



# DOUBLE DRUM HIGHLEAD WINCH

## Introduction

This Information Note is one of a series derived from Technical Development Branch (TDB) Outdoor Workshops (ODW). It is produced as a guide to part of a harvesting system suitable for use in small scale woodlands. ODWs are a TDB initiative designed to offer practical advice to practical people through presentation, demonstration and user guidance. The ODW programme will involve repeating trials where appropriate and introducing new systems around Great Britain so that a wide range of sites, systems and practitioners can be included.

*Information has been gathered from equipment and method trials based at a limited number of locations. This information therefore must be taken as indicative only. Variation could be expected for other operations where factors such as terrain, crop specification, product specification, operating distances or operator efficiency differ.*

## The System

The Double Drum Highlead System is a method of extracting timber to the roadside by cableway over concave ground for distances up to c 150 m. Winch ropes are suspended above ground by spar trees (towers) and pulley blocks (Figure 1). The ropes support a carriage and control its direction and position, either away from (haul back) or towards (haul in) the landing bay.

The system has the following attributes:

- Good landing site, the tractor offset allows the product to be positioned at the roadside or on the road.
- Quick return of the carriage into the wood (no operator pulling rope-wire).
- Products can be pre-choked as prior load is being winched in.



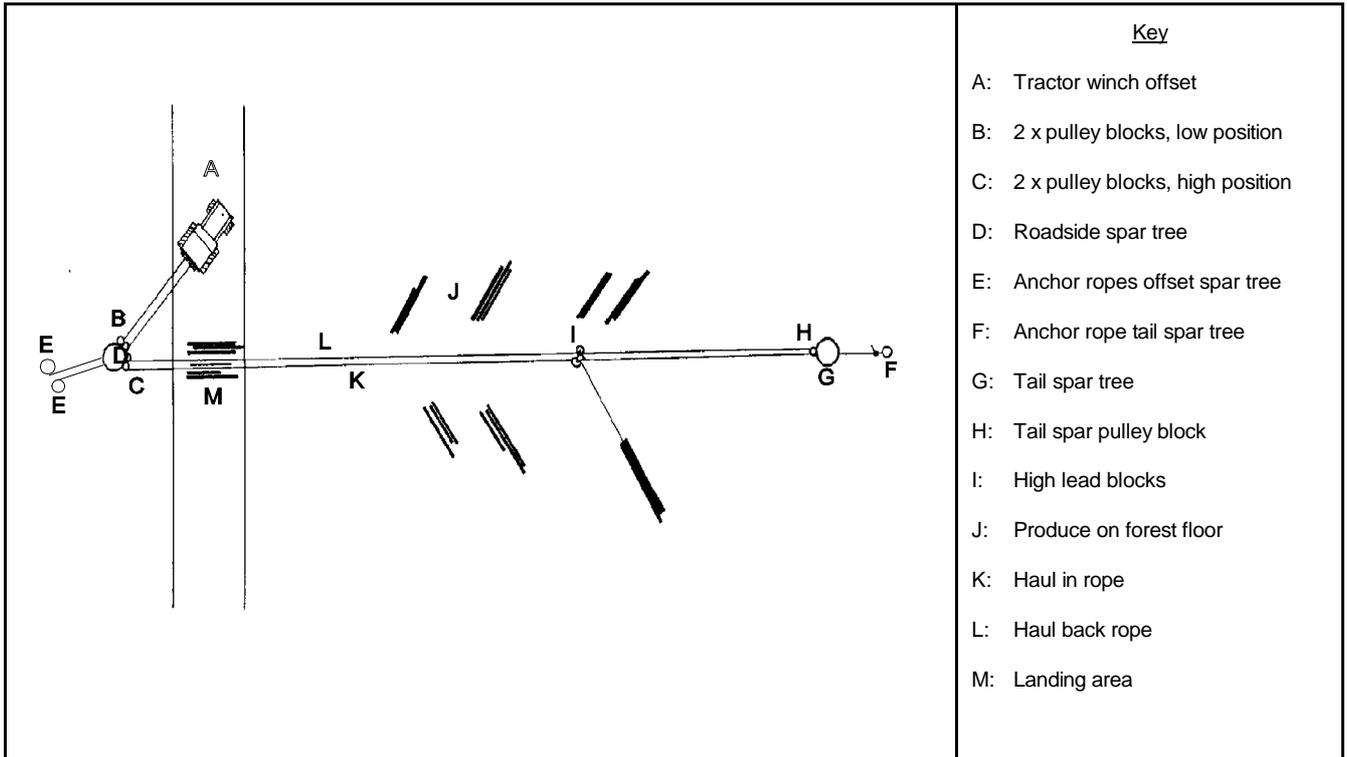
## Costing Operating Systems

There are various options when costing operating systems. In this profile (1998) the costing (Table 1) assumes that machinery and equipment has been purchased at the second-hand price and labour has been charged to the operation.

The High Lead winch system is labour intensive, requiring 2 operators (winchman and chokerman). With this high labour cost it is essential to maximise output where possible. The main variables affecting output are the thinning density, volume per rack and the average load size. A limited case study extracting shortwood in an undermanaged broadleaved crop (Table 2) consisted of a thinning density of 28 m<sup>3</sup>/ha, a rack volume of 7.0 m<sup>3</sup> and an average load size of 0.13 m<sup>3</sup>. The load size is more likely to be increased when extracting pole length but the conversion at roadside would require to be considered. An effect of changing the variables for the operation studied is shown in Table 3.

Figure 1

System Layout



- Key**
- A: Tractor winch offset
  - B: 2 x pulley blocks, low position
  - C: 2 x pulley blocks, high position
  - D: Roadside spar tree
  - E: Anchor ropes offset spar tree
  - F: Anchor rope tail spar tree
  - G: Tail spar tree
  - H: Tail spar pulley block
  - I: High lead blocks
  - J: Produce on forest floor
  - K: Haul in rope
  - L: Haul back rope
  - M: Landing area

Table 1

Case Study: Machine/Equipment Description and Cost

Item	Specification	Capital Cost (£)	Cost (£/hr)
Ford County 1164	4 wheeled tractor. 6 Cylinder. Fitted with an Iglad 4000 winch. Winch ropes - 8 mm Haul In and 7 mm Haul Back. Manual clutch/brake controls for winch.	12 000 (secondhand)	2.57
Operator	2 operators @ £64.00/day on 8 hr day	-----	16.00
Felling	Man £8.00/hr, Saw £1.00/hr	-----	9.00
Total			27.57

Table 2

Case Study: Site and Crop Characteristics

Soil	Clay loam, free draining, overlying shale. Depth to 200 + cm.	Species	Main crop of Poplar and DF with understorey of mixed hardwoods	Age	c 40 yrs
Vegetation	Grass/Fern/mixed flora	Form	Variable		
Terrain	Slope up to 20%. Good access.	Average Tree (m <sup>3</sup> )	0.15 (thinning)	Thinning Volume (m <sup>3</sup> /ha)	28

Table 3

Case Study: Outputs and Costs

Operation	Average Load Size (m <sup>3</sup> )	Average Volume/ha (m <sup>3</sup> /ha)	Rack Length (m)	Output (m <sup>3</sup> /shr)	Cost (£/m <sup>3</sup> )		
					Extraction Study	Load/Density variation	Load/Density/Distance Variation
Felling	-	-	-	1.30	6.29	6.29	6.29
Extraction study	0.13	28	80	0.89	20.87	-	-
Load/density variation	0.26	56	80	1.80	-	10.32	-
Load/density/distance variation	0.26	56	120	1.72	-	-	10.80
Total cost					27.16	16.61	17.09
All Outputs for skilled and accustomed operators shr = Standard Hour (Includes allowances of 27% for Personal Needs and Rest, and 16% for Other Work such as refuelling)							

At the case study site (Table 2), which had an average tree size of 0.15 m<sup>3</sup> and a rack length of 80 m, the extraction output was 0.89 m<sup>3</sup>/shr. This equates to a system cost of £27.16/m<sup>3</sup>.

The shortwood produce was well presented although stacks were small due to the low thinning volume per hectare. This gave a low average load size, which resulted in a low output (Table 3).

**Comments on System**

All forestry operations require assessment of risk and operational training to ensure safety and efficient working.

The High Lead system is for the trained forestry contractor and not for the casual user. Training in the operation and rigging techniques is essential.

The High Lead is a good and relatively inexpensive system. Auxiliary components including such as pulleys, strops ground anchors can cost c £3 000. The double drum winch system is readily adaptable to uphill and downhill extraction on either steep or very soft ground.

The time to set up the system at the roadside and at the tail spar is constant. Therefore short rack lengths should be avoided where possible as this reduces the overall output of the system.

Two man operation with good communications and an understanding of each operator's task is a necessity to prevent problems with the extraction operation. Good pre-planning is required to identify spar trees, product presentation and landing areas.

Where pole lengths are to be extracted a suitable conversion site would need to be identified.

If large quantities of produce are extracted to roadside secondary extraction will be required as soon as possible to prevent blockage in the system.

**Associated TDB Publications**

Associated publications available now are:

- Technical Note 20/96 - Using Farm Tractors and Machinery in Woodlands.
- Technical Note 21/96 - Adding Value to Farm Woods.
- Technical Note 25/96 - Harvesting, Extraction and Processing of Low Grade Broadleaves.

Forestry Commission  
 Technical Development Branch  
 Ae Village, Dumfries  
 DG1 1QB

Tel: 01387 860264  
 Fax: 01387 860386  
 e-mail: tdb.ae@forestry.gsi.gov.uk

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