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# Hydratongs

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Forestry Commission  
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# HYDRATONGS

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## Introduction

The 'Hydratongs' is a small hydraulic grapple developed by the Forestry Commission at Thetford Forest, East Anglia, for fitting to the rear of a light, rubber-tyred, wheeled agricultural tractor. It is essentially an "easy terrain" machine and can be used on all areas where such a tractor can move freely to extract timber from stump, either in line or selective thinnings or in clear fellings. The output using this equipment is higher than with 'Thetford Tongs', 'Alice Holt Drawbar', chains, etc. These alternative types of equipment are all described in Booklet No. 19, *Timber Extraction by Light Agricultural Tractor*, by J. W. Barraclough (HMSO 1967. 25p, postage 6½p.)

The 'Hydratongs' is hung from an 'A' frame jib attached to the rear of the tractor. The jib can be raised and lowered by the tractor hydraulic lifting mechanism. The grapple jaws are opened and closed by two double-acting hydraulic rams operated by the tractor's external hydraulic supply. The grapple is suspended from the top of the 'A' frame by a flexible coupling which gives sufficient free movement when working and which can absorb shock loads. The driver can rotate the grapple manually by a cable linkage; an alternative version is available with a hydraulic rotator.

Controls are simple. Jib and grapple are lifted by the standard hydraulic lift control by the driver's right hand. The grapple open-and-close control is mounted on the off-side mudguard and is worked by the driver's left hand. If it is necessary to rotate the grapple to pick up a load, the rotation control is operated

by his right hand, whilst the left lowers the jib to locate the load.

The 'Hydratongs' is supplied by J. H. B. Implements Limited, of Ickburgh, Thetford, Norfolk IP26 5JG. Cost of the current model is £384 ex works. If required, the hydraulic rotator is available as an extra at £150. (1972 prices).

## Working Method

The 'Hydratongs' is a development of the earlier, manually operated 'Thetford Tongs' mounted on similar tractors. These could only pick up one piece at a time and seldom made full use of the tractor's load-carrying capacity. 'Hydratongs' can pick up and drop loads quickly and easily without the driver leaving the cab. One or more pieces can be picked up, pulled or reversed alongside others, dropped and the combined load picked up. Since the tractor can run as quickly with several pieces as with one, the essential basic principle is:

**ALWAYS EXTRACT WITH THE  
GRAPPLE AS FULL AS POSSIBLE**

The equipment is very suitable for tree-length extraction to roadside, both in clear fellings and thinnings. Trees should be felled so that their butts point in the direction of extraction. Tip-first extraction should be avoided as poles tend to slip out of the grapple. Method details are given in figures 1, 2 and 3.

It is possible to extract material that has already been crosscut at stump into logs,

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PLATE 1 (cover): Hydratongs hauling pine logs in Thetford Forest.

billets, small poles, etc. by making up small heaps and extracting as described above. Because pieces must be moved to obtain a full load, this form of extraction is likely to be more costly than extraction of tree lengths. Cost-wise it is not practicable to extract pieces of less than 6½ feet (2m) unless they have been made up into piles by the fellers.

Extracted loads can be drawn alongside a roadside stack, the tractor turned at right angles to the load whilst still gripping it, and then reversed on to the heap. The load is released and the process repeated at the tail of the load. In this way a stack of up to 3 feet (0.9 metres) high can be built up.

### The Tractor

The terrain at Thetford Forest allows light agricultural tractors to be used successfully for timber extraction. The Massey-Ferguson MF135 tractor with Multipower has been used with the 'Hydratongs', but any similar powered tractor with adequate external hydraulic supply is suitable.

Weights must be fitted to the front of the tractor to counterbalance the load behind the rear axle. Guarding is essential on the radiator, sump, tyre valves and dynamo; guarding is explained in Booklet No 19.

### Technical Details

Full grapple jaw opening	4.25 ft.	(1.3m)
Grapple cross-section area	3.2 sq.ft.	(0.3 sq.m)
Maximum reach of grapple behind rear tyre on level ground	2.6 ft	(0.8m)
Maximum downward reach below ground level	13 inches	(0.33m)
Maximum height to which load in grapple can be raised	16 inches	(0.4m)
Maximum width inside fully closed grapple	4 inches	(0.1m)
Approximate load capacity	1 ton	(1 tonne)
Weight: hydratongs only	¼ ton	(240 kg)
Weight: total additional on tractor including front counterweight, guarding cab and hydratongs	0.9 ton	(880 kg)
Grapple rotation (manual and hydraulic)	± 135°	
Grapple hydraulic cylinder diameter	2½ inches	(63.5 mm)
Minimum external hydraulic supply	6 gals/minute	(0.45 litres /second)



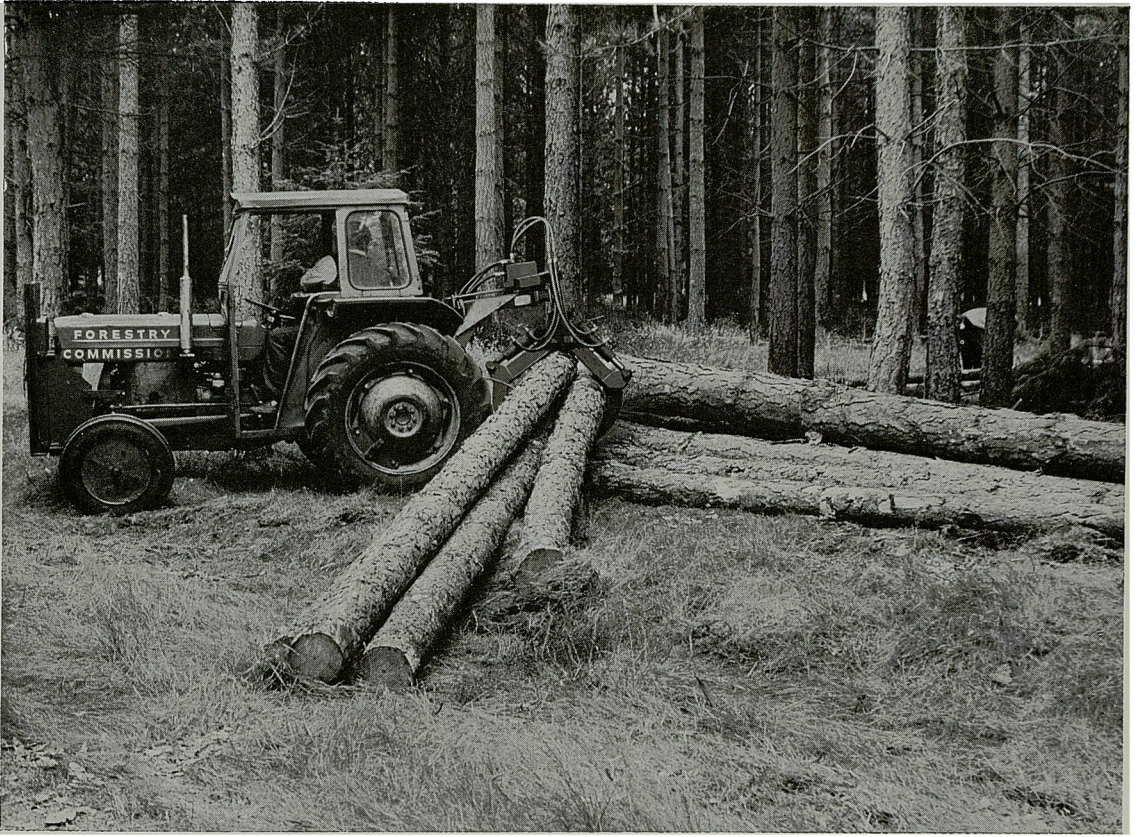


Plate 2. Stacking extracted timber with Hydratongs.

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Figure 1  
 USING HYDRATONGS IN LINE THINNING

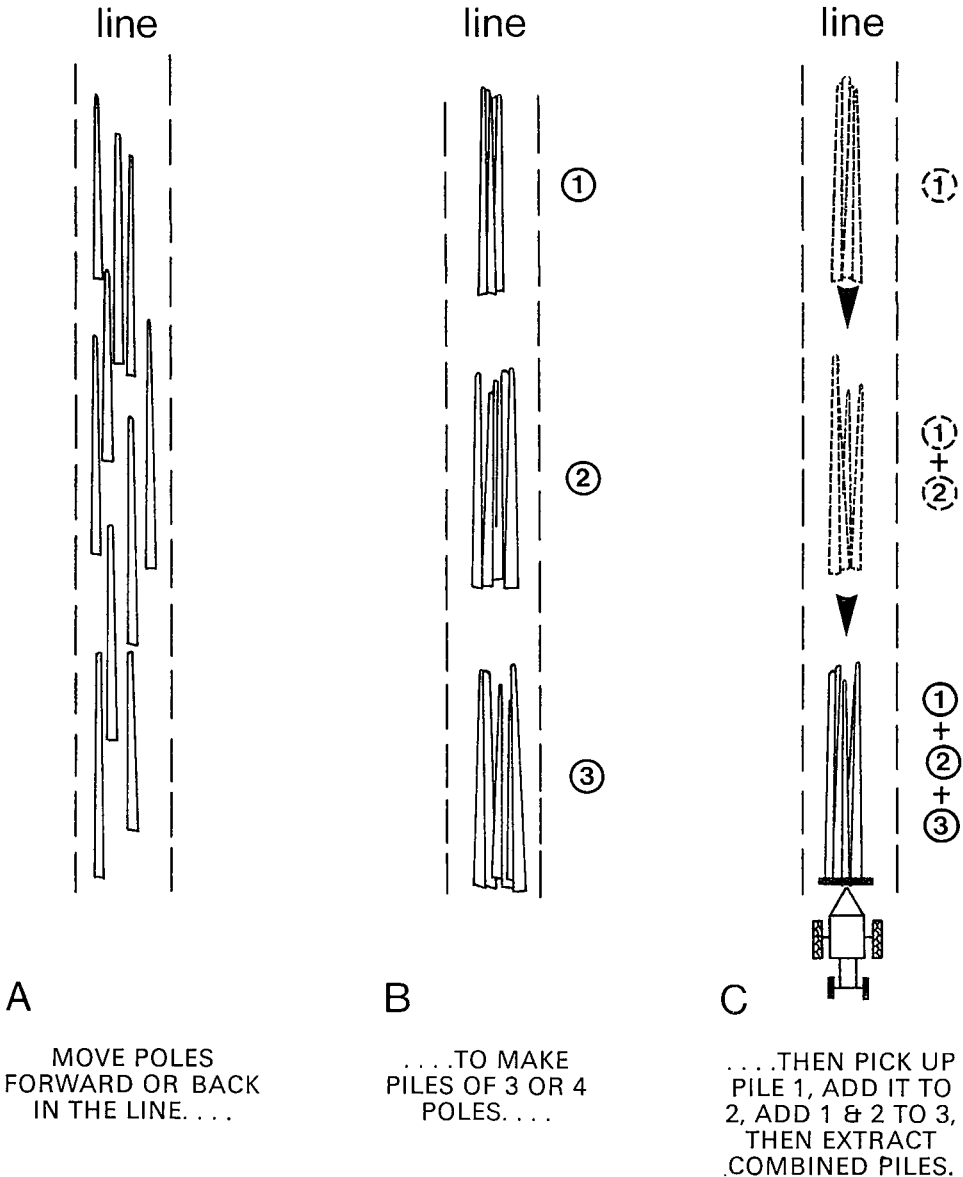
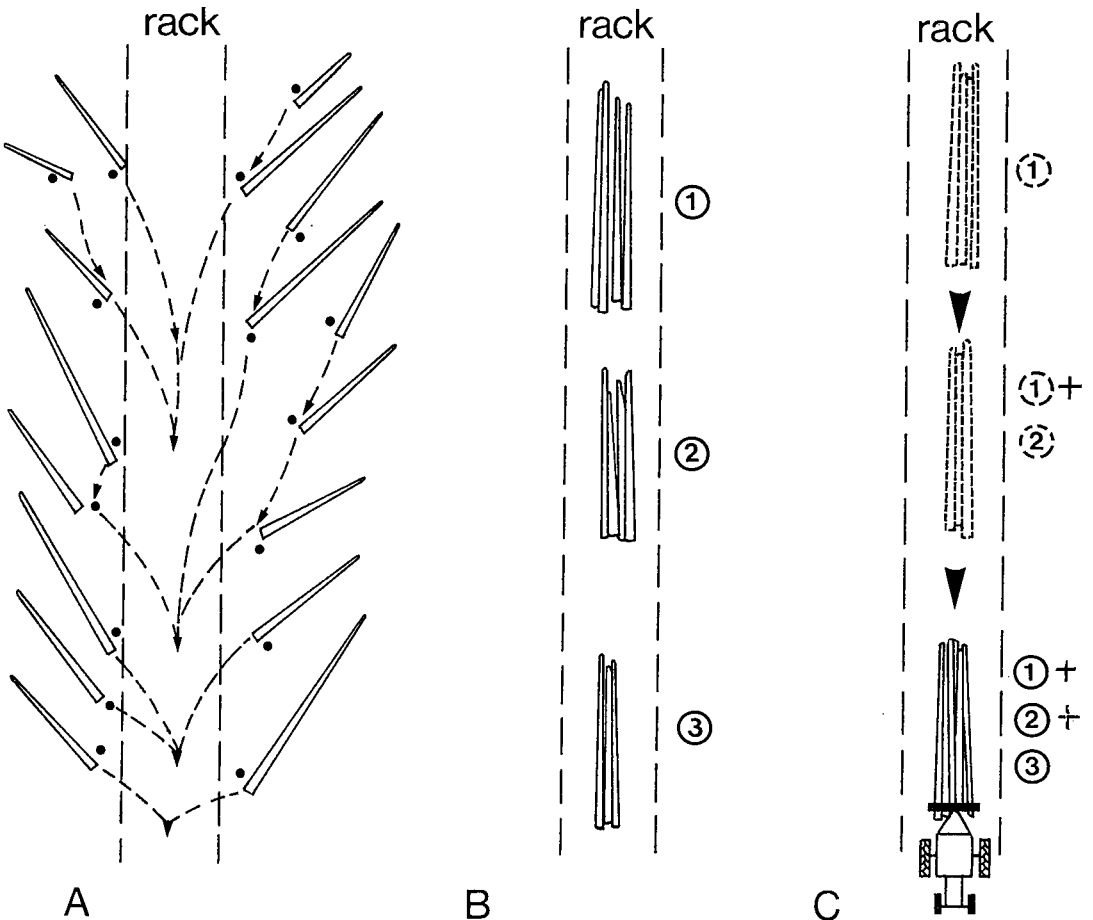


Figure 2

USING HYDRATONGS IN SELECTIVE THINNING



A

MOVE POLES TO  
RACK FROM  
WITHIN STAND....

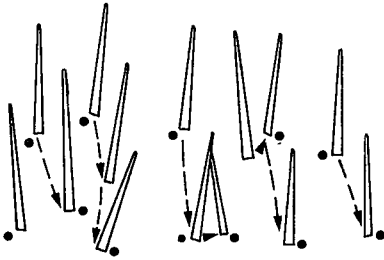
B

... TO MAKE UP  
PILES OF 3 OR 4  
POLES IN THE RACK....

C

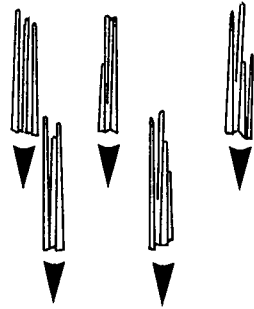
... THEN EXTRACT  
PILES 1+2+3 AS  
IN LINE THINNING.

Figure 3  
 USING HYDRATONGS IN CLEAR FELLING



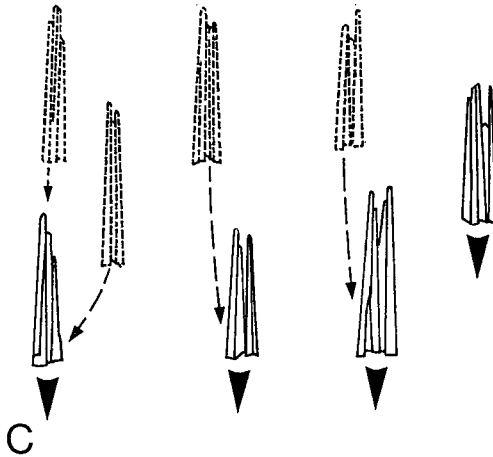
A

DO SUFFICIENT MOVING  
 OF POLES. . . .



B

. . . . TO MAKE UP SUITABLE  
 PILES, LYING CONVENIENTLY  
 FOR EXTRACTION. WITH BIG  
 TREES EACH PILE MAY BE A  
 FULL LOAD IN ITSELF. . . .



C

. . . . BUT IF TREES ARE SMALL  
 AGGREGATE PILES TO MAKE FULL LOADS  
 AS IN LINE THINNING.



### Operating Costs

The capital cost of the equipment at July 1972 prices is:

MF 135 tractor with Multipower	£1,550
Hydratongs	384
Guarding for tractor, say	150
Miscellaneous, fitting, etc.	36
	<hr/>
	£2,120

The cost per hour (depreciation, repairs, maintenance, fuel and lubricants) can be estimated at £0.80 assuming a 'life' of 5 years and a usage of 1600 hours per year. If a different 'life' and usage is obtained, this cost

will vary accordingly. Operator cost, on the basis of £18 per 40 hour week + 40% incentive payment + 50% of basic pay for overheads (insurance, sick pay, holidays etc.), amounts up to £0.85 per hour.

Total cost of driver plus machine is therefore £1.65 per hour.

### Expected Output

Under the conditions described in this leaflet, the following outputs should be obtainable using the methods described. The figures given can be taken as indicative of thinnings. On clear fellings a trained operator should be able to achieve outputs of 1 ton or more per hour.

TABLE 1 : OUTPUT IN IMPERIAL MEASURES

Average extraction distance (yds)	Output in Hoppus feet per working hour for tree sizes of (Hoppus feet)					
	2.5	5.0	7.5	10.0	12.5	15.0
50	170	180	190	205	230	250
100	160	165	175	190	205	225
150	150	155	165	175	190	205
200	140	145	150	160	175	185
250	130	135	140	150	160	170

TABLE 2: OUTPUT IN METRIC UNITS

Average extraction distance (m)	Output in cu m per working hour for tree sizes of (cu m)					
	0.1	0.2	0.3	0.4	0.5	0.6
50	6.2	6.5	7.0	7.5	8.3	9.2
100	5.8	6.0	6.5	6.9	7.5	8.2
150	5.4	5.6	6.0	6.4	6.9	7.5
200	5.0	5.2	5.5	5.9	6.3	6.8
250	4.7	4.9	5.2	5.5	5.9	6.3

#### Acknowledgments

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