



(Minor changes to the previous edition are indicated by ◆ placed before the relevant paragraphs)

Contents	Page		
1. Scope	1	14. Packaging and shipping of completed units	17
2. Reference	1	15. Prescribed jigs and methods	18
3. Abbreviations and symbols	1	16. Jigs and gauges	18
4. Definitions	2	17. Equipment identification and documentation	18
5. Introduction	2	18. Record retention	19
6. Usage of item	3	Document history	19
7. Equipment design outline	3	Document index data	20
8. Applicability	4	Attachments	
9. Critical functions	5	1. References	21
10. Performance parameters	7	2. Illustrated parts list	22
11. Equipment configuration	7	3. Critical parameters and settings	42
12. General requirements	7	4. Specification hierarchy	43
13. Overhaul definition	8		

1. Scope

This Specification is written to comply with Engineering Standard 1-202 in defining the requirements for the overhaul of all variants of Chairlock Point Mechanisms which are used extensively in the signalling system on the London Underground.

The specification hierarchy which supports these requirements is detailed in Attachment 4 to the Specification.

2. Reference

The text of this document cites other documents that provide information or guidance. These are listed in attachment 1.

3. Abbreviations and symbols

The following abbreviations are used in this document (if from a published source this is indicated):

A	Ampere
AC	Alternating current;
CPS	Critical Parameter or Setting
CR	Criticality rating
°	Degree (plane angle)
DC	Direct current;
DCN	Design Change Notice
GE	Glass-enclosed
in.	Inch;



lb	Pound;
LH	Left-hand
LU	London Underground;
mm	Millimetre;
MΩ	Megohm, 1 MΩ = 1 × 10 ⁶ Ω;
Ω	Ohm;
OEM	Original Equipment Manufacturer;
p.s.i	Pounds per square inch
RH	Right-hand;
V	Volt;
WSL	Westinghouse Signal Limited

4. Definitions

The Client – The Client is the Infracore representative responsible for administering the contract under which the overhaul work is being performed.

The Contractor – The Contractor refers to the organisation responsible for the delivery of overhauled equipment.

5. Introduction

This specification has been written to detail the overhaul requirements of Chairlock Point Mechanisms which form part of the signalling system on the London Underground.

Chairlock Point Mechanisms are classified as items of vital signalling equipment which means that they are used to perform a safety critical function directly affecting the safe movement of trains. They have been designed to be an ultra reliable piece of equipment whose mechanical integrity will be relied on throughout its extended working life. It is a mandatory requirement that equipment that has been overhauled shall have a functional performance, a safety integrity, a reliability, an expected service life in its installed condition and a shelf life equivalent to that of a new item.

Any failure condition which causes a set of points to be free to move under the influence of a passing train or other forces, or to be detected other than in the true position in which they are, is classed as a 'wrong-side' failure. Wrong-side failures are investigated exhaustively to establish the cause of the failure. Investigations into wrong-side failures will examine materials, processes and the history of overhaul operations to establish the exact cause of the event and to ensure that no other items are likely to suffer a similar failure. An occurrence of a wrong-side failure, or a misoperation showing a tendency towards a wrong-side failure, even if no accident or damage is caused, can be extremely costly to investigate and could result in the need to change many units in service.

Items supplied for overhaul will be complete units which may be in working order or may have failed in service. The failure mode of equipments will vary, ranging from simple causes such as wear caused by a long period in service with frequent operation, to items which have suffered severe damage. In the latter case there will be an element of salvage involved in the overhaul process. The equipment will be supplied in an 'as found' condition after being removed from its working position on the railway.

Figure A below shows a Chairlock Unit. Figure B shows the associated LockArm.

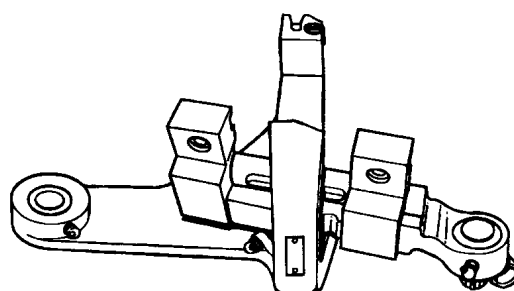
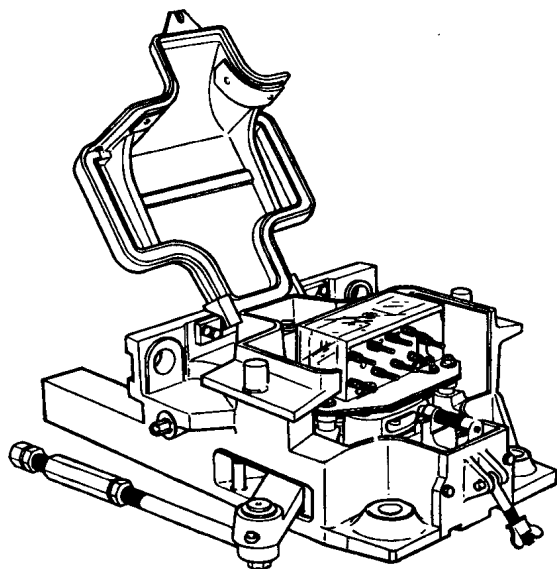


Figure A General view of Chairlock mechanism

Figure B General view of LockArm

The service life of this equipment is 15 years. The shelf life is 3 years.

6. Usage of item

The Chairlock Point Mechanism, hereafter referred to as 'a Chairlock', is a self-contained unit which contains locking and detecting components for a switch in a single unit. Associated with each Chairlock Unit is a LockArm and Switch Bracket Assembly, hereafter referred to as a 'LockArm'. Two of each unit are required to equip a set of points, one of each item for each switch.

Chairlock Units and LockArms are handed and are designated as Left Hand or Right Hand units to correspond to the side of the track to which they are fitted. Left and Right Hand is determined by viewing the layout from the tip of the switches and looking towards the turnout.

The Chairlock Unit has space internally to fit an independently controlled Ground Lock. Ground Locks are fitted to units used for facing passenger moves. Where no Ground Lock is fitted a Spring Return Unit is required in its place. The Ground Lock is not overhauled, it being a throw-away item, and is therefore not covered by this Specification.

7. Equipment design outline

Design features built into the Chairlock Mechanism include:-

- Construction that is designed to be ultra reliable in operation
- Construction designed to resist the considerable forces to which it will be subjected when moving and holding a set of points
- An ability to re-furbish the main wearing components without the need to scrap major items

A 9½ in. stroke by 5 in. diameter double acting air motor, fed with compressed air at nominally 60 p.s.i. is used to work a set of Chairlock points. The motor is mounted between extended sleepers, and in line with them, to provide a direct drive to the Drive Rod which links both switch tips.

The first part of the motor stroke unlocks the closed switch by swivelling the Lock Arm crank to move the lock head to a position where it can be withdrawn from the Chairlock Unit by a straight pull. The middle part of the stroke throws the points and closes the alternate switch. The final part of the stroke engages the lock head in the Chairlock Unit of closed switch.

In completing the stroke, the lock head engages with a spigot which drives one of two cams coupled to the Chairlock Controller. This cam will only be in the correct position to detect a closed switch if the lock head is in its fully home position. A second cam is operated by the switch detector rod attached to the Lock Arm and Switch Bracket Assembly. This cam will only be in its correct position if the switch tips are fully closed.

The Ground Lock, if fitted, engages with a cam follower which operates on the two previously described cams. The cam follower is only allowed to detect the cam positions if the Ground Lock is in its fully home position.

The Spring Return Unit, used when no Ground Lock is fitted, presses the cam follower onto the cams. Where a Ground Lock is fitted this only allows the cam follower to contact the cams when it is in a fully de-energized position.

The Indication Circuit Controller, generally referred to as the Chairlock Controller, is a self contained unit used to detect the status of the point switch. It behaves electrically as four independent circuits, two of which close when the point switch is detected in the closed position and the other two close when the point switch is detected in the open position.

The Chairlock Controller may also be supplied as a separate item under its own part number given in section 8 below.

Chairlock Units supplied under their own part number include a Controller as part of the unit.

Ground Locks and Spring Return Units are only supplied separately under their own part numbers.

8. Applicability

This specification applies to the following items.

Item	Stores List No.
Chairlock Unit, LH	317S133
Chairlock Unit, RH	317S132
Spring Return Unit, LH	26S55
Spring Return Unit, RH	26S54
Chairlock Lock Arm, LH	12S169
Chairlock Lock Arm, RH	12S170
Chairlock Controller, LH	14S29
Chairlock Controller, RH	14S30

The Illustrated Parts List and accompanying figures, Attachment 2 to this document, forms part of this specification.



9. Critical functions

Critical Functions of Chairlock Point Mechanisms are defined to be:-

Ultra-reliable Operation: The equipment has been designed to be a highly reliable item which will work in a hostile environment where it is mounted on the track-bed and therefore subject to high levels of vibration.

High Structural Integrity of structural elements of the mechanism: Considerable force (in excess of 1000 lbs.) will be exerted on the Lock Arm by the Air Motor driving the layout. It is imperative that the structural integrity is maintained under all circumstances to ensure that 'drive' is applied to the switch tips at all times. Any failure which allows free movement of the mechanism will be considered a wrong-side failure.

High Structural Integrity of Lock Arm and Switch Bracket Assembly: The Lock Arm is used to transmit the drive force from the air motor into the switch. It is also used to clamp the closed switch shut. Once detected to be in position the switch rail is assumed to be locked shut. Any structural failure of the Lock Arm or its attachment to the mechanism will be treated as a wrong-side failure.

Highly reliable detection of the switch, lock and Ground Lock positions: The Controller has been designed to provide ultra high integrity and reliability in detecting the position of the points. The mechanical arrangement of the cams and Ground Lock allow the status of the switch detection, lock and Ground Lock to be detected by a single Controller.

Electrical Safety. Satisfactory earthing and bonding of the Chairlock mechanism is crucial to ensure that leakage paths to the case or other extraneous metalwork in the event of faults do not give rise to electric shock hazards or to a loss of vital system integrity.

The ability of the item to meet the critical functions listed above throughout its life depends on many factors, not all of which are immediately obvious to people not familiar with all aspects of the design, overhaul and use of the equipment. To ensure that the significance of certain of the detailed requirements is understood and complied with, a number of Critical Parameters or Settings have been designated throughout the text.

Attachment 3 to this Specification lists all the Critical Parameters or Settings [CPS], a reference to the section from which the requirement originates and provides a Criticality Rating of the importance of each CPS item.

The Criticality Rating is based on the severity of the consequence if there is a deviation of the subject parameter from the value specified. Numerical values have been assigned to various levels of the Criticality Rating (CR) according to the following table.



Criticality Rating (CR)	SAFETY RELATED CRITERIA	RELIABILITY RELATED CRITERIA
10	Life critical – sole dependence Occurrence of this deviation alone may lead to an incident causing death or injury.	
8	Life critical – shared dependence Occurrence of this deviation, together with a second deviation which is potentially latent (i.e. not self announcing), may lead to an incident causing death or injury.	
7	Life critical – contributory Occurrence of this deviation increases the probability of an event which may lead to an incident causing death or injury.	Service critical – sole dependence Occurrence of this deviation alone may lead directly to an incident causing major service delays, and indirectly to the danger of a life threatening incident through enforced use of manual rules for operating the railway.
6		Service critical – shared dependence Occurrence of this deviation, together with a second deviation which is potentially latent (i.e. not self-announcing), may lead directly to an incident causing major service delays, and indirectly to the danger of a life threatening incident through enforced use of manual rules for operating the railway.
5		Service critical – contributory Occurrence of this deviation increases the probability of an event which may lead to major service delays, and indirectly to the danger of a life threatening incident through enforced use of manual rules for operating the railway.
1	Not life critical	Not service critical

The criticality rating provides a scale of the importance of achieving the specified parameter and therefore of the care needed in designing the process or processes that will lead to the parameter being achieved. The design of the process or processes that will lead to the parameter being met are the responsibility of the Contractor and they shall be designed and documented in accordance with the requirements of Engineering Standard 1-202, Signalling equipment overhaul.

10. Performance parameters

Performance parameters applicable to the Chairlock Point Mechanism are defined and quantified below.

10.1 Contact resistance

This section is applicable to the Switch Detection Unit Assemblies (item 1-23a/b)

Contact resistance shall be measured by a volt-drop method made with a current of 0.100 A derived from a 100 V AC source flowing through the circuit. The measurement shall be made at the item terminals. It is recognised that this method will therefore include an element of resistance contributed by the item wiring.

The maximum resistance of each circuit shall be 0.05 Ω .

10.2 Insulation resistance

This section is applicable to the Switch Detection Unit Assemblies (item 1-23a/b).

The Insulation Resistance between all terminals of the item connected together and any other metal part of the item shall be greater than 10 M Ω when measured at 500 V DC

The Insulation Resistance between a terminal and any other unconnected terminal of the item shall be greater than 10 M Ω when measured at 500 V DC.

11. Equipment configuration

An Illustrated Parts List, Attachment 2 to this document, comprising an itemised list and five exploded component drawings, is provided to describe the equipment as identified in Section 8 of this specification. The Illustrated Parts List contains all relevant drawing numbers.

A convention of using the figure number followed by the item number has been adopted in this document to uniquely refer to specific components where necessary. Thus, item 1-3 is the Cover.

The Lock Arm, Spring Return Unit and the Controller may be supplied as individual separate items. Each item shall be overhauled to the relevant sections of this specification.

Unless specifically noted, drawings and figures used in this Specification are for reference only.

12. General requirements

12.1 Compliance with specification

No departures from the requirements of this Specification shall be permitted (either permanently or temporarily) without compliance with the relevant change control procedures.

Neither equivalence of process nor substitution of materials shall be recognised by the Client in receiving work performed against this specification. The Client shall have the immutable expectation that equipment overhauled to this version of the specification shall be 100 % compliant with the specification herein.

12.2 Workshop environment

There are no special conditions required of the workshop environment.

Calibrated test equipment shall be used to carry out all measurements specified.

Each Chairlock Unit overhauled is required to be operated on a test rig which simulates the track conditions of a complete point layout.

A supply of compressed air regulated over the range 30 – 60 p.s.i. is required. The air consumption is minimal.

12.3 Calibre of staff

Any staff involved in the overhaul process shall be competent in the tasks they carry out and the overhauling contractor shall demonstrate this in accordance with the requirements of Engineering Standard 1-203, Competence of personnel working on signal and control systems.

12.4 Operator accountability

Process control documentation is required to be completed by identified certified (stamp-holding) operators and inspectors throughout the overhaul process. Each certified operator and inspector shall possess a uniquely numbered stamp which is traceable to the owner. Only competent operators shall be provided with a stamp. Records of the issue and withdrawal (if appropriate) of every stamp shall be kept and shall be made available to the Client on request. The retention period of these records is required to be indefinite.

13. Overhaul definition

13.1 Full overhaul

A full overhaul will be performed on items which generally will have been in service for their full routine service life or which will have been removed from service as a result of a failure.

No item returned after failing in service shall be overhauled until the failure report has been reviewed and accepted by the Client in accordance with a defined arrangement agreed with the Client.

Unless stated to the contrary, all processes detailed in this specification shall be performed for each overhaul.

13.1.1 Dismantle

The mechanism shall be dismantled in a manner that shall not damage or shorten the life of any component that is required to be re-used. The life of all recyclable components is indefinite.

The items listed below shall be discarded and replaced with new items at every overhaul.

Locking Plates (all)	Asset Plates and fixings	Self Locking Nuts (all)
Lubricating Nipples (all)	Split Taper Pins (all)	Split Pins (all)
Cover Insulating Components (1-5, 6 and 7)	► ◄ Bearing Bushes (2-41, 50a, 70, 75, 3-102)	► ◄ Thrust Washers (2-37, 50, 69, 3-101)
Cover Gasket (1-4)	Insulation Collar (1-25)	Insulation Bush (1-26)
Oil Wick (3-92)	Detector Arm Pin (3-98)	Lock Nut (4-116)
Locking Tab (4-117)	Lock Arm Pin (4-118)	Woodruff Key (4-119)
Copper Seating Washers (all)	Interconnecting Wiring and Sleeving (5-7 and 7a)	Termination Strips (5-10, 11, 26, 27 and 28)
Centralizing Pins (5-23)		

WARNING: Earlier non-metallic versions of items prefaced with the symbol '► ◄' in the table above were made of FEROBESTOS material which contains asbestos and are therefore subject to the appropriate handling and disposal procedures.

Switch Detector Arms (item 3-103) with holes for round cotter pins shall be discarded and replaced with items to the current design.



Detector Mounting Stud(1-27), Shoulder Pin (2-44), Lock Cam Shaft (2-48), Lock Cam Operating Pin (2-49), Bearing Bushes (2-56 and 2-57), Thrust Stud (2-58), Pin (2-59), Controller Operating Arm Pivot (2-63), Operating Pin (3-100), Switch Detector Arm Bush (3-104), Stop Pin (3-114), Lock Arm Bearing Bush (4-121), Lock Arm Drive Bearing Bush (4-122), Detector Arm Bearing Bush (4-130) and any associated fixings need not be removed from their host components until determined necessary after examination.

The Lock Arm Crank (item 4-120a/b/c/d/e/f) and its mating Switch Connection Bracket (item 4-129a/b) shall be kept together as a matching set.

13.1.2 Cleaning

The following shall be implemented after the unit has been dismantled in accordance with Section 13.1.1 above.

All components shall be cleaned and degreased using a technique suitable for that component. A 'suitable technique' shall not cause short term or long term degradation to the component nor shall any solvent used leave undesirable residues on the component which will affect the performance of the component when it forms part of an overhauled unit.

13.1.3 Examination and gauging

All components shall be examined for the effects of excessive or unusual wear, general damage, damage caused by misuse or age, electrical arcing or tracking or overheating. All thread forms shall be checked for signs of over-tightening. Items exhibiting damage that will not be corrected by the specified re-furbishing processes shall be discarded.

All occurrences of excessive or unusual wear or damage shall be catalogued and reported to the Client. Signs of electrical tracking or arcing shall be treated as excessive wear.

The subject items of such reports and as much of the unit from which they were removed as possible, shall be saved in their as near as original condition after being discovered and shall be clearly tagged and identified and shall be made available for Client inspection if so desired.

It is critical that **only** those components specified for refurbishment should be reclaimed after failing the wear tolerances specified.

Items not meeting the examination criteria shall be discarded if there is no refurbishment process detailed for it in this Specification.

Major components and items with specific examination criteria are listed below.

All component parts set aside for use at assembly shall be to an approved design. Modification schemes may have been commenced which may not yet have been fully implemented. Units submitted for overhaul may not be to the current build standard. Some components may therefore require to be modified or discarded.

13.1.3.1 Base casting (Item 1-2a/b)

After dressing the top surface of the slide arm to be free of burrs and other defects and to be parallel with the bottom datum face of the casting, the thickness of the slide arm shall be measured. The minimum acceptable thickness is 2.219 in. Items not meeting the minimum thickness shall be refurbished as detailed in section 13.1.4.1.

13.1.3.2 Switch detector cam assembly (Items 2-43a/b and 2-44)

The Shoulder Pin shall be securely attached to the Cam. A new Pin shall be fitted if necessary after checking manufacturing dimensions of the Cam bore and the new Pin diameter.

The minimum acceptable diameter of the Shoulder Pin is 0.620 in. The surface finish shall be free of scratching and blemishes.



The minimum acceptable thickness of the cam slot is 0.335 in. The maximum acceptable width of the cam slot is 0.754 in. The minimum acceptable radii of the three cam segments are 4.105 in. 4.195 in. and 4.285 in. The cam face shall not be scored or otherwise damaged.

13.1.3.3 Detector cam slide (Item 2-45)

The maximum acceptable width of each cam slide groove is 0.390 in. The minimum acceptable width across cam slide faces is 0.746 in. The maximum acceptable diameter of the bore is 0.5045 in.

13.1.3.4 Lock cam assembly (Items 2-46a/b)

The Lock Cam Shaft (item 2-48) and the Operating Pin (item 2-49) shall both be securely attached to the Lock Cam. A new item shall be fitted as necessary after first checking the manufacturing dimension of the relevant bore before fitting a new Shaft or Pin.

The minimum acceptable diameter of the Shaft is 0.620 in. The minimum acceptable diameter of the Operating Pin is 0.495 in. The minimum acceptable radii of the cam segments are 5.105 in. and 5.195 in. The cam face shall not be scored or otherwise damaged.

13.1.3.5 Circuit controller operating arm assembly (Item 2-51a/b)

The Operating Arm Pivot (item 2-63) shall be free from scratches, burrs or other defects and shall be securely fitted to the Operating Arm (item 2-52a/b). The minimum acceptable diameter of the shaft is 0.495 in.

The Roller Shaft (item 2-60) shall be free from scratches, burrs or other defects. The minimum acceptable diameter of the shaft is 0.308 in.

The outer surface of the Roller (item 2-61) shall not have any flats worn into it. The bore shall be unscored. The minimum acceptable diameter of the Roller is 0.560 in. The maximum acceptable diameter of the bore is 0.3155 in.

The maximum acceptable depth of the flat on the Pin (item 2-59) is 0.080 in. The protruding end of the Pin shall be free of burrs and other damage. The minimum acceptable thickness of the end of the Pin is 0.340 in.

The Thrust Stud (item 2-58) shall be securely attached to the Operating Arm. The face shall be free of burrs and other damage. Bruising of the operating face to a maximum depth of 0.010 in. is acceptable, otherwise the Stud shall be replaced.

The minimum acceptable diameter of the Pivot Pin (item 2-54) on the bearing portion of the item is 0.245 in.

The maximum acceptable diameter of the Bearing Bushes (items 2-56 and 2-57) is 0.2530 in. Worn bearings shall be replaced with new.

The minimum acceptable diameter of the Drive Pin (item 2-54) is 0.245 in.

13.1.3.6 Catch and catch bolt (Items 2-73 and 2-74a/b)

The minimum acceptable diameter of the bearing portion of the Catch Bolt is 0.370 in.

The maximum acceptable diameter of the Bearing Bush (item 2-75) in the Catch is 0.378 in.

The latching notch in the Catch shall be free of burrs and other damage. The profile of the latching notch shall be checked against the manufacturing dimensions.

13.1.3.7 Switch detector arm bush (Item 3-104)

The maximum acceptable diameter of the Switch Detector Arm Bush is 0.7540 in.



13.1.3.8 Detector rod connector pin (Item 3-108)

The minimum acceptable diameter of the bearing portion of the Connector Pin is 0.745 in.

13.1.3.9 Switch detector crank assembly (Items 3-99 and 3-100)

The bearing surface of the Crank Assembly shall be free from scratches, burrs or other defects. The cotter seating groove shall be free of burrs and other damage.

The minimum acceptable diameter of the shaft at the bearing areas is 0.995 in.

The Operating Pin (item 3-100) shall be securely attached to the Detector Crank. The minimum acceptable diameter of the Operating Pin is 0.4952 in.

13.1.3.10 Seating block (Item 3-95)

Before an examination is made, the item shall be dressed to a rounded profile approximating the original shape to remove any ridge that may have been worn into the seating surface.

The minimum acceptable thickness of the seating pad is 0.490 in.

13.1.3.11 Lock arm crank (Item 4-120a/b/c/d/e/f)

Several changes to the design of the Lock Arm Crank have been made during the life of the equipment. Two **required** modifications are thought to have already been fully implemented. These concern the fitting of a web between the Drive Arm section and the Lock Arm section of the casting on early versions where this feature was not part of the original casting. Additionally, early versions were modified to use the current, larger, size of Pin (item 4-118) and associated bearing. Provided that the above modifications have been implemented, all versions of the Lock Arm Crank are acceptable for re-use if all the examination criteria are met. Any items not already modified as above shall be scrapped. All new items shall be to the drawing identified in the parts list.

As part of every overhaul, each Crank shall be tested for the presence of cracking particularly in the area of the main bearing boss, the switch bracket support arm and the Lock Head. The tests shall comprise a Magnetic Particle Test and an X-ray Test able to detect the presence of cracking in the areas designated for testing. A test certificate shall be provided for each Lock Arm Crank tested. The test certificate shall be uniquely traceable back to the individual component which was the subject of the test. No cracking is acceptable in the test areas previously defined.

The geometry of the Crank shall be checked. The angle between the centre-line of the Drive Rod Bearing and the Lock Arm Bearing and the centre-line of the Lock Arm Bearing and the lock head shall be $90 \pm 1^\circ$. The measurement may be taken using the cam operating pin recess in the lock head as a reference if the difference of 0.125 in. in centre-lines of the recess and the arm is taken into account. The vertical alignment of the lock head arm shall be checked using the top machined face of the Lock Arm Bearing bore as the datum. The bottom face of the lock head shall be 2.250 in. $\pm$ 0.030 in. below the datum.

13.1.3.12 Lock arm bearing bush (Item 4-121)

The bearing bush shall be securely fitted in its housing and shall have an unscored bearing surface.

The maximum acceptable diameter of the Lock Arm Bearing Bush is 1.5637 in.

13.1.3.13 Lock arm drive bearing bush (Item 4-122)

The bearing bush shall be securely fitted in its housing and shall have an unscored bearing surface.

The maximum acceptable diameter of the Drive Bearing Bush is 1.004 in.



13.1.3.14. Roller screw (Item 4-127)

The minimum acceptable diameter of the bearing section of the Roller Screw is 0.373 in. The surface shall be unscored and free from other defects.

13.1.3.15 Lock arm roller (Item 4-128)

The minimum acceptable diameter of the Lock Arm Roller is 0.744 in. The maximum acceptable diameter of the bore is 0.393 in.

13.1.3.16 Switch connection bracket (Item 4-129a/b)

The minimum acceptable thickness of the casting 0.975 in. Switch Connection Brackets worn below this to be reclaimed in accordance with drawings EES-A2-122011 and EES-A1-121981.

13.1.3.17 Detector arm bearing bush (Item 4-130)

The bearing bush shall be securely fitted in its housing and shall have an unscored bearing surface.

The maximum acceptable diameter of the Detector Arm Bearing Bush is 0.754 in.

13.1.3.18 Detector rod connection pin (Item 4-136)

The bearing surface of the Pin shall be unscored and free from other defects. The minimum acceptable diameter of the bearing portion of the Pin is 0.745 in.

13.1.3.19 Cover (Item 5-2)

Cracked, crazed or incomplete items shall be discarded.

Two patterns of Cover are in circulation, the original being fabricated from three pieces of Perspex, the latest design being a single piece bent into shape and not sealed at the edges. Both types are acceptable for re-use, subject to condition, as below.

The integrity of the welded joints shall be checked. Failing joints may be re-made in their entirety; otherwise the item shall be discarded.

13.1.3.20 Bearing bush (Item 5-5)

The maximum acceptable diameter of the bearing is 0.503 in.

13.1.3.21 Front and back terminal blocks (Items 5-9a/b and 5-25a/b/c/d)

The mouldings shall be checked for signs of cracking and electrical tracking or arcing.

13.1.3.22 Contact stud assemblies (Items 5-13 and 5-29)

The Contact Faces (5-13b and 5-29b) shall be firmly attached to their holders.

Contact Faces exhibiting light pitting caused by electrical erosion may be re-furbished as detailed below (see section 13.1.4.3). Contact Stud Assemblies which are deeply eroded shall be discarded. The minimum acceptable height of the body of the assembly (after re-furbishing) is 0.432 in.

13.1.3.23 Contact holder (Item 5-37)

The moulding shall be checked for signs of cracking, particularly on and around the operating arm and the hole for the drive pin. The moulding shall be checked for signs of electrical tracking or arcing.

The minimum acceptable diameter of the moulded bearing pins is 0.493 in.

The maximum acceptable diameter of the hole in the operating arm is 0.253 in.



13.1.3.24 Contact spring assembly (Items 5-40a/b/c)

The Contact Tips (items 5-40b) shall be firmly attached to the Contact Spring (item 5-40a) in accordance with drawing A58763/1. They shall be free from pitting caused by electrical erosion. The minimum acceptable length of the Contact Tip is 0.312 in.

13.1.4 Refurbishment

13.1.4.1 Base casting (Item 1-2a/b)

Previously unmodified Base Castings with slide arms worn below the acceptable minimum may be refurbished in accordance with drawing 6140-A1-106425.

Castings already modified may be fitted with a new wear plate in accordance with drawing 6140-A1-106425.

13.1.4.2 Lock arm crank and switch connection bracket (Items 4-120a/b and 4-129a/b)

Switch Connection Brackets which are below the 0.975 in. minimum thickness around the central bore shall be refurbished in accordance with drawings EES-A2-122011 & EES-A1-121981.

Lock Arm Cranks with lock faces deemed acceptable for refurbishment shall be reclaimed in accordance with drawings EES-A2-122011 & EES-A1-121982.

Switch Connection Brackets with rail clamping faces deemed acceptable for refurbishment shall be reclaimed in accordance with drawings EES-A2-122011 & EES-A1-121981.

◆ Note: Wherever possible the Switch Connection Bracket and its mating Lock Arm Crank shall be kept together as a pair for reclamation.

13.1.4.3 Contact stud assemblies (Items 5-13 and 5-29)

The Contact Face of Contact Stud Assemblies may be re-furbished to remove pitting caused by electrical erosion. The face shall be cleaned with 400 grit Emery paper to remove light pitting only. The minimum acceptable height of the body of the assembly is 0.432 in.

13.1.4.4 Contact spring assembly (Items 5-40)

The Contact Tips (items 5-40b) may be dressed with 400 grit Emery paper to restore an unpitted surface finish to the Tip. The original end radius of the Tip ($\frac{3}{32}$ in.) shall be maintained. The minimum acceptable length of the Tip is 0.312 in. Tips which cannot be dressed shall be replaced with new.

13.1.4.5 Paint finishes

Studs, threads on components, threaded holes and bearing bores shall be protected from paint application.

All un-machined surfaces of the Cover (item 1-3) and the Base Casting (item 1-2a/b) shall be spray painted all over. Paint application for these components shall be a base coat of Red Oxide Primer (manufacturer-Hadfields, reference 1313.006) – LU Part No. 17412/429, followed by a top coat of General Purpose Aluminium Paint to LT Specification 174-27 – LU Part No. 17450/225.

Un-machined surfaces of the following components shall be hand-painted with one coat of General Purpose Aluminium Paint to LT Specification 174-27 – LU Part No. 17450/225 :- Cam Bearing Block (item 2-40a/b), Switch Detector Cam (item 2-43a/b), Lock Cam (item 2-47a/b), Switch Detector Crank (item 3-99), Switch Detector Arm (item 3-103), Detector Rod (item 3-111), Sleeve Nut (item 3-113), Lock Arm Crank (item 4-120a/b), Switch Connection Bracket (item 4-129a/b).

For Base Castings that have been fitted with 'oilite' sintered bronze bushes, after aluminium spray painting the casting as specified above, paint a blue stripe 75 mm wide on both sides of the casting.