

15-2  
PARKATE DEER, DEERINGE PLOUGH,  
WITH HYDRAULICALLY DEPTH CONTROLLED  
Mouldboard - Sept 1971  
MPS 68/50 - Addendum No. 2

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FORESTRY COMMISSION

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THE PARKGATE DEEP DRAINING PLOUGH

(SYN "HUMPY" PLOUGH)

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The Parkgate Deep Draining Plough (Syn. "Humpy" Plough)

Summary - This plough has been developed for deep draining. Studies show that the plough towed by three tractors will give a drain depth of 3 ft in peat and 2'4" to 2'6" in peat (9-15") over clay. There is variable fall back of spoil depending on conditions but on the sites seen the finished drain, having allowed for some hand clearance of spoil, was prepared for under £1 chain.

The resulting drain does not reach the standard of <sup>8</sup>/digger drain but it can be prepared more cheaply and more quickly especially as size of area to be drained and drain lengths increase, and it is suggested these factors outweigh the slightly poorer drain produced.

1. Introduction

The plough sometimes called the "Humpy" plough, has been developed by Wm. Clark of Parkgate, Dumfries to produce drains down to 3 ft depth in accordance with the specification in Research Branch Paper No. 26. Earlier attempts at ploughing drains to this depth with ploughs such as the S.F. Cuthbertson and the Parkgate Deep Drainer on a straight beam have not given the necessary depth.

2. Details of Equipment

2.1. Plough

A single throw plough mounted on a modified Parkgate beam carried by double tractor wheels. Control by hydraulic or P.T.O. winch. The name "Humpy" is derived from the curve in the beam ahead of the box which is designed to prevent spoil being caught up between the box and the beam. A drawbar shear pin is designed to fracture at pulls in excess of 9 tons.

2.1.1. Plough Adjustment

The body pivots on the beam and adjustment is by the mouldboard depth screw. In addition there are three settings at the drawbar attachment point to allow adjustment of the body in relation to the ground.

2.1.2. Discs

Twin discs of 34" diameter are mounted. The discs are adjustable to accommodate the varying top width of drain with changes in depth.

2.1.3. The Mouldboard extension or "Packer" pushes the spoil away from the drain. An extension of 2'6" was fitted on the N.(W) plough.

2.2. Tractors

The plough was towed during the studies by a combination (normally 3) of the following machines (details in para. 5).

|    |                                                  |           |            |                                     |
|----|--------------------------------------------------|-----------|------------|-------------------------------------|
| 1. | County Short Wide Track                          | 54 B.H.P. | 30" tracks | Bearing pressure<br>2.7 lbs/sq in.  |
| 2. | County Long Wide Track                           | 54 B.H.P. | 30" tracks | Bearing pressure<br>2.26 lbs/sq in. |
| 3. | Fowler Track Marshall<br>(Long wide track)       | 54 B.H.P. | 30" tracks | Bearing pressure<br>2.4 lbs/sq in.  |
| 4. | International B.T.D.8<br>+ Winch (Boughton Cl/8) | 52 B.H.P. | 16" tracks | Bearing pressure<br>5.7 lbs/sq in.  |

Winch pull (underwind) bare drum 27,200 lbs. full drum  
13,000 lbs.

### 3. Description of Site

The studies were carried out on the Alwen Beat of Clocaenog Forest N.(W) during the period August - October 1967; subsequent observations were made at other forests in N. Wales. The soil type is largely a peaty gley with peat from a few inches in depth up to 2 ft. interspersed with areas of deep peat. Altitude 1250-1400 ft.

The draining was carried out through crops planted during the period 1953-64 and in the recently planted areas the dominant vegetation was molinia with heather on the pure peat. Some studies over a newly ploughed area provided interesting comparison. This land was in the same locality, but in private ownership, the work being done on an agency basis.

Slopes ranged from  $0-17^{\circ}$ , the most common range being  $4-8^{\circ}$  on the peaty gley and  $0-1\frac{1}{2}^{\circ}$  on the pure peat.

The tree crops, mainly spruce, varied in height from 2-12' and in crops in the thicket stage a 12' ride had been cut along the drain lines to allow passage by the equipment without interference. This gave the added benefit of a very clear marking of the drain lines.

### 4. Layout of Drains

The line of the drains had been marked on the ground by the local staff in accordance with Research Branch Paper No. 26 at intervals between  $1\frac{1}{2}$ -3 chains. The object gradient in the drain was  $1^{\circ}-1\frac{1}{2}^{\circ}$ . In most instances contour drains only were ploughed; these fed into natural water courses wherever possible. Some main drains were ploughed but it was difficult to cross the newly ploughed contour drains in wet areas. All drains were laid out across the original ploughed furrows which in most cases were up and down the hill.

### 5. Method of Working

Various combinations of the tractors mentioned in para. 2.2 were used. These changes were made necessary by availability of machines rather than a desire to test various methods. This allowed comparisons of the following combinations, the method of working (towing or winching) being detailed in each case.

1. Long Wide County + Short Wide County + Short Wide County towing the plough.
2. B.T.D.8 + S.W.C. + S.W.C. - Winching in mineral - towing and winching in wet deep peat.
3. S.W.C. + B.T.D.8 + S.W.C. - Winching plough
4. Track Marshall + B.T.D.8 + S.W.C. - towing plough.
5. B.T.D.8 + T.M. + S.W.C. - mainly winching plough.
6. T.M. + S.W.C. - towing plough.

Towing was the normal procedure with the plough hitched to a S.W.C. tractor which was assisted as above.

In wet conditions of poor traction where the B.T.D.8 with narrow tracks was unable to tow satisfactorily, winching was used. The B.T.D.8 with winch moved forward with the other equipment stationary and it then winched in tractors and plough. In very wet conditions the B.T.D.8 needed the assistance to the Short Wide County to tow it into position and in these instances it subsequently winched the remaining S.W.C. with plough.

## 6. Study Method

Time study separated the main elements in the job. Drain depth measurements were taken at chain intervals and the soil description noted at each measurement. Pegs were inserted by the study man at each distinct change in ground conditions to find total lengths of various ground types and to associate times to ground conditions.

Drain depth was measured vertically upwards from the mid point of the drain bottom to a rod stretched across from side to side at ground level. This is in line with current Research Branch assessments.

## 7. Discussion of Results

With so many factors affecting drain depth and form, the assessment of the effect of any one factor must be somewhat subjective bearing in mind the limited number of studies carried out.

The main considerations are:-

1. Drain depth.
2. Drain form.
3. Speed of draining.

## 8. Drain Depth

### 8.1. Soil Type

The mean depth for all the studies varied between 37" and 24.5". In pure peat the target depth of 3 ft. was consistently achieved but in the peaty gley conditions as the depth of peat decreased the drain depth also fell. Where the clay contained concentrations of large stones (approx. 1 ft. diam.) the drain was poor. The plough had to be lifted constantly to allow progress and as a result an uneven drain bottom was formed. As a fairly typical example of depths analysis of study 329/1 shows:-

35" depth in pure peat.  
30.5" in peat clay (19" peat 11.5" clay)  
22.5" peat stony clay (local areas only)  
22" shaley mineral soil (considerable fall back reduced depth)

The last two measurements were on sites occurring infrequently on the area.

As the proportion of clay to be turned out increases, the drawbar pull increases, and slipping of the tractor tracks occurs. The driver lifts the plough slightly to allow normal running but with reduced drain depth.

### 8.2. Ground Bearing Capacity

Track slip is a critical factor in drain depth and (other things being equal) drains will be deeper where drier surface conditions allow improved traction. In pure peat with a vigorous heather vegetation a drain depth of 36" was achieved; however on a newly ploughed area in very wet conditions the same 3 tractor combination could only give a 33" drain. This is important in relation to the timing of drainage - regrowth of vegetation over a ploughed area prior to drainage allows distinctly better traction.

### 8.3. Gradient

Ploughing is obviously easier downhill but at the ruling gradient of 1-2% no measurable differences were noted. However, Study 339 with two tractors shows that 28" was achieved in 12" and 16" clay on a downhill slope of 9-12°. The remaining ground on this study on slopes up to 3° gave 26" on a similar depth of peat and clay.

#### 8.4. Tractor Combination

Attempts to gain sufficient depth in the peaty gleys with two crawler tractors resulted in poor results, and in breakdowns, and it was decided by the Conservancy staff to try three tractors.

Basically these give a steady pull at more constant throttle setting resulting in a more regular depth. The various combinations used are detailed in para. 5 but for towing the L.W. County leading 2 S.W. Counties was the most satisfactory and coped easily with peat conditions. As far as the other three tractor combinations are concerned the B.T.D.8 is at a disadvantage in wet conditions in that its ground bearing pressure is higher but this machine was of value when the winching technique was used. When winching in very wet conditions the B.T.D.8 needed one of the S.W. Counties ahead of it to enable it to move. Such conditions are the only ones in which we consider winching applicable, i.e. a wet surface over a stiff clay -- poor traction associated with a high drawbar pull.

The track Marshall appeared equal to the L.W. County except that lack of steering clutches reduced its manoeuvrability. As a result of this deficiency one track is driven at an increased speed when the other track is braked for turning purposes, resulting in the track tearing through the bearing surface and increasing the risk of bogging.

- 8.5. Cross Slope. The forces giving rise to "crabbing" are reduced if the turf is thrown downhill when ploughing on a side slope. This allows the plough to ride deeper giving a better drain. Whilst no detailed investigation of this was made an analysis of drain profile measurements in the peaty gleys showed consistently deeper drains on downhill throws. Actual measurements which are indicative rather than definitive - downhill 30"; uphill 28".

#### 9. Drain Form

In peat the drain sides are comparatively smooth and uniform with generally a low level of fallback, the form corresponding to the mouldboard shape. The turf comes out as a continuous ribbon broken at intervals (most often corresponding with the original ploughing furrow on ploughed ground) and is placed clear of the drain edge.

In peat over clay the mouldboard side of the drain is torn and irregular, the drain being broader and shallower. The turf comes out in a series of irregular broken sections. There is more fallback, mainly from the torn sides of the drain.

Drain profiles in peat and peat over clay are illustrated in the Appendix.

##### 9.1. Action of the Plough

As pointed out by Granfield in Research Branch Paper 27 on Drainage Machinery, a problem with a single mouldboard plough at depths approaching 3 feet is the "crabbing" effect. This is a result of the side thrust exerted by the single share turning out the furrow which tends to force the plough body up the batter on the side opposite to the throw. This is less of a problem in pure peat than in peat over clay soils; the harder the soil type, the greater the effort required to lift out the turf and the greater the tendency to "crab".

The forcing of the plough body away from the ridge side of the drain tends to the formation of a ragged unstable edge resulting in fall back into the drain and this is a very significant factor in the shape and form of the finished drain.

An uphill throw will require a greater force and therefore accentuates this problem. Also under these circumstances there was a greater tendency for fall back from the spoil ridge. Similar fall back also occurred on level newly ploughed ground, due it is felt to the deep single furrow ploughing breaking the ridge up.

## 9.2. Slope of Ground

Throwing the turf downhill gives a better formed drain owing to the limitation of "crabbing" by the tendency for a balancing of the forces which cause this effect. As a result both drain edges are smooth, there is less tearing, and the slope reduces fall-back.

Where the slope is  $4^{\circ}$  or more fall back is noticeably greater if the turf is thrown uphill rather than downhill, i.e. it is then necessary for the equipment to travel greater distances to ensure a constant downhill throw.

## 9.3. Drain Stability

Measurements have been made on a series of marked profiles to assess change due to weathering effect. The main observations after almost 12 months are that the peat drains have changed very little. Weathering has occurred in the peat clay type, a more stable form being assumed. There is a loss in depth where the fall and flow of water is insufficient for self cleaning. Falling in of the sides has resulted in a silting up of 3-5" in the profiles examined.

General observations on peat drains ploughed at the same period show a distinct narrowing and further work is necessary to show just how stable this shape of drain is.

## 9.4. Size of Tree Crop

Most of the work was done along cut drain lines in crops in the thicket stage (crop heights 6-12'). However the equipment has been worked in uncut thicket crops up to 15' or so. If the line is adequately marked the tractors have no trouble but the bigger trees do cause some interference and this may result in increased cleaning costs.

Clearance of the line prior to drainage is a major task. There is no necessity to clear crops one can walk and see through and beyond this it is felt clearance should be limited to that necessary for surveying purposes and access of banksman if necessary.

## 10. Factors Affecting Output

Both layout of the job and working methods are important.

### 10.1. Working Method

The towing method described in para. 5 is quicker than the winching method as with the latter there is the lost ploughing time whilst the winching tractor moves forward. There is some indication that winching gives slightly deeper drains but this is not sufficient to outweigh the extra time required. Winching is advisable in the circumstances described in para. 8.4

### 10.2. Travel Between Drains

The studies separated the travelling involved in moving from one drain to another. The travelling time with plough out of the ground averaged .6 min/chain. Pre-planning the route to cut down the travelling results in savings on the actual job. The travelling light can be expressed as a percentage of the ploughing distance.

The differences can be illustrated as follows:

When ploughing to and fro on a peat bog, travelling distance was 16% of ploughing distance.

When ploughing one way on a slope of more than 4° travelling distance was 15% of ploughing distance.

### 10.3. Drain Length

Time is occupied between each drain in manoeuvring the equipment from one to the other. Therefore the longer the actual drains are, the less proportion of time this job will occupy, and outputs should increase. The average drain length in the studies varied between 4 and 20.6 chains and averaged 13 chains.

### 10.4. Banksman

Where visibility is restricted in thicket stage crops, a banksman familiar with the area using a route plan can increase time actually spent on ploughing. Relatively small increases in output will save wages + oncosts of a banksman. Where the team is 3 tractors the extra cost would be approx. 10%. With 2 tractors however the extra cost would rise to around 16% of the total.

### 10.5. Route Planning

Output increases as the relation of ploughing time to travelling time between drains increases. It is therefore important to plan the plough route to minimise travelling and the linking of drain lengths into long runs should be the aim. Drains for ploughing should be planned as long as is compatible with drainage principles (Research Branch Paper 26).

### 10.6. Cross Slope

To reduce travelling between drains it is best to plough to and fro wherever possible but on side slopes of 4° or more one way ploughing, throwing the turf downhill, is advisable. This will give a drain of better form with less fall back of spoil and slightly greater depth. In the studies complete to and fro ploughing was only possible on the peat bog.

### 10.7. Soil Conditions

The difficulty of ploughing increases in proportion to the amount of clay appearing in the profiles. The range of times for movement of plough through the ground in the conditions shown was as follows:-

Peat .8 - 1.3 mins/chain

Peat over < 12" clay .8 - 1.4 mins/chain

Peat over > 12" clay .9 - 1.6 mins/chain

These differences in time are slight but it must be remembered that the drain depths fell in the clay. With constant drain depths the differences would certainly be larger.

## 11. Rate of Working

The average time per chain for all work elements in each of the studies varied between 1.67 minutes and 3.75 minutes/chain and the weighted average was 2.5 minutes/chain. This excludes other work (inspect and consider route, maintenance, minor repairs, debogging, etc.) and rest. Insufficient long period studies were done to assess other work accurately but it has been estimated at around 30%. A rest factor of 20% on all work has been assumed.

With these assumptions the basic times quoted above would indicate the following outputs/hour.

| <u>Basic time</u> | <u>B.T. + O.W. 30%</u> | <u>B.T. + O.W. + R.F. 20%</u> | <u>Output/hour,</u><br><u>i.e. <math>\frac{60}{\text{Col. 3}}</math></u> |
|-------------------|------------------------|-------------------------------|--------------------------------------------------------------------------|
| 1.67 mins         | 2.17                   | 2.50                          | 24 chns/hr                                                               |
| 2.5 "             | 3.25                   | 3.90                          | 15.4 chns/hr                                                             |
| 3.75 "            | 4.87                   | 5.85                          | 10.24 chns/hr                                                            |

The critical factors to bear in mind when considering these figures are average drain lengths (4-21 chains) and travel percentages (16-21%).

(Note: The overall output for 53 working days at Clocaenog was 4,713 chains an average of 89 chains/day, but it must be noted that this is overall time including lost time for repairs, bogging, weather, etc.).

## 12. Operating Costs

The hourly operating costs can be summarised as follows:-

|                                         |                 |                  |
|-----------------------------------------|-----------------|------------------|
| 2 tractors at 18/6 hr (Cons. P.V. & M.) | 37s. 0d.        |                  |
| 1 tractor at 23/- hr ( " " )            | <u>23s. 0d.</u> |                  |
|                                         |                 | 60s. 0d.         |
| 3 drivers at 7/8d. hr. + 40% incentive  | 10.75           |                  |
| + 40% oncost                            | <u>4.3</u>      |                  |
|                                         | <u>15.05</u>    |                  |
|                                         | 3 x 15.05       | 45s. 0d.         |
|                                         |                 | <u>105s. 0d.</u> |

## 13. Cost per Chain

If we take the weighted average time/chain from all the studies as given in para. 11 and the hourly operating cost from para. 12 the cost per chain can be assessed.

$$\text{i.e. } \frac{105 \text{ shillings}}{15.4 \text{ chains}} = 6.8 \text{ shillings}$$

The actual costs on 4,000 chains provided by Forester J. M. Williams of Clocaenog was 8/3d. chain. This included P.V. & M. labour and oncosts and all other attributable expenditure.

However with the fall back of spoil into the drain cleaning out has been necessary, which has involved an actual extra expenditure varying from four to six shillings per chain. If one takes the maximum cost to date, i.e. 6/- plus oncosts of 40% this would add 8/6d. to the figure above giving an overall actual cost of 16/9d. chain.

## 14. Conclusions and Recommendations

1. In pure peat a drain of good form and 3 ft. depth was ploughed; in peaty gleys as the depth of clay to be removed increased the drain depth fell to 2'3" - 2'6". On sites with a high proportion of stones or small boulders in the clay the plough was not suitable.
2. There was some fallback of the turf in peat; this was worst when draining across single furrow ploughing. On peaty gleys fall back was greater and modifications to prevent this are necessary.

3. The speed of draining is affected by many factors as detailed in the report. The average figure from the studies would indicate a daily output on the study areas in an 8-hour day of approx. 120 chains. This can be compared with a backacting digger output of possibly 10-12 chains/day in similar conditions.

In addition where the areas allow long drain runs the plough outputs will rise. Where drain lines are very short and access is difficult backacting diggers will be at an advantage.

4. In an attempt to get maximum depth 3 tractors were used. The actual costs on a total of 4,000 chains was 8/3d. for ploughing and 8/6d. for cleaning out a total of 16/9d. chain which is considerably less than the cost of drainage by backacting digger. It is true that the digger is more versatile in that it can deepen certain sections to ensure a flow and that one can guarantee a certain depth and form. However it is very doubtful if these advantages alone outweigh the extra cost.
5. Traction is assisted and better results obtained if the ploughing for planting has "grassed over". It has been suggested that the drainage equipment should be brought in say 3-5 years after planting, putting in drains for a batch of P.years.
6. On side slopes a better drain is produced by turning the turf downhill. This results in extra travelling. The cost of this extra travelling must be balanced against the extra cost of drain cleaning resulting from an uphill throw. The problem can be considered as follows:-
- a) Travel time not ploughing is constant at .6 min/chain.
  - b) Additional travelling will be the drain length plus turning at ends etc. Let us assume it is 120% of drain length. It could be more or less depending on conditions.
  - c) This will add  $.6 \times \frac{120}{100}$  mins to job cycle  
i.e. .72 mins.
  - d) Assume a job cycle excluding travel of 2-3 mins. Travel of .72 minutes is therefore 30-40% of cycle.
  - e) If we now relate this to drain cost 30-40% of 6.8 shillings quoted in para. 13 = 2/- - 2/6d.
  - f) In this case the extra travelling should save the above sum in cleaning costs to break even.

In general this is the order of the cost involved and as slopes increase there is no doubt that travelling back is worthwhile.

7. The item for drain cleaning in para. 4 is considerable and it is suggested that modifications to minimise fall back might be on the following lines:-
- a) By altering the mouldboard extension to lie more in line with the mouldboard itself and extending it to reduce fallback from the ridge.
  - b) By increasing the disc size to increase their cutting effect and reduce the tearing which leads to fall back especially on the throw side.
  - c) To attempt to equalise pressures on the drain side the extension plate on the plough box on the opposite side to the throw (i.e. "landside") could be extended.

8. This leads to the consideration of a double throw plough which should give a better formed and more stable drain. It is not known what side slopes would be critical for such a double throw plough but it is thought (from evidence with the Lokomo) that it would not be affected adversely until side slopes reached approx.  $8^{\circ}$ .

The argument has been advanced that a double throw plough does not allow free drainage from the top side of the drain. If Research Branch can provide evidence that this is not serious we feel a 2 throw development of the Humpy is very worthwhile.

9. There is some doubt about the stability of the drain made by the Humpy. The form as shown in the peat sections is somewhat narrow and may close; preliminary evidence from measurements on fixed profiles does not suggest this will be critical. In the clay profiles which owing to crabbing were broader and shallower in section with ragged edges weathering has resulted in a more stable form with some silting up where the drains are not self cleaning.

Investigation of weathering effects by Research Branch to determine optimum profiles for peat and clay drains is indicated.

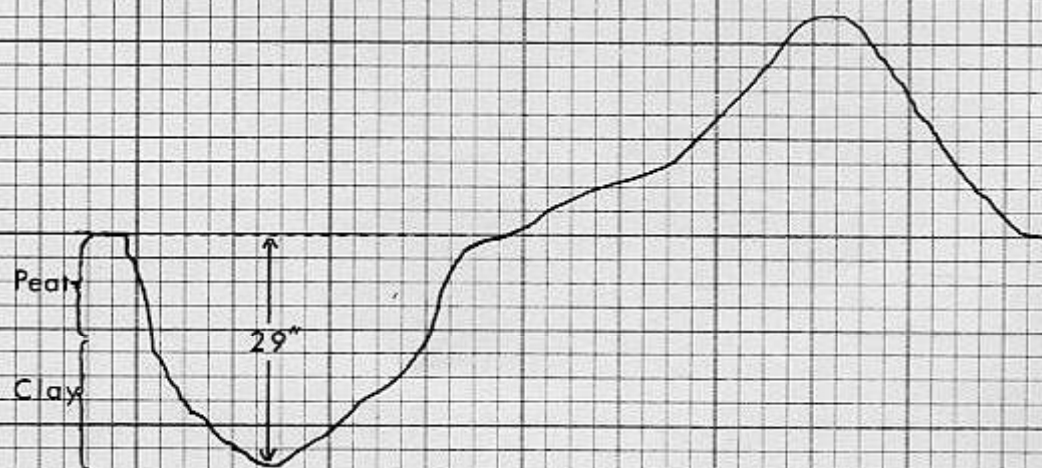
10. Three tractors were used to obtain a sufficient drawbar pull to give adequate drain depths in the peaty gleys. In better ground conditions of predominantly peat this could be reduced to 2 machines reducing running costs by  $\frac{1}{3}$  of course one might be satisfied with a slightly reduced depth from 2 tractors.

In this case 2 long wide tracked machines would be the best combination. It is suggested that one machine should be fitted with a winch and anchoring device to allow the winching technique to be used in difficult conditions and to facilitate de-bogging when necessary.

11. Acknowledgement

The help of the machine operators, the Conservancy staff in the various forests, and the Mech. Engineer is gratefully acknowledged.

D. M. Hughes  
October 1968

PARKGATE DEEP DRAINING PLOUGH.DRAIN PROFILEScale  $\frac{1}{2}$  Inch = 1 Foot1 PURE PEAT.2 PEAT OVER CLAY

FORESTRY COMMISSIONMECHANICAL PLANT SPECIFICATION NO 68/50(superseding Specification No 67/31)PARKGATE (TRAILED) DEEP DRAINING FORESTRY PLOUGH  
(Arched Beam Type)

## MANUFACTURER:

Wm Clark & Son, Agricultural and General  
Engineers, Parkgate, Dumfries.1. PLOUGH BEAM AND  
CARRIAGE:

Parkgate, Deep Drainer plough carriage in steel box section with 10 stud heavy-duty ball bearing hubs, all necessary fixtures suitable for hydraulic operation complete with four wheels to suit 11.00 x 36 tyres, the wheels arranged with adjustable centres suitable for fitting up as twin wheels without detaching both wheels to arrange this (i.e. so that the outer wheel may be easily detached or fitted while the other wheel is in position allowing the plough to be used either with single wheels or twins. Arched beam complete with necessary attachments welded to beam for both tine and draining attachments, the whole fitted with hydraulic rams complete with hose and couplings. Hose couplings to be Tecalmit Golden Flow self-sealing type or equivalent,  $\frac{1}{2}$ " with male end fitted to plough hose, with drawbar pole and coupling and complete with rams. C/W TWO 34" Diameter Discs, Disc shears, spring equipment and cross-shaft. Tool Kit

( 920 )

2. DEEP DRAINING  
MOULDBOARD:  
(RIGHT HAND)

Extra large and reinforced mouldboard for deep draining operations with adjustable trailing mould.

( 350 )

3. DEEP DRAINING  
MOULDBOARD:  
(LEFT HAND)

Extra large and reinforced mouldboard for deep draining operations with adjustable trailing mould.

( 350 )

4. DEEP DRAINING  
DOUBLE THROW  
MOULDBOARD:

See Specification No 69/29 for details.

( 480 )

5. HYDRAULICALLY  
DEPTH CONTROLLED  
MOULDBOARDS:

See Addendum No 2 to Specification No 69/29 for details.

( 160 )

6. WHEEL SPACER  
UNITS:

Minimum of FOUR per plough; two together put space of about 11" between each pair of twin wheels (for improved flotation under certain conditions).

( 38 )

7. CAGE WHEELS:

Outer of twin wheels may be of cage wheel type if desired: See Addendum No 1 for details.

( 86 )

8. TOOL KIT:

One Tommy bar, one  $\frac{3}{4}$ " square drive short extension, one  $\frac{3}{4}$ " Whitworth hex socket, one  $\frac{7}{8}$ " Whitworth hex socket, one flat spanner for depth control screw, one tool box (small) to hold Tommy bar, square drive short extension and sockets, complete with padlock.

( )

WM C ANDERSON  
Plant & Depot Manager

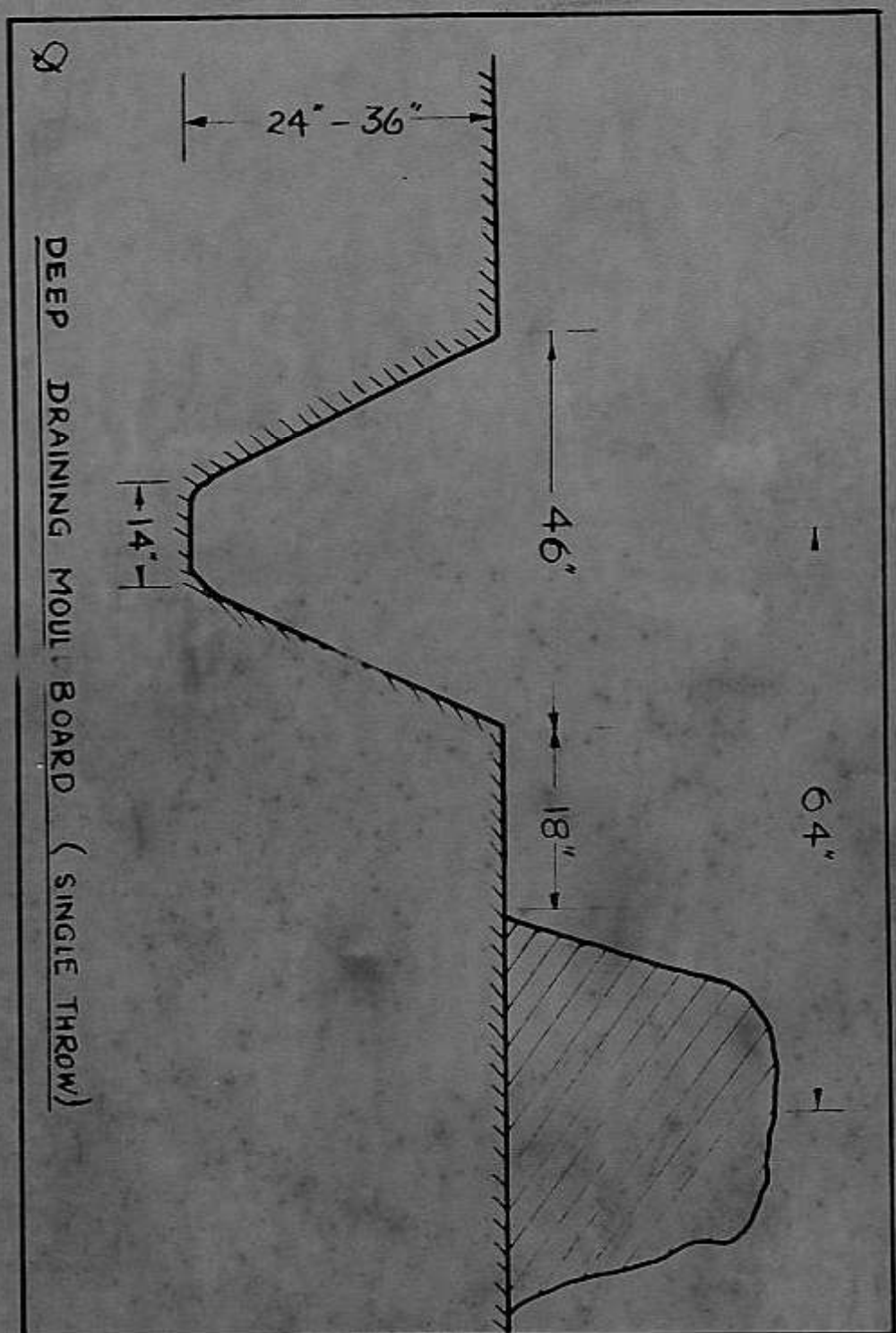
This Specification superseded/amended by Mechanical Plant Specification .....

Dated .....

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(12:71)



## FORESTRY COMMISSION

## ADDENDUM NO 1

to

## MECHANICAL PLANT SPECIFICATION NO 68/50

## CAGE WHEEL FOR PARKGATE DEEP DRAINAGE PLOUGH

(i.e. Alternative Outer Wheels - Cage Type)

(See main Specification No 68/50 for Specification of Parkgate Deep Draining Plough)

Number required per plough - TWO

Use ..... As alternative for Outer Pneumatic  
tyred wheel with 11.00 x 36 tyre  
equipment.

Size ..... Standard width - 16" \*

Optional width - 18" \*

\* (delete inappropriate)

Central Workshop Reference: CWS 2005

NOTE: As with pneumatic tyred outer wheel the cage type outer wheel is fitted through a separated set of wheel studs. Thus the outer wheel can be fitted or removed without disturbing the inner wheel. This is useful for transit purposes etc. Also the diameter of the cage wheel is slightly less than that of the inner pneumatic tyred wheel for similar reasons.

WM C ANDERSON  
Plant & Depot Manager  
OCTOBER 1971

DISTRIBUTION:

## FORESTRY COMMISSION

## ADDENDUM NO 2

to

## MECHANICAL PLANT SPECIFICATION NO 68/50

## HYDRAULICALLY DEPTH CONTROLLED MOULDBOARDS

(See main Specification No 68/50 for specification of Parkgate Deep Draining Plough and in particular item (5))

The hydraulically depth controlled mouldboards are alternatives to standard mouldboard. They are particularly advantageous on soft ground operations.

Existing Parkgate arched beam deep drainage ploughs can be so equipped. It is not considered that existing mouldboards be modified but rather that they be replaced when worn with this type.

DEEP DRAINAGE MOULDBOARD:  
(RIGHT HAND FOR HYDRAULIC CONTROL)

As standard single throw  
RIGHT HAND model with  
complete hydraulic package  
and attachments \*

OR

DEEP DRAINAGE MOULDBOARD:  
(LEFT HAND FOR HYDRAULIC CONTROL)

As standard single throw  
LEFT HAND model with  
complete hydraulic package  
and attachments \*

DEEP DRAINAGE MOULDBOARD:  
(DOUBLE THROW FOR HYDRAULIC CONTROL)

As standard DOUBLE THROW  
model with complete hydraulic  
package and attachments \*

\* The hydraulic package and attachments comprise:-

- 1 Double acting ram
- 2 Twin hydraulic hoses each with appropriate attachments with Tecalemit Golden Flow (or equivalent) self-sealing male couplings.
- 3 Attachments for plough beam (to be welded to beam).

## FORESTRY COMMISSION

ADDENDUM *no 3*

TO MECHANICAL PLANT SPECIFICATION NO 68/50

(Parkgate trailed deep-drainage plough beam and carriage etc)

DEEP TINE MOULD-BOARD  
(ADDITIONAL MOULD BOARD TO THE RANGE)

DEEP TINE MOULDBOARD: To suit Deep-Drainage beam and carriage (345)

- NOTE: (1) This is a similar mould board to that on the mounted equipment for felled woodland cultivation - but designed to fit the trailed plough beam referred to.
- (2) Depth of Tining Effect - 3'-0"  
Soil turn over (cultivation) 24" x 24" approx.

WM C ANDERSON  
Plant & Depot ManagerDISTRIBUTION:This Specification superseded/amended by  
Mechanical Plant Specification No .....

Dated .....

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(1:72)

FORESTRY COMMISSIONMECHANICAL PLANT SPECIFICATION NO. 69/29DOUBLE THROW, DEEP DRAINAGE MOULDBOARD

(with related disc equipment etc.)

This is an addendum to Mechanical Plant Specification No. 68/50 which deals with the Parkgate (trailed) Deep Draining Forestry Plough.

MANUFACTURER: Wm. Clark & Son, Agricultural & Forestry Engineers, Parkgate, Dumfries

(1) DOUBLE THROW DEEP DRAINAGE MOULDBOARD

Extra large and reinforced double throw mouldboard for deep drainage operations, with adjustable trailing moulds, laying the removed turves equidistantly on either side of the drain provided as shown generally on the attached sketch.

(2) CENTRE DISC EQUIPMENT

Large centre disc mounted on spring loaded disc sheens to plough beam.

(= 480)

NOTE The above equipment is used with the Parkgate Deep Draining Forestry Plough by replacement of the Single Throw Deep Drainage Mouldboard with the Double Throw Mouldboard, item (1) above, and the addition of the Centre Disc, item (2) above.

Wm. C. ANDERSON  
Plant and Depot Manager

March 1970

This Specification Superseded by/amended by  
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FORESTAL COMMISSION  
MECHANICAL PLANT SPECIFICATION NO.69/29

DOUBLE THROW, DEEP DRAINAGE MOULDBOARD

(with related disc equipment etc.)

This is an addendum to Mechanical Plant Specification No. 68/50 which deals with the Parkgate (trailed) Deep Draining Forestry Plough.

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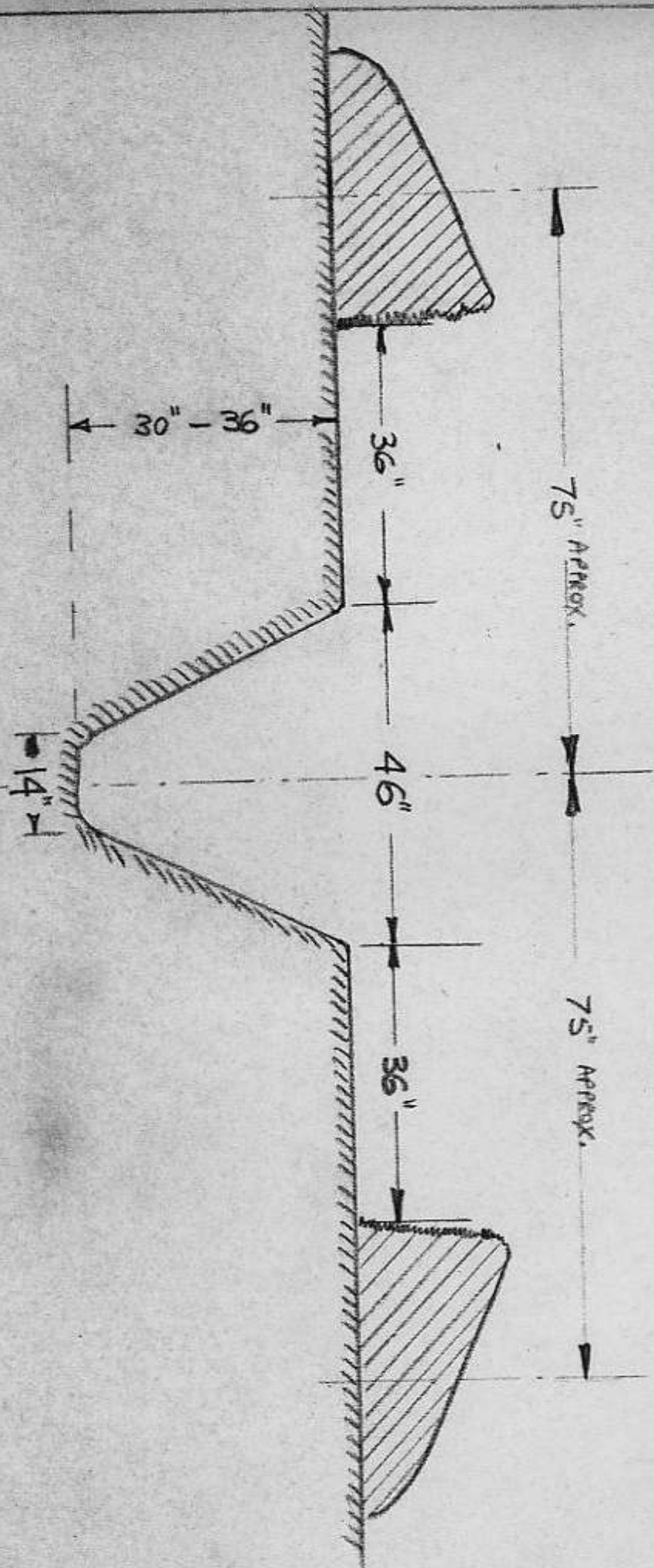
Wm. C. ANDERSON  
Plant and Depot Manager

March 1970

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DOUBLE THROW DEEP DRAINAGE MOULD BOARD

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