

John Deere 100K Synchronous Thinner



TECHNICAL MANUAL John Deere 100K Synchronous Thinner

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100K SYNCHRONOUS THINNER

TECHNICAL MANUAL

TM-1023 (Jun-69)

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INTRODUCTION

This technical manual for the 100K Synchronous Thinner is a concisely written publication for the journeyman mechanic. It contains procedures and specifications which an individual cannot be expected to remember.

Use the table of contents at the front of the manual to locate the section and group that you are seeking. The table of contents on the first page of the section lists the specific information desired.

Coverage for each component includes general information, diagnosis and test, removal when necessary, adjustments, installation when necessary, specifications, and special tools. For your convenience, the specifications and service tools are listed at the end of each group.

Use the lubrication chart in the General Section to determine what type and amount of lubricant to use after servicing a component or system.

No effort has been made to explain theory of operation in this manual unless a component is peculiar to this machine. If you wish to review basic principles, we recommend the John Deere "Fundamentals of Service" manuals for this purpose.

Make a habit of using this Technical Manual whenever you are servicing the 100K Synchronous Thinner. Keep it readily accessible. You'll find it to be one of your most important service tools!

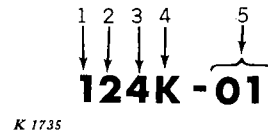
SERIAL NUMBERS

The thinner serial number and model number plate is located on the switch mounting bracket.

NOTE: When ordering parts, record both serial number and model number on plate.

Each amplifier box and actuator have a serial number attached. Use this number whenever additional detailed service information is required or when parts are needed.

MODEL NUMBER EXPLANATION



1. This number designates 100K Series Thinner.
2. This number designates the number of rows on each bed.
3. This number designates the total number of rows.
4. This letter designates the manufacturer.
5. This number designates the model number.

NOTE: On model numbers 114K30-01, 116K30-01, and 118K30-01 the "30" designates the maximum row spacing.

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Section 10 GENERAL

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Group 5 SPECIFICATIONS

THINNER DESIGN

The 100K Synchronous Thinner selectively thins row crops of beets, lettuce, cabbage, broccoli, tomatoes, and cotton.

The thinner uses an electronic probe to sense the plant before the thinner knife is actuated. When the probe contacts a plant, the plant completes the low voltage electrical circuit to the ground. This activates a solenoid valve which directs the oil to a piston, causing a knife to sweep across the row, leaving the plant that the probe touched but removing plants in the space ahead of it. The spacing is determined by the length of the knife and the ground speed.

SPECIFICATIONS

ELECTRICAL SYSTEM

- Alternator 110 to 130 volts
 1250 to 1800 Watts
 Powered by hydraulic motor
- Voltage Output Regulated by flow control valve
- Solenoid circuit 110 volts
- Probe circuit 11 volts
- Switch Shuts off electricity to amplifier which supplies electricity to solenoid and probe

HYDRAULIC SYSTEM

- Type (Tractor) Closed center, constant pressure system to operate actuator knives

HYDRAULIC SYSTEM—Continued

- Pump (Tractor) Transmission-mounted, having a minimum of 13 gpm with constant pressure in return line; 50 psi minimum and 100 psi maximum
- Working pressure 2000 psi minimum
 2300 psi maximum
- Selective control valve lock To hold valve in open position
- Filter cover With inlet for return oil
- Fittings Allowing return oil to enter at rock-shaft return line
- Accumulator (Pressure) One gallon on pressure manifold with a precharge of 1500 psi
- Accumulator (Return) 30 cubic inch on return manifold with a precharge of 25 psi

DIMENSIONS (Model Number 116K)

- Height . . . 29 Inches (at alternator)
- Width . . . 144 Inches (24 inch row spacing)
- Length . . . 45 Inches (front to rear)

WEIGHT (Est.)

- 112K 20 to 60-in. Rows 700 Lbs.
- 114K30 22 to 30-in. Rows 1,000 Lbs.
- 114K40 32 to 42-in. Rows 1,000 Lbs.
- 116K30 22 to 30-in. Rows 1,500 Lbs.
- 118K30 22 to 30-in. Rows 2,000 Lbs.
- 124K 13 to 15-in. Rows 1,000 Lbs.
- 128K 13 to 15-in. Rows 2,000 Lbs.

Group 10 LUBRICATION

GENERAL INFORMATION

Carefully written and illustrated lubrication instructions are included in the operator's manual furnished with your customer's machine. Remind him to follow these instructions.

For your convenience, the following chart shows capacities and types of lubricants for the thinner components and systems. Specifications for lubricants follow the chart.

	Capacity	Type of Lubricant	Interval of Service
Grease fittings	SAE Multipurpose grease	See Operator's Manual
Actuator Crankcase (Add through breather elbow)	6 Ounces	J.D. Type 303 Special Purpose Oil or its equivalent	Every 50 Hours - Check (by removing frame clamp bolt in center of casting, either side)

HYDRAULIC OIL

Use only John Deere Type 303 Special-Purpose Oil or its equivalent in the thinner actuator crankcase. Other types of oil will contaminate the hydraulic oil in the tractor system and will not give satisfactory service. Other oil may result in eventual damage.

STORING LUBRICANTS

This thinner can operate efficiently only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in a area protected from dust, moisture, and other contaminants.

GREASES

SAE multipurpose-type grease is recommended for all grease fittings. Application of grease as instructed in the lubrication chart will provide proper lubrication and will prevent contamination of bearings.

10 General
10-2 Lubrication

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Section 20

ELECTRICAL SYSTEM

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Group 5

DIAGNOSING SYSTEM MALFUNCTIONS

DIAGNOSING MALFUNCTIONS

Following is a guide for diagnosing thinner difficulties. For specific diagnosis of thinner components, refer to the groups which cover complete servicing.

KNIFE OSCILLATES CONTINUOUSLY

Plant or dirt shorting from probe to frame or ground.

KNIFE MAKES TWO STROKES FOR EACH PLANT

Probe wire passing too close to solenoid.

TWO KNIVES ACTUATE WHEN ONLY ONE PROBE CONTACTS PLANT

Loose power supply wire.
 Loose or broken amplifier to solenoid wire on unit not contacted.
 Fuse not tight in socket.

THREE OR MORE UNITS OPERATE WHEN ONLY ONE PROBE IS CONTACTED

Electrical power source is being interrupted.
 Alternator voltage in excess of 150 volts.

NO ELECTRICAL POWER

Brushes worn out.
 Brushes not contacting slip rings because of misalignment and wear.
 Armature of alternator not turning.
 Switch inoperative.

THINNING ERRATIC

Hydraulic oil volume too low.
 Ground wire from amplifier to support broken.
 Machine not grounding because of insufficient metal-to-ground contact.
 Broken electrical wire or loose connection.

Group 10 WIRING DIAGRAM

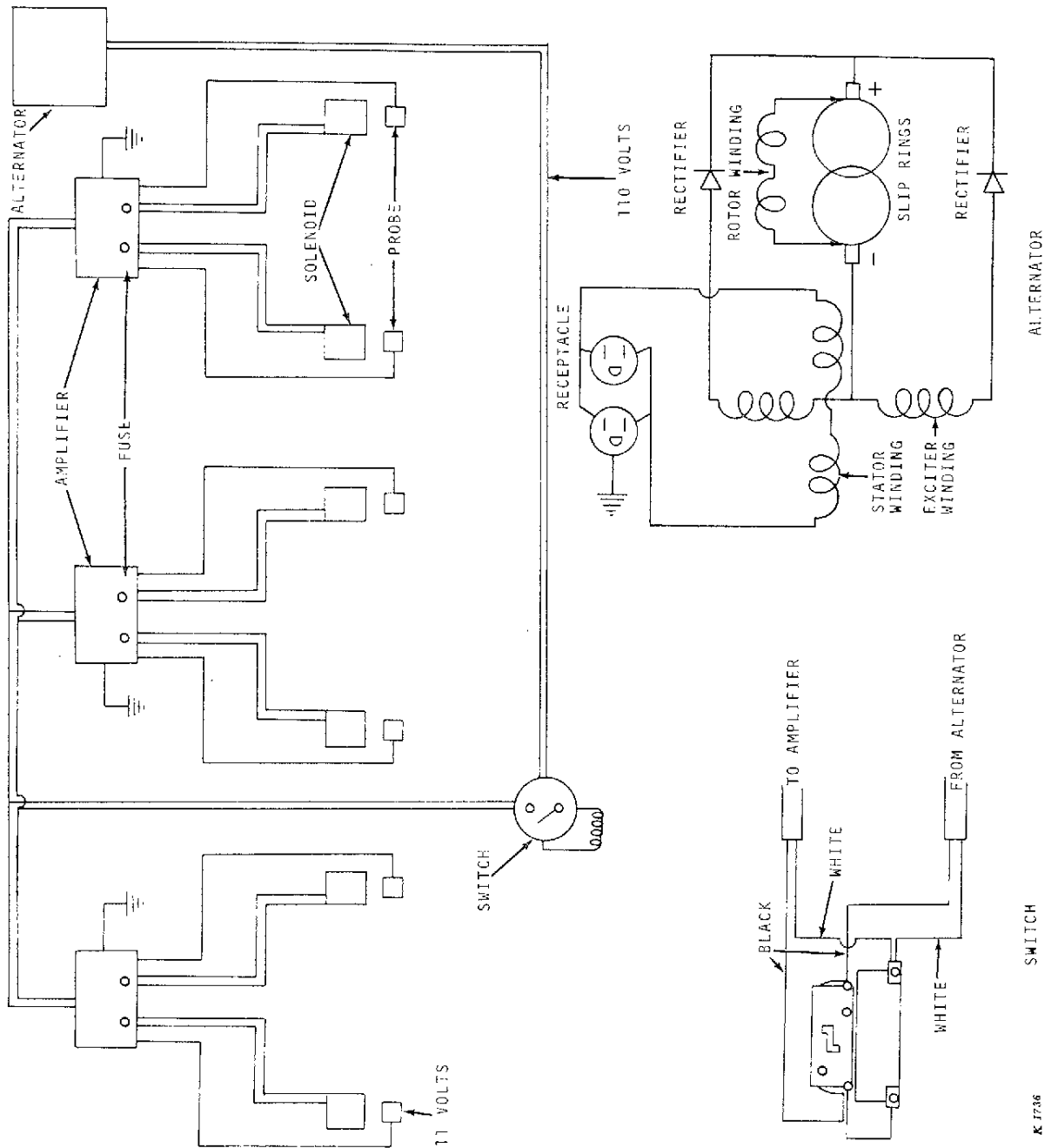
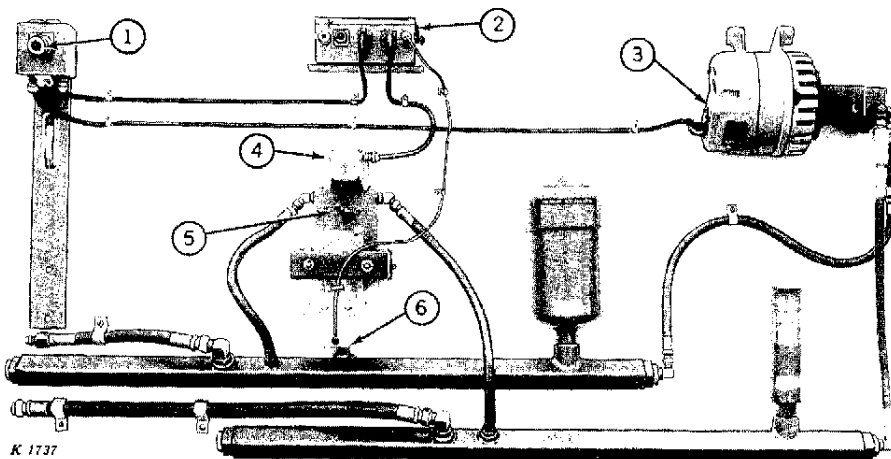


Fig. 1-100K Thinner Wiring Diagram



- | | | |
|---------------|----------------|--------------|
| 1 - Switch | 3 - Alternator | 5 - Actuator |
| 2 - Amplifier | 4 - Solenoid | 6 - Probe |

Fig. 2-100K Thinner Components with One Actuator Hooked-Up to Show Electrical System

GENERAL INFORMATION

The electrical system consists of a 110-volt alternator, an amplifier, a solenoid, a probe and a switch.

The amplifier amplifies the 11 volts going to the probe back to 110 volts to operate the solenoid.

The solenoid opens and closes the spool valve that works the actuator.

The switch turns on and off the 110 volts coming from the alternator to the amplifier box.

Group 15 ALTERNATOR

GENERAL INFORMATION

When the alternator is driven by the hydraulic motor, it produces a 110 volt, 60 cycle, 1800 watt electrical current.

Alternator speed must be constant as voltage increases as the alternator speed is increased and decreases as the alternator speed decreases. Under normal rated loads, the voltage will be approximately 115 volts when the alternator speed is 3600 rpm. As the load varies from no load to maximum load, the voltage will vary from 110 volts to 115 volts. This is normal expected variation and is perfectly safe.

DIAGNOSING MALFUNCTIONS

ALTERNATOR FAILS TO GENERATE

- Brushes not aligned with slip rings.
- Brushes holding up (weak springs).
- Brushes worn out (too short).

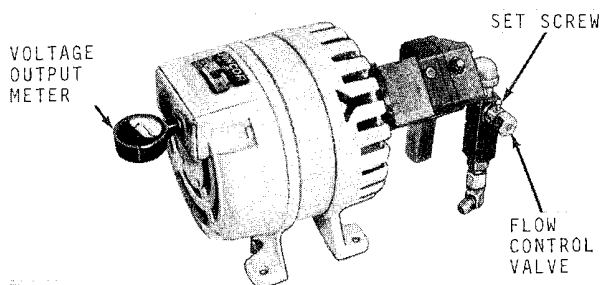
LOW VOLTAGE WHEN OPERATING

- Low hydraulic oil supply in tractor reservoir.
- Rpm too low on alternator.
- Pressure accumulator defective.
- Motor not turning alternator at correct speed.

NOISY ALTERNATOR

- Alternator bearing worn out.
- Drive block bearing worn out.

TESTING



K 1624

Fig. 1—Voltmeter Test

With alternator running at 3600 rpm, plug in voltmeter (Fig. 1).

Voltmeter should read 110 to 115 volts.

Check voltage only after oil has warmed up. If meter shows incorrect voltage, reset flow control valve.

Unlock valve set screw and turn valve hex. nut to increase or decrease the speed of the alternator. When meter reads 110 to 115 volts, relock flow control valve with set screw.

If no voltage shows on voltmeter, check for defective brushes.

Brushes must be aligned to allow each brush to fully contact its copper slip ring. If out of alignment, add shims to move the brush holder out, or remove shims to move in. When brushes are worn beyond specifications, they should be replaced.

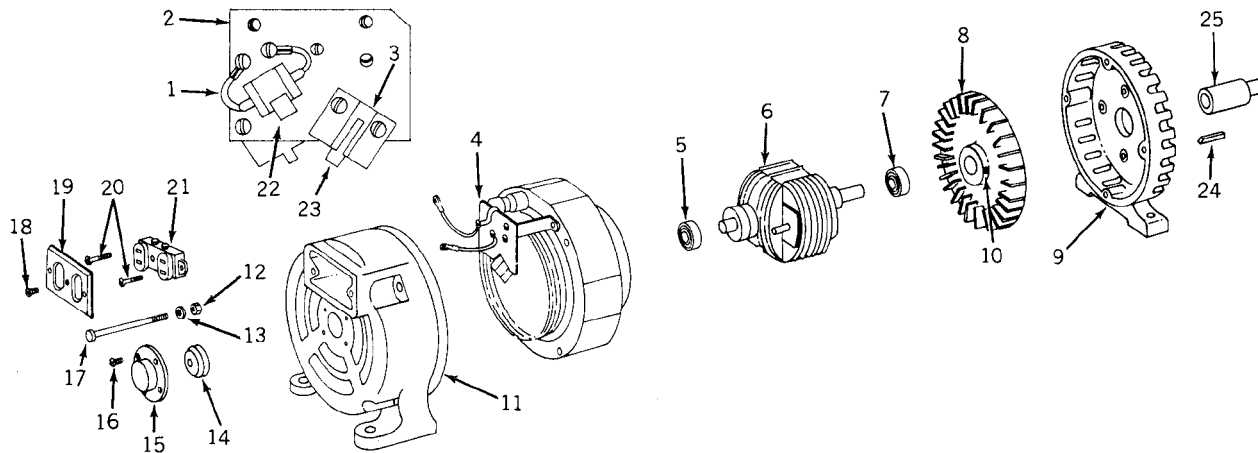
Replace brushes in sets only—never singly.

REPAIR

To replace brushes, remove brush holder and yoke assembly. Replace both brushes making sure the spring is in place and has sufficient expansion to apply down pressure to brush.

The drive block (25, Fig. 2) is installed at the factory with a primer and Loctite, Grade AA.

When installing drive block, make sure the shaft and I.D. of the drive block are completely free of oil and apply Loctite primer and allow to dry. Apply Loctite, Grade AA to both parts and slide drive block onto shaft until it bottoms. Allow a minimum of 12 hours curing time at 75° F. after installation. Curing time can be reduced to approximately one hour by applying heat. Do not heat above 300° F.



K 1738

- | | | |
|---------------------------|---------------------------|-----------------------|
| 1 - Rectifier (2 used) | 10 - Set Screw | 18 - Screw |
| 2 - Brush Holder and Yoke | 11 - End Bracket | 19 - Receptacle Cover |
| 3 - Brush Holder | 12 - Hex. Nut (4 used) | 20 - Screw (2 used) |
| 4 - Stator Assembly | 13 - Lock Washer (4 used) | 21 - Receptacle |
| 5 - Ball Bearing | 14 - Shim | 22 - Clamp |
| 6 - Rotor | 15 - Bearing | 23 - Brush and Spring |
| 7 - Bearing | 16 - Screw (4 used) | 24 - Key |
| 8 - Fan | 17 - Screw (4 used) | 25 - Drive Block |
| 9 - End Bracket | | |

Fig. 2-Exploded View of Alternator

SPECIFICATIONS

<u>Item</u>	<u>Measurement</u>	<u>Specification</u>
Alternator	Cycles per minute . .	60
.	Voltage (at 3600 rpm) .	110 to 115
.	Wattage	1250 to 1800
.	Speed (rpm).	3600
Brushes.	Minimum length . . .	1/4-inch

TORQUES FOR HARDWARE

<u>Item</u>	<u>Torque (in-lbs)</u>
Alternator through screws (17, Fig. 2)	25 to 30

Group 20 AMPLIFIER AND PROBE

GENERAL INFORMATION

The amplifier box contains two complete circuits, one for each solenoid valve it operates. The amplifier receives 110 volts from the alternator through the switch and is coupled to the amplifier box at the center terminal. The wire to the right of center terminal controls the right solenoid valve. The wire to the left of center terminal controls the left solenoid valve. The two outside wires are the probe wires that sense the plants, causing the actuators to work on each of their rows. Probe voltage is 11 volts.

The probe is the contact point that touches the plant to trigger the actuator knife. The probe plate must be kept clean and set at the proper height. The probe shield is designed to fold the large plant foliage back, allowing the probe plate to contact the plant at the stem.

DIAGNOSING MALFUNCTIONS

NO CURRENT TO AMPLIFIER

Check with test light.

LOOSE CONNECTIONS, TO AND FROM AMPLIFIER

Unplug, reconnect, and tighten connector nut.

FUSE BLOWN

Check with test light.

PROBE WIRE DEFECTIVE

Shorted out, causing continual oscillation of knife.

Wire corroded.

Binding post spring weak.

Binding post bolt loose.

AMPLIFIER SHORTED OUT BY MOISTURE

Remove lid (if dry day).

Reactivate desiccant bag.

GROUND WIRE LOOSE OR BROKEN

Replace or tighten ground wire.

PROBE SHORTED OUT

Moisture inside shielded wire.

Buildup between probe plate and shield.

BUILDUP ON PROBE PLATE

Wax from plants.

Dirt and dust from plants.

AMPLIFIER TESTS

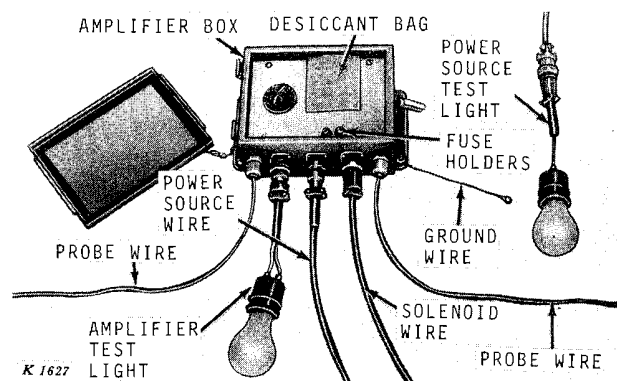


Fig. 1—Amplifier Test Lights

When the thinner fails, look for the following possible causes at the amplifier box in the order listed:

1. Probe wire plate insulated by dirt or wax from plants.

File the probe plate clean.

2. Probe wire broken or shorting out by dirt or moisture.

Replace probe wire.

Check to be certain that the connector makes a good contact between the outer shield contacts. Install neoprene grommet over outer (female) probe plug. Place washer and nut over wire and insert assembled plug into the fitting and tighten nut. **IMPORTANT: DO NOT** leave probe wires disconnected from box as dirt and moisture can enter when the probe wire is not in place.

3. No current coming to the amplifier box.

Uncouple the center power source wire and plug in test light. With switch on and alternator running at 3600 rpm, the light should light up. If it fails to light up, check wire connections and check alternator with volt meter.

4. Bad wire connection at solenoid or at the amplifier box.

Remove valve housing plate and check wire connections inside housing. Uncouple wire at the amplifier box, clean connecting prongs, and recouple.

5. Ground wire broken or not grounding amplifier box to frame.

If wire is broken, replace it. Clean the contacting surfaces of the ground wire.

6. Fuse blown out.

Uncouple solenoid wire on the side you wish to test; attach amplifier test light. With alternator running and electrical switch on, detach probe wire from binding post and ground it to the amplifier box at the probe outlet coupler on amplifier box. The test light should go off and on. If light fails to go off and on, replace fuse in amplifier box on the side you are testing and test again.

7. Amplifier box is shorted out by moisture or dirt entering box.

Remove any dust or dirt from the amplifier box cover and remove cover. (If it is a dry day, leave lid off for 10 minutes.) Remove the desiccant bag and reactivate per instructions on bag. If the amplifier is shorted out by dirt, the amplifier will have to be exchanged.

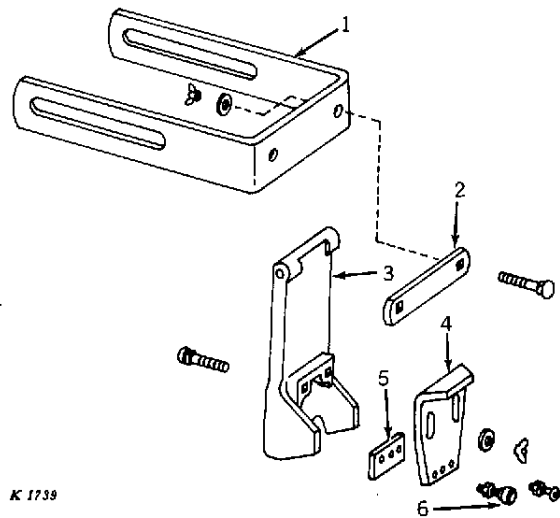
IMPORTANT: The amplifier is extremely sensitive to moisture and dirt. Therefore, care must be taken to prevent dirt or moisture from entering the amplifier box.

PROBE TEST

Remove probe wire and test for damaged wire. Touch one ohmmeter lead to the end of the probe wire that inserts in the binding post. Touch other ohmmeter lead to the ground shield on the opposite end of probe wire. If ohmmeter test shows less than 10 million ohms (10 megohms), the probe wire is defective.

SPECIFICATIONS

<u>Item</u>	<u>Measurement</u>	<u>Specification</u>
Probe Wire	Continuity	10 Megohms (Minimum)



- 1 - Probe Holder Frame
- 2 - Probe Clamp
- 3 - Probe Shield
- 4 - Probe
- 5 - Probe Plate
- 6 - Binding Post

Fig. 2-Exploded View of Probe

REPAIR

When binding post spring is weak, making poor contact, replace binding post which is attached to the probe plate.

Should plastic shield break, replace and set probe plate per dimension given in operator's manual.

Group 25 SOLENOID AND SWITCH

GENERAL INFORMATION

The solenoid and valve, in combination, controls the flow of hydraulic oil to the actuator, causing the knife to work back and forth.

The solenoid is a magnet that works the spool valve back and forth, closing and opening the oil ports. An electrical current energizes the magnet shifting the valve spool in one direction. When the current is turned off, a spring returns the valve to its original position.

DIAGNOSING MALFUNCTIONS

SOLENOID FAILS

- Coil burned out.
- Wires broken or disconnected.
- Spool locked or stiff due to overtightened bolts or foreign material.

SWITCH FAILS

- Loose connection.
- Broken wire.
- Wired wrong.

PILOT LIGHT NOT WORKING

- Bulb burned out.
- Loose wire.

SOLENOID TESTS

The solenoid cover has a pin in the center. With a small punch or nail, push in at this point. This pin should go in about 7/16-inch and return when released. If sticking, check solenoid armature and valve spool for obstructions.

Unplug the solenoid wires and apply 110 volts directly to the solenoid. If the solenoid works each time you make and break contact, the solenoid is all right. Check for loose connections or bad wires to the solenoid.

Check the coil for defects by using an ohmmeter. If no reading appears (infinite), the coil is defective; possible broken wire. A good solenoid coil will give a reading of 12 ohms.

REPAIR

Remove the two bolts holding the armature stop in place. Remove armature stop and pull armature out of coil center. Lift coil out of holder and replace with new coil.

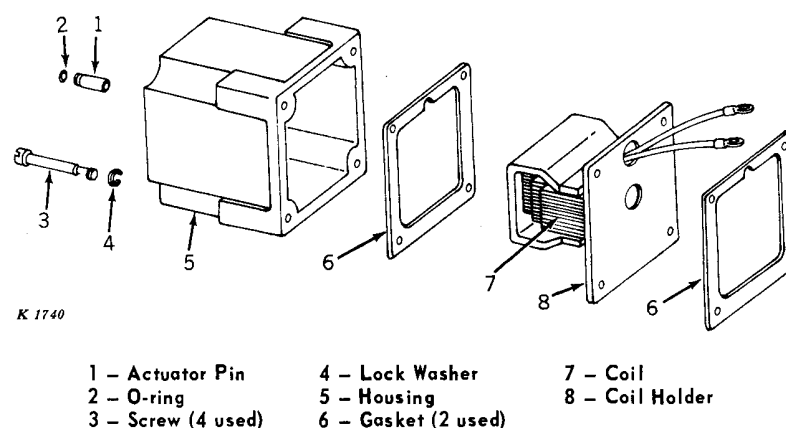


Fig. 1-Exploded View of Solenoid

20 Electrical System
25-2 Solenoid and Switch

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SPECIFICATIONS

<u>Item</u>	<u>Measurement</u>	<u>Specification</u>
Solenoid Coil	Coil Resistance	12 ohms
Solenoid Cover	Actuator Pin Movement	7/16 inch

Section 30

HYDRAULIC SYSTEM

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Group 5

GENERAL INFORMATION AND TESTING

GENERAL INFORMATION

The hydraulic system (Fig. 1) used on the Synchronous Thinner consists of a pump (tractor), reservoir (tractor), manifolds, actuators, accumulators, hydraulic motor, and remote cylinder. These individual components are connected with steel bar manifolds and reinforced neoprene hose.

The tractor hydraulic system must be a closed-center, constant-pressure system with 2200 to 2300 psi.