Durst®

ADVANCED COLOR SYSTEMS

401 MK II COLOR HEAD

Durst (UK) LTD., Epsom, Surrey, England

DURST®

401 MK II COLOR HEAD

INSTRUCTION MANUAL

DURST (UK) LIMITED · FELSTEAD ROAD · EPSOM · SURREY · ENGLAND

DURST 401 MK II COLOR HEAD MANUAL/*CONTENTS*

		Page
Introduction		1
Section 1	Description	3
	Specification	3
Section 2	Pre-installation instructions	5
Section 3	Fitting-up instructions and preparation for use	7
Section 4	Operation	13
Section 5	Fault Finding	17
	Maintenance	17
Section 6	Accessories	19

ILLUSTRATIONS

Fig. 1	Equipment layout	2
Fig. 2	Cable Connections	4
Fig. 3		
Fig. 4		
Fig. 5		
Fig. 6	Fitting-up sequence	6
Fig. 7		
Fig. 8		
Fig. 9		
Fig. 10		
Fig. 11	Mounting kit	6
Fig. 12	Lamp handling	8
Fig. 13	Removing lamp cover/ fitting lamps	10
Fig. 14	Photocells	12

INTRODUCTION

The DURST 401 Mk II COLOR HEAD is designed to convert the DURST L-1000 to a color enlarger, capable of producing high quality enlargements from negatives up to 5 x 4 inches. (12.7 x 10.2 cms).

The DURST 401 Mk II COLOR HEAD MANUAL includes full instructions for its fitting-up, preparation, operation and maintenance.

This manual contains information for the 401 Mk II Head together with all ancillary items.

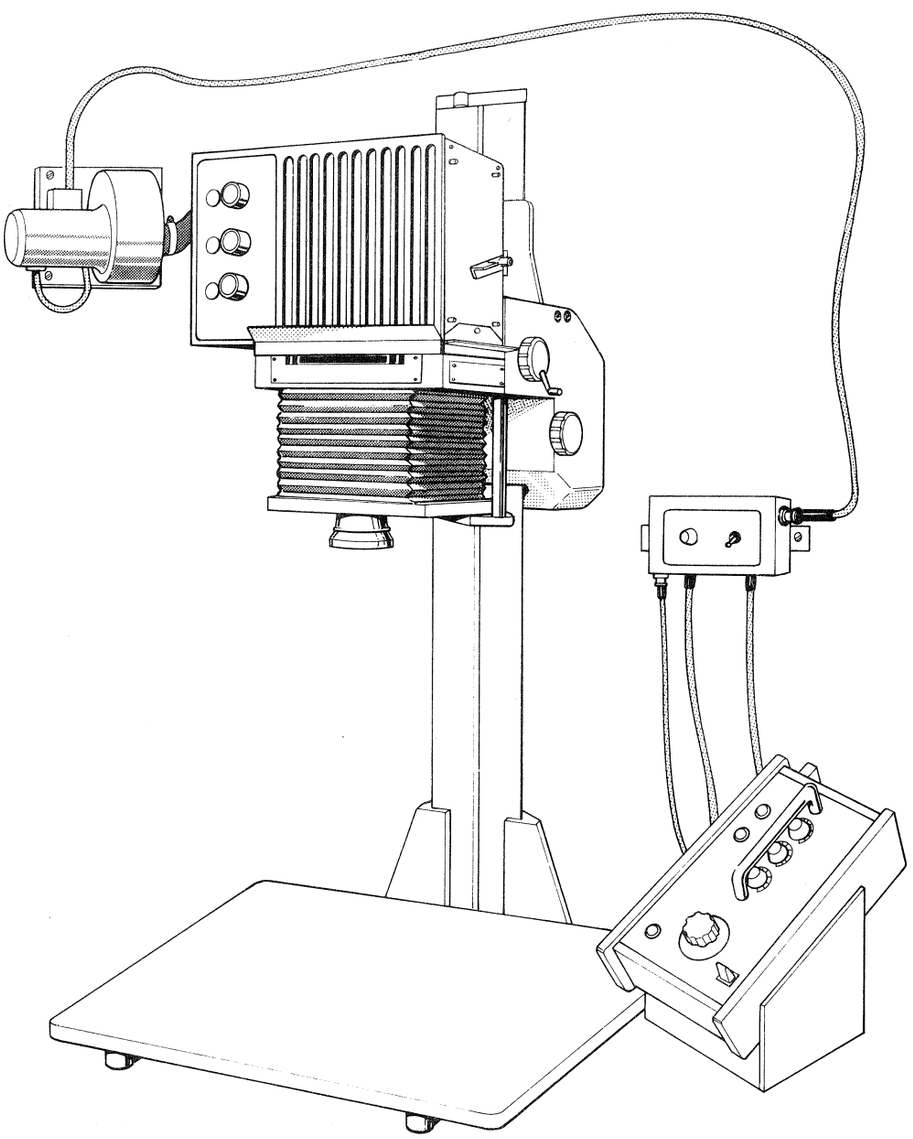


Figure 1
GENERAL LAYOUT
(ANALYSER SHOWN)

1. DESCRIPTION AND SPECIFICATION

1.1 DESCRIPTION

1.1.1 The DURST 401 Mk II COLOR HEAD incorporates a lamp assembly, housing two EJL quartz halogen lamps with built-in reflectors. Light from the lamps passes into a diffusion box lined with white expanded polystyrene. The diffused light then passes through the diffuser slide/filter pack holder onto the negative.

1.1.2 There are three pairs of non-fade subtractive dichroic filters placed immediately in front of the light source. Any combination of these filters can be introduced into the light beam by use of the control knobs at the front of the COLOR HEAD. The value of the filtration in color compensating (CC) units is shown on illuminated color scales adjacent to each control knob. The whole unit is encased in a stove-enamelled aluminium casing.

1.2 SPECIFICATION

1.2.1 HEAD

DIMENSIONS: WIDTH: 12 7/8" (32.70 cm)
DEPTH: 9 1/4" (23.50 cm)
HEIGHT: 9 1/2" (24.13 cm)

WEIGHT: 14 lb (6.35 kg)

VOLTAGE: 50v 50/60 Hz, 400w (Head)

LAMPS: General Electric EJL 24v 200W Quartz halogen or equivalent.

NEGATIVE SIZE: Any format up to 5" x 4" (12.7 x 10.2 cm)

OPERATING POSITION: Vertical only as shown in Figure 1

1.2.2 TRANSFORMER/TIMER AND TRANSFORMER/ANALYSER UNIT

DIMENSIONS: WIDTH: 6 3/4" (17 cm)
DEPTH: 12 1/4" (31 cm)
HEIGHT: 12" (30.5 cm)

WEIGHT: 20 lb (9 kg)

VOLTAGE: 100-120 or 200-240 v 50/60 Hz

1.2.3 FAN KIT

FAN: WIDTH: 7" (17.8 cm)
DEPTH: 5 3/4" (14.6 cm)
HEIGHT: 7" (17.8 cm)

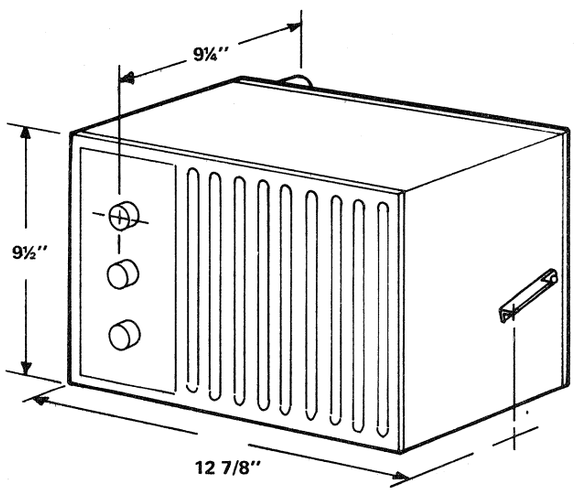
WEIGHT: 5 lb (2.27 Kg)

1.2.4 FAN CONTROL UNIT

WIDTH: 7 1/4" (18.4 cm)
DEPTH: 2 1/4" (5.7 cm)
HEIGHT: 4 1/2" (11.4 cm)
WEIGHT: 2 1/2 lb (1.13 kg)

VOLTAGE: 100-120 or 200-240v 50/60 Hz, 100w

TOTAL PACKED WEIGHT: 44 lb (20 kg)



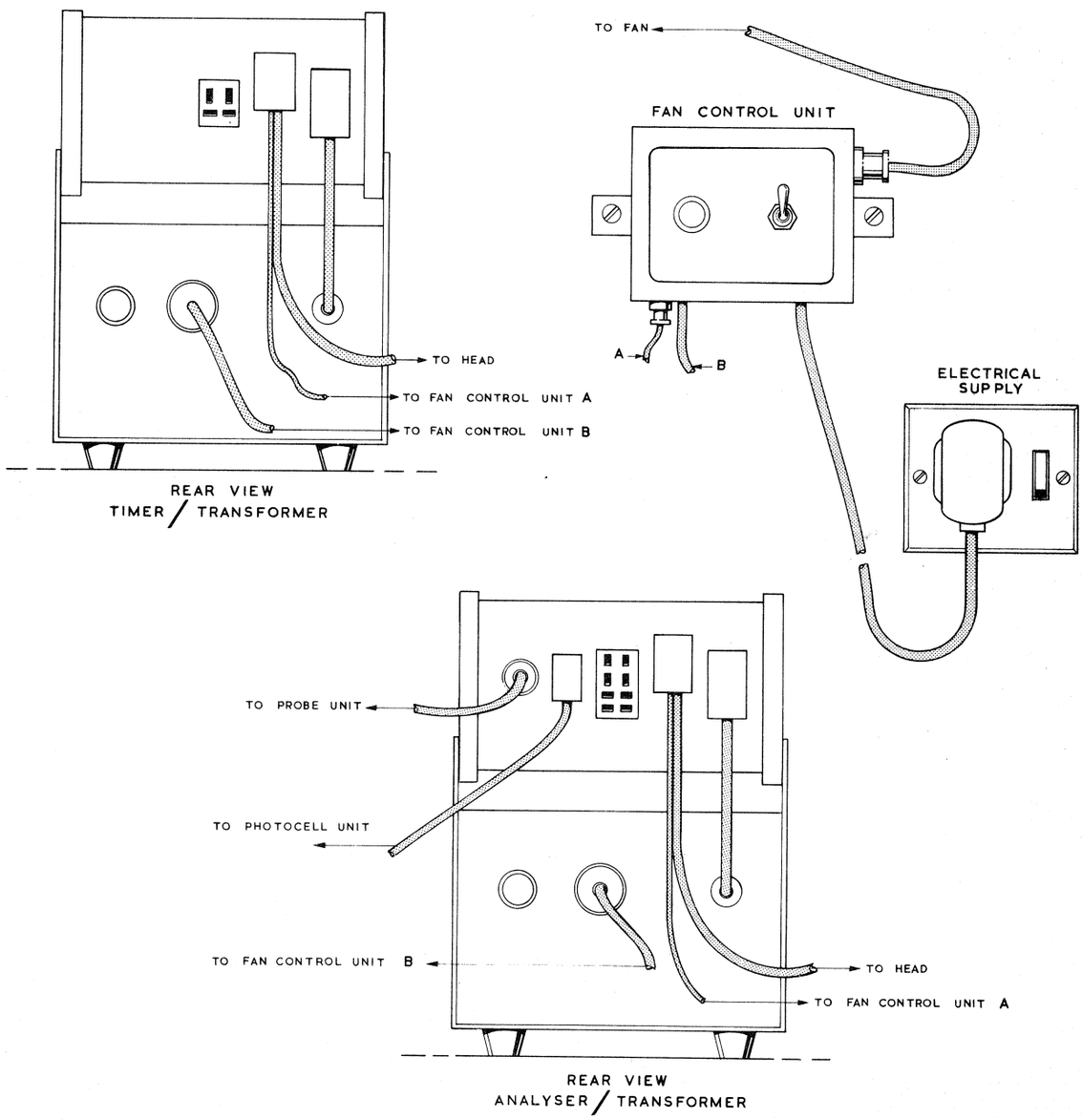


Figure 2
CABLE CONNECTIONS

2. PRE-INSTALLATION INSTRUCTIONS

2.1 The L-1000 as a bench mounted enlarger, requires a bench at least 27 inches (70 cms) wide. The bench height should be between 30 inches (75 cms) and 36 inches (90 cms) from the ground. There should be at least 50 inches (125 cms) above the bench to allow clearance for the enlarger column.

The L-1000 as a wall mounted enlarger should be mounted on a minimum 1 inch (2.5 cms) thick, 7 inches (18 cms) wide and 90 inches (2.3 m) high board. A shelf will be required to hold the Transformer/Timer/Analyser unit (20 lbs - 9.1 Kg.), if required.

2.2 An electrical outlet should be situated near the bench in a convenient position to the Fan Control unit. The outlet should have an earth/ground connection.

2.3 A cut-out for the Fan 2 1/4 inches (6.0 cms) square should be made in the wall, 24 inches (60 cms) to the left of the position of the enlarger, and 8 feet (248 cms) from the floor. The cut-out must be light proof.

2.4 If it is impossible to make the cut-out described in 2.3 because of the construction of the darkroom, use two pieces of wood 7 x 3 x 1 inches (18 x 7.5 x 2.5 cms), as described in 3.7.1.

NOTE

If the fan is mounted so that the exhausted hot air is discharged into the room, then working conditions may not be satisfactory, particularly in small darkrooms without adequate ventilation.

NOTE

The fan must be mounted with the hose to the right hand side. This ensures that the oilers are correctly positioned.

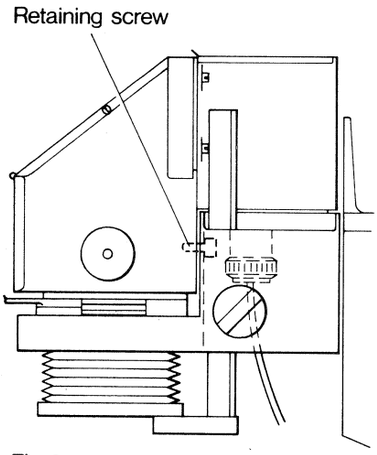


Fig 3

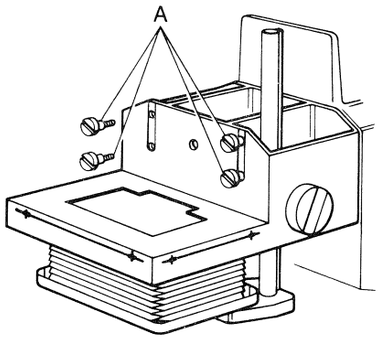


Fig 4

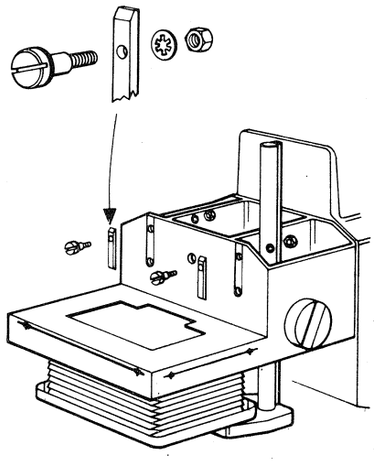


Fig 5

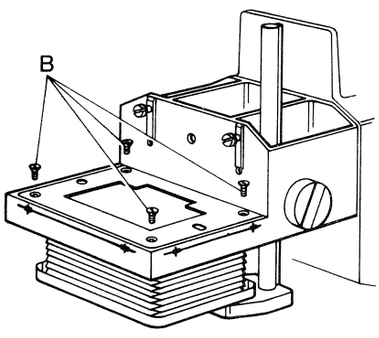


Fig 6

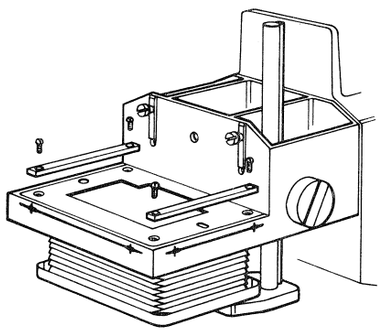


Fig 7

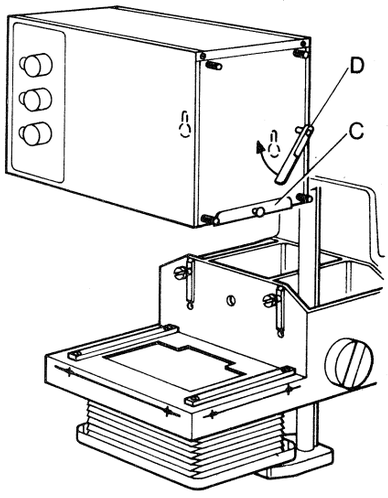


Fig 8

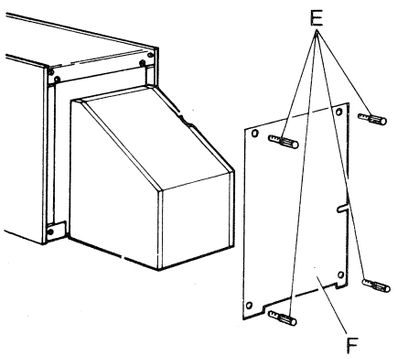


Fig 9

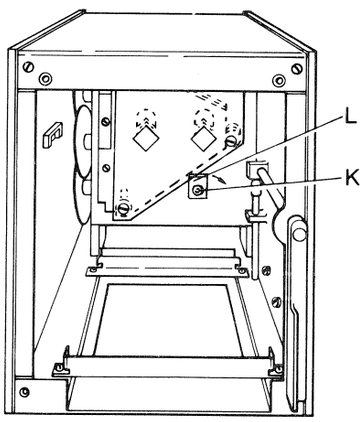


Fig 10

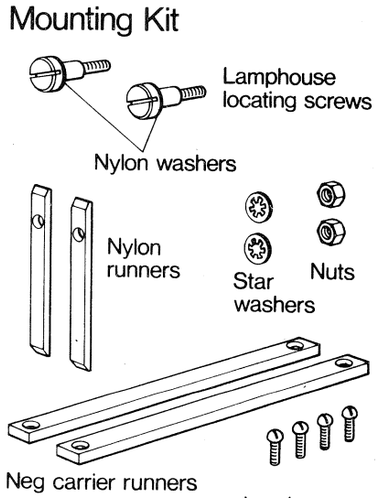


Fig 11

FITTING UP SEQUENCE

3. FITTING-UP INSTRUCTIONS AND PREPARATION FOR USE

NOTE

Read the following instructions in conjunction with Figs. 3 to 11

3.1 REMOVING DURST LAMPHOUSE AND FITTINGS

3.1.1 Disconnect the DURST lamphouse from the electrical supply, and remove the retaining screw securing the lamphouse to the main movable casting. The retaining screw is located in the casting recess, immediately in front of the cable entry to the lamphouse (Fig. 3).

3.1.2 Ensuring that the lamphouse cable does not foul, lift the lamphouse up and away from the enlarger. Lift off the negative carrier (Fig. 3) and then remove the four lamphouse locating screws "A" (Fig. 4).

3.2 DURST MOUNTING KIT

3.2.1 The mounting kit (Fig. 11) for the DURST 401 MkII COLOR HEAD consists of:

2 lamphouse locating screws fitted with nylon washers

2 nylon runners.

2 star washers.

2 nuts.

2 negative carrier runners.

4 round head screws.

3.2.2 Fit the locating screws and nylon runners to the top two holes using the star washers and nuts as shown in Fig. 5.

3.2.3 Remove the four counter-sunk screws "B", from the negative carrier location plate (Fig. 6), but leave the plate in position. The negative carrier runners with the screw head recess on the top, should then be fitted to the plate, with the four screws provided (Fig. 7).

3.3 FITTING THE DURST 401 MK II COLOR HEAD

3.3.1 Remove the diffuser slide "C" (Fig. 8) from the color head. Position the keyhole slots in the rear of the head over the locating screws, and slide the Durst 401 Mk II down until it is securely positioned. **3.6.1**

3.4 FILTERS

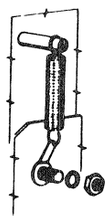
3.4.1 The filters are locked in position to avoid damage in transit. THE FILTERS MUST BE RELEASED BEFORE THEY CAN BE USED.

3.4.2 Remove the four thumb screws "E" (Fig. 9), rotate the lift lever "D" (Fig. 8) down to the vertical position and remove the end cover "F". The diffuser box can now be removed.

3.4.3 With the diffuser box removed, the filter slides are visible in the top position secured by a locking bracket "L" (Fig. 10). Loosen the knurled nut "K" and swing the bracket to the bottom of its travel. The knurled nut should then be retightened, the diffuser box replaced, and locked in position.

3.4.4 Replace the end cover, rotate the lift lever to the horizontal position, and replace the four thumb screws. Finally, re-locate the diffuser plate into its original position with the flap at the top.

3.4.5



Attach the spring behind the key slot screw locknut, as shown in the diagram.

3.5 FITTING THE LAMPS (Figs. 12 & 13)

WARNING

UNDER NO CIRCUMSTANCES MUST THE LAMPS BE TOUCHED BY HAND. THEY SHOULD ONLY BE HANDLED BY USING THE PACKING FROM THE LAMP CARTON, (FIG. 12).

3.5.1 To fit the lamps, remove the four thumb screws "A" (Fig. 13) and lift the lamp cover "B" clear of the head. To insert a lamp into its socket, ease back the lampholder tension arm and push the lamp down until it is clamped in position. Repeat the operation for the second lamp and then replace the lamp cover and screws.

3.6 FITTING THE NEGATIVE CARRIER

To insert the negative carrier, rotate the lever "D" (Fig. 8) down to the vertical position. This will lift the color head to provide sufficient clearance for the negative carrier. The lever is returned to the horizontal position to lock the negative carrier in place.

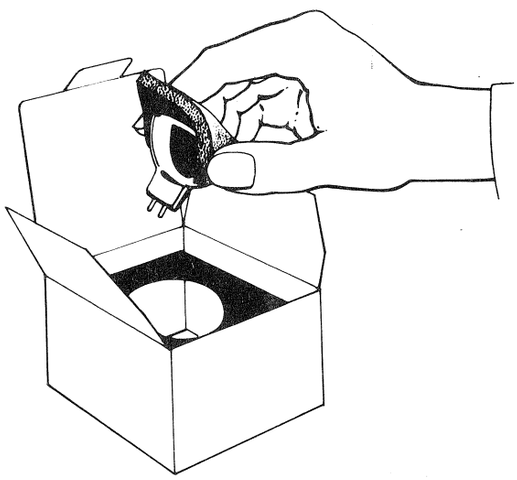


Figure 12
LAMP HANDLING

NOTE

A 5 x 4 inch (12.7 x 10.2 cm) negative carrier is provided with each unit. Others are available as required. See Section 6.6

3.6.2 When a roll film carrier is used, the lift lever should be in its vertical position when feeding film through.

3.7 COOLING FAN

WARNING

FAILURE TO USE THE COOLING FAN WILL CAUSE OVERHEATING AND SUBSEQUENT DAMAGE TO THE COLOR HEAD.

3.7.1 Cut a hole in the darkroom wall, as described in the pre-installation instructions paragraph 2.3.

Alternatively, mount the Fan on two pieces of wood (2.4). Screw the Fan unit on the 1 inch faces of the wood, then position the Fan unit and wood in an appropriate position on the wall. Draw around the wooden supports. Remove the supports from the Fan unit and screw them to the wall, where previously marked. Mount the Fan unit on the supports.

3.7.2 Place one end of the 50 mm flexible hose over the flange on the Fan, and the other end over the flange on the back of the 401 Mk II Head, and secure with clips. The hose may be shortened if necessary.

3.8 TRANSFORMER/TIMER (if supplied)

3.8.1 The Transformer and Timer are transported unattached, and therefore require assembly. The Timer unit should be mounted above the Transformer unit between the extended sides, by means of four M5 pan head screws. The cable from the Transformer unit is plugged into the right hand socket of the Timer unit (viewed from the rear)(Fig. 2).

3.8.2 The Transformer/Timer should be placed on the bench to the right of the enlarger, with the socket outlets facing the wall.

3.8.3 Provision for input voltage selection is situated on the front of the Transformer unit. Before using the equipment, the local electrical voltage should be ascertained, and set on the Transformer unit.

3.9 TRANSFORMER/ANALYSER (if supplied)

3.9.1 The Transformer and Analyser are transported unattached and therefore require assembly. The Analyser unit should be mounted above the Transformer unit between the extended sides, by means of four M5 pan head screws. The cable from the Transformer unit is plugged into the right hand socket of the Analyser unit (viewed from the rear)(Fig.2).

3.9.2 The Transformer/Analyser should be placed on the bench to the right of the enlarger, with the socket outlets facing the wall.

3.9.3 Provision for input voltage selection is situated on the front of the Transformer unit. Before using the equipment the local electrical voltage should be ascertained, and set on the Transformer unit.

3.10 BALANCE PHOTOCELL UNIT

Fitting to enlargers pre-serial number 4813

3.10.1 The Balance Photocell unit is supplied fitted to the lens holder and should be fitted in the normal way. The balance cell should be moved as near to the projection lens as possible at all times.

Fitting to enlargers including and post serial number 4813

3.10.2 Position the enlarger head at the bottom of the column, and adjust the focussing knob so that the lens is as close to the negative as possible.

3.10.3 Remove the 401 Mk II Head from the enlarger.

3.10.4 Remove and discard the black knurled locking collar from the safety filter shaft. Remove the shaft by unscrewing and discard the shaft and filter holder.

3.10.5 Remove the green sleeve from the earth wire.

3.10.6 Pass the cable up through the filter shaft hole in the lens panel and then through the hole of the cell block stud.

3.10.7 Loosen the P clip and pass the cable through.

3.10.8 Replace the green sleeve and connect the wires into the terminal block ensuring that the color coding is correct.

3.10.9 Secure the P clip.

3.10.10 Remove the nut from the cell block stud, and move the stud away from the cell block.

3.10.11 Screw the stud into the hole securely.

3.10.12 Fit the cell block over the stud and secure in position with the nut.

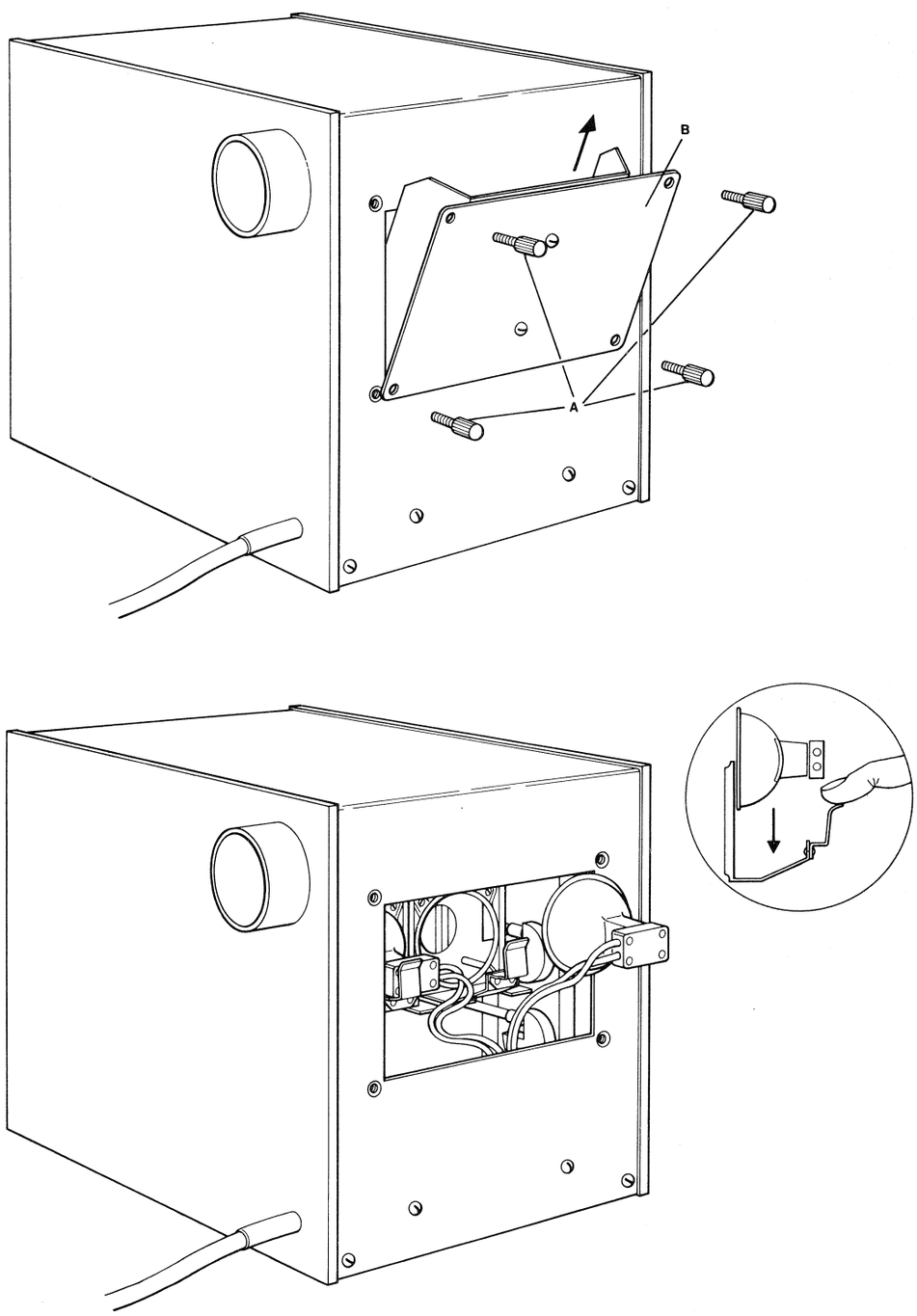


Figure 13

**REMOVING LAMP COVER/
FITTING LAMP**

CAUTION

THE CELL BLOCK IS FITTED ON A SLIDING BASE SO THAT THE PHOTOCELL CAN BE POSITIONED AS CLOSE TO THE LENS AS POSSIBLE (FIG. 14).

3.11 PROBE UNIT (if supplied)

3.11.1 The Probe unit is used on the baseboard of the enlarger, with the photocell accepting light from the lens.

3.12 FAN CONTROL UNIT

3.12.1 Mount the Fan Control unit on the darkroom wall approximately 2 feet (60 cms) above the Transformer/Timer/Analyser, to the right of the enlarger.

3.12.2 The Fan is operated by the Fan Control unit, which incorporates an ON/OFF switch controlling the power to the complete system, and a 5A fuse. The Fan is operating all the time that the lamps are lit.

3.13 WIRING THE 401 MK II HEAD TO THE TRANSFORMER/TIMER (Fig. 2).

3.13.1 Connect a suitable plug to the cable on the bottom right hand side of the Fan Control unit.

3.13.2 Connect the cable on the bottom left hand side of the Fan Control unit, with the 3-way plug attached, to the socket at the back of the Transformer unit.

3.13.3 Connect the Fan plug to the socket on the right hand side of the Fan Control unit.

3.13.4 Fit the 6-way plug from the DURST 401 Mk II HEAD into the second socket from the right, at the back of the Timer. Fit the other smaller cable, from the 6-way plug, into the small socket on the left hand side of the Fan Control unit.

3.13.5 The left hand socket is for use when a DURST ACS R11A Roll Paper Holder is used in conjunction with the DURST 401 Mk II. This item is an optional extra.

3.14 WIRING THE 401 MK II HEAD TO THE TRANSFORMER/ANALYSER (Fig. 2).

3.14.1 Connect a suitable plug to the cable on the bottom right hand side of the Fan Control unit.

3.14.2 Connect the cable on the bottom left hand side of the Fan Control unit, with the 3-way plug attached, to the socket at the back of the Transformer unit.

3.14.3 Connect the Fan plug to the socket on the right hand side of the Fan Control unit.

3.14.4 Fit the 6-way plug from the DURST 401 Mk II HEAD, into the second socket from the right, at the back of the Analyser. Fit the other smaller cable, from the 6-way plug, into the small socket on the left hand side of the Fan Control unit.

3.14.5 Connect the Probe cable to the left hand round socket on the Analyser.

3.14.6 Connect the Photocell cable to the left hand rectangular socket on the Analyser.

3.14.7 The centre socket is for use when a DURST ACS R11A Roll Paper Holder is used in conjunction with the DURST 401 Mk II. This item is an optional extra.

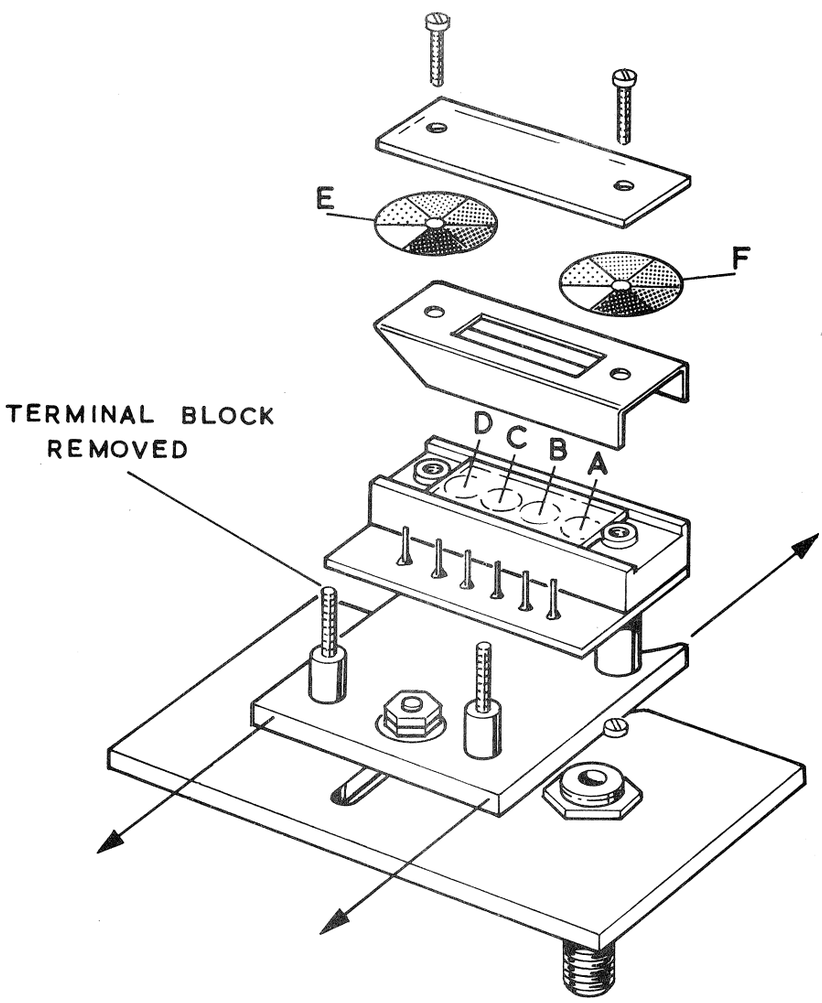


Figure 14
PHOTOCELLS

4. OPERATION

NOTE

Paragraphs 4.1 and 4.3.1–10 refer to the TRANSFORMER/TIMER.
Paragraphs 4.2 and 4.3.1–14 refer to the TRANSFORMER/ANALYSER.

4.1 TRANSFORMER/TIMER

4.1.1 When the TIME/FOCUS switch is set to TIME and the exposure time is set on the control knob, an exposure may be made by operating the EXPOSE button.

4.1.2 When the TIME/FOCUS switch is in the DIM position the lamps are lit at a low intensity for composing, whereas in the FOCUS position the lamps are at full power for critical focusing.

NOTE

Five increments clockwise doubles the exposure. Five increments anticlockwise halves the exposure.

4.2 TRANSFORMER/ANALYSER

4.2.1 Balance/Probe Switch

The central position is OFF. When set to BALANCE, the printing lamps are lit, and the photo-electric color balancing circuits are activated. When set to PROBE, the printing lamps are lit, and the exposure probe circuit is activated. When focussing, set to BALANCE.

4.2.2 Timer Control Knob

The knob operates a rotary switch connected to the timing circuits, and is used in conjunction with the Exposure Probe. The control is calibrated in seconds.

NOTE

Five increments clockwise doubles the exposure. Five increments anticlockwise halves the exposure.

4.2.3 Indicator Lamps

The two neon lamps are used with the two Balance Control knobs immediately to the right of the lamps. The rear neon lamp indicates the CYAN/MAGENTA filtration balance, and the front neon lamp indicates the YELLOW/MAGENTA filtration balance. The balance point is shown precisely by the neon lamps. The front lamp is also used as the exposure measurement indication when the BALANCE/PROBE switch is set to PROBE, and is used with the Timer and Exposure Control knobs.

4.2.4 Balance Control Knobs

The two knobs are for calibrating the Analyser during initial setting up. The position of the knobs are dependent on the batch of paper.

4.2.5 Exposure Control Knob

The knob is used for calibrating the Analyser density.

4.2.6 Exposure Button

When the BALANCE/PROBE switch is set to the OFF position, an exposure is started by depressing the EXPOSE button.

4.2.7 Paper Transport

At the end of an exposure, a pulse is transmitted to the Roll Paper Holder (if fitted), to wind on the paper.

4.3 MAKING A COLOR PRINT

4.3.1 Position a film manufacturers standard negative in the correct carrier, and insert the carrier in the enlarger. Ensure that the masking lines around the edge of the negative are not showing. Fit the appropriate lens, and adjust the enlarger to the required image size, then focus.

4.3.2 Exposure Test

Set the Filter Control knob on the 401 Mk II Head to 0, close down the lens two stops and then print a series of test exposures. The following timer settings are suggested: 1.2 seconds, 2.6 seconds, 5.2 seconds, 10 seconds and 20 seconds (or similar if a Durst unit is not used). Process the exposure test and determine the correct exposure. If all the prints are too light, open the lens aperture one stop, or,if all the prints are too dark , close the lens aperture one stop. Repeat the exposure test.

4.3.3 Wide Range Color Balance Test (W.C.B. Test)

Examine the color balance of the prints made during the exposure test. It is unlikely that any print will have correct color balance, but a basis for the W.C.B. test can be assessed. For example; if the exposure tests are too YELLOW, set the YELLOW Filter Control knob on the 401 Mk II Head to an arbitrary figure (i.e. 20) and then make the following test:

4.3.4 Correction on Basic Filter Settings (if any)

Print No.	Y	M	C	Color of Print
1	+30	00	00	more Blue
2	+60	00	00	
3	00	+30	+30	more Yellow
4	00	+60	+60	
5	00	+30	00	more Green
6	00	+60	00	
7	+30	00	+30	more Magenta
8	+60	00	+60	
9	00	00	+30	more Red
10	00	00	+60	
11	+30	+30	00	more Cyan
12	+60	+30	00	

Table 1

4.3.5 Process the W.C.B. test, and after drying, select the best print. If the optimum color balance lies between two of the prints, then the correction should be estimated, and the new filtration used as a basis for a Close Range Color Balance Test. (C.C.B. test).

NOTE

If all the prints in the W.C.B. test are, for example, too YELLOW, it is necessary to add a YELLOW gelatine filter to the filter pack. The exact amount of filtration to be added to the perspex diffuser is gained by experience. At least 30 c.p. of the correct filter should be added, and the W.C.B. test repeated.

4.3.6 The purity of the filters in the DURST 401 Mk II Head are very good, but some adjustment of exposure time will be required to the prints in the W.C.B. test. The following table shows the amount of exposure adjustment.

DURST ANALYSER/TIMER

UNITS	Adjustment on Control Knob		
	YELLOW	MAGENTA	CYAN
+30	+1 click	+2 clicks	+4 clicks
+60	+1 click	+3 clicks	+7 clicks

OTHER TIMERS

UNITS	YELLOW	MAGENTA	CYAN
+30	+15%	+30%	+60%
+60	+15%	+45%	+105%

Table 2

4.3.7 These factors only apply when setting up the 400 Series Analyser. After the Analyser is calibrated, the Exposure Probe will compensate for the addition or removal of filtration from the DURST 401 Mk II Head.

4.3.8 Supplementary Filter Packs

If the scales show that one or two of the filters are near the top (i.e. 60 or above), they should be re-positioned near the centre of the range.

To achieve this, one or more filters of the appropriate color should be added to the diffuser pack. The filter values on the DURST 401 Mk II Head are calibrated in C.P. filter units. Therefore, if the YELLOW filter value is at 60, a 30 C.P. filter should be added to the pack, and the YELLOW filter dial setting reduced to 30.

If CYAN prints are obtained even if the CYAN filtration of the head is at maximum, it may be necessary to use an infra-red absorbing filter, such as a Kodak CPIR, to obtain a correctly balanced print.

4.3.9 Close Range Color Balance Test (C.C.B. Test)

For final setting up, a Close Range Test must be made. A series of exposures of 10 unit steps should be made, using the optimum filtration found in the Wide Range Color Balance Test, as a reference.

4.3.10 Example:

Correction on Basic Filter Settings				
Print No.	Y	M	C	Color of Print
1	+10	00	00	more Blue
2	−10	00	00	more Yellow
3	00	+10	00	more Green
4	00	−10	00	more Magenta
5	00	00	+10	more Red
6	00	00	−10	more Cyan

Table 3

Process the Close Range Color Balance Test, and after drying, select the best print. It is possible that the optimum print balance lies between two of the test prints. A further Close Range Test should be made, or the correct filtration estimated by the operator.

4.3.11 Calibrating the Analyser for Color Balance

Retain the test negative in position. Set the filter dials on the DURST 401 Mk II Head to the filtration which gave the optimum print, and ensure that the correct filters (if any) are in the supplementary filter pack.

Set the switch on the Analyser to BALANCE. Turn the Control knob adjacent to the CYAN/MAGENTA lamp, until the lamp just lights. Repeat the operation for the centre Control

knob, so that the YELLOW/MAGENTA lamp just lights

4.3.12 Although the enlarger is designed to cope with most variations of emulsion speeds which can be expected in different batches of paper, extremes may be encountered where the knob may be turned throughout its full limit without the indicator lamp lighting, or going out. If the knob is turned to 0, and the lamp is still on, then the appropriate Neutral Density (N.D.) filter disc should be rotated to place the next darker segment over the photocell. The built-in adjustable filters are calibrated up to 1.0 density. If the darkest segment is over the cell, and the lamp has still not gone out, then the N.D. filter must be augmented with an additional piece of 0.3 N.D. filter. This is fitted by removing the screws, transparent cover plate and filter disc; securing the piece of N.D. filter over the filtered cell with a strip of transparent tape; then replacing the filter disc, cover plate and screws. Conversely, if the lamp does not light, even when the filter disc is rotated to position the lightest segment over the cell, then an additional piece of N.D. filter must be fitted over the other cell of the pair (Fig. 14).

NOTE

If a N.D. filter is not available, a piece of slightly fogged film may be used.

CAUTION

BEFORE ADDING A N.D. FILTER CENTRALISE THE APPROPRIATE CONTROL KNOB.

1.	Cyan/Magenta lamp will not extinguish	Rotate the N.D. filter disc (E) to a darker segment until the lamp does extinguish
2.	Cyan/Magenta lamp will not light	Rotate the N.D. filter disc (E) to a lighter segment until the lamp does light
3.	Cyan/Magenta lamp will not extinguish after rotating filter disc (E) to darkest segment	Fit a 0.30 N.D. filter over photocell D with transparent tape, then rotate the N.D. filter disc (E) until the lamp does extinguish
4.	Cyan/Magenta lamp will not light after rotating filter disc (E) to lightest segment	Fit a 0.30 N.D. filter over photocell C with transparent tape, then rotate the N.D. filter disc (E) until the lamp does light
5.	Yellow/Magenta lamp will not extinguish	Rotate the N.D. filter disc (F) to a darker segment until the lamp does extinguish.
6.	Yellow/Magenta lamp will not light	Rotate the N.D. filter disc (F) to a lighter segment until the lamp does light
7.	Yellow/Magenta lamp will not extinguish after rotating filter disc (F) to darkest segment	Fit a 0.30 N.D. filter over photocell A with transparent tape, then rotate the N.D. filter disc (F) until the lamp does extinguish
8.	Yellow/Magenta lamp will not light after rotating filter disc (F) to lightest segment	Fit a 0.30 N.D. filter over photocell B with transparent tape, then rotate the N.D. filter disc (F) until the lamp does light

Table 4

4.3.13 Calibrating the Analyser for Exposure

Retain the standard negative in the enlarger. Set the Time Control knob to the time which produced the best print. Switch off all room lights.

Set the Analyser BALANCE/PROBE switch to PROBE, and place the Exposure Probe over the darkest shadow area in which detail is required (i.e. the brightest part of the projected image). Set the lens to the correct aperture, and rotate the lower control knob until the YELLOW/MAGENTA lamp just lights. Set the BALANCE/PROBE switch to OFF.

4.3.14 Switch on the room lights and record filtration and exposure details for future reference.

The Analyser is now calibrated for the particular batch of paper and type of negative material in use, and the enlarger is ready for production.

NOTE

It is advisable to print a few non-standard negatives and examine the prints prior to commencing production.

4.4 PRODUCTION PRINTING

4.4.1 Insert a customer's negative into the enlarger. Set the BALANCE/PROBE switch to BALANCE, adjust the image to the required size, and focus. Adjust the Filter Control knobs on the Head to 0. If only one indicator lamp lights, rotate the MAGENTA Filter Control knob until the lamp goes out, then adjust until the lamp lights. Rotate either the CYAN or YELLOW Filter Control knob (depending upon which lamp is still not lit), until the second lamp just lights.

4.4.2 If both lamps light, rotate the MAGENTA Filter Control knob until both lamps go out, then reverse the rotation until one lamp just lights. Rotate either the CYAN or YELLOW Filter

Control knob until the other lamp just lights. If neither lamp lights, first rotate the CYAN Filter Control knob until one lamp just lights, then rotate the YELLOW Filter Control knob until the other lamp just lights.

4.4.3 During the balancing operation, some re-adjustment to the Filter Control knobs may be necessary, as there is a certain amount of interaction between the filters.

NOTE

Only two filters should be used for any one negative.

4.5 COLOR FAILURES

4.5.1 The 400 Series Color Analyser will produce satisfactory prints from negatives which have approximately equal distribution of red, green and blue densities.

4.5.2 If a negative has one predominant color; for example, a white cat on a red carpet; then the predominant color will bias the photocells, and the color balance of the print will be incorrect. This effect is known as Color Failure, and the print will require some correction by the operator.

4.5.3 When experience has been gained, a skilled operator will examine the negatives before printing to assess any predominant color, and estimate the correction required.

5. FAULT FINDING AND MAINTENANCE

5.1

Fault	Possible Cause
No light	(a) Fan Control switched off. (b) Electrical supply failure. (c) Loose lamp connection. (d) One or both lamps failed. (the characteristics of the lamps change with age and if one lamp fails BOTH lamps must be replaced). (e) Blown fuse in either the Transformer or Fan Control unit. (f) Loose plug in the Control Box.
Uneven illumination (Density)	(g) Diffuser box fitted incorrectly. (h) Diffuser box insert displaced or fitted incorrectly. (i) Diffuser slide is left out, or fitted incorrectly.
Uneven illumination (color)	(j) Dichroic filter cracked or broken.
Fall off in corners of print	(k) Lens not covering negative.
Overheating	(l) Fan not working. (m) Fan outlet or hose restricted.

FAN AND FAN CONTROL UNIT

Fan not working	(a) Fan outlet restricted. (b) Blown fuse in the Fan Control unit. (c) Fan siezed due to bearing failure or clogged by dust. (d) Fan plug insecure.

ANALYSER AND TRANSFORMER

Analyser not working	(a) Blown fuse in the Transformer unit.
Printing lamps light, but not indicator lamps	(b) Blown fuse inside Analyser unit.

5.2

Type of Maintenance	Parts	Maintenance Period	Procedure
Cleaning	Diffuser Slide Probe photocell	Daily Weekly	Wipe carefully with anti-static cloth.
Inspection	Diffuser Box	Weekly	Check polystyrene lining for any signs of discoloration and re-line if necessary. (Do **not** clean the Diffuser box with any type of solvent.)
	Fan	3 – Monthly	Disconnect the hose from the fan and visually check that the impeller is not clogged.
Lubrication	–	–	Sintered bushes are used throughout the color head, and no lubrication is required.
	Fan	Yearly	Not more than two drops of oil in each oiler.

6. ACCESSORIES

Part No.

6.1

Detailed literature is available on all the items listed below.

6.2 **400 SERIES ANALYSER 240v** **758-1001**
This consists of: **120v** **758-1002**

(a) Balance Cell Block
(b) Probe
(c) Control unit
(d) Transformer unit

These items comprise a color balance assessor which is positive and extremely simple to use; an exposure probe with coupled electronic timer is also provided.

NOTE

When ordering, state machine serial number.

6.3 **ACS R11A TYPE 2 ROLL PAPER HOLDER** **700-0006 An**
ACS R11A TYPE 3 ROLL PAPER HOLDER. **700-0003 Tim.**
This unit can be coupled to most wall mounted enlargers to provide automatic paper advance after each exposure. Paper rolls can be varied between 3 1/2 and 11 inches (8.9 and 28 cms.) wide, and the paper transport is adjustable in 1/2 inch steps from 2 inches (5.1 cms) to 14 inches (35.5 cms).

6.4 **ACS PR R11A PRINT REPEAT UNIT** **700-1001**

Used in conjunction with the ACS R11A Roll Paper Holder, the ACS Print Repeat Unit can be pre-set for any number of prints up to 9999 and will switch off automatically.

6.5 **400 SERIES TIMER 240v** **759-1001**
120v **759-1002**

6.6 **401 Mk II DIFFUSER BOX RELINING KIT** **750-1006**

6.7 **SPECIAL NEGATIVE CARRIERS**

Special negative carriers are supplied against quotation. The following information must be provided when ordering:-

(a) Actual projected image dimensions.

(b) If film guides are required, state whether they are for feeding is only convenient for cut lengths of film).

(c) Sample exposed film - sheet or roll.

(d) Format- horizontal, vertical or square.

NOTE

An order form is provided at the end of the manual.

6.8 **STANDARD NEGATIVE CARRIERS**

6.8.1 **FOLDING TYPE NEGATIVE CARRIER**

Part No.	Negative Type Exposure Per Roll	Normal Nomenclature	Aperture	
			Actual Inches	Actual-Centimetres
452-4100 Glassless	4" x 5"	4" x 5"	3.625 x 4.625	9.210 x 11.750
452-2170 Glass	4" x 5"	4" x 5"	3.625 x 4.625	9.210 x 11.750

TABLE 1

6.8.2 DROP IN TYPE NEGATIVE CARRIERS FOR ROTATING NEGATIVE CARRIER BASE PLATE (see Table 2)
Rotating Negative Carrier Base Plate **750-1012**

6.9 BESSELER ADAPTOR KIT 750-1014
The kit for fitting the 401 Mk 11 to the Besseler 5" x 4" Enlarger.

6.10 CHROMEGA D2/D3 ADAPTOR KIT 750-1015
The kit for fitting the 401 Mk II to the Chromega D2/D3 Enlargers.

6.11 CHROMEGA D4/D6 ADAPTOR KIT 750-1013
The kit for fitting the 401 Mk II to the Chromega D4/D6 Enlargers.

6.12 TYPE 66 DIFFUSER BOX 750-1005
The Diffuser Box designed to increase the illumination of negatives smaller than 2¼" x 2¼" (6 x 6 cm)

6.13 401 Mk II FILTER SERVICE KIT 750-1016

Part Number	Negative Type Exposure Per Roll	Normal Nomenclature	Aperture	
			Actual-Inches	Actual-Centimeters
452-2066	70 mm	70 mm	2.562 x 3.375	6.507 x 8.572
452-2096	8/120	2 1/4 x 3 1/4" 6 x 9 cm	2.187 x 3.250	5.555 x 8.255
452-2086	10/120	2 1/4 x 2 3/4"	2.187 x 2.750	5.555 x 6.985
452-2016	10/120 KONIOMEGA	2 1/4 x 2 3/4"	2.125 x 2.625	5.397 x 6.667
452-2116	12/120	2 1/4 x 2 1/4"	2.187 x 2.187	5.555 x 5.555
452-2136	12/120 HASSELBLAD	2 1/4 x 2 1/4" HASSELBLAD	2.062 x 2.062	5.243 x 5.243
452-2166	16/120	4.5 x 6 cm	2.187 x 1.562	5.555 x 3.968
452-2126	35 mm	24 x 36 mm	0.906 x 1.343	2.301 x 3.411
452-2076	INSTAMATIC 126	INSTAMATIC 126	1.062 x 1.062	2.698 x 2.698
452-2196	110	13 x 17 mm	0.472 x 0.622	1.200 x 1.599
452-2226	35 mm slide	2 x 2"	1.500 x 1.500	3.810 x 3.810

TABLE 2

ORDER FORM		
DESCRIPTION OF ITEM	PART NUMBER	REQUIRED QUANTITY

DURST®

401 MK II COLOR HEAD

SERVICE MANUAL

DURST (UK) LIMITED · FELSTEAD ROAD · EPSOM · SURREY · ENGLAND

401-8-72

DURST 401 MK II COLOR HEAD SERVICE MANUAL/*CONTENTS*

	Page
Introduction	1
Servicing and repair of units	3
Wiring diagrams	9

INTRODUCTION

The DURST 401 MK II COLOR HEAD SERVICE MANUAL includes instructions for the servicing, fault finding and repair of the unit.

A jig (650-0846) is required to set-up the dials.

TECHNICAL OPERATION SERVICING AND REPAIR OF UNITS

1. FAN

1.1 No repair is envisaged, although a qualified electrician could carry out simple repairs; otherwise, the unit should be changed.

2. FAN CONTROL UNIT

2.1 The electrical supply input is fed through the Fan Control unit to the input transformer, controlled by the Fan Control unit switch.

2.2 Every time that the lamps are lit, an electrical supply is fed through a rectifier bridge to the relay, closing the contacts.

2.3 The Fan operates for an extended time after the lamps are lit, due to the capacitor discharge.

3. TRANSFORMER

3.1 No repair is envisaged, although a qualified electrician could carry out any simple repairs; otherwise, the unit should be changed.

4. TIMER UNIT

4.1 A qualified electrician may carry out any repairs to this unit, and to facilitate fault-finding, a circuit description is given (4.2–4.4) evolving from the three position switch (Fig. 3).

4.2 CENTRE (DIM) POSITION

4.2.1 The 50 V AC supply from tag 2, is fed via resistor R 12, diode D3 and resistor R 14 to capacitor C3 and transistor T4. Capacitor C3 charges up to a pre-determined voltage and discharges via the transistor T4, in pulses.

4.2.2 The Triac is switched on from the 22 V DC rail, via resistors R 17 and R 16 and transistor T4, causing the lamps to be intermittently lit at such a frequency to give approximately half brightness.

4.3 FOCUS POSITION

4.3.1 The 50 V AC supply from tag 2 is fed via resistor R 12, diode D3 and resistor R14 to capacitor C3 and transistor T4. A supply from the 22 V DC rail is fed via resistor R 11, through the switch, diode D3, resistor R 14 to capacitor C3.

4.3.2 Due to the presence of the standing 22 V DC on capacitor C3, the pulsing rate is at a higher frequency than described in paragraph 4.2.2., causing the lamps to give full brightness.

4.4 EXPOSE POSITION

4.4.1 In this position the timer circuit is ready for automatic operation.

4.4.2 Pressing the EXPOSE button causes a voltage to appear across resistor R 2, derived from the 22 V DC rail. This voltage switches on transistors T2 and T3 which in turn feeds 22 V DC to diodes D2 and D4.

4.4.3 D4 switches on transistor T4, as previously described in paragraph 4.2.1 Capacitor C1 charges up via resistors R 10 and R 8 and the Timer Selector switch to a pre-determined voltage, which switches on transistor T1, effectively short circuiting zener diodes ZD1 and ZD2. ZD1 is then switched off, in turn switching off transistors T3 and T2.

NOTE

The capacitor (C1) charge time is determined by the selection of the Timer Selector switch.

NOTE

Transistor T3 and resistor R 3 form a hold on circuit when the EXPOSE button is released.

5. ANALYSER

5.1.1 The DURST 400 Series Analyser comprises three separate units:

(a) Control Unit
(b) Balance Photocell block
(c) Exposure

5.1.2 A qualified electronics engineer may carry out any repairs to this unit, and to facilitate fault finding, a circuit description is given (5.2.1 to 5.5.2), together with Wiring Diagram (No. 1).

5.2.1 The DURST 400 Series Analyser, has two color and one exposure balance circuits which must be set before an exposure is made. (Instruction Manual Section 4). The whole unit is powered by 56V AC from the Transformer Unit which is mounted below the Control Unit. The Transformer Unit is available with the primary tapped either for 200 – 240V or 100 – 120V (50-60 Hz)

5.2.2 An exposure is initiated by pressing the EXPOSE button, or if it is being used on repetition with an Automatic Roll Paper Holder, exposures will start automatically. The exposure is timed by an RC circuit, set by the exposure time-switch in the Control Unit. At the end of the exposure, there is a short time delay, followed by a transport pulse which is fed to an Automatic Roll Paper Holder, if used, such as the DURST ACS R11A.

5.3 BALANCE CIRCUITS

5.3.1 This description should be read in conjunction with Wiring Diagram No. 1.

5.3.2 RED-GREEN BALANCE

When the BALANCE/PROBE switch is selected to BALANCE, the 44 V and 22 V lines are switched on and the circuit becomes activated. The CYAN BALANCE control and the green/red pair of photocells switch T11 off or on. T11 switches on if the voltage at the junction of the photocells is greater than that of the sink of T11. (i.e. the slider of R.1.), and off, if less. T11 switching on, switches T1 on, in turn switching S3 on, lighting the CYAN/MAGENTA indicator lamp.

5.3.3 The circuit is designed so that when the red/green pair of photocells have equal resistances, the balance point occurs when the CYAN/MAGENTA balance control is in the mid-position (7 1/2).

This is achieved by adjusting R.1. (To facilitate adjustment, the photocells must be replaced by 1 M resistors).

5.3.4 BLUE-GREEN BALANCE

This uses an identical circuit to the Red/Green Balance, except part of its circuitry is shared by the exposure balance circuit (T4, S4 and the YELLOW/MAGENTA indicator lamp).

5.3.5 EXPOSURE BALANCE

This circuit is very similar to the color balance circuit. Instead of two photocells, there is only one, (the Exposure Probe), which is balanced against the resistance of the Exposure Time switch. (R22 is for probe linearity compensation). Any imbalance, switches T13 off or on. T13 switching on, switches T4 and S4 on, lighting the YELLOW/MAGENTA indicator lamp. The circuit is designed so that when the Exposure Probe is replaced by a 1 M resistor, the balance point is obtained when the exposure control is at 7 1/2, and the Exposure Time switch at 9 seconds.

5.3.6 22/44 V SUPPLIES

These are switched on when BALANCE or PROBE is selected, connecting the 56 V AC to D10, R26, R25, C.1, Z1 and Z2, producing the stabilised 22 and 44 V supplies.

5.4 EXPOSE CIRCUIT

5.4.1 EXPOSE CIRCUIT SWITCH

When the Expose button is pushed, T3 is switched on, in turn switching on S6. S6 latches on (via D14, R36, R40), switching S8 on and the lamp half on. The negative side of C6 becomes earthed, and since the positive side is charged positively (D26, R59 and R60), this produces a positive voltage between gate and cathode of S9 (R61, D27), switching it on. The lamps are fully lit virtually instantaneously.

5.4.2 BLOCK START

From the beginning of an exposure to the end of paper transport pulse, or when the BALANCE/PROBE switch is set to BALANCE or PROBE, the block start circuit operates, preventing another exposure starting. Line B is held positive via D25 (during exposure and until the end of the roll-head pulse), D24 (during paper transport), and D9 (BALANCE or PROBE selected). When B is positive, it holds T5 on, shorting the supply to T3 and thus preventing another start pulse from T3.

5.4.3 VOLTAGE COMPENSATION

This circuit acts as a stabiliser to the lamp supply. The firing angle of S9 is varied with mains voltage fluctuations, so that when the mains voltage is above nominal, S9 is on for a greater part of the half-cycle. When the mains voltage is below nominal, S9 is off for a greater part of the half-cycle. This is achieved by shorting the supply to the gate of S9 to the cathode, using T9.

5.4.4 R65–67 D30 and C14 provide a half-wave, partially smoothed wave form which is followed by the base of T8 via D29. When the base voltage is greater than 10 V, T8 conducts, because the emitter is held at 10 V by Z5. When T8 conducts, it switches T9 on, blocking the voltage to the gate of S9. If the mains voltage is below nominal, the voltage on the base of T8 will be lower, and T8 and T9 will be on for a smaller part, and S9 a larger part, of each negative half-cycle. The adjustment of R66 sets the amount of compensation.

5.5 EXPOSURE TIME SWITCH

5.5.1 When an exposure is started, C4 is charged (D14 and R36) to produce 10 V and 32 V stabilised supplies (R32, Z3 and Z4). The timer capacitor C3 is slowly charged up, via D8 and the resistance R73, until it reaches 10 V. T10 then becomes forward biased (via R29 and D12). T10 switching on, switches T2 and S5 on. S5 discharges C4, and shorts the latch-on circuit of S6, switching off S6, S8, S9 and the lamps.

5.5.2 The timer is adjusted, using R27, to give exactly 9 seconds when the Exposure Time-switch is set to 9 seconds. The exposure times will then be correct for all other switch settings.

5.6 PAPER TRANSPORT (when fitted)

5.6.1 ROLLHEAD DELAY

During an exposure, C5 is charged positively to 32 volts (R37, R38, D18). This holds T6 on and T7 off. When the exposure ends, D20 and R50 discharge C5 in approximately 1.2 seconds, after which T6 switches off.

5.6.2 ROLLHEAD PULSE

During the exposure, C2 is charged positively to 30 volts (D21, R52). At the end of the exposure, after the rollhead delay, T7 switches on, switching S7 on for approximately 1/4 second, until the current through T7 from C2 is insufficient to hold S7 on. The pulse from S7 supplies, via pin 2 on the centre socket of the Analyser, a 50 V half-wave pulse (a 24 V relay is used on the DURST ACS Automatic Roll Paper Holder to start a paper transport cycle).

6. COLOR HEAD

6.1 FITTING NEW LAMPS

6.1.1 The correct procedure for changing the lamps is in paragraph 3.5 of the INSTRUCTION MANUAL.

6.2 FITTING A NEW DIFFUSER AND LINING

6.2.1 Position the top (204-0048), back (204-0050) and two side (204-0051) linings in the Diffuser Box.

6.2.2 Place the Diffuser Box insert (200-0406) and the front lining (204-0049) nearly in position, with the insert fitted in the slot of the front lining.

CAUTION

ENSURE THAT THE PLATE (VIEWED LOOKING INTO THE BOX) HAS THE LARGE OPAQUE SIDE FACING OUTWARDS, AND THE SMALL OPAQUE PLATE FURTHEST FROM THE LAMP APERTURES.

6.2.3 Gently push the Plate and front lining into position, so that the Plate is held by the two slots in the front and rear linings. Check that the Plate is at right angles to all four sides.

6.2.4 Ensuring that the lining is correctly positioned, fit twelve pins in the twelve holes around the edge of the Box.

6.3 REMOVING THE DIALS

NOTE

If filters only require changing, omit 6.4 and 6.5.

6.3.1 Remove the five screws (88, Fig. 2) securing the Main Plate (60, Fig. 2) then remove the Plate.

6.3.2 Remove the two screws (93, Fig. 1); lifting the felt strip to fully expose the second screw; then carefully remove the Main Plate Support complete with the Scale Assembly.

6.3.3 Place the Scale Assembly in the jig (650-0846).

6.3.4 Loosen the dial grub with the 4 mm hexagonal socket wrench, then remove the dials.

NOTE

The YELLOW and CYAN dials must be loosened and removed before the MAGENTA dial, as there is a slight tension on the spring washers (111, Fig. 2).

6.4 REFITTING THE DIALS

6.4.1 Ensure that all three cams are against the stops on the jig, by rotating the spindles clockwise whilst loose.

6.4.2 Fit the new MAGENTA Dial Assembly (650-0727) in the centre position, the YELLOW (650-0729) at the top and the CYAN (650-

0728) the bottom. Fit the retaining bar, and secure with thumb nuts.

6.4.3 Rotate all three dials clockwise until the zero is aligned with the pointer on the jig.

6.4.4 Secure the dials to their respective shafts, using the 4 mm hexagonal socket wrench.

6.4.5 Remove the retaining bar of the jig, then remove the Scale Assembly.

6.4.6 Position the Scale Assembly with the Main Plate Support on the Intake Baffle (61, Fig. 2). Secure with two screws from the base.

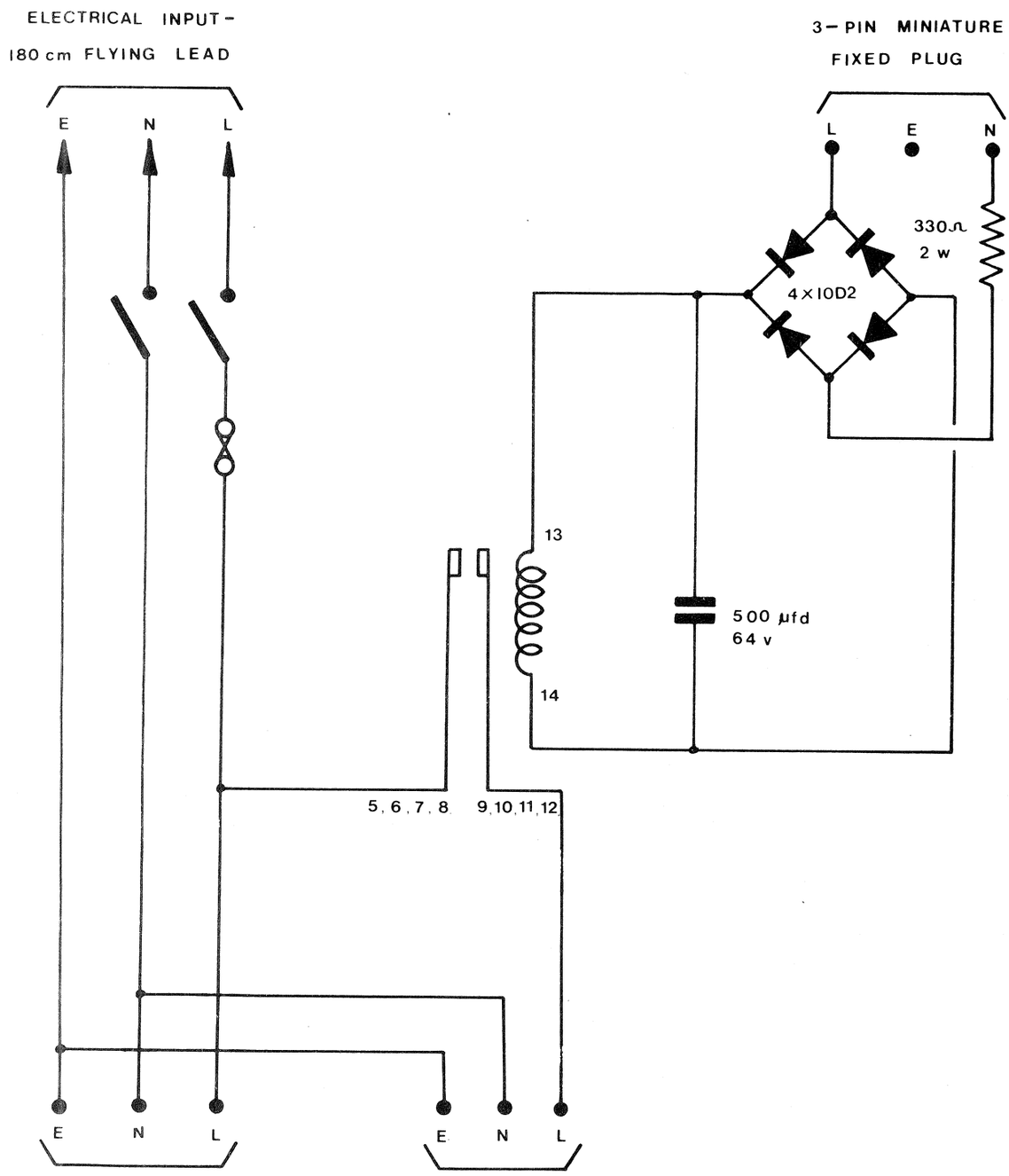
6.4.7 Re-affix the felt strip with adhesive.

6.4.8 Position the Main Plate (202-0527) with the cut-out to the top, against both Plate Supports, and secure with the five screws.

NOTE
Since the filter settings are critical, filters must only be changed by authorized distributors.

WIRING CODE

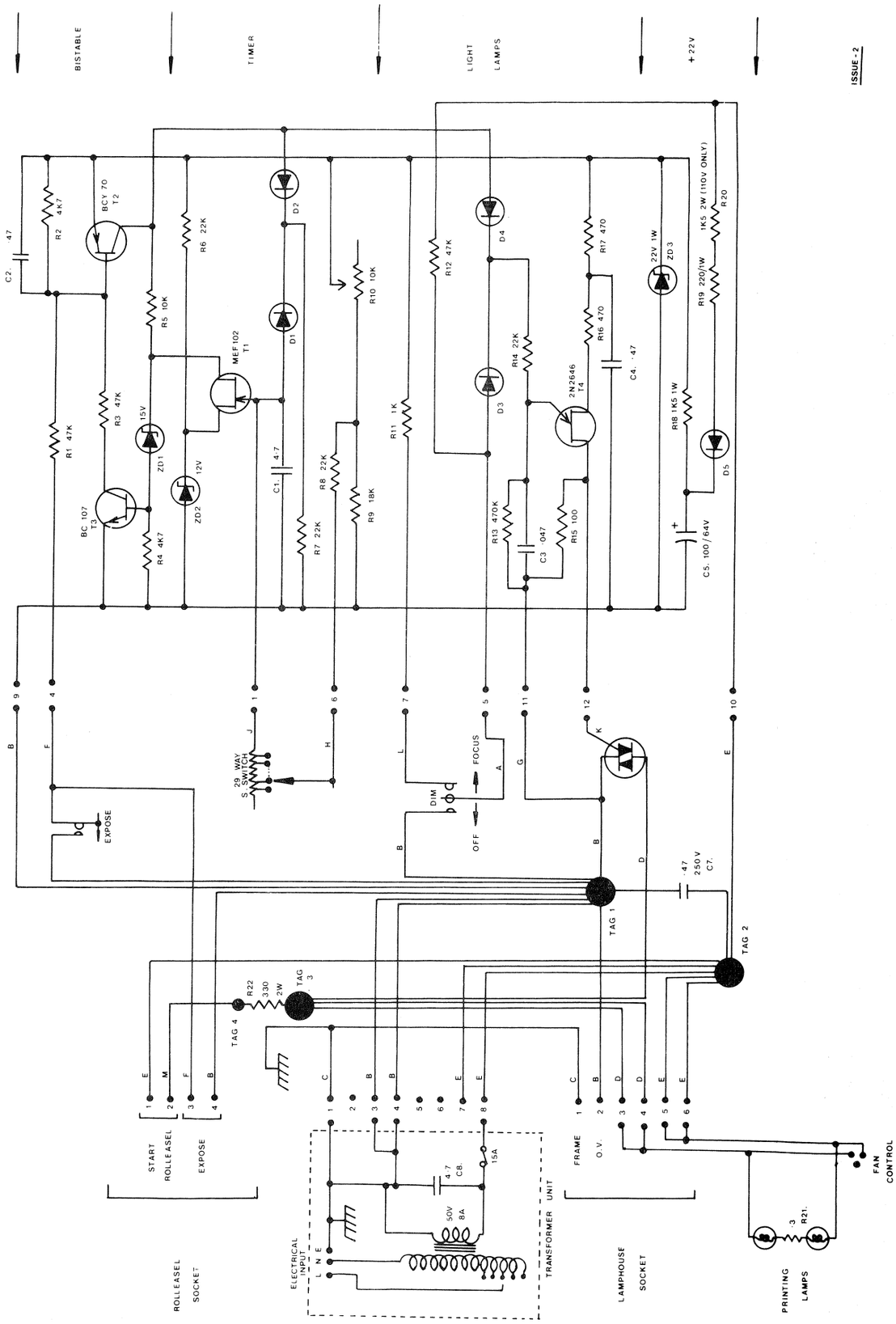
A	= RED
B	= BLACK
C	= GREEN
D	= PURPLE
E	= WHITE
F	= PINK
G	= BLACK, WHITE
H	= WHITE, ORANGE
J	= PINK, BLACK
K	= BLUE, GREEN
L	= RED, BLACK
M	= WHITE, BROWN
N	= WHITE, BLUE
O	= YELLOW, BLACK
P	= PINK, BLUE
Q	= WHITE, GREEN
R	= WHITE, YELLOW
S	= WHITE, RED
T	= BLUE, BROWN
U	= ORANGE
V	= WHITE, PURPLE
W	= RED, BLUE
X	= PINK, RED
Y	= BLUE
Z	= YELLOW
A – A	= GRAY, BLACK
A – B	= GRAY, WHITE
A – C	= GRAY



ISSUE - 3

RELAY PART Nº 320 - 7012

WIRING DIAGRAM 2
FAN CONTROL UNIT
513-0035



WIRING DIAGRAM 3
TIMER
513-0061

DURST®

401 MK II COLOR HEAD

PARTS LIST

DURST (UK) LIMITED · FELSTEAD ROAD · EPSOM · SURREY · ENGLAND

DURST 401 MK II COLOR HEAD MANUAL/*CONTENTS*

		Page
Fig. 1	Front and Back Casting Assembly	2
Fig. 2	Filter Assembly	6
Fig. 3	Diffuser Box	8
Fig. 4	Fan Control Unit	10
Fig. 5	Fan	10
Fig. 6	Transformer Unit	14
Fig. 7	400 Series Timer	16
Fig. 8	400 Series Analyser – 1	18
Fig. 9	400 Series Analyser – 2	20
Fig. 10	Probe	24
Fig. 11	Balance Photocell Assembly (Pre – 4813)	26
Fig. 12	Balance Photocell Assembly (including and post 4813)	28

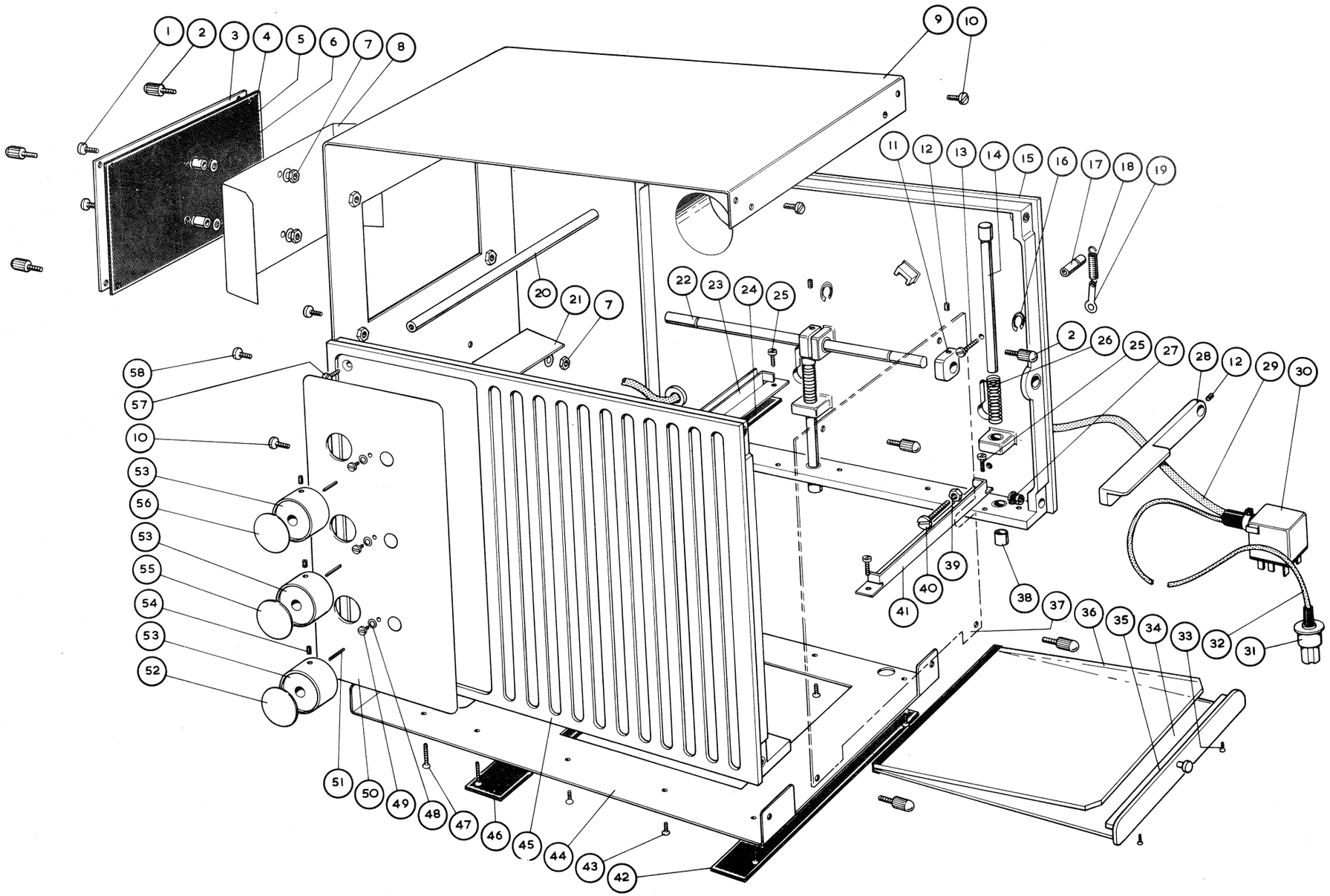


Figure 1
FRONT AND BACK CASTING ASSEMBLY

FRONT AND BACK CASTING ASSEMBLY

Ref. No.	Part No.	Description
Fig. 1– 1	021-4012	M4 x 12 mm PAN BNP.
2	201-5855	Domed screw
3	202-0515	Lamp cover
4	103-0040	Black felt
5	017-4006	M4 (C) x 6 mm spacer
6	021-4800	M4 washer normal BNP.
7	021-4901	M4 full nut BNP.
8	202-0517	Lamp cover baffle
9	202-5626	Top cover
10	021-4010	M4 x 10 mm PAN BNP.
11	201-5859	Lift cam
12	025-4705	M4 x 5 mm socket grub
13	021-3015	M3 x 15 mm PAN BNP.
14	201-0690	Lift rod
15	650-0737	Back casting
16	218-0001	Circlip 5 mm 1/D
17	201-1322	Spring locating spacer
18	212-0020	Spring
19	511-0030	2 BA solder tag
20	201-5856	Tie rod
21	202-0516	Top cover baffle
22	202-0689	Lift cam spindle
23	202-0519	Tie strip
	202-0520	Tie strip baffle
24	233-0035	Black felt
25	021-3006	M3 x 6 mm PAN BNP.
26	212-0049	Spring
27	232-0013	M4 insert
28	201-5857	Lift lever
29	650-0273	Cable assy.
30	308-0085	6 way free plug
or	308-0107	Plug JP4-CCT (not shown)
31	308-0073	3 pin free socket
32	307-6016	Twin oval cable
33	021-2405	M2 x 5 mm CSK BNP.
34	200-0404	Diffuser plate
35	201-6309	Diffuser slide end piece
36	200-0421	Diffuser plate
37	202-0524	Side cover
38	200-0579	Lift rod cap
39	221-2902	2BA half nut BNP.
40	226-2111	Nylon screw
41	202-0519	Tie strip baffle
42	233-0023	Felt strip
43	021-3406	M3 x 6 mm CSK BNP.
44	202-0518	Bottom cover
45	203-5046	Front casting
46	233-0024	Felt strip
47	021-3416	M3 x 16 mm CSK BNP.
48	021-3800	M3 washer normal BNP.
49	021-3004	M3 x 4 mm PAN BNP.
50	214-5233	Front panel
51	232-0004	Seloc pin
52	206-0067	Control knob insert cyan
53	206-5072	Filter control knob
54	025-3710	M3 x 10 mm socket grub

FRONT AND BACK CASTING ASSEMBLY (continued)

Ref. No.	Part No.	Description
Fig. 1–55	206-0066	Control knob insert magenta
56	206-0065	Control knob insert yellow
57	021-3408	M3 x 8 mm CSK BNP
58	021-4010	M4 x 10 mm PAN BNP.

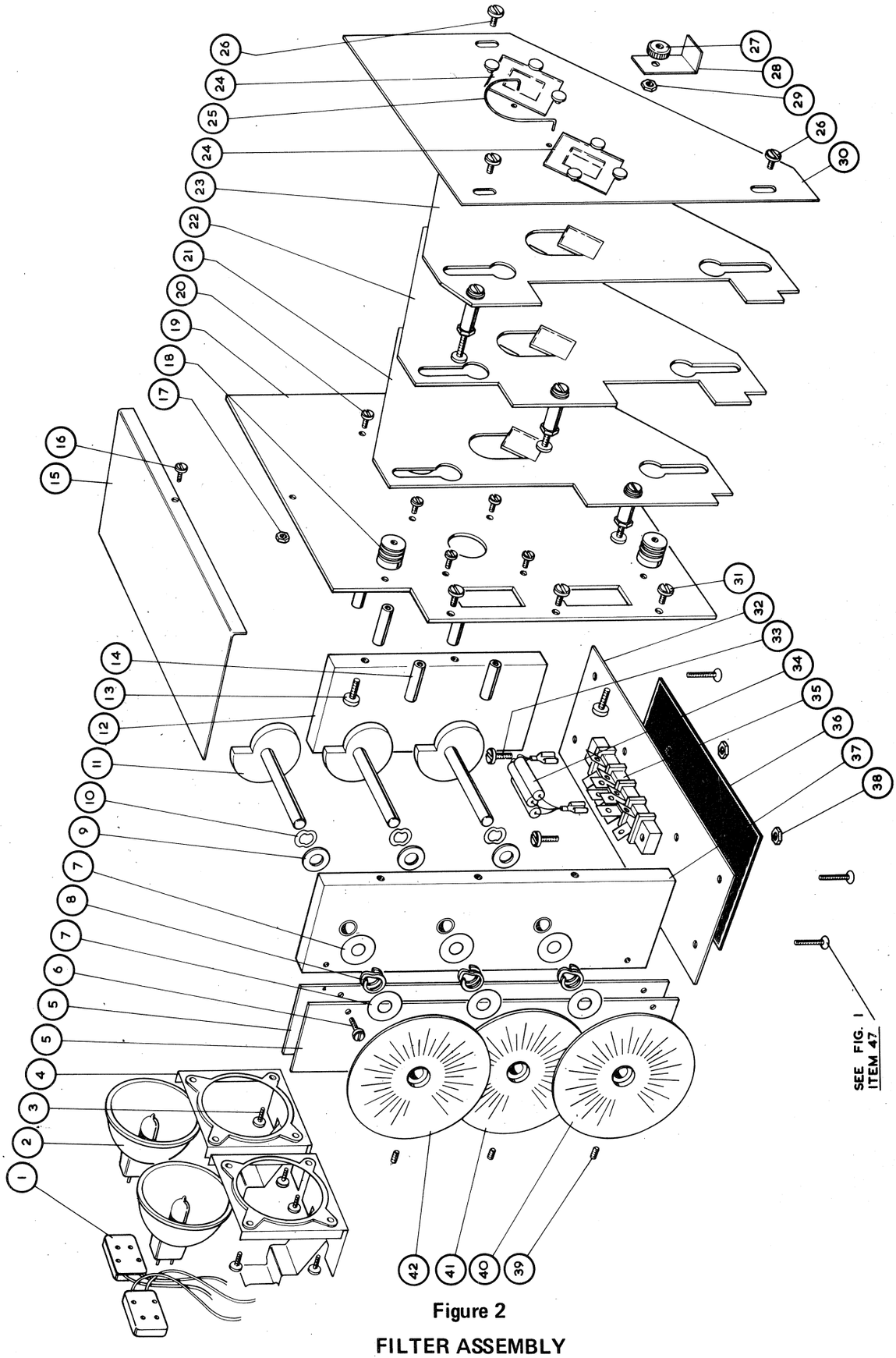


Figure 2

FILTER ASSEMBLY

FILTER ASSEMBLY

Ref. No.	Part No.	Description
Fig. 2– 1	650-0292	Lamp socket assy
2	300-0022	E.J.L. lamp
3	021-3010	M3 x 10 mm PAN BNP.
4	317-0030	Lampholder
5	200-6121	Light baffle
6	021-3012	M3 x 12 mm PAN BNP.
7	233-0006	Nylon washer
8	233-0021	Washer double coil
9	200-0070	Shaft washer
10	244-7840	Washer wave
11	650-1878	Cam and spindle assy.
12	201-5865	Main plate support - short
13	021-4010	M4 x 10 mm PAN BNP.
14	017-3119	M3 (T) x 19 mm spacer
15	202-0533	Heat shield
16	021-4006	M4 x 6 mm PAN BNP.
17	201-6625	Filter holder boss
18	200-5758	Filter holder boss
19	202-0527	Main plate
20	021-3010	M3 x 10 mm PAN BNP.
21	650-1749	Cyan Filter assy (only supplied complete)
22	650-1748	Magenta filter assy (only supplied complete)
23	650-1750	Yellow filter assy (only supplied complete)
24	398-0054	Filter
25	212-0073	Spring clip
26	021-4006	M4 x 6 mm PAN BNP.
	021-4800	M4 washer normal BNP.
27	021-4905	M4 thumb nut BNP.
28	202-0525	Locking bracket
29	021-4901	M4 full nut BNP.
	021-4016	M4 x 16 mm PAN BNP.
30	650-1059	Light baffle plate assy.
31	021-4010	M4 x 10 mm PAN BNP.
32	202-0528	Intake baffle
33	021-4012	M4 x 12 mm PAN BNP.
34	650-0293	Resistor assy.
35	309-0029	Terminal block
36	233-0051	Intake baffle felt
37	201-6513	Main plate support - long
38	021-4901	M4 full nut BNP.
39	025-4706	M4 x 6 mm socket grub
40	650-1597	Cyan Dial assy.
41	650-1596	Magenta dial assy.
42	650-1598	Yellow dial assy.

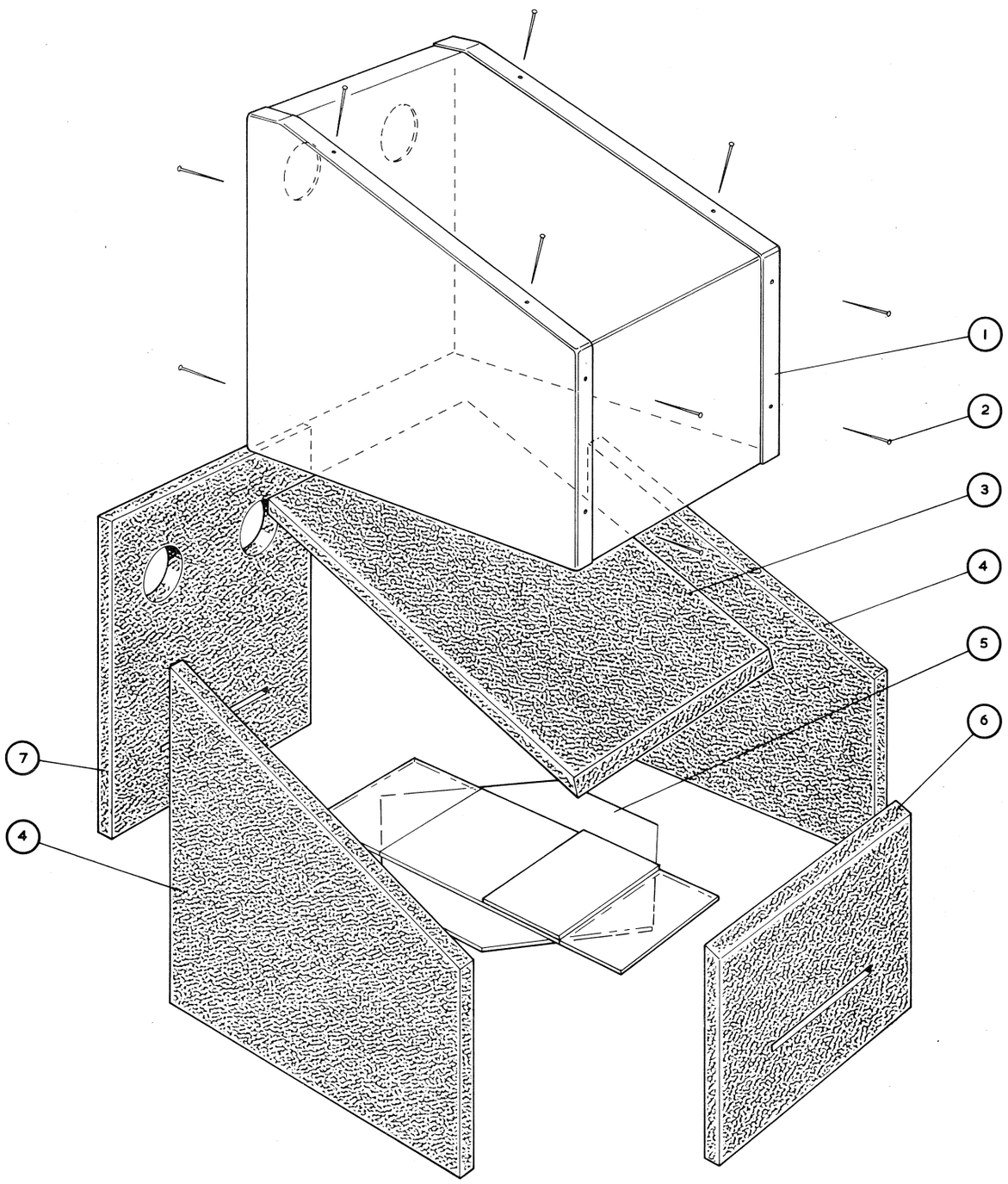


Figure 3
DIFFUSER BOX

DIFFUSER BOX

Ref. No.	Part No.	Description
Fig. 3– 1	202-0513	Diffuser box
2	216-0022	Pins
3	204-0048	Diffuser box lining - top
4	204-0051	Diffuser box lining - sides
5	200-0406	Diffuser box insert
6	204-0050	Diffuser box lining back
7	204-0049	Diffuser box lining front
	650-0274	Complete Diffuser Box Assembly
	750-1006	Diffuser Box Relining Kit

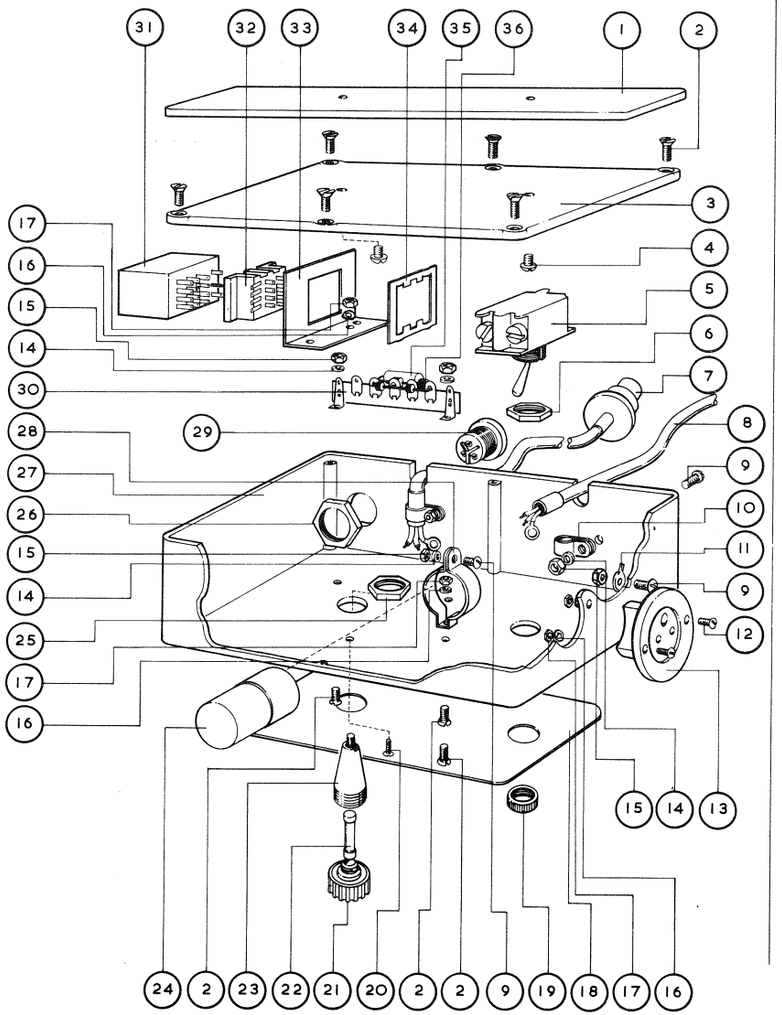


Figure 4

FAN CONTROL UNIT

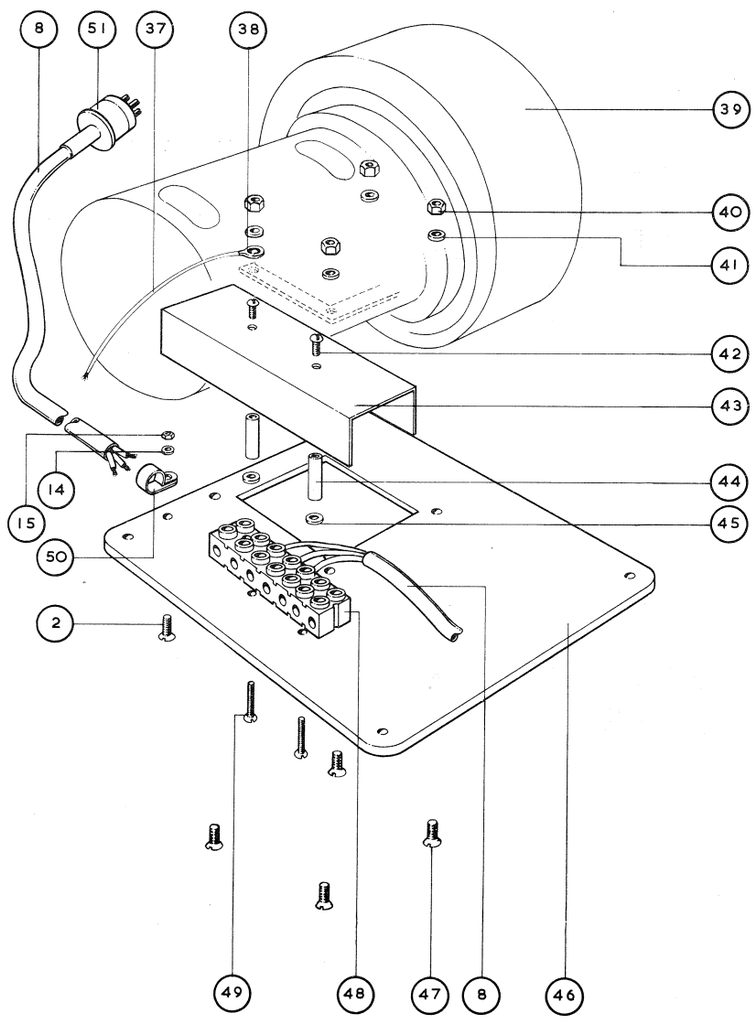


Figure 5

FAN

FAN AND FAN CONTROL

Ref. No.		Part No.	Description
Figs. 4 & 5–	1	201-5864	Bracket
	2	021-4410	M4 x 10mm CSK BNP
	3	203-5049	Lid
	4	021-5006	M5 x 6mm PAN BNP
	5	305-0038	Switch
	6		Only sold as part of Item 5
	7	308-0077	3 pin free socket
	8	307-0003	3 core cable
	9	021-4010	M4 x 10mm PAN BNP
	10	318-0009	NX3 cable clip
	11	511-0110	Amp tag
	12	021-3010	M3 x 10mm PAN BNP
	13	308-0026	3 pin socket
	14	025-4850	M4 washer shakeproof
	15	021-4901	M4 full nut BNP
	16	025-3850	M3 washer shakeproof
	17	021-3901	M3 full nut BNP
	18	214-5104	Name plate
	19		Only sold as part of Item 5
	20	021-3408	M3 x 8mm CSK BNP
	21		Only sold as part of Item 23
	22	300-0024	5 amp fuse
	23	317-0029	Fuse holder
	24	302-0059	500 MFD 64V capacitor
	25		Only sold as part of Item 23
	26		Only sold as part of Item 29
	27	203-5048	Box
	28	318-0003	Capacitor clip
	29	308-0032	Miniature fixed plug
	30	309-0005	7-way tag board
	31	320-7012	24V relay
		318-0042	Clip
	32	317-0002	Relay base and retainer
	33	202-0123	Relay bracket
	34		Only sold as part of Item 32
	35	303-1010	330 OHM resistor 2w
	36	320-2004	Diode 10D2
	37	307-2082	Earth wire
	38	511-0110	Amp tag
	39	311-0011	Fan (Specify voltage)
	40	021-5901	M5 full nut BNP
	41	025-5850	M5 washer shakeproof
	42	021-3006	M3 x 6mm PAN BNP
	43	202-5633	Terminal cover
	44	017-3110	M3 (T) x 10mm spacer
	45	021-3800	M3 washer normal BNP
	46	202-5632	Mounting plate
	47	021-5410	M5 x 10mm CSK BNP
	48	309-0003	5 amp 7-way terminal block
	49	021-3416	M3 x 16mm CSK BNP
	50	318-0008	NX2 cable clip
	51	308-0076	3 pin plug
	52	218-0009	Hose clip (not shown)
	53	219-0050	Hose (not shown)
	54	200-5699	Fan adaptor (not shown)

FAN AND FAN CONTROL (continued)

Ref. No.	Part No.	Description	
Figs. 4 & 5–	650-0741	Complete Fan 110V	(Not shown)
	650-0755	Complete Fan 230V	(Not shown)
	650-0696	Fan Control Unit Type 2	(Not shown)

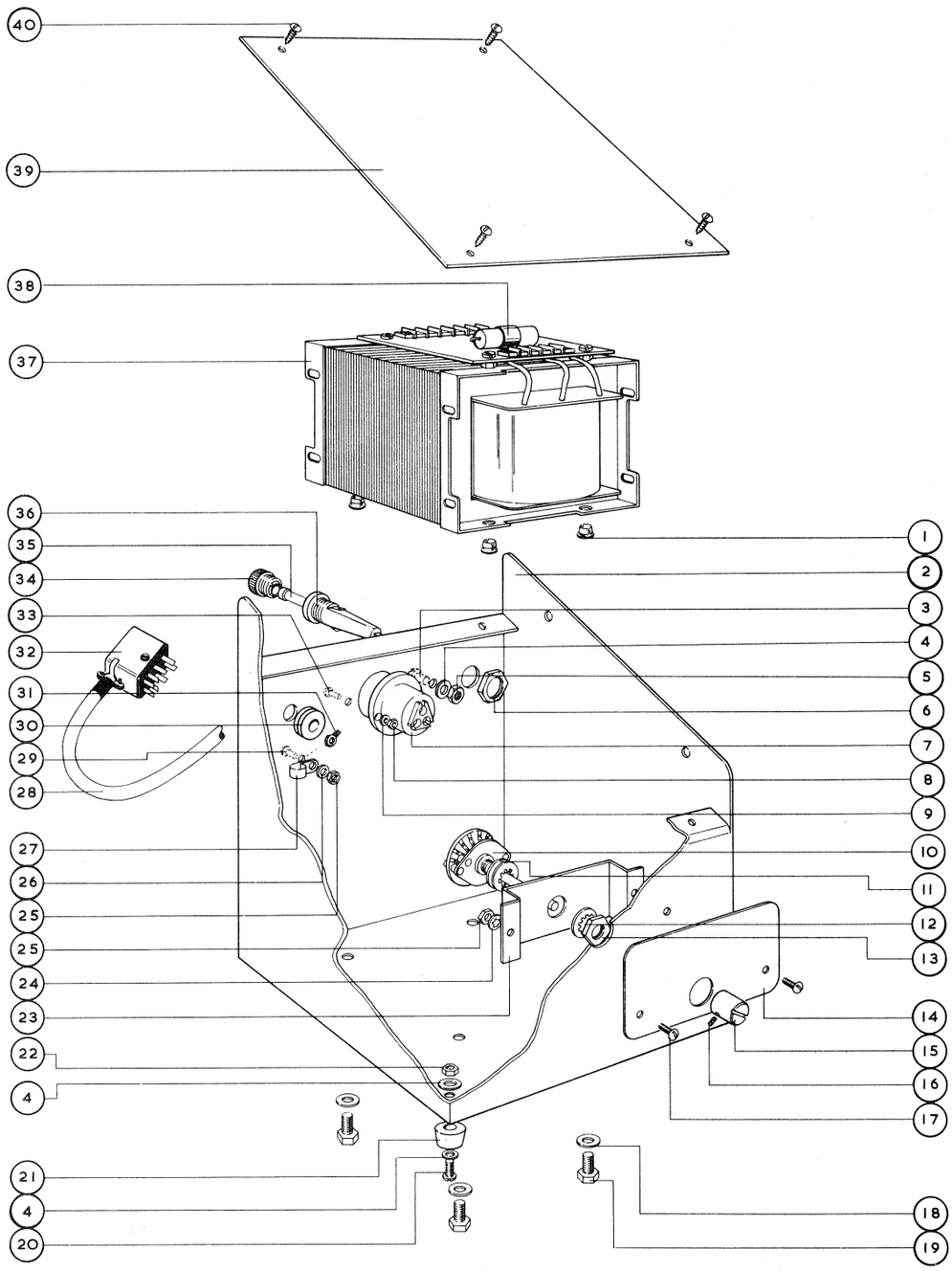


Figure 6

TRANSFORMER UNIT

TRANSFORMER UNIT

Ref. No.	Part No.	Description
Fig. 6 — 1	232-0014	Thread insert 6mm
2	202-5630	Transformer stand
3	021-5010	M5 x 10mm PAN BNP
4	021-5800	M5 washer normal BNP
5	021-5902	M5 half nut BNP
6		Only sold as part of Item 36
7	308-0078	Mains socket
8	021-3901	M3 full nut BNP
9	021-3800	M3 washer normal BNP
10	305-0012	Rotary switch
11		Only sold as part of Item 10
12		Only sold as part of Item 10
13		Only sold as part of Item 10
14	214-0110	Voltage selector panel 110 volts
15	214-0108	Voltage selector panel 230 volts
15	201-0863	Switch extension
16	025-4705	M4 x 5mm socket grub
17	021-3010	M3 x 10mm PAN BNP
18	021-6800	M6 washer normal BNP
19	021-6312	M6 x 12mm Hex BNP
20	021-5012	M5 x 12mm PAN BNP
21	318-0026	Foot PVC
22	021-5901	M5 full nut BNP
23	202-5433	Switch mounting bracket
24	021-3850	M3 washer shakeproof
25	021-3901	M3 full nut BNP
26	021-4800	M4 washer normal BNP
27	318-0009	NX3 P clip
28	307-0003	3 core cable
29	021-4012	M4 x 12mm PAN BNP
30	318-0030	Grommet
31	511-0111	Amp tag
32	308-0084	Plug 8 way
33	021-3010	M3 x 10mm PAN BNP
34		Only sold as part of Item 36
35	300-0033	Fuse 15A
36	317-0011	Fuse holder
37	304-0002	Transformer 230V
	304-0003	Transformer 110v
38	302-0086	Capacitor 4.7 mfd. 250v
39	202-0631	Transformer cover
40	251-1205	No 4 x 3/8 RD HD self tap
	650-0719	Complete Power Pack 110v
	650-0720	Complete Power Pack 230v

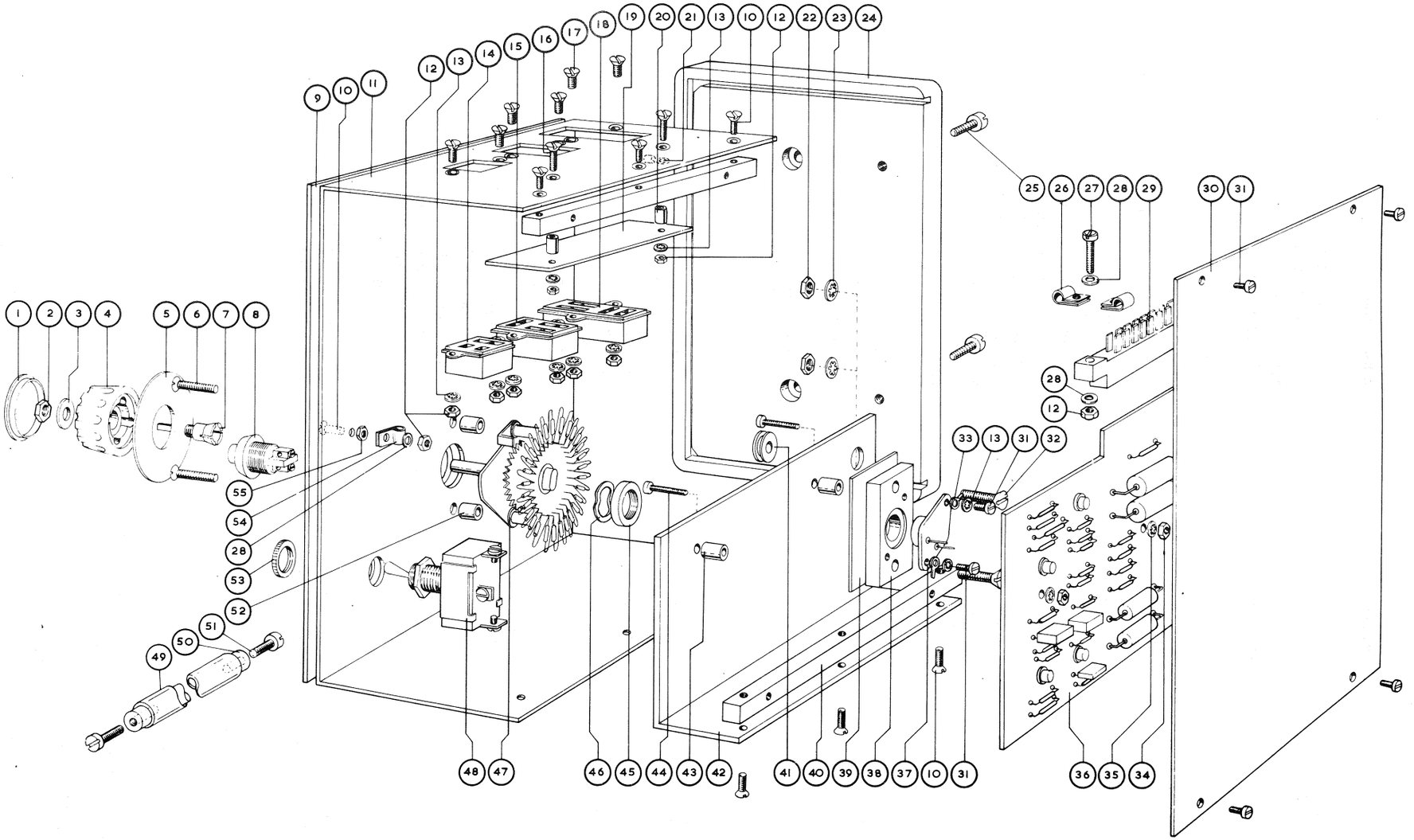


Figure 7

400 SERIES TIMER

400 SERIES TIMER ASSEMBLY

Ref. No.	Part No.	Description
Fig. 7– 1	006-0039	Control knob cap (grey)
2		Only sold as part of Item 4
3		Only sold as part of Item 4
4	206-5036	Control knob
5	006-0044	Figure dial skirt
6	021-4420	M4 x 20mm CSK BNP
7		Only sold as part of Item 4
8	305-0009	Push button switch
9	214-5111	Front panel
10	021-3406	M3 x 6mm CSK BNP
11	202-5622	Chassis
12	021-3901	M3 full nut BNP
13	025-3850	M3 washer shakeproof
14	308-0079	4 way fixed socket
15	308-0048	6 way fixed socket
16	021-3416	M3 x 16mm CSK BNP
17	021-3406	M3 x 6mm CSK BNP
18	308-0070	8 way fixed socket
19	659-0746	Filter circuit assembly
20	017-3110	M3 (T) x 10 mm spacer
21	511-0121	Ring tag
22	021-5120	M5 half nut BNP
23	025-5850	M5 washer shakeproof
24	200-5698	Side plate
25	021-5012	M5 x 12mm PAN BNP
26	318-0013	NXO P Clip
27	021-3016	M3 x 16mm PAN BNP
28	021-3800	M3 washer normal BNP
29	308-0111	Edge connector 12 way
30	202-5620	Back plate
31	021-4012	M3 x 6mm PAN BNP
32	027-5120	M5 x 20mm CSK BNP
33	511-0027	6BA solder tag
34	021-4902	M4 half nut BNP
35	025-4850	M4 washer shakeproof
36	659-0747	Printed circuit board assembly
37	320-0008	Triac
38	201-5869	Heat sink
39	200-5530	Fibre glass strip
40	202-5623	Fixing bar
41	318-0032	Grommet
42	202-5624	Bracket
43	017-4110	M4 (T) x 10mm spacer
44	021-4020	M4 x 20mm PAN BNP
45		Only sold as part of Item 8
46		Only sold as part of Item 8
47	659-0744	Stud switch assembly
48	305-0058	Toggle switch
49	515-0019	Sleeve (state length required)
50	202-5621	Spacer
51	021-4012	M4 x 12mm PAN BNP
52	017-4010	M4 (C) x 10mm spacer
53	511-0011	Switch ring
54	318-0007	NX1 P clip
55	021-3902	M3 half nut BNP
	759-1001	Complete 400 Series Timer (240v)
	759-1002	Complete 400 Series Timer (120v)

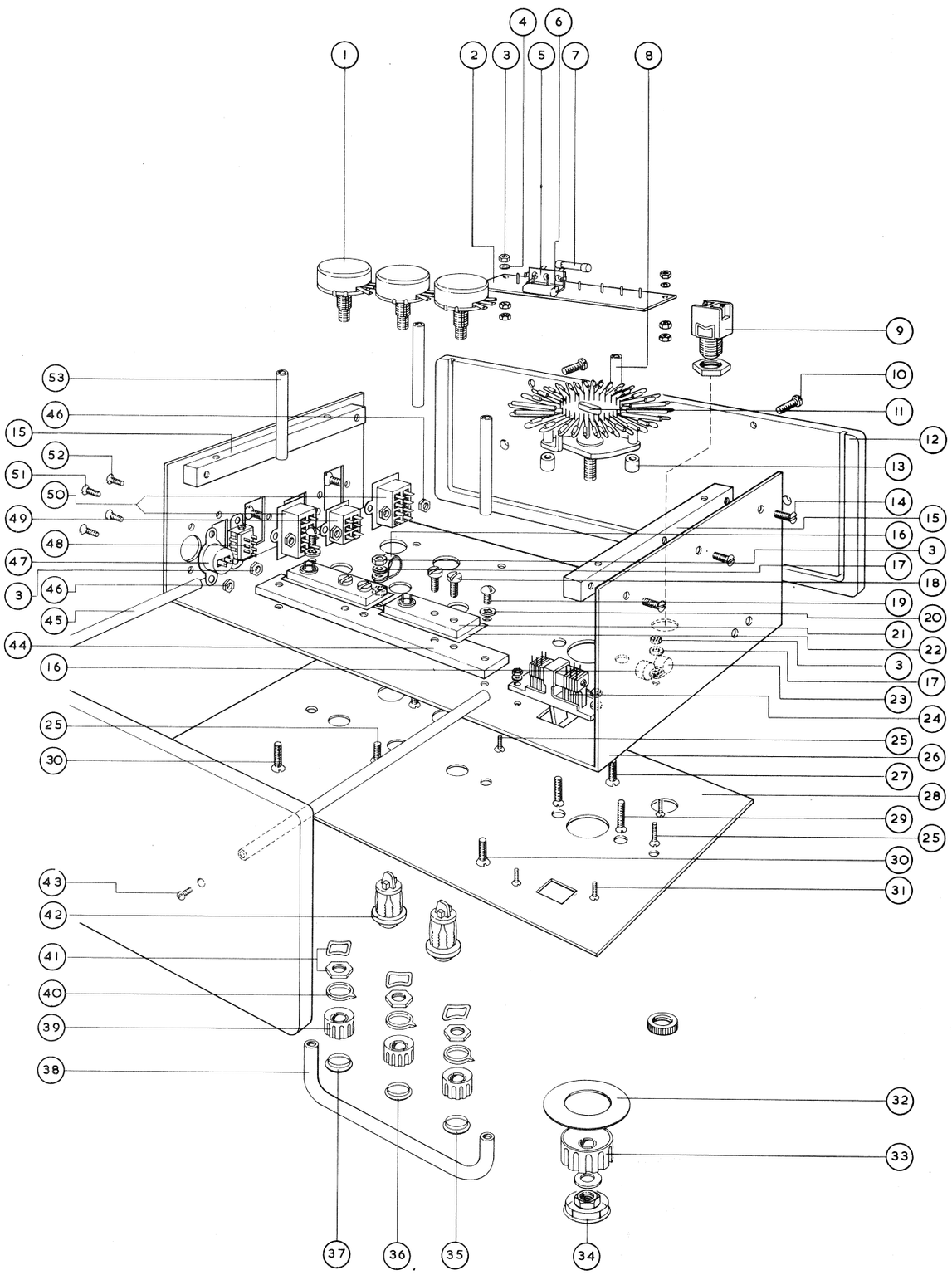


Figure 8

400 SERIES ANALYSER–1

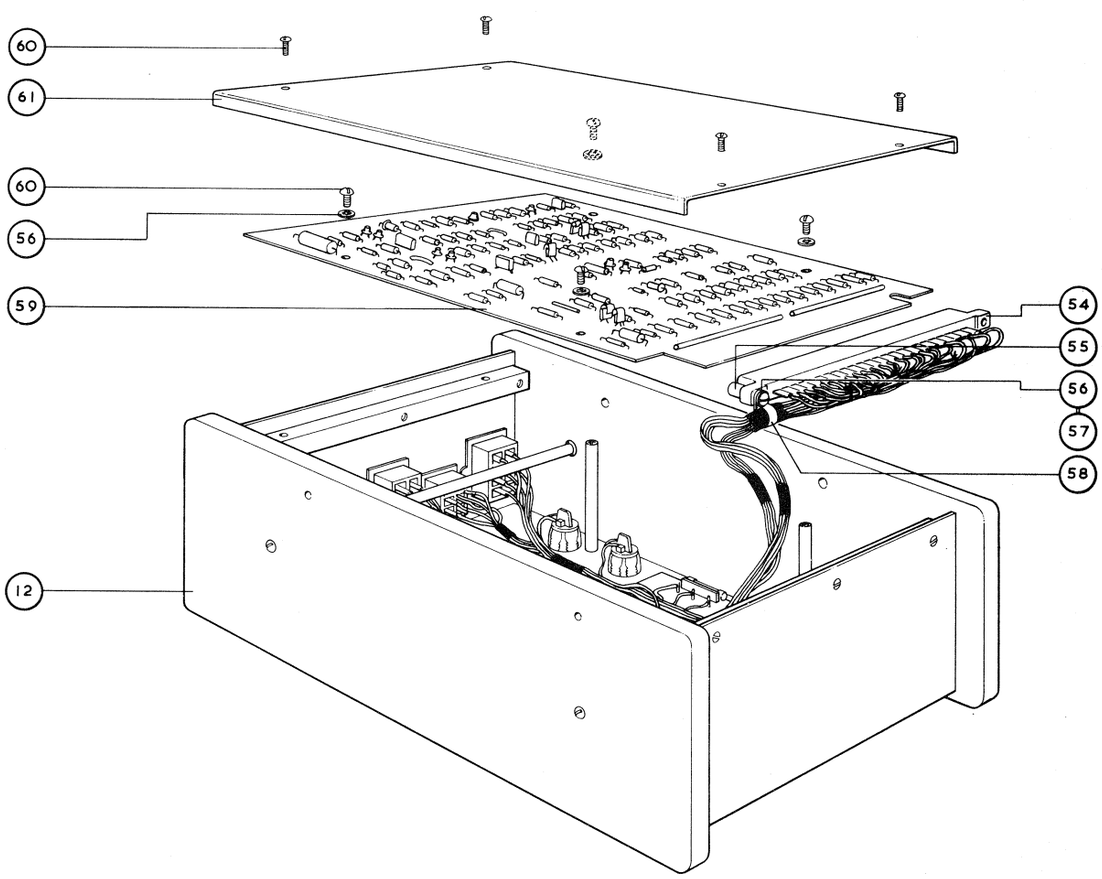


Figure 9

400 SERIES ANALYSER–2

400 SERIES ANALYSER

Ref. No.		Part No.	Description
Figs. 8 & 9–	1	320-6004	Potentiometer 50K
	2	200-0064	Tag board
	3	021-0901	M2.5 full nut BNP
	4	021-0800	M2.5 washer normal BNP
	5	317-0013	Fuse holder
	6	302-0081	Capacitor
	7	300-0037	Fuse 3A
	8	201-5880	Printed circuit spacer
	9	305-0043	Push button switch
	10	021-5012	M4 x 12mm PAN BNP
	11	658-0744	Stud switch assembly
	12	200-5716	Side plate
	13	017-4010	M4 (C) x 10mm spacer
	14	021-3410	M3 x 10mm CSK BNP
	15	202-5623	Fixing Bar
	16	318-0007	NX1 P clip
	17	025-0850	M2.5 washer shakeproof
	18	027-5112	M5 x 12mm nylon screw
	19	021-5010	M5 x 10mm PAN BNP
	20	025-5850	M5 washer shakeproof
	21	658-0260	Thyristor assembly
	22	200-0065	Thyristor insulator
	23	318-0008	NX2 P clip
	24	305-0036	Key switch
	25	021-0412	M2.5 x 12mm CSK BNP
	26	202-5645	Chassis
	27	021-3412	M3 x 12mm CSK BNP
	28	214-0112	Panel
	29	021-4420	M4 x 20mm CSK BNP
	30	021-3420	M3 x 20mm CSK BNP
	31	021-2410	M2 x 10mm CSK BNP
	32	006-0044	Figure dial skirt
	33	206-5036	Control knob
	34	006-0039	Cap
	35	006-0042	Cap (grey)
	36	006-0052	Cap (yellow)
	37	006-0050	Cap (cyan)
	38	016-5024	Handle
	39	206-5037	Control knob
	40	206-0045	Pointer black
	41		Only sold as part of Item 1
	42	300-0021	Signal lamp (green)
	43	021-4020	M4 x 20mm PAN BNP
	44	201-5879	Thyristor base plate
	45	202-5621	Spacer
	46	021-3902	M3 half nut
	47	308-0071	2 way socket
	48	308-0089	7 way socket
	49	308-0048	6 way socket
	50	308-0070	8 way socket
	51	021-3406	M3 x 6mm CSK BNP
	52	021-0406	M2.5 x 6mm CSK BNP
	53	201-5881	Printed circuit spacer
	54	308-0081	Edge connector
	55	017-3106	M3 (T) x 6mm spacer
	56	025-3850	M3 washer shakeproof
	57	021-3012	M3 x 12mm PAN BNP

400 SERIES ANALYSER (continued)

Ref. No.	Part No.	Description
Figs. 8 & 9– 58	318-0009	NX3 P clip
59	658-0243	Printed circuit board assy.
60	021-3006	M3 x 6mm PAN BNP
61	202-5646	Cover plate
	758-1001	Complete 400 Series Analyser (240v)
	758-1002	Complete 400 Series Analyser (120v)

RED — GREEN BALANCE | BLUE — GREEN BALANCE | EXPOSURE BRIDGE | 22/44V SUPPLIES | TIMER | EXPOSE SW CIRCUIT | BLOCK START | ROLLHEAD DELAY | ROLLHEAD PULSE | LIGHT LAMPS | VOLTAGE COMPENSATION

+44 V | + 22V | B | L | 50 ~

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13

S3 S4 S5 S6 S7 S8 S9

D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20 D22 D23 D24 D26 D27 D28 D29 D30 D31

Z1 22V Z2 22V Z3 10V Z4 10V

R1 47k R2 47k R3 33k R4 100k R5 2·2k R6 470 R7 1M R8 33k R9 10k R10 47k R11 47k R12 33k R13 100k R14 2·2k R15 470 R16 1M R17 33k R18 10k R19 47k R20 47k R21 33k R22 2·2M R23 470 R24 1M R25 680 R26 470 R27 47k R28 47k R29 100k R30 1M R31 100k R32 4·7k R33 2·2k R34 10k R35 220 R36 1k R37 1k R38 100k R39 2·2k R40 22k R41 100k R42 10k R43 10k R44 47k R46 47k R47 470k R48 47k R49 100k R50 100k R51 220+ R52 2·2+ R53 2·2k R54 2·2k R55 2·2k R56 470 2W R57 2·2k R58 1k 2W R59 470 R60 470 R61 680 R62 10k R63 2·2k R64 1M R65 68k R66 47k R67 2·2k R68 2·2k R69

C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18

·0022 C7 ·0022 C8 ·0022 C9 100-64V C1 ·1 C10 ·22 C11 ·22 C12 ·01 C13 ·0·47 C14 5·64V C17 ·0·47 C15 4·7mfd C16 56V @ 8A FUSE 15A

CRJ

50k LIN CYAN R70 BALANCE PROBE OFF

50k LIN. YELLOW R71

50k LIN EXPOSURE R72

29-WAY STUD SW "EXPOSURE TIME" R73

OFF BALANCE ② PROBE CYAN

BALANCE OFF ③ PROBE YELLOW

4·8V ·02A INDICATOR LAMPS

EXPOSE C

FUSE 3A

WHI-PUR

GRA-BLK

GRA-WHI

PNK-WHI

PNK-BLU

PNK-RED

BLK-WHI

WHI-RED

BLU-BRN

WHI-YEL

WHI-BLU

YEL-BLK

WHI-GRN

GRA

BLK

RED

BLU

WHI-GRA

PNK

YEL

GRN

PUR

BLU-GRN

RED-BLU

24-WAY PC CONNECTOR

7-WAY CONNECTOR FOR COLOR BALANCE PHOTOCELLS

COLOR BALANCE BLOCK

RED PHOTOCELLS

GREEN PHOTOCELLS

BLUE PHOTOCELLS

EXPOSURE PROBE

2-WAY CONNECTOR FOR EXPOSURE PROBE

ELECTRICAL INPUT E N L

200 210 220 240

TRANSFORMER UNIT

110 V VERSION TAPPED 120 V THRU 100 V

2 IDENTICAL 8-WAY SOCKETS FOR SUPPLY INPUT AND ROLLHEAD OUTPUT

EARTH (FRAME) | TRANSP PULSE | SUPPLY 0V (EARTH) | EXPOSE/REP | 56V ~ SUPPLY

3M FLAT 2 CORE CABLE

6-WAY LAMPHOUSE CONNECTOR

3 PIN MINIATURE SOCKET

TO FAN CONTROL

R74 0·3Ω

2 X PRINTING LAMPS 24V 200W

LAMPHOUSE

WIRES MARKED Ⓐ = 14/0076

WIRES UNMARKED = 7/0076

MAIN CHASSIS

EXTERNAL UNITS

PRINTED CIRCUIT REF: C400-268 OR C400-968

WIRING DIAGRAM 1
ANALYZER
513-0034

ISSUE - 5

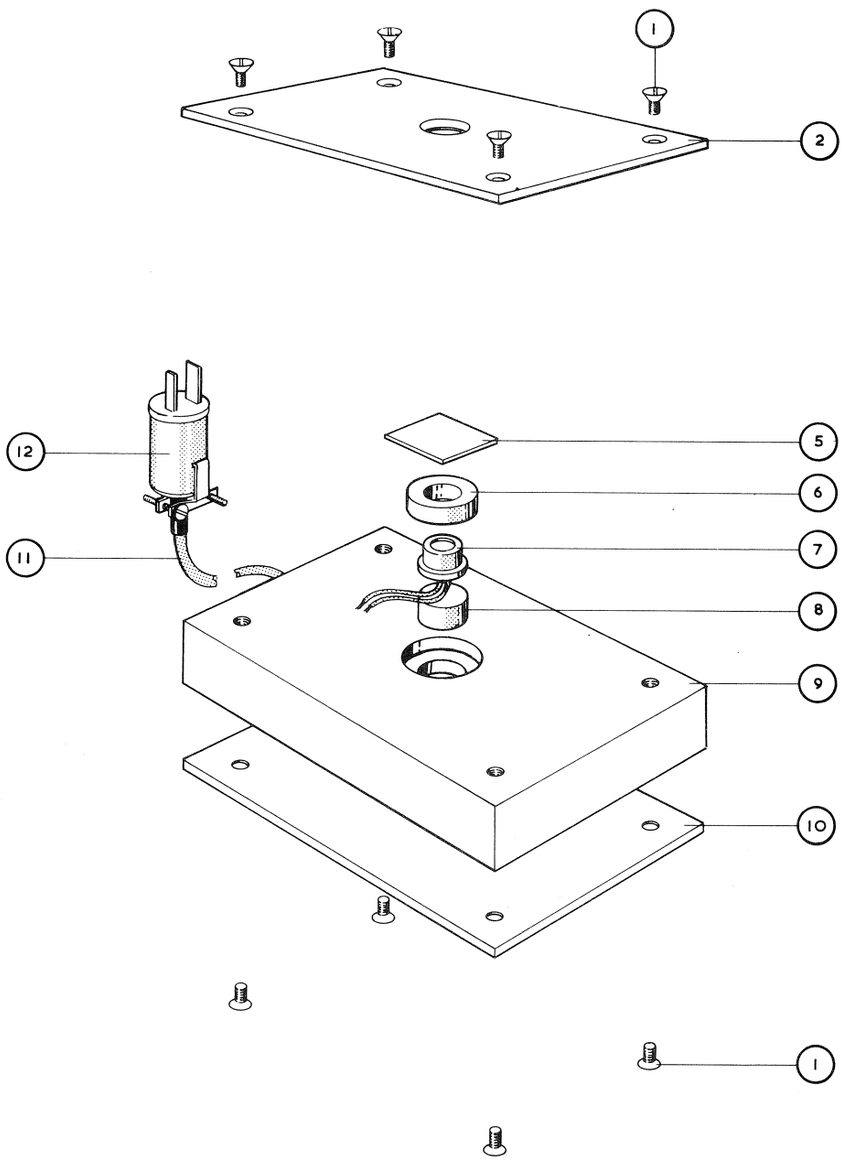


Figure 10

PROBE

PROBE UNIT

Ref. No.	Part No.	Description
Fig. 10– 1	021-0406	M2.5 x 6mm CSK BNP
2		Only sold as part of Item 9
3	Not used at this time	
4	Not used at this time	
5	398-0017	Glass filter
6	200-0405	Spacer
7	320-4001	Photocell
8	103-0021	Foam pad
9	200-5715	Photocell probe
10		Only sold as part of Item 9
11	307-6001	Cable
12	308-0082	2 way Painton plug
	658-0769	Complete Probe

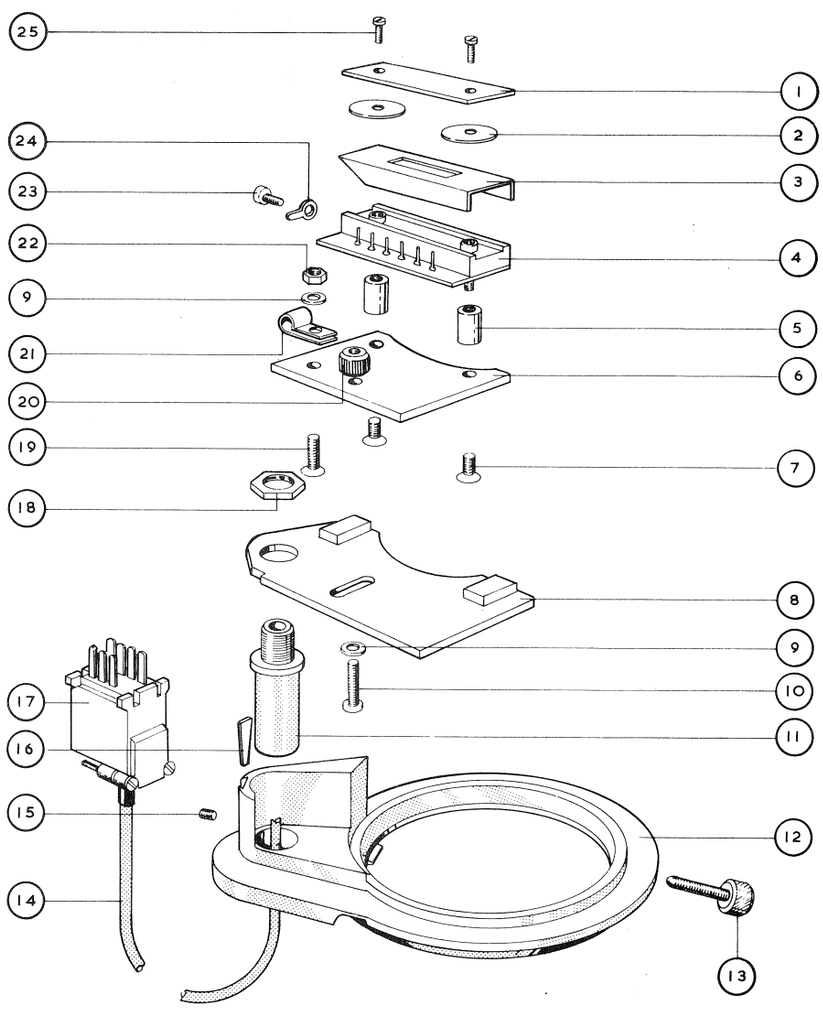


Figure 11

BALANCE PHOTOCELL ASSY
(Pre–4813)

BALANCE PHOTOCELL ASSEMBLY FOR DURST L1000 PRE-SERIAL NO. 4813

Ref. No.	Part No.	Description
Fig. 11– 1	200-0084	Filter cover
2	398-0015	Wedge filter
3	202-0147	Cell block cover
4	658-0786	Cell unit assembly
5	017-4110	M4 (T) x 10mm Spacer
6	200-0625	Sliding plate
7	021-4406	M4 x 6mm CSK BNP
8	200-0529	Mounting plate
9	021-4800	M4 washer light BNP
10	021-4012	M4 x 12mm PAN BNP
11	201-0759	Mounting bush
12	399-5054	Durst lens holder modified
13	232-0017	Thumbscrew
14		Only sold as part of Item 17
15	025-4705	M4 x 5mm socket grub BLK
16		Only sold as part of Item 12
17	658-1167	Cable preform assembly
18	511-0001	3/8 ME nut
19	021-4410	M4 x 10mm CSK BNP
20	021-4905	M4 Thumbnut
21	318-0007	NX1 P clip
22	021-4901	M4 full nut BNP
23	021-2003	M2 x 3mm PAN BNP
24	511-0112	M2 Solder tag
25	021-2006	M2 x 6mm PAN BNP
	658-0768	Complete assembly

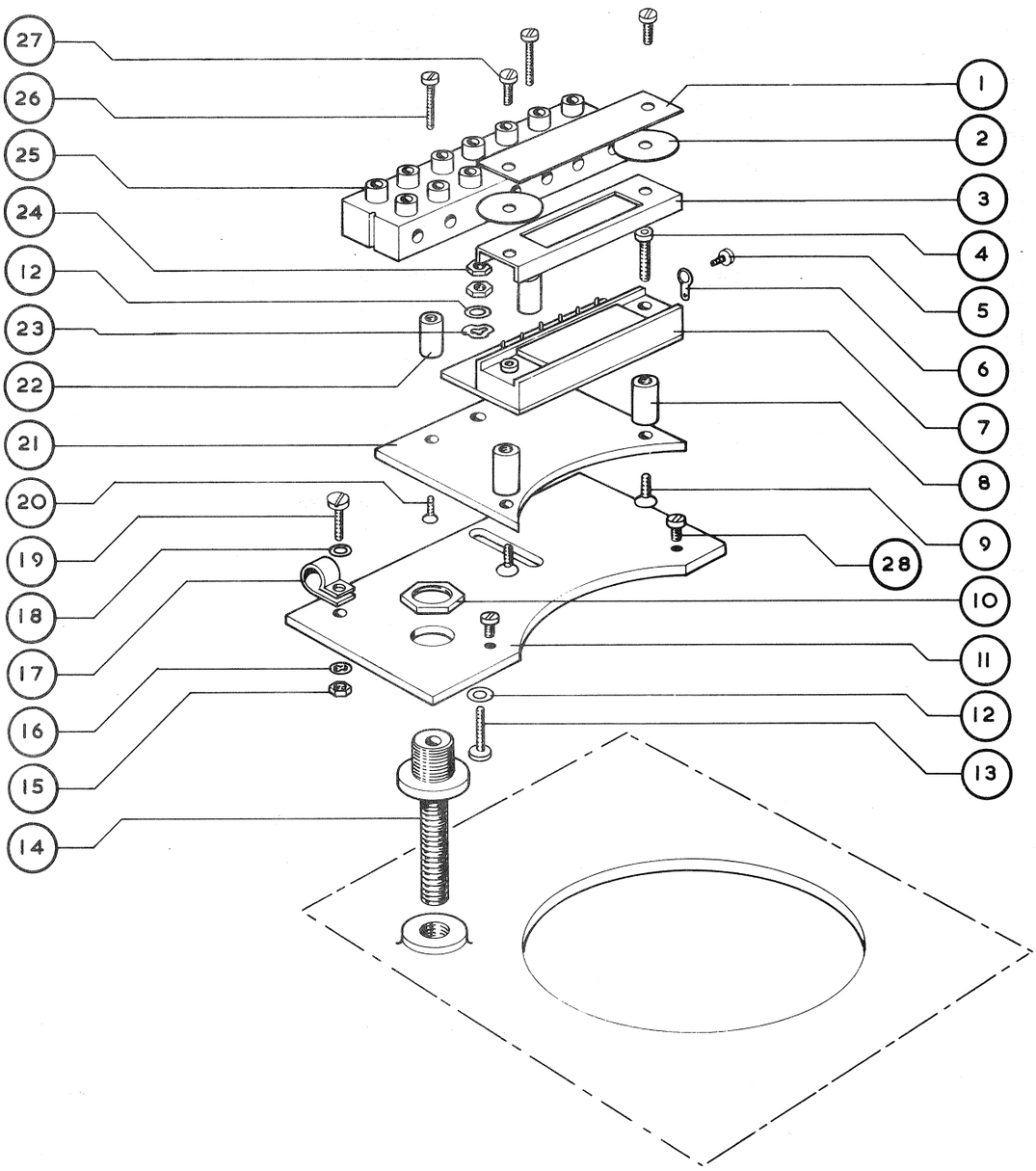


Figure 12

BALANCE PHOTOCELL ASSY
(including and post 4813)

BALANCE PHOTOCELL ASSEMBLY
FOR DURST L1000 INCLUDING AND POST-SERIAL NO. 4813

Ref. No.	Part No.	Description
Fig. 12– 1	200-0084	Filter cover
2	398-0015	Wedge filter
3	202-0147	Cell block cover
4	201-5883	Photocell mounting screw
5	021-2103	M2 x 3mm CH. HD. BNP
6	511-0112	M2 solder tag
7	658-0786	Cell unit assy
8	017-4110	M4 (T) x 10mm spacer
9	021-4403	M4 x 3mm CSK BNP
10	511-0001	3/8 ME nut
11	200-0938	Cell block holder
12	021-4800	M4 washer normal BNP
13	021-4012	M4 x 12mm PAN BNP
14	201-1298	Stud cell block holder
15	021-3901	M3 full nut BNP
16	021-3850	M3 washer shakeproof
17	318-0013	NXO P clip
18	021-3800	M3 washer normal BNP
19	021-3901	M3 x 6mm PAN BNP
20	021-2405	M2 x 5mm CSK BNP
21	200-0937	Photocell sliding plate
22	017-2108	M2 (T) x 8mm spacer
23	240-4840	4BA washer wave BER CU
24	021-4902	M4 half nut
25	309-0002	Terminal block 7 way
26	021-2405	M2 x 10mm CH. HD. BNP
27	021-2006	M2 x 6mm PAN BNP
28	021-0006	M2.5 x 6mm PAN BNP
	658-1167	Cable pre-form assy (not shown)
Complete assembly	658-0702	

658-0702 Complete assembly

ABBREVIATIONS

ASSY	Assembly
BER CU	Beryllium copper
BLK	Black
BNP	Bright nickel plate
CH	Cheese
CSK	Countersunk
HEX	Hexagonal
HD	Head
PHOS	Phosphor
RD	Round

Every effort has been made to ensure that the contents of this manual are accurate and comprehensive. No liability however, can be accepted by the company for any loss or damage arising from the use of this manual.

The company also reserves the right to alter, without prior notice, the specification, construction or content of its equipment.

This machine is manufactured by Durst (UK) Limited, Epsom, Surrey, England.