

User Instructions for
MICROC**OLOUR**
MRD CONTROLLER
Unit

C O N T E N T S

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MRD Controller Unit

Description

The MRD Controller Unit, as its name suggests, is designed to be used with Recordak™ Micro-File MRD Camera made by KODAK™.

Among the 35mm. roll film cameras the Recordak Micro-File MRD is the most widely used throughout the world. The original camera design has been through many changes during its three decades of production run. While the basic functions remained the same the camera design has been modified extensively.

At one time, KODAK offered many add on Kits for the Recordak Micro-File MRD camera, such as:- Column Extension for 24x reduction, Duplex Image Kit, Microfiche XY Co-ordinator Model XY-1, Shutter Time Delay Model TD-6, 16mm. roll film Conversion and subsurface Illuminator. These Kits were discontinued some years ago. Until now it has not been possible to use Cibachrome® Colour Microfilm in a Recordak Micro-File MRD camera, due to the fixed exposure cycle of its design.

We have frequently been asked to develop a Kit which will allow Cibachrome Colour Microfilm to be used in a Recordak Micro-File MRD camera. In response the MRD Controller Unit was designed specifically for this purpose.

The MRD Controller Unit with its precision Digital Timer has an exposure timing range from 0.1 - 99.9 seconds in increments of 0.1 second. The exposure sequence is activated by pressing the shutter foot-switch pedal which immediately switches on the overhead lights. The shutter is activated only on the release of the shutter foot-switch pedal. The exposure cycle is completed when the Digital Timer counts up to the set exposure time and the MRD Controller Unit switches off the overhead lights.

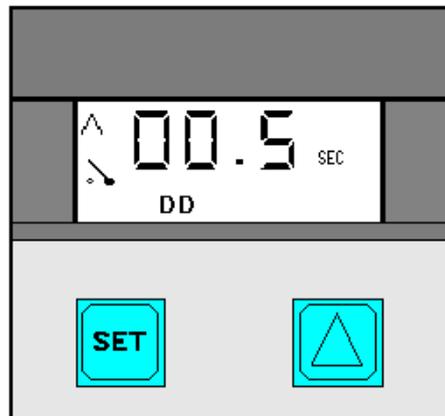
With tungsten halogen overhead lights, 1,000 Watts on each side of the copy board, the exposure with Cibachrome Colour Microfilm is normally 3.0 to 8.0 seconds depending on coverage.

Note: The Tungsten-Halogen OverHead Lights are not supplied with the MRD Controller Unit but they are available separately as a Kit.

Multifunction Digital Timer

Modes

The Multifunction Digital Timer is set to operate in Delay on De-energise 'DD' MODE and within a 'Time' RANGE of 00.1 to 99.9 sec. Once the MRD Controller Unit is powered up, the Multifunction Digital Timer's LCD display will appear as shown below:-



MULTIFUNCTION DIGITAL TIMER

All the Digital Timer's functions, such as 'SET TIME', 'RANGE' and 'MODE' data is retained in the memory by a built-in Lithium battery.

As long as the MRD Controller Unit is connected to a power supply, there is no danger of accidentally 'reprogramming' the Multifunction Digital Timer's operating modes as set in our workshop. However, should it be necessary, the enclosed operating instructions (see page 12) will guide you to reprogram the Multifunction Digital Timer. In which case the Multifunction Digital Timer should be programmed to operate in the following MODES:-

- w 'Operating mode' Delay on De-energise as indicated on the base line of the display by the symbols DD.
- w 'Time range' 00.1 to 99.9 sec.
- w 'Time elapsed' as indicated on the left of the display by the symbol Δ

MRD Controller Unit

Features:

- w The Digital Timer can be programmed for exposures from one-tenth of a second through 99.9 seconds. Count-up sequence is in 0.1 second intervals.

Note:- The Recordak Micro-File MRD camera's shutter has a fixed timing, i.e. 'Closed-Open-Close' sequence of 0.42 second. Due to this mechanical restraint the Digital Timer cannot cycle the camera's shutter faster than 0.5 second.

- w Overhead lights are automatically activated and shut off by the interval programmed into the Digital Timer.

- w The camera shutter is activated prior to the Digital Timer cycling.

- w Camera Power is interrupted to freeze the shutter in the open position while the Digital Timer completes its programmed cycle, and is restored at the end so that the camera can complete its own cycle and advance the film.

- w The new foot-switch pedal provided, activates all of the above mentioned circuits. But the pedal starts the sequence *only* when it is released.

Note:- This gives the operator a chance to hold the pedal down and release it when he or she is ready to complete the exposure cycle.

- w Overhead light sockets on the rear of the MRD Controller Unit have a power handling capacity of up to 1,000 Watts of tungsten halogen lighting each.

- w Manually adjustable synchronisation interval, between the camera shutter activation - to - camera power interruption.

Note:- The rotary dial on the front panel will enable the MRD Controller Unit to be precisely matched to any Recordak Micro-File MRD camera.

- w Independent AC power input for overhead lights. We recommend that you power the overhead lights from a different power circuit than the one used for powering the MRD Controller Unit. This will minimise the voltage drop to the camera power.

Note:- The MRD Controller Unit will allow either 110/120V AC or 220/240VAC OverHead Lights to be used, depending on the Local Mains Power available.

MRD Controller Unit

Set-Up Instructions:- *see mains wiring diagram illustration at the back of this booklet*

1. Plug the mains power line cord of the camera table into the socket marked MRD POWER on the back of the MRD Controller Unit.
2. Unplug the camera's original shutter foot switch from the rear of the camera table and keep it in a safe place. The original foot switch is not required for the MRD Controller Unit.
3. Unplug the original overhead lights from the rear of the camera table. As they will no longer be used for illuminating documents for colour microfilming.
4. Insert the 2 pin plug marked 'SHUTTER' on the rear of the MRD Controller Unit, to the camera's foot switch socket on the back of the camera table.
5. Plug in your overhead tungsten halogen lights to the back of the MRD Controller Unit. The sockets are marked as OH LIGHTS.
6. Connect the new foot-switch pedal to the foot-switch socket on the front panel of the MRD Controller Unit.
7. Plug in the MRD Controller Unit's captive mains power cord, which is terminated with an American type plug, to 110/120V AC Mains **or** to the socket of the step-down transformer provided with the camera in the UK.

IMPORTANT:- You must **NEVER** plug the MRD Controller Unit's captive Mains Power Cord to 220/240V AC. The Recordak Micro-File MRD Cameras were designed to work from 110/120V AC. In countries where the mains voltage differed, the cameras were sold with an external step-down transformer. Therefore you must only plug the MRD Controller Unit's captive Mains Power Cord to 110/120V AC or to the output of the external step-down transformer. Connecting the 110/120V AC captive Mains Power Cord to 220/240V AC will cause extensive damage to your Camera.

8. Plug in the overhead lights' captive mains power cord, marked as 'O.H. LIGHTS POWER', on the back of the MRD Controller Unit, to the local AC mains. The wiring for this power cord may have been left unterminated, so that the purchaser can fit the appropriate plug to suit the local wiring regulations.

Note:- The power input for the OverHead. Lights is independent from the power input of the MRD Controller Unit. Therefore depending on the local Mains Voltage, and assuming that you have the correct voltage Tungsten Halogen Light bulbs, you can either run your OverHead Lights from 220/240V AC as in the UK and Europe or from 110/120V AC as in the USA.

9. Switch on the MRD Controller Unit and the camera. Set the required exposure time with the Digital Timer. To commence the exposure cycle Press and Release the shutter foot-switch pedal.

HOW TO SET THE 'EXPOSURE TIME' :

- 1) Press the SET button once and all the digits on the Digital Timer's LCD display will start flashing. The display will show the last stored 'Time Setting'.



Note: When the MRD Controller Unit is switched-on for the first time, the display of the Digital Timer will indicate the 'Time Setting' as 00.5 sec. as set in our workshop. Any subsequent alteration to the 'Time Setting' will be stored in the memory and when the unit is switched-on next, the display will indicate the last stored 'Time Setting'.

Example: The following example will guide you to reset the 'Time Setting' to 03.4 sec. i.e. exposure time of 3.4 sec.

- 2) Press the SET button again, and the most significant digit will flash. Use the Δ button to select the required value for this digit.

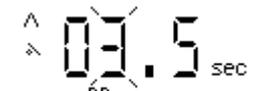


Example: As the required value is 0 on this occasion there is no need to alter the digit which is already being displayed.

- 3) Press the SET button to store the selected value '0' and the next digit will flash. Use the Δ button to select the required value for the middle digit.



Example: Press the Δ button three times to change the middle digit to 3.



- 4) Press the SET button to store the selected value '3' and the next digit will flash. Use the Δ button again to select the required value for the last digit.



Example: Press the Δ button 9 times and the last digit will roll over to display the digit 4.

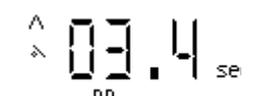


- 5) Press the SET button to store the last selected value '4'.

Note: As the last digit is stored by pressing the SET button the Digital Timer's LCD display will revert back to indicate the 'OLD' setting of 00.5 seconds however the timer is actually set for the 'NEW' selected exposure time of 3.4 seconds.



- 6) Press and hold the Display Update button, on the front panel of the MRD Controller Unit for two seconds. Once the button is released the display will update to show the 'New' exposure time i.e. 3.4 seconds.



Further example:- To alter the exposure time say from 3.4 sec. to 3.9 sec.

STEP 1 - Press the 'SET' button 4 times and the last digit will flash.



STEP 2 - Press the button  5 times and the display digits will roll up to 3.9 seconds.



STEP 3 - Press the 'SET' button once to store the 'New' exposure time. The display will revert to showing the initial setting of 3.4 seconds.



STEP 4 - Press and Hold the Display Update button for two seconds. the display will now indicate the new exposure time of 3.9 seconds.



Due to the particular design of the Digital Timer, the display will not automatically update to show the altered exposure time. Instead the display will revert back to the previous exposure setting. To confirm and lock the 'NEW' exposure setting onto the display, press the 'Display Update' button for two seconds. After the release of the Display Update button, the display will indicate the most recent programmed exposure setting.

Having altered the exposure setting, if you operate the shutter foot-switch pedal *without* first using the Display Update button, the MRD Controller Unit will activate the exposure cycle of the Recordak Micro-File MRD camera using the 'NEW' exposure setting and at the end of the exposure cycle it will update the Digital Timer's display to show the 'NEW' exposure setting .

Pressing the Display Update button during an exposure cycle, will cause the timed exposure cycle to be aborted.

Shutter Synchronisation

Rotary Dial

The early models of Recordak Micro-File MRD cameras were fitted with a motor cam assembly that had a cork washer. This was later modified (Modification No. 11) when a new higher torque motor cam assembly was fitted which had a leather washer. Due to this mechanical difference and the variation in the pull torque of the motor cam-assembly, the precise timing of the 'Closed-Open-Close' cycle of the shutter may differ from one camera to another.

The Rotary Dial on the front panel allows the MRD Controller Unit to be synchronised to the Recordak Micro-File MRD camera's shutter so that the shutter remains in the fully open position while the programmed exposure count is taking place.

The MRD Controller Unit is set in our workshop to operate with the new higher torque motor cam assembly. However should it be necessary to readjust the shutter synchronisation please follow the instruction below:-

- w Set-Up the MRD Controller Unit, using the instructions given on page 4.
- w Load the camera with a Black & White microfilm.
- w Set the Digital Timer for 2.0 seconds exposure count.
- w Press and Release the Shutter Foot Switch Pedal while observing the mechanical frame counter on the Micro-File MRD camera head. The least significant digit of the frame counter should just start turning and freeze before the exposure cycle is completed. Should the frame counter count-up to the next frame before the exposure cycle is complete, then the shutter is going through a 'Closed-Open-Close' sequence before power to the camera is interrupted.
- w To shorten the time interval between Shutter Activation - to - Camera Power Interruption, turn the Rotary Dial to a lower number than it is set presently. To do this, slide the lever lock on the base of the Rotary Dial to the left, and then turn the Rotary Dial anticlockwise.
- w Repeat the above exposure cycle until the frame counter digit freezes as it just starts turning. For more precise method of shutter synchronisation see page 13.

Note:- Do not shorten the time interval between Shutter Activation - to - Camera Power Interruption to such that the shutter has no time to fully open. Also see page 13 for an alternative method of synchronising the shutter.

Film Test for Correct Synchronisation

To test for correct shutter synchronisation carry out a series of test exposures with a Black & White microfilm. Using just a single 150 Watts Tungsten Halogen OverHead Light. Shoot a standard Grey Scale and a Resolution test target. Start the first frame with 0.5 second exposure and increase the exposure setting by half stops to 0.7 seconds then to 1.0 sec, 1.5 sec, 2.0 sec and finally to 3.0 sec. Once the film is processed, you should be able to see the difference in exposure between each frame. Should all the frames have the same exposure then the shutter is not synchronised correctly.

Once the shutter synchronisation process is successfully completed, the lever lock on the base of the Rotary Dial should be set to locked position by sliding the lever to the right.

Cibachrome Microfilm

Colour Exposure Test:

Cibachrome Micrographic Film is balanced for a colour temperature of 3200° K, i.e. for exposure with Tungsten-Halogen lamps. The approximate effective speed is rated below 1ASA.

The MRD Controller Unit is supplied without Tungsten-Halogen OverHead Lights. We recommend that 2x 500W should be used on each sides of the copy board - a total of 2,000W.

To carry out a colour exposure test, follow the instructions as set out below:-

- w Use the set-up instructions given on page 4, to connect the MRD Controller Unit to the camera.
- w Load the camera with Cibachrome Type M microfilm.
- w Set-up a resolution target and include a Grey Scale & Colour Separations Chart in the same frame.
- w Start the exposure series with the first frame set for 0.5 sec. exposure.
- w Increase the exposure setting by half a stop with each frame or use the following exposure series 0.5, 1.0, 2.0, 3.0, 4.0, 6.0, 8.0 seconds.
- w Process the microfilm and inspect the results. You should then be able to judge the best 'exposure time' for the lights being used.

Problems:

Q. The test for Cibachrome colour film resulted in all the frames having the same exposure, why?

A. *The MRD Controller Unit was not synchronised correctly with the camera's shutter. The shutter was cycling through 'Closed-Open-Close' sequence before the camera power was interrupted. This is caused by the Shutter Activation - to - Camera Power Interruption interval having been set too long.*

Action: Decrease the time interval, set the Rotary Dial to a lower number than it is set presently (see page 7 & 13).

CIBACHROME MICROGRAPHIC FILM Type-M Type-P

Effective speed at 3200° K	0.2-0.5ASA	0.4-0.8ASA
Resolving power (target contrast 1000:1)	364 lp/mm	325 lp/mm
Diffuse RMS granularity	6	9
Modulation transfer at 100 lp/mm	55%	53%
Maximum density	2.3	2.15
Contrast (midrange tonal reproduction)	2.0	1.4

Cibachrome Microfilm, Chemicals and Processing Service are available from:-

MicroColor International Inc.
P.O. Box 581
Ridgewood
New Jersey. NJ 07451
USA.

Tel: (201) 445-3450
Fax: (201) 445-2924
E-Mail: AraH@aol.com

MicroColour International Ltd.
P.O. Box 173
Walton-on-Thames
Surrey. KT12 1SS
England

Tel: +44 (0)1932-253887
Fax: +44 (0)1932-247970
E-Mail: Hayk@microcolour.com

Technical Information

There are no user serviceable parts inside the MRD Controller Unit, but should it be necessary to gain access to the internal wiring, **ISOLATE FROM MAINS** before removing the top cover **or** when changing the fuses.

All the fuses are accessible from the rear panel.

- w The FS1 fuse is rated @ 5 amps fast-blow.
- w The FS2 & FS3 fuses for OverHead Lights are each rated @ 10 amps.

The optically coupled solid-state OverHead Lights' Relay is capable of switching 2,000W of lighting in total. The zero voltage switching capability of the relay will also minimise the large current surges.

The OverHead lights output sockets are rated for 15 amps each. Therefore it is possible to use 1,000W (or 2 x 500 Watts) Tungsten Halogen OverHead lighting on each side of the copy board. Do not exceed the 1,000 Watts of Tungsten Halogen lighting on each side of the copy board, as the heat generated by OverHead lights may have adverse effect on the documents being microfilmed. In any case UV filters should always be used. We also suggest that the operator wears sunglasses to avoid eyestrain!

Each MRD Controller Unit is supplied complete with:-

- w 2 m. of captive mains cord terminated in 3 pin USA Plug.
- w 2 m. of captive mains cord, for OverHead Lights input.
- w 2.5 m. of captive camera shutter cord terminated in 2 pin Locking Plug.
- w Foot-Switch Pedal with 2.0 m. of cord terminated in Locking XLR Line Plug.

Multifunction Digital Timer

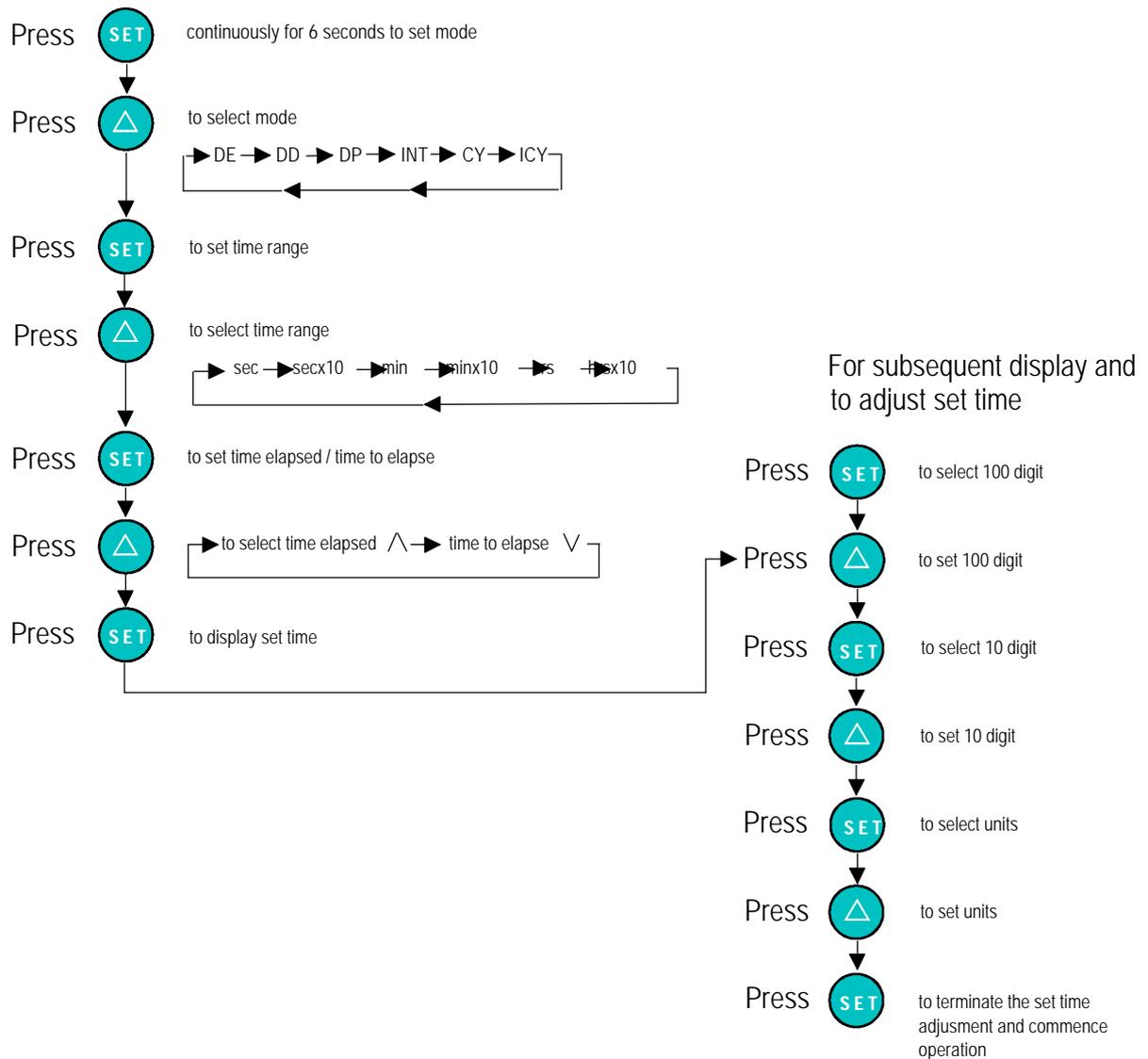
Set-up Procedure

1. DESCRIPTION

The Multifunction Digital Timer is a multi-mode, multi-range, universal voltage device for time delay relay requirements with a single product. The timer incorporates circuitry that allows operation with a supply voltage between 18 and 260V ac/dc without adjustment. Six operating Modes and Time ranges are provided. Only the DD- Delay on De-energise and Sec x10 (for 0.1 sec resolution) is used for MicroColourMRD Controller Unit.

2. TO SET-UP FOR THE FIRST TIME

Two buttons on the front fascia, SET and Δ , are used for all adjustments. The set time may be adjusted at any time, but RANGE and MODE can only be altered when the supply has been removed.



WARNING:

Multifunction Digital Timer contains a Lithium battery which must not be cut open, incinerated, exposed to temperatures above +60°C or recharged. Dispose of in accordance with local regulations.

Techniques

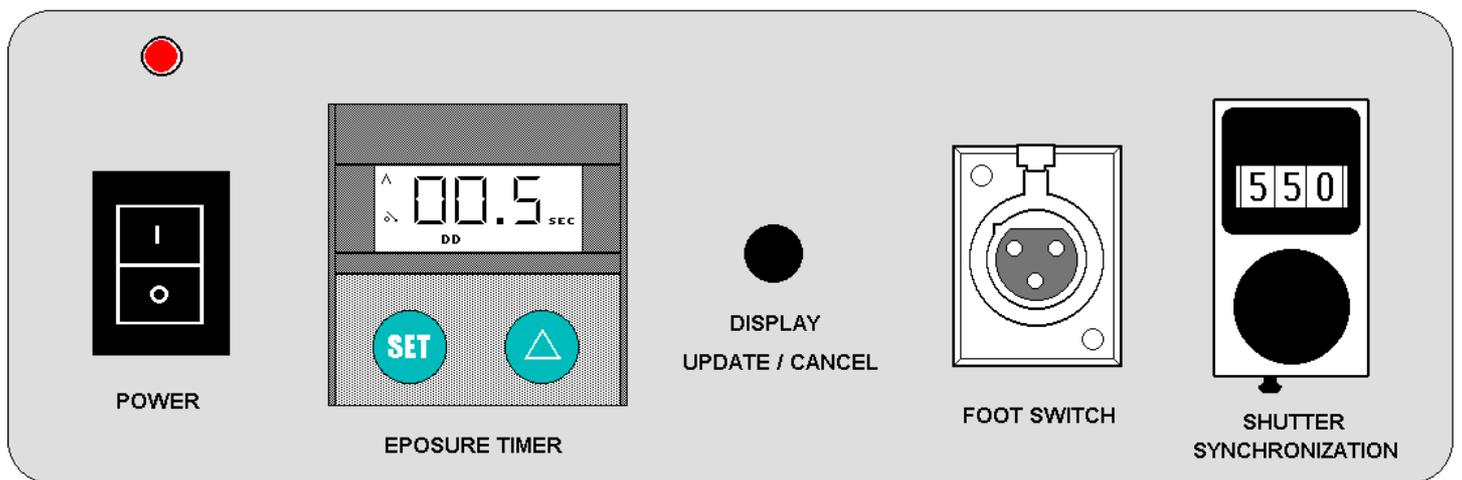
Synchronising the Shutter: An Alternative Method

- w Load the camera with film to stop the 'Film Spool Empty' alarm buzzing.
- w Remove the four screws holding the side plate of the camera head, as if changing the frame-bulb in the camera head. The condenser lens, which concentrates the light from the frame-bulb to illuminate the copy board for frame masking will then be visible.
- w Place an electrical light source in the middle of the copy board, so that the light from the source shines through the MRD lens up into the camera head.
- w Connect the MRD Controller Unit to the camera as described on page 4. It is important that the OverHead Lights are also connected, so that if there is a voltage drop by the OverHead Lights being switched on, it is taken into account when synchronising with this method.
- w Set the exposure time for 2 sec. and operate the MRD Controller Unit's Shutter Foot Switch.
- w Observe the condenser lens in the camera head. When the shutter is frozen in the open position, the light shining from the camera table will be visible through the condenser lens for duration of the exposure time set on the Digital Timer.
- w If the MRD Controller Unit is not synchronised correctly, then the shutter will cycle through the closed-open-close sequence before the power to the camera is interrupted. The user will only be able to observe the light shining through the condenser lenses for a brief 0.42 sec. Should this be the case then it will be necessary turn the Rotary Synch. Dial on the front panel to a lower setting.
- w The unit is shipped with Rotary Synch. Dial set at a reading '550'. Lower this setting to a reading '525' and try the shutter again. Continue with this process by gradually lowering the setting until the shutter is synchronised.
- w On the other hand, if the shutter fail to open then increase the Rotary Synch. Dial setting to a reading higher than presently indicated on the dial.

Inserting Blank Frames.

The usual method for inserting blank frames, to mark the beginning or the end of an exposure series, is either to wind on the take-up spool manually or to cover the lens of the MRD camera and operate the shutter foot switch for each blank frame required.

With the MRD Controller Unit connected to the camera and with long exposure times set on the timer, it will be time consuming to wait for each blank frame to “expose”. To overcome this delay we recommend to keep the ‘Display-Update’ button pressed and while holding the button pressed operate the MRD Controller Unit’s shutter foot switch. This action will cause the overhead lights to remain deactivated while the camera quickly cycles through an “exposure” as if the MRD Controller Unit was not in circuit.



⌂ FRONT PANEL - REAR PANEL ⌂

