X-Net ® 3T(LH) Vehicle Lightweight Arresting Device
User Manual
WARNING:

The activity for which X-Net is designed and therefore the use of the product is inherently hazardous and may entail risk of serious injury or death, as well as property damage. Its use must be strictly in accordance with these operating instructions and only by fully trained personnel in order to minimize such risks. All potential users of this product must be apprised of this warning.

Since the arresting of vehicles is a potentially hazardous operation, it needs to be undertaken only after the operator has carried out thorough and proper risk assessments, reference to all training, operating instructions/manual, and safety cases.

Furthermore, there are many arrest scenario variations e.g. vehicles size, vehicle speed, collateral risks, road conditions, traffic conditions etc, the risks associated with these should be judged on the individual merits. The decision to arrest or take alternative action should be made by an experienced individual. **QinetiQ accepts no liability with respect to any injury or damage caused to persons or property as a result of using the nets.**

The user agency must fully understand the hazards associated with deploying the X-Net and the possible consequences that may arise. **QinetiQ accepts no liability for improper use or misuse of the nets.**
1. Introduction

This instruction booklet is designed to assist potential users who may deploy the X-Net® vehicle arresting system and enable them to do so as quickly and safely as possible and to recover the system if unused.

The manual covers the following family of vehicle arresting nets;

- X-Net® 3T (LH) Vehicle Lightweight Arresting Device, Part Number 10015047
- X-Net® 3T (LH) Training Net, Part Number 10016613

The instructions are not intended as a substitute for training, which should be conducted to minimise risk and make the best use of the system. User agencies are strongly advised to carry out training relating to their specific needs.

This manual also covers the use of training nets which are designed to enable users to train in checkpoint set up, net deployment and re packaging without the need for consuming operational nets. Refer to Appendix A for details.

2. X-Net® description

The X-Net® vehicle lightweight arresting system is a novel man portable device; it can be rapidly deployed to arrest a range of vehicles. Unique barbed spikes on the leading edge of the net pierce the front tyres of the target vehicle; the net then envelops the front tyres and is pulled tight under the vehicle. This stops the wheels rotating and brings the vehicle to a standstill in a similar distance to an emergency stop.

The X-Net 3T system comprises:

1. X-Net device x 1
2. Remote deployment lanyards x 2
3. Anchor lanyards x 2
4. Plastic anchor pegs x 4
5. Stowage bag x 1
6. User manual (this document) x 1
3. Hazards

The X-Net® vehicle arresting system is manufactured using a large number of sharp barbed spikes. Care should be taken to avoid treading on the spikes or unnecessary handling to avoid injury. The use of safety gloves is necessary when handling. Do not sit, lie or kneel on the bag.

The spikes are covered with plastic sheaths to prevent snagging, and help prevent cuts to personnel. Do not remove these sheaths as they are designed to crush down and expose the spikes when a tyre passes over them.

A formal safety appraisal for the X-Net® has been conducted and hazard sheets are available from the issuing agency.

The hazards are summarised below:

1. The X-Net® MUST be used in accordance with the User Manual.
2. The X-Net® vehicle arresting system is manufactured using a large number of sharp barbed spikes. Care should be taken to avoid treading on the spikes or unnecessary handling to avoid injury.
3. Do not sit, lie or kneel on the carrying bag containing the X-Net®.
4. The spikes are covered with plastic sheaths to prevent snagging, and help prevent cuts to personnel. Do not remove these sheaths as they are designed to crush down, and expose the spikes when a tyre passes over them.
5. To prevent injury to persons or even death X-Net® should not be used against motorcycles or articulated vehicles including vehicles towing trailers.
6. X-Net® should only be deployed by experienced operators. If less experienced operators are used they must be supervised by the experienced operators.
7. X-Net® should only be deployed by personnel who have received adequate training.
8. To prevent injury to persons or even death, all personnel should stand clear of the deployed X-Net® in case the target vehicle makes evasive manoeuvres or tries to avoid the X-Net®.
9. Two people are required to lift and handle the packed X-Net® carrying bag to prevent back and/or other physical injuries.
10. Do not place X-Net® before a bend or other hazard in the road. Failure to comply may result in death or injury to persons.

11. Wear gloves and avoid unnecessary handling of X-Net® to prevent hand injury from barbed spikes.

12. To prevent injury to personnel do not step on barbed spikes on the leading edge of X-Net®.

13. Do not wrap the deployment lanyards around hands or fingers to prevent personal injury.

14. Release the lanyards as soon as possible after deployment of X-Net®, and stand clear of area to prevent personal injury.

15. Approach all vehicles stopped by the X-Net® with caution. On some occasions the vehicle may be stopped but still have limited mobility.

16. Before removing X-Net® from the vehicle conduct a local risk assessment, and make sure that the situation is safe and under control.

17. When removing X-Net® from the vehicle personnel must wear personal protective equipment made to a recognised standard, and follow safe working procedures. If jacking the vehicle up to remove wheels it must be safely jacked-up, and secured using axle stands and chocks.

18. X-Net®3T (LH) is not designed to be used for arresting vehicles at speeds greater than 50 mph (80 kph) or weighing more than 3 tonne.
4. Venue selection

The X-Net system is designed to arrest a vehicle in a predominantly straight line.

Deploy the X-Net® with the leading edge on a flat, smooth surface. On road surfaces where this is impractical, ensure that the leading edge is not deployed on top of ridges, pot holes, ruts, large stones etc. Remove any objects or obstructions in the area under the leading edge to ensure that the leading edge is as flat and smooth as possible.

Typical arrest distances for medium passenger vehicles are as follows:

<table>
<thead>
<tr>
<th>Vehicle speed</th>
<th>Typical distance to arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 km/h (30 mph)</td>
<td>25 metres (82 feet)</td>
</tr>
<tr>
<td>64 km/h (40 mph)</td>
<td>36 metres (118 feet)</td>
</tr>
<tr>
<td>80 km/h (50 mph)</td>
<td>55 metres (180 feet)</td>
</tr>
</tbody>
</table>

It is therefore essential that an arrest venue be selected that has around 100m of straight road beyond the device. If used in wet conditions then this distance should be doubled. Do not deploy X-Net® approaching a bend or other hazard.

A fast moving vehicle will have a much higher chance of evading arrest. Therefore the venue should be selected ideally just after a natural slowing feature to maximise the chance of success.

5. Limitations

The X-Net® vehicle arresting system can be effective at stopping the majority of passenger vehicles and light trucks.

**Arrests should not be attempted against MOTORCYCLES or ARTICULATED vehicles including vehicles towing trailers.**
6. Deployment

Note: If the net has been in storage for some time, it is advisable to unpack and re-pack to ensure the net is free to deploy and not too compacted before taking out on operational use.

The X-Net® bag should be positioned at the roadside (Figure 1) to suit the direction of vehicle approach, as indicated by the markings on the bag, i.e. arrow marked ‘Towards Target Vehicle’ pointing towards approaching target vehicle.

*Figure 1: Place bag at roadside*

In preparation for arrest open the bag and remove the net from the bag in its folded state (Figure 2).

*Figure 2: Remove X-Net from bag*
Pull the non-spiked end of the net (using yellow tabs) parallel with the roadside (Figures 3 & 4). Ensure the net is positioned so the **spiked leading edge is closest to the approaching vehicle** and ensure the **spikes will be pointing upright** when the device is pulled across the road.

![Figure 3: Unfold X-Net using yellow tabs](image)

The device can be left in this prepared state at the roadside until a decision to deploy is made.

![Figure 4: X-Net prepared at roadside](image)
7. Deployment methods

There are 2 methods of deployment both will require 2 personnel to conduct effectively;

- Lanyard deployment – for pre-planned arrest position
- Rapid deployment – for short notice arrests

7.1 Lanyard deployment

If time is available to prepare the device, anchor lanyards can be clipped to the net to anchor the net and deployment lanyards can be clipped to the opposite handles to allow a semi-remote deployment option.

The lanyards are fitted with breakaway safety joints, which are designed to shear and reduce the risk to the user.

To deploy with lanyards

Plastic anchor pegs are provided which can be used on soft verges to assist positioning of the net. Clip the anchor lanyards to the bottom edge of the net and peg out the lanyards at a diverging angle (Figure 5).

*Figure 5: Attach anchor lanyards*
Clip deployment lanyards to the opposite end of the net and lay lanyards across the road surface. (Figure 6)

When the decision to deploy is made, draw the net across the road using the lanyards and pull with a diverging angle between the lanyards to keep the net straight until the net is fully deployed across the road (Figures 7 & 8).

Extreme care should be taken not to wrap the lanyard around hands or fingers. As soon as possible after deployment, release the lanyard and stand clear of area.

Once fully deployed (Figure 8) stand clear of the net, lanyards and any anticipated evasive manoeuvres the target vehicle may take and await arrest.
7.2 Rapid deployment

X-Net® can be deployed quickly by pulling the device across the road using red tabs (Figure 9). Ensure the leading edge is taught and spikes are upright. Then stand clear of the area. (Figure 10)

![Figure 9: Rapid manual deployment of X-Net](image)

The device is now ready for use.

Ensure you stand clear of the device or any anticipated evasive manoeuvres the target vehicle may take and await arrest.

![Figure 10: Fully deployed X-Net](image)
8. **Follow up action**

The vehicle is normally arrested and immobilised and follow up action can be carried out accordingly. On some occasions the vehicle may be arrested and still have limited mobility and caution should therefore be taken when approaching the vehicle.

9. **Clear up**

Once the occupant/s have been dealt with, the vehicle will require recovery. The most effective way is to remove the bulk of the net from the front tyres with a sharp knife and then recover the vehicle in the normal way (see section 3, hazards).

The remaining net should be disposed of securely to avoid unauthorised re-use.
10. Re-packing X-Net

If the X-Net® is deployed and not used for an arrest, the device should be correctly re-packed to allow subsequent deployments to be made effectively.

Starting from the end labelled ‘FOLD FROM THIS END’ fold the net in a ‘concertina’ pattern (Figure 11) by dragging the net across the road at the marked fold points (eyelets on trailing edge and notches on leading edge) so that the device is folded into equal sections the same width as the bag.

Fold the net again by picking up from underside and positioning folding line A with the edge of the spike section B (Figure 12).
Finally fold the rest of the net over the spike section and place the net in the bag with the spike section towards the bag end marked ‘SPIKES THIS END’ (Figures 13 & 14).

The device is then ready for re-deployment.
11. Maintenance

The X-Net® requires minimal maintenance. However the following points will increase the life and reliability of the system.

The X-Net® should be checked before use, if any damage is noticed it should be reported to the issuing agency as the performance of the system may be affected.

The user should periodically lay the X-Net® on the ground to ensure the material does not set in a creased manner. This should be carried out as a minimum every 3 months. Normal training and rotation of systems can accommodate this.

If any spike tubes are damaged (exposing the spike barbs), these tubes should be replaced to prevent snagging.

If used in wet conditions the user should lie out the net to dry to avoid mould growth.

Modifications or repairs should not be carried out without consulting the supplier.

12. Shelf life

The X-Net® device has an effective service life of 4 years from manufacture. If the net is deployed but not used it can be repacked and subsequently stored, on a number of occasions, providing the X-Net® system is maintained correctly (see section 11). After the expiry date marked on the net label has passed, user agencies are recommended to return unused devices for a service check.
Appendix A – Training nets

The X-Net® training net is produced to the same overall dimensions as an operational net. (Figure 15) The main difference is the omission of spikes which are replaced with steel discs to represent the weight of spikes. This enables the net to be deployed in the path of a vehicle and allow the vehicle to drive over the net repeatedly without engaging the spikes.

The net can be used to train in checkpoint set up, net deployment and re-packaging without the need for consuming operational X-Nets.

Figure 15: Training net

The deployment and repacking method is the same method as used for operational nets. Refer to earlier sections of manual.
Users should monitor wear of training nets if used repeatedly. Trials have shown minimal signs of wear after in excess of 50 vehicle passes.

For further information please contact the issuing agency.