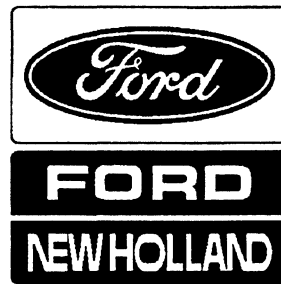


VERSATILE

Service Manual



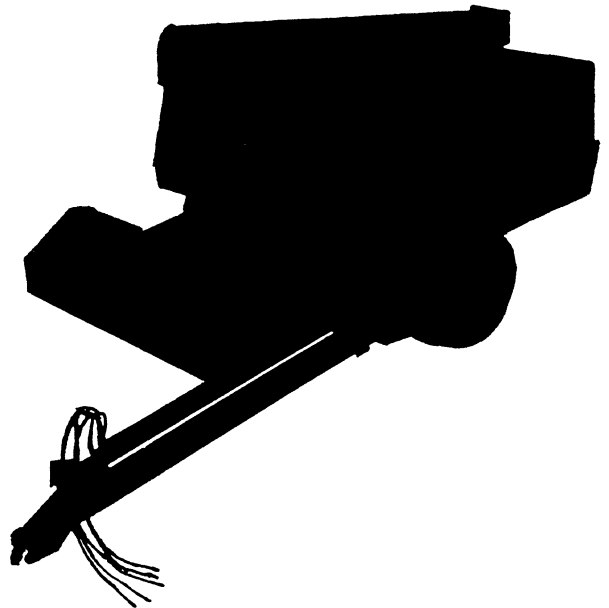
Combine
2000

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 **VERSATILE**

2000 Combine

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FOREWORD

This service manual provides instructions for troubleshooting, removal, inspection, replacement and overhaul of VERSATILE® Model 2000 Combine components.

The service manual should be used in conjunction with the parts manual for the specific model year. Consult the Operator's Manual for information on adjustments, troubleshooting and lubrication.

A table of contents precedes each section providing detailed coverage of the information contained within that section. The index at the end of the book should ease location of specific information.

REVISIONS AND ADDITIONS

The purpose of a loose leaf service manual is to enable us to keep the book updated.

When changes are made, pages will be forwarded to you marked either as replacement or additional pages.

Replacement pages will carry the same page number as the original. Discard the original page and insert the replacement page in its place. Added pages will carry the original page number plus an alphabetical suffix. Insert these pages after the existing page.

Please complete the feedback page at the back of the manual and return it to Versatile Farm Equipment Company. Such information will help us improve our service manuals in the future.



BE ALERT

Watch for this symbol. It identifies potential hazards to health or personal safety. It points out safety precautions. It means: ATTENTION – Be Alert. Your safety is involved.



BE ALERT



BE ALERT



BE ALERT



BE ALERT

Safety

Safety

This section contains general safety precautions which should be thoroughly studied and practised by all service personnel.

GENERAL SAFETY

1. Mount a fire extinguisher in the service area. Maintain it according to manufacturer's recommendations.
2. Never operate tractor and combine in a closed building. If it is necessary to do so, ensure building is well ventilated and use ducting to channel exhaust fumes outside.
3. Always keep clothing relatively tight and belted. Remove jewelry or any objects that might catch in moving parts.
4. Use ladder and handholds when inspecting grain tank.
5. Park combine on a clear, level area before servicing. Disconnect from tractor - lower hitch and rear stands to ground and block wheels.

HOIST SAFETY

1. Use a chain hoist and frame of adequate capacity to lift heavy components.
2. Protect yourself from injury when heavy components are being raised by doing the following:
 - a. Do not stand on table when lifting.
 - b. Keep hands away from pinch points where chain links or belts tighten.
 - c. Do not let components swing and strike personnel or hoist frame as it leaves the ground.
 - d. Keep support stands nearby and place under lifted item when the necessary height is reached.
 - e. Do not go under any combine part supported by a hoist. Place support stands of adequate capacity under item before working on it.

MAINTENANCE SAFETY

1. Shut down tractor engine, set parkbrake, remove key and disconnect combine from tractor before servicing combine.
2. Always chock wheels and lock table cylinders UP before working on or under combine.
3. Never service, lubricate or clean combine while it is running.
4. Be alert when approaching combine while it is running.
5. Relieve all hydraulic pressure before servicing components. Use a piece of wood or cardboard and wear safety gloves and goggles when searching for hydraulic leaks.
6. Repair adhesive is very flammable. Keep adhesive and its vapors away from heat, sparks and flames.
7. During adhesive use and until vapor is dissipated, avoid using spark producing electrical equipment. Keep container closed when not in use.
8. Use adhesive only in a well ventilated area.

SECTION 1: SPECIFICATIONS

CLEANING

Fans

Type Two, 6 blade centrifugal
Diameter 584 mm (22.9 in.)
Width 828 mm (32.5 in.)
Width between fans 130 mm (5 in.)
Speed 450 to 1 100 r/min

Shoe

Speed 263 cycle/min
Type Opposed Action

Chaffer

Type Adjustable Slat
Spacing 28.5 mm (1.12 in.)
Number 2
Length 1 524 mm (60 in.)
Width (each) 952 mm (37.5 in.)
Extension length 254 mm (10 in.)
Area 2.651 m² (4 110 in.²)
including 0.471 m² (731 in.²) extension

Sieve

Type Adjustable Slat
Spacing 28.5 mm (1.12 in.)
Number 2
Length 1 270 mm (50 in.)
Width (each) 952 mm (37.5 in.)
Area 2.185 m² (3 388 in.²) ASAE

Total Cleaning Area . . . 4.897 m² (7 593 in.²) ASAE

GENERAL

Wheel Tread 3 650 mm (143.7 in.)
Overall Length 9 700 mm (381.9 in.)
Overall Width
Field 5 500 mm (216.5 in.)
Transport 4 400 mm (173.2 in.)
Shipping 3 657 mm (144 in.)
Overall Height 3 600 mm (141.7 in.)
Weight
Empty 7 400 kg (16 265 lb)
Full 13 000 kg (28 500 lb)

GRAIN HANDLING

Clean Grain Elevators

Type Roller chain with rubber cups
Chain type CA550
Width 204 mm (8 in.)
Drive Top drive

Return Elevator

Type Roller chain with rubber cups
Chain CA550
Width 127 mm (5 in.)
Drive Top drive

Grain Tank

Capacity 7.72 m³ (220 bu) approx
Levelling Augers 2

Unloading Auger

Diameter 356 mm (14 in.)
Unloading Time 100 sec
Length 4 800 mm (189 in.)
Speed 0.074 m³ (2.1 bu) per second
Discharge Height 3 660 mm (144 in.)
Clearance Height 3 560 mm (140 in.)
Auger Positioning Control Hydraulic
Auger Positioning Range 90° right to
180° left

SEPARATING

Rotors

Type 2 Axial
Rotor Diameter 533 mm (21 in.)
Rotor Speed 1 000 r/min
Rotor Length 2 383 mm (93.8 in.)
Pitch on Flighting 855 mm (33.7 in.)
Housing Diameter 635 mm (25 in.)
Separation Area 1.257 m² (1 914 in.²)
per housing

Auger Bed

Number 4
Diameter 127 mm (5 in.)
Length 1 288 mm (50 in.)
Speed 573 r/min

TABLE AND FEED ELEVATOR

Table Width 3.65 m (12 ft)
Auger Diameter 610 mm (24 in.)
Elevator Type Three chain staggered slat
Elevator Width 1 060 mm (41.7 in.)
Elevator Cleanout Door 865 × 280 mm
(34 × 11 in.)

THRESHING

Cylinder

Diameter 821 mm (32.35 in.)
Length 2 000 mm (78.75 in.)
Speed 425 to 1 000 r/min
Type Rasp Bar

Concave

Area 11.115 m² (1 728 in.²)
Clearance 3 to 30 mm (.12 to 1.18 in.)
Type 6 mm (0.24 in.) dia
14 mm (0.55) center-to-center

TRACTOR REQUIREMENT

Minimum PTO HP . . 130 hp (97 kW) at 1 000 r/min
Drawbar pin to PTO shaft 510 mm (20 in.)
Hydraulic Couplers 3 sets
Hydraulic Minimum Pressure 12 400 kPa
(1 800 psi) at zero flow
Electrical 12 volt, 75 amp minimum
negative ground

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

The manufacturer reserves the right to make changes or add improvements at any time without incurring any obligation to make such changes on machines manufactured previously.

SECTION 2: ELECTRICAL SYSTEM

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SECTION 2: ELECTRICAL SYSTEM

1 Introduction

This section contains information on the circuitry, circuit testing, and repair of the electrical system.

1.1 SPECIFICATIONS AND DATA

Lights three 60 W worklamps;
two taillights; two brakelights;
two amber warning lights

Tractor Requirement 12 volt 75 amp
minimum negative ground

1.2 WIRING DIAGRAMS

Refer to Figure 2-1.

1.3 COMPONENT LOCATION

Refer to Figure 2-2.

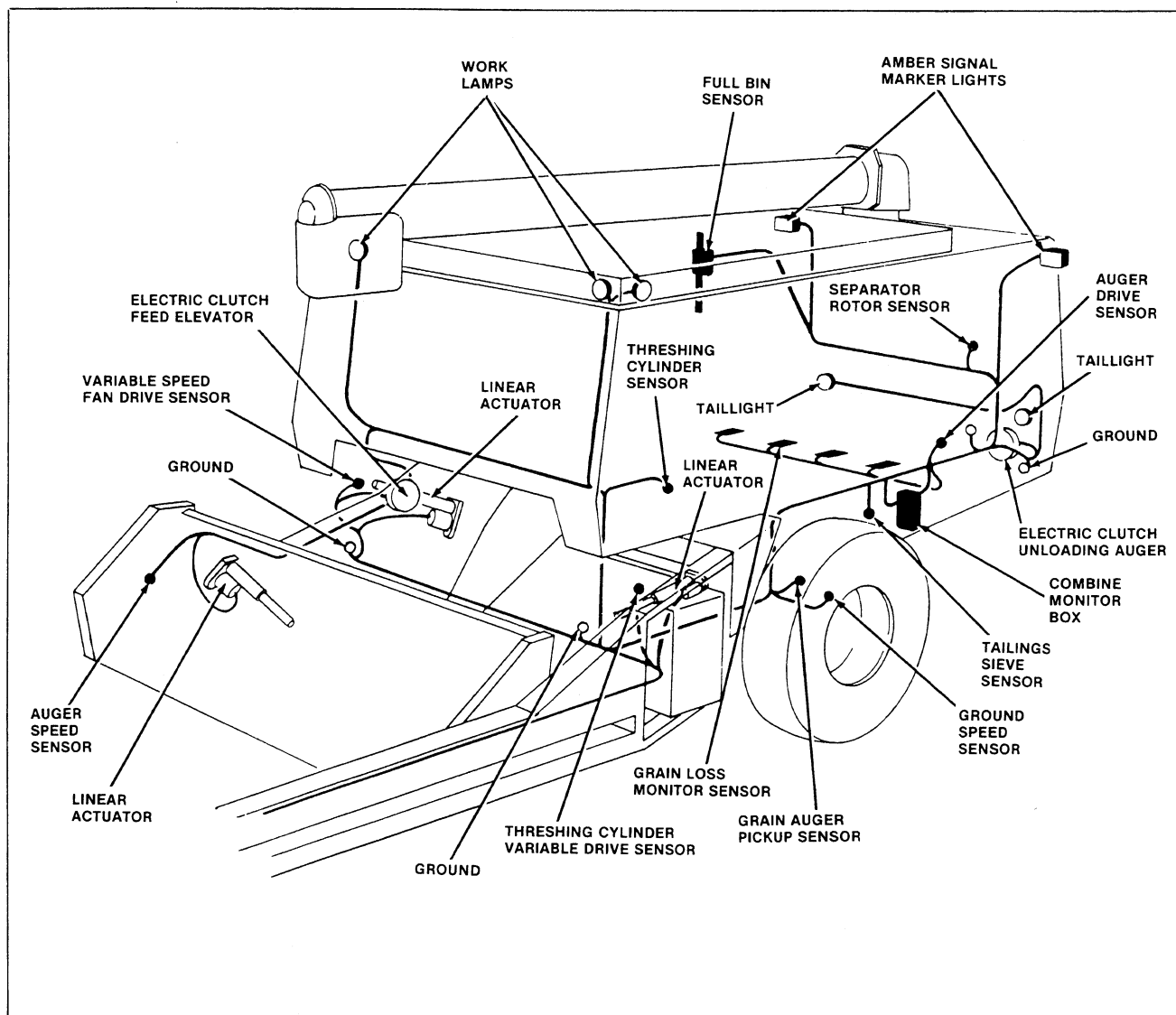
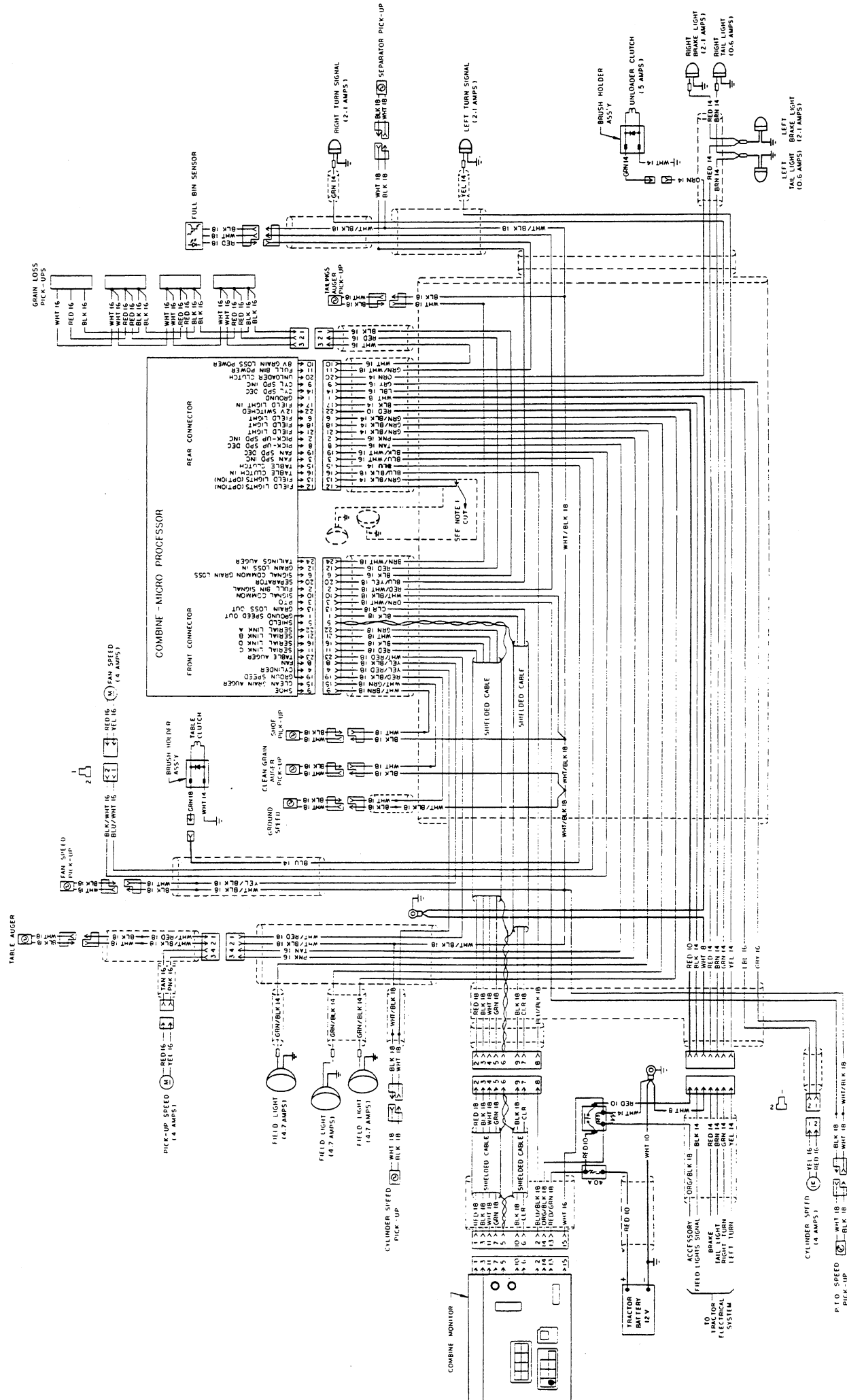


FIGURE 2-2: Electrical Components



2 Electromagnetic Clutches

2.1 TESTING

1. Check fuse in combine monitor box. Replace if necessary. Refer to decal on combine monitor box door for fuse location.
2. Remove two screws from clutch magnet assembly and remove two electrical connectors from magnet, noting position of connectors (Figure 2-3). Install screws.
3. Connect ohmmeter leads to screws and measure coil resistance. Resistance must be 2.6 ± 0.5 ohms or clutch magnet must be replaced.

IMPORTANT

Do not use a powered test lamp to test brushes assembly or diode may be damaged.

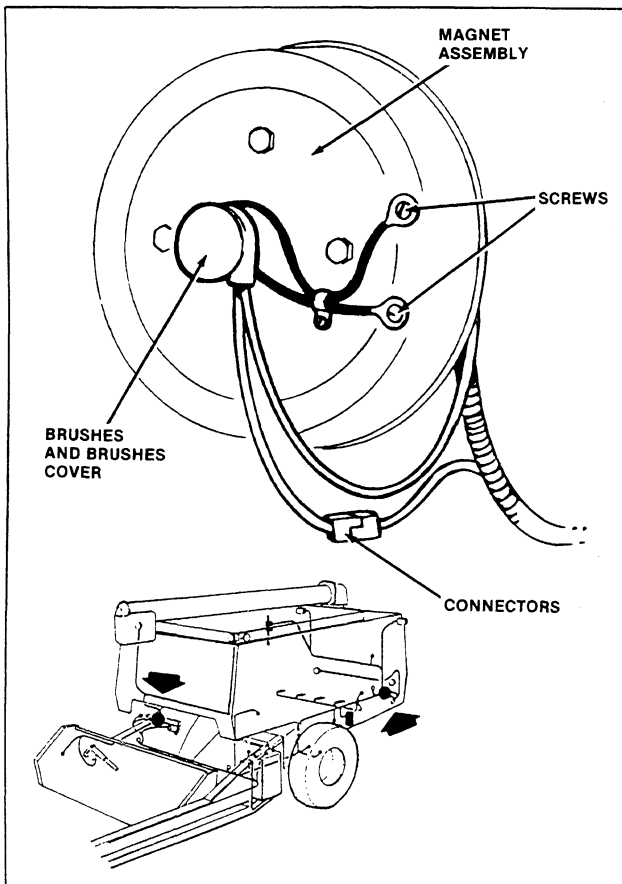


FIGURE 2-3: Electric Clutch

4. Remove and clean screws and connectors.
5. Install connectors and screws. Tighten securely.
6. Remove two screws from clutch brushes cover and remove cover.
7. Connect ohmmeter positive lead to brushes positive input terminal and negative lead to brushes negative input or output terminals. Resistance must be infinite or brushes diode is damaged and brushes assembly must be replaced.
8. Reverse ohmmeter leads attached in Step 6. Resistance must be less than 500 ohms or brushes assembly must be replaced.
9. Check circuit continuity between negative input and output terminals. If continuity is broken, brushes assembly or individual wires must be replaced.

IMPORTANT

Ensure continuity to ground is checked when checking circuit continuity.

10. Check circuit continuity between positive input and output terminals. If continuity is broken, brushes assembly or individual wires must be replaced.
11. Install electronic signal simulator to combine. Follow manufacturer's recommendations.

NOTE

Electronic signal simulator is required to test unloading auger clutch only.

12. Engage unloading auger override switch and listen for relay to "click", indicating relay is engaged. If relay does not "click", check LED beside relay. If LED is not lit, power is not reaching relay.
13. If LED is not lit, connect voltmeter probe to combine monitor rear harness; positive probe to pin 22 and negative to pin 1. If 12 (+2/-0) volts are present, combine monitor box is faulty and must be replaced.

14. If LED is lit, replace relay with another relay known to work. Repeat Step 11. If relay does not “click”, combine monitor box is faulty and must be replaced. If new relay “clicks”, replace old relay.
15. Check armature and magnet assemblies for scoring, pitting and galling. If these conditions exist, they may be repaired by machining the part.

IMPORTANT

Only machine part to a max. of 0.030 to remove damage.

2.2 TABLE CLUTCH

2.2.1 Disassembly

1. Disconnect and remove brushes assembly leads with open end wrench on slot between brushes assembly and clutch.
2. Remove clutch assembly with heavy duty gear puller.
3. Remove four flange screws securing magnet assembly to clutch (Figure 2-4). Remove magnet assembly.

4. Remove four capscrews, lockwashers and nuts securing remaining parts. Remove sprocket, outer hub, armature assembly and inner hub.
5. Remove internal and external snapping from outer hub and press bearing from hub.

2.2.2 Assembly

1. Chill bearings in deep freeze at -40°C (-40°F) for 1 hr.
2. Install bearings to outer hub and secure with internal and external snaprings (Figure 2-4).
3. Install sprocket and armature assembly to outer hub with four capscrews, lockwashers and nuts. Torque to 75 N·m (155 lbf ft).
4. Install magnet assembly to inner hub with four flange screws. Tighten securely.
5. Install inner hub and magnet assembly to outer hub. Ensure a gap of 1 to 2 mm (0.039 to 0.078 in.) exists between armature assembly and magnet assembly.
6. Press clutch on feeder drive gearbox shaft and install brushes assembly and leads to clutch.

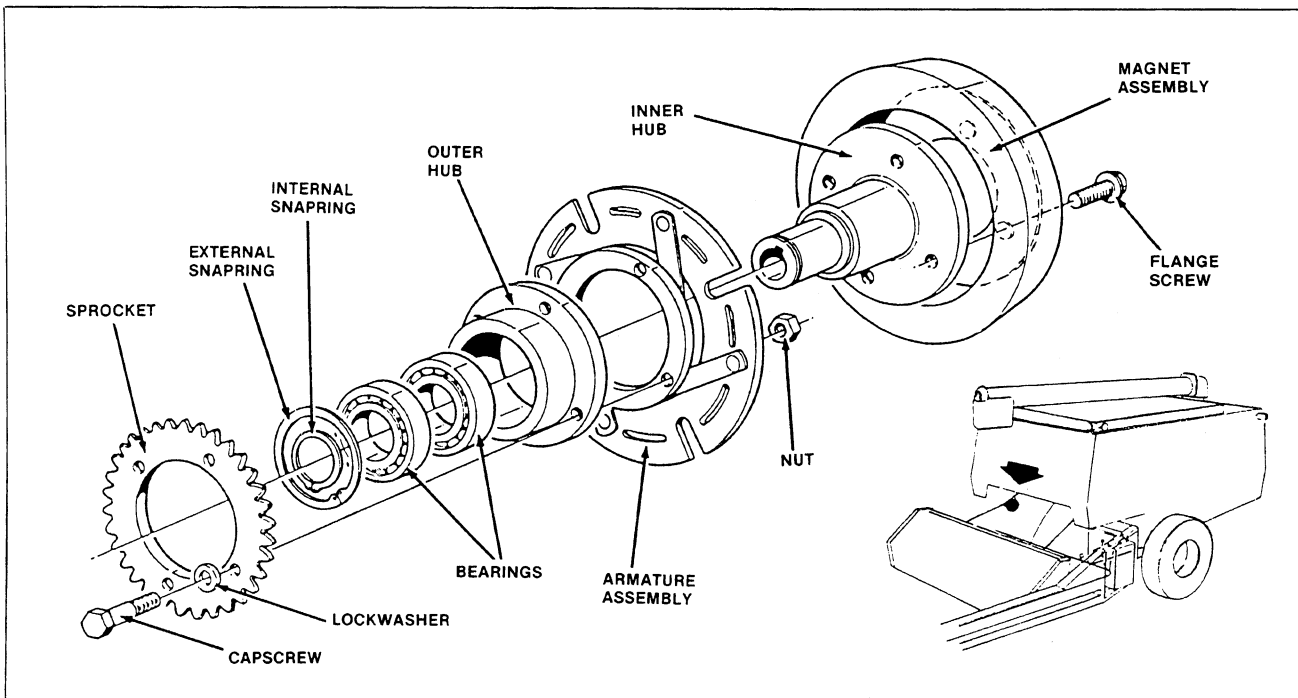


FIGURE 2-4: Table Clutch

2.3 UNLOADING AUGER CLUTCH

2.3.1 Disassembly

1. Remove brushes assembly leads and remove brushes assembly with open end wrench on slot between brushes assembly and clutch.
2. Remove unloading auger clutch from shaft with heavy duty gear puller.
3. Remove four flange screws securing magnet assembly to clutch (Figure 2-5). Remove magnet assembly.
4. Remove inner hub from clutch and remove four flange screws securing armature assembly to pulley.
5. Remove pulley from armature assembly.
6. Remove two snaprings and press two bearing from pulley.

2.3.2 Assembly

1. Chill bearings in deep freeze at -40°C (-40°F) for 1 hr.
2. Install bearing to pulley and secure with two snaprings (Figure 2-5).
3. Install armature assembly to pulley with four flange screws. Tighten securely.
4. Install inner hub to magnet assembly with four flange screws. Tighten securely.
5. Install inner hub to pulley and armature assembly ensuring a gap of 1 to 2 mm (0.39 to 0.078 in.) exists between magnet and armature assemblies.
6. Press clutch on unloading auger driveshaft and install brushes assembly and leads to clutch.

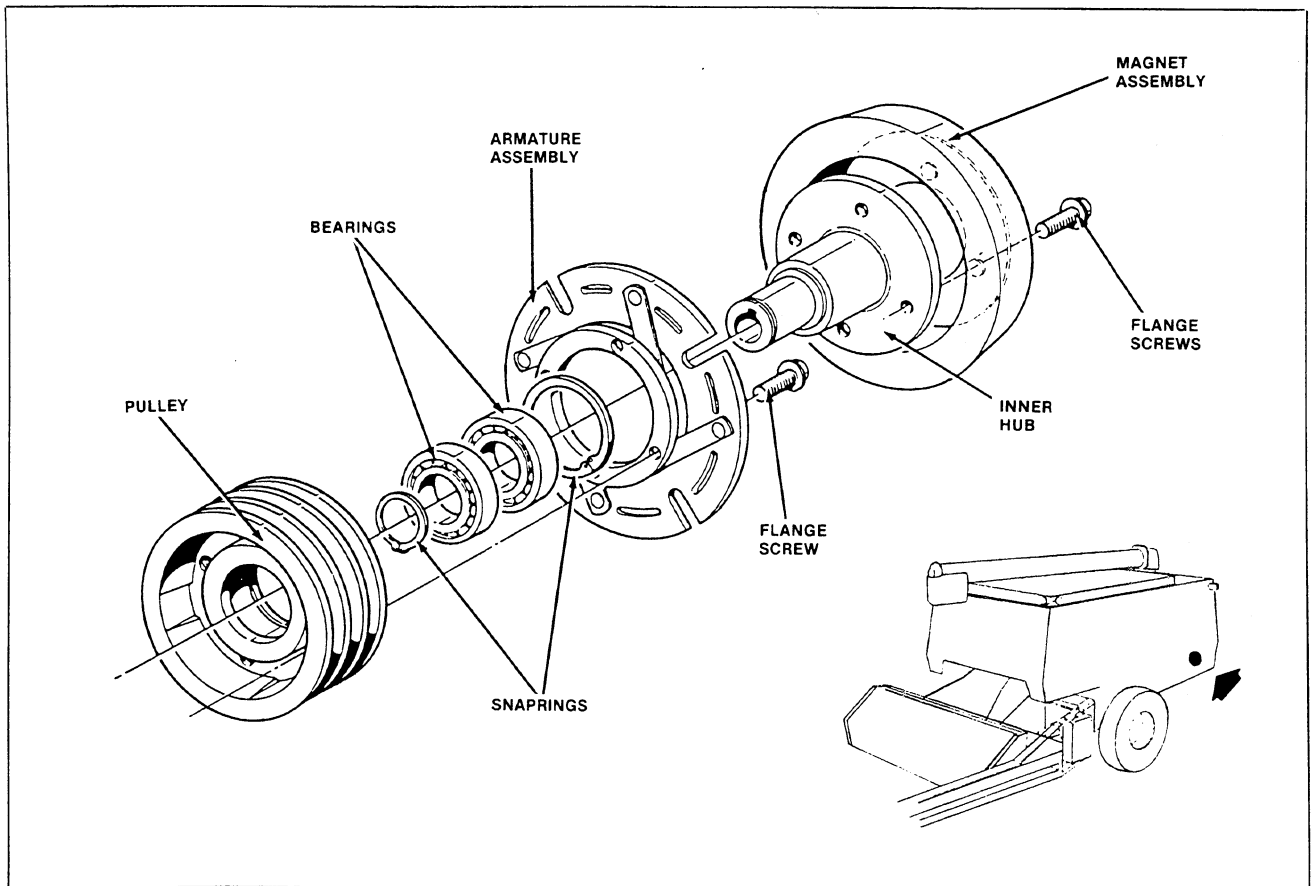


FIGURE 2-5:Unloading Auger Clutch

3 Lights

3.1 TESTING

The combine is equipped with three field lights with wiring provided for two additional 60 W lamps. The field lighting circuit is routed through the combine monitor box on the combine left side.

The brake, hazard and taillights are routed directly from the tractor electrical system through the trailer connector. The combine field lights are engaged automatically when the tractor field lights are turned on.

1. Check field light fuse in combine monitor box.
2. Check for burnt out lamps.
3. Check circuit for continuity.
4. Ensure lamp body is properly grounded.
5. **Field Lights Only:** Open monitor box on combine left side and have a helper engage and disengage field lights several times. Field lights relay should “click”, as lights are engaged. If relay does not “click”, observe LED beside relay. If relay is not lit, power is not reaching relay.

NOTE

Tractor keyswitch and field lights must be ON for combine field lights to work.

6. If LED is not lit, connect voltmeter to monitor box rear harness, positive probe to pin 22 and negative probe to pin1. If 12 (+2/-0) 2 volts are present, combine monitor box is faulty and must be replaced.
7. If LED is lit, replace relay with another relay known to be working. Repeat Step 4. If relay does not “click”, combine monitor box is faulty and must be replaced. If new relay “clicks”, replace old relay.

3.2 FIELD LIGHTS

3.2.1 Replacement

1. Disconnect plug from sealed beam lamp to combine wiring harness (Figure 2-6).
2. Pry lamp from rubber housing with a piece of stiff plastic or wood.

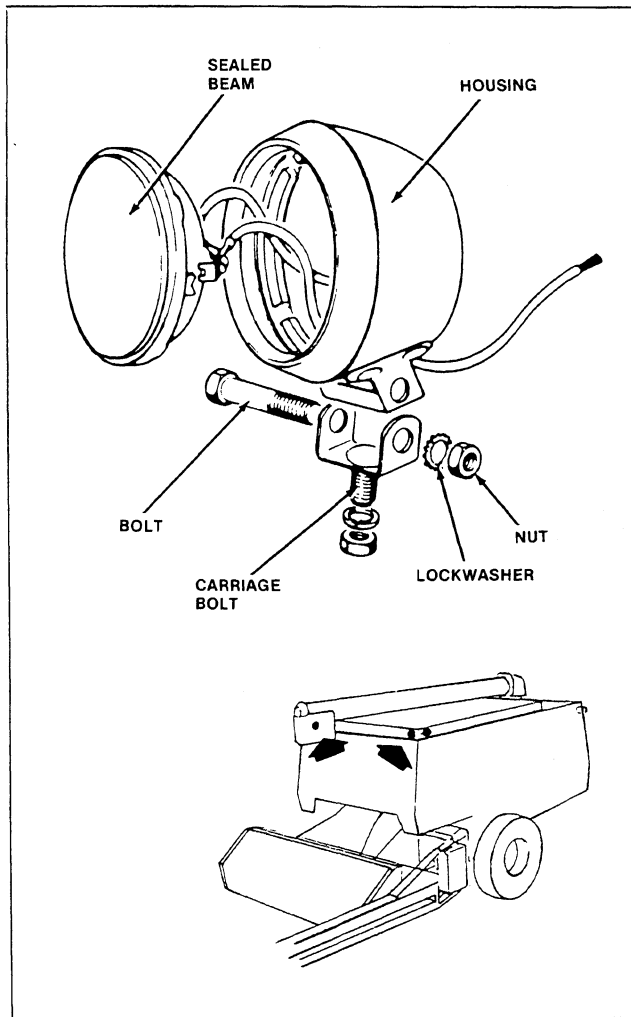


FIGURE 2-6: Field Light

3. Press lamp into rubber housing.
4. Connect plug from lamp to combine wiring harness.

3.3 WARNING LIGHTS

3.3.1 Replacement

1. Remove screws securing lens to lamp body. Remove lens (Figure 2-7). Replace lens if necessary.
2. Push bulb in and turn. Remove bulb.
3. Push new bulb in and secure by turning and releasing bulb.
4. Install lens to lamp body with screws. Do not overtighten or lens may be damaged.

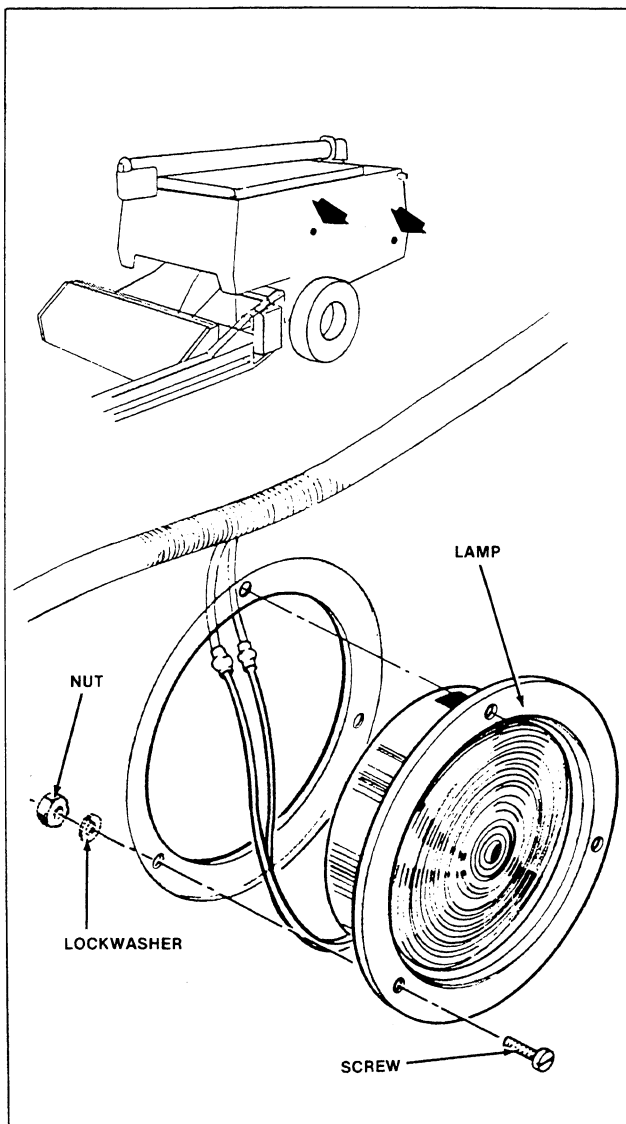


FIGURE 2-7: Taillight

4 Linear Actuators

4.1 TESTING

1. Check fuses in combine monitor box.
2. Check circuit for continuity with multimeter.
3. Connect a wire from the positive terminal of a 12 volt battery to linear actuator red lead wire and a wire from negative battery terminal to actuator yellow lead wire with a 15 amp circuit breaker connected in series. Linear actuator should extend or actuator is faulty and must be repaired or replaced (Figure 2-8).

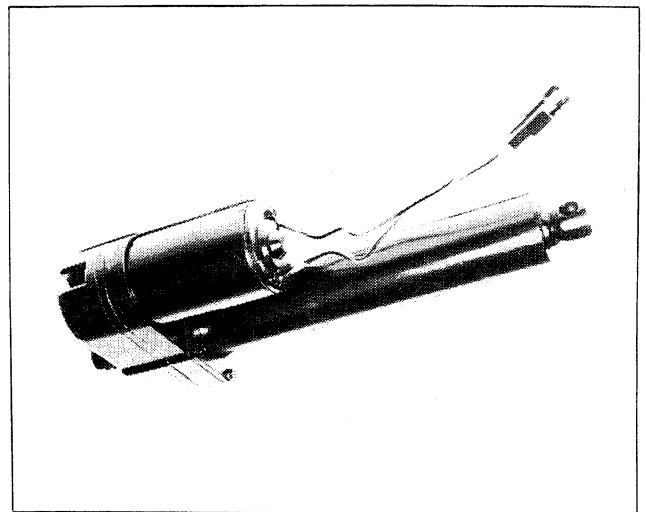


FIGURE 2-8: Linear Actuator

4. If circuit breaker trips while actuator is extending or retracting, check actuator wiring for faults.
5. Reverse battery terminal wires installed in Step 2. Linear actuator should retract or actuator is faulty and must be repaired or replaced.
6. Listen to linear actuator during extension and retraction. Sound should be steady and smooth with no grinding noises. If grinding noises occur, actuator gears may be damaged and require replacement.
7. Linear actuator motor must extend or retract actuator smoothly, without straining or motor may be worn and require replacement.

4.2 DISASSEMBLY

NOTE

All linear actuators are serviced the same way.

1. Remove clevis pins and cotterpins securing linear actuator to combine. Remove plug from actuator electric motor wires and remove linear actuator.
2. Remove four flange screws securing cover tube retaining plate to linear actuator rear housing and remove plate and cover tube (Figure 2-9).

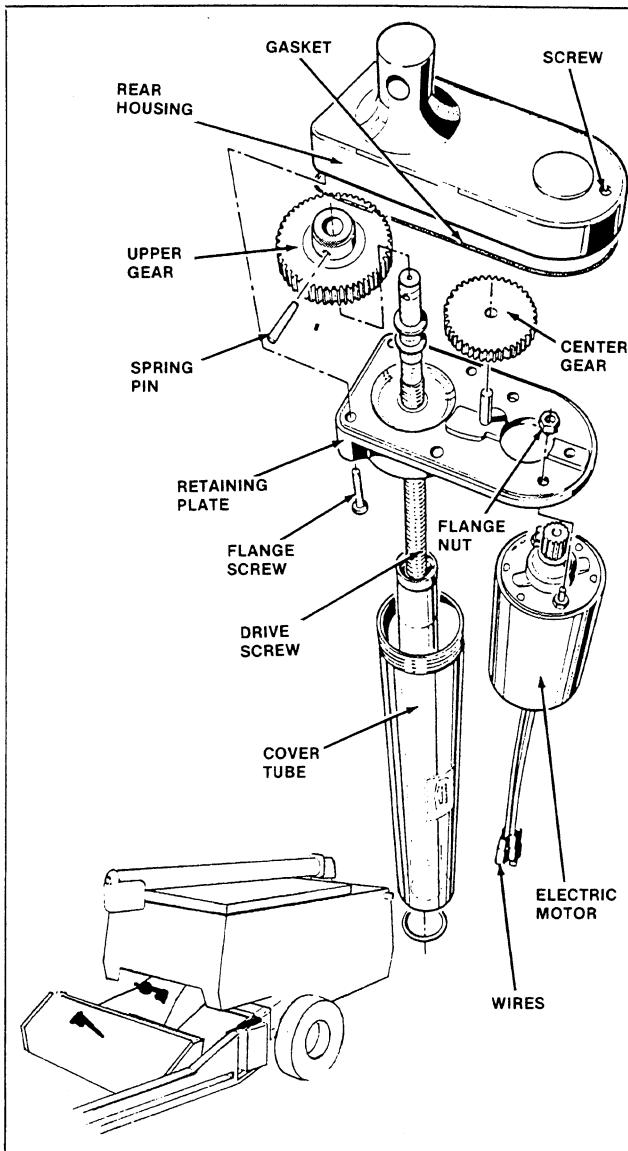


FIGURE 2-9: Linear Actuator

3. Remove screw on actuator rear housing and remove rear housing. Discard gasket.
4. Remove center gear from actuator and remove spring pin securing actuator upper gear. Remove upper gear.
5. Remove two flange nuts securing electric motor to actuator front housing and remove motor.

4.3 INSPECTION

1. Check gears for broken, worn or pitted teeth. Replace gears showing any of these conditions.
2. Check housings for cracks or warpage. Replace if necessary.
3. Check actuator drive screw for damaged or worn threads. Replace if necessary.

4.4 ASSEMBLY

1. Install electric motor to linear actuator with two flange nuts (Figure 2-9). Tighten securely.
2. Smear gears with multipurpose grease and install gears to actuator front housing. Secure top gear with spring pin.
3. Install actuator rear housing and gasket to front housing with screw. Tighten securely.
4. Install cover tube to actuator front housing and secure with cover plate and four flange screws. Tighten securely.
5. Install linear actuator to combine with two clevis pins and cotterpins.
6. Connect plug on wires from actuator electric motor to combine wiring harness.

**Thanks very much for your reading,
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manual**

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