



Wheeled Detrenching Grapnel

Asset no. GD 3-1 and 3-11

Weight	1.9 Tonnes
Length	4.125m
Width	2.4m
Height	1.25m
Maximum Towing Tension	25 Tonnes
Shear Pin Failure Load	25 Tonnes Approximately
Tine Types: -	
Detrenching	0.8m
B.A.S.	0.3m, 0.4m, 0.5m, 0.6m, 0.7m, 0.8m
Maximum Working Depth	1000m
Acoustics: -	
Command Unit	Applied Acoustics PAM 2520
Pingers	Applied Acoustics 10kHz Type 669-138
Hydrophone	Applied Acoustics 7914A
or:-	
Command Unit	Simrad Receiver Type 114
Pingers	Simrad 10kHz Type 138
Hydrophone	Simrad Type 157



1.3 GENERAL DESCRIPTION (Fig 1 Page 1 - 11)

1.3.1 Grapnel

The detrenching grapnel comprises, a prefabricated steel shank with a skid secured by a pin at the front end and a pivoted wheel support and grapnel crown on the rear end. The fluke is bolted to either side of the grapnel crown.

The rear of the grapnel is supported on wheels. These reduce friction and allow for the free flow of the soil being pushed up by the fluke. They also keep the overall towing force as low as possible and allow steady control of the grapnel's working depth.

The wheels are mounted on a wheel support axle containing two RAILKO bushes with a thrust washer either end of the housing.

Two types of flukes can be mounted on the grapnel crown depending on the application, they are as follows:

- a) For detrenching work (cable recovery), a 0.8 metre narrow tip fluke.
- b) For plough assessment mode, a wide replaceable fluke tip, identical to the plough share tip, is fitted to a heavy duty fluke.

The standard fluke penetration is 0.8 m and, at this setting, the grapnel will maintain a full working depth in all uniformly friable sea-beds. It will however ride over hard underlying layers that it cannot penetrate.

The grapnel is designed to withstand towing forces up to 25 tonnes at the fluke tip. To protect the grapnel from permanent damage, forces in excess of 25 tonnes cause a shear pin to fail, allowing the fluke to rotate over the obstruction. The grapnel can then be recovered to the ship and a new shear pin fitted.

To make cable recognition easier, the grapnel is fitted with a sonar transmitter system. The fluke has a trigger mounted near the grapnel crown. When cable rides up the fluke and forces against the trigger, a 10 kHz sound pulse from the pinger, mounted on the wheel arm, is switched from a rate of one pulse per eight seconds to two pulses per second.

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The sound pulses can either be picked up by hull-mounted transducers or by a hydrophone lowered over the ship's side. The signals are then relayed to a receiver loudspeaker on the bridge.

For Detrenching Work

The grapnel can also be fitted with a sensor which indicates when the rear of the grapnel is riding out of the sea-bed. This may occur if the grapnel encounters a hard underlying layer of rock or if it engages a boulder.

A second sensor can be fitted to provide an indication when the front of the grapnel lifts up, due to insufficient tow rope being deployed.

The grapnel is fitted with a third sensor (trigger) to indicate when a cable rides up on the fluke.

The grapnel is fitted with a fourth sensor which is connected in parallel with the third sensor to indicate when the grapnel is upside-down.

For PAS Work

The grapnel penetration depth is monitored by two magnetically-operated reed switches mounted in the cable guard at the rear of the support arm.

The grapnel is fitted with a mercury switch to indicate when the grapnel is upside-down.

The grapnel is fitted with a trigger to indicate when a cable rides up on the fluke.

If the trigger is removed the fluke can be folded up and locked in position, making the grapnel stable on a flat deck.