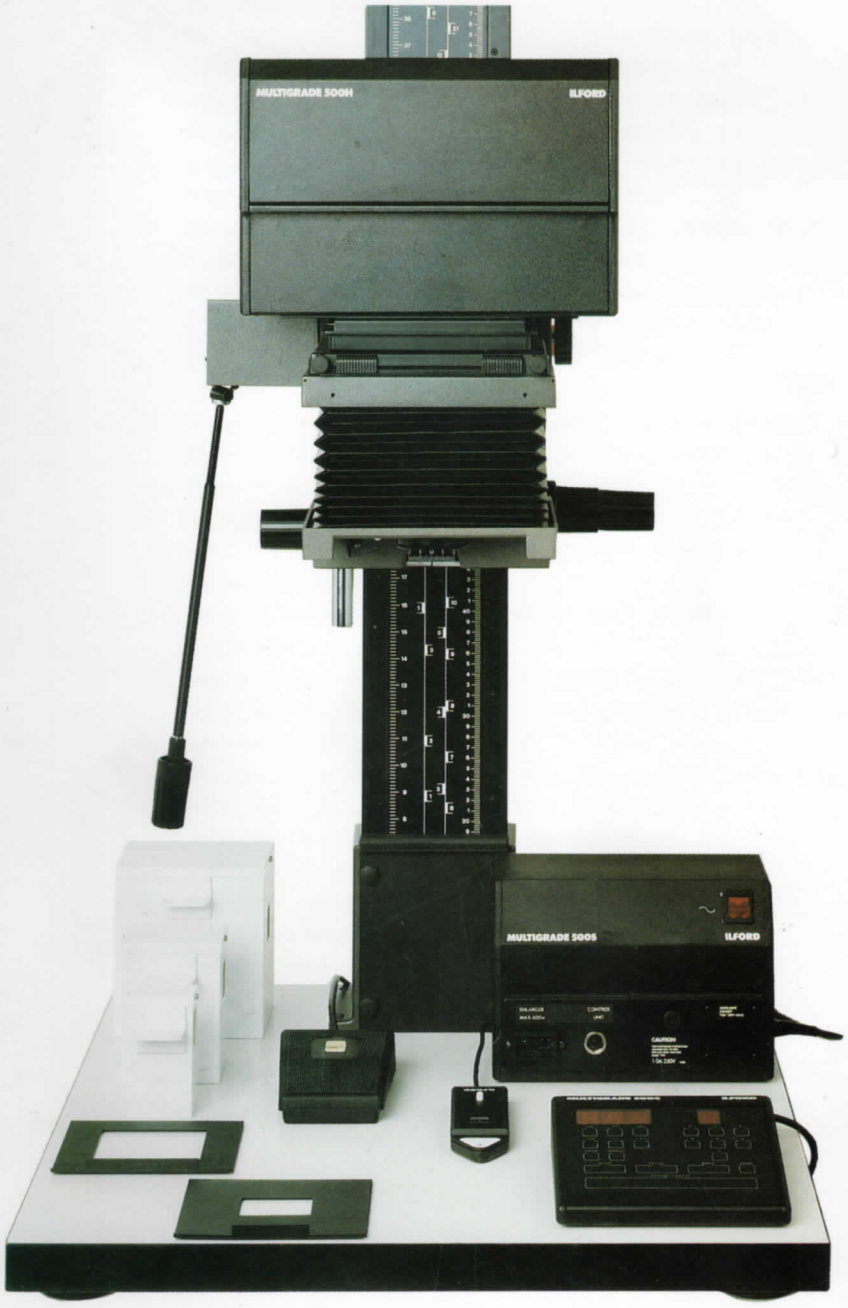
OPERATING MANUAL 60Hz

ILFORD MULTIGRADE 500

ENLARGER HEAD AND CONTROL SYSTEM INCORPORATING MEMORY FACILITY. FOR SMALL TO MEDIUM FORMAT ENLARGERS



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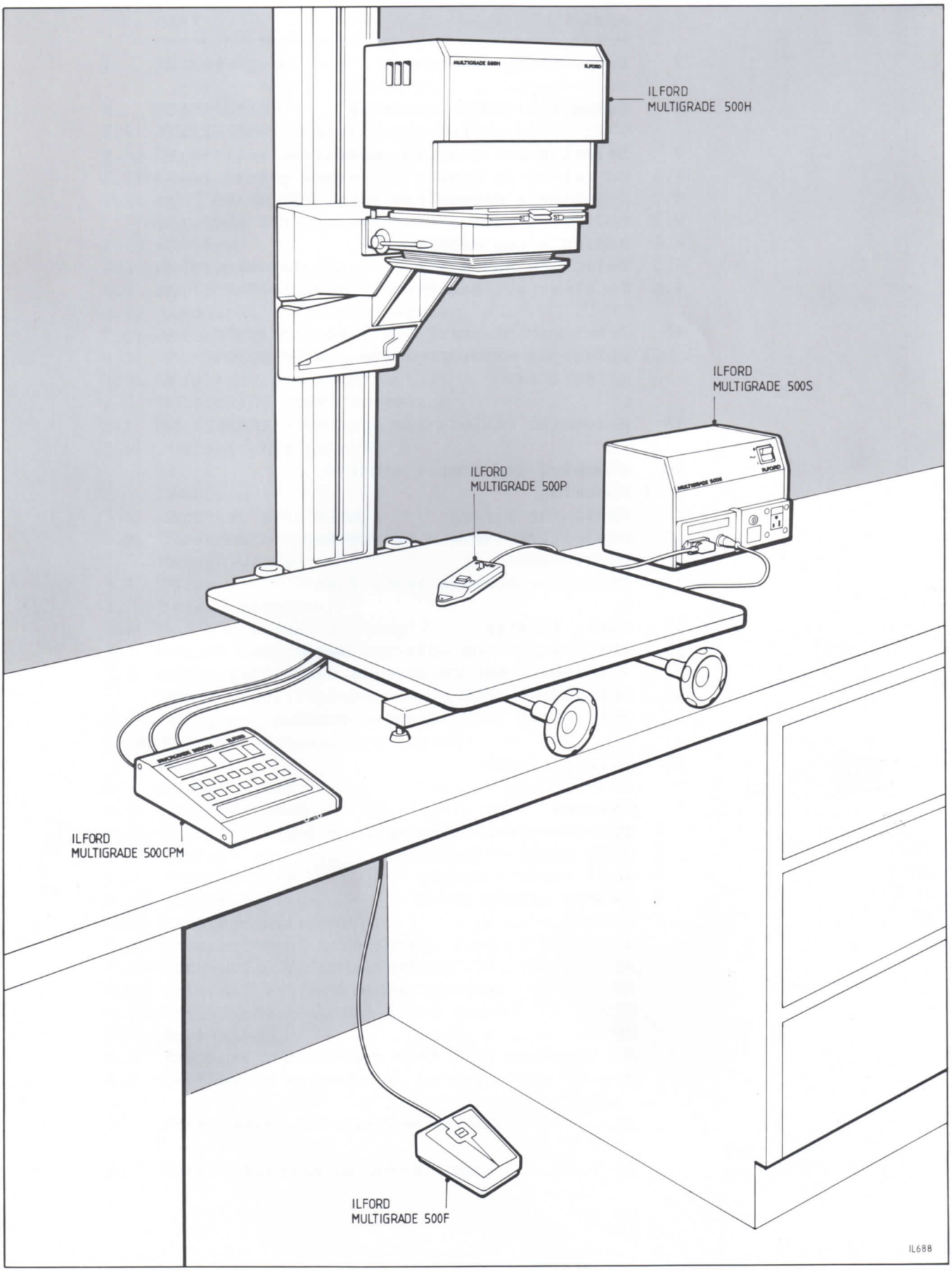
SAFETY PRECAUTIONS

Your photographic equipment is powered by mains electricity, and is designed to comply with international electrical safety standards. However, basic safety precautions must always be followed when operating electrical equipment, including the following:

1 Read and understand all instructions.
2 Close supervision is necessary when the equipment is being used by inexperienced personnel.
3 Certain parts of the equipment become very hot with continuous use. Take care to avoid burns.
4 Do not operate equipment that has been dropped or damaged, or has damaged electrical cords. Have the equipment examined by qualified personnel.
5 Do not allow any electrical cord to touch hot surfaces.
6 Avoid scuffing any electrical cords that hang over the edge of working surfaces. Ensure the cords are arranged such that they cannot be pulled or tripped over (this applies also to any extension cords).
7 Ensure extension cords are of a suitable current rating to prevent the cord overheating.
8 Always unplug the equipment when it is not in use. Never pull plugs out by holding the cords.
9 Avoid contact with water and other liquids.
10 When operating the equipment, ensure the air flow through the side vents is not obstructed.
11 Do not dismantle the equipment unless you are qualified to do so. Incorrect assembly can cause hazards both to yourself and to the equipment.
12 Always obey local codes of practice, particularly for installation requirements.

Do not destroy these instructions

CONTENTS



The MULTIGRADE 500 system

Figure 1.1

1 INTRODUCTION

The MULTIGRADE 500 enlarger head and control system (see figure 1.1) is for use on small to medium format enlargers where negative coverage is required up to 4x5 inches. The system incorporates the very latest in advanced electronics, and offers the black and white printer finger tip control of a wide range of contrasts.

The MULTIGRADE 500 system comprises the following elements:

1 MULTIGRADE 500H enlarger head
2 MULTIGRADE 500CPM control unit
3 MULTIGRADE 500S power supply

Available as optional extras are:

1 MULTIGRADE 500F footswitch
2 MULTIGRADE 500P exposure probe

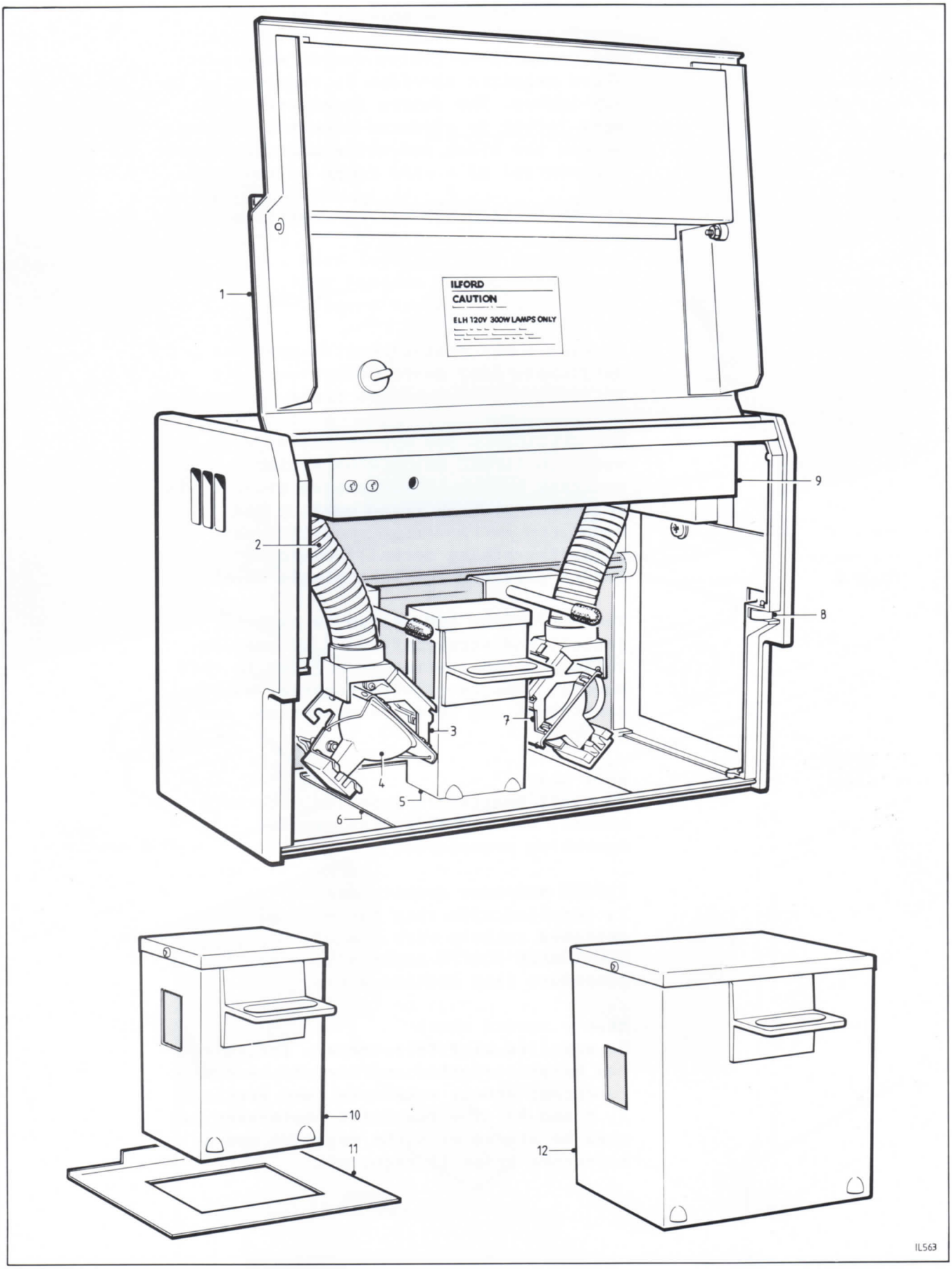
The MULTIGRADE 500 system is designed for use with ILFORD MULTIGRADE variable contrast papers. These papers provide six full grades, high image quality and excellent latent image stability, and offer everything normally expected of graded papers - all in a single sheet.

The MULTIGRADE 500 system is easy to install and straightforward to use. By following the instructions given in this manual, quality prints, together with continuous and reliable operation, are assured.

Wall charts
Two wall charts are supplied with this manual, and summarise the regular operating procedures.

ILFORD mid-tone density card
Is supplied with this manual, and is designed to help with the MULTIGRADE 500CPM control unit setting up procedure (see section 4.6).

Memory record sheet
Is supplied with this manual. The sheet can be photo-copied and used to record important memory sequences (see sections 7, 8 and 9). The completed photo-copy can then be stored with the negative and a reference print if required.



MULTIGRADE 500H enlarger head

Figure 2.1

2 DESCRIPTION

Figure 2.1

1 Door
2 Cooling duct (flexible)
3 Lamp assembly (green)
4 Lamp
5 Light mixing box (35mm format)
6 Register plate (35mm format)
7 Lamp assembly (blue)
8 Door roller catch
9 Fan housing
10 Light mixing box (6x7cm format)
11 Register plate (6x7cm format)
12 Light mixing box (4x5 inch format)

2.1 MULTIGRADE 500H enlarger head

See figure 2.1.

The MULTIGRADE 500H enlarger head replaces the original condenser, diffuser or cold cathode lamphouse used with most professional enlargers. It is fitted to the enlarger chassis using an adaptor kit, designed to make installation quick and relatively simple. Full instructions are supplied with each adaptor kit.

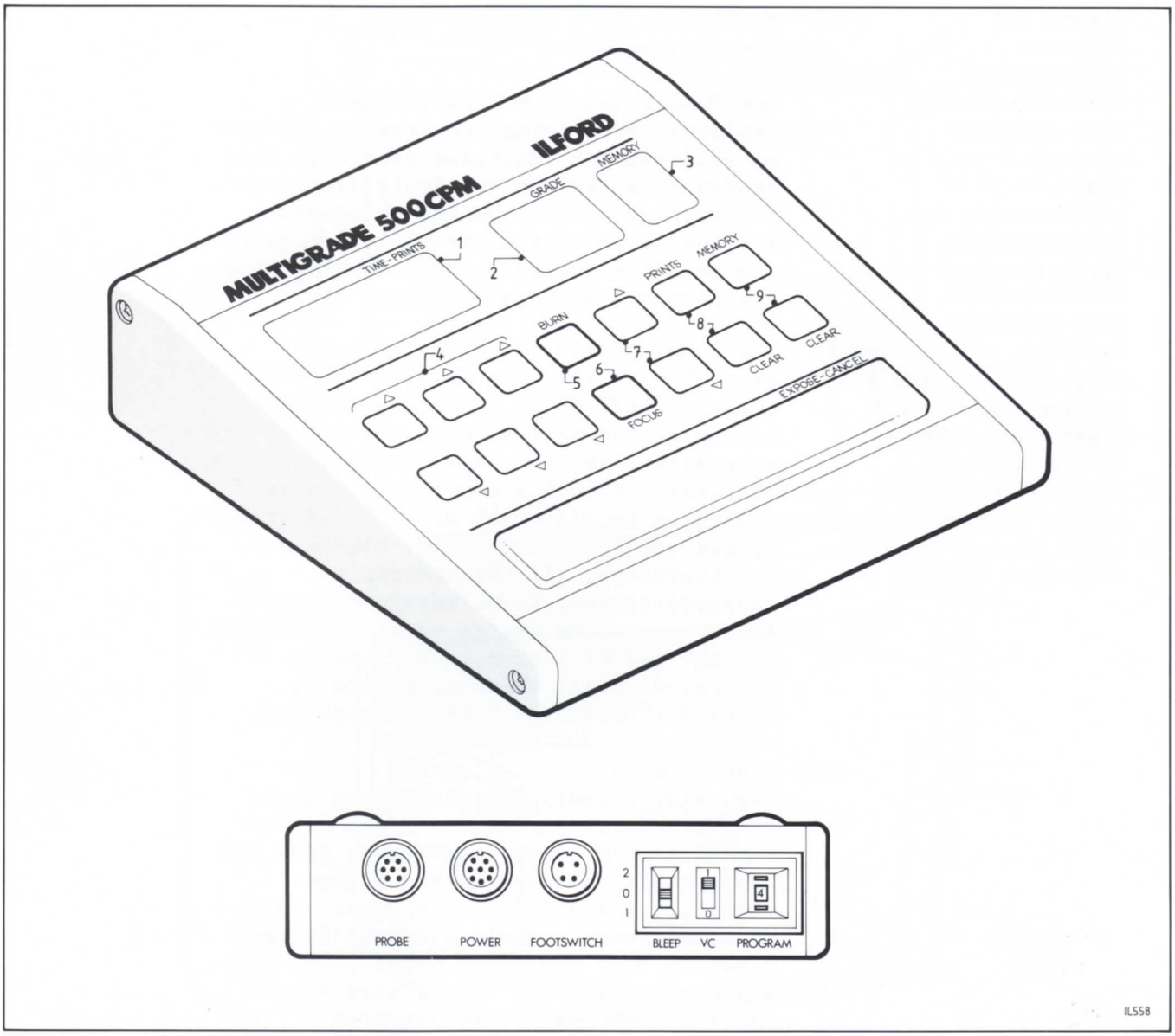
The range of adaptor kits currently available enables the MULTIGRADE 500H enlarger head to be fitted to the most commonly used professional enlargers. For some enlargers, two kits are available; a diffuser kit (which converts condenser enlargers to diffuser) or a condenser kit (which enables the enlarger condensers, and therefore, all the associated characteristics, to be retained). In these cases, the choice of kit depends on whether the user prefers diffuse or condensed light. Where no choice is available, diffuser kits are supplied.

2.1a Light source

Two, high output, quartz halogen lamps and associated heat filters are fitted inside the enlarger head. Light from one lamp passes through a blue dichroic filter, and light from the other lamp passes through a green dichroic filter. Separate blue and green light beams are produced, and their intensities are varied independently by electronic control of the voltage to each lamp. The light beams are mixed, reflected and diffused in the light mixing box to provide even illumination of the negative. The resulting color variation enables the wide contrast range, available with ILFORD variable contrast papers, to be used to its full advantage.

Note

Blue and green filters do not transmit red light. It will not be possible, therefore, to use the enlarger below-the-lens red safety filter during, for example, multiple exposures from one



MULTIGRADE 500CPM control unit

Figure 2.2

negative. However, the choice of filtration, coupled with the heat filters, reduces the problem of negative popping.

2.1b Light mixing boxes

The correct mixing boxes for your enlarger are supplied as part of the adaptor kit. See, also, section 14 **MULTIGRADE 500H enlarger head.**

To fit light mixing boxes, see section 4.1a.

Figure 2.2

1 Exposure time/print counter display
2 Grade display
3 Memory display
4 Exposure time buttons
5 For manual burning-in operations
6 Focus button
7 Grade buttons
8 Batch counter buttons
9 Memory buttons

2.1c MULTIGRADE 500 light mixing box retainer kit

To protect the delicate internal components in the enlarger head (such as the lamps and filters) on enlargers that have the facility to tilt the head, the ILFORD MULTIGRADE 500 light mixing box retainer kit (part number 6069-P-003) must be fitted. This kit is designed to clamp the light mixing box and lampholder assemblies in position, and is supplied with full fitting instructions.

WARNING
To prevent damage, do not tilt the head without the light mixing box retainer kit fitted.

2.1d Cooling

To dissipate the heat generated by the lamps, the MULTIGRADE 500H enlarger head is force cooled by a centrifugal fan housed in the top of the head.

For maximum effect, the cooling air travels through two flexible ducts, one directed to each lamp and filter assembly. Air exits through two light-tight vents, one in each side of the head.

2.1e Safety features

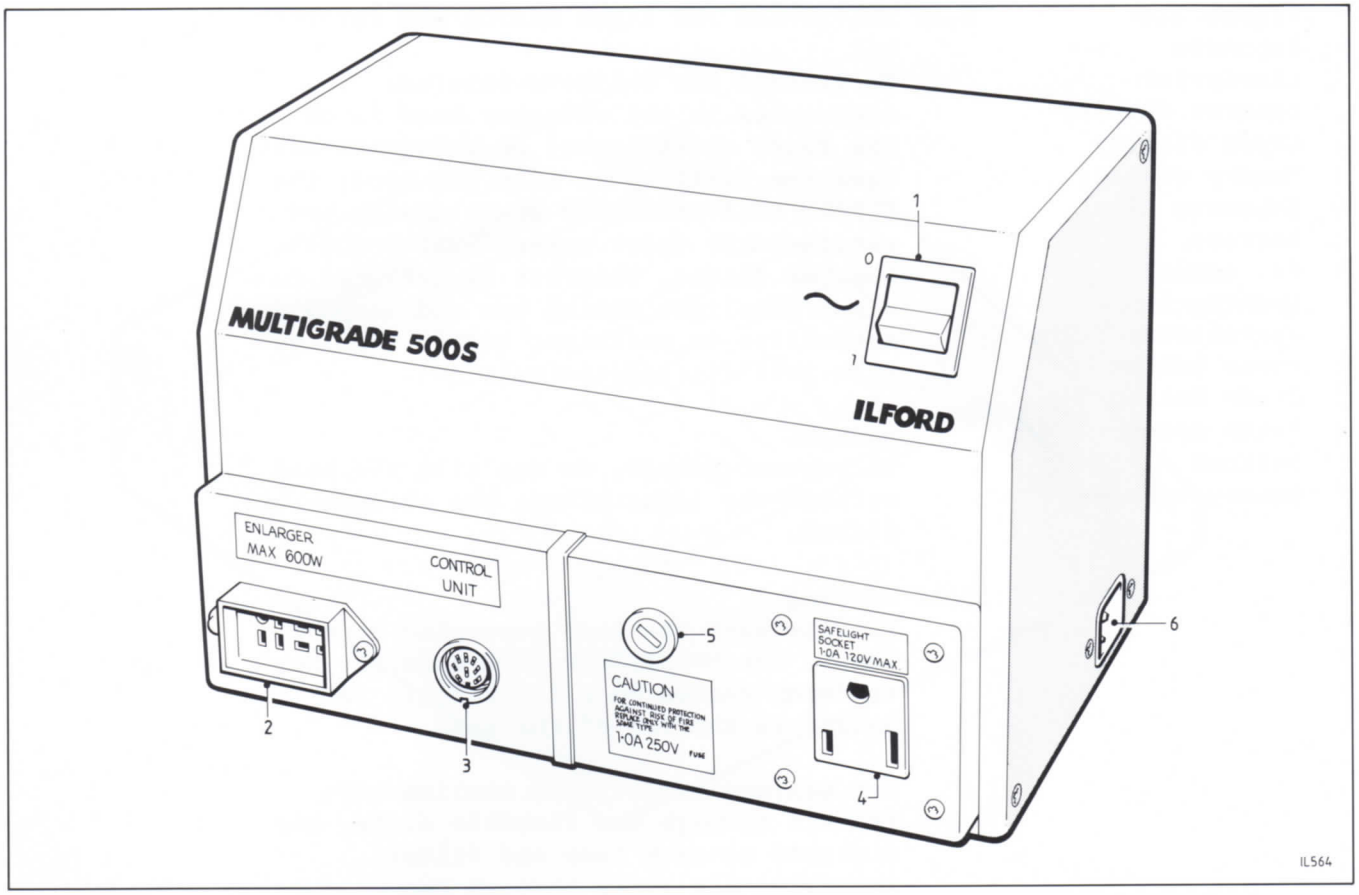
The following safety features are included in the MULTIGRADE 500H enlarger head:

1 The fan is timed to continue running for approximately two minutes at the completion of any operation involving the enlarger lamps, or when the equipment is first switched on.
2 In the event of fan failure, power to the fan and both lamps is switched off after one minute.
3 A micro-switch removes power to both lamps and the fan assembly when the door is opened.

2.2 MULTIGRADE 500CPM control unit

See figure 2.2.

The MULTIGRADE 500CPM control unit is an improved version of the MULTIGRADE 500C control unit which is no longer available. The two units are fully interchangeable but their controls are different. The control unit is quick and



MULTIGRADE 500S power supply

Figure 2.3

simple to operate. Once the exposure time is established at a particular contrast, microprocessor electronics automatically adjust the light intensity to each lamp, to ensure the exposure time remains constant across the contrast range.

All controls are described in section 3.

For maximum operator safety, the control unit is powered entirely by low voltages supplied from a remote power supply (see section 2.3).

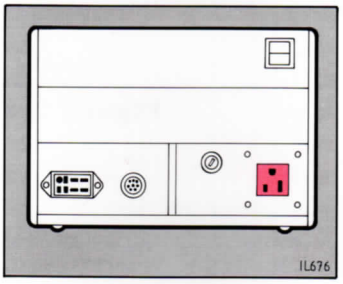
The brightness of the displays is optimised to be seen under normal darkroom lighting. During normal use, the displays will not fog ILFORD variable contrast papers or other black and white papers of similar sensitivity.

2.2a Automatic frequency setting

When the control unit is switched on, it measures the frequency of the incoming electrical mains supply and automatically

Figure 2.3

1 On/off switch
2 Socket, enlarger head
3 Socket, control unit
4 Socket, safelight
5 Fuse, safelight socket
6 Power input



adjusts the internal control circuitry accordingly. The measured frequency is displayed briefly on the exposure time display (see section 5).

2.2b Automatic voltage stabilization

Automatic voltage stabilization is built into the MULTIGRADE 500CPM electronic circuitry, and compensates for variations in mains voltages up to ±4%. This ensures that light output remains constant within this range of input voltages.

The automatic voltage stabilization circuitry is controlled by the 'VC' switch, located on the rear panel of the control unit, enabling the circuitry to be switched on or off as required. See, also, sections 3.10 and 4.3e).

2.3 MULTIGRADE 500S power supply

See figure 2.3.

The MULTIGRADE 500S power supply is connected directly to the electrical mains supply. It has sockets for connecting the enlarger head, control unit and safelight, positioned on the front of the unit for easy access. The on/off switch (labelled '1/0') controls power to the three sockets, and incorporates a neon indicator.

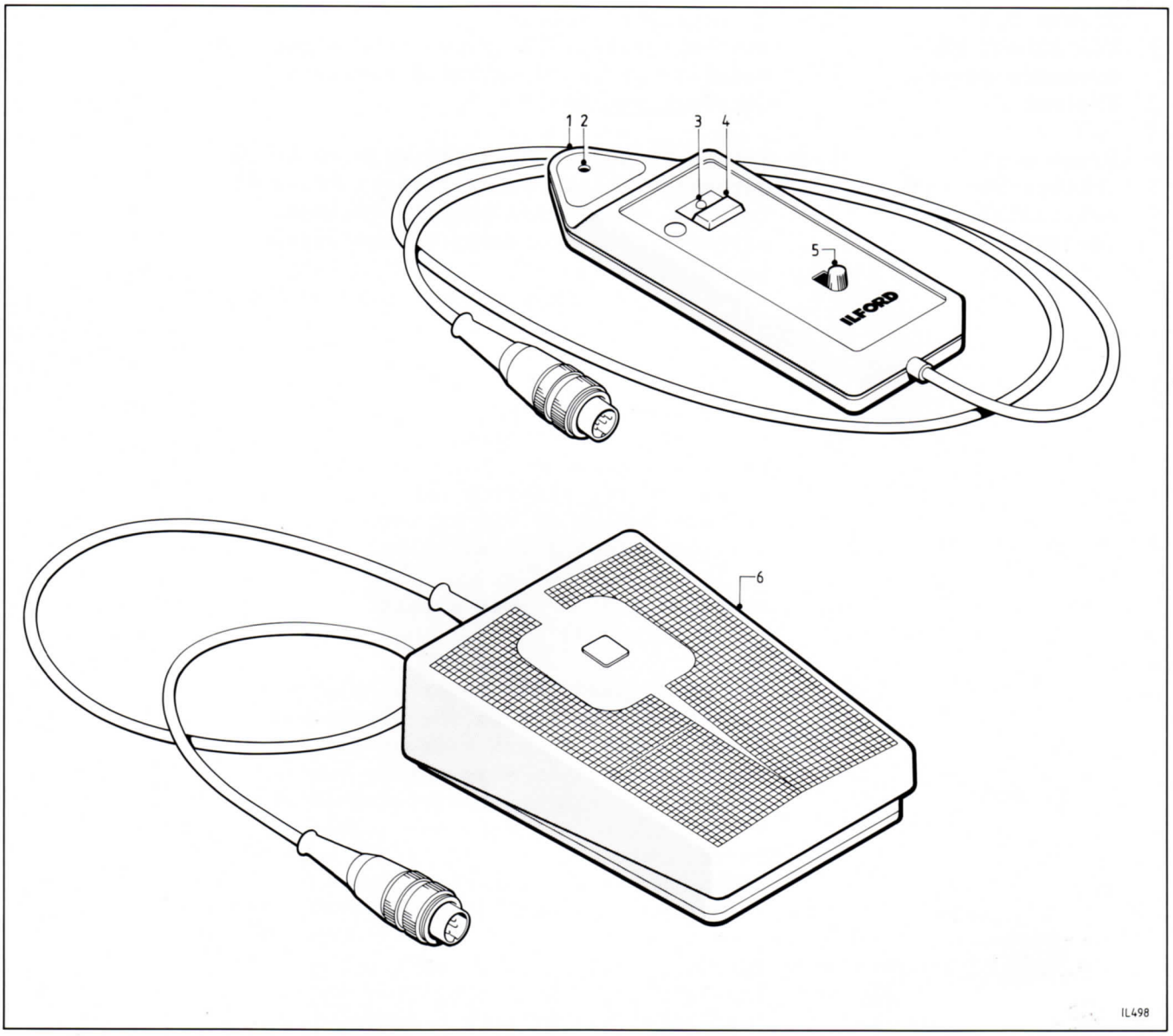
2.3a Safelight synchronisation

Any safelight that is plugged into the 'safelight 1 amp' socket on the power supply is controlled by the MULTIGRADE 500CPM control unit. During 'focus' and 'burn' operations, and during an exposure, the safelight is automatically switched off. To connect the safelight, see section 4.3c.

2.4 MULTIGRADE 500F footswitch

See figure 2.4.

The MULTIGRADE 500F footswitch is available as an optional extra, and enables the printer to keep both hands free. In all the following sections, functions that are controlled by the 'expose-cancel' bar are controlled in the same way by the footswitch.



MULTIGRADE 500F footswitch and 500P exposure probe Figure 2.4

2.5 MULTIGRADE 500P exposure probe

See figure 2.4.

The MULTIGRADE 500P exposure probe is available as an optional extra, and provides automatic display of the optimum exposure time at the grade selected, from

a spot reading. Using the probe saves paper and time by eliminating the need to make test strips or sheets.

For a detailed description of how to use the probe, see section 10 and the leaflet supplied with the probe.

Figure 2.4

1 MULTIGRADE 500P exposure probe
2 Photocell
3 LED
4 Probe switch
5 Calibration knob
6 MULTIGRADE 500F footswitch

2.6 Photographic papers

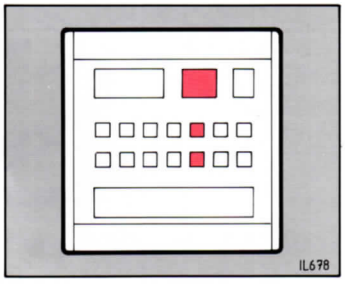
The MULTIGRADE 500 system is designed for use with ILFORD MULTIGRADE variable contrast papers.

Prints from graded papers such as ILFORD ILFOSPEED can be made by using grade 4½ to give the best compromise between exposure time and image visibility.

3 CONTROLS

See figure 2.2.
All the controls necessary to operate the MULTIGRADE 500 system are located on the control unit, except for the power control switch which is located on the power supply. This switch incorporates a neon indicator, and controls power to the system.

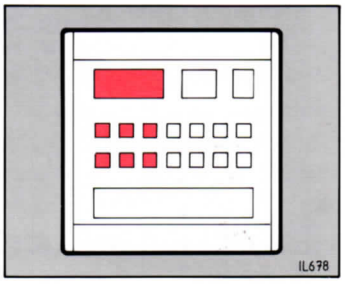
3.1 Contrast selection



Grade is displayed in the centre display. Selection of the required grade is controlled by a pair of up (▲) and down (▼) buttons, located below the 'grade' display. The buttons control the selection of eleven grades in half-grade steps from 0 (lowest grade) to 5 (highest grade). Short presses of the buttons increases or decreases the grade displayed in half-grade steps. Holding the buttons down causes the display to roll sequentially in increments of half-grades.

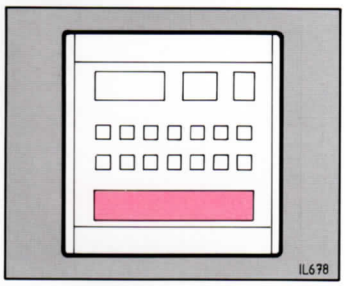
The whole grades 0, 1, 2, 3, 4 and 5 provide contrasts that correspond closely to those obtained with conventional ILFOSPEED graded paper.

3.2 Electronic timer



Exposure time is displayed in the left hand display. The electronic timer is extremely accurate and measures time in tenth-second increments over the range 0·1 to 99·9 seconds. The display counts down to zero during main exposures, or up from zero during manual burning-in operations.

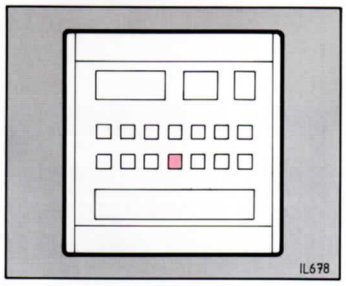
Selection of the required exposure time is controlled by three pairs of up (▲) and down (▼) buttons located below the 'time-prints' display. Reading from the left, the three pairs control units of ten seconds, units of seconds and units of tenths of seconds. Short presses of the buttons add or subtract one unit to the corresponding display. Holding the buttons down causes the corresponding display to roll sequentially from 0 to 9 or from 9 to 0.



3.3 Expose-cancel

With the time and grade selected, start the main exposure by pressing the 'expose-cancel' bar. The time display will count down to zero.

Exposures can be cancelled at any time by pressing the 'expose-cancel' bar. The time display automatically resets to the initial display.

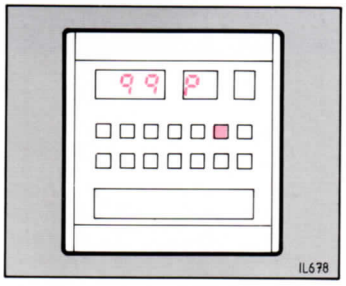


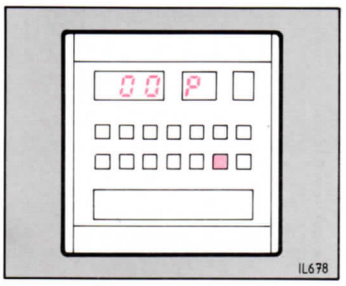
3.4 Focus

To obtain a continuous light suitable for focusing and composition, press the 'focus' button. To cancel the 'focus' mode, press the 'expose-cancel' bar (or press the 'focus' button again).

Note

If the control unit is inadvertently left in the 'focus' mode, the control unit automatically cancels the mode after 100 seconds.





3.5 Prints counter

The control unit automatically counts the number of exposure cycles (ie main exposure plus any additional memory sequence), and can display this information in the 'time-prints' and 'grade' displays. This is particularly useful if a run of identical prints are made from one negative. To obtain the display, press the 'prints' button. For example, 99 exposure cycles is displayed '9 9 P'.

Note

The maximum number of exposure cycles that can be counted is 999.

To return to the exposure time and grade display, press 'prints' again.

To reset the prints counter to zero, press and hold the 'prints clear' button until '0 0 P' is displayed. The need to retain pressure on the 'prints clear' button prevents inadvertent resetting of the prints counter.

Notes

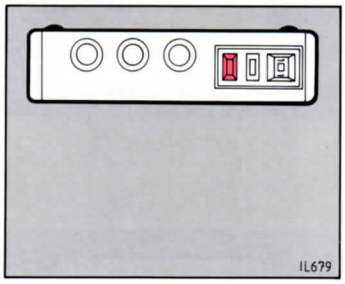
1 The prints counter does not record a cancelled exposure cycle.

2 Exposures can be made while the control unit is displaying the prints counter. The exposure time and grade are displayed, as normal, during the exposure. The prints counter records all completed exposure cycles during the prints display mode, and the revised number is displayed at the end of the exposure cycle.

3 While the control unit is in the prints display mode, the 'prints', 'prints clear' and 'expose-cancel' bar are the only controls that remain active.

4 The prints counter resets to zero when the equipment is switched off.

3.6 Audible signal ('bleep')



An audible signal in the control unit is controlled by the 3-position 'bleep' switch, located on the rear panel of the control unit. The three positions are:

1 Position '1'. The signal sounds every time a button or the 'expose-cancel' bar is pressed, to confirm positive selection.

2 Position '2'. The signal operates as detailed in position '1', with the addition of signals once a second during exposures or manual burning-in operations. In this position, the end of an exposure is indicated by a continuous signal over the last half-second.

3 Position '0'. The audible signal is switched off at all times.

3.7 Manual burning-in

For these operations, use the 'burn' button as described in section 6.

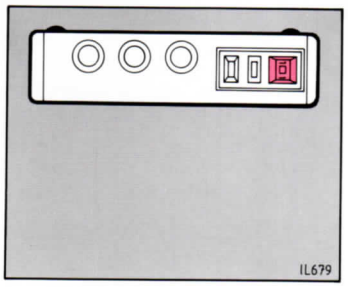
3.8 Burning-in operations using the memory facility

The control unit incorporates a memory store, capable of storing a maximum of eight memories in addition to the main exposure. The memory store is particularly useful for programming a sequence of additional exposures to

follow the main exposure. Each additional exposure can be made at a different grade. Once the memory has been programmed, the control unit steps through the sequence of exposures each time the 'expose-cancel' bar is pressed. The operating procedure is detailed in sections 7, 8 and 9.

Note

The stored memories are lost when the equipment is switched off. Use the memory record sheet supplied to record important memory sequences.



3.9 'Program' selector switch

The 'program' selector, located on the rear panel of the control unit, is used to compensate for any variations in light output due to manufacturing tolerances of individual lamps. It also allows the operator to make fine adjustments to the density matching of prints across the contrast range.

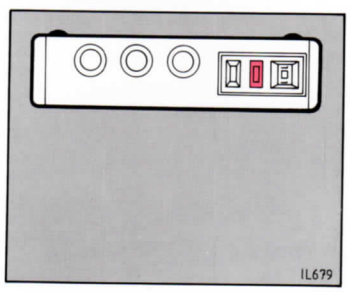
As figure 3.1 shows, the 'program' selector controls the intensity of green light only. Programs 1 to 7 are for use with the MULTIGRADE 500H enlarger head, fitted with ELH type lamps. Each step up or down increases or decreases the intensity of green light by approximately 10%. The normal setting is position 4.

Programs 8, 9 and 0 are for use with the small format MULTIGRADE 500HLZ enlarger head fitted with ELB type lamps. In this case, the normal setting is position 9.

Note

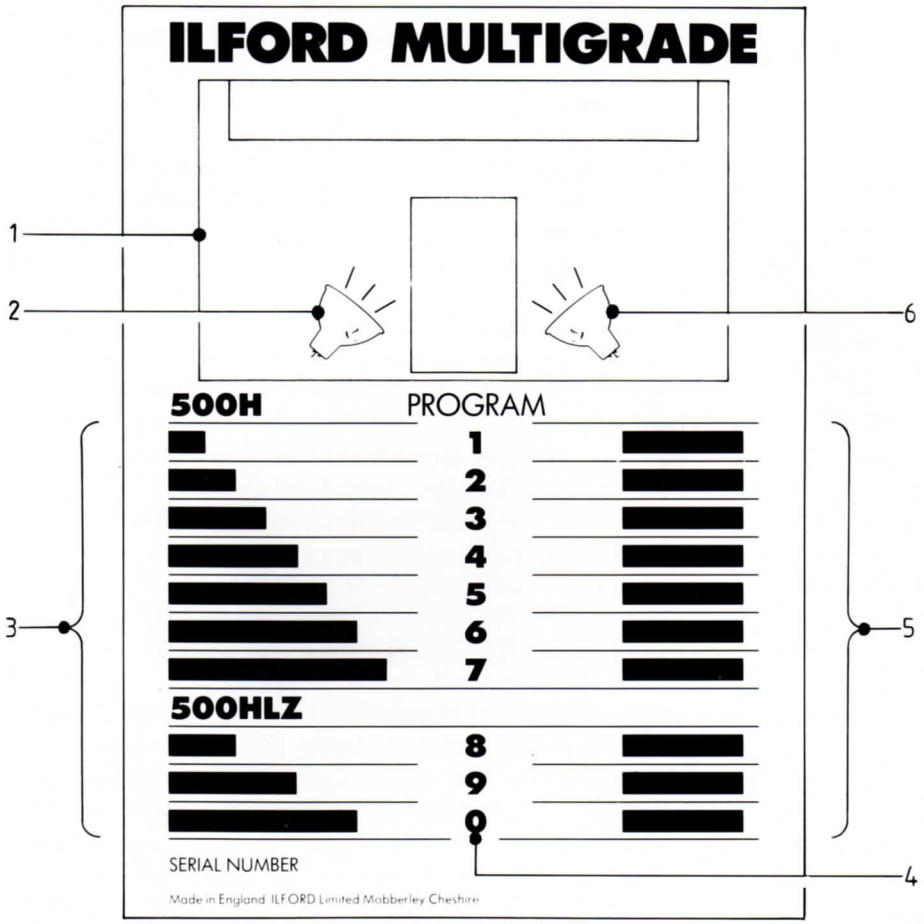
Programs 8, 9 and 0 should not be used with the MULTIGRADE 500H enlarger head, since print density will not be matched across the range of contrasts.

See section 4.6 for a detailed description of the 'program' selector switch setting up procedure.



3.10 Voltage compensation switch

The voltage compensation switch ('VC') is located on the rear panel of the control unit and controls the automatic voltage stabilization circuitry (see section 2.2b).



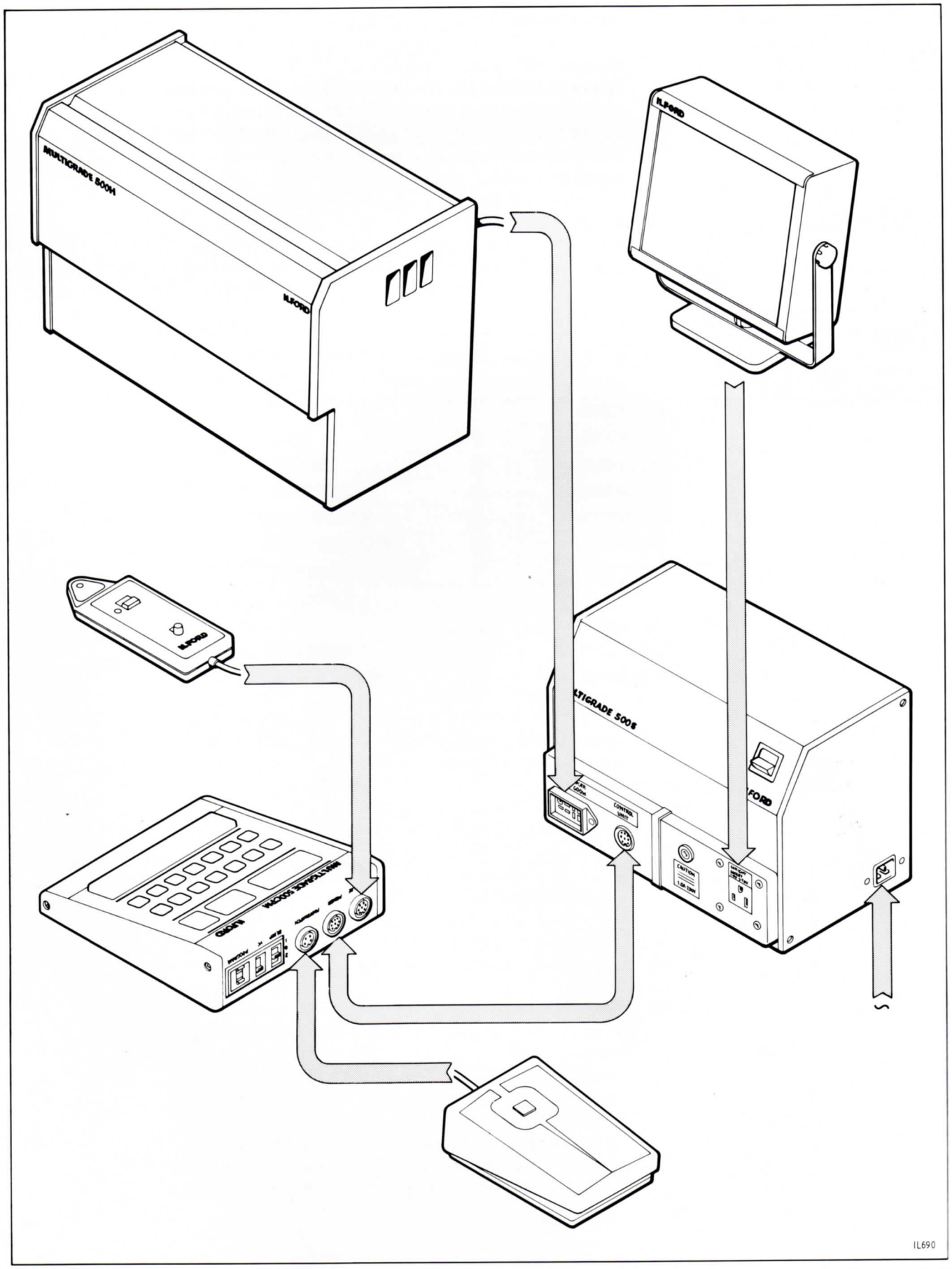
Light output related to program switch

Figure 3.1

Figure 3.1

1 MULTIGRADE 500H enlarger head
2 'Green' lamp
3 Green light output
4 Program switch setting
5 Blue light output
6 'Blue' lamp

It is important to note that the control unit is supplied with the 'VC' switch set in the '1' (on) position. If an external voltage stabilizer is to be used (see section 4.3e), the 'VC' switch must be set to the '0' (off) position. The switch is moved by using a small screwdriver or similar tool.



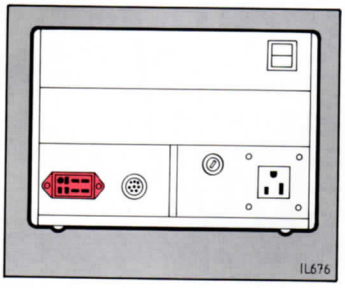
Installation

Figure 4.1

4 INSTALLATION

See figure 4.1.

CAUTION
Installation of the MULTIGRADE 500 system is very straightforward. However, if you are in any doubt about making any of the electrical connections, consult a competent electrician.



4.1 Enlarger head

For information on fitting the enlarger head to your particular enlarger, refer to the separate leaflet supplied with the adaptor kit.

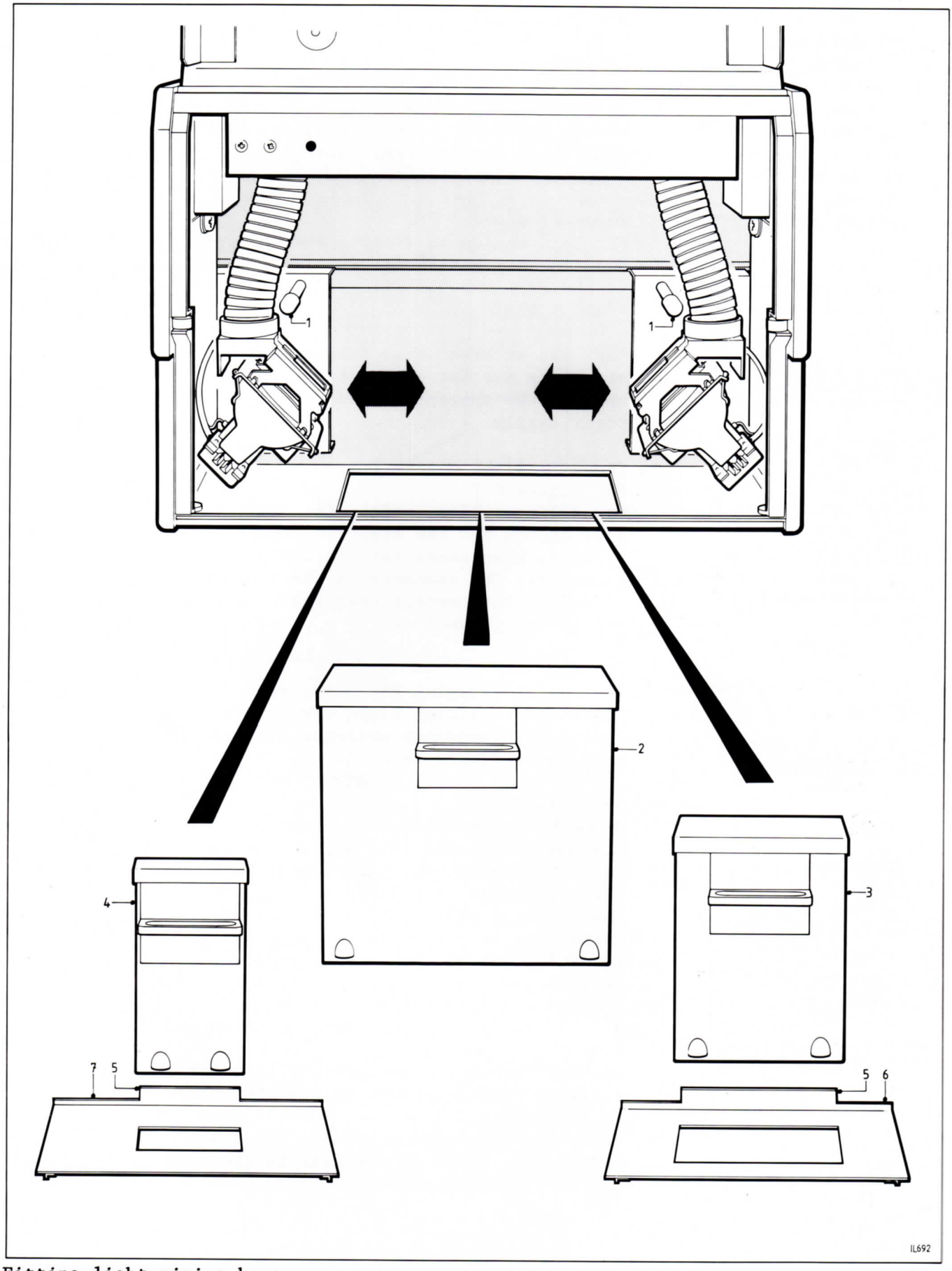
With the enlarger head fitted, ensure the air vents are not obstructed. Connect the head to the appropriate socket on the power supply.

4.1a Changing light mixing boxes

See figure 4.2.
For diffuser kits, select the correct size of box for the negative format to be printed, then carry out the following procedure. The sequence is the same for condenser kits except that only one light mixing box is supplied.

CAUTION
To prevent damaging the lamps when removing or fitting light mixing boxes, ensure the lamps are switched off and have been allowed to cool.

1 Open the door.
2 Slide both lampholders sideways away from the box, using the lamp slide handles.
3 Lift the mixing box, by holding the plastic handle, until the box is clear of the register plate, if fitted. Carefully remove the box from the enlarger head.
4 Carefully remove the register plate, if fitted.
5 Fit the required register plate and associated light mixing box, as shown.
Note
The 4x5 inch box fits directly into the enlarger head aperture. No register plate is required.
6 Slide the lampholders towards the light mixing box. Stops on the rear of the 35mm and 6x7cm format register plates position



Fitting light mixing boxes

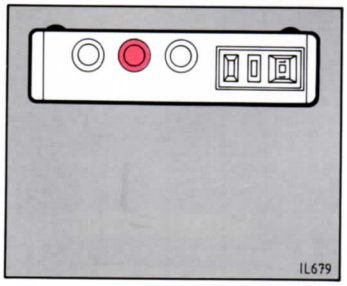
Figure 4.2

Figure 4.2

1 Handle - lamp slide
2 Light mixing box (4x5 inch format)
3 Light mixing box (6x7cm format)
4 Light mixing box (35mm format)
5 Register plate stop
6 Register plate (6x7cm format)
7 Register plate (35mm format)

the lamps correctly relative to the light mixing box. For the 4x5 inch box, the lamps are positioned correctly when they are at their maximum distance apart.

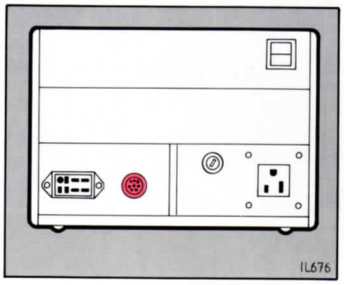
7 Close the door. There is no setting up procedure required. Each adaptor kit is designed to suit the particular enlarger.



4.2 Control unit

Connect the 'power' socket to the appropriate socket on the power supply with the cord supplied. Tighten the plug securing ring at both ends.

See section 4.6 for the 'program' selector switch setting up procedure.



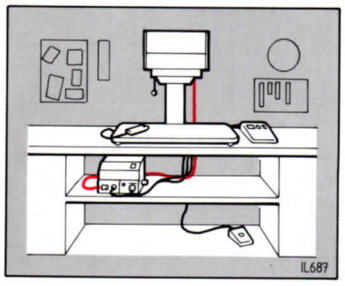
4.3 Power supply

4.3a Supply voltage

To replace a mains input fuse, see section 12.4.

4.3b Working environment

The power supply is totally enclosed and becomes warm with extended use. It is advisable to position the unit so that adequate all round ventilation is provided at all times.



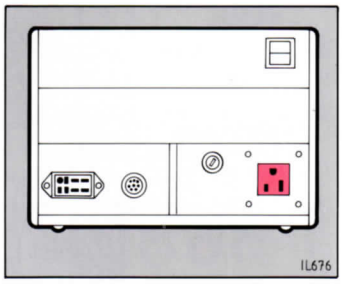
Extension cords are available for connecting to the control unit and enlarger head supply cords. These extension cords enable the power supply to be positioned away from the working area, and are available as optional extras.

CAUTION
For safety reasons, do not position the power supply on the floor.

When the power supply has been positioned, ensure there is enough slack in the cord to the enlarger head, to allow full travel of the head on the enlarger column.

4.3c Connection of safelight

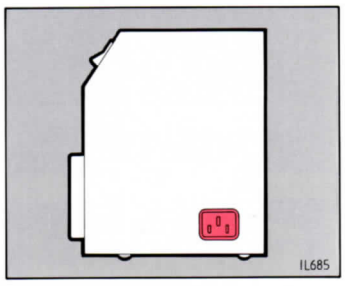
Connect the plug on your safelight cord to the 'safelight 1 amp' socket.



WARNING
The recommended maximum current of 1 amp must not be exceeded.

4.3d Connection to mains supply

If a moulded plug is not fitted to the mains cord provided, connect a plug of at least 10 amp rating as follows:



1a Brown wire to the live pin (marked L).
1b Blue wire to the neutral pin (marked N).
1c Green/yellow wire to the earth pin (marked E or ⏚).
2 If a fused plug is used, fit a 5 amp fuse.
3 Connect the other end of the mains cord to the 'mains input' socket. Ensure the plug is pushed fully into the socket.

4.3e External voltage stabilization

Certain installations may be subject to large variations in mains voltage. If these variations are regular and larger than the range that is compensated for by the control unit (see section 2.2b), it will be necessary to connect the power supply to the electrical mains supply via a voltage stabilizer. If an external voltage stabilizer is used, the automatic voltage stabilization circuitry in the control unit must be switched off (see section 3.10).

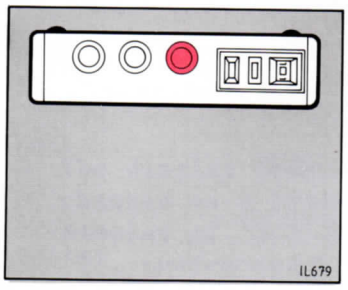
Voltage stabilizers used in some darkrooms are not suitable for the MULTIGRADE 500 system. It is important that the voltage stabilizer has a pure sine wave output and is rated at least 750 watts. Typical examples of suitable voltage stabilizers are the Rayco SOS750 or the Claude Lyons MS300.

4.3f Interference on the mains supply

Certain installations may be subject to severe interference on the mains supply, causing incorrect operation of the MULTIGRADE 500 system. If the problem persists (see section 13.2) it will be necessary to connect the power supply to the electrical mains supply via a mains interference filter.

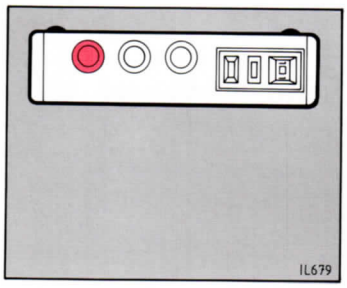
Note

Many voltage stabilizers (see section 4.3e) incorporate interference filters. Check the manufacturer's specification.



4.4 Footswitch

Connect the footswitch to the appropriate socket on the control unit, and tighten the plug securing ring.



4.5 Exposure probe

Connect the probe to the appropriate socket on the control unit, and tighten the plug securing ring.

4.6 Setting up procedure

To obtain the best performance from the MULTIGRADE 500 system, the following setting up procedure must be carried out after installing the equipment and after all lamp replacements.

The procedure should be carried out using a negative that prints with some areas of even grey tone, that can be matched in density to the ILFORD Mid-tone density card supplied with this manual. For consistently good results, the negative chosen should be retained as a standard for subsequent setting up procedures.

The procedure compares the density of mid-tones at the two extremes of contrast, for each of the 'program' selector switch settings 1 to 7 (MULTIGRADE 500H enlarger heads) or 8 to 0 (MULTIGRADE 500HLZ enlarger heads). See also section 5.

1 Using the chosen negative, make a print at grade 5. Adjust the exposure until an area of mid-tone on the print matches the ILFORD Mid-tone density card. Visual assessment is adequate. Note the area of mid-tone selected.

Note

The density of the rest of the print is unimportant for this procedure.

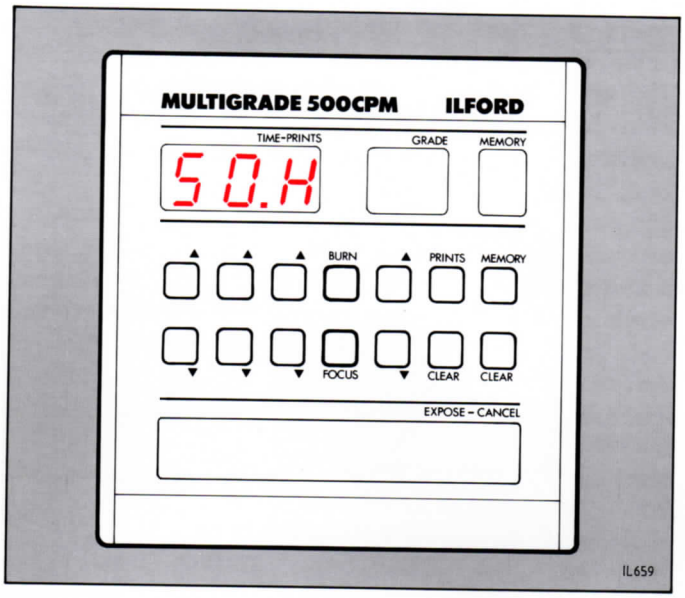
2 Using the same exposure, make prints at grade 0 for each of the 'program' selector switch settings 1 to 7 (MULTIGRADE 500H enlarger heads) or 8 to 0 (MULTIGRADE 500HLZ enlarger heads). Mark each print with the switch setting used.

3 Compare the same areas of mid-tones (as in operation 1) on each of the 7 (or 3) prints with the ILFORD Mid-tone density card. Select the print that matches.

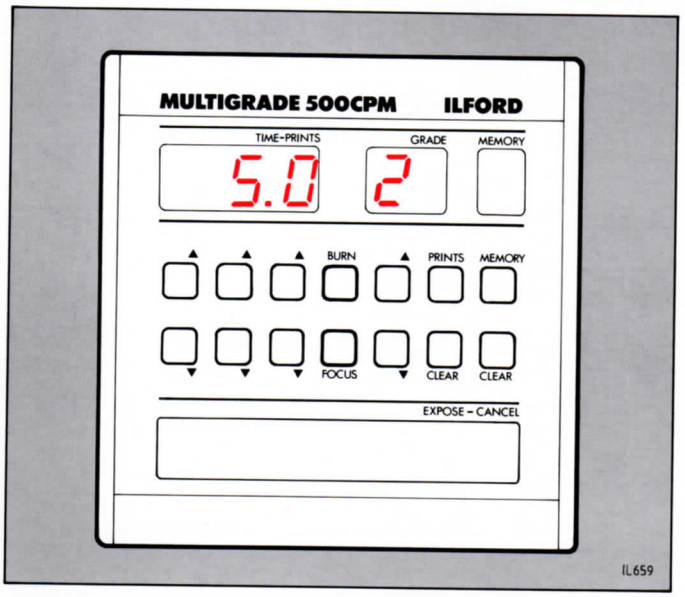
4 Set the 'program' selector switch to the number indicated on the selected print.

5 PRINT MAKING- STANDARD METHOD

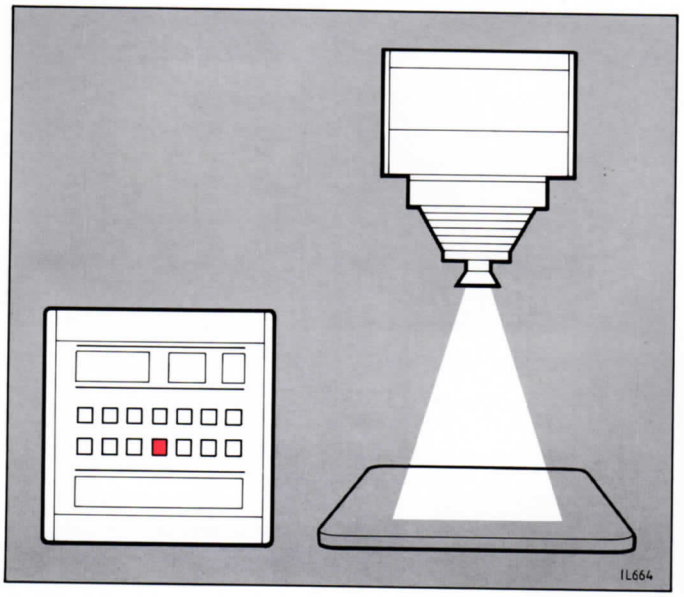
1 Switch the system on. Check the display on the control unit briefly shows the correct mains supply frequency of 50 or 60Hz, as shown.

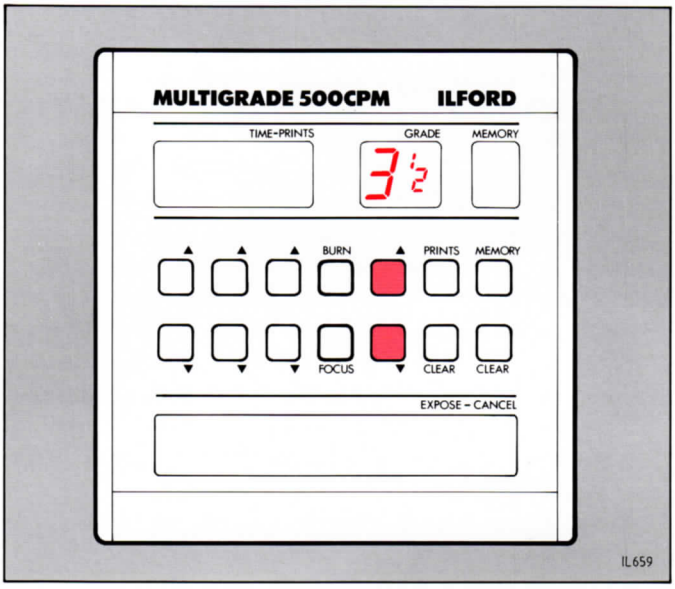


2 The display then changes to a typical display of '5.0' and '2', indicating 5 seconds at grade 2.

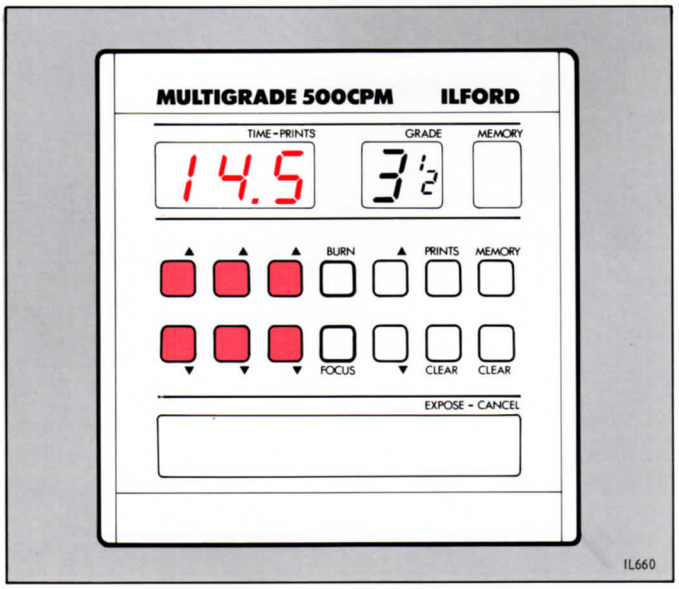


3 Locate your negative in the enlarger. Select 'focus'. Light suitable for focusing, composition and assessment is projected.

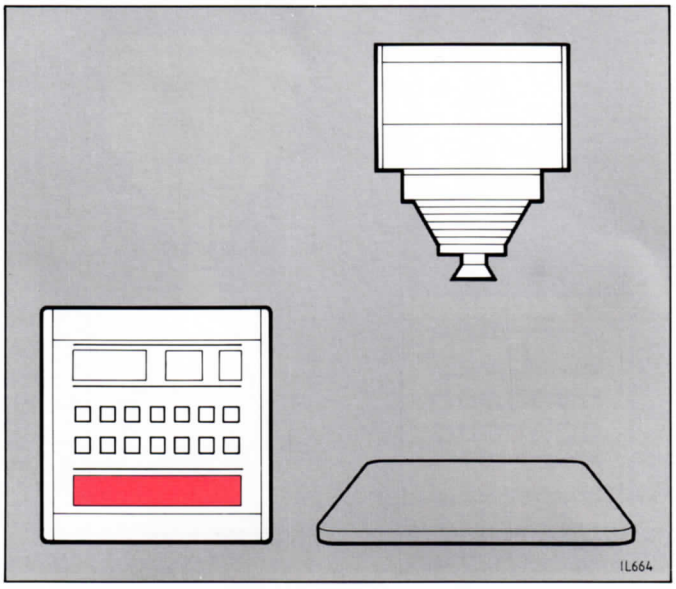




4 Select the contrast required. See section 3.1.
Note
This operation can be done after operation 6, if preferred.

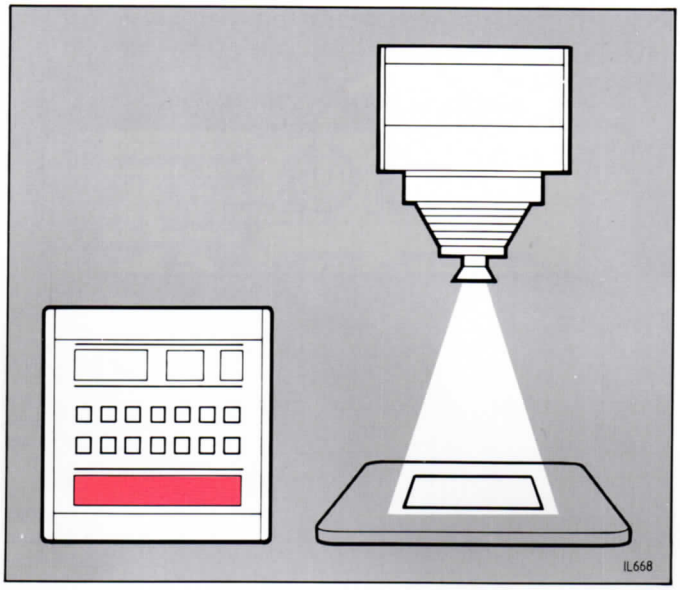


5 Select the estimated exposure time. See section 3.2.
Note
This operation can be done after operation 6, if preferred.

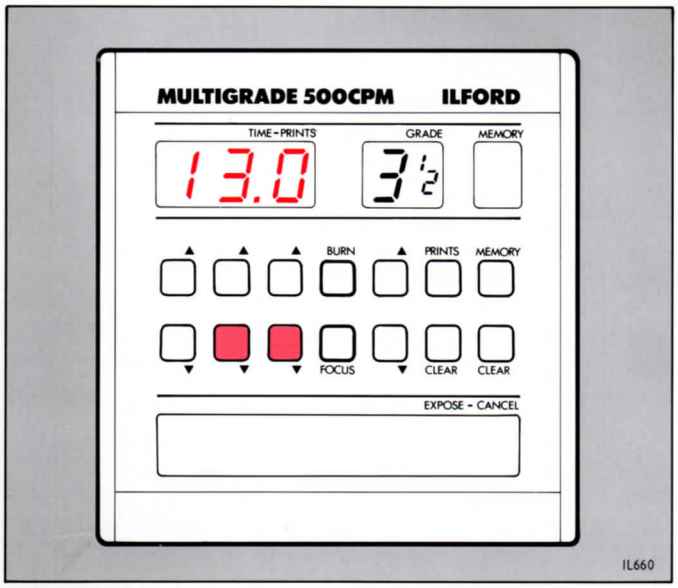


6 Cancel 'focus' by pressing 'expose-cancel'.

7 Position a sheet of ILFORD MULTIGRADE paper on the enlarger base board. Expose the sheet by pressing 'expose-cancel'.
Note
To cancel exposure during timer countdown, press 'expose-cancel' again.

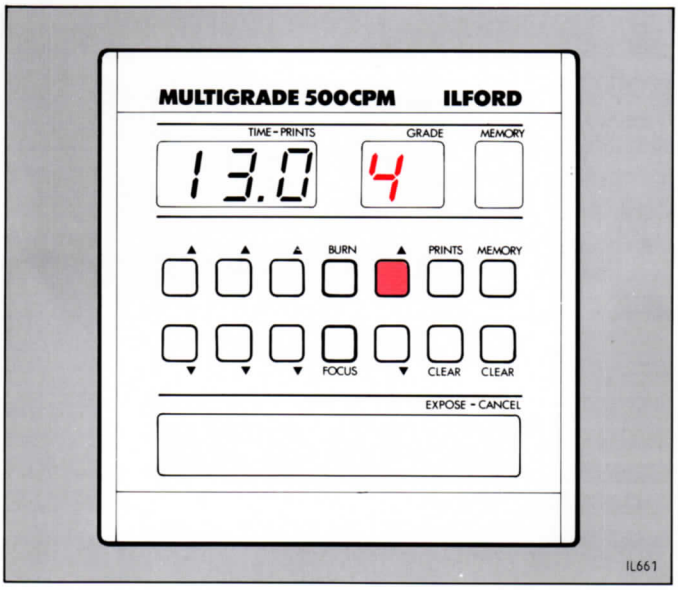


8 Process the exposed paper. Check the print for density. If necessary, correct the exposure and make another print.

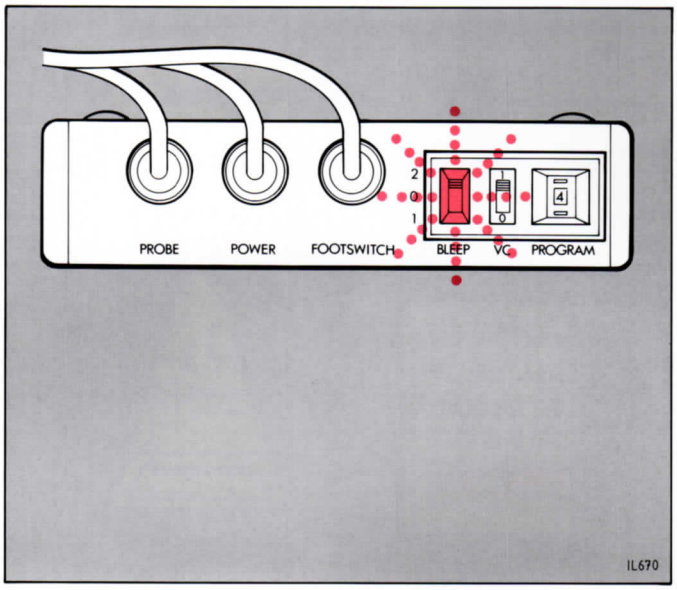


9 Check the print for contrast. If necessary, make another print at a different grade.

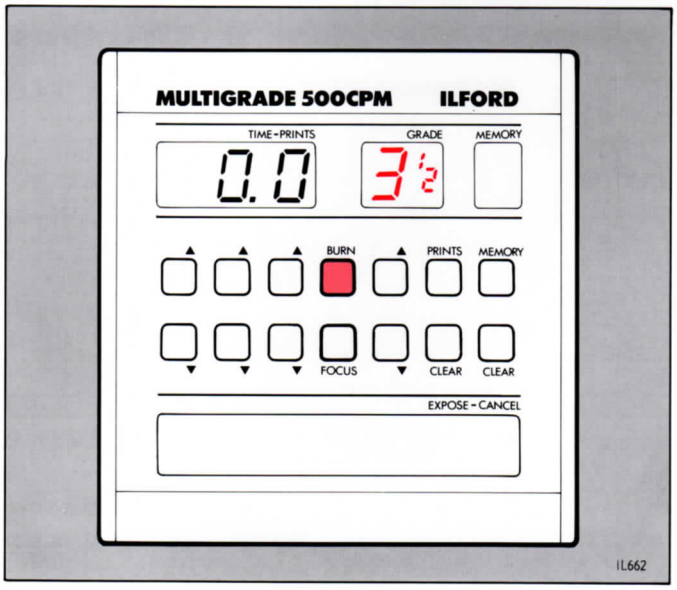
It is not necessary to alter the exposure time when changing grades, since the light intensity is adjusted automatically across the range of contrasts.



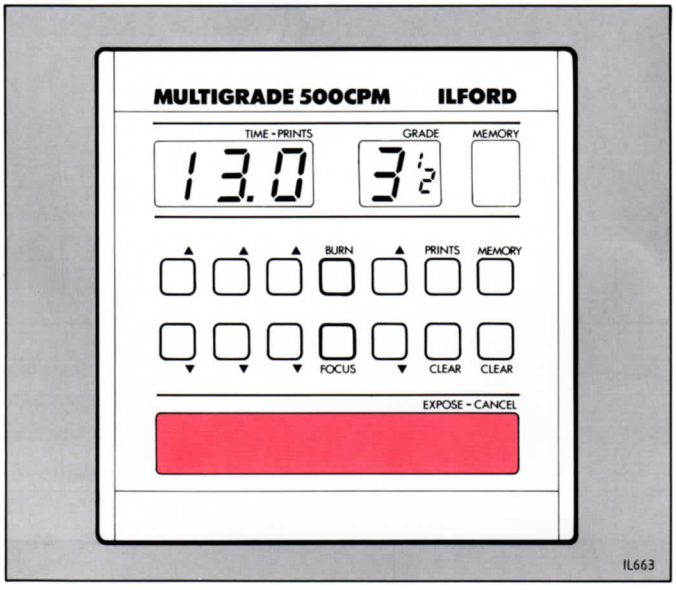
6 MANUAL BURNING-IN OPERATIONS



1 If required, set 'bleep' to '2'. The audible signal will sound once a second to assist counting the additional exposure.



2 Select the grade required. Press 'burn' and time the additional exposure. The time display counts up from zero.

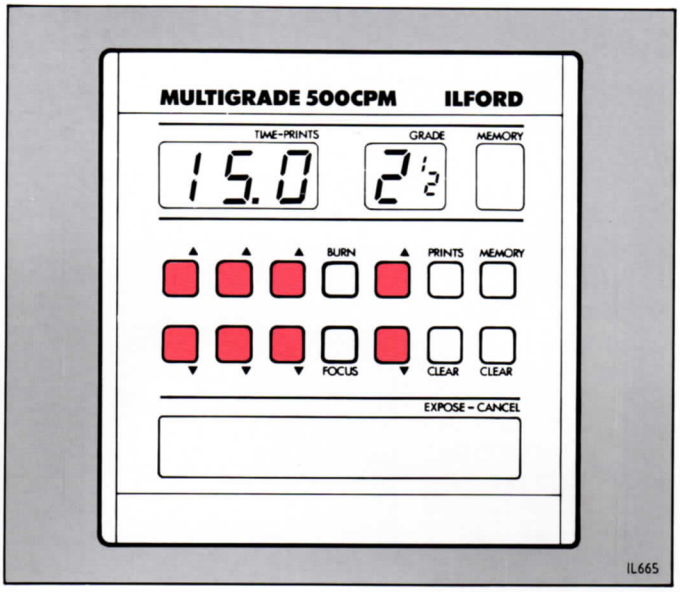


3 Stop the exposure by pressing 'expose-cancel' or by using the footswitch.

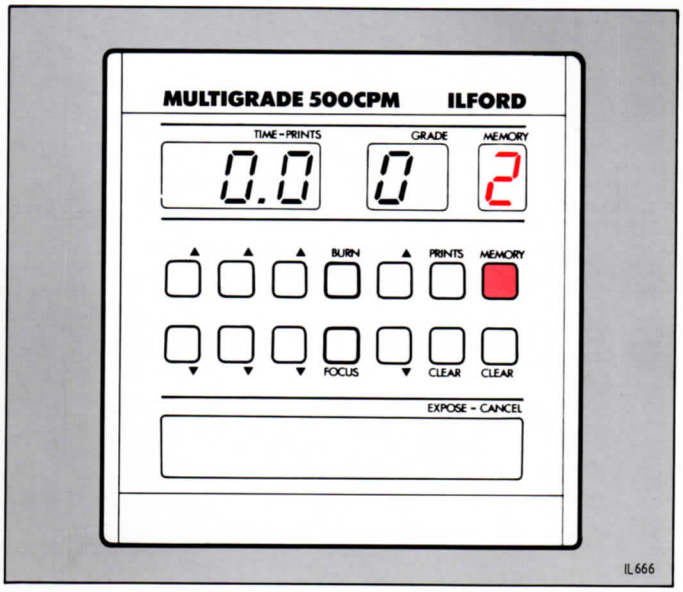
Using this method, several different areas of the print can be given additional exposure, at different grades, to obtain the desired result.

7 PROGRAMMING THE MEMORY

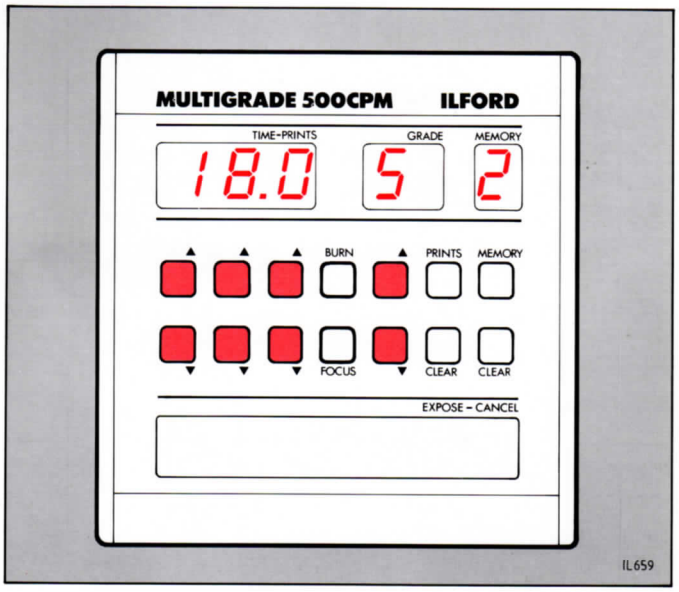
1 The values shown in the following diagrams are given for example only. Set the main exposure time and grade required with the up and down buttons (this will become memory '1').



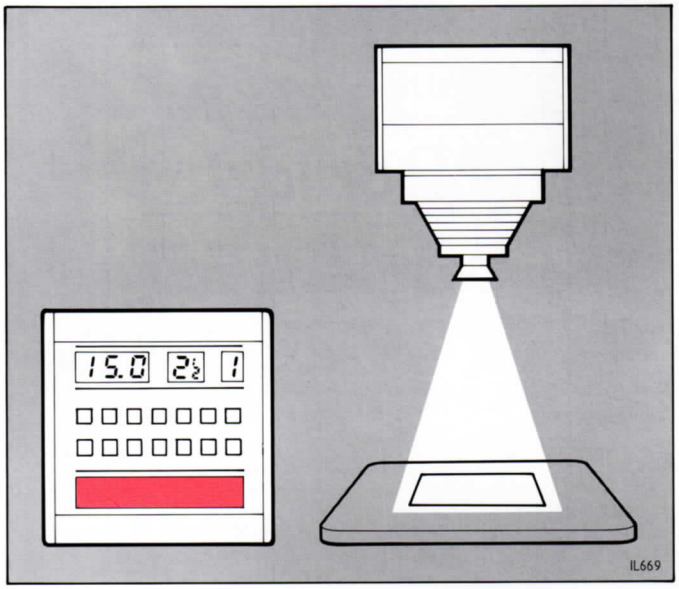
2 Press 'memory'. A '2' will appear in the memory display indicating the second exposure to be entered. The exposure time and grade displays will show zero.



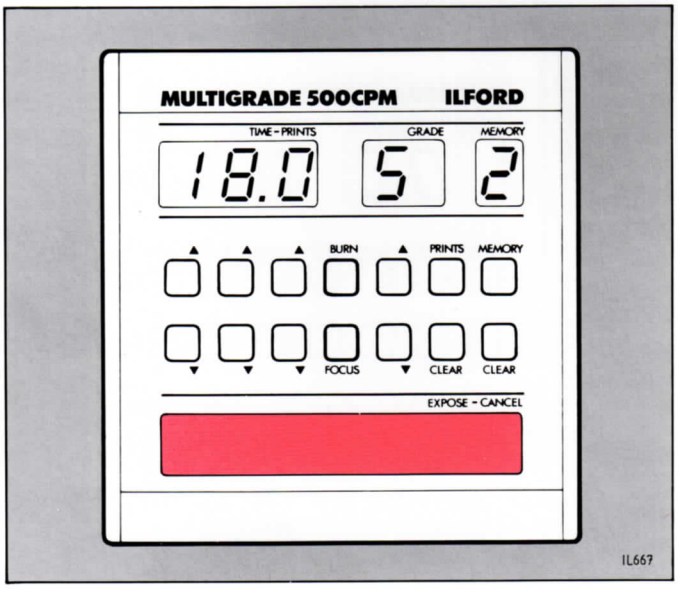
3 Press the exposure time and grade up and down buttons until the displays show the values required for the second exposure. Press 'memory'. Continue in this way until the required number of memories have been stored.



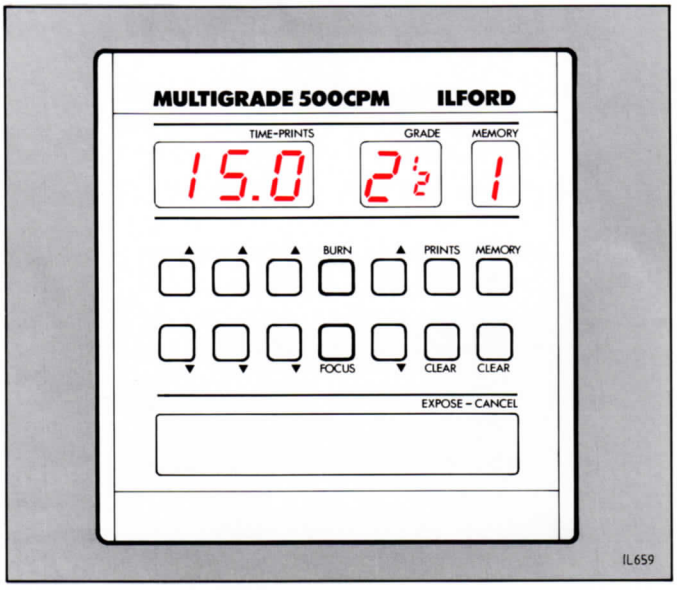
8 USING THE STORED MEMORIES



1 Press 'expose-cancel' to return to memory '1' (see section 9.1). With a sheet of paper on the enlarger base board, press 'expose-cancel'. The sheet is exposed for the values given in memory '1'.



2 When this exposure is complete, a '2' appears in the memory display together with the exposure time and grade previously stored in memory 2. Press 'expose-cancel' to give the sheet additional exposure for the values given in memory '2'. Shade the paper as required.



3 Continue in this way. When the last of the stored memories has been run, two audible signals are given and the display automatically returns to memory '1', ready to run the sequence again.

9 DELETING AND CHANGING MEMORIES

9.1 To return to memory '1'

The following is useful information for section 8, operation 1 and sections 9.2 to 9.6.

Assuming memories '1' to '5' are programmed, and memories '6' to '9' are not, there are two methods of returning to memory '1' from memory '5' (ie the last programmed memory). The first method is to press 'memory' a further five times through memories '6' to '9' until memory '1' is displayed.

The second method is a short cut method as follows:

1 Press 'memory' once. Memory '6' is displayed.
2 Press 'expose-cancel' to return quickly to memory '1'.

9.2 Deleting a memory

To delete one of the memories, carry out the following sequence:

1 Press 'memory' repeatedly until the memory to be deleted is displayed.
2 Press the exposure time decrease buttons until zero is displayed in the exposure time display.
3 Return to memory '1' (see section 9.1).

When the memory sequence is re-run, it will skip the deleted memory.

Note

Any number of memories can be deleted by following the above procedure.

9.3 Modifying an existing memory

To modify one of the memories, carry out the following sequence:

1 Press 'memory' repeatedly until the memory to be modified is displayed.
2 Using the exposure time and grade up and down buttons, change the display to the required new values.
3 Return to memory '1' (see section 9.1).

Note

Any number of memories can be modified by following the above procedure.

9.4 Adding a new memory

To add a new memory, carry out the following sequence:

1. Press 'memory' repeatedly until the required new memory is displayed.
2. Using the exposure time and grade up and down buttons, change the display to the required new values.
3. Return to memory '1' (see section 9.1).

9.5 Selecting and using a particular memory

To select and use a particular memory, carry out the following sequence:

1. Press 'memory' repeatedly until the required memory is displayed.
2. Press 'expose-cancel'. The sheet is exposed for the values given in the selected memory.

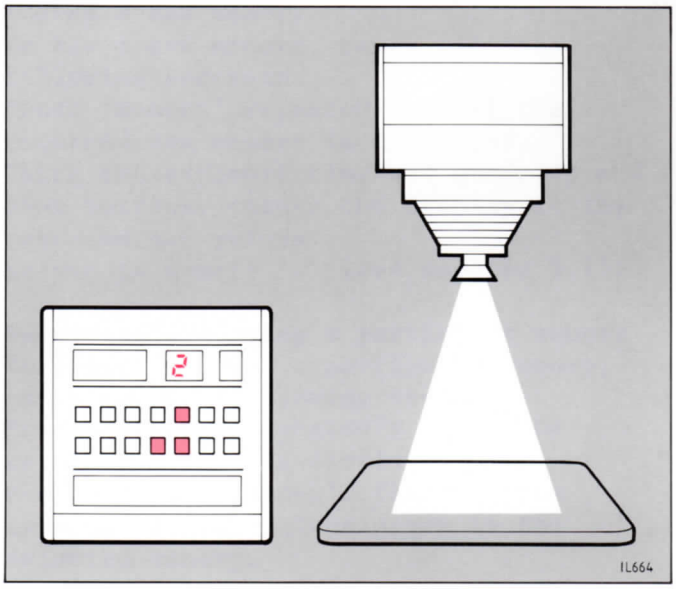
   Note

   At the end of the exposure, the next memory in the sequence is automatically displayed.
3. Return to memory '1' (see section 9.1).

9.6 To clear all memories

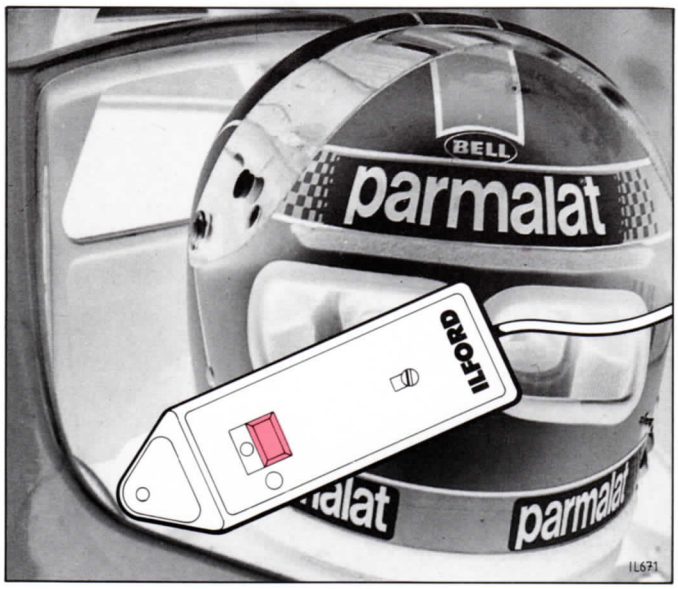
To clear all memories, ie to reduce all exposure times to zero quickly, press and hold the 'memory clear' button until the memory display clears. The display will show the exposure time and grade for the main exposure and a blank memory display. The need to retain pressure on the 'memory clear' button prevents inadvertent clearing of the memories.

10 PRINT MAKING USING THE EXPOSURE PROBE



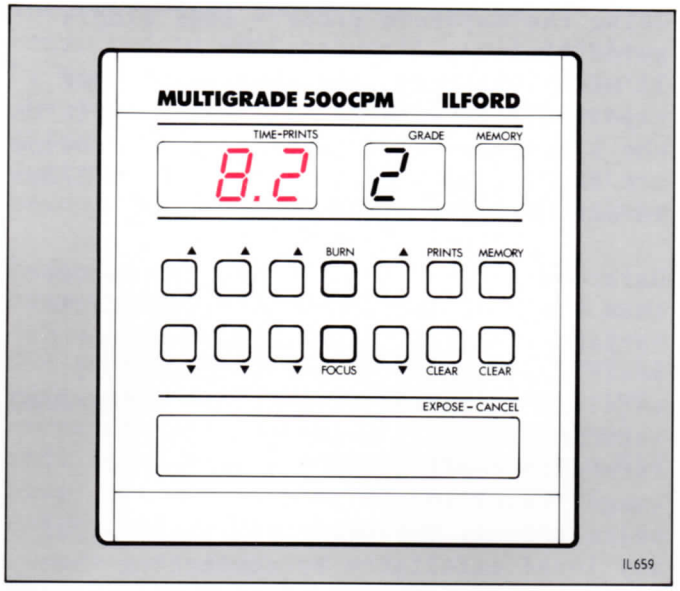
1 With the probe calibrated (see leaflet supplied with the probe) and a negative in the enlarger, select 'focus'. Focus and compose the required image. Select the contrast required.

2 Check the probe LED is switched on. Position the probe photocell in a shadow area where you wish to retain detail on the final print. For accurate measurements, position the photocell towards the centre of the projected image (see section 10.1).

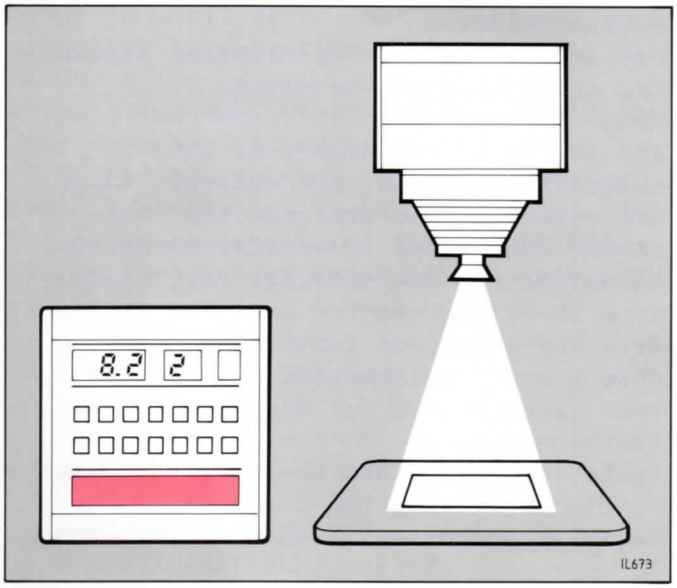


3 Press and release the probe switch to start the measurement period. Observe the guide lines detailed in section 10.1.

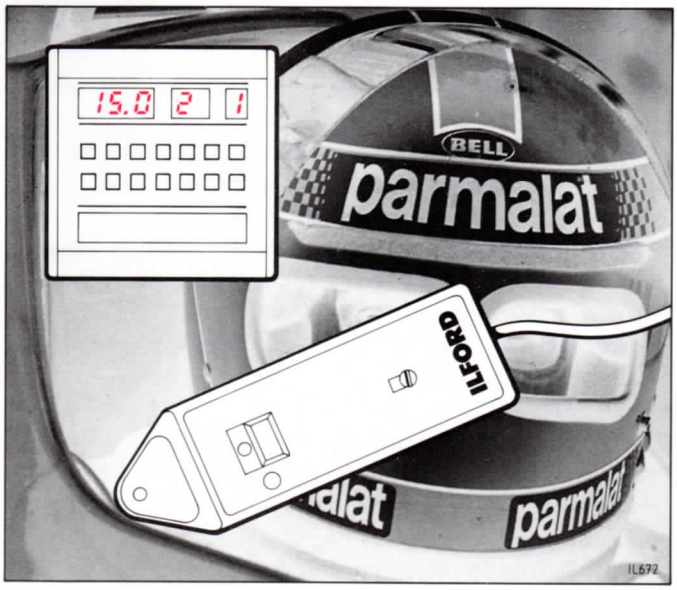
4 The calculated exposure time is displayed after approximately 5 seconds and the enlarger lamps are switched off automatically, cancelling 'focus'. Print making can now begin.



5 Position a sheet of paper on the enlarger baseboard. Press 'expose-cancel'. The sheet is exposed for the calculated time. Process and assess the final print (see leaflet supplied with the probe).



6 The exposure probe can be used if the control unit has stored memories (see sections 7, 8 and 9). In this case, measurements are taken as described above, memory '1' is automatically selected and changed. Memories 2 to 9 remain unchanged.



10.1 Using the exposure probe - some simple guide lines

If used correctly, the MULTIGRADE 500P exposure probe can be of great benefit to the black and white printer. Listed below are some simple rules to observe in order to maximise the probe accuracy.

1 Darkroom safelights must be no brighter than that recommended when using ILFORD variable contrast paper, and must not be positioned close to the equipment. If safelights are too bright, the background illumination will swamp the light intensity readings of the projected image, resulting in incorrect calculations. For best results, control any local safelights by connecting them to the MULTIGRADE 500 equipment (see section 4.3c).

2 During the 5 second calculation period, the probe must not be moved.

Note

For the last two seconds of the calculation period, the enlarger lamps are automatically switched off. This enables the probe to measure background illumination, and subtract this reading from the first reading of light intensity from the projected image. The display then gives a recommended exposure time that is corrected for background illumination.

3 It is important that the operator remains stationary during the 5 second calculation period. Even when the probe is measuring background illumination (see 2 above), it is essential that the operator and the probe remain stationary to avoid light reflections from clothing and/or shadows falling across the probe photocell.

4 For accurate results, always position the probe as close to the centre of the projected image as possible.

5 The MULTIGRADE 500 system is programmed to calculate the correct exposure time for a wide range of negatives. Inevitably, there will be some negatives (showing extremes of exposure or development, or not having a suitable spot from which to take readings) that may produce inaccurate results. If difficulty is found in obtaining a high percentage of correctly exposed prints, re-calibrate the probe (see leaflet supplied with the probe).

11 AUTOMATIC ROLL EASELS

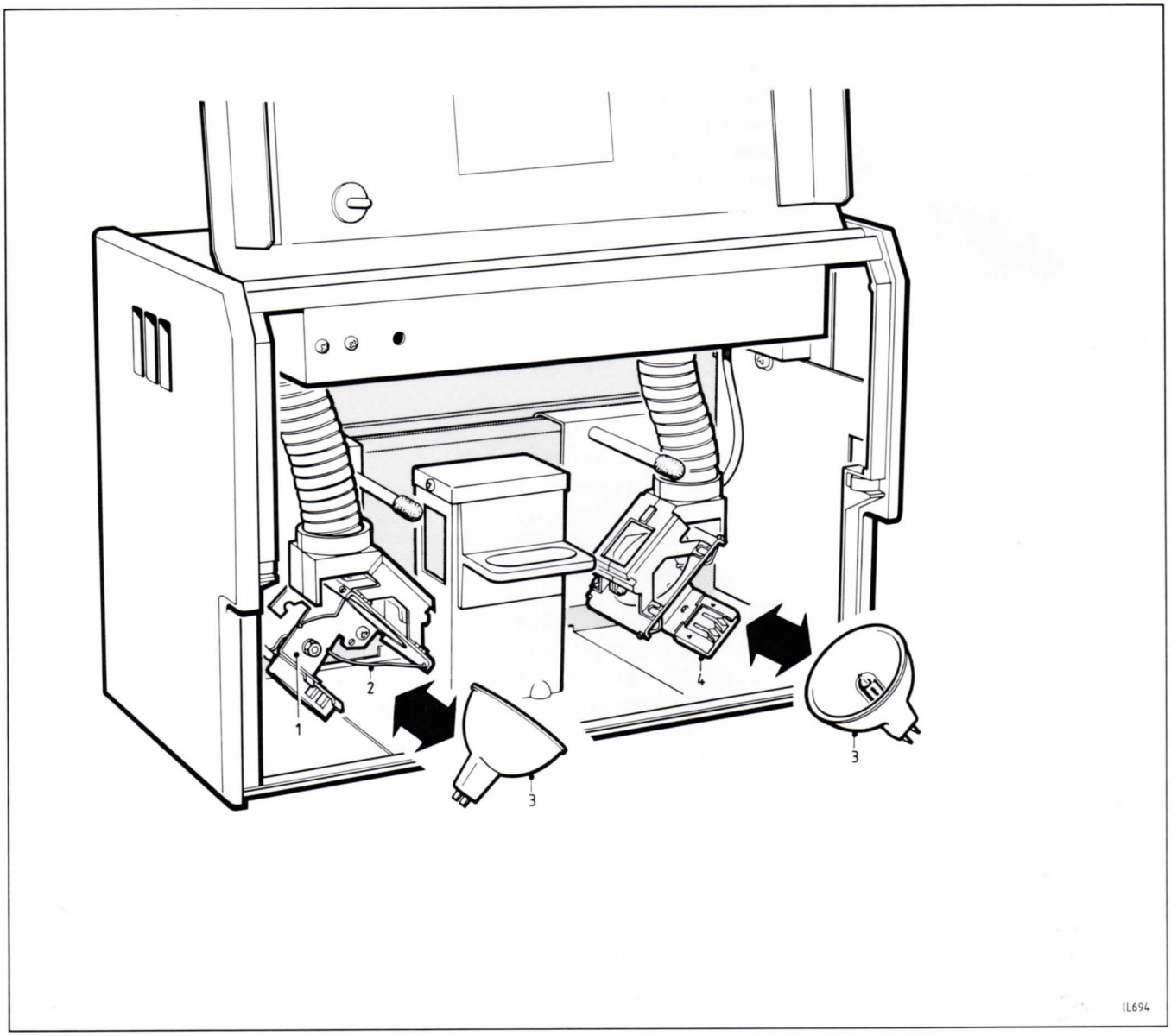
The MULTIGRADE 500 system can be connected to most automatic roll easels by using an ILFORD roll easel converter. The converters are supplied as optional extras complete with fitting instructions. Please quote the correct part number (listed below) when ordering.

Part number 6082-P-003 for 220/240V.
Part number 6082-P-004 for 120V.

The converter is an interface unit and is very easy to install. There are just two connections to make, one to the control unit 'footswitch' socket (via a 4-pin DIN plug) and one to the roll easel power output (via a 2-pin plug).

Note
Prior to use, ensure that memories 2 to 9 are clear (see section 9.6).

In use, the MULTIGRADE 500CPM control unit exposure time display is set to '0.0' by the operator, and the exposure time is controlled by the roll easel. In all other respects, the MULTIGRADE 500 system operates as described in this manual.



Lamp removal and replacement

Figure 12.1

12 CLEANING AND SIMPLE REPAIRS

Figure 12.1
1 Lampholder
2 Lamp retaining spring
3 Lamp
4 Electrical connector

12.1 Cleaning

Cleaning is the only routine maintenance required on the MULTIGRADE 500 equipment. Carry out the following operations at regular intervals:

1 Remove dust and debris from the light mixing box(es) with a soft brush. Take care not to leave finger prints on the diffuser and internal plastic mirrors.
2 The control unit switch panel should be cleaned periodically using a damp, lint free cloth.

12.2 Replacing a lamp

See figure 12.1.

WARNING
Switch the system off and allow the lamps to cool before handling them.

To replace a lamp, proceed as follows:

1 Open the enlarger head door.
2 If necessary, slide the lampholders away from the light mixing box.
3 Support the lampholder and carefully pull the lamp forwards away from the electrical connector and retaining spring. It is not necessary to remove or unclip the spring.
4 Fit the replacement lamp with the pins either way round, ensuring the pins are entering squarely into the connector before pushing the lamp into position.
5 When using the two smaller format mixing boxes, slide the lampholders back into position.
6 Close the door.
7 **Important.** Carry out the setting up procedure detailed in section 4.6.

12.3 Projection lamps - preventive maintenance

The projection lamps used in the MULTIGRADE 500H enlarger head are precision made items. To ensure maximum lamp life and to obtain the best results from the lamps, always keep the following points in mind.

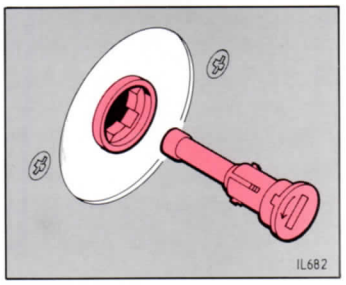
1 Avoid excessive vibration and mechanical shock, particularly when the lamps are switched on.
2 Ensure the lamps are the correct type (see section 14 **MULTIGRADE 500H enlarger head**).

3 Ensure the power supply is always operated at the correct voltage. Unusually high voltages will reduce lamp performance leading to premature lamp failure.

4 Ensure the cooling fan operates correctly, and that the air vents are not obstructed.

5 Do not touch the inner reflective surface of the lamp, and especially the bulb.

12.4 Replacing the mains input fuse



1 Remove the fuseholder cap, complete with fuse, by turning the cap anti-clockwise until it is released by spring action.

2 Fit the correct fuse (see section 14 **MULTIGRADE 500S power supply**).

3 Refit the fuseholder and secure it by turning the cap clockwise.

Note
Use the same procedure described above to replace the safelight socket fuse.

13 FAULT FINDING

Tables 13.1 to 13.4 provide a list of checks to make should there be any problems with the equipment; these checks can be made by any competent person. If the checks prove to be ineffective, contact your nearest ILFORD selling company, the address of which can be found on the back cover of this manual.

CAUTION
If in doubt about making any of the following checks, consult a competent engineer. Any further repair work carried out by unqualified personnel will invalidate any warranty applicable to the equipment.

Figure 13.1

13.1 MULTIGRADE 500H enlarger head

Symptom	Possible cause and recommended action
1 One lamp not working	**Lamp defective or blown** Replace lamp (see section 12.2).
2 Both lamps and fan not working	**Poor connection between power supply and enlarger head** Check enlarger head is plugged correctly into the power supply. **Door open** Close enlarger head door.
3 Both lamps switch off during use	**Safety cut-out has operated** The cut-out operates under abnormal operating conditions, for example, fan failure, and is self resetting. If the fault persists, contact your nearest ILFORD selling company.
4 Uneven illumination on the enlarger baseboard	**Light mixing box and/or register plate incorrectly positioned or damaged** Examine light mixing box and register plate for damage. Clean the light mixing box (see section 12.1).
5 Change in print density with change in contrast selection. Incorrect grade	**Incorrect program selected on control unit** Select alternative program (see section 4.6). **Lamps incorrectly positioned** Check lamp slides are correctly positioned relative to the light mixing box (see section 4.1a). **Incorrect lamps fitted** Check all lamps are of the correct ANSI code (ELH for MULTIGRADE 500H enlarger heads, and ELB for MULTIGRADE 500HLZ enlarger heads).
6 Lamps blow frequently or light output is low	**Incorrect program selected on control unit** See symptom 5.
7 Lamp contacts black or pitted	**Defective lampholder** Replace lamp and lampholder. Contact your nearest ILFORD selling company.

13.2 MULTIGRADE 500CPM control unit

Symptom	Possible cause and recommended action
1 Display and key pad fail to illuminate	**Failure of power supply** See table 13.3. **Poor connection between power supply and control unit** Check control unit is plugged correctly into the power supply.
2 'HELP 1' is displayed when control unit is switched on (see figure 13.1)	**Mains frequency measured to be out of limits** Mains frequency may not be within the range 45-65Hz. Switch the equipment off then on again.
3 'HELP' is displayed when exposure probe is being used	**See table 13.4**
4 Display becomes inoperative	**Severe interference on the mains supply** Switch power off and on again. If the fault persists, it is recommended to power the equipment via a mains interference filter. See section 4.3f.
5 No audible signal	**'Bleep' signal switched off** Adjust position of 'bleep' switch (see section 3.6).

13.3 MULTIGRADE 500S power supply

Symptom	Possible cause and recommended action
1 On/off switch fails to illuminate. No power to output sockets	**Poor connection between electrical mains and power supply** Ensure plug at each end of mains cord is pushed fully into socket. **Mains fuse blown** Replace fuse (see section 12.4).
2 Mains fuse blown	**Incorrect mains fuse fitted** Check and replace fuse (see section 12.4). If fault persists, contact your nearest ILFORD selling company. **Faulty power supply** Contact your nearest ILFORD selling company.

13.4 MULTIGRADE 500P exposure probe

Symptom	Possible cause and recommended action
1 'HELP 2' displayed	**Calibration knob is set between two numbers** Move the calibration knob to the nearest whole number. **Faulty probe** Return probe to your nearest ILFORD selling company. **Note** To cancel the 'HELP' display, press 'expose-cancel'.
2 'HELP 3' or 'HELP 5' displayed	**Light intensity too high for probe to measure** Close enlarger lens aperture. **Note** To cancel the 'HELP' display, press 'expose-cancel'.
3 'HELP 4' displayed	**Light intensity too low for probe to measure** Open enlarger lens aperture. **Note** To cancel the 'HELP' display, press 'expose-cancel'.
4 Incorrect or erratic results	a **Probe moved during measurement period** Do not move probe until the recommended time is displayed on control unit. The measurement period will take about 5 seconds (see section 10.1). b **Operator moved during measurement period** Do not move or lean over the probe during the measurement period. Changes in background illumination will cause errors (see section 10.1). c **Safelights too bright** See section 10.1. d **Unsuitable area on projected image chosen to take measurements** Select a shadow area towards the centre of the projected image (see section 10.1).

Symptom		Possible cause and recommended action
		e **Unsuitable negative** Negatives should be correctly exposed and processed with a good tonal range (see section 10.1). Some negatives, for example, those used in electron microscopy, are unsuitable for taking probe measurements.
5	Probe cannot be calibrated within the range of the calibration knob	**Coarse adjustment incorrect** See leaflet supplied with probe.
6	Grade and density incorrect on final print	**Wrong grade chosen on control unit** Select new grade. **Note** When using the probe, exposure time must be determined every time the grade is changed.
7	Probe switch LED fails to illuminate	**Poor connection between probe and control unit** Check probe is plugged correctly into the control unit.

14 SPECIFICATION

MULTIGRADE 500H ENLARGER HEAD

Dimensions	Height 216mm Width 316mm Depth 173mm
Weight	3kg excluding light mixing box and adaptor kit
Construction	Black stoved aluminium alloy sheet and extrusion, with polycarbonate end plates
Electrical cord (integral)	Multicore Length 2m Maximum voltage 120Vac
Lamps	Two 120Vac 300W ANSI code ELH Quartz halogen projection lamp with dichroic reflector.
Heat filters	Four 30x15x2mm heat absorbing glass
Color filters	Two 25x25x1mm. One blue and one green dichroic interference filter coating on glass substrate. Tempered for maximum stability. Cut-off wavelengths selected to give optimum grade range on ILFORD variable contrast paper.
Cooling fan	115Vac 21W dynamically balanced centrifugal type. The fan cools both lamp and filter assemblies.
Safety features	Safety cut-out cuts power to lamps under abnormal operating conditions, eg fan failure. Micro-switch cuts power to lamps and fan when door is opened.
Light mixing boxes	**Diffuser type adaptor kit** Up to three sizes are supplied to cover the following negative sizes: up to 35mm, from 35mm to 6x7cm and from 6x7cm to 4x5 inches. **Condenser type adaptor kit** One box is supplied. Negative coverage is limited only by your enlarger. **Note** In all cases, the light mixing box or boxes are supplied with the adaptor kit.

MULTIGRADE 500CPM CONTROL UNIT

Dimensions	Height 46mm Width 186mm Depth 192mm
Weight	1·2kg
Construction	Black stoved aluminium alloy extrusion, with zinc die-cast end plates
Electrical cord (separate)	Multicore Length 2m
Features	Listed below. Operation of each is by an illuminated button, except for 'expose-cancel' which is a raised bar. Audible confirmation of control operations can be selected. **Exposure time** - 0 to 99·9 seconds in steps of 0·1 seconds. **Grade** - 0 to 5 in half-grade steps. **Memory** and **Memory clear** - for storage of 1 main exposure and up to 8 additional exposures. **Burn** **Bleep** **Prints counter** and **Prints clear** **Focus** **Expose-cancel**
Display	Digital, 7 segment LED
Electronics	Microprocessor incorporating memory
Additional features	Sockets for optional exposure probe and footswitch. Program switch to compensate for lamps that vary in light intensity. Automatic voltage compensation for variations in mains voltage up to $\pm$4%.

MULTIGRADE 500S POWER SUPPLY

Dimensions	Height 175mm Width 254mm Depth 140mm
Weight	10·3kg
Construction	Totally enclosed unit using black stoved aluminium alloy extrusions, with zinc die-cast end plates
Electrical cord (separate)	3 core, live, neutral and earth Length - 2m
Mains input	Voltage 120Vac. Frequency 50 or 60Hz (automatic selection). Power consumption 600W maximum.
Replacement fuses	
Mains input	120V 6·3A SB
Safelight socket	250V 1A.
Outputs	Control unit Enlarger head 1A supply for local safelight

MULTIGRADE 500P EXPOSURE PROBE

Dimensions	Height 19mm Width 50mm Depth 155mm
Weight	0·35kg
Construction	Black stoved zinc die-casting
Electrical cord (integral)	Multicore Length 1·2m
Controls	Measurement period initiated by push button incorporating LED indication. Ten position calibration knob
Exposure times	1 to 50 seconds (1 second at 20 lux baseboard illumination)
Repeatability	Without safelights, better than ±2% With safelights, typically ±4%

Constant improvements in ILFORD products mean that changes in design or specification may occur from time to time. It will not always be possible to amend instructions at the same time, and the right to alter the design and specification of the equipment without prior notice is accordingly reserved.

MULTIGRADE 500 is covered by patents and patent applications.

Australia
ILFORD PHOTO (Australia) Pty Ltd
PO Box 144
Mt Waverley
3149 Victoria

Belgium
SA ILFORD PHOTO NV
Kazernenlaan 39
B-1040 Brussel

Canada
ILFORD PHOTO (Canada) Limited
2751 John Street
Markham
Ontario
L3R 2Y8

Denmark
ILFORD PHOTO A/S
Gadelandet 18
DK-2700 Brønshøj

France
ILFORD PHOTO SA
BP 336
Chemin de la Fouillouse
F-69802 Saint-Priest
Cédex

Germany
ILFORD PHOTO GmbH
Postfach 124
D-6078 Neu-Isenburg

Holland
ILFORD PHOTO BV
Jan Rebelstraat 5
Postbus 9040
NL-1006 AA Amsterdam

Italy
ILFORD PHOTO SpA
Origgio (Va)
Casella Postale 77
I-21047 Saronno

Sweden
ILFORD PHOTO AB
Box 3052
S-400 10 Göteborg

Switzerland
ILFORD PHOTO AG/SA
Rue de l'industrie 15
CH-1700 Fribourg 5

United Kingdom
ILFORD PHOTO Company
14-22 Tottenham Street
GB-London W1P 0AH

USA
ILFORD PHOTO Corporation
West 70 Century Road
PO Box 288
Paramus
New Jersey 07653

If your country is not
shown here,
please contact:
ILFORD PHOTO International
ILFORD Limited
14-22 Tottenham Street
GB-London W1P 0AH
England

ILFORD Limited Mobberley Cheshire
Printed in England 37104.USA

MEMORY RECORD SHEET

ILFORD MULTIGRADE 500CPM

TIME-PRINTS	GRADE	MEMORY	COMMENTS
		1	
		2	
		3	
		4	
		5	
		6	
		7	
		8	
		9	

NEGATIVE REFERENCE

ENLARGER APERATURE

FILE NUMBER

PRINT SIZE

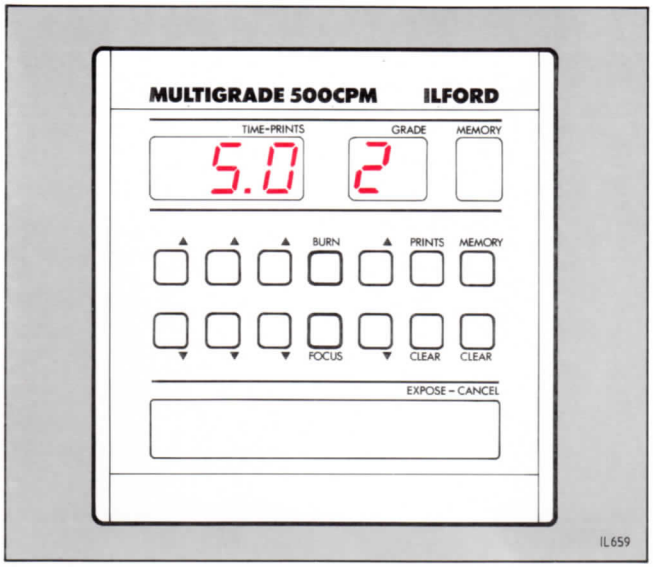
ILFORD MULTIGRADE 500 SIMPLIFIED INSTRUCTIONS 50Hz/60

OPERATING

1

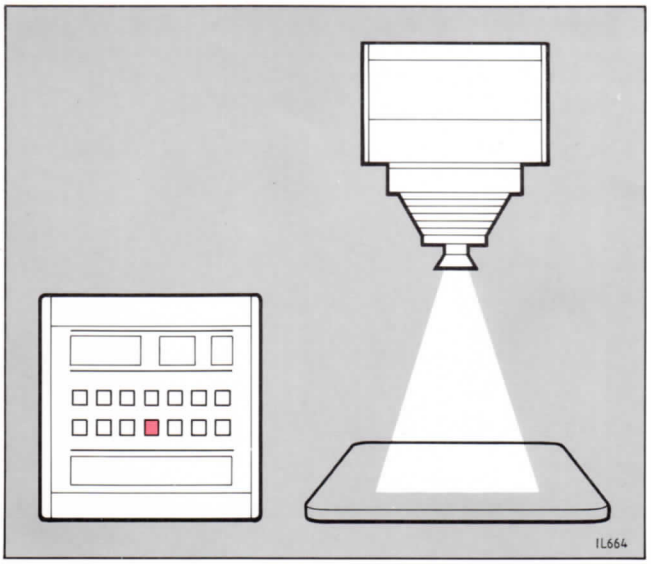
2

1



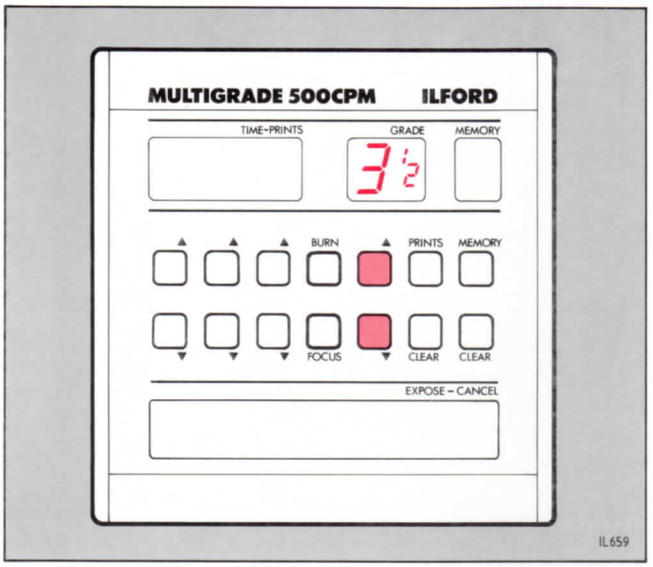
Switch on. Ensure typical display.

2



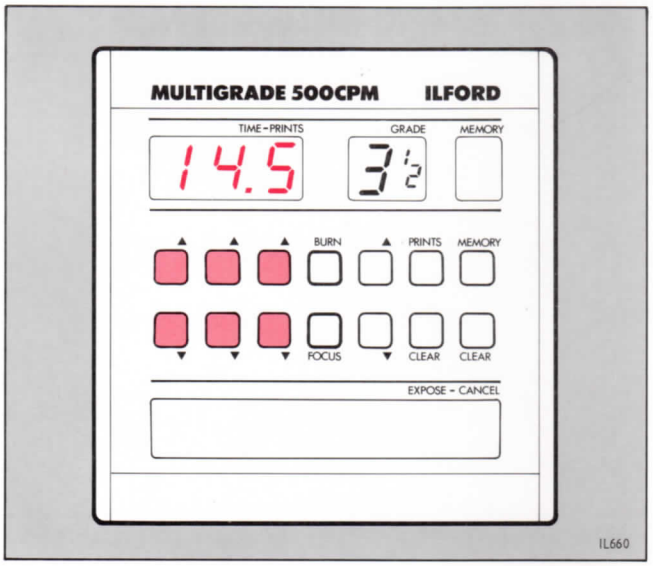
Locate negative. Select 'focus' (note 1).

3



Select contrast (or after operation 5).

4



Select exposure time (or after operation 5).

5

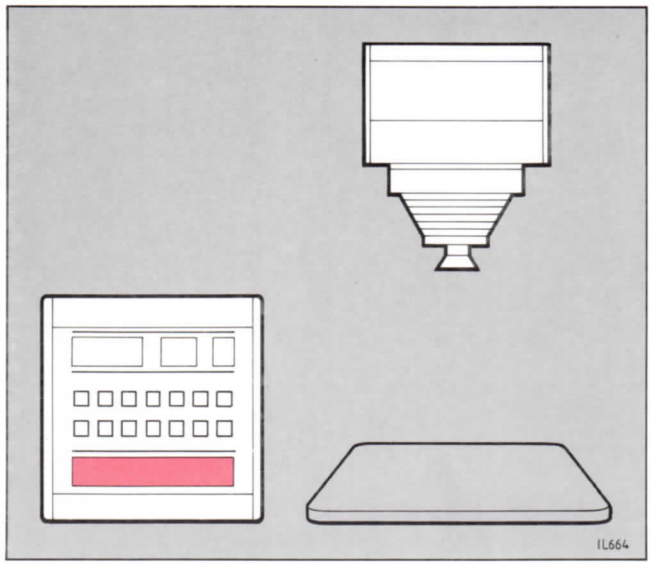
6

IMPORTANT NOTES

1 Light suitable for focusing, composition and assessment is projected.

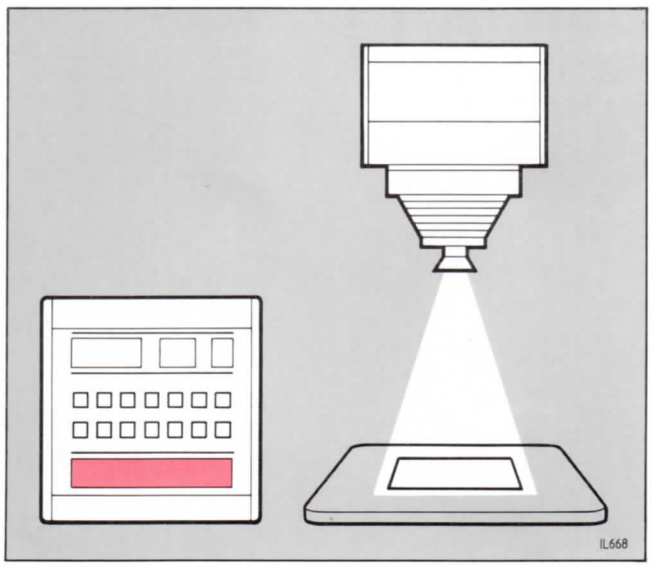
2 If the print density is correct but a different grade of contrast is required, select the new contrast. It is not necessary to alter exposure time since light intensity is adjusted automatically across the range of contrasts.

5



Press 'expose-cancel' to cancel 'focus'.

6



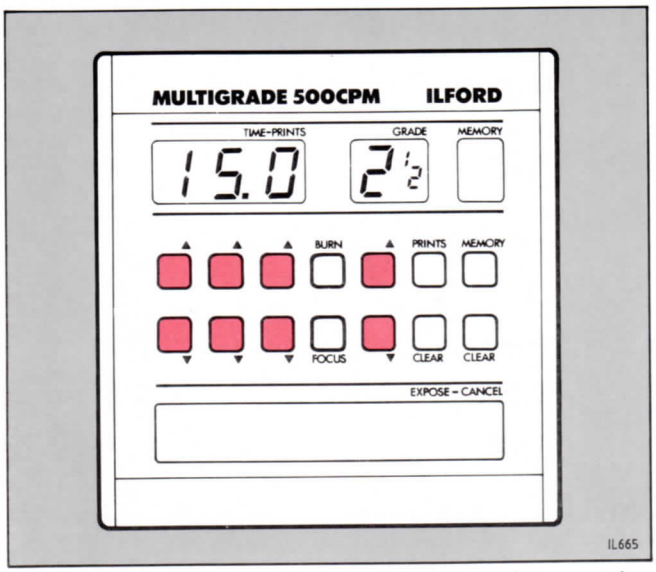
Expose a sheet by pressing 'expose-cancel' (note 2).

ILFORD MULTIGRADE 500 SIMPLIFIED INSTRUCTIONS 50Hz

MEMORY

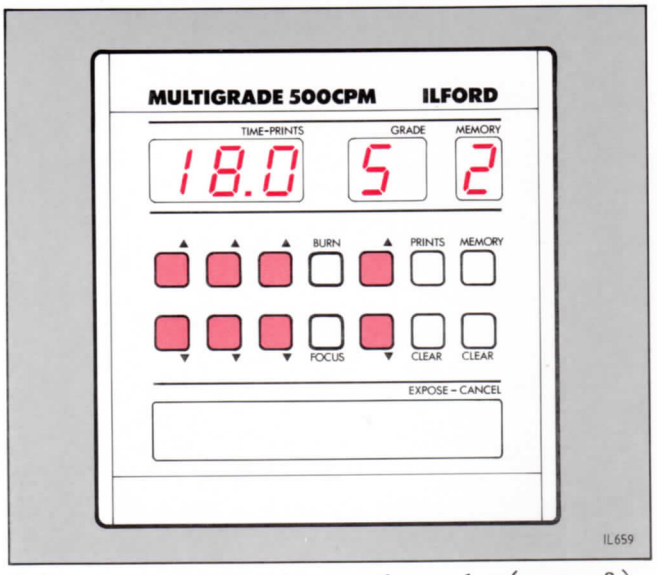
PROGRAMMING

1



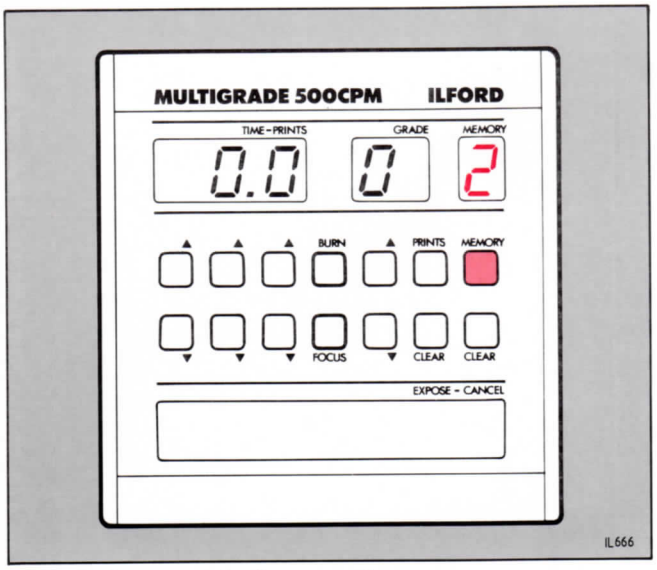
Select exposure time and grade (note 1).

3



Select exposure time and grade (note 3).

2



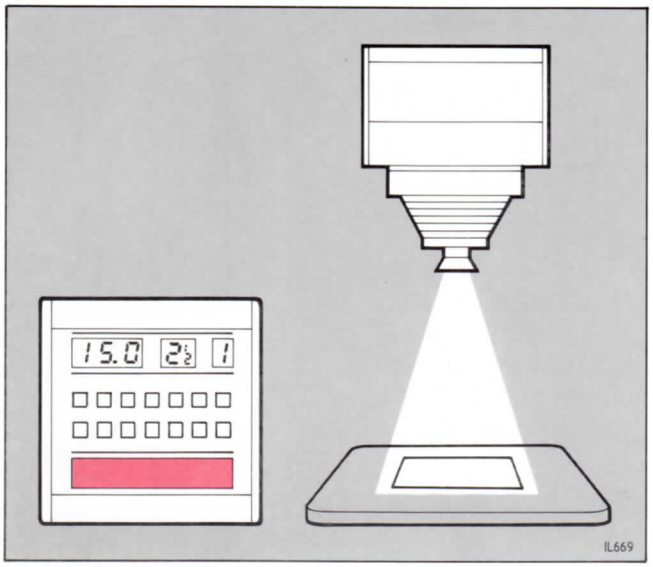
Press 'memory' (note 2).

IMPORTANT NOTES

1 Main exposure. This will become memory '1'.
2 Memories '2' to '9' (maximum) for additional exposures.
3 Repeat operations 2 and 3 until the required number of memories have been stored. Return to memory '1' by pressing 'memory' then 'expose-cancel'.
4 Shade paper as required. Repeat operation 2 until the last of the stored memories has been run. Two audible signals are given and the control unit returns to memory '1' ready to run the sequence again.

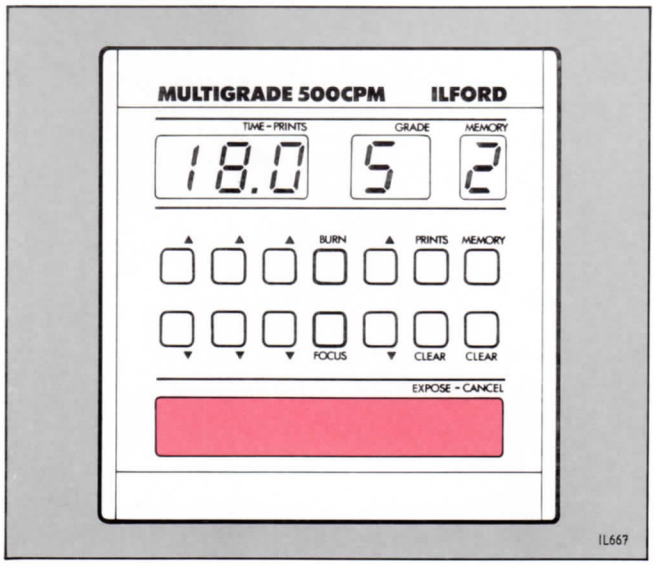
USING

1



Expose a sheet by pressing 'expose-cancel'.

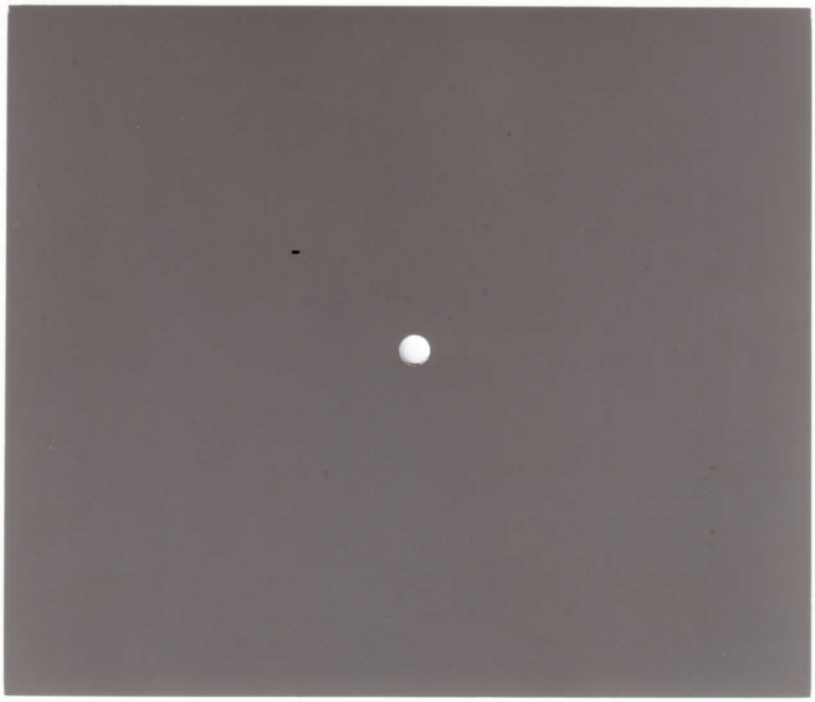
2



Press 'expose-cancel' to start memory '2' (note 4).

MID-TONE DENSITY

ILFORD MULTIGRADE 500



MID-TONE DENSITY

ILFORD MULTIGRADE 500

r Negative
Cyan Printer
.20
.30
M
Green-Filter Negative
Magenta Printer
.50
.70
M
1.00
Y
Blue-Filter Negative
Yellow Printer
1.30
1.60
B
1.90