

TELEVISION AUTOMATIC MONITOR MN2M/518

Introduction

The MN2M/518 is designed to be used in conjunction with a Television Automatic Monitor MN2M/513, principally at u.h.f. television transmitting stations. The MN2M/513 is used to measure various parameters of a standard Insertion Test Signal. The MN2M/518 is used to switch the MN2M/513 between three video signal sources, to store and compare the analogue voltages developed from the measured parameters and, if necessary, to make an executive switching action to clear a fault. Additional alarm signals are generated which can be transmitted over an external data channel.

The MN2M/518 comprises the following units, mounted on a PN3/23 chassis:

- IN2/504 Limit Unit
- IN5/503 Fault Indication Unit
- PS2/67B Power Supplier
- PS2/82A Power Supplier
- UN3/525 Control Unit
- UN9/576 Meter Switching Unit
- UN23/510 Gating Unit
- UN23/533 Executive Logic Unit
- UN23/534 Logic Unit
- UN23/535 Clock and Store Logic Unit.

General Description (Fig. 1)

Fig. 1 is a simplified diagram of a conventional arrangement at a television transmitting station and is designed to show the principle of operation.

When the radiated signal is normal, the demodulated transmitter output is monitored. If any of the measured parameters are outside what is known as a 'narrow-limit' an alarm signal is generated which can be transmitted to a parent station. If the measured parameter deteriorates and a so-called 'wide-limit' is exceeded the MN2M/518 starts a switching routine. The main video input is monitored for a preset period and any alarm signals generated are stored, the reserve video input is then similarly monitored and finally the demodulated transmitter output is monitored for the same length of time. The stored alarm signals are decoded and compared, and if necessary an executive switching action is taken to clear the fault condition. Further details of the theory of this type of monitoring are given in the publications listed in the bibliography at the end of this Instruction.

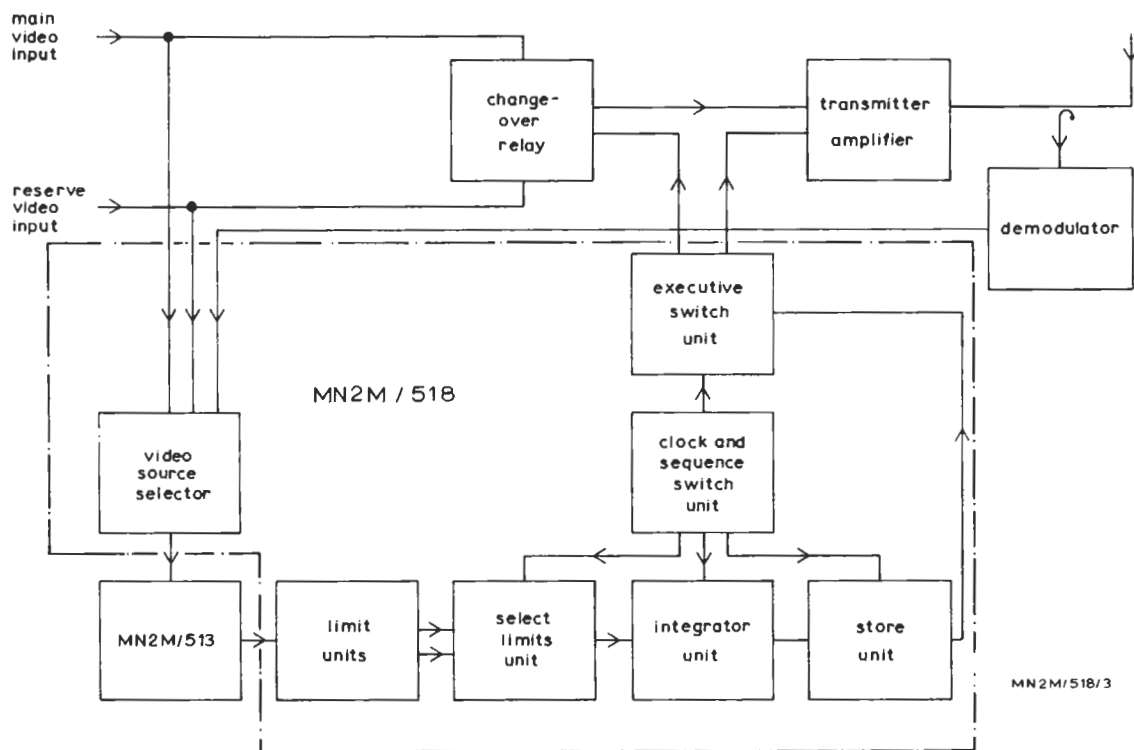


Fig. 1. Monitoring Arrangements at a Transmitting Station

Circuit Description (Figs. 2 and 3)

Fig. 2 shows the interconnection of units in the MN2M/518 and Fig. 3 shows the mains and d.c. connections.

System Normal

If the system is normal, the MN2M/513 monitor remains switched to the output of the system, typically that shown in Fig. 1. Lamps on the various units of the MN2M/518 indicate as follows:

Limit Unit IN2/504

Lamps all on.

Fault Indicator Unit IN5/503

Alarm lamp on.

Executive Logic Unit UN23/533

Tx. C/O lamp on.

If the main video feed is in use the *Main Feed* lamp is on and the *Res. Feed* lamp is off.

Control Unit UN3/525

Auto lamp on.

Tx. lamp on.

require future action. The lamp or lamps on the IN2/504 limit units corresponding to the faulty inputs are extinguished.

Wide Limit Alarm

If a fault signal which is outside the pre-set wide-limits is detected the appropriate lamp on the IN2/504 is extinguished and a logic 1 signal is applied to pin PLB19. The following sequence then takes place:

1. After a pre-set integration period the *Alarm* lamp on the IN5/503 is extinguished.
2. A clock-pulse gate in the UN23/525 is opened and clock pulses are fed to a counter in the UN23/510.

The *Auto* lamp on the UN23/525 starts to flash. The flashing light indicates that the automatic switching sequence is taking place. Main and reserve feed logic stores in the UN23/535 are cleared.

3. The MN2M/513 is switched to the main video feed.

The *Main Feed* lamp on the UN3/525 lights.

An integration circuit in the IN5/503 is reset.

The *Alarm* lamp on the IN5/503 lights.

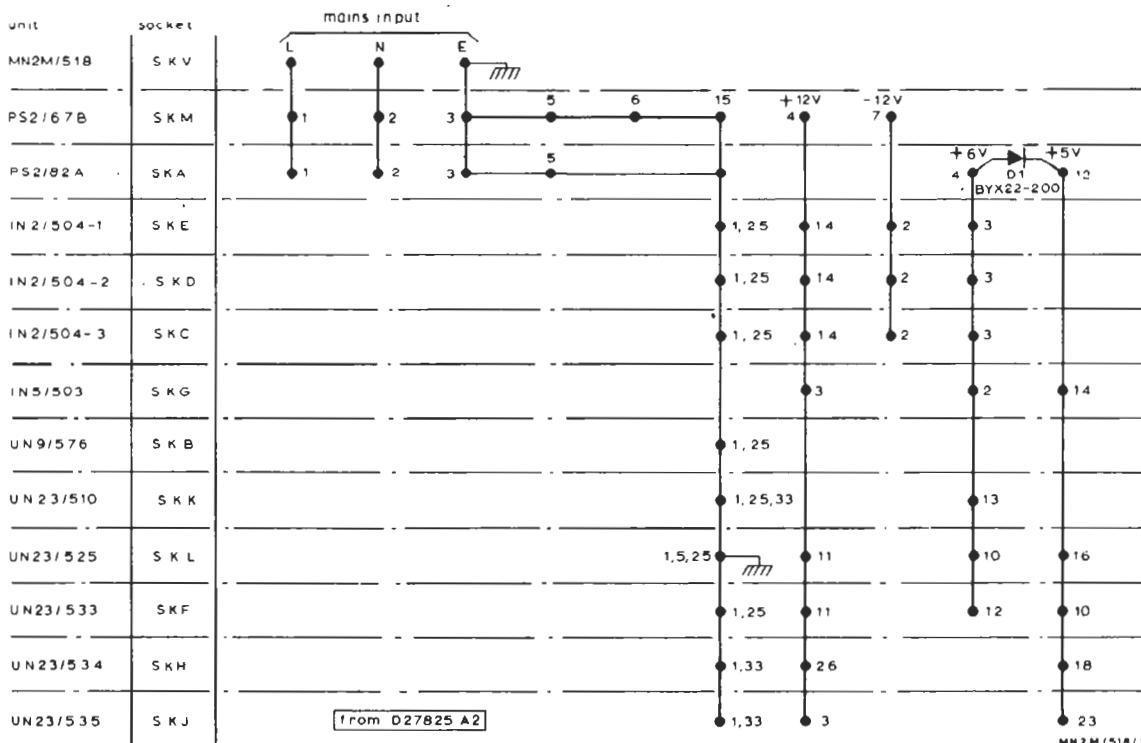


Fig. 3. Mains and D.C. Connections

Narrow Limit Alarm

If one or more outputs from the MN2M/513 are outside pre-set narrow-limits a logic 1 potential is applied to pin PLB17. This signal can be extended if desired to a parent station to give prior warning of a possible imminent fault condition which would

After the integration period, if a fault has been detected, the *Alarm* lamp is extinguished and a logic 1 signal is stored in the main feed logic store UN23/535. If the system is normal a logic 0 is stored.

4. The MN2M/513 is switched to the reserve video feed.
The integrator is reset.
The Alarm lamp lights.
The Res. Feed lamp on the IN5/503 lights.
At the end of the integration period a logic 1 or 0 is stored as described in step 3. If a fault has been detected the Alarm lamp is extinguished.
5. The MN2M/513 is switched to the demodulated output of the transmitter. The integrator is reset.
A logic indication of which feed is in use is stored in the IN5/503.
The Alarm lamp lights.
The Tx. lamp on the UN3/525 lights.
At the end of the integration period a logic 1 or 0 is stored as described previously. If a fault is detected the Alarm lamp is extinguished.
6. The stored information, together with the information obtained in step 5 concerning the feed in use, is presented to the UN23/533 Executive Logic Unit and, if necessary, an executive switching action takes place.

Failure of Incoming Video Feeds

If both video sources are faulty the transmitter is held on the main feed. The control system checks the main and the reserve feeds until a non-faulty feed is monitored and the transmitter is then switched to that feed. It is possible to select feeds manually by operation of push-button switches on the UN23/533.

Failure of Main Video Feed

If a switching action has put the transmitter on the reserve feed it is desirable to select the main feed as soon as possible, and the control system checks each feed until the main feed is restored to normal.

Table 2 indicates all the possible control actions.

Executive Switching Action

Each time an executive switching action is taken a relay in the UN23/535 is operated and an alarm of about one minute in duration is given. The alarm signal energises a relay on the UN23/535 whose contacts are extended to a plug on the MN2M/518 chassis.

Overnight Mute

On certain installations the video selection system may be switched to the reserve feed when the trans-

Table 1 shows all the possible input states and the action taken to clear the fault assuming that a fault condition is indicated at the transmitter output.

TABLE 1

Transmitter Output	Main Feed	Reserve Feed	Feed in Use	Action
Fault	Normal	Normal	Main	Change-over transmitter
Fault	Normal	Normal	Reserve	Change-over transmitter
Fault	Normal	Fault	Main	Change-over transmitter
Fault	Normal	Fault	Reserve	Change to main feed
Fault	Fault	Normal	Main	Change to reserve feed
Fault	Fault	Normal	Reserve	Change-over transmitter
Fault	Fault	Fault	Main	Remain on main feed
Fault	Fault	Fault	Reserve	Switch to main feed

TABLE 2

Transmitter Output	Main Feed	Reserve Feed	Feed in use	Action
Normal	Normal	Normal	Main	No action
Normal	Normal	Normal	Reserve	Change to main feed
Normal	Normal	Fault	Main	No action
Normal	Normal	Fault	Reserve	Change to main feed
Normal	Fault	Normal	Main	No action
Normal	Fault	Normal	Reserve	No action
Normal	Fault	Fault	Main	No action
Normal	Fault	Fault	Reserve	No action

mitter is closed down. This could result in the monitor starting a cycling sequence, but a so-called 'overnight mute' is achieved by making an earth connection to PLC14 which prevents the monitor from being cycled. Also a 10-minute delay circuit is included so that after switch-on the equipment is allowed to reach its normal operating state before monitoring is started.

Meter Unit

A meter unit UN9/576 in connection with a high-impedance voltmeter, preferably a digital type, can be used to measure each of the waveform parameters. Normalising circuits in the meter unit allow a direct read-out to be made of all the parameters measured by the MN2M/513. Chrominance/luminance delay, either positive or negative, is read directly in nanoseconds.

Manual Operation

The monitored video source can be selected manually by operating switches on the UN3/525. If one of these switches is operated, the Auto lamp on the UN3/525 is switched off, the counter in the UN23/510 is set to zero and the transmitter change-over relay in the UN23/535 goes to its normally de-energised state.

When the transmitter is in its normal condition, the main video feed is selected and the relays in the UN23/535 are de-energised. Normally closed contacts maintain the System Normal condition. If it is

necessary to remove the UN23/535, U-links on the rear of the PN3/23 must be taken from the Auto positions and inserted in the Hold positions. This ensures that a false switching action is not given and that the transmitter remains connected to the main feed and cannot go to the standby condition. In the Hold position the station Systems Normal circuit is broken.

Test Schedule

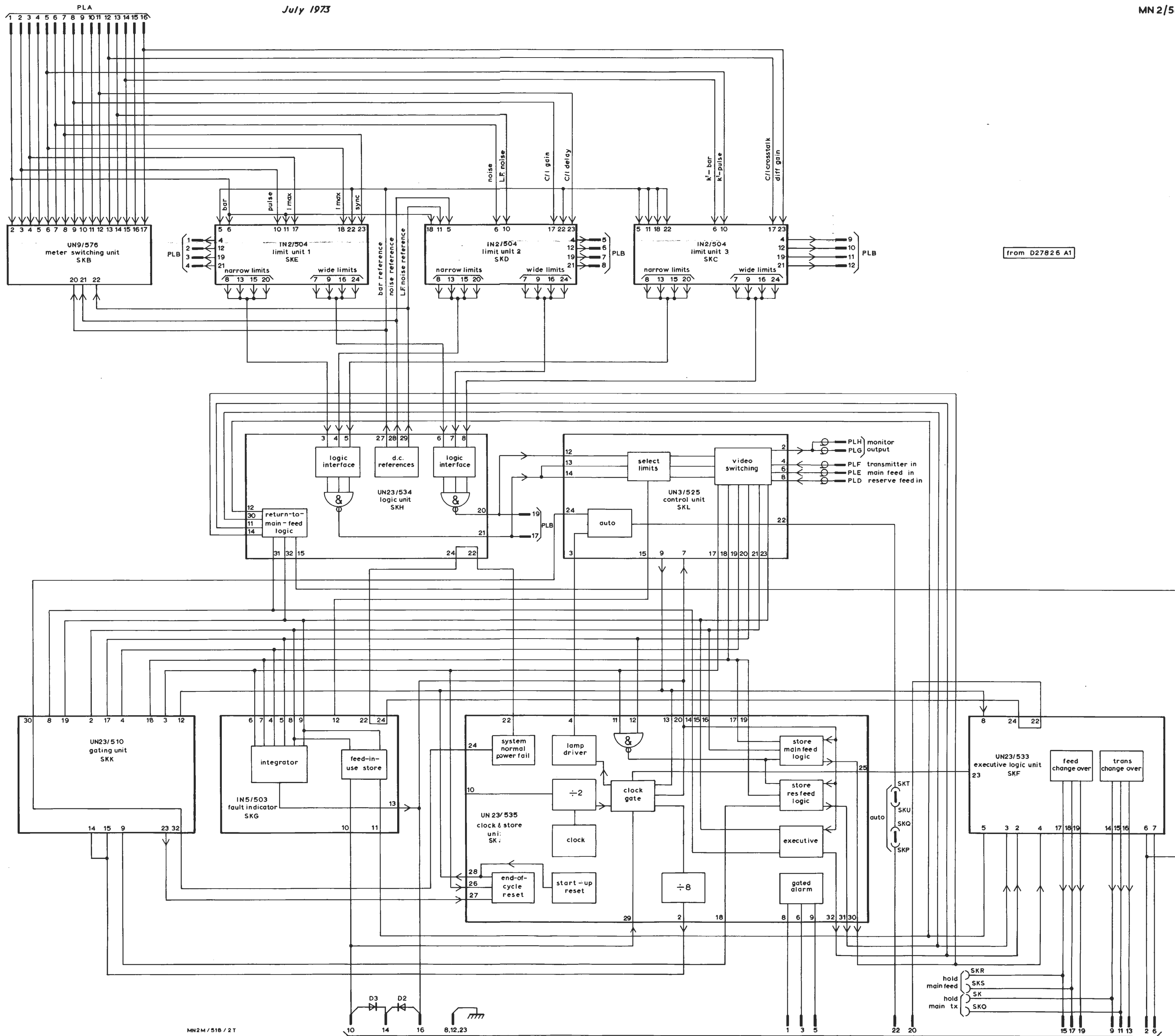
Apparatus Required

- Digital Voltmeter
- Frequency Counter
- Oscilloscope
- Video Oscillator with 75-ohm output
- Avometer

Test Procedure

1. Remove all the IN2/504 limit units except one.
2. Operate the Tx. push button switch on the UN3/525.
3. Check the following voltages, with respect to chassis, on the power supply units:

PS2/76B	SKM4	+12 ±0.5 volts
	SKM7	-12 ±0.5 volts
PS2/82A	SKA4	+6 ±0.1 volts
	SKA12	+5.2 ±0.2 volts.
4. Insert a socket into plug PLC wired so that:
 - PLC10 is strapped to PLC15
 - PLC17 is strapped to PLC23.
 Check that the U-links on the rear of the



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Fig. 2. Block Diagram of MN2M518

chassis are both in the *Auto* position. Remove the remaining IN2/504 limit unit.

5. Operate the *Auto* switch on the UN3/525. Switch the mains input supply on and off several times. Check that when the mains supply is on all the lamps on the various units are on, except the following:
Main Feed lamp on the UN3/525
Res. Feed lamp on the UN3/525
Res. Feed lamp on the UN23/533.
6. Operate the *Res. Feed* reset switch on the UN23/533. Check that the *Main Feed* lamp on the UN23/533, is switched on. Check that the *Auto* lamp starts to flash twice a second. The lamp flashing-rate can be checked by connecting the frequency counter across the *Auto* lamp. If the counter has a 10-second gating time the reading should be 20 ± 2 . As soon as the *Auto* lamp begins to flash a monitoring sequence starts. The switching cycle is given in Table 3. This can be checked by leaving the frequency counter connected across the *Auto* lamp.
 When the executive switch is made the *Res. Feed* lamp on the UN23/533 is extinguished and the *Main Feed* lamp lights. At the end of the monitoring sequence the *Auto* lamp stops flashing.
7. Insert a single IN2/504 Limit Unit. This simulates a fault condition and a monitoring sequence starts.
 Check that when the integrator is reset the lamp on the fault indicator unit IN5/503 lights for about 10 seconds and then is switched off. Check that the monitoring sequence can be stopped at any time by operating the *Tx.*, *Main Feed* or *Res. Feed* pushbutton switches on the UN3/525. Check that operating the *Auto* push-button switch starts the monitoring sequence again.
8. Start the monitoring sequence. Insert a limit unit so that a transmitter fault is simulated at the same time as the monitor is connected to the demodulated transmitter output. Check that the *Tx. c/o* lamp on the UN23/533 is switched off at the end of the sequence. Remove the limit unit after the *Tx. c/o* lamp has been switched off. Check that the lamp is switched on at the end of the monitoring sequence. Check that the monitoring sequence has stopped. Check that, when the *Tx. c/o* lamp is switched off, an open-circuit appears between pins PLC9 and PLC11.
9. Insert a limit unit such that a fault on the transmitter and the main video feed is simulated. Check that a change to the reserve feed takes place and that an open-circuit appears between pins PLC15 and PLC17.

TABLE 3

Count	Time (Seconds)	Operation
0	0	Receive integrated alarm and start sequence
2	8	Reset alarm stores
3	12	Switch monitor to main feed and reset integrator
9	36	Store integrated alarm
10	40	Switch monitor to reserve feed
16	64	Store integrated alarm
17	68	Switch monitor to transmitter output and reset integrator
23	92	Make executive switch and operate alarm relay in UN23/535
50	200	Close clock pulse gate, stop transmitter change-over instruction and de-energise relay in UN23/535

10. Allowing the previous condition, change-over to reserve feed, to remain simulate a fault on the reserve feed and the transmitter output only. Check that a change-over to the main feed occurs.
11. Connect pin PLC6 to chassis. Check that a change-over from main feed to reserve feed takes place.
12. Connect pin PLC2 to chassis. Check that a change-over from the reserve to the main feed takes place.
13. Operate the *Main Feed* push-button switch on the UN23/535. Check that the *Auto* and *Tx.* lamps are switched off and the *Main Feed* lamp is switched on.

14. Operate the *Res. Feed* switch. Check that the *Main Feed* lamp goes out and the *Res. Feed* lamp is switched on.
15. Operate the *Tx.* switch. Check that the *Res. Feed* lamp is switched off and the *Tx.* lamp is switched on.
16. Feed a one-volt p-p signal, either composite video or single tone, to plug PLF, *Tx. In.* Check the waveform appearing at plug PLG, *Outputs*, when plug PLH is terminated with 75 ohms.
17. Check that the video waveform is present when the *Tx.* switch is operated but not when the *Main Feed* or *Res. Feed* switches are operated.
18. Feed the video signal to plug PLE, *Main Feed In.* Check that the video waveform is present when the *Main Feed* switch is operated but not when the *Res. Feed* or *Tx.* switches are operated.
19. Feed the video signal to plug PLD, *Res. Feed In.* Check that the video signal is present when the *Res. Feed* switch is operated but not when the *Main Feed* or *Tx.* switches are operated.
20. Check that those sources not switched to the oscilloscope always present an internal 75-ohm load.
21. Disconnect the video signal generator, the oscilloscope and the external termination.
22. Insert a single IN2/504 limit unit. Operate the *Auto* switch. When the monitoring sequence starts connect pin PLC14 to chassis. Check that the alarm but not the fault indication is muted and that the sequence stops after the first cycle.
23. Remove the chassis connection from pin PLC14. Operate the *Res. Feed* push-button switch on the UN23/535. After the monitoring sequence has started reconnect pin PLC14 to chassis. Check that the sequence stops after the first cycle. Remove the connection from PLC14.
24. Connect a digital voltmeter to the meter socket on the UN9/576 Meter Unit. Check the voltages detailed below:

Switch position 20	5 volts \pm 5 mV
Switch position 21	2 volts \pm 100 mV
Switch position 22	2 volts \pm 100 mV
25. Operate the *Auto* push-button switch. Check that a short-circuit exists between pins PLC20 and PLC22. Switch off the mains input to the monitor. Check that an open-circuit exists between pins PLC20 and PLC22.
26. Operate the *Tx.* switch. Check that the *Tx. c/o* and the *Main Feed* lamps are on. Check that a short-circuit exists between pins PLC9 and PLC11. Check that a short-circuit exists between pins PLC9 and PLC11. Check that a short-circuit exists between pins PLC15 and PLC17.
27. Remove the UN23/533. Check that an open-circuit exists on the two circuits checked in step 26.
28. Remove the U-links from the *Auto* position and place them in the *Hold* position. Check that the short-circuits measured in step 26 reappear.

Bibliography

1. Automatic Monitoring of Unattended Television Transmitters. D.D. Technical Memorandum 11.69(71)
2. Automatic Measurement of Insertion Test Signals. Technical Publications Section Reprint No. A.97(1970)

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