

# Extension ladder drills

These drills will provide basic practical training for crews in the use and operation of ladders and associated equipment, carrying out a wide variety of procedures and techniques, and applying them to situations that will enable them, when proficient, to progress onto more advanced forms of practical training.

## Objectives

Prior to carrying out ladder drills, crews should be proficient in Preliminary details.

For each ladder drill, objectives have been allocated that identify the specific training benefit relevant that drill.

On completion of each ladder drill, or period of training, firefighters should be able to carry out all the objectives individually, or as part of a crew, without error.

## Notes on Extension Ladder Drills

### Safety

The following MUST be adhered to in order to ensure maximum safety when operating with extension ladders.

1. Helmets must be worn by all personnel.

To lift and carry a 9 m or 10.5 m ladder.

#### **Crew of three**

Nos.1 and 2 grasp the round (back of the hand to the centre of the ladder) at the head. NO.3 grasps the round (back of the hand to the centre of the ladder) at the heel positioned at the side of the string, one hand being free to correct possible tipping and to secure the extending line. The ladder is carried with the rounds horizontal (Plate 9).

#### **Crew of two**

No.1 at the head and NO.2 at the heel, the ladder should be carried by the upper string with the rounds vertical.

3. A ladder should, as far as circumstances permit, be pitched to the right hand side of a window or other opening with, where possible, three rounds above the sill.
4. When a ladder is pitched and extended, the pawls must be properly engaged with the rounds in line and the heel correctly footed before any attempt is made to climb or descend.
5. When stepping off a ladder, personnel should ascend to the level of, or to the round above, the parapet or window sill before stepping off with the outside foot, i.e., with the left foot if to the left, or with the right foot if to the right.

6. When getting out of a window or from a parapet and stepping up on to a ladder pitched to the right, a convenient round should be grasped from the rear underside with the left hand palm uppermost. The right foot should be placed on the round above the sill or parapet; at the same time the top of a round should be grasped with the right hand until the left hand has been moved and is grasping a convenient round (from the front). At no time should both hands be off the ladder and a step down should never be made on to a ladder except as outlined in the Rescue section (Notes on 'Carrying Down').
7. When moving from one ladder to another, either ascending or descending, the nearest foot must always be placed on the ladder first, then the nearest hand, followed by the other hand and then the other foot.
8. As the overlap of extension is reached during the descent, the warning 'Step in' or 'Step out' should be given, according to the type of ladder.
9. On descent when the feet are one round above the pawls the warning 'Pawls' should be given.
10. When working on a ladder and it is necessary to use both hands a leg lock should always be taken particularly prior to 'Water on' being ordered when working with a branch.
11. The Officer-in-Charge of ladder drills is required to judge if special precautions are necessary due to weather conditions, e.g., lash the head of the ladder.
12. Nos.1 and 2 lift the head of the ladder by grasping the top round and Nos.3 and 4 lift the heel of the ladder by grasping the jack beam, or handles, where fitted.
13. Before placing the heel of an extension ladder on the ground prior to underrunning, ensure that the correct side of the ladder is uppermost and the ladder heel firmly positioned. It is essential that both firefighters remain in contact until they have completed the under-running particularly when handling the heavier 13.5 m ladder.
14. When a ladder is pitched into the building the ideal distance of the heel of the ladder from the base of the building is approximately one third of the working height of the ladder.
15. Before an extension ladder is extended it should be stable with the heel of each string or the jack pads steady on the ground.
16. While a ladder is being extended or housed (three firefighters) each string should be steadied with the hand nearer the building reaching up and with the hand away from the building reaching down. The foot farthest from the building should be placed at the heel of the ladder. Feet must never be placed on the rounds when extending or lowering (Plate 10).
17. Extension ladders must always be held in such a manner that fingers will not be trapped by the extending sections. Fingers should be kept outside the strings, away from mounting guide brackets. When handles are fitted they should be used.
18. When an extension ladder is being extended the line must be pulled in as nearly a vertical position as possible, with the hands as close to the ladder as the rounds permit.
19. When an extension ladder is being extended any tendency of the pull on the extending line to cause the ladder to tilt should be resisted, but a ladder should always be slightly inclined towards the building while it is being extended, and should never be allowed to lean away from the building.

- If at any time an Officer-in-Charge of a drill considers that the crew are losing control, the order *'Head in'* should be given. Each member of the crew should then strive to place the head of the ladder against the building to obtain some measure of stability.
20. When an extension ladder has been extended, manual pawls must be tripped by placing the arm round the string and not through the ladder.
  21. When an extension ladder is being housed the extending line must be paid out hand under hand, and must not be allowed to slide through the palms of the hand.
  22. When an extension ladder is housed the pawls should rest on the bottom or second round as appropriate.
  23. The head of an extension ladder should only be secured when necessary, e.g., in high winds or when it is certain that a ladder will not be required elsewhere. In a drill yard surrounded by buildings, care should be taken to assess the effects of the wind upon the head of the ladder when it is raised above roof level. (see Drill L.3).

## Footing and bracing

### (a) 'Footing a ladder'.

The term 'Footing a ladder' should only be used to describe the process of stabilising a ladder when the ladder has been pawled.

#### (i) The footing of Fire Service ladders.

Footing a ladder in the manner described in paras (ii), (iii) and (iv) below ensures that maximum force can be exerted in order to stabilise the ladder when it is footed by one or two persons.

#### (ii) 10.5 m and similar ladders.

When footed by two firefighters, each firefighter should place the inner foot on the lowest round, with the outer foot on the ground well back from the ladder. At the same time they should grasp the inside of the string with the inner arm and, by using this method, maintain stability of the ladder (Plate 11).

#### (iii) 13.5 m and similar ladders.

When footed by two firefighters, each firefighter should place the outer foot on the jack beam, outside of the strings, with the inner foot on the ground well back from the ladder. At the same time they should grasp the outside of the string with the outer arm and, by using this method, maintain stability of the ladder (Plate 12).

#### (iv) 10.5 m, 13.5 m and similar ladders

When footed by one firefighter one foot should be placed in the centre of the lowest round or jack beam with the other foot on the ground well back from the ladder. At the same time the firefighter should grasp both strings from the outside of the ladder and, using this method, maintain stability of the ladder (Plates 13 and 14).

### (b) 'Bracing a ladder'

The term 'Bracing a ladder' should only be used to describe the process of stabilising a ladder during the time that the ladder is being pawled or pitched. How a ladder is braced will depend on the type of ladder.

- (i) The bracing of all ladders other than 13.5 m ladders  
The bracing method described in para (ii) provides maximum control over the various loads imposed on the ladder when it is in this position. It allows the crew to brace the heel of the ladder using their feet during extending and lowering operations. At the same time they can respond to any undue forces that may be applied to the head of the ladder using their arms.
- (ii) Bracing a 10.5 m or similar ladder.  
The hand nearest to the building should reach up and hold the outside of the string with the hand away from the building reaching down and grasping the outside of the string. The foot farthest away from the building should be placed against the heel of the ladder pressing inwards, the other foot should be placed well back, bracing the body (Plate 10).
- (iii) Bracing a 13.5 m or similar ladder.  
It is not possible to adopt the bracing method described in para (b)(ii) when bracing a 13.5 m or similar ladder. Due to the ladder being unpawled in a vertical position it would not be appropriate to stabilise the ladder using the method described in para (a)(iv). The methods described below provide a safe and effective means of bracing this ladder ensuring that maximum use is made of the force applied.
  - (1) When the ladder is not pawled the ladder should be braced using the straddle method with the feet resting on the jack beam outside the strings of the main ladder and the arms outside of the strings (Plate 15).
  - (2) When pawled and pitching the ladder into a building, Nos.1 and 2 should place their outer feet on the jack beam outside the strings and grasp the outside of the strings using the outer arm. The inner foot should be placed on the ground well back from the ladder, bracing the body as in (a)(iii).
- (c) When a 13.5 m ladder is being under-run, the maximum thrust or pull should be exerted at the head when the props are in line with the strings.
- (d) Plumbing should be carried out after the ladder has been under-run and before it is extended. Final adjustments may be made after the ladder has been extended, and the head is resting on the building.
- (e) When the ladder is pitched and ready for work, the jacks should be in such a position that the full weight of the ladder is on the jacks.
- (f) During extending and housing it is essential that weight is evenly maintained on the jacks.
- (g) If necessary, the ladder can be raised against a building and extended by allowing the head wheels to run up the wall; the heel of the ladder can then be moved to a safe working angle when the required height has been reached.
- (h) Normally the 13.5 m ladder should be climbed at a steady pace. On occasions when rapid climbing is required, or unstable conditions prevail, the props should be used to control and restrain excessive movement of the ladder.

After each ascent or descent the position of the props should be checked to ensure that the ladder remains stable.

## Bridging Ladders

- (a) There should be not less than 650 mm of ladder on each side of the gap being bridged.
- (b) Care should be taken to avoid undue oscillation when moving across bridged ladders.
- (c) When bridging a 10.5 m ladder the overall length, when extended, should not exceed 8 m, and the gap to be bridged should not exceed 6 m. Except in an emergency not more than one firefighter should be allowed on the bridged portion of the ladder.
- (d) When bridging a 13.5 m ladder the maximum bridging distance must not be more than 8 m. When the bridging distance is more than 6 m only one firefighter should be on the ladder. No more than two firefighters may be on the ladder when the bridging distance is less than 6 m.
- (e) The Officer-in-Charge of a bridging drill should consider the use of safety lines. Personnel must be made aware of the danger of losing balance when crossing a bridged ladder.
- (f) It is common practice to permanently mark the strings of the main ladder to indicate the maximum permissible extension for bridging.

## Notes on the use of Roof Ladders

Whilst it is not possible to cater for all circumstances in which roof ladders may be used, the following points of guidance should be observed wherever practicable.

1. An extension ladder should be pitched to a point slightly to one side of the position where the roof ladder is to be used. It should be extended at least three and preferably five rounds above the eaves and extra care should be taken if resting it on plastic guttering.
2. The roof ladder should be under-run, hook uppermost, and positioned adjacent to the strings of the extension ladder on the side that is to be used with the hook pointing towards the opposite string. A firefighter should mount the extension ladder and ascend until able to place one arm between two appropriate rounds near the head of the roof ladder with the round resting firmly on the shoulder and the ladder comfortably counterbalanced.  
  
The firefighter should then continue to ascend to a suitable point just below the eaves where a leg-lock can be taken with the leg opposite to the side where the roof ladder is being carried (Plate 16).
3. The roof ladder should be transferred from the shoulder and, grasping both strings the wheels rested on the roof. The grip should then be transferred to the rounds and the ladder manoeuvred towards the ridge at an angle of approximately 10 degrees away from the extension ladder. Once the hook has passed beyond the ridge the roof ladder should be turned over, towards the extension ladder, and adjusted to ensure that the hook is resting firmly on the opposite side of the roof (Plate 17).
4. When transferring to, or from, the roof ladder the sequence of movements must be foot, hand, hand, foot. The nearest foot/hand being transferred first (Plate 18).
5. When making up the roof ladder the reverse procedure must be adopted, one crew member receiving the roof ladder when the firefighter on the extension ladder approaches the ground. The roof ladder should be under-run and carried clear of operations.

# Drill L 1

## Slipping and pitching a 9 m or 10.5 m ladder (crew of three)

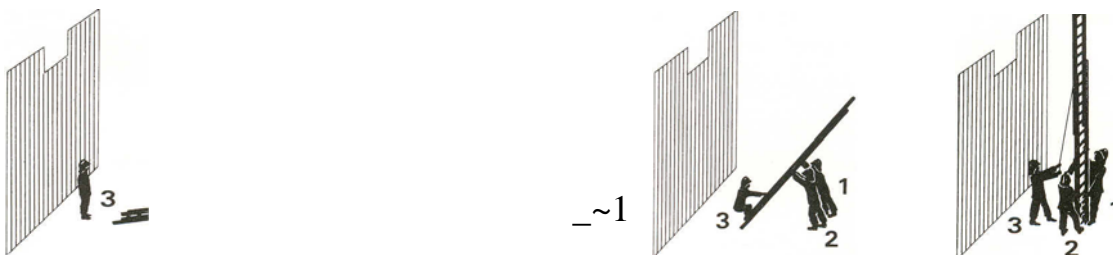
### Specific objectives

- 1 Operate the mechanism used to secure the ladder to the appliance.
- 2 Slip the ladder from the appliance.
- 3 Carry and position the ladder.
- 4 Pitch the ladder.
- 5 Give the appropriate words of command.
- 6 Under-run the ladder.
- 7 Brace the ladder.
- 8 Foot the ladder.
- 9 Extend the ladder.
- 10 Pawl the ladder.
- 11 Make-up the ladder.
- 12 Climb and descend the ladder.
- 13 Take a leg-lock on the ladder.
- 14 Step off the ladder.
- 15 Step onto the ladder.
- 16 Explain the terms 'Head in' and 'Head out'.
- 17 Stow the ladder on the appliance.

*Preliminary detail:* As given in PD2.

### 'Get to work'

NO.1 gives the order 'Stand-by to slip'. The crew dismount and NO.1 and/or No.3 release the fastenings. When ready No.1 gives the order 'Slip', No.3 grips the heel of the ladder and, assisted by Nos.1 and 2 at the rear of the appliance, eases it backwards until the head of the ladder is within a distance of about two rounds from the gantry. Nos.1 and 2 lift the ladder clear of the appliance.



Nos.1 and 2 at the head and NO.3 at the heel, carry the ladder to the required position at right angles to the face of the building with the heel at an appropriate

distance from the building. Making certain that the correct side of the ladder is uppermost, the heel of the ladder is placed on the ground. No.3 places both feet on the bottom round and pulls on a higher round.

NO.1 gives the order 'Under-run' and Nos.1 and 2 raise the ladder to the vertical position by under-running with both arms fully extended and working closely together.

NO.1 gives the order to 'Extend'. No.3, by means of the line, extends the ladder to the required height, NO.1 giving the order 'Well' followed by 'Lower', and No.3 engages the paws by pulling on the line. Nos.1 and 2 brace the ladder whilst it is being extended. The ladder is then carefully placed into the window or against the building and the heel adjusted to a safe working angle.

## Drill L2

### Slipping and pitching a 9 m or 10.5 m ladder (crew of four)

#### Specific objectives

**Note:** L 1 provides the core objectives for this drill.

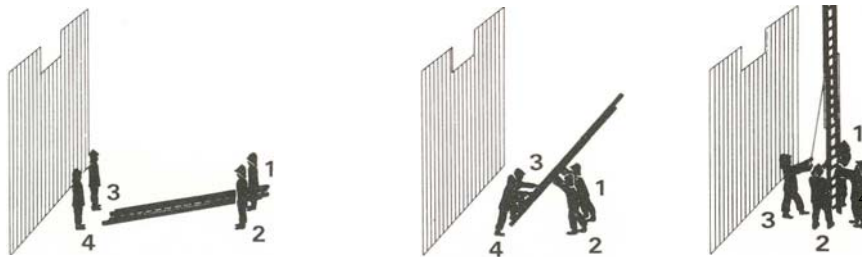
*Preliminary detail:* As given in PD3.

#### 'Get to work'

NO.1 gives the order 'Stand-by to slip'. The crew dismount, NO.1 and/or No.3 release the fastenings and No.1 gives the order 'Slip'. Nos.3 and 4 grip the heel of the ladder and, assisted by Nos.1 and 2 at the rear of the appliance, ease it backwards until the head is within a distance of about two rounds from the gantry. Nos.1 and 2 lift the ladder clear of the appliance grasping it firmly.

With Nos.1 and 2 at the head, Nos.3 and 4 at the heel, carry the ladder to the required position at right angles to the face of the building with the heel at an appropriate distance from the base of the building. After making certain that the correct side of the ladder is uppermost, the heel of the ladder is placed on the ground. Nos.3 and 4 place their inner feet on the bottom round, i.e., the right foot of No.3 and the left foot of No.4, and pull with their hands on a higher round and Nos.1 and 2 raise the ladder to the vertical position by under-running.

No.1 orders 'Extend'. No.3 by means of the line extends the ladder to the required height. NO.1 gives the order 'Well' when sufficiently extended and 'Lower' to house the extension onto the pawls and NO.4 doubles round to the front of the ladder and trips the pawls. Meanwhile, Nos.1 and 2 brace the ladder while it is being extended. The ladder is then carefully placed into the window or against the building and the heel adjusted to give a safe working angle.



#### Make-up

Nos.1, 2, 3 and 4 take up their previous positions at the heel and pull the ladder into a vertical position. No.1 gives the order 'Extend to lower'. No.3, by means of the line, raises the extension slightly to trip the pawls. NO.1 gives the order 'Well' followed by 'Lower' and No.3 then houses the extension.

NO.4 ensures that the pawls engage on the bottom or second round. Nos.3 and 4 place their inner feet on the bottom round, throw their weight backwards and pull with their hands on a higher round.

Nos.1 and 2 lower the head of the ladder by under-running. The crew then carry the ladder to the rear of the appliance. Nos.1 and 2 lift the head of the ladder onto the gantry and all four members of the crew push the ladder into the riding position. Nos.1 and/or 3 secures the fastenings after which a check is made by attempting to slip the ladder.

The crew then mount, NO.1 reporting to the Officer-in-Charge.

*Note:* To extend a ladder on which the extending line lies on the working face of the main section, NO.3 doubles to the front of the ladder, extends to the required height and No.4 trips the pawls. To house the extension, No.3 operates the line and NO.1 sees that the pawls engage on the bottom or second round.

After housing the extension, NO.3 returns to the back of the ladder and resumes position with No.4 at the heel.

# Drill L3

## Slipping and pitching a 13.5 m ladder (crew of four)

### Specific objectives

*Note:* L 1 provides the core objectives for this drill.

- 1 Under-run the ladder using the props.
- 2 Site the props on the ground.
- 3 Plumb the ladder.
- 4 Using the props place the head into the building.
- 5 Explain the procedure to be adopted when the ladder is to be used in high winds.
- 6 Explain the purpose of the props.
- 7 Explain the terms 'Step in' and 'Step out'.

*Preliminary detail:* As given in PD3.

### 'Get to work'

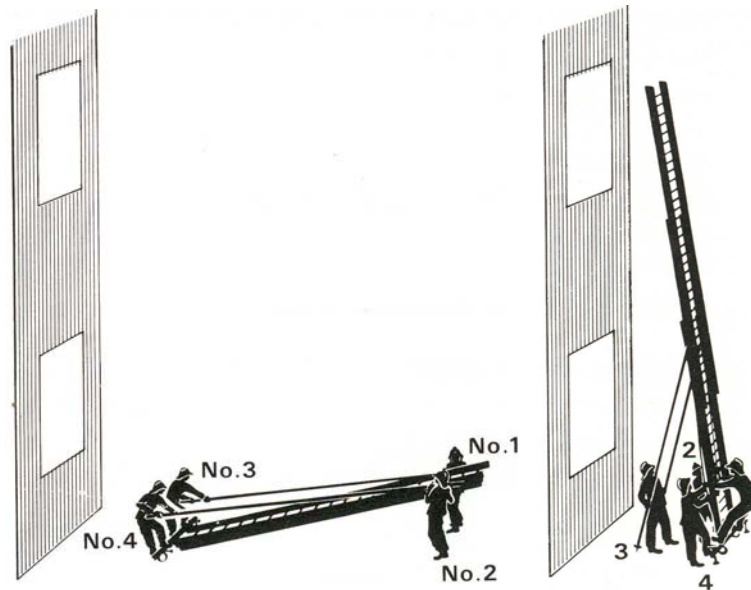
The ladder is slipped from the appliance and positioned to the building as detailed in Drill L2.

Nos.3 and 4 release the props from the clips, then support the heel with their inside feet on the jack beam outside the strings and, with the props on the outer side of the body, pull on them by throwing their weight backwards as Nos.1 and 2 under-run and raise the ladder. Nos.3 and 4 continue to support the heel until the ladder has reached the vertical position at which time Nos.1 and 2 take over with their outside feet. Nos.3 and 4 rest the props on the ground in line with each other and with the strings, between the ladder and the building.

If it is necessary to plumb the ladder, NO.1 gives the order to NO.2 'Plumb head, left' or 'Plumb head, right' and No.2 plumbs the ladder by adjusting the appropriate jack. NO.1 gives the order 'Well' when the ladder is vertical.

NO.3 steadies the props and NO.1 braces the ladder from the front by straddling the base of the ladder, both feet on the jack beam with a foot outside each of the strings. NO.1 gives the order to extend, Nos.2 and 4 at the rear extend the ladder to the required height by hauling on the line. NO.1 gives the order 'Well' followed by 'Lower' and NO.2 houses the extension slightly to engage the pawls. Nos.3 and 4 then lift on the props and, assisted by Nos.1 and 2 at the heel of the ladder, lower the head of the ladder carefully into the window or against the building. Nos.3 and 4 place the props on the ground in the best position to support the ladder, about two-thirds of the distance from the base of the ladder to the wall. No.2 checks the plumbing and readjusts if necessary.

## Make up



No.1 supports the heel of the ladder and Nos.3 and 4 lift upwards with the props to clear the head of the ladder from the building. Nos.3 and 4 then rest the props while No.2 at the rear of the ladder, on the orders of No.1, hauls on the line to clear the pawls, houses the extensions and ensures that the pawls engage on the bottom round.

No.2 centralises the plumbing if necessary, Nos.3 and 4 push the props until the ladder is in the vertical position and take over the support from Nos.1 and 2.

Nos.1 and 2 then under-run the ladder assisted by Nos.3 and 4 who throw their weight backwards on the props. When the ladder is on the ground Nos.3 and 4 replace the props in the clips.

The ladder is then returned to the appliance as detailed in Drill L2.

The crew mount, No.1 reporting to the Officer-in-Charge.

## Notes

### 1. Ladder stowage

Where the ladder is carried on the appliance with the main section down, it should be turned over after removal from the appliance so that the extensions are underneath when it is placed on the ground.

### 2. Soft or sloping ground

When the ladder is used on soft or sloping ground, particular care should be taken in placing and supervising the props.

### 3. High wind procedure

Where the Officer-in-Charge deems it necessary to introduce additional safety measures in high wind conditions, the following procedure should be implemented.

Drill L.3 should be carried out until the point where the ladder has been under-run and has reached the vertical position and Nos.1 and 2 have taken over the support of the ladder.

Then, Nos.3 and 4 walk back with the props, taking a line just outside the ends of the jack-beam. NO.1 takes a line of sight along the main ladder and, when the head of the ladder is pointing just above the target, gives the order 'Props down'.

Nos.3 and 4 rest the props on the ground ensuring that the base of the props are just outside the line of the jack beam on the main ladder and forward of the anchorage point of the props at the head of the main ladder. (The ladder is pitched in this way to ensure that an 'Pi frame across and through the ladder creates a stable base for the ladder to work on).

Once the ladder is in this position Nos.3 and 4 remain in position on the props, No.1 braces the ladder by straddling on the jack beam. No.1 gives the order to extend and NO.2 at the rear extends the ladder to the required height. Any excess movement caused by the wind can be counteracted by Nos.3 and 4 adjusting their weight on the props.

Once the ladder has been extended and is resting on its pawls it can be lowered into the building in the normal way.

When 'making-up' ensure that the base of the props takes a line just outside the ends of the jack beam and forward of the anchorage point of the props at the head of the main ladder. Nos.1 and 2 support the heel of the ladder and Nos.3 and 4 lift upwards with the props to clear the head from the building. The ladder may then be made up in the normal way.

# **Drill L4**

## **Slipping and pitching a 13.5 m ladder to the face of a building over an obstruction (crew of four)**

### **(Props to the face of the ladder)**

#### Specific objectives

**Note:** L 1 and L3 provide the core objectives for this drill.

- 1 Explain the purpose of the drill.
- 2 Explain the purpose of the props forming the 'A' frame.

*Preliminary detail:* As given in PD3.

#### **'Get to work'**

The ladder is slipped and pitched to the vertical position as in Drill L3.

When the ladder is in a vertical position Nos.3 and 4 will be controlling the head with Nos.1 and 2 bracing the ladder.

No.1 give the order 'No.3 to the face of the ladder'. NO.3 takes up a new position in line with the strings and at right angles to the rounds on the right side of the ladder (facing the building).

With No.3 in the new position and controlling the head of the ladder, NO.1 gives the order 'No.4 to the face of the ladder'. No.4 takes up a position in line with NO.3 but on the left side of the ladder.

With Nos.3 and 4 controlling the head of the ladder, No.1 takes over the bracing of the ladder alone by straddling the ladder with both feet on the jack beam and firmly holding the strings. NO.2 releases the securing pin.

#### **'Plumbing the ladder'**

If it is necessary to plumb the ladder No.1 will give the order 'Plumb head right' or 'Plumb head left' to NO.2. No.2 will operate the appropriate jack, No.1 giving the order 'Well' when the ladder is plumb. Only slight adjustment may be made when the ladder is extended. No.1 gives the order 'Extend' and NO.2 moves close under the ladder to the extending line and extends the ladder alone. NO.1 gives the order 'No.3 take over sighting'. No.3 is then responsible for giving the order 'Well' when the ladder has been extended to the required height.

When they are in position, NO.1 will give the order 'Into the building', Nos.3 and 4 now walk slowly forward firmly holding the props as the ladder is depressed to its position on the building. The props are now housed in their clips.

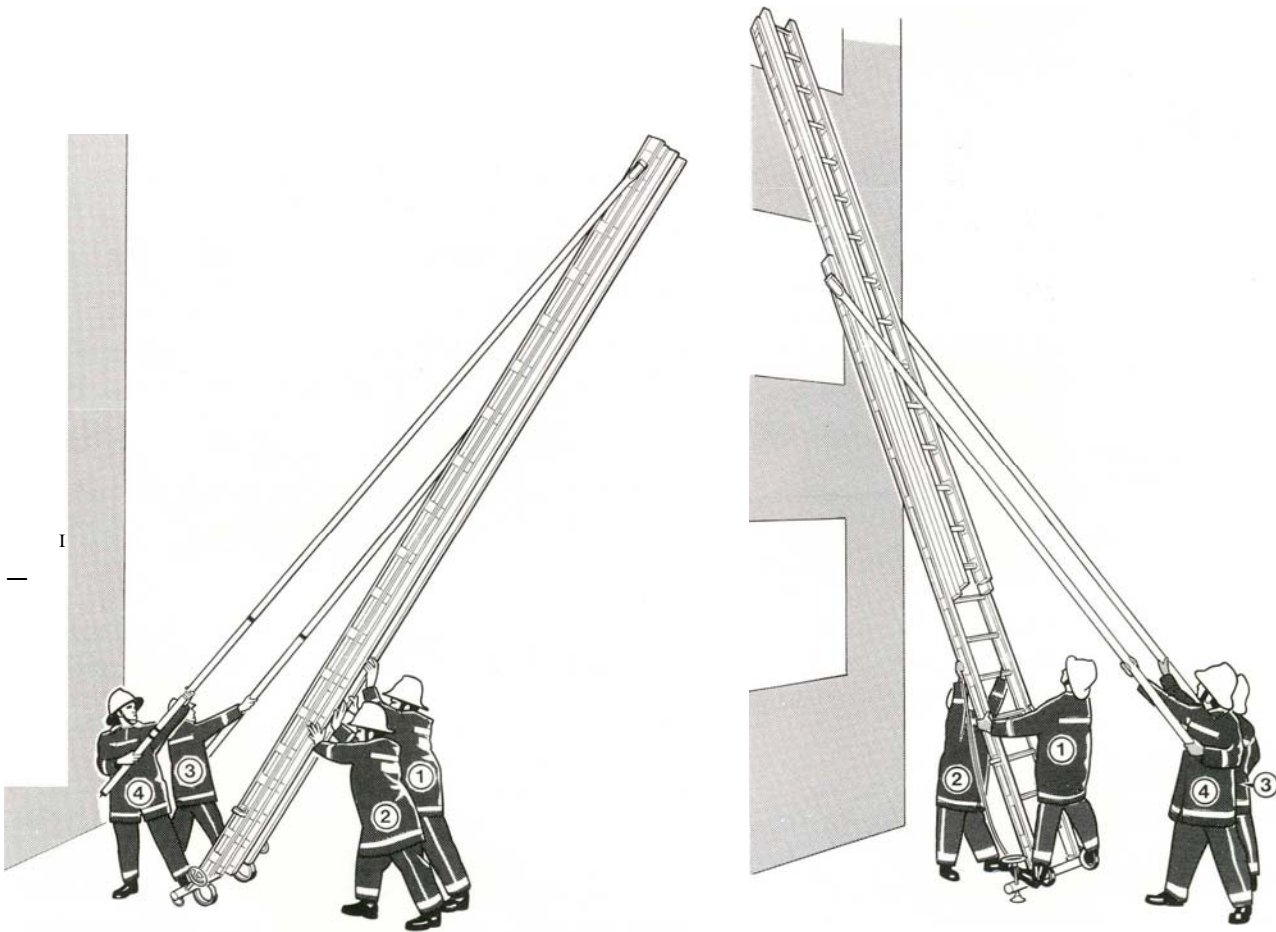
## Make up

Nos.3 and 4 remove the props from the clips and take up position at right angles to the rounds in line with the strings at the face of the ladder. With Nos.1 and 2 bracing the ladder, Nos.3 and 4 pull on the props and clear the head of the ladder from the building bringing it to the vertical position.

NO.1 now takes over the bracing of the ladder alone (by straddling the ladder on the jack beam) whilst No.2 moves close under the ladder and houses the extensions. No.2 replaces the securing pin and then returns to brace the ladder with No.1.

No.1 then gives the order 'No.3 to the underside'. No.3 takes up a position close under the ladder. When No.3 is controlling the head of the ladder No.1 gives the order 'No.4 to the underside'. No.4 joins No.3 close under the ladder and in line.

The ladder is then made up and returned to the appliance as in Drill L2.



**Note:** Whilst the props are housed in the clips ALL loads on the ladder should be applied with care and vigorous or excessive movement should be minimised. This is particularly important when the ladder is extended to, or near to, maximum.