

AIRPORT EQUIPMENT

INSTALLATION AND MAINTENANCE INSTRUCTIONS

and

SPARE PARTS LIST

for the

203MM (8") DIA. HIGH INTENSITY, INSET RUNWAY LIGHTS

TYPE ZA180 (I) - IEC SERIES



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ISSUE RECORD

	Issue Status			
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AUTHOR:	A L LANDLESS	A L Landless		
AUTHORISED:	P M HUMBER	P M Humber		

SAFETY ADVICE NOTICE

Please ensure that personnel are made aware of all safety aspects. **Appendix 'A'** contains safety advice. This appendix can be copied and used to record authorised personnel.

TOOLS AND CONSUMABLES

- 11.0mm AF socket.
- Torque wrench.
- 5mm A/F Hex. Allen key.
- Ambersil 10008A black sealant.
- 17mm A/F Hex. socket.
- Loctite 648.
- Low voltage Multi-meter.
- 1/8th BSP adaptor, for air pressure test.
- Compressed Air line capable 30 PSI. or Alstom portable Air Pressure Test Equipment.

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with IEC flange

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ZA180 (I), 203MM (8") DIA. IEC FLANGE, HIGH INTENSITY, INSET RUNWAY LIGHTS

1. INTRODUCTION

The ZA180 i series, high intensity, inset runway fittings are designed to meet ICAO requirements for Categories I, II and III, all weather operation lighting systems. The fittings are designated as follows:

ZA181 i Runway centreline
ZA184 i Runway TDZ

Fittings are supplied with 1 or 2 long life, low energy reflector lamp(s) and 1 or 2, 'B' type (L823) plug lead(s). 2 leads are used on switchable, bi-directional fittings.

When required, an internal electronic lamp by-pass device is available as an option.

The fittings are lightweight and robust due to their predominantly aluminium alloy construction that also provides excellent protection against corrosion. The glass prisms or blanks are accurately located in the main body casting, secured by an aluminium alloy retaining clamp without the need for sealing compounds.

The optical system employed is completely free of adjustment, either at installation or in service, thus simplifying installation and maintenance procedures.

The fitting is suitable for installation into a 203mm (8") diameter ZM203 i seating pot, either 'dry' or 'wet' version.

A range of PSA and FAA style adaptors are also available to fit 305mm (12") and 394mm (15.5") diameter mountings.

Seating pots and adaptors are supplied separately to order.

2. SITE PREPARATION FOR INSTALLATION OF ZM203 I SEATING POT

Prior to the installation of the seating pot, the runway pavement surface must be correctly prepared.

- Pre-form or trepan a hole, 250mm in diameter and minimum depth of 160mm, at the correct location in the runway in accordance with the site plan.

When bottom cable entry is required a 'wet' Seating Pot is supplied with an entry hole in the base.

- Excavate a further hole, not greater than 130mm in diameter, beneath the seating pot.

Note. When a side cable entry is to be employed no additional storage space needs to be provided beneath the seating pot to accommodate cables and connectors.

- Install the seating pot in accordance with Alstom Installation and Maintenance Instructions 'imm-zm-seating-pots-3'.

3. INSTALLATION INTO ZM203 I SEATING POT OR ADAPTOR

At this stage the seating pot and transformer secondary socket lead(s) are installed.

See **Fig. 17** for power supply convention used with twin lead fittings.

- Check that the light unit is of the correct type/option for the relevant position on the runway, in accordance with the site plan.
- Check that the pressure test plug is tight in the fitting, (approx. 4Nm), using an 11.0mm AF Hex socket.
- Remove the two M10 holding down nuts and washers from the seating pot. Check that the M10 studs are secure in the seating pot.
- Clean out any debris from the seating area in the seating pot. Check that there are no internal protrusions or casting damage, especially on the seating surface.
- Check the underside seating surface of the fitting for debris or damage, that can prevent correct mounting of the fitting.
- Wipe clean the moulded plug and socket connector(s). Ensure that the female connector(s) contacts are free from debris. When required, flush out with a suitable contact cleaner aerosol.
- Connect the plug from secondary lead(s) into the appropriate transformer socket on the secondary lead(s), in accordance with the site layout plan. Take care to observe the correct pin polarisation.
- Insert the light unit into the seating pot, oriented correctly to the site plan, using the extractor tool recommended for this purpose, (ALSTOM type SLC21226). Take care not to trap any leads between mating surfaces.

WARNING DO NOT USE THE EXTRACTOR TOOL FOR CARRYING THE FITTING TO OR FROM THE SEATING POT.

- Re-assemble crinkle washers and M10 nuts, or use new M10nyloc nuts, to secure the light unit in the seating pot. Tighten each nut, progressively, until a torque of 40Nm (30lbf.ft) is achieved on each nut.

3.1 PERIODIC CHECK OF THE INSTALLATION

Periodically check the tightness of the M10 nuts. Alstom recommend monthly as a minimum period between checks, but the intervals will be specific to each Airport.

- Check tightness of the M10 nuts securing the fitting, at a torque setting on the torque spanner of 35Nm (25 lbf. ft) maximum. The use of a break type torque

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spanner with a 100mm extension bar enables the load to be applied correctly, this avoids any over-tightening.

4. REMOVE A FITTING FROM A SEATING POT

- Release and remove the M10 securing nuts and washers and put safely aside for re-use when re-assembling a new fitting. When M10 Nyloc nuts are fitted, discard and obtain new M10 nyloc nuts. Discard any damaged items & replace with 'new' items.
- Remove the fitting from the seating pot using the extractor tool recommended for this purpose, (ALSTOM type SLC21226).

WARNING DO NOT USE THE EXTRACTOR TOOL FOR CARRYING THE FITTING TO OR FROM THE SEATING POT.

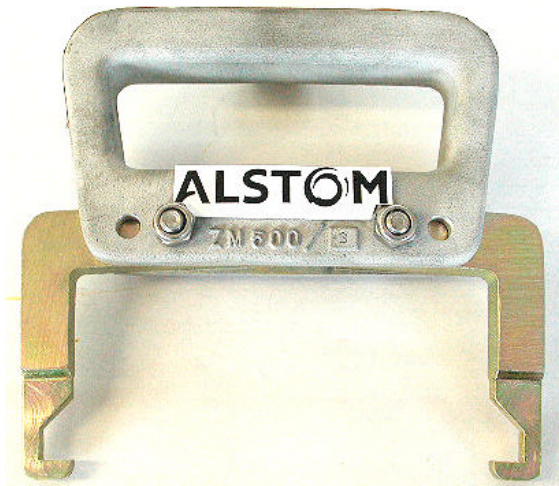


Fig. 1. Extractor tool to remove/re-assemble the fitting from/to the seating pot.

5. MAINTENANCE ON SITE

Maintenance will normally be restricted to prism cleaning, and inspection for damage to the prisms and seals. (See **Fig. 2**).



Fig. 2. Detail of prism in body assembly

- Clean dirt and oil from the exposed surfaces using a suitable detergent applied with a stiff bristle paint brush. (See **Fig. 2**)

Note. DO NOT USE abrasives or detergents with high alkalinity on the prism surfaces.

- Remove a failed fitting to workshop environment for repair.

When light fittings are removed from the seating pot/adaptor.

- Check that both M10 studs are secure in the seating pot.

When a stud can be rotated by hand.

- Ensure the studs and seating pots are as dry as possible.
- Assemble two M10 standard nuts to the top of the stud and lock together.
- Using the two locked M10 nuts, remove the stud, clean and apply Loctite 648 adhesive to the stud, bottom thread portion only.
- Replace the stud until the correct length protrudes above the seating pot flange face. . When standard M10 nuts are used, set the studs level with the top of the seating pot up-stand. When Nyloc M10 nuts are used, set the studs 3 to 4mm above with the top of the seating pot up-stand.
- Carefully unlock and remove both M10 nuts. Clean any remaining loctite from the studs to ensure that the top nut/washer will not adhere to the stud or flange.
- Re-assemble the fitting to the seating pot, re-assemble M10 nuts and crinkle washers. **Only hand tighten** the M10 nuts at this stage.
- Allow at least 30 minutes for the Loctite 648 adhesive to cure.
- Torque tighten the fitting into seating pot, to 40Nm (30lbsf.ft) maximum.

6. WORKSHOP MAINTENANCE

6.1 POLICY

To minimise future failures in service, initially.

- Establish an efficient spares holding policy.
- Generate a record of the status of fittings and major components kept.

6.2 PREPARE TO DIS-ASSEMBLE

When a light fitting is to be dis-assembled, either for lamp changing or at planned maintenance intervals, clean any dirt or oil from the exterior of the fitting, to avoid internal contamination when the fitting is dis-assembled.

- Clean the fitting externally using a suitable household detergent applied with a stiff bristle paint brush. Finally wash in clean water and dry with a lint free cloth.

DO NOT USE compressed air directly onto the prism faces. DO NOT clean the prisms with any abrasive substances or detergents with high alkalinity.

- Transport the fitting to a workshop environment, that is clean, free from dust and/or atmospheric pollutants likely to cause contamination of prism, lamp and reflector surfaces.

6.3 DIS-ASSEMBLE BODY ASSEMBLY FROM BOTTOM COVER ASSEMBLY

The main tool required for stripping the fitting down to its component parts is a 5mm A/F Allen key. During dis-assembly, discard any damaged items and replace with 'new' items. Store all items safely for re-assembly.

- Place the light fitting on a clean, flat, work surface with its bottom cover uppermost. (See **Fig. 3**).

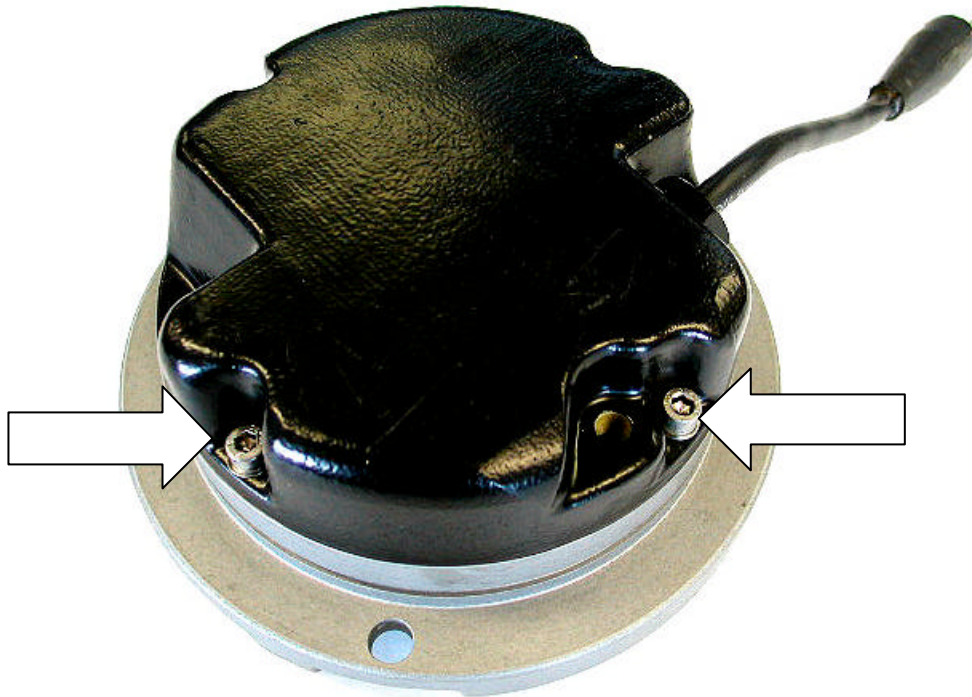


Fig. 3. ZA180 i Series fitting inverted on work surface.

- Release the two M6 cap head screws attaching the base casting to the body casting.
- Carefully lift off the bottom cover assembly and place 'bottom down' on the work surface. (See **Fig. 4**).

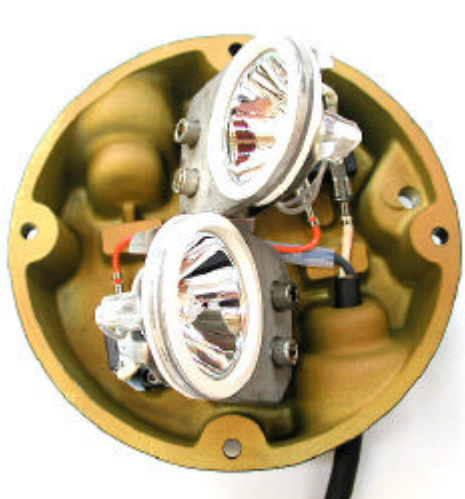


Fig. 4. ZA180 i Series fitting, Bottom Cover Assembly.

- Undertake a comprehensive internal inspection and record the fitting status.
- Replace failed components with approved 'new' replacement parts.

Only in exceptional circumstances can repairs to components be attempted and then **only** by qualified staff using recommended tooling.

6.4 MAINTAIN THE BODY ASSEMBLY

6.4.1 Remove & Replace a Prism

NOTE 1. DO NOT OVER TIGHTEN THE PRISM RETAINING CLAMP SCREWS AS THIS CAN CAUSE DAMAGE TO THE PRISM.

NOTE 2. WHEN HANDLING A COLOURED PRISM, TAKE CARE NOT TO SCRATCH OR OTHERWISE DAMAGE THE DICHROIC COATING.

NOTE 3. WEAR SUITABLE PROTECTIVE GLOVES WHEN REMOVING PRISMS.

- Release the two M6 socket head screws and dis-assemble the prism clamp & prism clamp gasket.
- Check prism front and rear optical surfaces, for contamination and physical damage.
- Check sealing around prisms for obvious evidence of water ingress.

When removing a prism/prism gasket assembly that is intact. (i.e. the prism is **not** broken).

- Place the body casting with the top uppermost, on some cushioning material (i.e. bubble wrap). Place both thumbs on the outer surface of the prism and press the prism/gasket assembly back through into the lamp cavity in the same direction as the light channel until free of the casting. (See **Fig. 5**).



Fig. 5. Remove a prism by hand.

Alternatively when a prism can **not** be dislodged by hand.

- Use a soft wood drift and soft faced hammer to dislodge the prism and gasket assembly. (See **Fig. 6**).

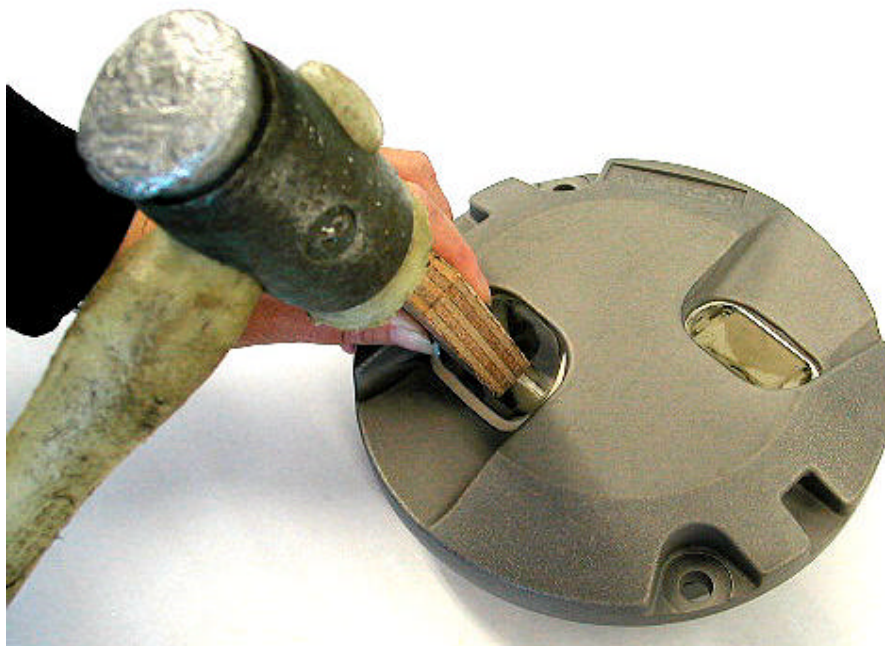


Fig. 6. Release a 'stuck' prism.

When the prism/prism gasket assembly is removed after a length of time in service, the internal heat generated in service will have adhered the gasket to the prism.

- Remove prism gasket from the prism, (probably by cutting and peeling). Check the exposed surface of the prism for damage or signs of deterioration. Ensure that **no** gasket residue remains on the prism.
- Replace both the prism and prism gasket with 'new' items. (See **Fig. 7**).



Fig. 7. Prism and gasket assembly.

Re-assemble the prism and gasket assembly to the body casting. This is a direct reversal of the dis-assembly procedure with the addition of.

- Apply rubber lubricant emulsion, International Products Group P80, to the outer surface of the gasket to ensure correct location in the body casting.
- Locate the prism and gasket assembly into the body. Ensure that it is correctly seated.
- Wipe any excess lubricant from the front and rear optical faces of the prism.
- Apply Ambersil 1008A black sealant to the M6 screws.
- Re-assemble the prism clamp gasket and prism clamp.
- Tighten M6 prism retaining clamp screws progressively to a torque of 7 Nm. (5.0lbsf.ft).

6.4.2 Seal, Body to Base

The sealing gasket is located in a groove in the prism body casting and is subject to ageing. When there is evidence that this seal has deteriorated or is damaged, replace the seal. Indicators are contamination of internal components and casting surfaces.

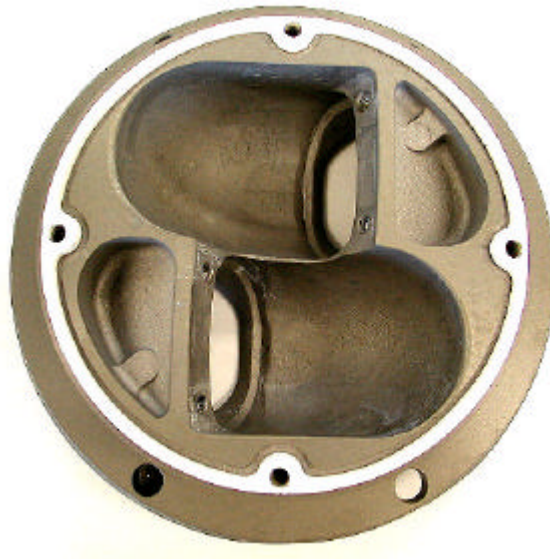


Fig. 8. Sealing gasket correctly located in the body casting.

- Remove the seal from its seating groove in the surface of the body casting.

When the seal **can** be re-used.

- Clean the seal and store safely.

When the seal is distorted or damaged and therefore **can not** be re-used.

- Discard and replace with a 'new' item.
- Clean the seal groove, to ensure an effective pressure seal on re-assembly.

6.5 MAINTAIN THE BOTTOM COVER ASSEMBLY

6.5.1 Replace a Lamp and check the Lamp Gasket

- Push the lamp retaining spring fingers back from the lampholder using two fingers of one hand. With the other hand pull the lamp back until the reflector rim is clear of the lampholder enabling the lamp to be lifted clear of the spring/lampholder assembly. (See **Fig. 9**).

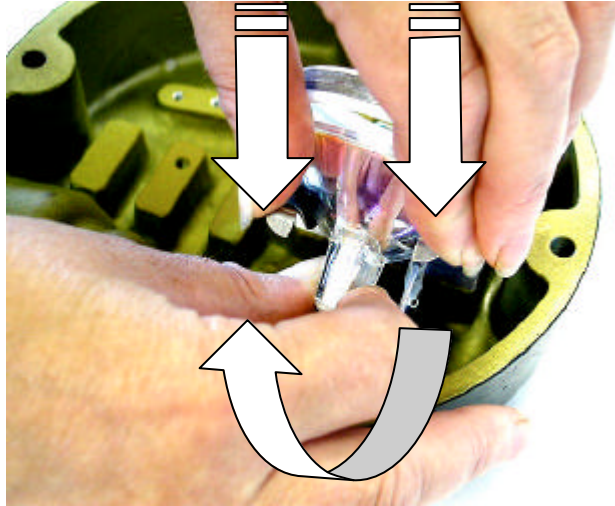


Fig. 9. Remove the lamp from the lamp holder.

- Disconnect the lamp leads to free the lamp. **DO NOT TOUCH** or otherwise contaminate the bulb of the lamp or the reflector surface.
- Check the condition of the lamp gasket and, when it has become embrittled replace it with a 'new' item. (See **Fig. 10**).

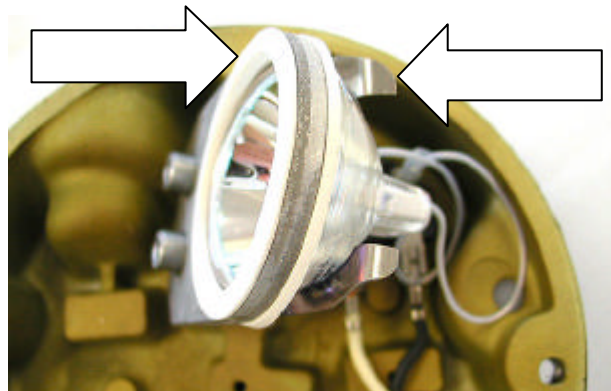


Fig. 10. Detail of lamp gasket & retaining spring in good condition.

- Ensure that the lamp gasket is seated correctly in the lampholder. (See **Fig. 10**).
- Re-assemble the lamp to the lampholder. This is a reverse of the procedure above.
- Re-connect the lamps to the terminal block.

6.5.2 Lampholder/Lamp Retaining Spring

- Check the lampholder condition and the lamp retaining spring for lack of spring pressure. (See **Fig. 10**).

When lack of spring pressure, or damage is evident.

- Release two M6 cap head screws and remove the lampholder and retaining spring.
- Re-assemble 'new' item(s) and secure with M6 screws torque tightened to 7Nm (5.0lbs.ft.).

6.5.3 Assembly of Electronic Lamp Bypass Device (When Fitted)

An Electronic Lamp By-pass is a factory fitted option and is connected in series with the terminal block. A heat shield is fitted to avoid excessive heating of the by-pass unit, from the lamps.

- Check the connectors on the Bypass device for signs of contamination or arcing due to water ingress or loose connections.
- Check the by-pass device is open circuit, and therefore functioning correctly. Use a low voltage multi-meter

When the Bypass device has become closed circuit it has failed, therefore replace it with a new unit of the same voltage rating.

To remove and replace a faulty unit.

- Remove the M3 screws holding the heat shield and By-pass unit. Place the heat shield and screws safely to one side. (See **Fig. 11**).
- Dis-connect the terminals from the terminal block/lead/lamp.
- Discard the faulty unit in an environmentally acceptable fashion.
- Obtain a replacement Electronic By-pass unit from ALSTOM, Power Conversion Ltd. Airports Division and re-assemble in the reverse order to removal.
- Re-assemble the heat shields and secure with M3 screws, to ensure that the Lamp By-pass does not become overheated thus shortening its operating life.

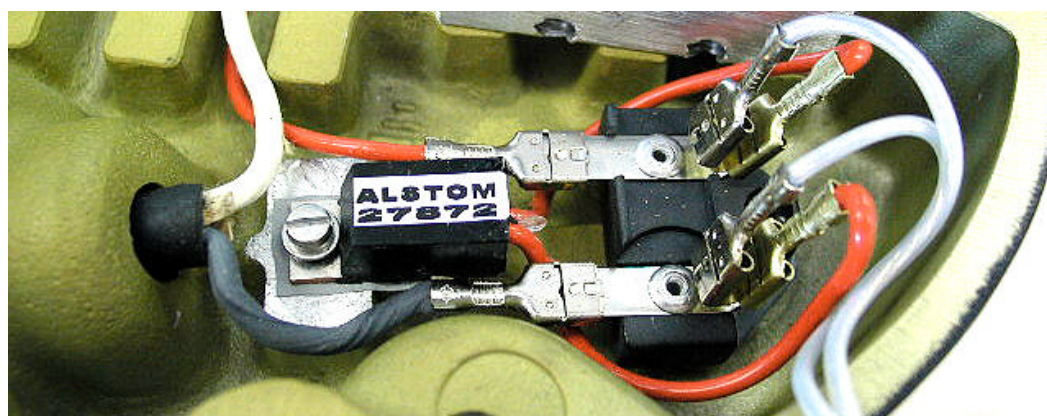
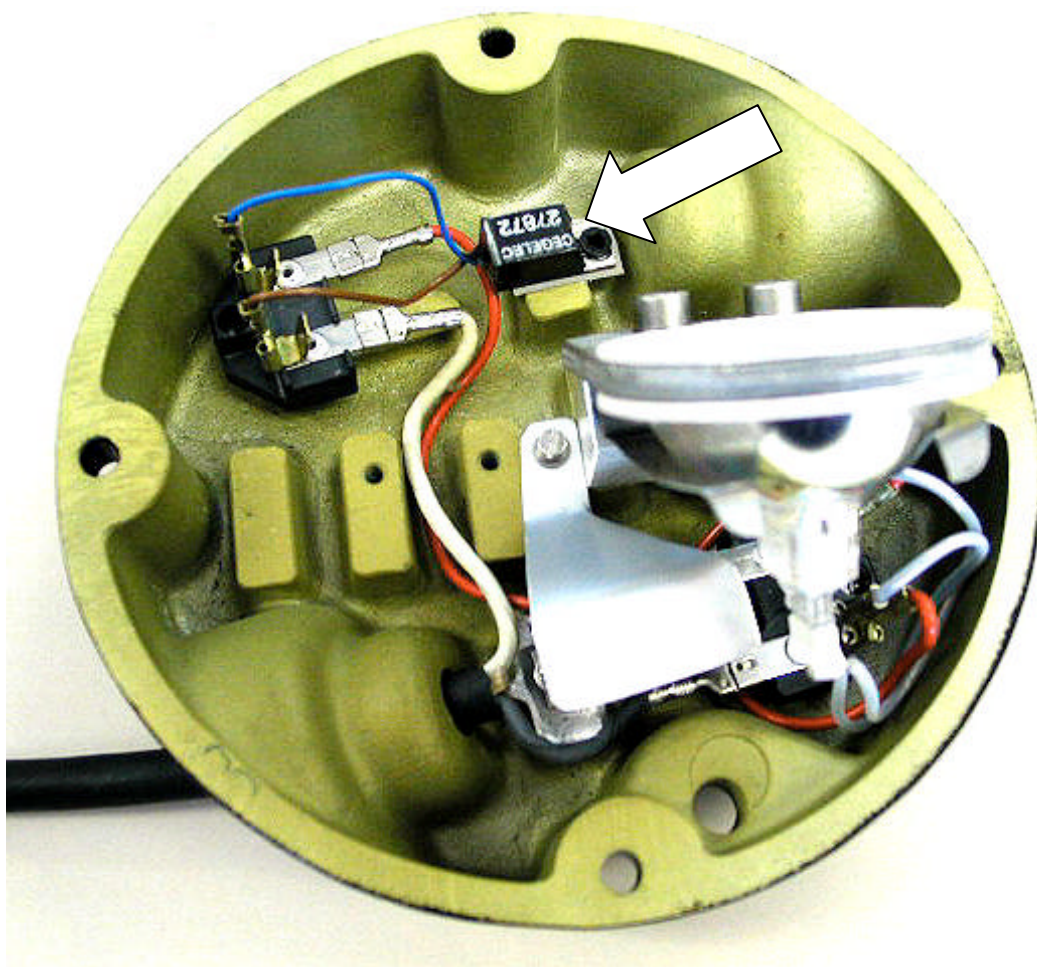


Fig. 11. Detail of Electronic Bypass arrangement. (Note. 1 heat shield removed to show electronic by-pass device).

6.5.4 Plug Lead/Cable Gland

When there is evidence internally of contamination by water, this can indicate a permeable cable or faulty gland seal. (i.e. dis-colouration of the casting). (See **Fig. 12**).



Fig. 12. external view of the bottom cover assembly in good condition.

- Check for abrasion of the cable outer sheath. (i.e. nicks, cuts and cracks), especially where the cable moulds into the connector housing and enters the bottom cover cable gland. (See **Fig. 12**).
- Check for evidence of arcing or physical damage to the cable plug pins.
- Check for looseness or evidence of arcing of the cable tail receptacles.
- Check for evidence of overheating in the cable cores.

When evidence of deterioration or damage is found, replace a plug lead.

- Release the cable gland and withdraw plug lead gland assembly from bottom casting. (See **Fig. 13**).

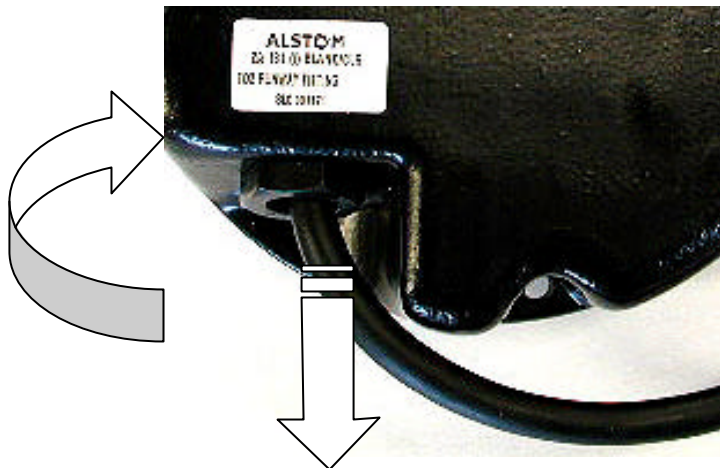


Fig. 13. Detail of cable entry & gland arrangement.

- Ensure that the cable entrance hole is free from debris and the sealing face is undamaged.

Assemble a complete new gland assembly/lead. **DO NOT** repair the old power lead.

- Thread a gland assembly onto the end of a plug lead cable, locate 80mm from the 'free' end. Note the order of components – gland nut, nylon skid washer, rubber compression bush.
- Thread the lead tails through the cable entry hole in the bottom cover until the outer sheath projects approximately 5mm into the inner chamber of the bottom cover.
- Tighten gland screw fully into cable entry hole to create a water-tight seal which can be checked at a later stage by conducting an air pressure test.

6.6 RE-ASSEMBLE BOTTOM ASSEMBLY AND BODY ASSEMBLY

All faulty components are replaced and re-connected correctly as described in previous sections.

- Place the prism body flat on a clean work surface, top surface downwards.
- Re-assemble the body to base seal in the body casting groove.
- Re-assemble the bottom cover assembly to the body assembly.
- Re-assemble 4 off M6 cap head screws and crinkle washers, progressively tighten to a torque of 9Nm (7.0 lbf.ft), on each screw.
- Prepare for an air pressure test of the assembled unit for leaks by attaching a compressed air line, using a 1/8" BSP adaptor, to the test plug hole.
- Apply an air pressure of 350 mbar (approx. 5 p.s.i.) to the fitting and immerse in a tank of clean water.
- Check for evidence of air bubbles from the areas adjacent to the body to base seal, prism seals, and the cable gland. (See **Fig. 14**).

When the air pressure test is satisfactorily completed.

- re-assemble the test plug to the fitting and tighten to 4Nm approximately. DO NOT OVER TIGHTEN.

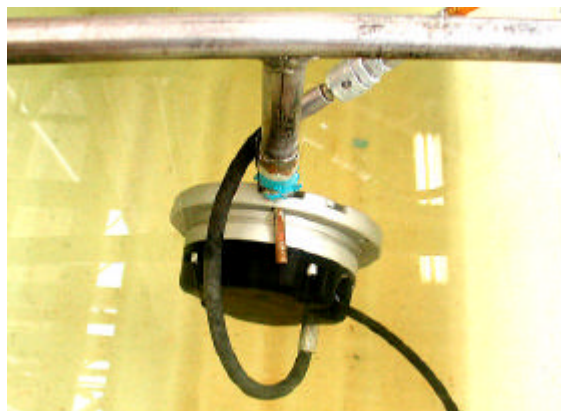


Fig. 14. Air pressure test a fitting in a water tank.

7. SPARES

7.1 SPARE PARTS ORDERING

When ordering spare **PARTS** refer to the parts schedule identifying those items required by stating:

Fitting type
Item description
Part No. or stock list code

7.2 FITTING ORDERING CODES

When ordering spare **FITTINGS** identify those required by using the ordering code.

The next page shows the ordering code for the basic units and the standard options that are available, for the

ZA181 i RUNWAY CENTRELINE FITTING

And the

ZA184 i TOUCHDOWN ZONE FITTINGS.

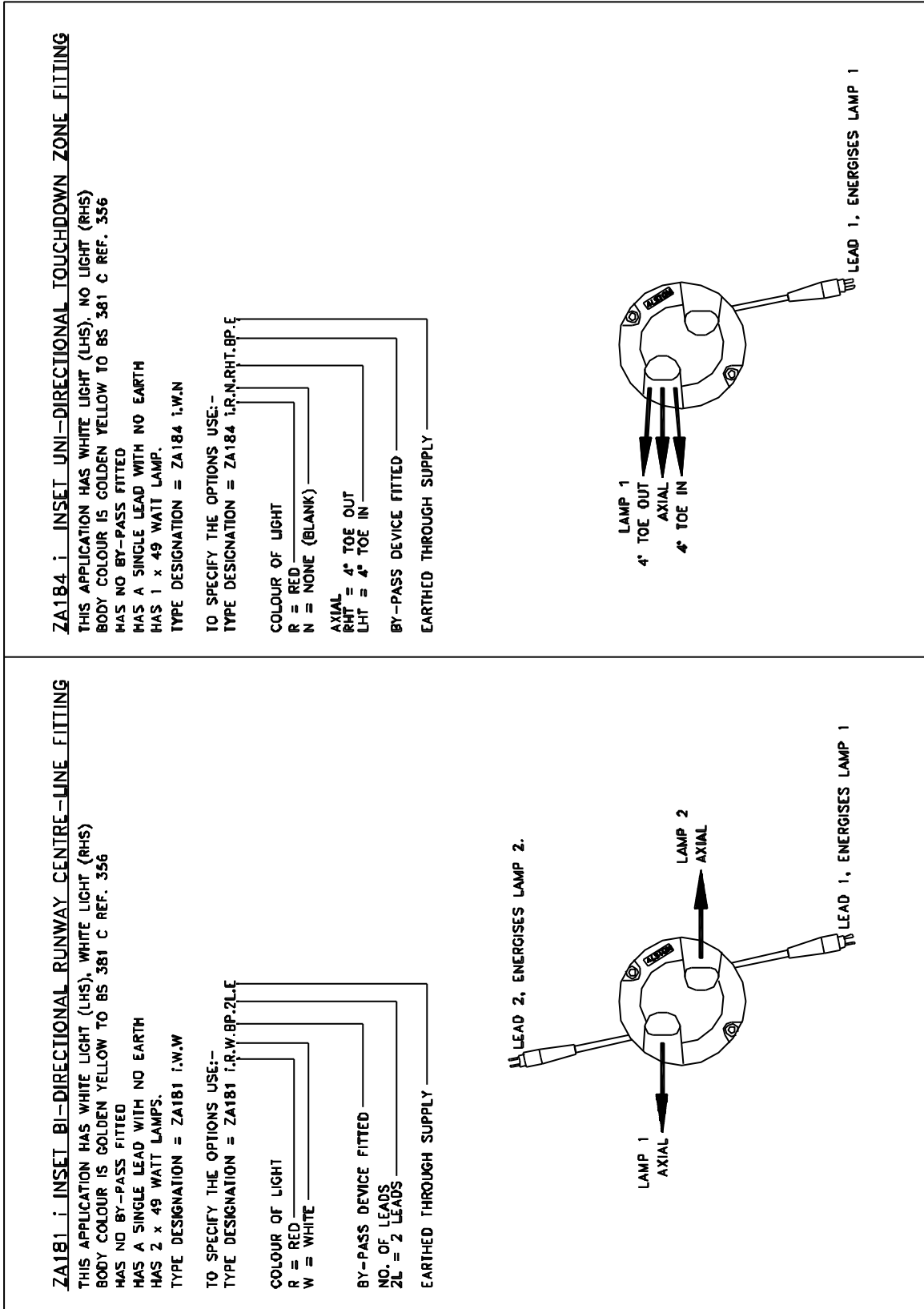


Fig. 15. ZA181 I & ZA184 I Fittings, Ordering Code Drawing.

SPARE PARTS SCHEDULE

(Item Nos. refer to Exploded Drawing Fig. 16)

Key to Abbreviations:

ST.ST	=	Stainless Steel	LG	=	Long
Hex	=	Hexagonal	A/R	=	As required
I/D	=	Inside Diameter	ALT	=	Alternative

Item No.	Part No	Stock List Code	Description	Qty for ZA181 i	Qty for ZA184 i
2	28821A	016069	Clear Prism	1 or 2	-
ALT	28821B	019141	Red Prism	-	1
3	28835	040092	Blank for Prism Aperture	1	1
4	28981	033075	Prism Gasket (White)	1 or 2	1
ALT	28827	033058	Prism Gasket (Black)	1 or 2	1
5	28826	032037	Prism Retaining Clamp	2	2
6	28824	032040	Lampholder	2	1
7	29057	021296	Lampholder Support Block	1 or 2	1
8	28825	032039	Lamp Retaining Spring	2	1
9	28887	008065	Cold Reflector Lamp 49W	2	-
10	29284		Terminal block Assembly	1 or 2	1
11		021134	45W Lamp By-Pass Device	1 or 2	-
12	10453A	013001	'B' Type Plug Lead L823	1 or 2	-
14		021114	Gland Nut (M20 Elkay 47-B)	1 or 2	-
15		021115	Skid Washer (M20 Elkay 97)	1 or 2	-
16		021343	Compression Bush (M20 Elkay 380)	1 or 2	-
17	29277	033095	Body to Base Sealing Gasket	1	1
18	29055	033083	Lamp Gasket	2	1

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Item No.	Part No	Stock List Code	Description	Qty for ZA181 i	Qty for ZA184 i
19	28918	033069	Prism clamp gasket	2	1
20	29057	21296	Lampholder Support Block	2	1
21	28988	021281	Cable Clamp (Optional)	2	1
22	28934	021256	Pressure Test Plug	1	1
23	29288		Prism Clamp Spacer (Optional)	1 or 2	1
24	27752A	025017	PTFE Sleeving 90 LG x 6.81 I/D	1	-
25			M3 x 9 St.St Cap Head Screw (Terminal Block)	1 or 2	1
26			M4 x 16 St St Hex Cap head Screw (Lampholder support)	2 or 4	2
27			M4 St St Crinkle washer	2 or 4	2
28			M6 x 20 St.St Hex Cap Head Screw (Lampholder)	2 or 4	2
29			M6 St. St Crinkle Washer	6 or 8	6
30			M6 x 40 St. St Hex Cap Head Screw (Body to Base)	4	4
31			M6 x 25 St. St Socket Head Screw (Prism Clamp)	2 or 4	2
32			P80 Rubber Lubricant Emulsion	A/R	A/R
33			'O' Ring Seal (Busak & Shamban 200-259-4470-99)	1	1
35	27753		Links for Lamps. State total length of link and male/female required.	Various	Various
36			3mm dia. x 10 long Spirol Pin, St.Stl	1 or 2	1
37	27872	031026	Electronic Lamp By-pass.	1 or 2	1
38			Heat shield for electronic Lamp By-pass. (With terminal block).	1 or 2	1
39			Heat shield for electronic Lamp By-pass. (Without terminal block).	1 or 2	1

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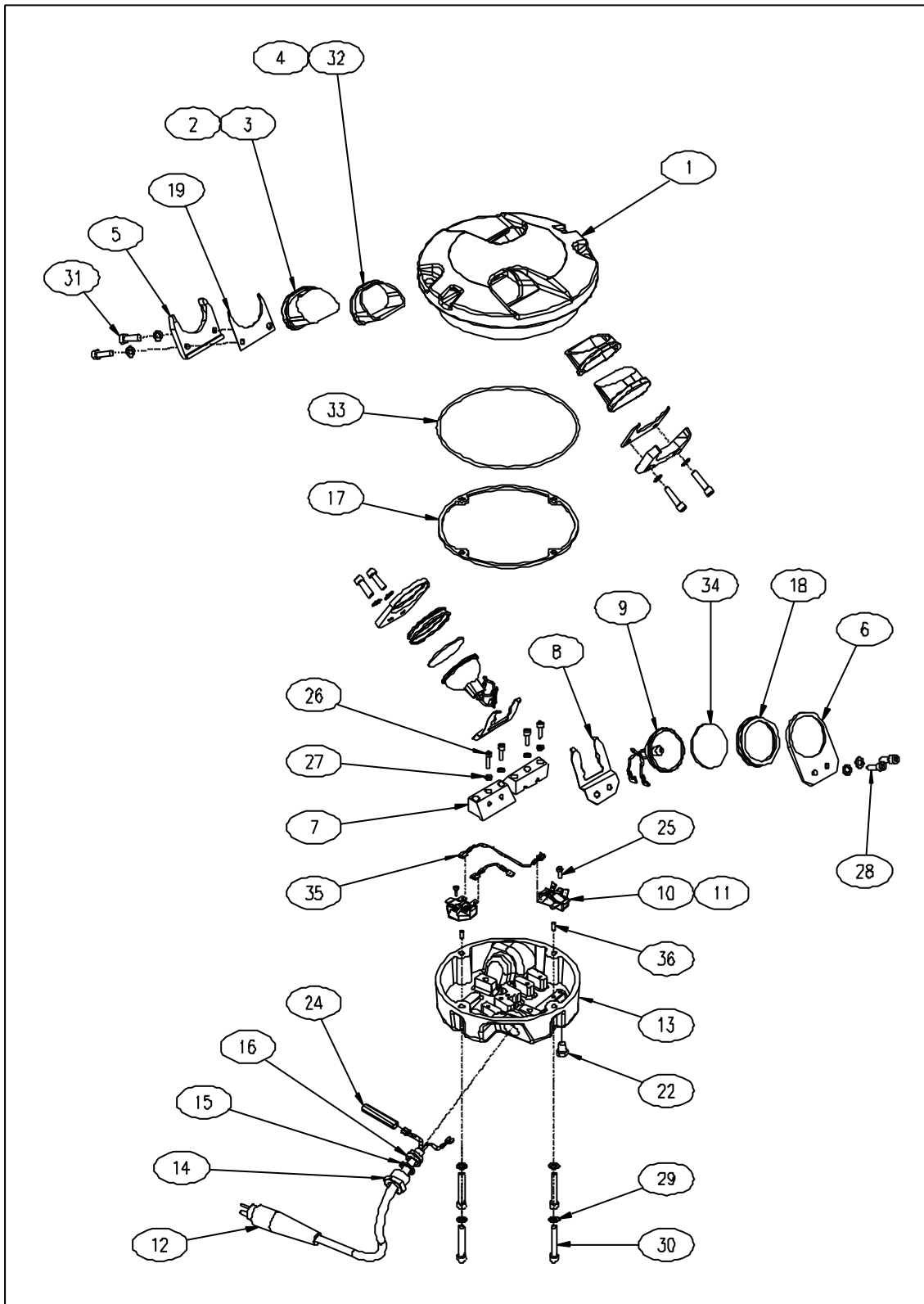


Fig. 16. Exploded view of complete fitting.

BASE ASSEMBLY CIRCUIT DIAGRAMS

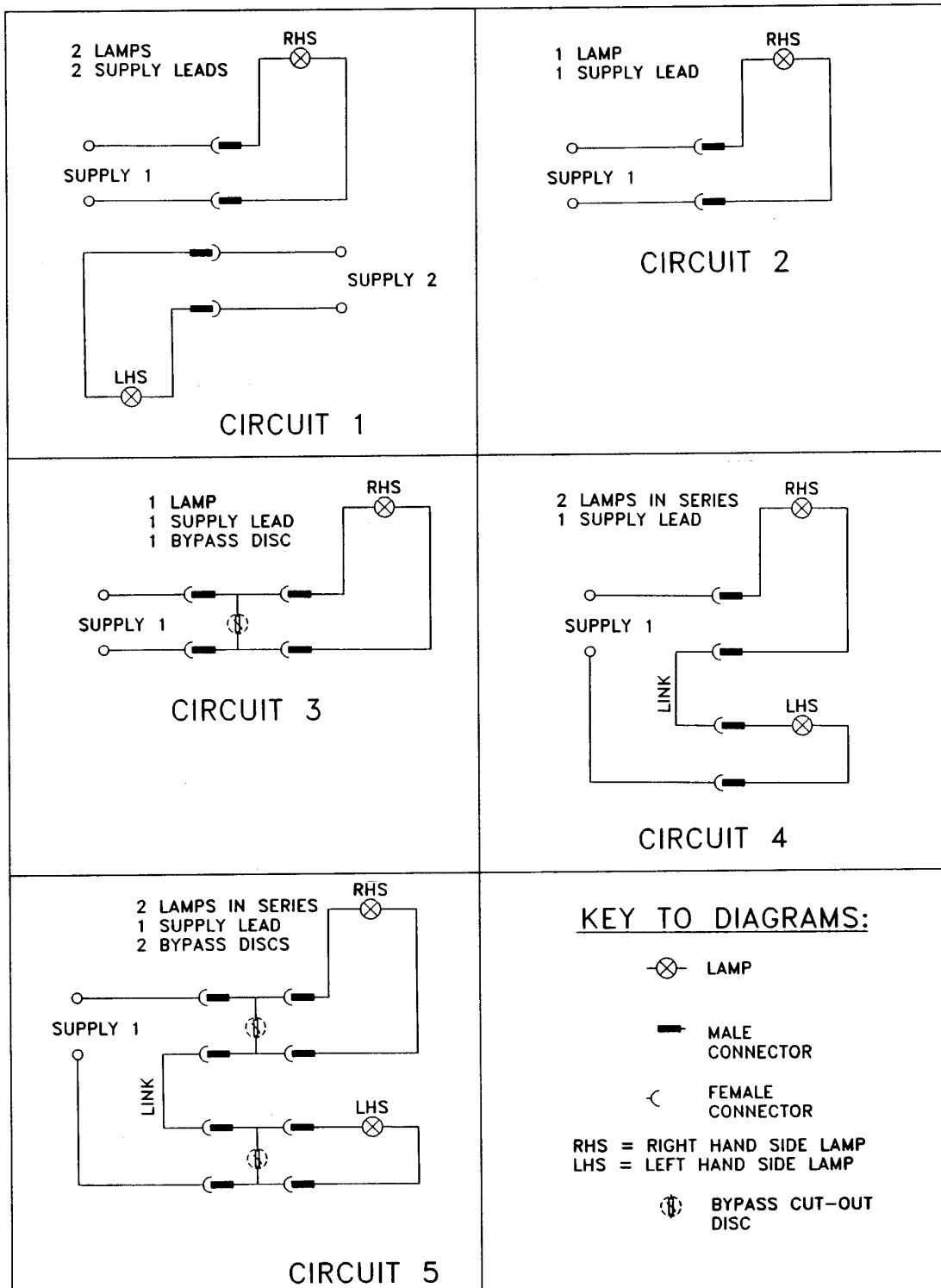


Fig. 17. Base Assembly Circuit Diagrams.

APPENDIX 'A' - SAFETY ADVICE

1. COMPLIANCE WITH INSTRUCTIONS IN THIS MANUAL

The purchaser/user is advised to comply with the instructions and information in this manual and ensure that all personnel to be associated with the apparatus under this contract are made familiar with the information contained herein.

2. GUIDANCE NOTES FOR USERS ON THE SAFETY OF PERSONNEL

Every employer shall ensure that his employees are informed, trained and supervised and use a safe system of work to ensure their safety. He is advised to comply with the information provided, to maintain the plant in a safe condition.

Electrically skilled personnel may have to gain access to apparatus which is not completely isolated. The burden of responsibility, for the safety of such personnel carrying out the work, rests on those under whose authority they act.

3. INSTALLATION, OPERATION AND MAINTENANCE

The purchaser/user is advised to ensure that each piece of apparatus supplied to the purchaser's order is correctly installed, in a suitable location, by technically qualified and competent persons experienced in the class of work involved. The rules for ensuring the safety of personnel can be summarised as follows:-

During normal use, ensure that plant operators:-

- are fully conversant with all controls, particularly those for emergency shut down,
- comply with safety warning notices and keep all enclosures shut,
- are trained to recognise signs of mal-operation and know what action to take in the event of trouble or difficulty.

During Maintenance, Testing etc., ensure that only suitably skilled persons are permitted to carry out work and that they:-

- comply with user's safe system of work and safe working procedures,
- isolate the apparatus completely, where possible, before opening enclosures and starting work,
- are conversant with the information provided particularly on measures relating to their safety,
- recognise the hazards which can arise when working on live apparatus and take all the necessary precautions,

- comply with all local safety regulations.

4. VOLTAGES GREATER THAN 50V A.C./120V D.C.

The purchaser/user is advised to ensure that apparatus operating on a voltage greater than 50V a.c./120V d.c. is isolated and made safe before any work is carried out upon it.

5. APPARATUS SUPPLIED AS LOOSE ITEMS, CHASSIS ETC.

The purchaser/user responsible for installing such apparatus is advised that, when live, it could constitute a safety hazard and relevant safety procedures are necessary.

6. ACCESS TO THE APPARATUS DESCRIBED IN THIS MANUAL

It is the purchaser's/user's responsibility to ensure that all personnel obtaining access to the apparatus are competent and work in accordance with the user's safe system of work

Record of Personnel made aware of Safety Advice.

Position/Job Title:

Signature:

Date: