

# Evaluation Report

# 553



## Deutz-Allis 475 Front-End Loader

A Co-operative Program Between



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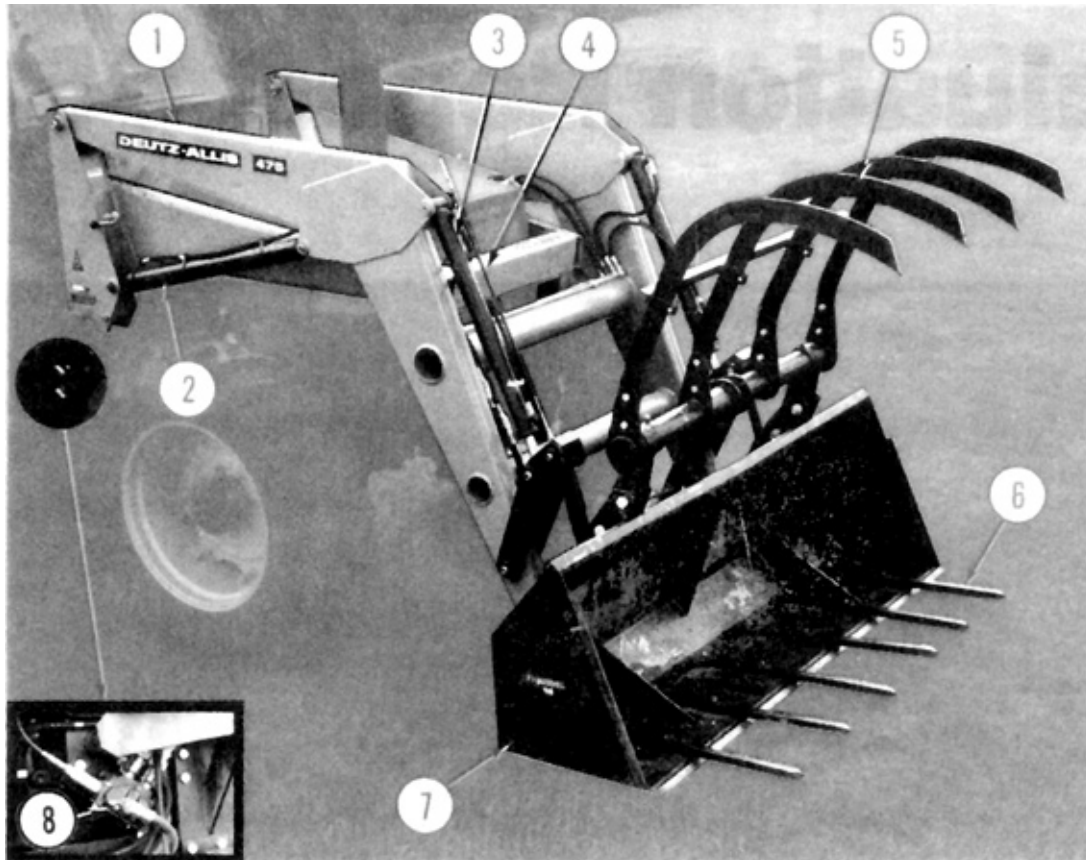
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

## DEUTZ-ALLIS 475 FRONT-END LOADER

### MANUFACTURER AND DISTRIBUTOR:

Deutz-Allis Corporation  
P.O. Box 933  
Milwaukee, Wisconsin  
53201

**RETAIL PRICE:** Basic Loader- \$4361.00 (January 1988, f.o.b. Portage la Prairie, Manitoba) Mounting Kit for Deutz-Allis 7110 --\$1035.00, Single Lever Joystick -- \$1139.00, 94 in. (2350 mm) Material Bucket-- \$1173.00, Six Tine Package-- \$462.00, Grapple Fork- \$1035.00



**FIGURE 1.** Main Components: (1) Main Lift Arms, (2) Main Lift Cylinders, (3) Bucket Cylinders, (4) Bucket Level Indicator, (5) Optional Grapple Forks, (6) Optional Bucket Tynes, (7) 94 in (2.4 m) Bucket, (8) Auxiliary Hydraulic Valve.

### SUMMARY

**Rate of Work:** Rate of work was dependent on the engine speed of the Deutz-Allis 7110 tractor. At the rated engine speed of 2100 rpm it took 8.5 seconds to raise the bucket from ground level to maximum height, and 5.5 seconds to lower to the ground. It took 3 seconds to dump the bucket from its retracted position. Lifting capacity was 2866 lb (1300 kg) at full height of 12.8 ft (3.9 m).

**Quality of Work:** The Deutz-Allis 475 was effective for moving manure, earth, and round bales. The front-end loader was equipped with optional bale grapples and bucket tynes. Its performance was complimented by the front wheel assist drive, and the synchromesh transmission of the Deutz-Allis 7110 tractor to which the loader was mounted. When moving round bales, the Deutz-Allis 475 was gentle and did not damage bales or twine. Quality of work was very good.

**Ease of Operation:** Digging, installing, bale handling, and lubrication were all rated very good. The single lever "joystick" mounted in the cab of the tractor made operation easy. Visibility was very good when compared to other makes of tractors due to the slimness of the engine hood. With practice, operators were able to accomplish work efficiently. Minimal adjustment and alteration to the Deutz-Allis tractor was required to install the loader. The optional bale handling grapple forks were easy to operate. All grease fittings were easy to get at and lubrication took 5 minutes.

**Power Requirements:** The Deutz-Allis 475 front end loader was compatible with the Deutz-Allis 71 series agricultural tractor. The hydraulic systems and circuits were set up to match the open centre circuits of the tractor.

**Operator Safety:** The Deutz-Allis 475 loader was safe to operate if normal safety precautions were followed. The optional grapple hooks allowed large round bales to be lifted to the maximum height of the loader without danger to the operator. Operator safety was rated as very good.

**Operator's Manual:** The operator's manual was excellent, and provided the operator with information on safety, specifications, operation, lubrication, maintenance, removal and installation. The manual was well written, illustrated, and presented. Special sections on service and setting up procedures were also included.

**Mechanical History:** The Deutz-Allis 475 was operated for 225 hours and no mechanical problems were encountered during that period. The optional grapple forks frame and bearing pillar bent the first time it was used. This sometimes allowed the forks to be placed in an over centre position, from which they could not be moved without the help of a person outside the tractor cab.

### RECOMMENDATIONS:

It is recommended that the manufacturer consider:

1. Modifying the bucket to prevent damp material from adher-

ing to the corners.

2. Strengthening the frame and bearing pillar of the optional grapple forks to prevent bending and deforming.
3. Strengthening the grapple forks to prevent bending, twisting and deforming.

Senior Engineer - G.M. Omichinski

Project Technologist - R.K. Harris

### THE MANUFACTURER COMMENTS:

With regard to recommendation: (1-3)

1. Adhering of material in the bucket has not been reported as a problem. We are aware a formed round back bucket design has less of tendency for material to "stick". The bucket design furnished for the 475 Loader is superior in strength and rigidity to a round back bucket and is required in this high horsepower application.
2. & 3. A field trip resulted to further evaluate these reported problems. The grapple design is being revised to prevent overcentering and to improve grapple frame strength. Instructions to be provided to position the tine tie bar assembly in the curvature of the tines for reinforcement. Addition of a second tie bar assembly is possible for heavy duty applications.

### GENERAL DESCRIPTION

The Deutz-Allis 475 loader is typical of most front-end loaders designed for use on agricultural tractors. It is designed to be compatible with the Deutz-Allis 71 series tractor and the manufacturer states that it should not be mounted on tractors other than this type. The loader consists of a permanently mounted structure that attaches to the frame and rear axle of the tractor. The loader arms are pinned to this structure as are the main lift cylinders. A simple stand allows the loader to be parked and kept in position for easy reattachment. The loader is equipped with a bucket level indicator. Hydraulic power is supplied by the tractor. The loader is controlled by a single lever control stick located in the cab of the tractor. The optional grapple forks hydraulic hoses are connected to one of the tractor's remote couplers, and are also operated from the cab of the tractor.

The test loader was equipped with optional round bale grapples, 94 in (2.4 m) material bucket, and bucket tynes. FIGURE 1 shows the location of major components and detailed specifications are presented in APPENDIX I.

### SCOPE OF TEST

The Deutz-Allis 475 loader was mounted to a Deutz-Allis 7110 front-wheel assist tractor, and was tested under typical prairie conditions for 225 hours. It was used to move and load large round bales, to dig a dugout, and to remove manure. It was evaluated for rate of work, quality of work, ease of operation and adjustment, power requirements, operator safety and suitability of the operator's manual. In addition, mechanical problems were monitored throughout the test. TABLE 1 shows the operating times and conditions.

TABLE 1. Operating conditions.

MATERIAL	HOURS
Round bales	165
Earth moving	27
Manure removal	33
Total	225

### RESULTS AND DISCUSSION

#### RATE OF WORK

TABLE 2 represents operational time required to raise to maximum height, to lower to ground and to dump the bucket and then rollback the bucket. All measurements were taken with the bucket empty. Rate of work was dependent on the engine speed of the tractor.

The Deutz-Allis 475 was capable of lifting a 2870 lb (1300 kg) load to its full height of 12.8 ft (3.9 m). FIGURE 2 represents the lift capacity of the loader. Breakout force measured at the cutting edge of the bucket was 5600 lbs (24.9 kN).

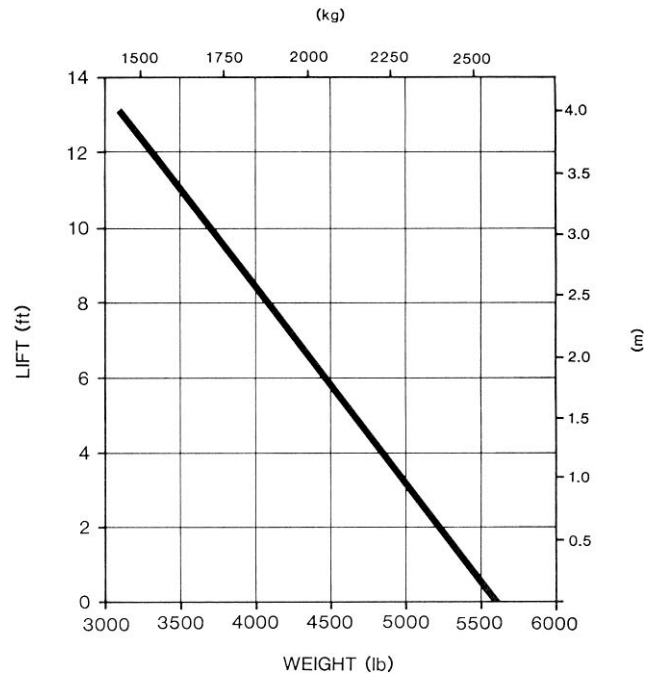


FIGURE 2. Lift Capacity.

TABLE 2. Time to Perform Specific Operations.

Operation	Engine Speed	
	2400 rpm	1500 rpm
Raising time	8.5	13.0
Lowering time	5.5	6.5
Bucket dumping time	3.5	4.0
Bucket rollback time	4.0	6.0

### QUALITY OF WORK

The Deutz-Allis 475 was effective for moving large round bales, digging or leveling earth, and for manure removal. Performance was complimented by the front-wheel assist and syncromesh transmission of the Deutz-Allis 7110 tractor. When fitted with the optional bucket tynes and grapple forks the loader was gentle on the bales and allowed the operator to position the bucket at the correct angle to prevent the bales from skidding on the ground during pickup. When digging earth or manure that was damp, material would stick in the corners of the bucket and would reduce the volumetric capacity (FIGURE 3). Eventually the operator would have to dig the accumulated material out of the bucket with a shovel. It is recommended that the manufacturer consider a modification to the bucket that would prevent damp material from adhering to the corners. In general, the quality of work was very good.



FIGURE 3. Damp Material Adhering to Bucket Walls.

## EASE OF OPERATION

**Digging:** The Deutz-Allis 475 was easy to operate. Visibility of the bucket was better than some other tractor loaders, due to the slim profile of the hood on the Deutz-Allis 7110 tractor. The single lever "joystick" control was conveniently located and easy to manipulate (FIGURE 4). The valve attached to the stick was equipped with a detent for the float position, and would hold the control stick in the float position without the operator's help. The bucket level indicator was easy to see and allowed the operator to precisely place the bucket at the desired angle. Digging performance was considered very good.



FIGURE 4. Single Lever "Joystick" Control.

**Bale Handling:** The optional grapple forks were easy to operate and provided a positive grip on large round bales. The hydraulic control for the grapple was conveniently located to the right of the operator's station and was easy to reach and use. The optional bucket tynes aided loading of round bales, and were very effective when digging into a manure pile. The tynes were easily removed, and took one person about 15 minutes. The optional bale handling attachment's performance was very good.

**Installing:** Installation of the main loader frame was done by the dealership, and it was not reattempted by PAMI staff. Front axle operation was not limited by the installation of the loader, however tractors equipped with front ballast weights would have to have the weights removed for loader installation and use. The brackets which attach the weights to the tractor could be left in place without interfering with loader operation. Disconnecting and reconnecting the loader from the tractor was simple and took one person about 5 minutes. Removal of a pin on each side of the loader allowed the lift arms, cylinders, and attachments to be easily removed from the tractor. A parking stand was provided and kept the disconnected loader in a position for easy attachment. Attachment and removal was very good.

**Lubrication:** Lubrication requirements of the loader consisted of 18 separate pressure nipples on the basic loader and an additional 4 on the optional grapple forks. The loader was greased at the start of each work day. All grease fittings were easy to get to and took one person about 5 minutes to lubricate the entire loader and grapples. Lubrication was considered very good.

## POWER REQUIREMENTS

All hydraulic circuits were plumbed to be compatible with the open centre hydraulic system of the Deutz-Allis 7110 tractor. The

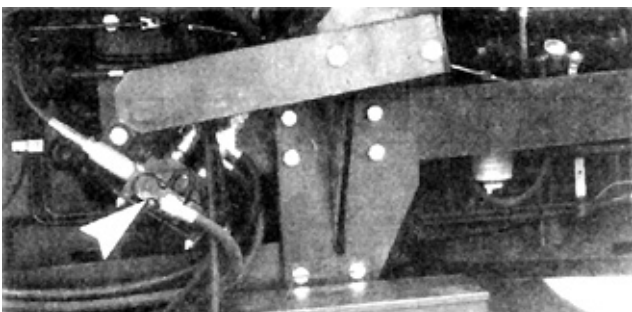


FIGURE 5. Auxiliary Hydraulic Valve.

basic loader functions were controlled by a four position single lever with a detent or catch that would keep the loader arms in the float position without sustained pressure from the operator. Oil pressure to the loader was distributed through an auxiliary hydraulic valve (FIGURE 5) which left the remote hydraulic couplers at the rear of the tractor free for some other use while the loader was attached. The tractor relief valve was set at 2540 psi (17,500 kpa) to prevent structural damage due to overloading. The Deutz-Allis 475 required a hydraulic flowrate of 15 gpm (0.96 L/s). The optional grapple forks required one hydraulic circuit and the hoses were attached to the remote outlets at the rear of the tractor.

## OPERATOR SAFETY

The Deutz-Allis 475 was safe to operate if the operator followed safety precautions outlined in the operator's manual. Heavy loads should only be moved with the loader in the carrying position of 24 to 36 in (600 to 900 mm) above ground. Care should be taken and the speed reduced when travelling around corners. The optional grapple forks ensured the safety of the operator when large round bales were lifted or transported. The Deutz-Allis 475 loader complied with ASAE standards for safety for agricultural loaders. Warning decals were in place that cautioned the operator or bystanders of potential danger areas.

## OPERATOR'S MANUAL

The operator's manual was excellent. It was well written and illustrated. All information contained was factual and easy to understand. The manual contained information on safety, operation, maintenance and servicing, setup, hydraulic schematics, and specifications.

## MECHANICAL HISTORY

No mechanical problems were encountered during the 225 hours of operation of the basic loader and bucket. The optional grapple forks bearing pillar, bent during the first hour of operation of bale handling, allowing the grapples to be placed in an over centre position, from which they could not be moved without the help of a person outside of the tractor. In addition the grapple hooks were easily bent out of shape and had to be reformed several times during the test (FIGURE 6). It is recommended that the manufacturer strengthen the bearing pillar to prevent bending and deforming. It is further recommended that the manufacturer strengthen the grapple forks to prevent twisting and deforming.



FIGURE 6. (1) Bent Bearing Pillar, (2) Area of Grapple Hook Deformation.

Table 3. Mechanical History

Item	Hours
Optional grapple forks bearing pillar bent	1
Grapple hooks	Bent several times during test

APPENDIX I

SPECIFICATIONS:

**MAKE:** Deutz-Allis  
**MODEL:** 475 Loader  
**SERIAL NUMBER:** 1008

**BUCKET:**  
 - width 7.8 ft (2.4 m)  
 - length 24.0 in (610 mm)  
 - height 30.0 in (762 mm)  
 - rated capacity\* 29.1 ft<sup>3</sup> (0.82 m<sup>3</sup>)  
 - struck capacity\*\* 23.4 ft<sup>3</sup> (0.70 m<sup>3</sup>)

**HYDRAULICS:**  
 - lift cylinders 3.0 x 32 in (75 mm x 815 mm)  
 - bucket cylinders 2.5 x 28 in (65 mm x 710 mm)  
 - system Open centre tractor  
 - relief valve psi 2,540 psi (17.5 mpa)  
 - rated flow 15.3 gpm (0.96 L/s)

**TEST TRACTOR:**  
 - make/model Deutz-Allis 7110 AWD  
 - power 110 hp (82.5 kW)  
 - rear tires two 18.4 - 38 R 1  
 - front tires two 14.9 - 28 R1

**WEIGHT:**  
 - tractor and loader 13,800 lb (6263 kg)  
 - loader and bucket 2330 lb (1058 kg)

\*Rated capacity of a loader bucket refers to the amount of material a bucket can hold if the material is heaped until it reaches its angle of repose.

\*\*Struck capacity of a loader bucket refers to the amount of material a bucket can hold without being heaped or overflowed.

**OPTIONS:** Single Lever Joystick - \$1,139.00, 94 in. (2350 mm) Material Bucket \$1,173.00, Six Tine Package - \$462.00, Grapple Fork - \$1,035.00.

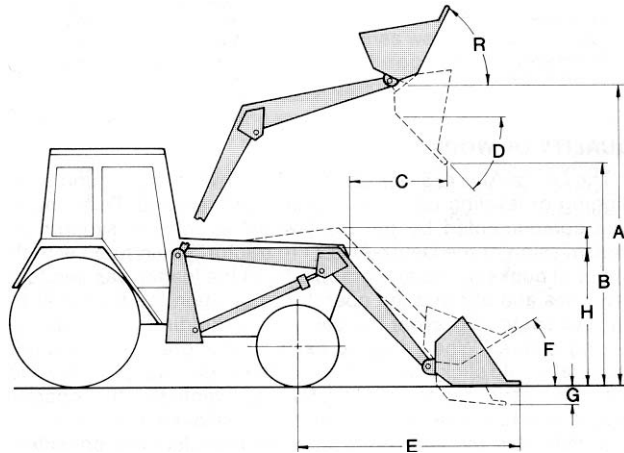


FIGURE 7. Specifications-Operational.

SPECIFICATIONS, DIMENSIONAL (See FIGURE 6)

A - Maximum Lift Height	12.7 ft	(3.87 m)
B - Clearance with Bucket Dumped	9.8 ft	(3.00 m)
C - Reach at Maximum Height	4.2 ft	(1.28 m)
D - Maximum Dump Angle	40°	
E - Reach with Bucket on Ground	8.2 ft	(2.50 m)
F - Bucket Rollback Angle	20.5°	
G - Digging Depth	23 in	(125 mm)
H - Overall Height in Carry Position	65 ft	(2.0 m)
L - Length of Bucket	3.2 ft	(1.0 m)
R - Rollback Angle at Full Height	102°	

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

SUMMARY CHART

DEUTZ-ALLIS 475 LOADER  
 for 71 Series Agricultural Tractors

<b>RETAIL PRICE:</b>	Total Package - \$9,205.00 (January 1988, f.o.b. Portage la Prairie, Manitoba)
<b>RATE OF WORK:</b>	<b>Very Good;</b> was dependent on speed of tractor engine.
<b>QUALITY OF WORK:</b>	<b>Very Good;</b> was gentle on bales. Damp material stuck in bucket.
<b>EASE OF OPERATION:</b>	
- Digging	<b>Very Good;</b> joystick control; effective bucket level indicator.
- Bale Handling	<b>Very Good;</b> easy to operate; bale forks; positive bale grip.
- Installing	<b>Very Good;</b> easy to remove and re-attach.
- Lubrication	<b>Good;</b> 5 minutes for complete servicing.
<b>POWER REQUIREMENTS:</b>	Used hydraulic power of tractor.
<b>OPERATOR SAFETY:</b>	<b>Very Good;</b> was safe to operate if normal precautions were followed.
<b>OPERATOR'S MANUAL:</b>	<b>Excellent;</b> well written and illustrated.
<b>MECHANICAL HISTORY:</b>	No problems occurred during test period to basic loader. Optional grapple forks bent.



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