

# Trawl door rigging

**This fact sheet gives generalised pointers on the rigging configurations possible for demersal trawl doors and the effects various alterations to the rigs have on the performance of the trawl door.**

Information on the optimum set up for specific designs of trawl doors should be obtained from the relevant trawl door supplier or manufacturer.

## Warp towing point

There are five main types of towing point arrangements used in otter board design and construction:

- Towing chain
- Combination chain and bracket
- Horizontal hinge bracket
- Triangle fixed bracket
- Fixed bracket

Each has characteristics which make them suitable for a variety of fishing methods or seabed conditions.

### 1. Towing chain

Trawl doors with this method of attachment are easy to store due to the absence of brackets, are economical to produce, simple to maintain and have many adjustments available. The chain is also effectively a form of hinged bracket.

The disadvantages are that the chain may stretch or wear thus affecting the angle of attack, heel or pitch. Shooting in heavy sea conditions may require a special technique to prevent the tension being released from the chain during shooting and

the spread collapsing. This may be particularly true if only a twin backstop system is used.



### 2. Combination chain and bracket

Trawl doors with this attachment method have the largest number of possible adjustment combinations and are easy to store onboard. The chain, if high quality and kept to a short length, produces no operational problems.

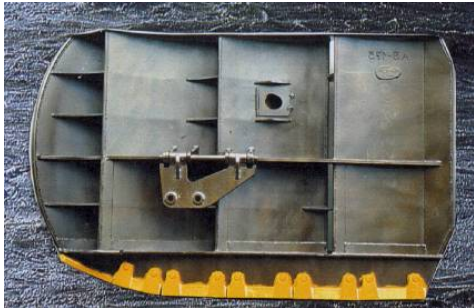
The disadvantages include the additional cost of manufacture compared to the chain system. Furthermore the numerous adjustments may confuse the inexperienced.



### Horizontal hinged bracket

Using trawl doors fitted with this type of attachment produces excellent rough ground performance and is favoured because the hinges allow the door to pivot over large boulders. It can be stored easily on the vessel, the bracket folding across the face of the door.

The disadvantages include an obvious additional construction cost and the requirement for careful setting up of the pivoting arm during manufacture. The hinge bolt needs to be checked regularly for wear or stiffness in order to prevent deterioration in performance.



### Triangle fixed bracket

This method of construction moves the point of attachment and pivoting further away from the face of the trawl door. It is simple to operate as there is usually only one possible position of warp attachment. Triangle fixed brackets usually produce consistent shooting behaviour and will not collapse during initial shooting in heavy seas.

Maintenance and wear problems are minimal but the bracket can be vulnerable to damage when hauling, also this type of fixed bracket can cause storage problems. There is no

simple way to alter the angle of attack with this type of bracket.

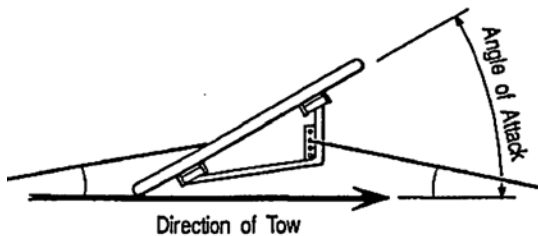


### Fixed bracket

The fixed bracket incorporates strength into the design and simplicity of operation is a feature. A fixed bracket also encourages the door to rise off the seabed if collapsed on its face after a hard turn, by holding the face of the door off the seabed. It requires minimal maintenance although care must be taken to avoid damage to the vessel when hauling. The towing point may polish or wear more readily and the option of an angle of attack change depends on the number of hole in the bracket.



### Angle of attack adjustments using the warp attachment

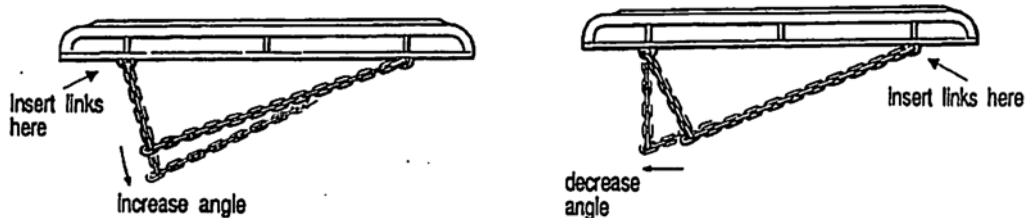


The **Angle of attack** is the angle between the shoe of the trawl door and the direction along which it is being towed. **Adjusting the angle of attack of the trawl door by making alteration to the towing point is considered a coarse adjustment and most doors provide few options for making alterations at this point.**

To increase the angle of attack the towing point should be moved aft and away from the face of the trawl door. In contrast to decrease the angle of attack the towing point moves forward and closer to the door. Angles of attack above  $45^\circ$  are considered inefficient and increase drag and produce high fuel consumption, while angles below  $30^\circ$  produce poor shooting behaviour and door instability.

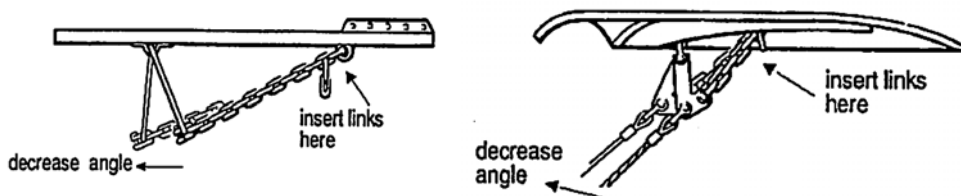
### Towing chain

The angle of attack can be adjusted by either adding or removing links from the towing chain or by moving the warp shackle along the towing chain.



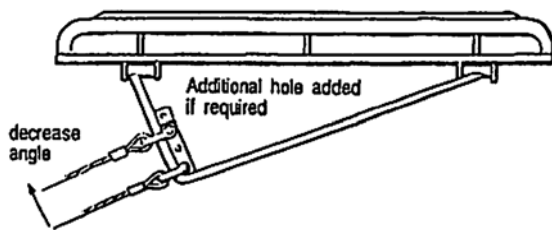
### Combination chain and bracket

If a combination chain and bracket is used then adjustments to the angle of attack are made by inserting links in the restraining chain.



### Horizontal hinged bracket

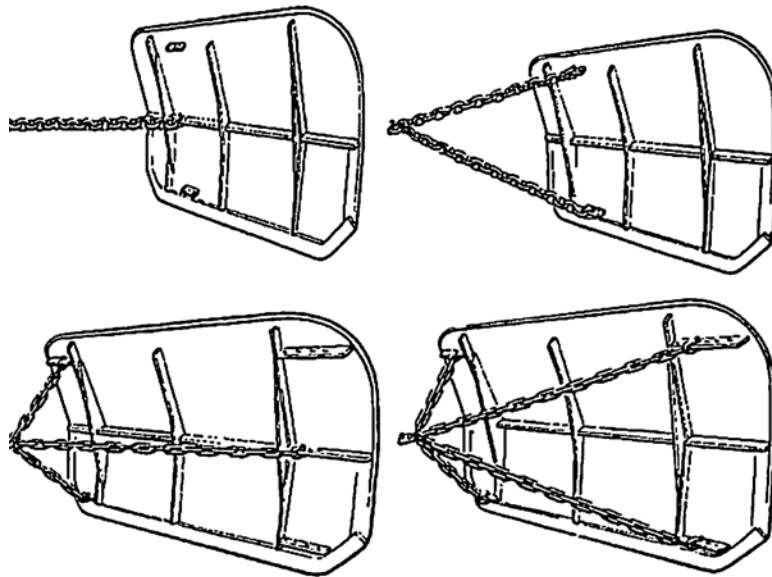
The hinged bracket arrangement is a little restrictive and usually only three options to change the angle of attack are available, however if lower angles are needed then additional hole can be welded to the bracket.



Trawl doors with **Triangle fixed bracket** and **fixed bracket** arrangement provide few if any alteration to the warp towing positions. If an adjustment to the angle of attack is required here then modifying the size or position of the fixed brackets can achieve this. To enable alternative angles to be obtained in the fixed bracket design, more holes need to be added to the bracket.

### Backstop attachment

Examples of 1,2,3, and 4 chain backstop arrangement on common Vee doors.

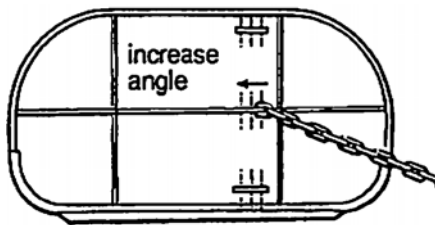


Most trawl doors are rigged with one, two, three or four chain backstops which can be relatively easy to adjust and simple to maintain. Fine adjustments to the angle of attack and the heel of a door are normally carried out by making changes to the length of these chains. These days' modern doors are supplied to the fisherman with the relevant rigging information. Once set up and providing the skipper and crew are monitoring the doors performance and the wear, it is rarely necessary to alter the recommended rig.

### Angle of attack and heel adjustments using the backstops

If necessary fine adjustments can be made to the length and positioning of the backstops to change the angle of attack, the heel and the pitch of the trawl door.

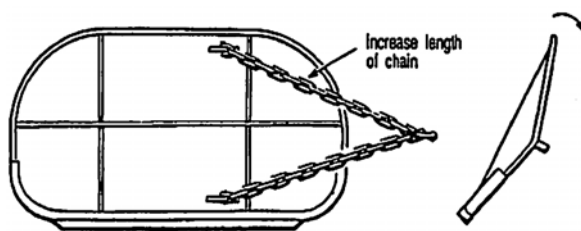
#### Adjusting the Angle of Attack



Single backstop

To increase the angle of attack the attachment point is moved forward. This applies to both the single and double backstop rig.

#### Adjusting the Heel

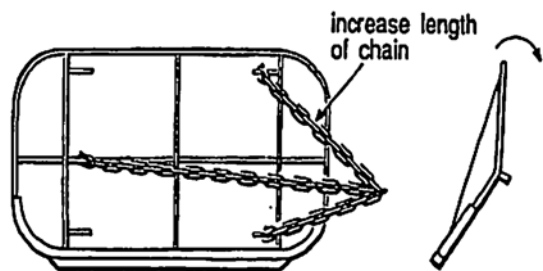


If the top chain is lengthened then the door will heel inwards.

If the lower chain is lengthened then the door will heel outwards.

Alterations needed to adjust the heel angle are small and should be carefully considered.

Care must be taken when adjusting the three and four chain systems to ensure all chains remain in tension. This can be difficult with the four chain system. If only an angle of attack change is required then both aft chains must be adjusted by the same amount. If only one chain is adjusted then the heel angle may inadvertently be altered.



Care must be taken when adjusting the three and four chain backstop set up to ensure that all chains remain in tension.

#### For further information

Summarised extract from Otterboard Performance and Behaviour Manual (Seafish, Ifremer, Difta). Published 1993, revised 1995.

#### For further information refer to the above publication or contact:

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