

INSTALLATION AND MAINTENANCE

MANUAL

EXTERNAL POWERED DOORS

FOR BRITISH RAIL

C.I.E. STOCK

TM - R22

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TM - R22 REVISION SHEET.

ISSUE 2.

PLC Peters reference number added to title page (TM-R22).

## TM-R22 REVISION SHEET

### ISSUE 3

<u>Section</u>	<u>Change</u>
2.1 (g)	Tool No. changed from P310-36-A2 to 047-223-A2. Measurement of overcentre position described in more detail.
2.2 (q) (r) (s)	Re-written
2.2 (t)	"or against each other" added to 1st sentence.
3.1 (v)	2nd Paragraph added.
3.2 (v)	2nd Paragraph added.
6.1	Paragraph E added
6.2	Section added

## TM-R22 REVISION SHEET

### ISSUE 4

<u>Section</u>	<u>Change</u>
Contents	2.2 Title extended to include alignment. 4. Title changed to cover setting up. Appendix added (Section 9).
1.1	Item 49 was incorrectly referred to in 1st paragraph as item 50. 3rd paragraph added.
2.1	Introduction - wording changed. (c) - completely re-written. (f) - wording changed. (h) - ) (i) - ) (j) - ) completely re-written. (k) - ) (l) - )
2.2	Re-arranged and shortened to include only those aspects of door positioning and mechanical setting-up which can be achieved without regulated air supply and electrical controls.
4	Complete new chapter added; replaces simple list of tests after installation; includes full setting up and test procedure for the door operating mechanism and emergency release mechanism, to be performed with regulated air supply and electrical controls, either after installation, after repair or modification, or during rectification of malfunction.
APPENDIX 9	New Section written to cover routine testing in the running depot (without removal of door gear covers) to indicate below-par door performance prior to malfunction occurring in service.

## CONTENTS

1. GENERAL DESCRIPTION
  - 1.1 Mechanism
  - 1.2 Manual Release Mechanism
  - 1.3 Doorleaf
2. DOORSHAFT AND MECHANISM INSTALLATION
  - 2.1 Preparation
  - 2.2 Installation and Door Alignment
3. RELEASE MECHANISM INSTALLATION
  - 3.1 Preparation
  - 3.2 Installation
4. SETTING UP AND TESTING WITH POWER OPERATION
5. FAULT FINDING
6. SERVICING/MAINTENANCE
  - 6.1 Recommended Maintenance
  - 6.2 Summary of Setting Instructions
7. OVERHAUL PROCEDURE
  - 7.1 Mechanism
  - 7.2 Emergency Release Mechanism
  - 7.3 Doorleaf
8. ILLUSTRATED PARTS LIST
  - 8.1 Mechanism
  - 8.2 Release Mechanism
  - 8.3 Doorleaf

## APPENDIX

9. Routine Testing of Doors In Service.

## 1. GENERAL DESCRIPTION

### 1.1 MECHANISM (See Figure 1).

The mechanism consists of an Operating Mechanism Housing (Item 9), which houses both the pneumatic actuator (Item 32), the locking mechanism and part of the release mechanism. The locking mechanism is connected to the top of the doorshaft (Item 8) which passes down through the vehicle floor and is supported by a bearing and housing assembly (Items 1, 3, 4, 5 & 6). The doorshaft has two arms which connect via two mounting brackets (Items 49 & 51) to the doorleaf.

A third arm (Item 43) is connected to a pivot assembly (Item 42), mounted in the vehicle alongside the bearing and housing assembly (Items 1, 3, 4, 5 & 6), and to the front bottom edge of the doorleaf via a bracket (Item 53). This arm is to provide for parallel motion of the doorleaf during operation.

The two brackets attached to the lower edge of the doorleaf, one pivoted to the doorshaft lower arm (Item 51) and the other pivoted to the parallel motion arm (Item 53) have their pivots directly linked by a rigid strap. This minimises the guidance forces transferred through the mountings on the doorleaf edge.

Mounted to the Operating Mechanism (Item 9) is a 'snap' action interlock switch (Item 98) which when acted upon by the actuator clevis (Item 34) indicates whether the locking mechanism is closed and locked or not.

The release mechanism mounted within the Operating Mechanism Housing (Item 9) consists of a lever (Item 60) which operates a wedge and clevis assembly (Items 57 & 58). The wedge moves in a guide (Item 56) which is mounted to the Operating Mechanism Housing by a bracket (Item 55). Movement of this assembly is controlled, via a push rod (Item 65), by the internal and external release mechanism (See Figure 2).

The whole assembly is connected to the vehicle cantrail above each doorway by two brackets (Items 10 & 39).

At each interface with the vehicle is a designed allowance which can be shimmed to unit, with the various shims provided.

### 1.2 MANUAL RELEASE INSTALLATION (See Figure 2).

The emergency release mechanism consists of both an internal and external handle (Items 4 & 17) each of which is connected to a lever assembly (Items 6 & 10). Actuation of either handle causes its respective lever assembly to activate a third lever (Item 9) so pushing the push rod (Item 65 of Figure 1) which in turn operates the lock release.

All three levers are mounted on a spindle (Item 8). The two lever assemblies (Item 6 & 10) are free to rotate about the spindle whilst the lever (Item 9) is clamped firmly to the spindle. This allows for independant action of both internal and external handles.

At one end of the spindle is securely fitted a cam (Item 13). This cam operates a pneumatic valve (not of PLC Peters Limited supply). Initial rotation of the spindle causes the cam to activate the pneumatic valve thus supplying air to both sides of the pneumatic actuator (Item 32 of Figure 1) and, due to the differential areas because of the piston diameter, gives a very slight bias to open the doorleaf. Further rotation of the spindle causes the wedge (Item 57 of Figure 1) to release the door mechanism thus allowing the doorleaf to be manually pushed open.

Resetting of the release mechanism causes the cam (Item 13) to reactivate the pneumatic valve to its normal position thus returning the door control system to its normal mode of operation. Should the doorleaf be in an open position and the control system in a closing mode, the doorleaf will close and lock in its designed manner.

Connected to the cam is a bias spring (Item 27) which has two functions. Firstly, the spring helps maintain the release mechanism in its non-operated condition. Secondly, on activation of either release handle, after the operation of the pneumatic valve, the spring goes "over centre" and helps in releasing the locking mechanism assembly.

### 1.3 DOORLEAF. (See Figure 3).

The doorleaf consists of a hot bonded sandwich construction (Item 1) to which is fitted a half drop light window unit (Item 2) that is held firmly in position by a direct glazing method (Item 28). The glazing is then covered by an aluminium retaining section (Item 3) and a two part Polysulphide compound (Item 29) to give a good cosmetic finish.

The drop light of the window unit is held in position by means of budget locks (Item 18 & 20) which are retained by covers (Item 19 & 21) and screws (Item 22). The release of the budget locks can only be initiated by a suitable staff carriage key (not of PLC Peters Limited supply). In order to open the window both budget locks must be released. To close the window unit the drop light must be raised and both locks engaged.

Capping edge extrusions (Items 5, 6, 7 and 8) and attached to the periphery of the sandwich construction (Item 1) using retaining clamps (Items 9, 10 and 11) and screws (Item 23).

The top, rear and leading edge of the doorleaf have seals (Items 15, 16 and 17 respectively) fitted using the tee-slot in the capping extrusion for retention.

A profiled glass fibre boot moulding (Item 4) is secured to the lower, inner face of the door using screws (Item 27). Attached to this boot moulding is a seal holder assembly (Item 12) and seal (Item 14). When the doorleaf is close this seal mates with the vehicle step profile securely sealing the bottom of the door.

On the bottom edge extrusion (Item 8) are two cut outs, for positioning the door mounting bracket and parallel motion arm bracket (Item 51 and 53 of Figure 1), and at the top, inner face of the doorleaf are two tapped holes for fitting the top door mounting bracket (Item 49 of Fig. 1).

## 2. DOORSHAFT AND MECHANISM INSTALLATION (See Fig. 1)

### 2.1 PREPARATION

The doorshaft and mechanism assembly as supplied is set for immediate installation into vehicle. However, should the mechanism require resetting this can be carried out on the vehicle itself, or on the bench prior to installation.

The following procedure should be adhered to when resetting the overcentre lock mechanism and/or the "door locked" switch:-

- (a) Ensure the mechanism is in the open position.
- (b) Slacken off locking screws (Item 81) which hold the stop screws (Item 80).
- (c) If the mechanism is already mounted on the vehicle, release the 2 screws (Item 72) and turn the torque setting screw (Item 93) several full turns anti-clockwise, so as to allow the mechanism to actuate and lock without pressing the doorleaf against the door seals.
- (d) Slacken off screws (Item 99) and push bracket and switch assembly (Item 97 & 98) away from clevis (Item 34).
- (e) Remove screws (Item 75) and bracket assembly (Item 55 & 56).
- (f) Operate the control system to close and lock the mechanism so that the clevis (Item 34) is firmly against both stop screws (Item 80). Having done so, isolate air supply. (If the mechanism is not already mounted on the vehicle, it can be moved to the closed and locked position manually, without air).
- (g) Check the "Overcentre" position of the locking mechanism using tool no. 047-223-A2, as shown in sketch. Ensure that the tool is horizontal with the 'V' section engaged on the washer (Item 22) and the arm on the washer (Item 21). Push gauge pin in until it just touches the locking arm pin (Item 20). Tighten screw on setting gauge (finger tight) and remove tool from mechanism. Dimension 'A' should be between 10.00mm and 10.5mm.
- (h) While using the tool no. 047-223-A2, always ensure that the clevis (Item 34) remains firmly against both the stop screws (Item 80). If there is any apparent difficulty in reaching or maintaining this position, it may be because the piston of the pneumatic actuator (Item 32) has reached the end of its stroke and is preventing the mechanism from reaching the fully locked position.

If piston stroke limits the locking movement, then the piston rod of (Item 32) should be turned so as to screw it more deeply into engagement with the clevis (Item 34). Re-tighten the locknut (Item 35).



- (i) If, with the clevis firmly against the stop screws, the 'Dimension A' indicated on the tool no. 047-223-A2 is not within the limits 10.0mm to 10.5mm, then the stop screws (Item 80) must be adjusted. Turn each screw anti-clockwise, so that it protrudes less, in order to increase the Dimension A, or clockwise to protrude more to reduce Dimension A.

Adjustments should be symetrical so that the stop screws protrude equally.

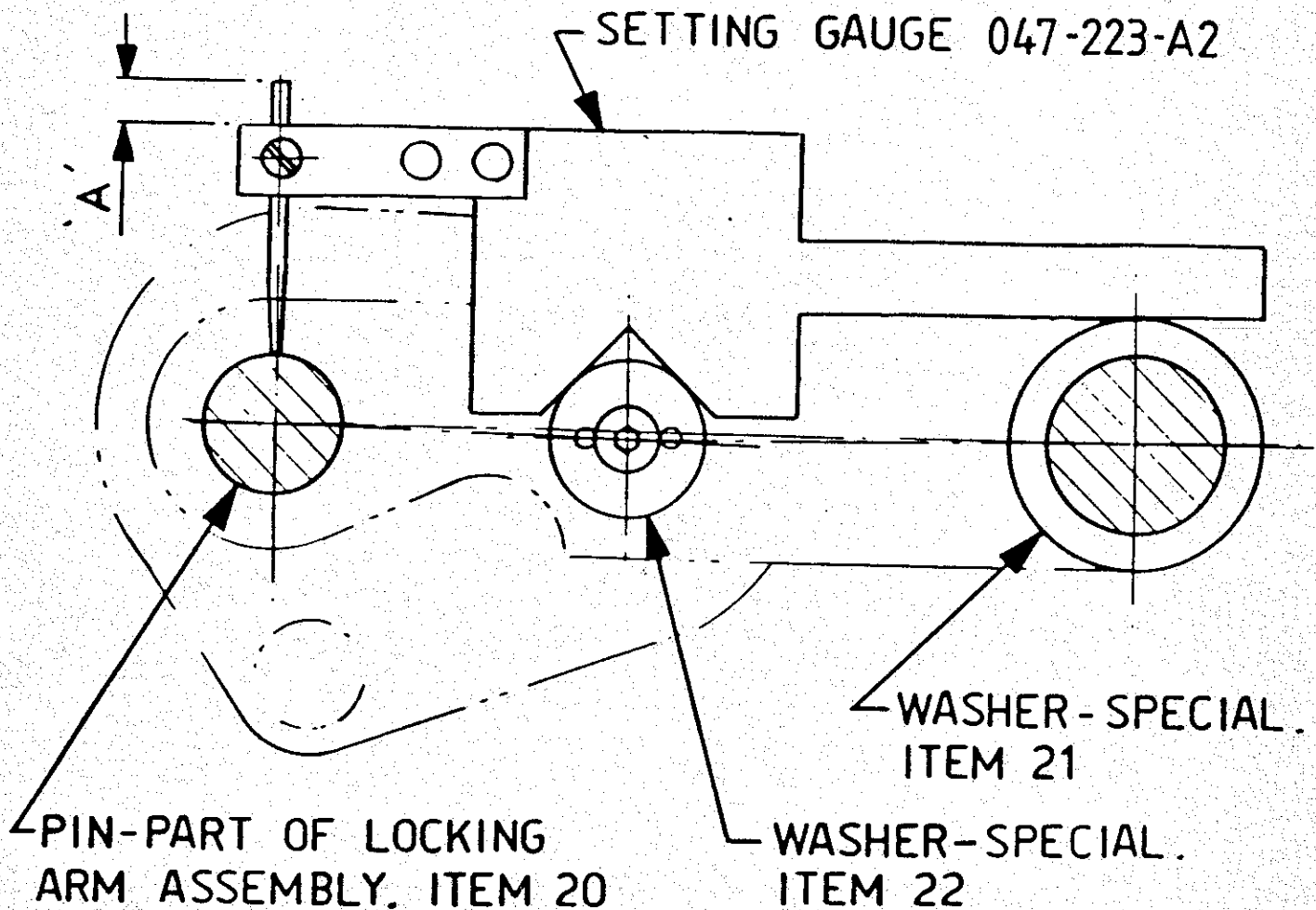


Fig.1. Section Through Mechanism Below Locking Arm Assembly  
Showing Setting Gauge In Position

- (j) When completely satisfied that the Dimension A is within the prescribed limits every time the mechanism rests against the stop screws, then retighten the locking screws (Item 81) to firmly secure the stop screws (Item 80).

2.1 (Cont'd)

- (k) Adjust the switch and bracket assembly (items 97 and 98) with the mechanism in the fully closed and locked position having the clevis (item 34) firmly against the two stop screws (item 80) throughout this procedure :

The countersunk head M3 socket screws (item 99A) holding the switch mounting bracket, should be slackened off until there is zero compression on the 'Nomel' 4mm conical spring washers (item 100a). A gauge plate or feeler, 0.30mm thick, is introduced between the operating plunger of the switch (item 98) and the lock mechanism clevis (item 34) and the switch bracket is then pushed forward on its elongated holes by finger pressure until the switch is operated to the limit of its overtravel, trapping the 0.30mm feeler between the switch and the clevis. The two M3 screws should be carefully tightened in this position to squeeze firmly onto the 'Nomel' washers, taking care that the 0.30mm spacing is maintained and that the clevis remains firmly in position against the two stop screws (item 80).

To check the switch adjustment, the mechanism should be opened, reclosed, and locked and verify that the switch is operated with sufficient overtravel remaining on the plunger to allow a 0.25mm feeler but not a 0.35mm feeler, to pass between the switch plunger and the clevis.

- (l) The reaction block (item 63) should be fitted with shims (item 64) sufficient to ensure that when the mechanism is in the locked position, but without strain to hold the door tightly closed against the door seals, the roller (item 25) just touches against the reaction block or has a maximum clearance of 0.1mm from it. When this condition is achieved, tighten the reaction block retaining screws (item 77).

## 2.2. INSTALLATION

(The correct positions of all components of the door are shown in the PLC Peters' drawing No. 047.132/133.A0 sheets 1 and 2. Note that the manufacturers "item numbers" on that drawing do not correspond to the item numbers used in this manual).

- (a) Locate bottom bearing housing (Item 1) and shims (Item 2) on tapped holes provided in the vehicle stop. Secure with screws (Item 66) and washers (Item 84), finger tighten only.

NOTE: Design calls for 3mm of shimming in the nominal position.

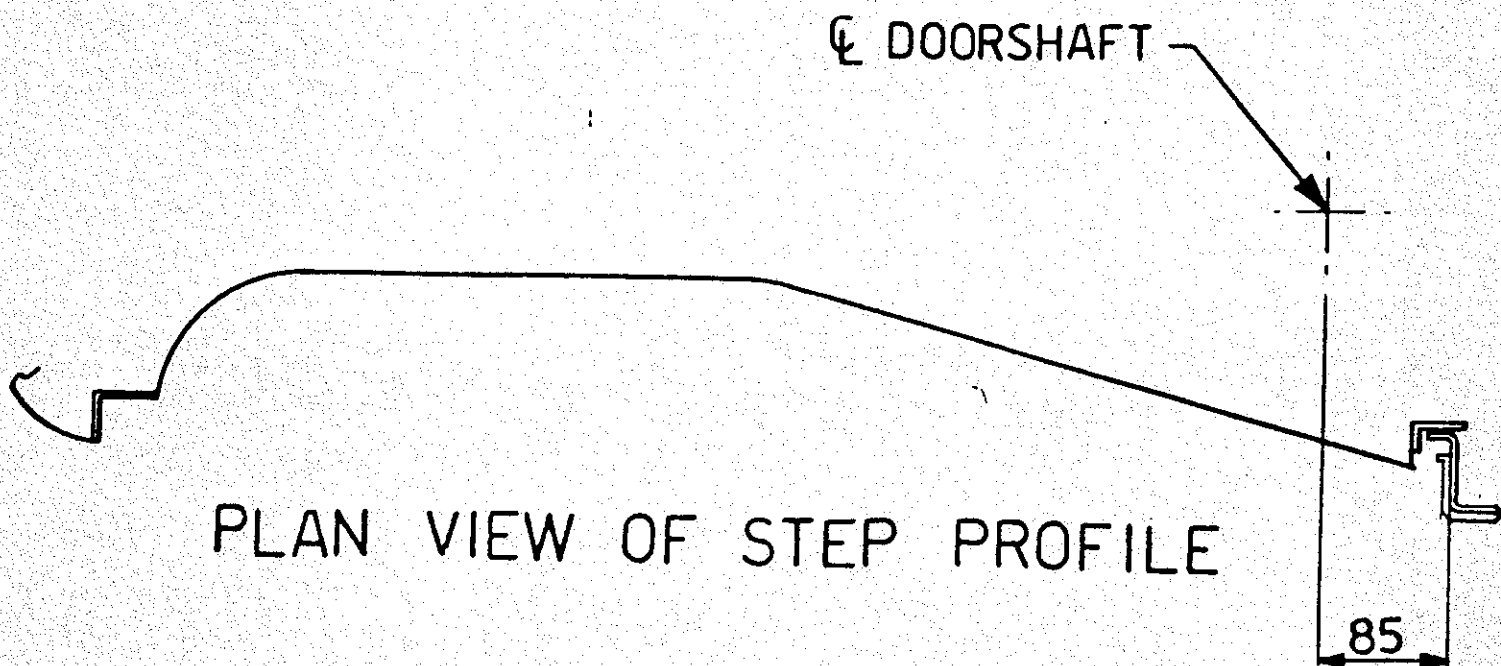
- (b) Place spherical bush (Item 3), bush (Item 4), thrust washer (Item 5) and pin (Item 6) into the bottom bearing housing (Item 1).

The thrust washer should have its low friction (grey) face uppermost and should engage on the pin in the spherical bush to prevent the thrust washer rotating. The pin must not protrude above the thrust washer.

- (c) Place scraper seal (Item 7) on doorshaft mechanism assembly.
- (d) Locate doorshaft and mechanism assembly, into the bottom bearing assembly and secure top mounting bracket (Item 10) to the vehicle cantrail using screws (Item 67A), washers (Item 78A) and shims (Item 11).

NOTE: In the nominal position design requires 3mm of shimming. It should be noted, however, that with 3mm shimming the mechanism when in the open position, does not foul the vehicle side. Shims can be added to unit, should a foul occur. (See Section 4.5(d) and (e)).

- (e) Fit mounting bracket (Item 39) to vehicle cantrail using screws (Item 67) and washers (Item 85 & 87). Slacken screw (Item 104).
- (f) Secure mechanism to mounting bracket (Item 39) using screws and washers (Item 72 & 87). Using vernier adjustment screw (Item 93) centralise mechanism about slots provided in bracket (Item 39) before tightening screws. (Item 72 & 104).
- (g) Check that the doorshaft (Item 8) is parallel to the rear, vertical doorway pillar to the dimension shown in the sketch below. The bottom bearing housing (Item 1) has slots that allow for adjustment as required.



Having correctly aligned doorshaft, tighten screws (Item 66) securing bottom bearing housing (Item 1) to vehicle step.

- (h) Secure pivot bracket (Item 42) to step floor using screws and washers (Items 93 & 88).
- (i) Fit the doorleaf assembly securing it to the upper and lower door mounting brackets (Items 49 & 51) and to the parallel motion arm bracket (Item 53). Linking the mounting brackets (Items 51 & 53) with the rigid support strap (Item 101A).
- (j) Align the doorleaf with the aperture. Vertical adjustment is provided by shims (Item 2) lateral adjustments are provided by the use of slots in the upper bracket (Item 49) and in the bottom doorleaf capping extrusion.
- (k) Fit parallel motion arm assembly (Items 43,44 & 45) to the parallel motion arm bracket (Item 53) and secure using nut and washers (Items 82,90 & 52).
- (l) To adjust length of parallel motion arm, slacken locknut (Item 45) and adjust length of assembly by screwing rod end (Item 44) either in or out of arm (Item 43) such that with the door closed the rod end fits neatly onto the pivot bracket (Item 42) and secure using nut and washers (Items 82,90 & 52).

With all the bottom fixings secure check movement of doorleaf. As the door closes against the step, the nose of the door (nearest to the coach end) should close about 8-10mm in advance of the tail of the door (the curved side).

- (m) Check the alignment of the doorleaf within the door aperture and adjust as required. Check the alignment between the vehicle step profile and boot seal (Item 14 of fig. 3). The boot (Item 14 of fig. 3) has oversize holes, which allow adjustment in all directions. Adjustments can be made by releasing screws (Item 23 of fig.3), aligning the seal with the step and re-tightening the screws.
- (n) When the boot seal is correctly positioned on the doorleaf, the door should swing into the closed position, nose first, and the nosing seal should touch the doorpost at the same time as the boot seal touches the step at its end nearest the door nose.

External pressure on the bottom centre of the doorleaf should cause the boot seal to engage snugly against the step over its whole length.

Sustained pressure on the bottom of the doorleaf should cause it to rest against the step with the outside surface of the doorleaf, at the bottom; neatly aligned with the car body exterior.

- (o) The upper part of the doorleaf should not be closed flush with the car body exterior when the door is firmly closed at the bottom by exterior pressure on the doorleaf. The upper doorleaf should be parallel to the car body side but standing about 5mm proud, and the upper part of the door nozing seal should be less tightly engaged than at the bottom.

Full closing of the top of the door will only be achieved with the large forces applied by the door operating mechanism when it is pneumatically locked.

- (p) Full closure and locking of the door can be achieved by application of shop air pressure to the elbow connection on the pneumatic actuator at the piston rod end. This should be done very cautiously to prevent dangerous slamming of the door. Preferably use an air supply hose incorporating a very small restricting choke of 0.5mm (0.020 in.) diameter hole, or less.
- (q) Final setting of the door closed position can only be achieved after adjustment of the door lock overcentre position and doorshaft torque, with regulated air pressure and electro-pneumatic control valves, as detailed in section 4.

### 3. RELEASE MECHANISM INSTALLATION (See Figure 2)

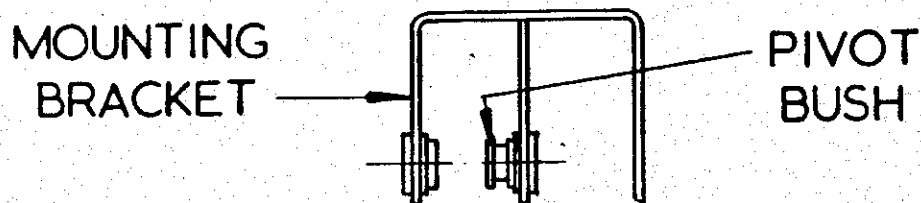
#### 3.1 PREPARATION

The interior release handle, the lever and the cams are supplied assembled and require disassembly before they can be mounted to the bracket, which is supplied by B.R. The bushes (Items 2, 7 and 11) will therefore be in their respective housings.

#### 3.2 INSTALLATION

- (a) Secure the two glands (Item 1) to the bracket using gland nuts (Item 3).

- (b) Place the pivot bush (Item 12) into the inner gland as shown.



- (c) Pass the spindle (Item 8), square end first, through the outer gland.
- (d) Place lever (Item 9) followed by lever assembly (Item 10) onto spindle as shown in figure 2.
- (e) Pass the spindle through the inner gland assembly until the two levers can just be maintained on the spindle. The outer end of the spindle will now be clear of the outer gland.
- (f) From the inside of the bracket place the lever assembly (Item 6) in the outer gland.
- (g) Pass the spindle back and into lever assembly (Item 6).
- (h) Position lever (Item 9) correctly on spindle, aligning the flat machined on the spindle with the hole provided in the lever for the clamp screw, and fit and secure clamping screw (Item 21).
- (i) Position lever (Item 6) at approximately  $30^{\circ}$  to the vertical and attach handle (Item 4) using the retaining washer (Item 5) and screw (Item 20).
- (j) Rotate lever (Item 9) to touch against lever (Item 6) maintaining the position described in (i) above.

Note. When viewed from the handle (Item 4); lever (Item 9) should be at approximately  $20^{\circ}$  to the vertical.

- (k) Attach the cam (Item 13) to the spindle using retaining washer (Item 14) and screw (Item 22).

Note. The detent in the cam should be approximately  $30^{\circ}$  to the vertical and should actuate the valve provided by B.R.

- (l) Attach the bollard (Item 15) to the bracket, first connecting it to the return spring (Item 27).

Note. It will be necessary to rotate the cam and spindle in order to attach the bollard without extending the spring.

- (m) Attach the clevis end of cable assembly (Item 16) to lever (Item 10).
- (n) Fit complete bracket assembly to vehicle taking care to pass the cable assembly (Item 16) over the pulley in the vehicle and down through the passage way provided.
- (o) Fit handle (Item 17) to cable assembly using pin (Item 19) and nut and washer (Items 24 and 25).
- (p) Fit handle (Item 17) to bracket provided in the vehicle using pin (Item 18) and washer and split pin (Item 23 and 26).
- (q) Adjust cable assembly (Item 16) at the clevis to give correct alignment of levers and cam ensuring that the cable is taut.

To adjust cable assembly slacken lock nut and rotate threaded rod in or out of clevis. Re-tighten lock nut on completion of adjustment.

- (r) Connect lever (Item 9) to lever (Item 60 of Figure 1) using push rod (Item 65 of Figure 1).
- (s) Check that lever (Item 60 of Figure 1) is approximately  $20^{\circ}$  to the vertical and the wedge (Item 57 of Figure 1) is clear of the mechanism when the doorleaf is closed and locked.
- (t) Operate the interior release handle (Item 4) taking note that the release mechanism valve operates before the wedge (Item 57 of Figure 1) engages the mechanism. Further operation of the handle should release the overcentre locking of the mechanism and allow the door to be pushed open.

Note. On releasing the handle care must be taken to ensure that it does not return to its initial position. This will re-activate the release mechanism valve and cause the doorleaf to close and the mechanism to lock.

- (u) Adjustment in the position of the wedge (Item 57 of Figure 1) is provided by the threaded clevis assembly (Item 58 of Figure 1). To adjust the clevis assembly it will be necessary to disassemble it from the lever (Item 60 of Figure 1).
- (v) The mechanism can be reset by pushing back on the push rod (Item 65 of Figure 1).

Ensure that when the mechanism is reset the valve is also correctly reset on the cam (Item 13). Adjust the cable assembly (see (q) above) to give at least 10 degrees of handle movement before the valve operates. Check by operating and resetting the release several times.

- (w) Operate the exterior release handle (Item 17) again checking that the release mechanism valve operates before the wedge (Item 57 of fig. 1) engages the mechanism and that on releasing the handle it does not return to its initial position so closing and locking the doorleaf and mechanism.

NOTE: The position of the wedge (Item 57 of fig. 1) set for internal operation of the release mechanism should also suit external operation.

- (x) The mechanism can, again, be reset by pushing back on the push rod (Item 65 of fig. 1). Check that the valve is also reset as described in (v) above.



#### 4. DOOR SETTING AND TESTING WITH POWER OPERATION

##### 4.1 WHEN TO USE THIS PROCEDURE:

- (a) If a new door equipment has been installed in a vehicle according to sections 2 and 3 of this manual.
- (b) If any major re-adjustment of door alignment or replacement of door mechanism components has taken place.
- (c) If any door is discovered, in service or during routine maintenance testing, to be not functioning correctly.

##### 4.2 VERIFY CORRECT ASSEMBLY AND INSTALLATION

Before commencing the setting up, a thorough visual inspection should be carried out to ensure that the equipment is properly installed and complete, in accordance with PLC Peters' assembly drawing No. 047 132/133 A0 sheets 1 and 2.

(Note that the assembly drawing uses item numbers and part numbers, for manufacturing purposes, which are not the same as the item numbers referred to in this manual. Identification of parts in this setting procedure refers to item numbers as shown in the 'exploded' view of Figs. 1, 2 and 3.

Where there are apparent differences between Fig.1 and the assembly drawing, e.g. in the positioning of screws and washers, etc., the assembly drawing must be taken to be the correct arrangement.

##### 4.3 MECHANICAL ALIGNMENT AND FRICTION

Before commencing the setting up, a check should be carried out with the air supply to the doorway isolated and vented, to ensure that the door moves freely without undue friction and without mechanical interference.

With the cover removed, the door can be manually un-locked by use of the emergency release lever. It should be free to swing slowly in either direction between a position 5% open and fully open, when a force of 200 N (approx. 10 lbf) is applied to the doorleaf in the direction of movement.

##### 4.4 REGULATED AIR SUPPLY

The setting up procedure requires that the air supply should be disconnected and re-connected from time to time, i.e. when air is switched off the connection to the doorway should be vented.

For safety reasons, it is important to employ a procedure which will ensure that high pressure air cannot inadvertently be re-connected to a doorway while setting up is in progress.

It must be possible to check the pressure of air supplied to the doorway. This will require a pressure gauge to be fitted, for test purposes, downstream of the air pressure regulator which

#### 4.4 REGULATED AIR SUPPLY (Cont'd)

feeds the door air reservoir on each car. (This regulator should be pre-set to deliver exactly 6.5 bar). The supply pressure to feed the regulator must be in excess of 7 bar.

#### 4.5 ACCESS

The setting procedure requires that the GRP cover, which is part of the vehicle bodywork trim, should first be removed to give full access to the door mechanism above the doorway.

#### 4.6 DOOR SETTING PROCEDURE

- (a) Disconnect the door operating mechanism from the air supply, or isolate and vent the air feed in a safe manner (see 4.4 above).
- (b) Note the number of shims (item 11) fitted between the top mounting bracket (item 10) and the vehicle cantrail. The nominal setting is with 3 shims; maximum allowable is 6 shims but more than 3 should not be used unless necessitated by paragraphs c), d), or h) of this procedure.

Note also the number of shims (item 50) between the upper door mounting bracket (item 49) and the doorleaf; nominally none, maximum 3.

Note also the number of shims (item 2) fitted underneath the bottom bearing housing (item 1); nominally 3 shims, maximum 6.

- (c) Manually swing the door, slowly, to the fully open position while observing the clearance between the roller on the mechanism (item 25) with its special retaining washer (item 27) and the heads of the bolts (item 67) which retain the top mounting bracket (item 10) to the cantrail. The roller and washer should be inboard of the bolt heads with a total clearance of at least 5mm.

Note that door equipment supplied for earlier vehicles had hexagon head bolts (item 67) but these have been subsequently replaced by button head socket screws to improve the clearance. If more clearance is required add shims (Item 11) at the cantrail.

- (d) Again, swing the door slowly open, while observing clearance between the outer end of the locking assembly (items 20 and 16) and the vehicle cantrail structure.

A minimum clearance of only 2 or 3mm is sufficient.

If necessary, add shims (item 11) at the cantrail mounting.

#### 4.6 DOOR SETTING PROCEDURE (Cont'd)

- (e) The door should be set to fit neatly into the aperture so that it is abutting, but not too firmly compressing the nosing seals. On closing, the nose of the door (the coach-end side) should come in just prior to the tail of the door. These adjustments can be achieved using the parallel motion arm (item 43) and by adjustment laterally of the bottom doorleaf mounting brackets (items 51 and 53) together, and adjustment laterally of the upper doorleaf mounting bracket (item 49).
- (f) With the door in the fully open position check that the clearance between the boot seal (Item 14 - Figure 3) and the bodyside is approximately 60mm. Adjustment can be achieved by screwing the actuator piston (item 32) in or out of the clevis (item 34) to achieve the required setting. Once the setting is correct tighten the lockout (item 35) against the clevis. If the piston rod is screwed out of the clevis (to open the door closer to the car bodyside) it is essential to check afterwards that, in the fully closed position, the piston travel does not prevent the clevis locking firmly against both backstop screws (item 80).
- (g) Reconnect the air and check that it is set at 6.5 bar.
- (h) With the door closed, check the alignment of the tail of the door with the bodyside. If the mechanism is being set up for the first time, a preliminary adjustment of torque should be made, as per item (n) below, before aligning the top corner of the doorleaf. If the top corner needs pulling in to achieve alignment this is accommodated by the addition of shims (item 11) to a maximum of 6 shims. Should the maximum of 6 shims be obtained without successful alignment then item (e) should be repeated. To move the top corner outwards, reduce the number of shims at the cantrail (item 11) only if allowable according to paragraphs (c) and (d) above. Otherwise add shims (item 50) at the upper doorleaf mounting bracket.
- (i) Remove the black wedge bracket (item 55) and the microswitch (items 97 and 98).
- (j) Check the overcentre locking position of the door using the special gauge 047.223.A2 (previously numbered P.310.36.A2 but no different). The overcentre should be set at 10mm + 0.5mm. Adjustment can be achieved by use of the back-stop screws (item 80), using the method detailed above in paragraphs (g), (h), (i) and (j) of Section 2.1 'Preparation'. On correct setting of the backstop to achieve 10mm overcentre the back-stop screws should be locked by use of the locking screws (item 81).
- (k) Check the microswitch for signs of damage, paying special attention to the screw fixings and the play of the switch. On operation of the plunger, the switch should make with about 1mm of free play left in the plunger. Should the switch be damaged in any way it must be replaced.

#### 4.6 DOOR SETTING PROCEDURE (Cont'd)

- (l) Refit microswitch, using 3mm socket c'sk head screws and Nomel washers. Set loosely at back of slots. Refit black bracket (Item 55) taking care to fit wedge to bracket.
- (m) Operate mechanism using the emergency release handle and manual opening, and reset the release handle. Observe the mechanism as it powers closed. Should the clevis (Item 34) twist such that it does not come in square against the stops, the mechanism needs adjusting by use of bracket (Item 39). If the top of the clevis hits the backstops first then the end of the mechanism must be lifted by raising bracket (Item 39). If the bottom hits first the bracket must be lowered. Continue adjustment until the clevis hits both back-stops together.
- (n) To set the torque on the doorshaft, first ensure that the air supply is at 6.5 bar. Release both locking screws (Item 72) and open the door. Tighten the torque adjustment screw (Item 93) clockwise until fully home. Close the door and note that the mechanism does not lock overcentre. Should the mechanism lock overcentre then decrease the shims (Item 11) such that the mechanism no longer locks overcentre; but in accordance with sections (c) and (d) above.

With the mechanism closed, but stalled short of its overcentre locked position, release the torque adjustment screw slowly until the overcentre position is just achieved. Release the screw a further four turns and secure both locking screws.

If insufficient adjustment is available on the torque adjustment screw, such that the mechanism bottoms against the bracket (Item 39), then add another shim (Item 11) at the cantrail and repeat this section.

- (o) Set the two cushioning screws on the rear of actuator (Item 32). The screw at the clevis end, for opening cushion, should be wound fully in, and then  $\frac{1}{4}$  turn back. The screw at the bracket end should be wound fully open. The screws are found in a recess on the back of the blue body of the actuator, adjacent to the air elbows. Check that when the door opens under power operation, a reduction in speed can be clearly observed before the end of stroke.
- (p) Reduce the operating pressure to 5 bar. Using power operation open and then close the door. If the door does not lock overcentre, further adjustment of the door as in section (e) is required to achieve correct alignment of the door. Should and adjustment be made, sections (e) - (h) should be carried out before repeating the closing test at 5 bar.
- (q) Reset the door operating pressure to 6.5 bar.
- (r) With the door in the fully closed position, set the microswitch (Item 98). Using a 0.3mm feeler gauge push the microswitch forward to achieve this clearance between the plunger and the clevis using the hole on the underside of the mechanism bracket (Item 9). When correctly set, the plunger should be fully home with 0.3mm feeler gauge separating it from the clevis. At this setting, tighten the screws and open and shut the door. Check that a 0.25mm feeler gauge will fit the gap but a 0.35mm feeler gauge will not enter. If these two conditions are not met, repeat operation (r) until they are satisfied.

#### 4.6 DOOR SETTING PROCEDURE (Cont'd)

- (s) By use of the exhaust chokes on the EP valve, fitted to the rail above the door mechanism, adjust the opening and closing speeds. The door should fully open in 5 to 6 seconds. On closing the door should close and lock overcentre in 10 seconds. On correct setting, tighten the choke lock-nuts.
- (t) Operate the door-open circuit but manually hold the door closed until all air is exhausted. Release the door. The 'slam' should be cushioned. If there is insufficient cushioning, slightly tighten the opening cushion screw, see operation (o), until sufficient cushioning is obtained.
- (u) With the door closed, check the operation of the emergency release handle. On operation, the wedge (item 57) should act on the locking arm (item 20) just after the position at which the air is equalised (audible slight hiss). By screwing item 58 into or out of the wedge, this position can be achieved.
- (v) Reset the emergency handle to normal operation.

#### 4.7 COMPLETION

When all the setting up stages of 4.6 (a) to (u) have been completed satisfactorily, the G.R.P. cover can be replaced. (Check that the emergency handle is set to normal).

The door function should then be checked by power opening and closing to ensure that the cover does not interfere with the operation of the mechanism.

5. FAULT FINDING

- |  |   |
|--|---|
| A. Door fails to open/close  | Check air supply<br>Check EP Valve  |
| B. Mechanism fails to lock when closing                                  | Check air supply pressure<br>Check for obstruction. If air pressure is correct and there is no obstruction mechanism may need resetting.                      |
| C. Slow or erratic door operation  | Check air supply pressure.<br>Check EP Valve is functioning correctly. Check airline for kinks or obstructions. Check for correct setting of speed adjustors. |
| D. Door opens or closes too fast or too slowly.                          | Check speed adjustors. Check air supply pressure.   |
| E. Operation of Emergency Release Mechanism fails to allow door to open. | Check spool valve operation.<br>Check adjustment of mechanism.  |

## 6. SERVICING/MAINTENANCE

### 6.1 RECOMMENDED MAINTENANCE

At 168 day intervals the following checks and maintenance should be carried out on the door equipment to ensure correct function.

- A. With air disconnected manually open and close door to check for free running. If stiff disconnect actuator. With mechanism now free from piston rod check for free movement of door. If doors are still stiff check bearings in bottom bearing assembly (Items 3, 4 and 5 of Figure 1) and bearings in bearing housing assembly (Item 14 of Figure 1). If doors are still stiff it is necessary to remove mechanism from vehicle and check all bearings and mating components. If the door is free when disconnected from actuator, remove actuator from car and examine. (See Section 7.1.B).
- B. If equipment moves freely when the air is disconnected, re-connect air supply and operate the door to ensure correct function.
- C. Where difficulty is experienced in achieving correct operating speeds or malfunctions of equipment are apparent, refer to fault finding instructions.
- D. With air supply connected check the operation of the equipment and firmness of the door sealing against the car. Refer to Installation and Setting instructions.
- E. Check tightness of all fixing screws. In particular fixings for the following components (Ref. fig. 1).

Door Mounting Brackets	Item 51, 49
Parallel Motion Arm Bracket	Item 53
Pivot Assembly	Item 42
Bottom Bearing Assembly	Item 1
Top Bracket	Item 10
Mechanism End Bracket	Item 39



SUMMARY OF SETTING INSTRUCTIONS

- (i) Set mechanism overcentre as described in Section 2.1 (a) to (j).
- (ii) Set switch position as described in Section 2.1 (k)
- (iii) Set torque on doorshaft as described in Section 4.6(n)
- (iv) Check operation of Emergency Release as described in Section 4.6(u)
- (v) Check clearance and position of door arms as described in Section 4.6(h)
- (vi) Check door speeds as described in Section 4.6(s)



## 7. OVERHAUL PROCEDURE

### 7.1 MECHANISM (See Figure 1).

At times of general overhaul (5 yearly intervals equivalent to approximately 200,000 cycles of the equipment), or when irregular or faulty operation necessitates, the door and mechanism should be removed from the vehicle and dismantled on the bench.

Removal of the door and mechanism is the reversal of the installation instructions in Section 2.2 of this manual.

#### A. Bottom Bearing Assembly.

Removal of the mechanism from the vehicle will leave the bottom bearing assembly in position. The thrust washer, bush and spherical bearing (Items 5, 4 and 3) can be removed, without disturbing the housing (Item 1), and inspected for signs of wear. If the bush (Item 4) or the thrust washer (Item 5) are worn or damaged check the mating surfaces at the bottom of the shaft assembly. If the spherical bearing (Item 3) is worn or damaged remove and inspect the housing (Item 1). Remove and check the scraper seal (Item 7) for wear or damage.

All worn or damaged components must be replaced.

#### B. Actuator.

The actuator (Item 32) can be removed either in situ in the vehicle when necessary or at the bench.

First slacken the locknut (Item 35) and unscrew the piston rod of the actuator from the clevis (Item 34), then slacken setscrew (Item 79) and remove pin (Item 30). The actuator, with the knuckle (Item 29) attached, can now be withdrawn.

Check the operation of the actuator by manual operation of the piston to ensure free movement over the full stroke of 140mm. Check for leaks by first connecting the air supply (7 bars) to the rear of the actuator then connecting the air supply to the front of the actuator.

Should an actuator prove to be faulty within one year of its supply it should be returned to PLC Peters Limited for inspection. Actuators becoming faulty beyond the initial one year period can be stripped down and worn or damaged components replaced. It is recommended that on re-assembly all seals should be replaced. A seal repair kit is available.

#### C. Locking Mechanism.

To inspect the bearings within the locking mechanism it will be necessary to dismantle the door mechanism.

To dismantle the mechanism first detach the actuator (Item 32) from the clevis (Item 34) as described in 7.1.B above. Then remove two countersunk screws (Item 68) that attach the bearing housing (Item 12) to the operating mechanism housing (Item 9). The shaft complete can

now be withdrawn from the operation mechanism housing. Remove screw (Item 70) and the roller assembly (Item 24, 25, 26 and 27) can be withdrawn. Remove circlip (Item 18) and the locking arm assembly (Item 20) can be withdrawn from the bearing housing assembly (Item 12) and the housing assembly (Item 16). Remove screw (Item 69) and washer (Item 22) and the housing assembly (Item 16) can be removed from the doorshaft. Remove capscrews (Item 78) and bearing cap (Item 13), the bearing housing assembly (Item 12) can now be removed from the top of the doorshaft (Item 8). Inspect all bearings and their mating surfaces for signs of wear and damage and replace if necessary. Check washers (Item 19 and 21) for signs of wear or damage and replace if necessary.

Assembly is the reversal of the above. Care should be taken in ensuring that the washers (Item 19 and 21) are positioned correctly.

D. Reaction Block.

Although the reaction block (Item 63) may be inspected in situ it is recommended that it is removed from the mechanism. This can be achieved by removing the two cap screws (Item 77). Slight wear in this component is allowable as extra shims (Item 64) may be used, when re-assembling, to ensure correct function. However in the case of excessive wear the reaction block should be discarded and replaced.

Refer to Installation and Setting instructions for resetting.

E. Wedge.

The wedge (Item 57) can also be inspected in situ, but, again, it is recommended that it is removed from the mechanism. First remove the split pin (Item 94) and washer (Item 89) then withdraw the clevis pin (Item 61). This allows the clevis assembly and wedge (Items 58 and 57) to be pushed clear of the lever (Item 60) and removed from the mechanism. Slight wear on the wedge is tolerable as adjustment can be made by slackening lock nut (Item 59) and repositioning clevis assembly. In the case of excessive wear or damage the wedge should be replaced.

Assembly is the reverse of the above using a new split pin (Item 94).

F. Rod Ends.

At the end of each doorshaft arm is a rod end (Item 40) and at either end of the parallel motion arm are two further rod ends (Item 44).

The rod ends (Item 40) can be inspected with the removal of the door. At any signs of wear, damage or lack of freedom of movement the rod end should be replaced. Securing the rod ends to the door mounting bracket, are two shoulder bolts (Item 46) which should also be inspected for wear or damage and replaced if necessary. When replacing these rod ends (Item 40) ensure that the radius from the centre line of the doorshaft to the centre line of the rod end bore is 450mm.

In order to inspect both rod ends (Item 44) it will be necessary to remove the parallel motion arm assembly from the vehicle. With the doorleaf already removed, slacken and remove nut (Item 82) and washers (Items 90 and 52) and withdraw parallel motion arm from pivot assembly (Item 42). Inspect the rod ends for wear, damage and lack of freedom of movement and replace if necessary. Inspect pivot assembly (Item 42) and shoulder bolt (Item 54) for wear or damage and replace if necessary.

## 7.2 Emergency Release Mechanism (See Figure 2)

It is assumed that the need to operate this mechanism during a 5 year (200,000 cycles) period will be very limited and a functional check on the operation of the mechanism should be all that is required.

However, should it be deemed necessary to inspect the mechanism during the 5 year overhaul, the bracket supporting the release mechanism must be removed from the vehicle.

First detach push rod (Item 65 of Figure 1) from the lever (Item 9) by removing the split pin and washer (Item 89 and 95 of Figure 1), then detach clevis of cable assembly (Item 16) from lever (Item 10), by removing the split pin, washer and clevis pin. The bracket, supporting the release mechanism, can now be removed from the vehicle.

Disassembly of the release mechanism is the reversal of the installation instructions outlined in section 3.2 of this manual.

Inspect all bearings and mating components for signs of wear or damage and replace if necessary. Inspect the cam (Item 13) and spool valve for wear or damage and replace if necessary.

Refer to section 3.2 for re-assembly and installation of emergency release mechanism.

## 7.3 Doorleaf (See Figure 3)

The doorleaf construction itself requires no overhaul other than replacement should severe damage be caused to the doorleaf in the event of an accident or vandalism.

The doorleaf seals (Items 14, 15, 16 and 17) should be inspected for signs of wear or damage and replaced if necessary. Seals (Items 15, 16 and 17) are bonded together and it may be necessary to replace all three should one be worn or damaged. To remove these seals first cut through at the joints between items 15 and 17 and items 15 and 16, this allows top seal (Item 15) to be slid out of the extrusion followed by the removal, in similar fashion, of the edge seals (Item 16 and 17). Replacement is the reversal of this process with the seals being cut to suit and bonded together using Loctite 415 as an adhesive. Should the bottom seal (Item 14) be worn or damaged, slide the seal from its extrusion and replace.

Should the window locks (Item 18 and 20), or their covers (Item 19 and 21) be worn or damaged they can be removed and replaced by removing two screws (Item 20).

8. ILLUSTRATED PARTS LIST

8.1 Door Mechanism

PARTS LIST - DOOR MECHANISM - AS ILLUSTRATED FIGURE 1

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
	047-132-A0	1	Door Mechanism	
1	047-065-A2	1	Housing - Bottom Brg	
2	047-183-A4	A/R	Shim	
3	047-066-A3	1	Bush - Spherical	
4	513-009-W	1	Bush - Bearing	
5	529-442-W	1	Thrust Washer	
6	554-805-07	3	Pin	
7	520-072-W	1	Scraper Seal	
8	047-067-A0	1	Doorshaft Assembly	
9	047-085-A0	1	Operating Mechanism Housing	
10	047-204-A2	1	Bracket	
11	047-179-A4	A/R	Shims	
12	047-099-A1	1	Bearing Housing Assy	This includes Items 13, 14, 15 and 78
13	047-105-A2	1	Cap - Bearing	For Illustration only These items are part of Item 12
14	047-101-A3	1	Bush Set	
15	513-050-W	3	Bush	
16	047-108-A2	1	Housing Assembly	
17	512-015-W	2	Spherical Bearing	
18	562-232-13	1	Circlip	
19	047-192-A4	1	Washer - Special	
20	047-110-A2	1	Arm Assy - Locking	
21	047-123-A4	1	Washer - Special	
22	047-116-A4	1	Washer - Special	
23	554-486-11	2	Spirol Pin	
24	047-117-A4	1	Washer - Special	
25	047-118-A4	1	Roller Assembly	
26	047-120-A4	1	Spacer	
27	047-121-A4	1	Washer - Special	
28	047-124-A2	1	Yoke	
29	047-125-A2	1	Knuckle	
30	047-126-A4	1	Pin	
31	047-127-A4	1	Pin	
32	506-015-W	1	Actuator	
33	047-182-A3	1	Trunnion	

PARTS LIST - DOOR MECHANISM - AS ILLUSTRATED FIGURE 1

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
34	047-128-A3	1	Clevis	
35	538-081-03	1	Locknut	
36	047-129-A3	1	Pin - Clevis	
37	047-130-A4	1	Washer - Special	
38	047-193-A4	1	Location - Washer	
39	047-131-A2	1	Bracket	
40	512-034-W	2	Rod End	
41	538-073-03	2	Locknut	
42	047-148-A4	1	Pivot Assembly	
43	047-151-A3	1	Arm - Parallel Motion	
44	512-035-W	2	Rod End	
45	538-071-03	2	Locknut	
46	047-156-A4	2	Bolt - Rod End	
47	047-194-A4	2	Flanged Bush	
48	047-157-A4	A/R	Shim	
49	047-152-A3	1	Bracket - Door Mtg	
50	047-159-A4	A/R	Shim	
51	047-197-A2	1	Bracket - Door Mtg	
52	047-158-A4	A/R	Shim	
53	047-154-A3	1	Bracket - Parallel Motion Arm	
54	047-155-A4	1	Bolt - Rod End	
55	047-143-A2	1	Bracket	
56	047-137-A3	1	Slide	
57	047-136-A3	1	Wedge	
58	047-140-A3	1	Clevis Block Assy	
59	538-069-03	1	Locknut	
60	047-141-A3	1	Link	
61	047-181-A4	1	Clevis Pin	
62	047-180-A4	1	Pivot Pin	
63	047-160-A4	1	Reaction Block	
64	047-161-A4	A/R	Shim	
65	047-135-A3	1	Push Rod	
66	542-551-07	4	Screw - Hex Head	
67	540-549-10	2	Screw - Hex Head	
67A	539-376-07	2	M8 Button Head	

PARTS LIST - DOOR MECHANISM - AS ILLUSTRATED FIGURE 1

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
68	541-076-10	2	Screw - C'sk Head	
69	541-012-10	1	Screw - Socket C'sk Head	
70	540-593-10	1	Screw - Socket Cap Hd	
71	541-058-10	2	Screw - Socket C'sk Head	
72	540-547-10	2	Screw - Hex Head	
73	542-536-07	4	Screw - Hex Head	
74	542-612-07	5	Screw - Socket Cap Hd	
75	541-038-10	4	Screw - Socket C'sk Head	
76	541-002-03	2	Screw - Socket C'sk Head	
77	540-592-10	2	Screw - Socket Cap Head	
78	540-629-10	2	Screw - Socket Cap Head	This item is part of Item 12
78A	529-254-W	2	Washer - Nome1 M8	
79	541-307-10	4	Setscrew - Cone Point	
80	541-393-10	2	Setscrew - Dog Point	
81	541-321-10	2	Setscrew - Cone Point	
82	538-223-07	2	Nut	
83	538-225-07	2	Nut	
84	529-222-07	4	Washer - Spring Form B	
85	529-192-10	4	Washer - Spring Form B	
86	529-006-03	1	Washer - Plain Form A	
87	529-009-03	4	Washer - Plain Form A	
88	529-221-07	5	Washer - Spring Form B	1 off
89	529-008-03	9	Washer - Plain Form A	1 off
90	529-052-07	2	Washer - Plain Form A	
91	529-054-02	2	Washer - Plain Form A	
92	529-460-03	10	Washer - Nome1	
93	539-100-10	1	Screw - Hex Head	
94	552-023-03	4	Pin - Split	
95	552-012-03	4	Pin - Split	
96	516-036-W	2	Elbow	
97	047-196-A3	1	Bracket Switch	
98	522-043-W	1	Switch	
99A	541-004-07	2	Screw - 3mm Soc C'sk Head	
100A	529-459-03	2	Washer - 4mm Nome1	
101A	042-225-A2	1	Rigid Support Strap	
102	541-001-10	2	Screw - Socket C'Sk Head	
103	047-122-A4	1	Washer - Special	
104	540-224-03	1	Screw - Hex Head	

PARTS LIST - DOOR MECHANISM - OPPOSITE HAND TO FIGURE 1

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
	047-133-A0	1	Door Mechanism	
1	047-065-A2	1	Housing - Bottom Brg	
2	047-183-A4	A/R	Shim	
3	047-066-A3	1	Bush - Spherical	
4	513-009-W	1	Bush - Bearing	
5	529-442-W	1	Thrust Washer	
6	554-805-07	3	Pin	
7	520-072-W	1	Scraper Seal	
8	047-068-A0	1	Doorshaft Assembly	
9	047-086-A0	1	Operating Mechanism Housing	
10	047-205-A2	1	Bracket	
11	047-179-A4	A/R	Shims	
12	047-100-A1	1	Bearing Housing Assy	This Includes Items 13, 14, 15 and 78 For Illustration only These items are part of Item 12
13	047-105-A2	1	Cap - Bearing	
14	047-101-A3	1	Bush Set	
15	513-050-W	3	Bush	
16	047-109-A2	1	Housing Assembly	
17	512-015-W	2	Spherical Bearing	
18	562-232-13	1	Circlip	
19	047-192-A4	1	Washer - Special	
20	047-111-A2	1	Arm Assy - Locking	
21	047-123-A4	1	Washer - Special	
22	047-116-A4	1	Washer - Special	
23	554-486-11	2	Spirol Pin	
24	047-117-A4	1	Washer - Special	
25	047-118-A4	1	Roller Assembly	
26	047-120-A4	1	Spacer	
27	047-121-A4	1	Washer - Special	
28	047-124-A2	1	Yoke	
29	047-125-A2	1	Knuckle	
30	047-126-A4	1	Pin	
31	047-127-A4	1	Pin	
32	506-015-W	1	Actuator	
33	047-182-A3	1	Trunnion	



PARTS LIST - DOOR MECHANISM - OPPOSITE HAND TO FIGURE 1

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
34	047-128-A3	1	Clevis	
35	538-081-03	1	Locknut	
36	047-129-A3	1	Pin - Clevis	
37	047-130-A4	1	Washer - Special	
38	047-193-A4	1	Location - Washer	
39	047-131-A2	1	Bracket	
40	512-034-W	2	Rod End	
41	538-073-03	2	Locknut	
42	047-148-A4	1	Pivot Assembly	
43	047-151-A3	1	Arm - Parallel Motion	
44	512-035-W	2	Rod End	
45	538-071-03	2	Locknut	
46	047-156-A4	2	Bolt - Rod End	
47	047-194-A4	2	Flanged Bush	
48	047-157-A4	A/R	Shim	
49	047-152-A3	1	Bracket - Door Mtg	
50	047-159-A4	A/R	Shim	
51	047-198-A2	1	Bracket - Door Mtg	
52	047-158-A4	A/R	Shim	
53	047-154-A3	1	Bracket - Parallel Motion Arm	
54	047-155-A4	1	Bolt - Rod End	
55	047-143-A2	1	Bracket	
56	047-137-A3	1	Slide	
57	047-136-A3	1	Wedge	
58	047-140-A3	1	Clevis Block Assy	
59	538-069-03	1	Locknut	
60	047-141-A3	1	Link	
61	047-181-A4	1	Clevis Pin	
62	047-180-A4	1	Pivot Pin	
63	047-160-A4	1	Reaction Block	
64	047-161-A4	A/R	Shim	
65	047-135-A3	1	Push Rod	
66	542-551-07	4	Screw - Hex Head	
67	540-549-10	2	Screw - Hex Head	
67A	539-376-07	2	M8 Button Head	

PARTS LIST - DOOR MECHANISM - OPPOSITE HAND TO FIGURE 1

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
68	541-076-10	2	Screw - C'sk Head	
69	541-012-10	1	Screw - Socket C'sk Head	
70	540-593-10	1	Screw - Socket Cap Hd	
71	541-058-10	2	Screw - Socket C'sk Head	
72	540-547-10	2	Screw - Hex Head	
73	542-536-07	4	Screw - Hex Head	
74	542-612-07	5	Screw - Socket Cap Hd	
75	541-038-10	4	Screw - Socket C'sk Head	
76	541-002-03	2	Screw - Socket C'sk Head	
77	540-592-10	2	Screw - Socket Cap Head	
78	540-629-10	2	Screw - Socket Cap Head	This item is part of ITEM 12
78A	529-254-W	2	Washer - Nome1 M8	
79	541-307-10	4	Setscrew - Cone Point	
80	541-393-10	2	Setscrew - Dog Point	
81	541-321-10	2	Setscrew - Cone Point	
82	538-223-07	2	Nut	
83	538-225-07	2	Nut	
84	529-222-07	4	Washer - Spring Form B	
85	529-192-10	4	Washer - Spring Form B	
86	529-006-03	1	Washer - Plain Form A	
87	529-009-03	4	Washer - Plain Form A	
88	529-221-07	5	Washer - Spring Form B	1 off
89	529-008-03	9	Washer - Plain Form A	1 off
90	529-052-07	2	Washer - Plain Form A	
91	529-054-02	2	Washer - Plain Form A	
92	529-460-03	10	Washer - Nome1	
93	539-100-10	1	Screw - Hex Head	
94	552-023-03	4	Pin - Split	
95	552-012-03	4	Pin - Split	
96	516-036-W	2	Elbow	
97	047-196-A3	1	Bracket Switch	
98	522-043-W	1	Switch	
99A	541-004-07	2	Screw - 3mm Soc C'sk Head	
100A	529-459-03	2	Washer - 4mm Nome1	
101A	047-225-A2	1	Rigid Support Strap	
102	541-001-10	2	Screw - Socket C'sk Head	
103	047-122-A4	1	Washer - Special	
104	540-224-03	1	Screw - Hex Head	

8.2

Release Mechanism

PARTS LIST - RELEASE MECHANISM - AS ILLUSTRATED FIGURE 2

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
1	047-166-A4	2	Gland	
2	513-001-W	2	Bush	
3	047-167-A4	2	Nut - Gland	
4	047-162-A2	1	Handle	
5	047-176-A4	1	Washer - Special	
6	047-163-A4	1	Lever Assembly	
7	513-016-W	2	Bush	
8	047-199-A4	1	Spindle	
9	047-169-A4	1	Lever	
10	047-170-A4	1	Lever Assembly	
11	513-026-W	1	Bush	
12	047-168-A4	1	Pivot Bush	
13	047-174-A4	1	Cam	
14	047-177-A4	1	Washer - Special	
15	047-175-A4	2	Bollard	
16	047-147-A3	1	Cable Assembly	
17	047-142-A2	1	Lever	
18	047-146-A4	1	Pivot Pin	
19	047-144-A4	1	Retaining Pin	
20	541-040-10	1	Screw - Socket C'sk Head	
21	540-512-10	1	Screw - Hex Head	
22	541-012-10	1	Screw - Socket C'sk Head	
23	529-026-03	1	Washer - Plain Form C	
24	529-176-10	1	Washer - Spring Type A	
25	538-068-03	1	Nut	
26	552-057-03	1	Pin - Split	
27	502-038-W	1	Spring	

PARTS LIST - RELEASE MECHANISM - OPPOSITE HAND TO FIGURE 2

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
1	047-166-A4	2	Gland	
2	513-001-W	2	Bush	
3	047-167-A4	2	Nut - Gland	
4	047-162-A2	1	Handle	
5	047-176-A4	1	Washer - Special	
6	047-163-A4	1	Lever Assembly	
7	513-016-W	2	Bush	
8	047-200-A4	1	Spindle	
9	047-169-A4	1	Lever	
10	047-170-A4	1	Lever Assembly	
11	513-026-W	1	Bush	
12	047-168-A4	1	Pivot Bush	
13	047-174-A4	1	Cam	
14	047-177-A4	1	Washer - Special	
15	047-175-A4	2	Bollard	
16	047-147-A3	1	Cable Assembly	
17	047-142-A2	1	Lever	
18	047-146-A4	1	Pivot Pin	
19	047-144-A4	1	Retaining Pin	
20	541-040-10	1	Screw - Socket C'sk Head	
21	540-512-10	1	Screw - Hex Head	
22	541-012-10	1	Screw - Socket C'sk Head	
23	529-026-03	1	Washer - Plain Form C	
24	529-176-10	1	Washer - Spring Type A	
25	538-068-03	1	Nut	
26	552-057-03	1	Pin - Split	
27	502-038-W	1	Spring	

8.3

Door Leaf

PARTS LIST - DOOR LEAF - AS ILLUSTRATED FIGURE 3

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
	047-001-AX	1	Doorleaf Complete	
1	047-005-AX	1	Doorleaf Assembly	This will be supplied with Melamine Panel 047-020-A0
2	047-029-A0	1	Window Unit	
3	047-034-A2	1	Window Retaining Strip	
4	047-038-A0	1	Boot	
5	047-022-A2	1	Capping Rail - Top	
6	047-027-A2	1	Capping Stile - Leading	
7	047-025-A0	1	Capping Stile - Trailing	
8	047-023-A0	1	Capping Rail - Bottom	
9	047-035-A4	13	Clamp Plate	
10	047-037-A4	1	Clamp Plate	
11	047-036	1	Clamp Plate	
12	047-040-A1	1	Bracket Assembly	
13	047-048-A3	4	Anchor Plate	
14	047-052-A3	1	Boot Seal	
15	047-050-A3	1	Top Seal	
16	047-049-A3	1	Trailing Seal	
17	047-051-A3	1	Nosing Seal	
18	533-004-W	1	Budget Lock	
19	047-030-A3	1	Cover	
20	533-005-W	1	Budget Lock	
21	047-031-A3	1	Cover	
22	540-899-03	4	Screw - Pan Hd Pozidrive	
23	542-986-07	15	Screw - Button Socket Hd	
24	542-985-07	8	Screw - Button Socket Hd	
25	529-050-07	8	Washer - Plain Form A	
26	529-220-07	8	Washer - Spring Type B	
27	542-985-07	12	Screw - Button Socket Hd	
28	526-031-W	A/R	Glazing Compound	
29	526-044-W	A/R	Sealant	

PARTS LIST - DOOR LEAF - OPPOSITE HAND TO FIGURE 3

ITEM NO	PLC PETERS LTD PART NO	QTY	DESCRIPTION	REMARKS
	047-002-AX	1	Doorleaf Complete	
1	047-006-AX	1	Doorleaf Assembly	This will be supplied with Melamine Panel 047-020-A0
2	047-029-A0	1	Window Unit	
3	047-034-A2	1	Window Retaining Strip	
4	047-039-A0	1	Boot	
5	047-022-A2	1	Capping Rail - Top	
6	047-027-A2	1	Capping Stile - Leading	
7	047-026-A0	1	Capping Stile - Trailing	
8	047-024-A0	1	Capping Rail - Bottom	
9	047-035-A4	13	Clamp Plate	
10	047-037-A4	1	Clamp Plate	
11	047-036	1	Clamp Plate	
12	047-041-A1	1	Bracket Assembly	
13	047-048-A3	4	Anchor Plate	
14	047-052-A3	1	Boot Seal	
15	047-050-A3	1	Top Seal	
16	047-049-A3	1	Trailing Seal	
17	047-051-A3	1	Nosing Seal	
18	533-004-W	1	Budget Lock	
19	047-030-A3	1	Cover	
20	533-005-W	1	Budget Lock	
21	047-031-A3	1	Cover	
22	540-899-03	4	Screw - Pan Hd Pozidrive	
23	542-986-07	15	Screw - Button Socket Hd	
24	542-985-07	8	Screw - Button Socket Hd	
25	529-050-07	8	Washer - Plain Form A	
26	529-220-07	8	Washer - Spring Type B	
27	542-985-07	12	Screw - Button Socket Hd	
28	526-031-W	A/R	Glazing Compound	
29	526-044-W	A/R	Sealant	