

WIDE BAND SOUND AND VISION MODULATOR MD1M/507

Introduction

The MD1M/507 provides a 625-line signal with negative vision modulation and with f.m. sound on any channel in Bands I to V. The vision output signal is of double-sideband form. Colour signals can be handled. The centre frequency of the f.m. signal can be locked to the incoming video signal or to a separate feed of line drive.

There are three versions. The MD1M/507 operates in Bands IV or V and has the u.h.f. outlet at the front of the unit. The MD1M/507A is precisely similar except that the u.h.f. outlet is at the back of the unit. The MD1M/507B operates in Bands I, II and III only.

The modulators are built on to PN2/23 panels. The sub-units comprising the modulators are listed below.

List of Sub-units

UN13/502B	Clamp Unit
UN15/503	Divider and Discriminator
MD3/502	6-MHz F M Modulator
MD1/503A	Vision Modulator
MD3/503B	Sound Modulator
MX1/509	U.H.F. Mixer) MD1M/507 and
OS2/511	U.H.F. Oscillator) MD1M/507A only
FL4/14	Band Pass Filter
PS1/25	Power Supplier

General Specification*Output Levels at Sync Tips*

V.H.F.	60-100 mV rms
U.H.F.	15 mV rms approx.

Output Impedance

V.H.F.	75 ohms
U.H.F.	50 ohms

Input Impedance

Video	75 ohms
Audio	600 ohms

Input Levels

Video	1 V p-p
Audio	+8 dB on 1 mV for 50-kHz deviation

The following performance figures are taken in conjunction with a receiver type RC5/501.

Video

Non-linearity	3%
Distortion	
Differential Gain	5%
Distortion at 4.43 MHz	
Differential Phase	2 degrees
Distortion at 4.43 MHz	
k rating (625-line 2T P-and-B signal)	not greater than 1%
Chrominance / Luminance Gain Inequality	5%
Chrominance / Luminance Delay	18 ns
Noise unweighted	-51 dB
Noise weighted	-62 dB

Sound

Harmonic Distortion	not greater than 50 dB at 50-kHz or 75-kHz deviation.
Noise weighted	-60 dB
Frequency Characteristic	± 0.5 dB, 50Hz to 10 kHz ± 1.0 dB, 50Hz to 20 kHz
Pre-emphasis	50 μ s

continued overleaf

General Description

A block diagram is given in Fig. 1. The input video signal is clamped and then fed to an MD1/503A vision modulator. Adjustable negative bias from the PS1/25 is fed to the modulator to produce the negative modulation characteristic. The sound signal frequency modulates a 6-MHz carrier which is then fed to the MD1/503B Sound Modulator. The signals from the two modulators, at v.h.f. or at i.f. depending on the version of the MD1/507 in use, are combined in a hybrid unit. The combined signal passes via a low-pass filter to the output in the v.h.f. version and to the MX1/509 u.h.f. mixer in the u.h.f. version.

The 6-MHz sound carrier can be locked to a reference signal, usually line drive; because one crystal-controlled oscillator is shared between the two modulators the spacing between vision and sound carriers is fixed and exactly related to the reference signal.

Maintenance

Routine maintenance is not required but the following checks may be made if the performance becomes suspect.

The carrier levels quoted in paragraphs 3 and 5 below are nominal only. Practical values must be such that the requirements of paragraph 6 are met. When the required ratios between the outputs of the MD1/503A and MD1/503B cannot be obtained because the output from the MD1/503B is too high, the output from the MD3/502 is reduced to produce the correct ratio.

1. To check the *Operation of the UN13/502B Clamp*, feed in a standard level pulse-and-bar signal and monitor the output on a terminated oscilloscope. There should be no obvious degradation of the signal and the bottom of sync pulses should be at zero potential.
2. *Vision Modulator Carrier Leak*. Remove the r.f. output lead (on pin 12 of the MD1/503A) from the hybrid unit and connect it to a terminated h.f. oscilloscope. Terminate the input of the MD1/503A and switch to *Pos. Mod* (SA on the PS1/25).

The carrier leakage observed on the oscilloscope should not be greater than 2mV p-p.

Reconnect the clamp to the MD1/503A.

Note that when testing an MD1M/507B in Band III, a calibrated communication receiver or a mixer with output in, say, Band 1 will be required.

3. *Vision Modulator, Output and Residual-carrier Level*. With the oscilloscope connected to the output of the MD1/503A as above, and with a pulse-and-bar signal input to the clamp, a clean modulation envelope with an amplitude of between 350 mV and 550 mV p-p should be displayed. The sync pulse bottoms should sit at zero carrier; RV4 in the UN13/502B provides

adjustment.

Switch SA to *Neg. Mod*. The residual carrier level should be 20%; adjustment is by the *Set Neg. Mod*. control on the PA1/25. Reconnect the r.f. output of the vision modulator to the hybrid unit.

4. *6-MHz Carrier Level and Deviation*. Remove the link to the MD1/503B. The level of the 6-MHz carrier at the output of the MD3/502 should be 1 V p-p $\pm$ 100 mV as monitored across 75 ohms. The deviation should be 50 kHz with a 400-Hz audio input at a level of +8 dB $\pm$ 0.5 dB.

Reconnect the MD3/502 to the MD1/503B.

5. *Sound Carrier Level* Disconnect the output of the MD1/503B from the hybrid unit and connect to a terminated h.f. oscilloscope. The display should be sound carrier at a level between 160 mV and 250 mV p-p. Some slight amplitude modulation will be seen on the waveform but this should not exceed 10% of the total amplitude.
6. *Vision/Sound Carrier Ratio*. With the vision circuit complete but with the sound input to the hybrid unit disconnected from the sound modulator and terminated with 75 ohms, note the p-p amplitude of the vision modulation envelope at the *I.F. Out/V.F. OUT* socket.

With the sound circuit complete but with zero audio input, and with the vision input to the hybrid terminated with 75 ohms, note the p-p amplitude of the sound carrier at the output. The ratio of the two p-p carriers should be 2.24:1. The ratio can be adjusted by means of an attenuator in the FL4/520 filter in the MD1/503A.

7. *Sound Carrier Lock*. To check that the locking circuit is functioning correctly, replace the pulse and bar signal with the standard video signal and monitor at the front panel monitoring socket on the UN15/503, using a capacitively-coupled oscilloscope and high-impedance probe. The display should consist of a sine wave with a stationary negative-going pulse, one per cycle, and positioned close to the zero transition of the waveform. The *Trim* control on the front panel of the MD3/502 provides adjustment.
8. *U.H.F. Local Oscillator*. The output from OS2/511 should be 1 V across 50 ohms.
9. *U.H.F. Sound Carrier Level*. With all unit interconnections in place except that between the MD1/503A and the hybrid unit and with no audio input signal, there should be 7 to 9 mV r.m.s. of u.h.f. carrier at the output of the MX1/509.

Reference

1. Designs Department Specification No.4.52(69).

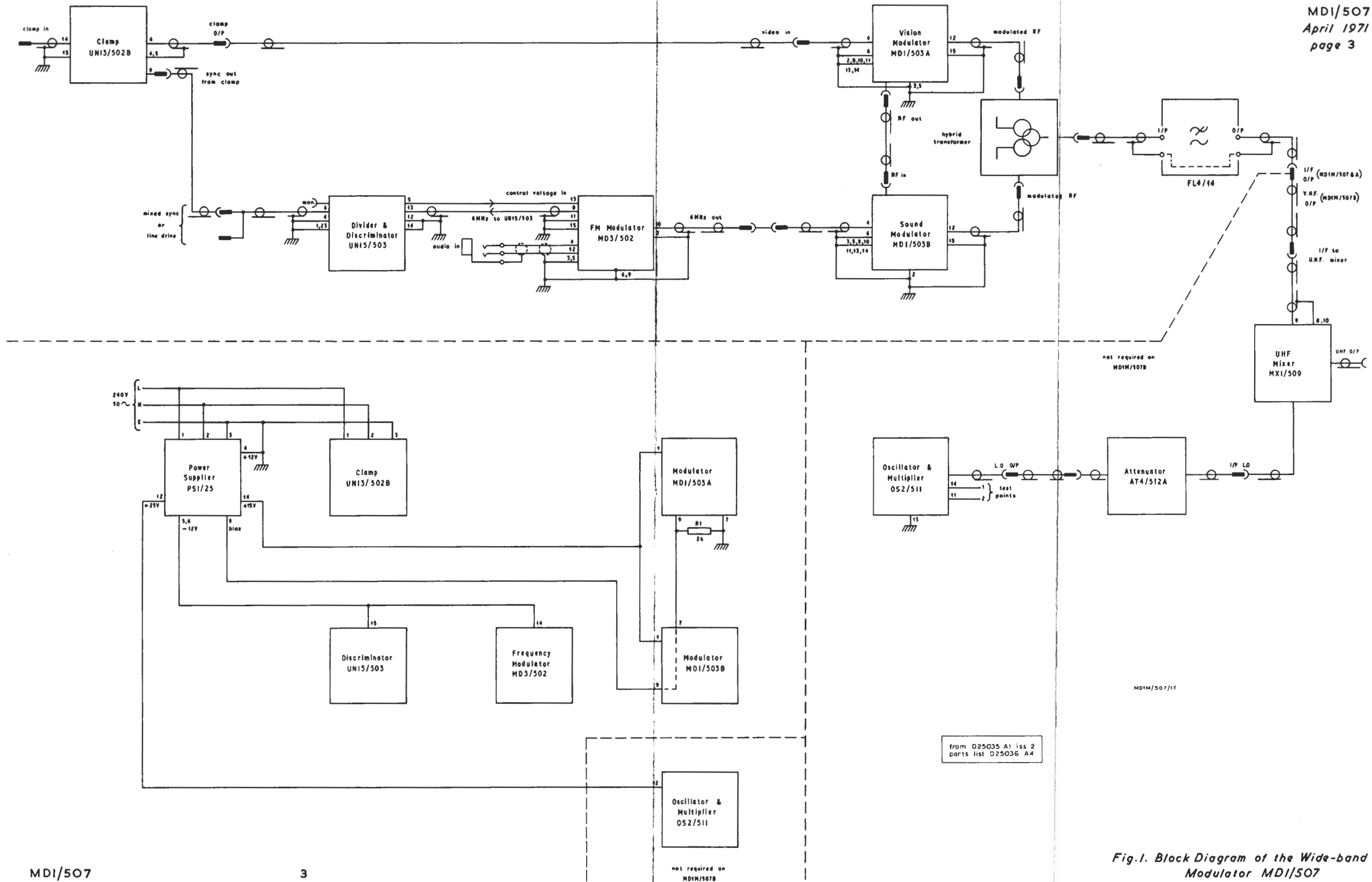


Fig.1. Block Diagram of the Wide-band Modulator MDI/507