

# Evaluation Report

# 687



## Morris Shank Mounted Ground Rod

A Co-operative Program Between



## MORRIS SHANK MOUNTED GROUND ROD

### MANUFACTURER AND DISTRIBUTOR

Morns Industries Ltd.  
85 York Road  
Yorkton Saskatchewan  
S3N 2X2  
Phone: (306) 783-8585

### RETAIL PRICE

\$1,553.00 less setup (September, 1992 f.o.b. Lethbridge, Alberta, Morris two shank rod system with six rods for 37 ft (11.3 m) Morris cultivator).

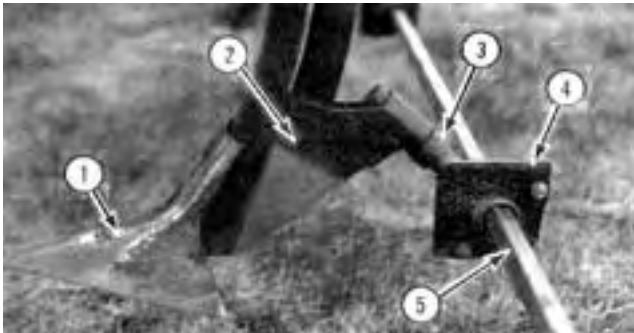


FIGURE 1. Morris Shank Mounted Ground Rod: (1) Sweep, (2) Wide Spread Seed Boot with Bracket, (3) Spacer, (4) Bearing Bracket and (5) Hex Rod.

### SUMMARY

#### QUALITY OF WORK

Penetration of the Morris shank mounted ground rod was very good. A minimum tillage depth of 3 in (76 mm) was required for proper operation in primary conditions. Uniform penetration produced even and smooth flow of soil and trash over the ground rod.

Operation of the ground rod in stony conditions was very good. No damage occurred to the rod when working in stony conditions.

When the cultivator was properly levelled the rod was very good in clearing large amounts of trash. Operation of the ground rod at a shallow depth caused plugging in heavy secondary trash conditions.

Soil finishing of the ground rod was very good. The rod left a level soil surface with the majority of the straw remaining on the surface. Working 1 in (25.4 mm) above the furrow bottom the rod packed soil around the seed creating a firm seedbed. The rod was also effective in eliminating soil ridges in summerfallow conditions. Weed kill of the ground rod was very good. The 3 in (76 mm) overlap between rods ensured weeds were not missed in the field.

#### EASE OF OPERATION AND ADJUSTMENT

Ease of transporting the ground rod was very good. With each rod rigidly secured to two shanks there was sufficient clearance between the rod and the ground when the cultivator wings were raised. Ease of changing the depth of the ground rod was very good. The supplied spacer changed the depth of the rod by 0.5 in (13 mm).

#### EASE OF INSTALLATION

Ease of installing the ground rod was very good. Initial installation onto the 37 ft (11.3 m) Morris 8900 floating hitch cultivator was 4 hours. Removing or re-installing just the rod took 10 minutes.

#### POWER REQUIREMENTS

Power take-off horsepower requirements per foot of ground rod at 5 mph (8 km/h) and a working depth of 2.5 in (64 mm) in loam soil ranged from 0.5 to 0.7 hp/ft (1.2 to 1.7 kW/m). Overall tractor size needed to pull the 37 ft (11.3 m) working width of ground rod ranged from 18.5 to 25.9 hp (13.9 to 19.4 kW).

### OPERATOR SAFETY

The ground rod was safe to service if normal safety precautions were observed.

### OPERATOR'S MANUAL

There was no operator's manual supplied with the ground rod. Assembly instructions were included with the ground rod.

### MECHANICAL PROBLEMS

The setscrews on the locking collars wore.

### RECOMMENDATIONS

The AFMRC recommends the manufacturer consider:

1. Modifying the locking collar to prevent the setscrews from wearing rapidly.
2. Supplying an operator's manual for the Morris ground rod.

Manager: R.P. Atkins

Project Engineer: L.W. Papworth

Project Technologist: G.A. Magyar

### THE MANUFACTURER STATES THAT:

With regards to recommendation number:

1. Modifications to the locking collar are being pursued.
2. This will be considered for future production runs.

### GENERAL DESCRIPTION

The Morris shank mounted ground rod is a rigid mount, hexagonal rod system suitable for use with a cultivator in primary and secondary tillage conditions. The flow of soil over the rod turns the hexagonal rod. The rod mounts onto various makes of Morris cultivators and is available in widths ranging from 25 to 41 ft (7.6 to 12.5 m). The ground rod is mounted to either 9 or 12 in (229 or 305mm) shank spacings.

Regular and offset brackets are attached to the back of either narrow or wide spread boots. The boots are secured to the rear row cultivator shanks. The offset brackets allow for overlap of the ground rod system. Each rod is secured to either two or three shanks. The rods are cut for the proper overlap. On three shank assemblies a universal joint at the centre shank allows the rod to flex when the shank trips. Each rod turns on sealed bearings mounted in pivoting brackets. The bearing bracket is secured to the boot assembly with a spring pin. Locking collars are positioned on the inside of each bearing bracket to prevent the rod from sliding. A spacer is positioned on the bearing bracket arm to set the rod working depth in relation to the furrow bottom.

The shank mounted ground rod tested was mounted on a four row, 9 in (229 mm) shank spacing, 37 ft (11.3 m) Morris 8900 floating hitch cultivator. Wide spread seed boots were attached to the cultivator shanks and each rod was secured to two shanks.

### SCOPE OF TEST

The ground rod was operated in the conditions shown in TABLE 1 for 132 hours while tilling 2850 ac (1154 ha). The ground rod was evaluated for quality of work, ease of operation and adjustment, power requirements, operator safety and suitability of the operator's manual.

The machine evaluated by the Alberta Farm Machinery Research Centre (AFMRC) was configured as described in the General Description, FIGURE 1, and the Specifications section in Appendix I of this report. The manufacturer may have built different configurations of this machine before and after AFMRC tests. Therefore, when using this report, be sure to first check the machine you are considering is the same as the one shown here. If not assistance can be obtained from the manufacturer or AFMRC in determining how this machine will perform compared to the one tested.

TABLE 1. Operating Conditions

Field Condition	Hours	FieldArea	
		ac	ha
Operation primary	46	1000	405
secondary	86	1850	749
Total	132	2850	1154
Soil Type			
loam	16	350	142
silt loam	82	1750	708
sandy loam	14	320	130
sandy clay loam	20	430	174
Total	132	2850	1154
Stony Phase			
stone free	44	950	385
occasional stones	65	1400	567
moderately stony	23	500	202
Total	132	2850	1154

## RESULTS AND DISCUSSION

### QUALITY OF WORK

**Penetration:** Penetration of the Morris shank mounted ground rod was very good. Penetrating ability of the rod was related to the cultivator penetration. Uneven rod penetration resulted when the cultivator was not level or when working in dry, hard primary tillage. A minimum tillage depth of 3 in (76 mm) was required for proper operation of the rod in primary conditions.

Uniform penetration across the width of the rod system required proper levelling of the cultivator main and wing frames. Maintaining uniform penetration required checking and making appropriate cultivator adjustments when changing fields. Uniform penetration produced even and smooth flow of soil and trash over the ground rod.

**Stony Conditions:** Operation of the ground rod in stony conditions was very good. No damage occurred to the rod when working in stony conditions. The pivoting bearing bracket allowed the rod to flex when the shank tripped.

**Trash Clearance:** The ground rod was very good in clearing large amounts of trash when the cultivator was properly levelled. Maintaining uniform tillage depth enabled the ground rod to operate in heavy straw conditions (FIGURE 2) without plugging. When working in heavy secondary trash conditions, trash would wrap around the cultivator shank causing trash to wrap around the ground rod. Operation of the ground rod at a shallow depth caused plugging in heavy secondary trash conditions.



FIGURE 2. Operation in Heavy Stubble Conditions.

**Soil Finishing:** Soil finishing of the Morris ground rod was very good. When working in moist secondary or primary soil conditions (FIGURE 3), the ground rod left a level soil surface with the majority of the straw remaining on the surface. The ground rod worked 1 in (25.4 mm) above the furrow bottom packing soil around the seed creating a firm seedbed. The ground rod was also effective in leaving dirt clumps on the soil surface to help prevent soil erosion.

When working in summerfallow conditions with excessive soil ridging, the ground rod was effective in eliminating the ridges while packing the soil for a good seedbed. In field conditions where the previous tillage operation left piles of dry straw, the ground rod partially spread the straw piles.



FIGURE 3. Soil Surface left with ground rod (right-before, left-after).

**Weed Kill:** Weed kill of the ground rod was very good. The ground rod was effective in exposing and leaving weeds on the field surface. When working in heavy weed areas the ground rod would occasionally plug. The 3 in (76 mm) overlap between the rods ensured weeds were not missed in the field.

### EASE OF OPERATION AND ADJUSTMENT

**Transporting:** Ease of transporting the ground rod was very good. The ground rod was not disassembled when placing the cultivator into transport position. With each rod rigidly secured to two shanks there was sufficient clearance between the rod and the ground when the cultivator wings were raised.

**Adjustment:** Ease of changing the depth of the ground rod was very good. By changing the location of the spacer (FIGURE 4) the depth of the rod was changed by 0.5 in (13 mm). To change the spacer location, the shank pins were removed from the bearing arms, the rod was removed and reinstalled with the spacer in the new location.

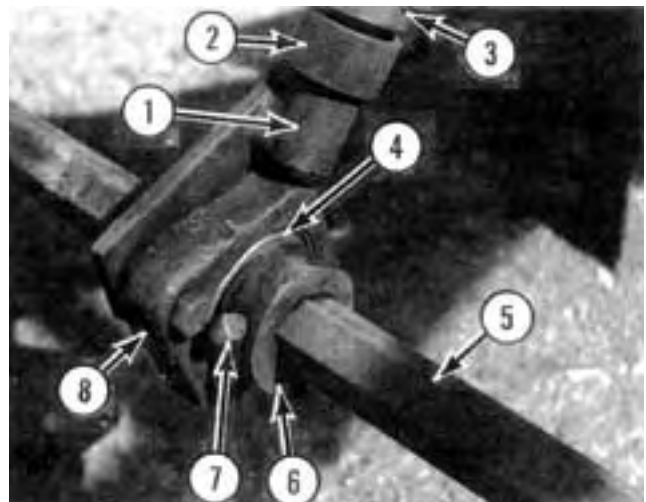


FIGURE 4. Ground Rod Mounting: (1) Bracket Arm, (2) Spacer, (3) Seed Boot Bracket, (4) Sealed Bearing, (5) Hex Rod, (6) Locking Collar, (7) Setscrews and (8) Bearing Bracket.

The 3 in (76 mm) overlap between rods was set by adjusting the location of the rods at the bearing brackets. The locking collars installed on the inside of each bearing secured the rods in place. Each collar was secured by two setscrews. The setscrews wore as the rod turned in the ground making it difficult to tighten or loosen the screws. AFMRC recommends the manufacturer consider modifying the locking collar to prevent the setscrews from wearing rapidly.

### EASE OF INSTALLATION

Ease of installing the Morris Ground Rod was very good. Initial installation onto the 37 ft (11.3 m) Morris 8900 floating hitch cultivator was 4 hours. Installation included assembling the brackets and bearings, cutting the rods to the required lengths, installing the special seed boots on the cultivator and mounting the rods and brackets on the seed boots. Removing or reinstalling just the rod took 10 minutes.

## POWER REQUIREMENTS

**Draft:** Draft for the 37 ft (11.3 m) working width of rod at 5 mph (8 km/h) and a working depth of 2.5 in (64 mm) ranged from 870 to 985 lb (3.9 to 4.4 kN). **Tractor Size:** Power take-off horsepower requirements per foot of ground rod at 5 mph (8 km/h) and a working depth of 2.5 in (64 mm) in loam soil ranged from 0.5 to 0.7 hp/ft (1.2 to 1.7 kW/m). Therefore, overall tractor size needed to pull the 37 ft (11.3 m) working width of ground rod ranged from 18.5 to 25.9 PTO hp (13.9 to 19.4 kW).

## OPERATOR SAFETY

The Morris shank mounted ground rod was safe to service if normal safety precautions were observed. The operator had to take care when moving around the tillage unit in both field and transport position to avoid tripping over or hitting the ground rod.

## OPERATOR'S MANUAL

The manufacturer included assembly instructions with the ground rod. The instructions showed the location and length of each rod. A parts list was also included with the ground rod. No operator's manual was supplied. AFMRC recommends the manufacturer consider supplying an operator's manual for the Morris ground rod.

## MECHANICAL HISTORY

As mentioned under the Adjustment section the setscrews on the locking collars wore. No additional mechanical problems were encountered during the 132 hours of field operation. The intent of the test was evaluation of functional performance. An extended durability evaluation was not conducted.

### APPENDIX I SPECIFICATIONS

<b>MAKE:</b>	Morris
<b>MODEL:</b>	Shank Mounted Ground Rod
<b>MANUFACTURER:</b>	Morris Industries Ltd. 85 York Road Yorkton, Saskatchewan S3N 2X2 Phone: (306) 783-8585
<b>PRINCIPLE OF OPERATION:</b>	rigid mount ground driven hex-rod designed to fit onto the rear row of Morris cultivators.
<b>ROD SYSTEM:</b>	
-- type	each rod secured to two shanks
-- size	1 in (25 mm) hexagonal rod
-- working width	37 ft (11.3 m)
-- boots	6 - regular wide spread seed boots 6 - offset wide spread seed boots
-- bearings	12 - one sealed bearing per shank
-- rod length	2 - 84 in (2134 mm) rods 2 - 75 in (1905 mm) rods 2 - 72 in (1829 mm) rods
-- mounting	rigid mount, rod secured to each boot by spring pin
<b>WEIGHT:</b>	160 lb (73 kg)
<b>OPERATING WIDTHS:</b>	25 ft (7.6 m) four rods on two shank system 27 ft (8.2 m) four rods on two shank system 29 ft (8.8 m) two rods on two shank system and two rods on three shank system 31 ft (9.4 m) two rods on two shank system and two rods on three shank system 33 ft (10.1 m) two rods on two shank system and two rods on three shank system 35 ft (10.7 m) six rods on two shank system 37 ft (11.3 m) six rods on two shank system 39 ft (11.9 m) six rods on two shank system 41 ft (12.5 m) four rods on two shank system and two rods on three shank system
<b>OPTIONS INCLUDED ON TEST MACHINE:</b>	regular and offset wide spread seed boots
<b>OTHER AVAILABLE OPTIONS:</b>	regular and offset narrow spread seed boots three shank rod mount

### APPENDIX II MACHINERY RATINGS

The following rating scale is used in Alberta Farm Machinery Research Centre Evaluation reports.	
Excellent	Very Good
Good	Fair
Poor	Unsatisfactory

## SUMMARY

### MORRIS SHANK MOUNTED GROUND ROD

<b>RETAIL PRICE:</b>	\$1,553.00 less setup (September, 1992 f.o.b. Lethbridge, Alberta, Morris two shank rod system with six rods for 37 ft (11.3 m) Morris cultivator).
<b>QUALITY OF WORK:</b>	
-Penetration:	<b>very good;</b> directly related to cultivator penetration
-Stony Conditions:	<b>very good;</b> no damage occurred to the rod
-Trash Clearance:	<b>very good</b>
-Soil Finishing:	<b>very good;</b> left trash and dirt lumps on surface to prevent soil erosion
-Weed Kill:	<b>very good;</b> exposed weeds to soil surface
<b>EASE OF OPERATION AND ADJUSTMENT:</b>	
-Transporting:	<b>very good;</b> easily placed into transport
-Adjustment:	<b>very good;</b> spacer changed depth of rod
<b>EASE OF INSTALLATION:</b>	<b>very good;</b> removing or reinstalling only the rod took ten minutes
<b>POWER REQUIREMENTS:</b>	PTO horsepower requirements for the 37 ft (11.3 m) ground rod ranged from 18.5 to 25.9 hp (13.9 to 19.4 kW)
<b>OPERATOR SAFETY:</b>	safe
<b>OPERATOR'S MANUAL:</b>	no operator's manual provided
<b>MECHANICAL HISTORY:</b>	setscrews on locking collars wore



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