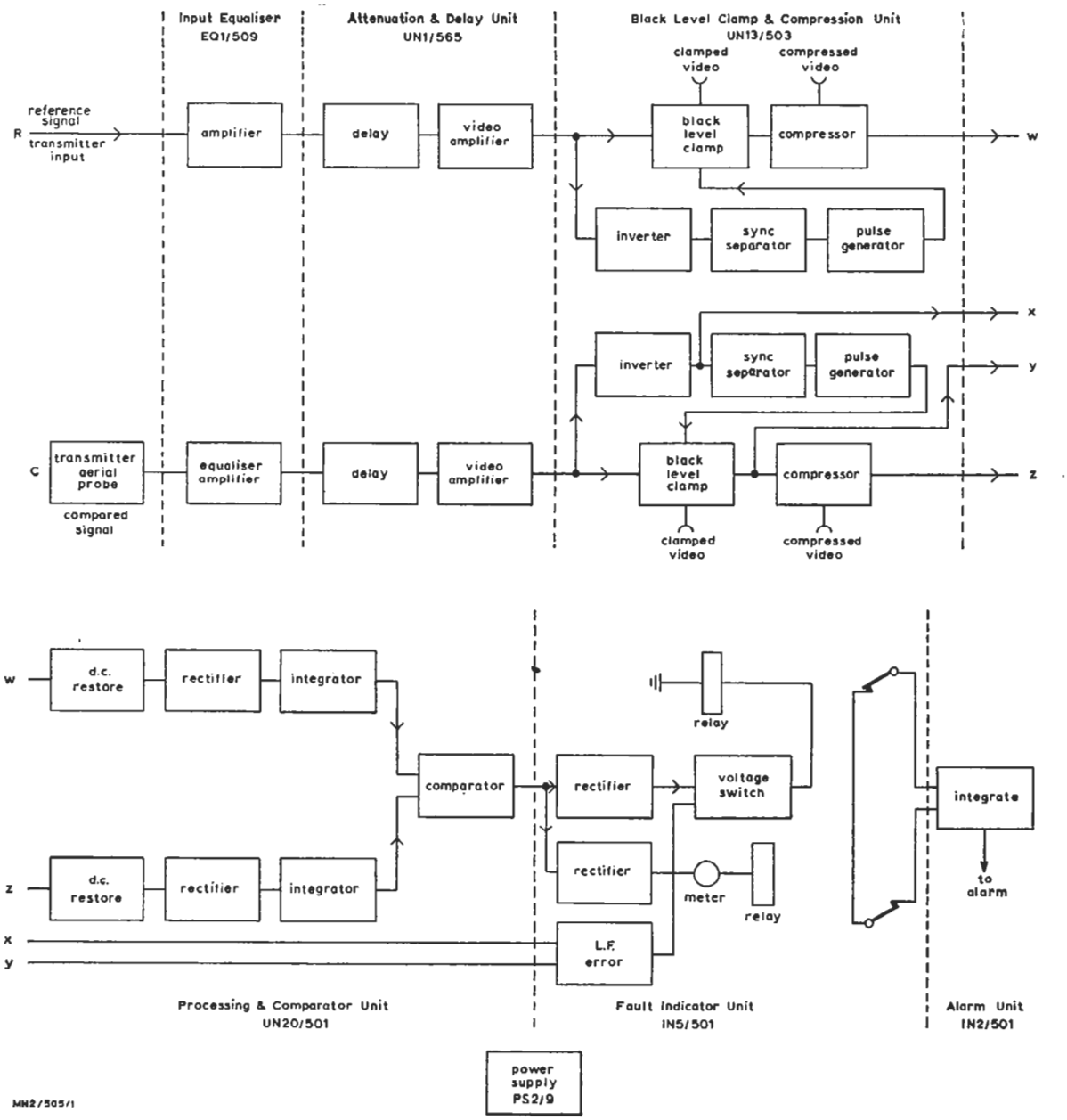

Fig. 1 Block Diagram of MN2/505

The main alarm circuit in the IN5/501 operates if an unbalance occurs between the signals because of impulsive interference or signal-level changes however caused. The alarm is operated also if a fault occurs in the monitor itself up to and including the comparator stage. A fault occurring in the main alarm circuit after the comparator stage does not necessarily give an alarm and the auxiliary circuit is provided to cover this eventuality. The auxiliary circuit is connected directly to the comparator output and gives a signal if significant level changes occur.

The operation of the relays in the IN5/501 signals the IN2/501 which initiates executive action if the fault condition persists for more than about 20 seconds. This delay prevents action being taken on transitory faults.

Mains hum and other l.f. distortion is measured by a separate circuit in the UN13/503 by comparing the demodulated signal before clamping with the same signal after clamping. Hum cannot be measured by direct comparison of the compared and reference signals because there may be appreciable hum on the reference signal itself; any such hum is clamped out in the transmitter and is not, therefore, of interest.

The front panel of the UN20/501 has test sockets by means of which the output of the differential amplifier may be inspected. A U-link on the front panel of the UN1/565 enables one signal to be fed to both channels simultaneously thus checking the inherent balance of the monitor.

Operational Line-up Procedure

The procedure detailed below is taken from Designs Department Technical Memorandum No. 5.42(67).

1. *D.C. Balance*
   Switch on the monitor and leave it to warm up for at least ten minutes.
   With no input to the monitor adjust R13 in the UN20/501 to bring the meter reading to zero.
2. *Signal-level Adjustment*
   It is essential to confirm first that the transmitter is lined-up correctly.
   Apply normal input signals to the monitor and connect an oscilloscope to the *Clamped Video R* test socket.
   Adjust R21 in the EQ1/509 to make the displayed signal amplitude 3 ±0·25 volts p-p.
   Transfer the oscilloscope to the *Clamped Video C* socket.
   Adjust R1 in the EQ1/509 to make the displayed signal amplitude 3 ±0·25 volts p-p.
   Adjust either R1 or R21 to obtain a zero, or near zero, reading on the meter in the IN5/501.
3. *Frequency Response*
   Feed a 2T pulse and bar signal into both inputs of the monitor.
   Connect the oscilloscope to the *Clamped Video R* socket. The pulse-to-bar ratio should be about 80 per cent.
   Connect the oscilloscope to the *Clamped Video C* socket. The pulse-to-bar ratio should be within 10 per cent of the first figure; if necessary adjust C18 in the UN1/565.
4. *Compression*
   The compression circuits cannot be adjusted but they should be correct if a good balance is obtained as described in test (2) above. Their performance can be checked as follows:
   Apply a composite sawtooth signal to the reference input and place the U-link in the *Test* position; the waveforms at *Clamped Video R* and *Clamped Video C* should be identical (20 mV).
5. *Relative Level Change*
   (*a*) *Quick Check*
   Break the reference feed by removing the U-link. The meter should read 6 or more and both the main and the auxiliary lamps (LP1 and LP2) should be extinguished.
   The integrator lamp (IN2/501) should be extinguished, and an alarm given, after a period determined by the integrator time constants.
   (*b*) *To Measure the Sensitivity*
   Connect a properly terminated attenuator in the reference input feed and determine the insertion loss required to operate the alarm.
6. *L.F. Error*
   Place the UN13/503 in a chassis extender.
   Connect an oscilloscope across C18 and adjust the time base to display one or two field periods.
   Adjust R62 for minimum trace amplitude ignoring the high-frequency components.
7. *Fault Indication*
   If a fault is indicated by the main lamp LP1 only, but the meter reading is close to zero, operate the *L.F. Error* pushbutton. If the fault indication is then removed it may be assumed that there is excessive hum or field bend from the transmitter.
   The auxiliary lamp LP2 indicates only on relative level changes.
8. *Time Delay*
   The monitor can tolerate a time displacement

between the two input signals of 0·5 μs without serious error in fault indication. This delay is measured and adjusted when the equipment is installed and does not require attention thereafter unless changes are made.

To check the delay, compare the waveforms at *Clamped Video R* and *Clamped Video C* using an oscilloscope which is triggered externally; a convenient test signal is a composite sawtooth.

Maintenance

Routine maintenance is not required. If the monitor does not perform as described it should be returned to Equipment Department for servicing.

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