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About this document ...

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Content approval

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Issue 7	15-Sep-2004	Clive Owens	Upissued due to change of Author/Approver
Issue 6	19-Oct-2001	R.C.M. Springett	Up-issue + EDRS format

Table of Content

1 *Introduction*

This document covers the types of terminating equipment approved for providing service to the customers' premises via overhead distribution and the work practices associated with their use. For audit purposes, ISIS NWK/NNS/V009 should be read in conjunction with this document.

The instruction describes the method of fitting Above ground dropwire closures, Block Terminals (BT) 66B/71A and Modular Box Connections (BC) 18A/19A to poles, siting and fixing the feed cable to the pole, and running and terminating overhead dropwires from the head of an overhead distribution pole to Block Terminals 40/66B/76/86 series and Modular BCs. The wiring management of BTs and BCs is also covered, as is lightning protection.

2 *General*

Block Terminals (BT) Box Connections (BC) and Above ground dropwire closures are used to provide a Distribution Point (DP), cross connection interface for either Underground (U/G) or Overhead (O/H) distribution network feed cables to customer's premises via overhead dropwires, or by running cables on external walls.

2.1 Current Products

The BC20 (i/c 091084) is a new style OH DP that accommodates two green tool less PCP connectors (i/c 083035) and up o 20 dropwires.

For information on the BC20 please see link below.

AEI/BPG/G008 - Installation of Box Connection 20

2.1.1 Box Connection 18 / 19 Lids

If a lid is missing or damaged, spare lids can be obtained from the Stores Catalogue.

Item Code – 051928 Spare lid for Box Connection 18

Item Code – 051932 Spare lid for Box Connection 19

2.1.2 Modules

External Connection Modules 1A or 1B provide the connection between the incoming and distribution pairs. Each module uses insulation displacement connectors (IDC) to terminate the pairs. The 1A modules allow an incoming pair (copper or aluminium) of 0.4-0.9 mm conductor diameter to be terminated as a one shot action, *the 1B module allows retermination and has a finger*

action for termination of the fixed pair. The module is designed to terminate Dropwires 10, 12, and 6 + Cable Aerial Dropwiring 55 metre (CAD55m); the dropwire connectors however allow retermination, in any combination, of these dropwires. The IDC connections are grease or gel filled so that moisture penetration is impossible.

Note: For other dropwire combinations see section 8.3.

There is space on the module so that a submodule such as a link module (EPM 1A) or a protector (EPM 2B) can be fitted. Fitting of any sub module connects the dropwire side of the module to the exchange side of the module. This facility plus an earth pick-up point means that three or five point devices can be inserted into the line. Testing can be carried out across a pair by plugging into the top of a submodule, and if either way testing is required, by removing any submodule fitted and using the grease or gel filled connector that it plugs into.

2.1.2.1 Link Modules

External Protector Modules 1A allow testing to be carried out by inserting probes into the top of the link module. Either way testing is described under 'Modules'.

2.1.2.2 Protectors 2B

This protector is a sophisticated five pin device incorporating a GDT and electronic switches so that it is quite fast to operate on fault conditions. The protector is similar to other devices which will be used in the network and will be to the standard required in the Lightning Protection Handbook. The testing facilities are similar to the dummy module described above.

2.1.3 Block Terminal 71A

This is an external BT for accommodating up to 20 dropwires. It is used within hollow poles as an interface to connect dropwires to the underground cable feed. The dropwire is connected to the cable by means of connector dropwire or connector wire insulated series connectors and all types of dropwire can be accommodated.

2.1.4 Block Terminal 66B

This is an external BT able to accommodate up to five dropwires. It is used for distribution at customer's entry points and as a connection point for dropwires. There are no inserts fitted in the box. These are to be made using connector dropwire or connector wire insulated series connectors.

The box is made of plastic and has a slide on lid locked with a screw. When the lid is removed there are holes in the base for incoming cables and a moveable cable clamp to secure a cable of up to 12 mm diameter. In the back of the box are holes for screws to secure the box to a suitable surface

and a knockout hole for direct entry to a dwelling when an access pipe has been provided.

2.1.5 Above Ground Drop Wire Closure

The above ground drop wire closure is for use at joints in the drop wire at customer premises and at other places where a Box connection 16A would have been used.

The use of the closure re-instates the integrity of the drop wire whereas the BC16A is an open box which allows moisture into the drop wire which can "wick" along the draw cord and subsequently into the NTE where it can cause faults.

2.2 Obsolescent Products

2.2.1 Mounting Block Terminals 1A & 2A (MTB)

The MTB 1A is now obsolete and the 2A is obsolescent they are replaced by use of the BC20.

2.2.2 Modular Box Connections 18A & 19A

Modular Box Connections consist of a box connection 18A or 19A, up to 20 External Connection Modules 1Aor 1B (ECM 1s), External Protector Modules 1A (EPM 1A), and if high voltage protection is required External Protector Modules 2A (EPM 2A).

2.2.3 Box Connection 18A

The BC 18A is a vented enclosure capable of accepting up to 20 modules, 4 incoming cables, an earth connection and 20 dropwires. The single pair modules can be fitted on to either of two metal rails permanently mounted in the box. Provision is made for dropwire and cable management. The box is fitted with enhanced security features which can be utilised if required.

2.2.4 Box Connection 19A

The BC 19A is a vented enclosure capable of accepting up to 10 modules, 2 incoming cables, an earth connection and 10 dropwires. The single pair modules can be fitted on to either of two metal rails permanently mounted in the box. Provision is made for dropwire and cable management. The box is fitted with enhanced security features which can be utilised if required.

2.2.5 Upgrade Kit

If lightning protection is required in either a BC18 or BC19 an upgrade kit needs to be fitted, these consist of high grade metal rails and the earthing strips, which enable the earth wire to be connected to the box.

Item Code 051899 – Upgrade kit for low cost Box Connection 18

Item Code 051926 – Upgrade kit for low cost Box Connection 19

2.2.6 Block Terminals 76/86 Series

BTs 76 and 86 are equipped with fully enclosed insulation displacement connection (IDC) terminations, removing the need to strip insulation from the conductor prior to terminating it under most conditions. The BT 76 is a 20 pair block and the BT 86 is a 10 pair block. They are suitable for use with most insulated dropwires, that is DW 3, 4, 5, 6, 7, 8, 10, CAD55m currently existing in the BT overhead network. If other dropwires are encountered, they should be renewed with current modern dropwire as appropriate.

2.2.7 Block Terminals 40 Series

BTs 41, 41A and 42 are equipped with open screw type terminations. The screws are designed with a pointed end which penetrates the insulation on termination of all dropwires (DW) except for 8, where the insulation will not fit in the connector, and 10, 11, 12, 15 & CAD55m, where the conductor needs to be stripped and doubled prior to termination. They are suitable for use with all dropwires. They are, however, prone to corrosion which can result in a high fault liability.

2.2.8 Block Terminal 66A

This is an external BT able to accommodate up to five dropwires using open screw type inserts. It is used for distribution at customer's entry points and as a connection point for dropwires.

This block has been superseded by the BT 66B.

Where work is carried out on a BT 66A it must be upgraded to a BT 66B by replacing the inserts with connector dropwire or connector wire insulated series connectors.

2.2.9 Block Terminal 18

The BT 18 is a circular block terminal for 2 pairs. The feeding cable and dropwire or serving pairs are stripped and terminated under cheese head screws.

2.2.10 Block Terminal 17

The BT 17 is a circular block terminal for 15 pairs. The feeding cable is solder terminated in the back of the block. The dropwire or serving cable is stripped and terminated under cheese head screws and arranged around the circumference of the block. Broken or faulty terminals are not replaceable.

The cover is fixed on a central thread by a knurled nut. If the cover or fixing is damaged the block must be replaced.

2.2.11 Block Terminal 13

The BT 13 is a block terminal for 4 pairs. The feeding cable is solder terminated in the back of the block. The dropwire or serving cable is stripped and terminated under cheese head screws. Broken or faulty terminals are not replaceable.

2.2.12 Box Connection 16 (BC 16)

This was used to provide an interface at the customer's premises for an overhead feed. They awere supplied in four colours to match in with the surrounding colour scheme.

The BC 16 is a small plastic box meant to be installed on a vertical surface in a sheltered position, normally under the eaves of a building. It has a hinged lid, when lifted the lid exposes three slotted holes in the side for cable entry. Internally it is sectioned into four compartments and the back has holes for fixing screws.

When an existing BC16 is worked on, it must be replaced with either a BT66b or an above ground closure.

2.3 Working with eNode Products when using a BT13, 17, or 18

Installation

- Before commencing any termination work clean block using Brush Block Cleaning and apply dewatering spray. (If the block has corrosion as defined in NWK/NNS/V009 then complete installation and use A1024 procedure for Block and Tail renewal.)
- Connect short length of drop wire for eNode DSL trunk pair to BT.
- Apply Sealant Silicone (Clear), (item code 127865), to the screw heads of the eNode trunk pair.
- Close up BT

- Connect other end of eNode EDSL trunk pair drop wire to PRU cable tail inside BT66. (eNode will now power up)
- Check PRU is working OK

Maintenance/recovery activity requiring the removal of an eNode PRU from a BT 13, 17 or 18

- Open BT66
- Cut eNode EDSL trunk pair drop wire close to the crimps, one wire at a time, using wire cutters with plastic coated handles.
- Open BT
- Before commencing any termination work clean block using Brush Block Cleaning. (If the block has corrosion as defined in NWK/NNS/V009 then complete work and use A1024 procedure for Block and Tail renewal.)
- Remove Sealant Silicone from the screw heads of the eNode trunk pair using a suitable wooden or plastic scraper. Wear appropriate eye and hand protection. Note a metal scraper may remove tiny pieces of metal that may subsequently cause a fault.
- Remove dropwire.
- Replace screws
- Apply dewatering spray
- Close BT

3 *Installation of a BT 71A*

3.1 Installing in a New Hollow Pole

1. Open the door at the base of the hollow pole and use the hook at the back of the BT 71A to hang it on the terminating rail. Ensure that there is a sufficient length of cable inside the hollow pole to reach the BT 71A and extend 100 mm above the terminating rail. When installing the cable to the hollow pole, there should be at least 1.5m of cable coming out of the door.
2. Mark the cable sheath at a point 150mm above the cable clamp on the BT 71A and ensuring there is sufficient slack cable below the BT 71A to allow the BT hook to be lifted clear of the termination rail. Strip the sheath from the end of the cable back to this mark.
3. Remove the cover from the back of the BT 71A and feed the individual pair through the small holes in the middle of the BT. Pull the pairs through so that when the BT 71A is hanging on the termination rail, in the hollow pole, the cable sheath is positioned in the cable clamp. The cable should then be secured in the cable clamp.

4. When the BT 71A has been attached to the cable, there should be sufficient slack in the cable, to allow the BT to be lifted off the termination rail and pulled through the door of the hollow pole for dropwire termination.
5. To protect the BT it must be covered (do not close the bottom of the bag) with a Polypropolene Sack Small (Item Code 237195) before the door is closed.

4 *Installation of Above Ground Drop Wire Closure and Block Terminal 66B*

4.1 Above Ground Drop Wire Closure

The Above Ground Drop wire closure should only be used where operationally necessary e.g. when the end user does not want a new wire run down the building. The preferred option (which must be the first to be considered) is to run the drop wire directly to the NTE without incorporating a joint.

The Above ground dropwire closure is only compatible with round profile dropwires obsolete figure of 8 dropwires must not be fitted into the closure.

4.1.1 Installation Instructions:

- Remove any plastic knockouts from ends of closure needed to install cables, always use the pre knocked out ports first. Do NOT knock out any unused ports.

  Leave the red dummy plug in situ if used in as an in line closure (1 in, 1 out). If using as a cap ended closure move the red dummy plug to the single end.
- Cut the steel suspension (catenary) wires approximately 20mm from the drop wire sheath butt and crimp the steel wire ends into a CWI8A. Ensure the crimp is dressed into the closure cavity.
- For the newer type of AGC (i/c 038271) shown below, dropwire steels maybe either crimped using CWI8a or 8b,

Ensure the crimp is dressed into the closure cavity.**DO NOT use sleeve protection 2A**

New Dexseal 2/4 AGC Item Code 038271

D Side Quality Manual.pdf **link see pages 82 to 84**

- Closure may be configured as “cap ended”, “in line” or “1 in 2 out”.
- Press the cable firmly into the cable restraint
- Cable sheath MUST protrude past the seal into the closure cavity
- Dress crimps into cavity
- Fold over and snap shut starting at end clips then the centre clips.

  The closure must be secured by cleating the cable to the building***** / structure***** / pole at either end of the closure. It should not be secured to the dropwire clamp.

  ***This can be carried out down to a height of not less than 2 metres above ground level.**

A short traing video can be found at the following URL.

www.dexgreen.com/quickguides/above-ground-closure

4.2 Block Terminal 66B (BT 66B)

When installing the box, secure it to a wall or pole with two screws. Bring the cable into the bottom and prepare the end, leaving sufficient for the connectors. Secure it with the cable clamp and bring the serving cables into the box. Prepare the ends of the serving cables and make the terminations using the appropriate dropwire connector or a connector wire insulated 8A or 11A.

If an access pipe has been provided fix the BT over the end of the pipe and when the cable has been terminated seal the entry hole with Compound 16A.

This BT is commonly used for underground feed entry to a customer's premises. If the cable is steel wire armoured remove the armour wire and outer sheath for 300 mm. It will not be necessary to tape the end of the armour wire as this will be pushed tight against the bottom of the BT base when the cable is clamped.

The BT66 must not be used in hollow poles.

Warning: Under no circumstances should a cable be terminated using block inserts. Use only insulation displacement connectors.

5 *Aerial Cable Routes with Interceptions for Dropwires*

Aerial cable routes often require pairs to be taken out to provide service for our customers.

The current standard is, at the end of a route or at a jointing positions where the aerial cable goes in and back out of a Cap Ended Mechanical Closure (Large) (i/c 021085), a cable tail is provided out of the UCJ to a BT66.

To increase sealing of the access network, an alternative method can be used to take the dropwires directly into a Cap end UCJ using a 1 x 7 Branch Plug DW/2pr (Item Code 045043) instead of a cable tail and BT66.

Where a block terminal is being replaced on an aerial cable route such as for FVR work then this method can also be used.

The following criteria must be met

- This is limited to 7 dropwires only.
- Must NOT be used to replace a recorded DP, e.g. where the DP has allocated numbered pairs and is greater than 2 pairs unless planned as a high pair count distribution point (see section 8)
- The Cap end UCJ should only be located within the top pole envelope.

If an existing dropwire is too short to fit into the UCJ then the dropwire must not be extended.

Obsolete dropwires such as twin grey DW3 cannot be fitted into the DW branching plug.

In both of these cases, either use the current method of providing a cable tail out and a BT66 or the dropwire will require replacing.

Exceptionally, a UCJ can be used as a numbered DP in exposed locations with approval from the local Quality Audit manager.

6 *Cost Effective High Pair Count Distribution Points*

It has been agreed that when using current approved drop wire the Cap Ended Mechanical Closure (Large) (i/c 021085) in conjunction with the seven way drop wire branching plug (i/c 045043) can be used as a distribution point in place of a block terminal 18A, 19A or BC20 when lightning protection is not required to be fitted within the DP closure. This not only provides a cost effective connection, but supplies a water tight environment for the connection which could reduced faults in the overhead network.

When using a Cap Ended Mechanical Closure (Large) which has four entry ports, it will be possible to provide a distribution point for up to 84 pairs (1 incoming cable of 100 pairs and 3 x 7 CAD55's leaving).

6.1 Planning Standards:

The high pair count distribution points should only be deployed in certain niche applications, namely:

In high density areas such as flat conversions, student accommodation etc where overhead distribution is the most cost effective solution

Where alternative provision of additional pole(s) is impractical or prohibitively expensive

Where lightning protection is either not required or where protectors can be effectively provided at a location other than the DP closure (protector units do not fit inside the cap ended closure)

Where a maximum distribution of 21 drop wires will be required and does not contradict existing safety / regulatory requirements or existing field practices documented in ISIS EPT/OHP/B011 & EPT/OHP/B058

6.2 Installation Method:

Follow the instructions supplied with the Closure, for installing cables and drop wires.

Position the sleeve on the pole as you would a block terminal 18A/19A/BC20.

The sleeve is secured by use of a number 8 wood screw at the bottom of the sleeve and by a strap cable fixing through the slot in the back of the Closure.

The incoming cable should be installed in the back cable entry port of the Closure.

Up to seven drop wires can be accommodated in one cable entry port. the drop wire cable butts should extend past the inner grip by at least 40mm , this is to ensure enough room to fit the sleeve drop wire protection 2a (item code 016330) which must be fitted as a matter of safety.

This method of providing a cost effective high pair count distribution point is not intended to contradict anything written in ISIS documents EPT/OHP/B011 or EPT/OHP/B058 which must be followed.

7 *Earthing*

For earthing on poles carrying power conductors, refer also to A2772 (a) Joint Use Agreement).

For earthing on lightning protected blocks, refer to Section 13.

7.1 Test Earths

Where a functional earth (FE) is required, make use of the pole earth. Most distribution poles are fitted with an earth prior to erection. If the existing pole has not been fitted with an earth, or if the earth resistance is too high for the signalling or test requirements, a new earth will need to be fitted.

Where a new earth is needed, a Spike Earth 4 may be used. Refer to Lightning Protection Handbook for the method of installing a 'Specially Provided Earth Electrode System' (Location of Services Handbook must always be consulted before this operation is carried out.).

A new earth wire may then be run up the pole or the existing earth wire connected to the spike. Only Copper soft 1.4 mm should be used for pole

earths. Attach the wire to the pole with Staples Brass 25 mm at 300 mm intervals from the ground line to 2 m up the pole and then at 600 mm intervals to the top of the pole. If a street light is fitted to the pole, Wire copper cadmium HV 1.7 mm or a suitable equivalent (Wire Earthing 9141/A) insulated earth wire MUST be used. When below ground the wire should be stripped of its insulation.

Site the wire so that it will be covered by the capping. If an earth wire is existing, to enable it to be connected to the spike, it will need to be extended with a length of earth wire at the base of the pole below ground level.

Under normal circumstances for testing purposes, use the earth on the pole and access as necessary using a crocodile clip on the test lead. If a permanent earth connection to the BT/BC is required, fit an earth bar in the BT, then connect the bar to the pole earth using Wire Copper Soft 1.4 mm and Connector Dropwire 3C. When making the joint, the copper wire must be sleeved using a 20 mm length of Sleeve 7C (Item Code 071971), which is slid into the Dropwire Connector before inserting the wire into the sleeve and making the connection.

Earth bars for BTs 76/86 may be obtained on local purchase from approved suppliers. (Refer to Local Suppliers section of the Engineering Stores Catalogue.) Alternatively use the earth bar from a recovered BT 41 or 41A. Earth connection points are already fitted in BC 18A & 19A.

When repairing a broken earth wire, should there be insufficient slack to make a joint using a single Connector 3C, then a pair of connectors can be used to splice in a short length of Wire Copper Soft 1.4 mm dia.

8 *Wiring Practices*

Note: ***Crimping wires across any Block Terminal or Box Connection is a maintenance hazard and is not allowed.***

8.1 Dropwire Preparation

8.1.1 Dropwire Presentation

1. Fit Straps, Cable Fixing 12A, using Pins Steel 2, 7/8", to the pole above and below the MBT at positions. Also thread Straps 12A through the slots in the lower corners of the MBT.
2. When the dropwire has been installed between the customer's premises and pole top, and secured in the dropwire clamp, take it over the ring and pass it down through the bridge of the MBT
3. If the dropwire is to be terminated on odd numbered pairs (those on the LEFT of the block), run the dropwire down through the MBT, bringing it out of the

bottom to the RIGHT of the tail cable. For even numbered pairs (those on the RIGHT of the block) run to the LEFT of the tail cable. This ensures that there will be one neat loop below the block.

4. Allow enough dropwire to form a loop of 80-100 mm below the block, then a further 900 mm (for 20 pair BT/BC), or 700 mm (for 10 pair BT/BC). This will ensure there is enough spare conductor for maintenance reterminations should the need arise. Feed the dropwire up into the block and secure it in position with the straps fitted as detailed previously. Do not cut the "tails" off the straps; tuck them neatly behind the dropwires.

8.1.2 Cable Dropwiring 10 11, 12 &15 + CAD55m

1. Dress the dropwire.
2. Using Splitter Cable Sheath 13, or other approved stripper, make two diametrically opposite longitudinal cuts on the cable sheath to expose 150 - - 200 mm of cable core. Extract the rip cord and wrap it round a suitable bar (for example, handle of Nippers Diagonal Cutting 160 mm). Pull the cord slowly to split the cable sheath to a point level with the lower edge of the rocker to be used. **Do not attempt to pull the rip cord with your fingers.**
3. Extract the conductors and strength members and cut off the excess sheathing and the rip cord with Nippers Diagonal Cutting 160 mm. Using the nippers, cut off the strength members to a length of 20 mm. *Note that these are the only nippers recommended to cut the steel strength members.* Fold the strength members back along the sheath and fit a Sleeve Dropwire Protection 2A over the wires and sheath (see Figure 4).

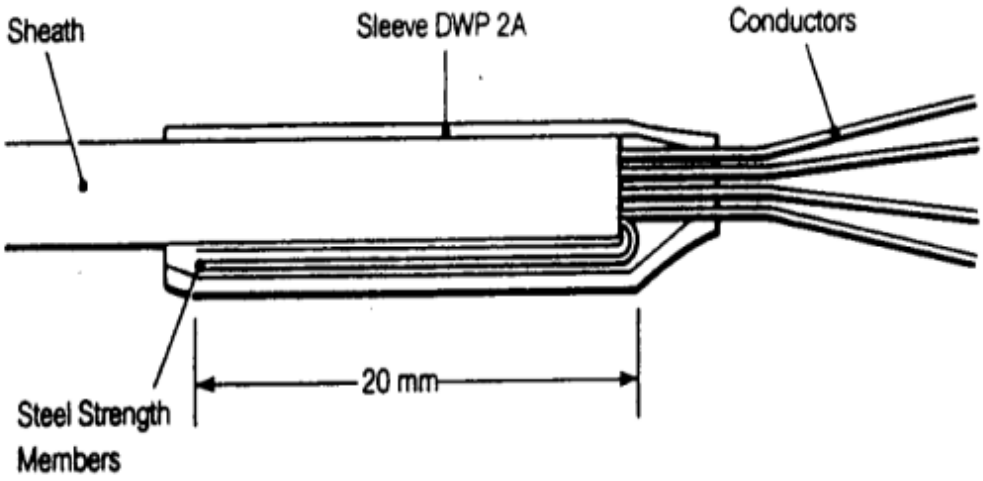

Figure 4 Sleeve Dropwire Protection 2A Fitted onto Dropwire 10

8.1.3 Dropwire 3, 4, 5, 6, 7, & 8

1. Dress the dropwire.
2. Allow enough dropwire to form a loop of 80-100 mm below the block (see Figure 1 (b)), and to extend 75 mm past the termination to be used. Secure in position with Straps Cable Fixing 12A fitted as previously described.
3. Having allowed 75 mm of dropwire past the rocker, separate the conductor pair to a point 10 mm below the termination. Form each wire at right angles to the termination. Cut the wire off to the correct length (approx. 40 mm). Do not strip the dropwires (see Note if temperature is below 0° C in section 8.6).

8.2 Terminating the Feeding Cable Pairs in Box Connection 18A & 19A

1. Locate and fix the feeding cable(s) as detailed in the instructions provided with the BC.
2. Identify, collett and twist the cable pairs.
3. Identify the pairs to be terminated. Trim the wires to a length approximately 125mm past the External Connection Module 1A or 1B to be used.
4. Terminate the pair on the module in line with the instruction sheet provided with the modules. It should be noted that the External Connection Module 1A is a ‘once only/single shot’ operation on the feed pair IDC and care must be

taken to ensure that both wires are fully inserted into the module and do not move as the connection is made. If re-termination of the feeder cable is necessary the 1A module **must** be replaced, ***this is not the case for the 1B module where both sides of the module can be re-used.***

5. Form the wire into a swan neck between the two rails.
6. Terminate on ECM 1 only the pairs required to feed working customers.
7. Tidy all spare pairs (See Section 10).
8. Replace the cover.

Note: Detailed fitting instructions are supplied with both Box Connections and External Connection Modules.

8.3 Terminating Cable Dropwiring 6, 10, 11, 12 15 or CAD55m in BC 18A & 19A

Follow instructions on preparing dropwires and length of conductors as previously detailed in section 8.1, then follow instructions as given out with modules.

8.3.1 Termination Combinations of Dropwires

External Connection Module 1 is designed to repeatedly terminate combinations of dropwire 6, 10, 11, 12, 15 or CAD55m within the BC18A.

Section 2.8.3 notes that “dropwire 8 will not fit into the module” however, both dropwires 4 & 8 can be terminated in the module if 25mm of insulation material is removed prior to insertion into the dropwire ports.

The insulation displacement connector (IDC) design within the module does not permit repeated termination of dropwires 4, 6, 8, 10, 11, 12, 15 or CAD55m combinations. It is therefore essential that the following procedures are followed when dropwires 4 or 8 are encountered.

1. If dropwires 6, 10, 12 or CAD55m are to be terminated in a module that has previously had dropwires 4 or 8 terminated, the module **must be replaced with a new module.**
2. If dropwires 4 or 8 are removed from a module and the module is not immediately re-used, the module **must be discarded**.
3. If dropwires 4 or 8 are to be terminated in a module that has previously had dropwires 4, 6, 8, 10, 11, 12, 15 or CAD55m terminated, the module may be reused.

   Repair and provision staff should ensure that an adequate stock of new modules 1 are carried.

8.4 Modifications to BC18A

8.4.1 Short Dropwires

In order to prevent the unnecessary re-running of 'short' dropwires, (a dropwire is defined as 'short' when its length prevents it from being re-terminated in the box connection using standard wiring practices), the BC18A is to be provided with vents in the back, similar to later versions of the BT76.

Until this modification becomes available, a 'short' dropwire can be fed into the box by drilling a 10mm diameter hole through the rear of the box, central to its intended connector position and close to the internal edge (see figure 4b).

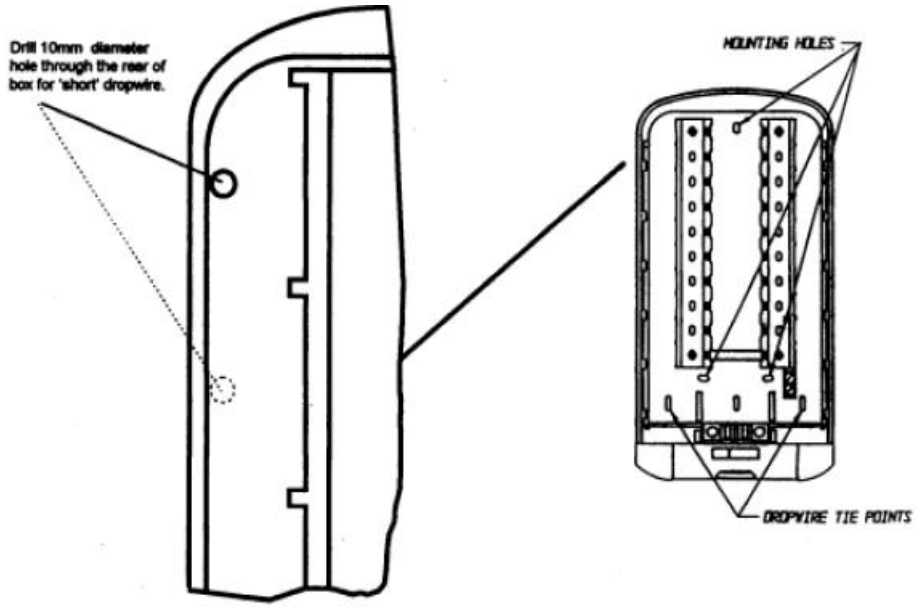

Figure 4b Modification for short dropwire access

Note: (1) The opening of short dropwire vents or the modification of BC 18A bases as described above must always made before the block is fitted to the pole.

Note: (2) Dropwire should be passed through the vent before removal of the sheath or fitting of the Sleeve Dropwire Protection 2A.

8.5 Block Terminals 76/86 Series

BTs 76 and 86 are equipped with fully enclosed Insulation Displacement Connection (IDC) terminations, removing the need to strip insulation from the conductor prior to terminating it under most conditions. The BT 76 is a 20 pair block and the BT 86 is a 10 pair block. They are suitable for use with most

insulated dropwires, that is DW 3, 4, 5, 6, 7, 8, 10,12 and CAD55m) currently existing in the BT overhead network. If other dropwires are encountered, they should be renewed with DW 10, 12 or CAD55m as appropriate.

1. Follow instructions on preparing dropwires and length of conductors as previously detailed in section 8.1.1.

2. Select the Orange/White pair and cut off to a length of 175 mm (measured from the sleeve dropwire protection). Unscrew the rocker to its fullest extent. the centre of the entry holes must be in line with the top of the adjacent rocker, see Figure 5.)

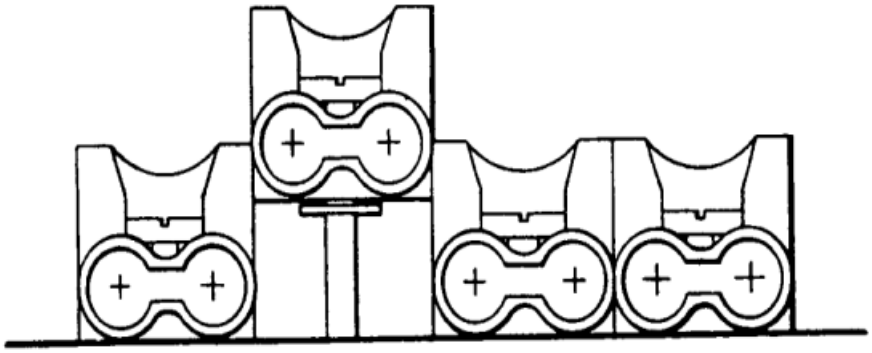

Figure 5 fully raised rocker

Caution: The rockers must always be fully raised when terminating or removing dropwires. Pieces of insulation could be left behind in the rocker if it is not fully raised when withdrawing dropwires. This will render the rocker unusable for future terminations.

3. Refer to the gauge in the cover to ensure that sufficient conductor is inserted into the rocker (40 mm). Do not strip the insulation from the wires.

4. Insert the conductors fully into the rocker, hold them in position and screw the rocker fully down. Once the rocker has reached the bottom of its travel, further tightening of the screw is unnecessary. Give each leg of the dropwire a gentle pull to ensure that the termination has been correctly made and then form the pair into a 'swan neck' to ensure that there is no strain on the termination (see Figure 6).

Note: When reterminating dropwires, cut off the last 20mm of conductor (that is, cut the dropwire off to discard the section containing the cuts in the insulation caused by the previous termination. This ensures that on retermination, the IDCs cut into Virgin dropwire.

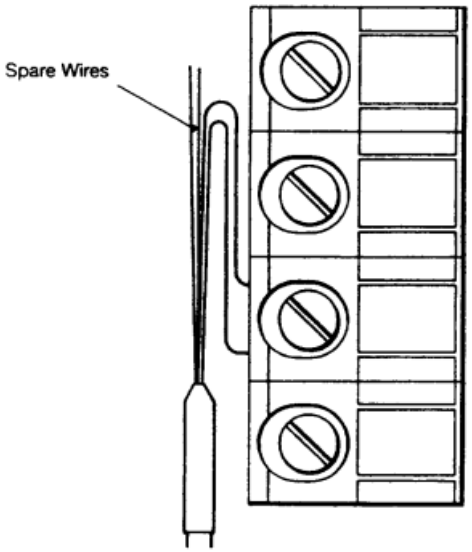

Figure 6 Position of Dropwire in BT 76/86

5. If termination is required, prepare the remaining Green/Black pair as previously described. If it is not to be terminated immediately, take it around the top of the block, through the plastic loop (fitted to newer blocks, see figure 8 Note 1), and down the centre of the block (see figure 8 Note 2) to the bottom. Cut the conductors off 80 mm past the bottom rocker. This allows future use of the pair in any rocker, if required, without the need to install another dropwire.

6. When terminating pairs on the opposite side of the block, run them through the plastic loop at the top of the block. Allow a similar amount of spare conductor before termination. The loop of spare conductor will be pointing downwards.

8.6 Terminating all other Dropwires (Dropwires 3, 4, 5, 6, 7 & 8)

1. Allow enough dropwire to form a loop of 80-100 mm below the block (see Figure 2(b)), and to extend 75 mm past the rocker to be used. Secure in position with Straps Cable Fixing 12A fitted as previously described.
2. Having allowed 75 mm of dropwire past the rocker, separate the conductor pair to a point 10 mm below the rocker. Form them at right angles. Refer to the gauge in the cover and cut off to the correct length (40 mm). Do not strip the dropwires (see Note if temperature is below 0° C).
3. Raise the rocker to its fullest extent (see Figure 5). Insert the conductors fully into the rocker, hold in position and screw the rocker fully down. Further tightening of the rocker screw is unnecessary once it has reached the bottom of its travel.

Note: **If terminating DW4 or 8 in temperatures below 0°C, using properly adjusted Strippers Wire, strip 5mm of the insulation from the conductors before inserting them into the rockers.**

8.7 Reterminating Dropwires in IDCs

When reterminating dropwires, the last 20 mm of conductor must be cut off and the wires reformed (that is, cut off the dropwire to discard the section containing the cuts in the insulation caused by the previous termination). This will ensure that the IDCs cut into virgin dropwire. This will lead to a smaller loop under the block which should be held in the straps as far as possible.

If a dropwire should at any time become too short to reach its rocker, it will have to be renewed.

Note: **To reduce the possibility of faults developing, do not use extra pieces of wire to increase the length of a dropwire.**

When working on BTs 76/86 or BCs 18A/19A short dropwire vents are provided in the base to provide a shorter route.

These must only be used;

During plant uplift, if short dropwires are encountered. To TEMPORARILY avoid the need to run new dropwires, they may be inserted through the louvered slots in the back edges of the block and held in position with Straps 12A through the slots in the edges of the MBT.

As an expedient, when working on existing dropwires where retermination has made the dropwire too short to reach the termination via the normal access ports. On completion of work the dropwire must be restrained in position with Straps 12A through the slots in the edges of the MBT.

Note: Early BC18A may be modified in line with section 8.4.1.

8.8 Wiring Practices for Block Terminal 71A

8.8.1 Terminating Cable Dropwire 10, 11, 12, 15 and CAD55m

1. Allow enough dropwire to form a loop of 80-100 mm below the BT, then a further 800 mm. This will ensure there is enough spare conductor for maintenance retermination should the need arise.
2. Using Splitter Cable Sheath 13, or other approved stripper, make two diametrically opposite longitudinal cuts on the cable sheath to expose 150 - 200 mm of cable core. Extract the rip cord and wrap it round a suitable bar (for example, handle of Nippers Diagonal Cutting 160 mm). Pull the cord slowly to split the cable sheath to a point level with the termination hole to be used. **Do not attempt to pull the cord with your fingers.**
3. Extract the conductors and strength members and fit a Sleeve Dropwire 2A as detailed in Section 8.1.2.

4. Select the Orange/White pair and cut off to a length of 175 mm (measured from the sleeve dropwire protection). Remove the BT 71A from its hanging position and pull it through the door of the hollow pole. Pass the dropwire conductors through the appropriate termination hole and terminate the dropwires to the correct cable pair using CWI 8B and the method described in ISIS document EPT/CJT/D021 Section 4.
5. Any spare pairs should be passed through the plastic loop at the top of the block, down the middle and restrained.
6. When terminating pairs on the opposite side of the block, run them through the plastic loop at the top of the block. Allow a similar amount of spare conductor before termination. The loop of spare conductor will be pointing downwards.
7. Before leaving the site cover the BT with a Polypropolene Sack Small (Item Code 237195) and hang the BT 71A back in its stowage point. Use suitable cable ties to tidy the dropwires replace and secure the door.

8.8.2 Terminating all other Dropwires (dropwire 3, 4, 5, 6, 7, 8)

1. Allow enough dropwire to form a loop of 80-100 mm below the BT and extend 75 mm past the terminating hole to be used.
2. Separate the conductors over the 75 mm of dropwire allowed for termination.
3. Remove the BT 71A from its hanging position and pull it through the door of the hollow pole. Pass the dropwire conductors through the appropriate termination hole and terminate the dropwires to the correct cable pair using CWI 8B and the method described in ISIS document EPT/CJT/D021 Section 4.
4. Before leaving the site cover the BT with a Polypropolene Sack Small (Item Code 237195) and hang the BT 71A back in its stowage point. Use suitable cable ties to tidy the dropwires replace and secure the door.

8.9 Wiring Practices for Existing BTs 41 and 41A

8.9.1 Fitting BT 41/41A to MBT 1A

Whenever possible, in pole mounted situations, fit BTs 41/41A to MBTs. The method of retrospectively fitting MBTs is detailed in Section 3.

8.9.2 Running Dropwires to Block Terminals 41 and 41A

Install the dropwires from the ringhead to the block as detailed previously.

8.9.3 Terminating Cable Dropwires 10, 11, 12, 15 and CAD55

1. Allow enough dropwire to form a loop of 80-100 mm below the block, plus enough dropwire to reach and terminate to the required connector on the block; then a further 90 mm of slack. This will ensure that there is sufficient spare conductor for maintenance reterminations or where it might be necessary to replace the BT with a a new Modular BC fitted on a MBT. Feed the dropwire up into the block and secure it in position with the Straps Cable Fixing fitted as previously described. Do not cut the "tails" off the straps; tuck them neatly behind the dropwires.
2. Prepare the end of the dropwire and fit sleeve dropwire protection 2A level with the lower edge of the terminals to be used.
3. Select the Orange/White pair and cut off to a length of 175 mm (measured from the sleeve dropwire protection). Using a properly adjusted pair of Strippers Wire 2, remove 20 mm of insulation from the end of the wires. Fold the ends of the wire back for 10 mm, raise the terminal screws and fully insert the bared wires. Tighten the screws onto the wires. Do not overtighten the screws. Give each leg a gentle pull to ensure the security of the terminations. Form the wires into a 'swan neck' as per BT 76/86 instructions.
4. If they are to be terminated, prepare the remaining pair/s as previously described. If they are not to be terminated immediately, run them up to the top of the block, across the width of the block and then back down to the bottom and cut off level with the bottom of the block (this allows enough wire to terminate if the pair/s have to go to the other side of the block). Twist the ends together and secure all pairs neatly with Straps Cable Fixing 1.

8.9.4 Terminating all other Dropwires

1. Install and secure the dropwire as previously described. Separate the conductors to a point 10 mm below the required terminals. Form into right angles and cut off to a length of 15 mm. Strip 10 mm of insulation from the conductors using properly adjusted Strippers Wire 2.
2. Raise the terminal screws and fully insert the conductors. Tighten the screws onto the conductors, ensuring they are not overtightened.
3. Secure all dropwires together with Straps Cable Fixing 1.

9 *Block Terminal Maintenance*

9.1 BT 76/86 Replacement Rockers

If a rocker should become broken or clogged with pieces of dropwire insulation, spares may be obtained from an approved supplier. (Refer to the Local Suppliers section of the Engineering Stores Catalogue.) Alternatively, in an emergency, a rocker may be taken from a spare BT and used to replace the faulty rocker.

Replacement rockers are fitted in the same manner as those in lightning protected BTs. Rockers cannot be interchanged between normal and protected blocks.

IDCs are not replaceable or maintainable. If one should become damaged or corroded, it will render the pair unusable. Another pair will then have to be allocated. When using the modular BT, new modules can be easily fitted.

9.2 Replacement Inserts for (BT) 41, 41A

Screw type block inserts 1A & 2A should be changed for a new type of gel filled IDC insert when worked upon in the OH network.

The connectors have test access ports

2 pair BT41 carrier pack of 10. - 082220

3 pair BT41 carrier pack of 10. - 082221

BT41 IDC connector box of 150. 082222

3 pair and 2 pair BT41 carriers complete with connectors

A short traing video can be found at the following URL.

www.dexgreen.com/quickguides/dp41-connector

Obsolete dropwires (such as twin grey dropwires) cannot be terminated into the BT41 gel filled IDC inserts and will require to be housed in a BT66B and connected to an 0.5mm modern type dropwire tail using a CDW2A.

When completing a block only renewal or block and tail change over on an FVR task, a BC20 is the direct replacement.

9.3 Replacement Inserts for (BT) 66A

Do not replace inserts within a BT66, the correct Connector Wire Insulated or Connector Dropwire must be used.

10 *Restraining the Wires in Block Terminals or Modular Box Connections*

10.1 Storage of Spare Feeder Cable Pairs within Modular BCs

Spare feeder pairs should be twisted, colletted, laid neatly into the centre of the BC18A and restrained under the cable cover using Straps cable Fixing 1.

10.2 Dropwire Spares

Modular BCs Spare pairs should be left with enough length to correctly terminate on the furthest ECM 1A and neatly laid up the side channels of the BC, over the top connector (or connector position if not in use) and formed down the centre on top of the cable cover using Straps cable Fixing 1 or Sleeves Dropwire Protection 2A. In the same manner as the BT 76 & 86 and shown in figure 7.

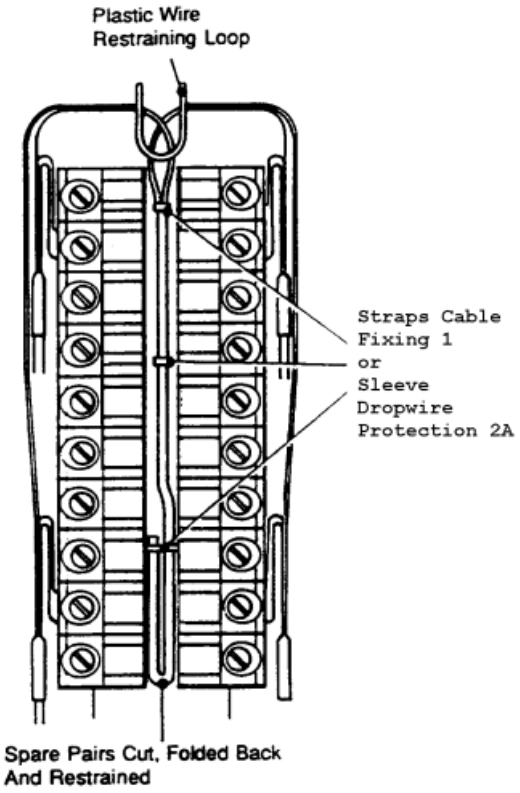

Figure 7 Approximate Position of Restraining Straps in BC18A & 19A

BTs 76, 86 Spare pairs should be left with enough length to correctly terminate on the furthest termination, neatly laid up the side channels of the BT over the top connector and formed down the centre Restrain the conductors within the block with Straps Cable Fixing 1 or Sleeves Dropwire Protection 2A. Bend excess "tails" down and tuck them neatly behind the dropwires (as shown in Figure 8).

Any spare pairs should be passed through the plastic loop at the top of the block and down the middle and restrained with Straps Cable Fixing 1.

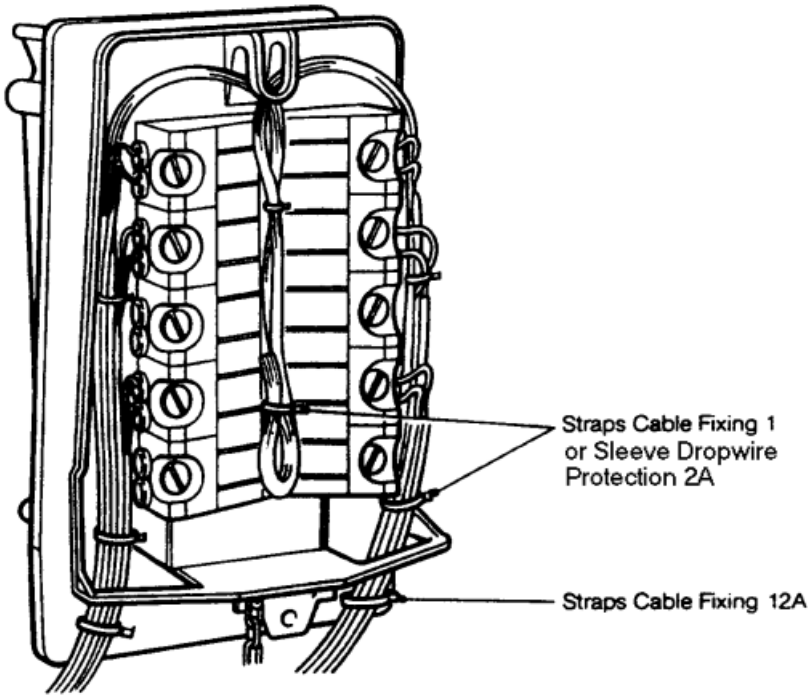

Figure 8 Approximate Position of Restraining Straps in BT 76/86

Note: (1) 0n older blocks where a plastic loop is not fitted, restrain the spare wires at the top with a Strap Cable fixing.

Note: (2) Some newer blocks may be provided with clips down the centre of the rockers for restraining the spare wires.

BT41A, 41 Spare pairs should be left with enough length to correctly terminate on the furthest termination, neatly laid up the side channels. Restrain the conductors within the block with Straps Cable Fixing 1 or Sleeves Dropwire Protection 2A. Bend excess "tails" down and tuck them neatly behind the dropwires

11 *Replacing the Covers of Block Terminals and Box Connections*

When replacing the cover ensure that all of the dropwires are contained within the confines of the BT or BC. To reduce the possibility of covers which slide on snagging any of the dropwires, the cover may be clipped over one side of the block approximately 50 mm up from the lower edge, snapped over the opposite side and then slid down to its correct position.

Which ever method of cover replacement is used, take care to ensure that it does not catch on any dropwire or straps.

12 *Test Access*

Test access to the IDCs in BT 76/86 is gained by means of an Adaptor Test 48A (see Figure 9), which supersedes Adaptors Test 4A and 4B.

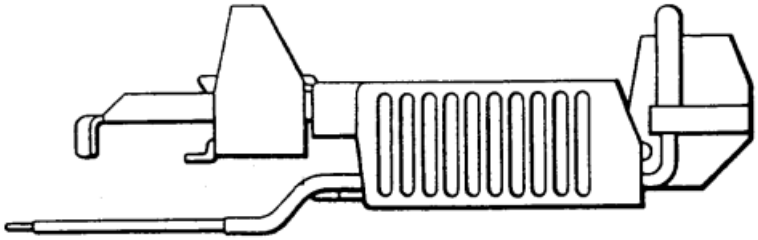

Figure 9 Adaptor Test

12.1 Description

The Adaptor Test 48A consists of a moulded yellow polypropylene body with two spring loaded probes which are inserted into the rocker ports under the dropwire. The adaptor may also be used in unoccupied rocker ports. A locking device then locates over the head of the rocker screw to hold the test adaptor in position. It is supplied in a polystyrene box complete with easy to follow instructions for use.

The Adaptor Test 48A is a piece of test equipment and, as such, should be treated with care.

12.2 Use of Adaptor Test 48A

The adaptor is very easy to use with the majority of dropwires encountered. However, when using it with dropwire 4 or 8, there is a precaution which should be observed to ensure a reliable contact with the IDC in the rocker. Prior to insertion of the probes under the dropwire, lift the dropwire slightly to ensure an unrestricted entry for the probes into the rocker. Apply light pressure to the V-shaped piece (the yoke), at the rear of the adaptor to check the security of the contact.

If the block terminal is very heavily populated with dropwire 4 or 8, it may prove very difficult or impossible to use the adaptor. In such cases it will be necessary to disconnect the dropwire.

There may also be rare circumstances when, due to the tolerances of the dropwire 4 or 8 and the rockers being on the maximum and minimum respectively, it will be impossible to use the adaptor without first disconnecting the dropwires.

Note: If the yoke at the rear does not appear to be Level then it is likely that one of the probes is not making contact with the IDC. Move the yoke from side to side while gently pushing in to rectify the situation.

12.3 Use of Adaptor Test 51A and Probes

Test access for the modular BC is gained by using probes and an Adaptor Test 51A. Any pair can be tested by inserting probes supplied with the SA 9083 into the gel filled holes on top of the external protector module. This will test across the pair. If either way testing is required then, if the line is free, the protector module can be removed and the Adaptor Test 51A plugged in. Reversal of the adaptor test will allow each way testing. After testing, the protector module should be replaced making sure that it is "snapped" properly in place.

13 *Lightning Protected Block Terminals*

Note: Lightning protection is not available for the BC20, if required it should be provided as shown in the lightning protection handbook.EPT/PPS/B055

Lightning protected versions of BT 76/86 were available. They had the suffix P/C denoting Protected/Untailed. They were not available in tailed versions.

Block Terminals 76P/C and 86P/C (see Figures 10 and 11) were only intended as maintenance replacements for BTs 42. The new modular BC can be used wherever lightning protection is required at the pole. The positions where it can be used are defined in the lightning protection handbook. (ISIS EPT/PPS/B055.)

The rockers of the BT 76/86P/C have been redesigned to accommodate Gas Discharge Tubes (GDTs). They are sealed during manufacture to hold the GDT in place and to prevent interference with the GDT. The GDTs should last for the life of the BT but if it is suspected that one has become faulty, the rocker should be changed complete with the GDT. Protected BTs will be supplied fitted with earth bars which should be connected to the pole functional earth or a separate earth as detailed in the lightning protection handbook.

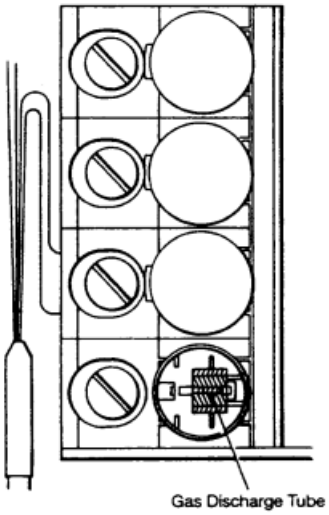

Figure 10 Part View of Block Terminal 86P/C Showing Gas Discharge Tube

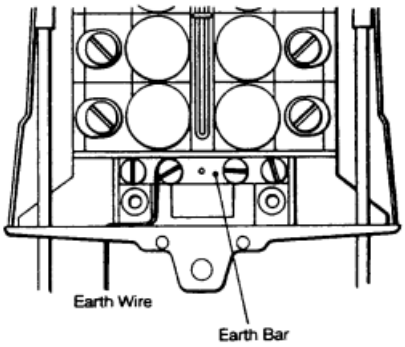

Figure 11 Block Terminal 86P/C Showing the Earth Bar

The Lightning Protection Handbook details the earth resistance required for lightning protection.

Wiring methods are the same as for unprotected BT 76/86s.

13.1 Changing the Rockers in BT 76P/C and 86P/C

Full instructions are supplied with all replacement rockers.

13.2 Use of External Protector Modules 2A

If lightning protection is required at the pole, as difined in the Lightning Protection Handbook, then the Modular Box Connection needs to be earthed. Provision of the earth is fully described in the handbook, and interconnection between the earth and the Box Connection 18A/19A should be carried out using wire copper soft 1.4 mm. The wire can be fitted into the screw connection in the box. Lightning protection of the required pairs can then be carried out by removing the External Protector Modules 1A and replacing with the External Protector Modules 2A (these modules are coloured Gentian Blue or for high frequency use 2 tone Grey).

14 *Replacing a Block Terminal 41 with a Box Connection 20*

When changing a Block terminal 41 to a BC20 the Box connection may need to be positioned lower on the pole.

The repositioning could mean that there is insufficient length of dropwire to make the termination to the new block terminal. In these instance's the dropwire should not be extended, but a new dropwire shall be provided using current working practices.

If access cannot be obtained at the customer's premises, a new dropwire may be erected and jointed to the existing lead in if it is defect free, at or close to the customer's fixing point only. The joint shall be made using insulation displacement connectors in a Block Terminal 66B or a Box Connection 16A.

15 *Use of AC90 in 40 Series Block Terminals*

15.1 General

On completion of work at a BT containing open screw type terminals, always spray the terminal strips with AC90 as a protection against moisture ingress and subsequent corrosion problems.

Warning:	When using the spray, observe all of the precautions printed on the can.

15.1.1 Application

1. Using a soft brush and clean dry rag, remove any dust, debris or corrosion which may have accumulated in the BT since the last visit, taking care not to damage any of the dropwires or feed wires.
2. Shake the can well and fit the extension tube. Spray the Strips Connection with one continuous motion, starting at the top and finishing at the bottom, with the end of the tube approximately 25 mm from the terminals, ensuring that the spray penetrates into the screw terminals. Treat both sides of each strip in this way.
3. Apply a second coating of the spray as above.

4. Wipe off any excess liquid which collects in the bottom of the block with a piece of clean, dry rag or paper towel. Do not wipe spray from the connection strips.

Caution: AC90 is only intended for use on block terminals which contain open screw type terminations, for example BT 40, and 17 series, and must not be used on Block Terminals 76/86, Box Connection 18A/19A or any designs which may be equipped with fully sealed IDCs.

16 *Replacement Covers of Block Terminals & Box Connections*

16.1 BT 76 & 86

Covers for both of these blocks are now obsolete, if a replacement cannot be found from local stocks the BT will need to be replaced with a BC20.

16.2 BT 41 & 41A

If an old style snap on cover is fitted or if the cover is missing, fit a new cover for BT 41 or 41A (IC 072790 or IC 072287) as appropriate (the new covers should clip on securely to the old BT). These are available as replacements for missing covers or existing old style snap on covers. The old style covers are prone to loss due to the effects of the weather causing them to warp and become dislodged.

The covers for BTs 41 and 41A are supplied complete with a fixing cord.

It is mandatory under NWK/NNS/V009 that spare covers are held by all works and maintenance staff involved with block terminals and, whenever a pole is visited for any reason, and it is fitted with a BT 41 or 41A with an old snap on cover, the cover should be changed for a new type. Missing covers should always be replaced using new type covers.

17 *Terminating Small Aerial Cables onto Pole Top Block Terminals*

17.1 General

When providing a customer with several O/H lines, or in the case of providing O/H service to a block of flats or a factory etc, to overcome the limitation of more than two dropwires in line of route, a suitable small aerial cable should be used.

Where more than one aerial cable 20pr or under is required to enter a BT/BC as documented in sections 17.2, 17.3 and 17.4, a joint should be provided and a separate tail taken out into the BT/BC. All cables greater than 20pr must go into a joint with a smaller cable tail out into the BT/BC.

17.2 Running the Cable to the BC or BT

When the aerial cable has been terminated on the pole, it should be routed to the block in a similar manner as that for a dropwire.

It should be run to the side of the block where the majority of the pairs will be terminated.

If terminating on a BT 41A. or 76, allow 900 mm of free cable from the bottom of the block or 700 mm for a BT86.

Aerial cables can be routed to the BC18A in a similar manner as that of a dropwire or can be restrained with the cable clamp used for the feed cable, as detailed in the instructions supplied with each BC18A. However, care must be taken as the cover of the BC18A is restrained with the strap connected to the cable clamp. Cables should therefore, be fitted without completely removing the cable clamp. If the clamp has to be removed staff must be aware that the cover will be free to fall and could cause an accident or injury if not restrained.

Warning: With BC18A & 19A if it is found necessary to remove the cable clamp for any reason it is recommended that the cover is restrained to the pole or another suitable fixing point using PVC tape before the clamp is released.

17.2.1 Terminating D-side Aerial Cable and both DW 10 Pairs or more than one CAD55m Pairs

Where aerial cable, aerial dropwire and dropwire 10 are used to provide service the situation may arise where the serving pairs are on opposite sides of the BC18A.

If known, the aerial cable should be run to the side where the majority of pairs are located. With the cable cover removed the pairs to be terminated on the opposite side should be run over the top connectors (or connector positions if not in use) and formed down the opposite side. The cable cover should then be replaced (see the above note on spare pairs) and the pairs terminated as detailed in **ISIS EPT/OHP/B073** section 9.4.

17.3 Terminating the Cable Pairs in BT 76/86 or Modular BC

1. Remove the cable sheath to within 25 mm of the bottom of the block and wipe the petroleum jelly from the conductors.
2. Terminate the pairs as described earlier, leaving a loop of wire as shown in Figure 6.
3. When terminating pairs on the opposite side of the block, run them through the plastic loop at the top of the block. Allow a similar amount of spare conductor before termination. The loop of spare conductor will be pointing downwards.
4. Restrain the conductors within the block with Straps Cable Fixing 1 as shown in Figure 8.
5. Any spare pairs should be passed through the plastic loop at the top of the block and down the middle and restrained.
6. Replace the cover.

17.4 Terminating the Cable Pairs in BT 41A

1. Prepare the cable as described earlier.
2. Terminate the pairs, leaving a loop of wire as shown in Figure 5.
3. Spare pairs should be restrained.
4. Spray the terminals with AC90 as previously detailed.
5. Replace or renew the cover.

18 *Safety*

18.1 Covers Causing Injury Falling to Ground

The covers of the BC 18A & 19A is retained with a strap connected to the cable clamp. Feed cables should be fitted without removing the clamp. If however, the clamp has to be removed staff must be aware that the cover will be free to fall and could cause an accident or injury. If it is found necessary to remove the clamp for any reason it is recommended that the cover is restrained to the pole or another suitable fixing point before the clamp is released.

18.2 Covers Causing Injury by Blowing in Wind

In order to prevent an injury caused by an unrestrained covers blowing in the wind, it is recommended that when the cover of a BT or BC is removed it is restrained to the pole or another suitable fixing point by the use of PVC tape.

18.3 MBT Safety Note

Some of the early MBT1As might need the top boss filing slightly to permit BC18s to be fitted. Care must be taken when doing this so that the filings are not allowed to blow away in the wind

19 *Security*

There are a number of security devices that are fitted to or over block terminals. If the block terminal has a seal at the base and a security screw or a steel over box it has been fitted with one of the security options. You will have to seek authority to enter and obtain keys if you have not already done so.

Security is more fully described in ISIS EPT/OHP/B005.

END OF DOCUMENT