OPERATORS MANUAL

Dynamometer Models:

Model 200, Model 375, NEB 200,
NEB 400, NEB 600, NEB 800

CONTENTS

SECTION 1
WARRANTY

AW Dynamometer, Inc. warrants its products to be free from defects in material and workmanship under normal and proper use for a period of one year from the date of shipment. Any products purchased from AW Dynamometer, Inc. that upon inspection at AW Dynamometer's factory prove to be defective as a result of normal use during the one year period will be repaired or replaced (at AW Dynamometer's option) without any charge for parts or labor. This limited warranty shall be void in regard to (1) any product or part without AW Dynamometer's previous written consent or (2) any product or part thereof that has been subjected to unusual electrical, physical, or mechanical stress or upon which the original identification marks have been removed or altered. **Transportation charges for shipping any product or part thereof that the buyer claims is covered by this limited warranty shall be paid by the buyer.** WITH THE EXPRESS WARRANTY SET OUT ABOVE, AW DYNAMOMETER, INC. DOES NOT GRANT ANY WARRANTIES EITHER EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR USE. The obligations or liabilities of AW Dynamometer, Inc. specifically shall not be liable for damages, AW Dynamometer, Inc. specifically shall not be liable for re-installing any product or part thereof repaired or replaced under the limited warranty set out above. AW Dynamometer, Inc. expressly excludes all liability for any indirect or consequential damages the buyer may sustain in connection with the delivery, use, or performance of AW Dynamometer, Inc. products.

Under no circumstances shall any liability for which AW Dynamometer, Inc. is held responsible exceed the selling price to the buyer of the AW Dynamometer, Inc. products that are proven to be defective. This limited warranty applies exclusively to AW Dynamometer, Inc. manufactured products. Warranties for driveline components, gauges, power computer and printer and other manufacturer's goods are covered by their warranty. Any legal action for breach of any AW Dynamometer, Inc. warranty must be commenced within one year of the date on which the breach is or should have been discovered.

SECTION 2
SAFETY

This safety alert symbol indicates important safety messages in this operator's manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

1. Stay clear of the rotating driveline and adapter assembly during operation. Do not stand or straddle the driveline while it is in use. All driveline shields must be in place prior to operating the test and inspected prior to each test for damage or defects. Replace as required.

2. Driveline and adapters require inspection prior to each test by visual inspection. Once a year all driveline components must be magnafluxed for stress cracks and replaced if found defective.

3. Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protective device such as ear muffs or ear plugs to protect against objectionable or uncomfortable loud noises

4. Caution: Water and electricity are lethal. Any spillage or leakage of water from the cooling system or dynamometer does create a hazardous condition to the operator. Any exposure of water leakage in the test area must be corrected before any test is conducted. The water system should be inspected for leakage prior to each test. Water leakage during the test should result in the operator aborting the test and correcting the leakage problem prior to proceeding.

5. All driveline shields, chain shields and sheet metal covers must be on the machine during operation.

6. At a minimum of once per year the internal lubrication must be inspected as to its quality and quantity.

7. Replace all safety and maintenance decals if they become worn and unledgeable or missing. Refer to Section 10.

SECTION 3
COOLING REQUIREMENTS

The most important part or requirement is water for cooling the dynamometer. Through the conversion of mechanical energy into heat energy by the dynamometer tremendous amounts of heat is created.

The unit of quantity of this thermal energy is called British Thermal Units or B.T.U.s. One B.T.U. is the amount of heat (thermal energy required to raise the temperature of 1 pound of water), 1^0F in 1 minute of time.

778 is the number of foot pounds of mechanical energy equivalent to 1 B.T.U. and is called the mechanical energy. It takes 33,000 ft lbs of work in 1 minute to produce 1 horsepower..

33,000 divided by 778 = 42.6 B.T.U. per horsepower.

Let's say we are testing a 100 H.P. tractor on a dynamometer.

100 H.P. X 42.6 = 4260 B.T.U. per minute of cooling. If we are to load test 1 hour we have a total quantity of heat of 4260 B.T.U. @ minute X 60 = 255,600 B.T.U. per hour. This is equal to a furnace roughly heating 2 ½ houses with the thermostat completely set on high for one hour. It is this heat which must be removed from the dynamometer in order to keep it cool. Without proper cooling your test periods would be short and the dynamometer life will have short intervals between major overhauls. Installations with an insufficient supply of water must follow Inspection/Servicing Brake Drum Unit in Section 6 very closely to prevent damage to the equipment or injury to personnel.

The following chart shows several types of cooling systems that have been used down through the years.

SECTION 3A

ATTACHMENT TO DRAWINGS (AA), (BB), & (CC)

THE UNIT OF QUANTITY OF THERMAL ENERGY USED IN THE UNITED STATES IS THE BRITISH THERMAL UNIT OR B.T.U. WHICH IS THE QUANTITY OF HEAT OR THERMAL ENERGY REQUIRED TO RAISE THE TEMPERATURE OF ONE POUND OF WATER, ONE DEGREE FARINHEITE IN ONE MINUTE. THE NUMBER OF FOOT POUNDS OF MECHANICAL ENERGY EQUIVALENT TO ON B.T.U. IS CALLED THE MECHANICAL EQUIVALENT OF HEAT WHICH EQUALS 778 FOOT POUNDS. 35,000 FOOT POUNDS OF WORK IN ONE MINUTE = 1 HORSEPOWER.

$$\frac{33,000}{778} = 42.6 \text{ B.T.U.'s PER HORSEPOWER}$$

In most applications fresh tap water is used for cooling. Free flowing tap water requirements for the dynamometer are based on the incoming water temperature and a maximum water discharge temperature of 140^{0}F. The chart provided shows the fresh water requirements based on incoming temperature versus increments of 100 H.P.

Enclosed systems require higher volumes of water flow to decrease the amount of temperature rise between the inlet and outlet. This is very important on systems which have no supplemental cooling and only rely on the holding tank as a heat sink or storage systems without some source for cooling the hot water and will suffer short tests and more maintenance on the dynamometer.

SECTION 3B
WATER REQUIREMENTS FOR CONTINUOUS TESTING

Incoming Water Temperature ^{0}F	Gallons Per Minute								
40^0	5	10	15	20	25	30	35	40	45
50^0	6	12	18	24	30	36	42	48	54
60^0	7	14	21	28	35	42	49	56	63
70^0	8	16	24	32	40	48	56	64	72
80^0	9	18	27	36	45	54	63	72	81
90^0	10	20	30	40	50	60	70	80	90
100^0	13	26	39	52	65	78	91	104	117
110^0	17	34	51	68	85	102	119	136	153
Horsepower	**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**

Example: *60^{0}F water requires 7 gpm to test 100 H.P.*

Gravity feed systems are not recommended due to low pressure created by them, reducing the required volume for cooling.

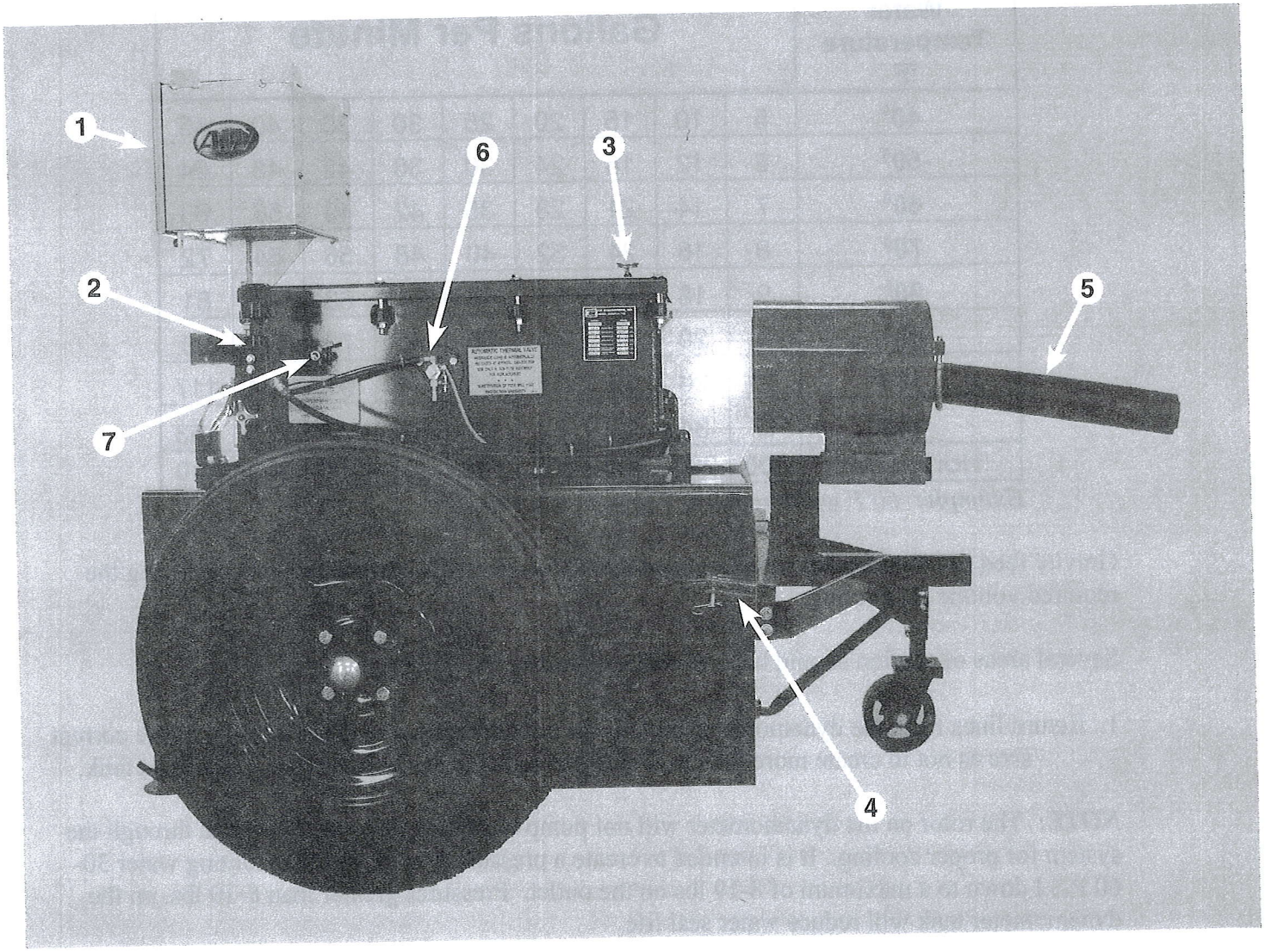
Several areas of caution should be used when plumbing the system.

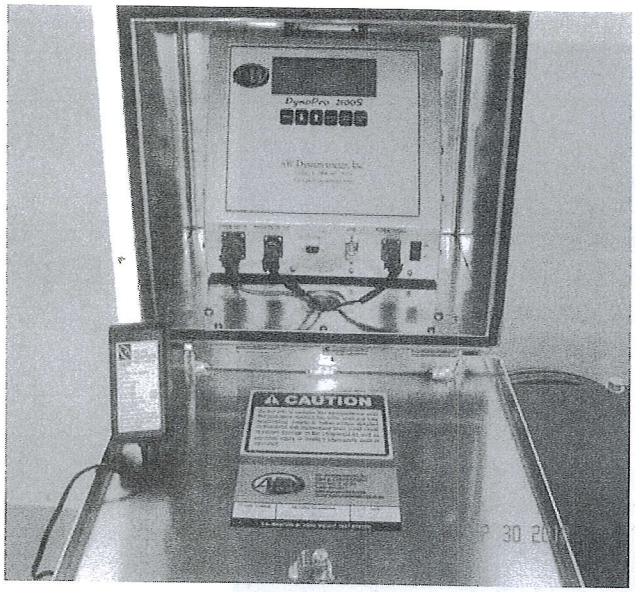
1. Return lines from the dynamometer back to the cooling system or drain must be of the correct size as not to create more than 8-10 P.S.I of back pressure on the dynamometer's tank.

NOTE: The rotor on the dynamometer will not pump water. Water must be forced through the system for proper cooling. It is intended to create a pressure drop from the incoming water 30-60 P.S.I down to a maximum of 8-19 lbs on the outlet. Pressures greater than 8-10 lbs. on the dynamometer tank will reduce water seal life.

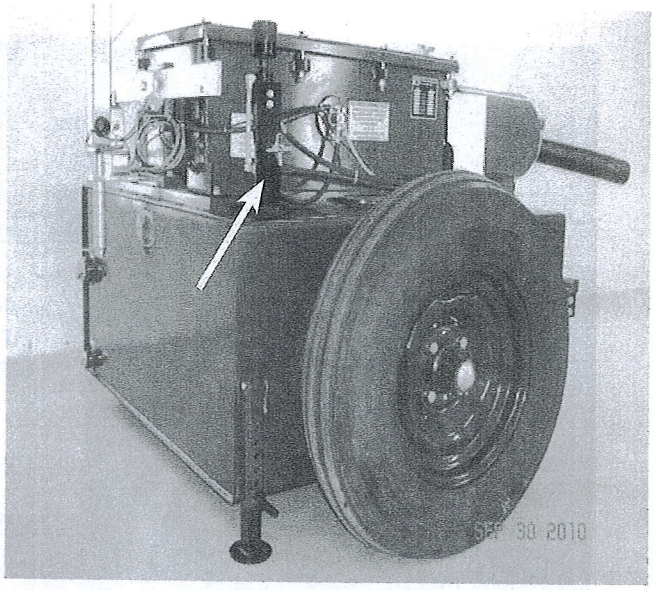
SECTION 4
GENERAL DESCRIPTION

1. Horsepower Computer
2. Load Control Valve
3. Water Temperature Guage
4. Dead Weight Test Bar
5. PTO Shaft
6. Thermal Fuse
7. Water Level Check

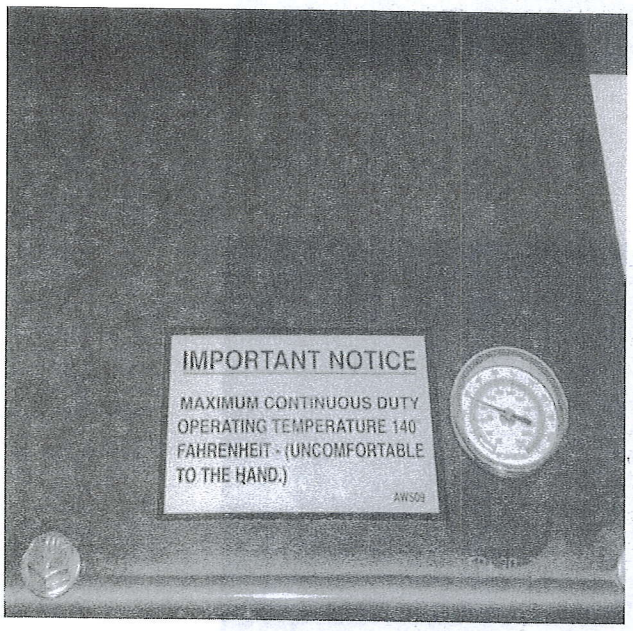




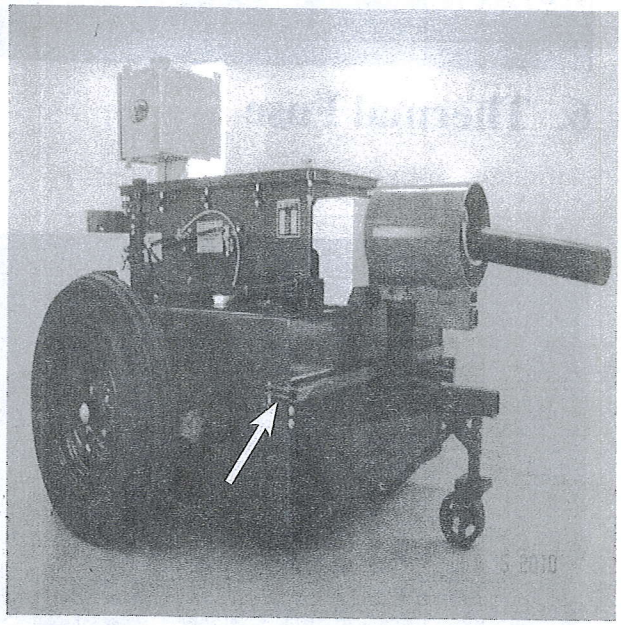
1. 2100S Computer



2. Load Control Valve

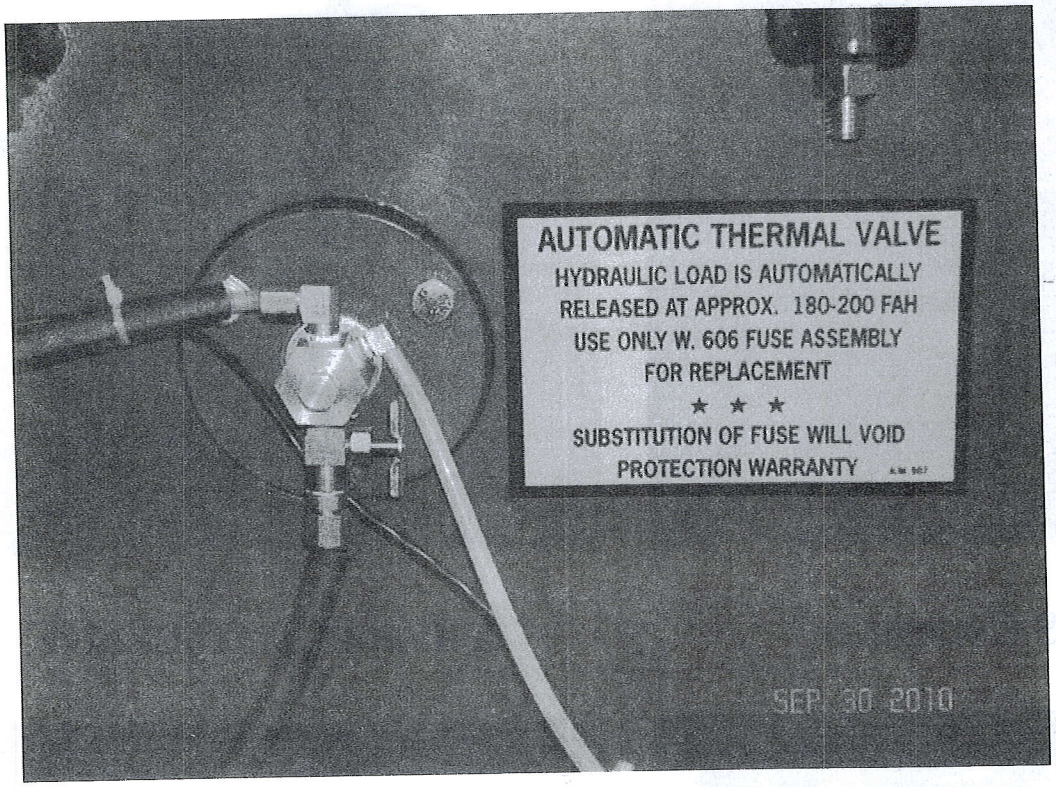


3. Water Temperature Gauge

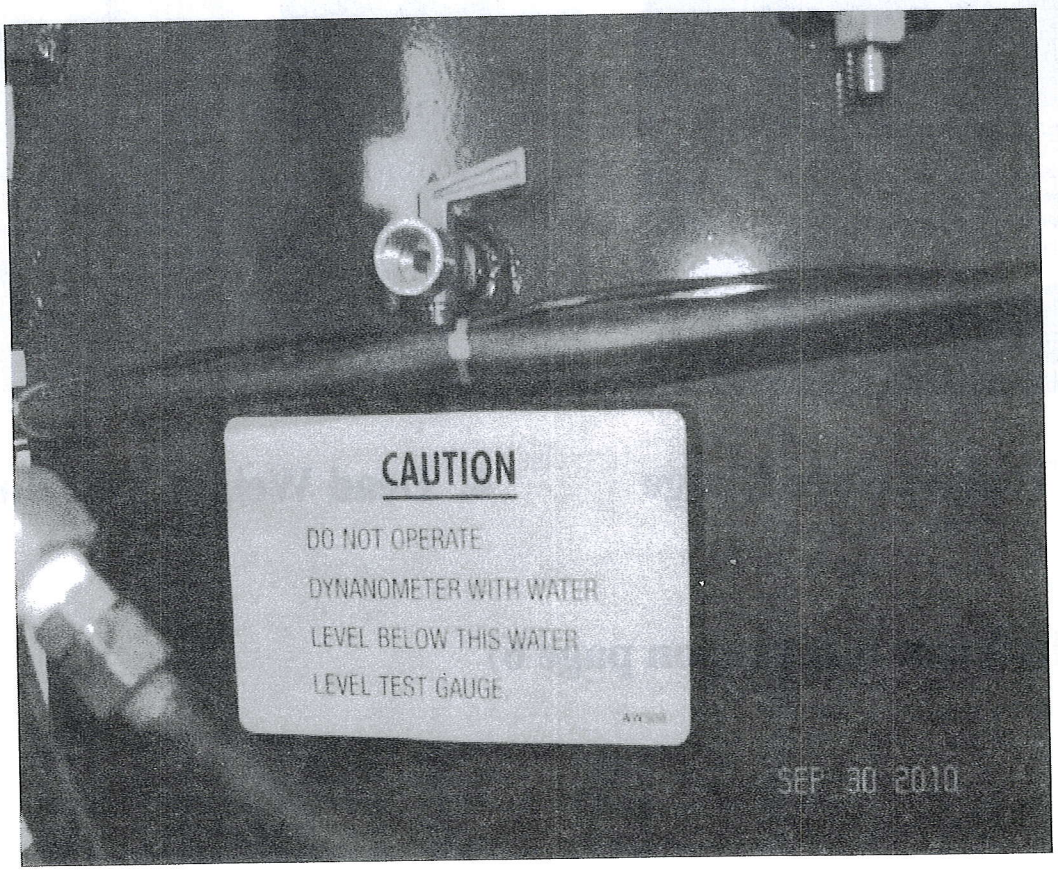


4. Dead Weight Test Bar

5. PTO Shaft (see diagram on page 6)

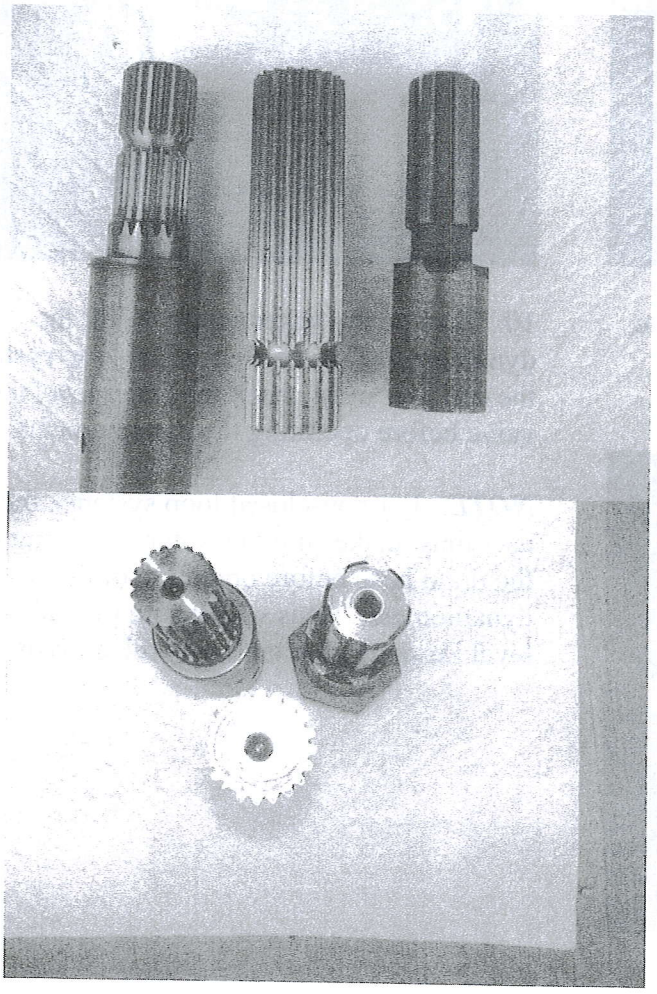


6. Thermal Fuse



7. Water Check Valve

SECTION 5
PRE INSTALLATION AND OPERATION OF THE DYNAMOMETER

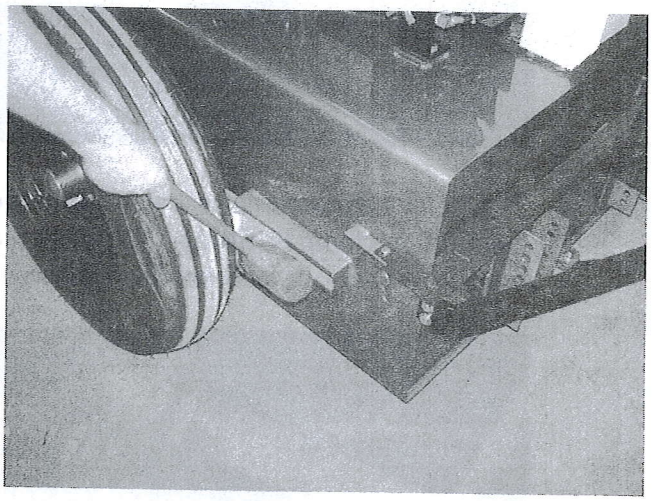


1. Select proper front half splined power shaft:
   1 3/8" – 6 Tooth 540 RPM
   1 3/8" –21 Tooth 1000 RPM
   1 3/4" –20 Tooth 1000 RPM

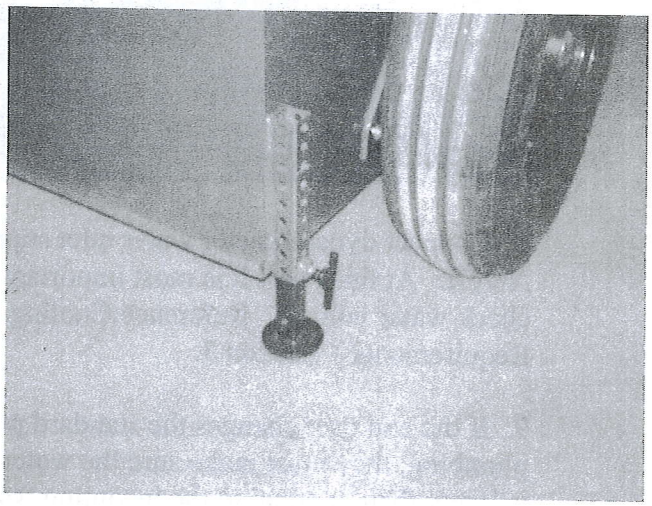
2. Place transmission shift lever in park or Neutral. Block tractor's rear wheels for added safety when on slopes or uneven ground.

3. Attach power shaft to tractor PTO. Align power shaft so that angles of the universal parts are straight as possible and on parallel plains.

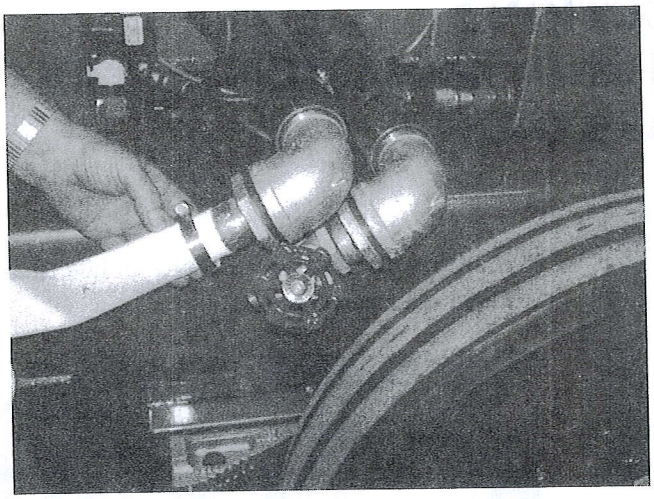
4. Push dynamometer forward until power shaft is at minimum length – then pull dynamometer back about two inches to avoid end thrust on power shaft.



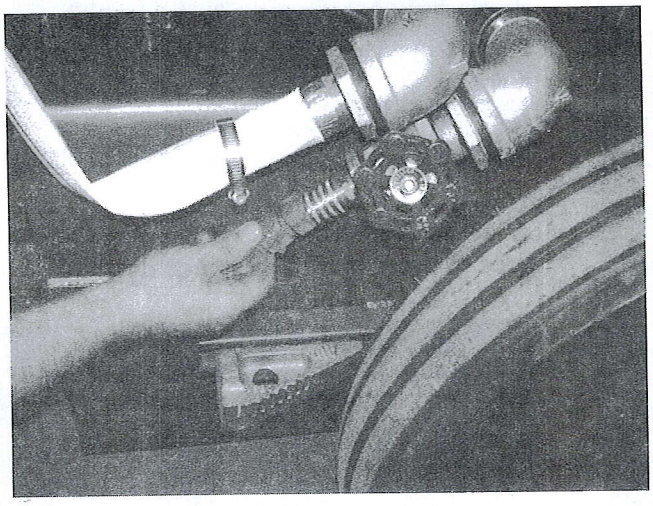
5. Use a hammer to force brake locks against tires to prevent movement of dynamometer.



6. Jack stand at rear of dynamometer should be lowered for added stability.

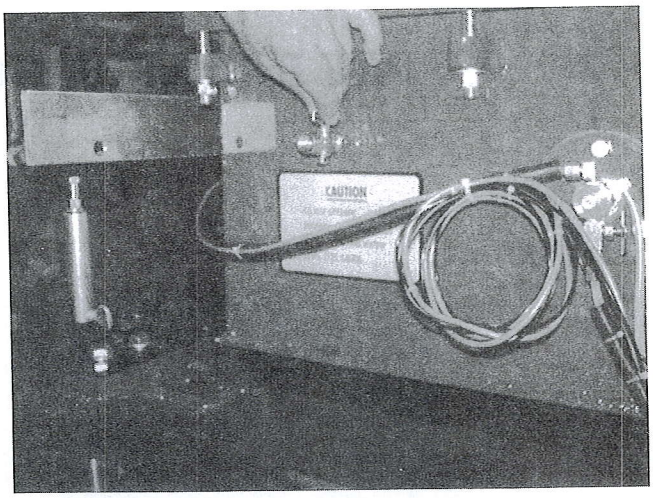


7. Connect dynamometer water discharge hose and tighten clamp or fitting. There should never be a shut off valve on the discharge line.



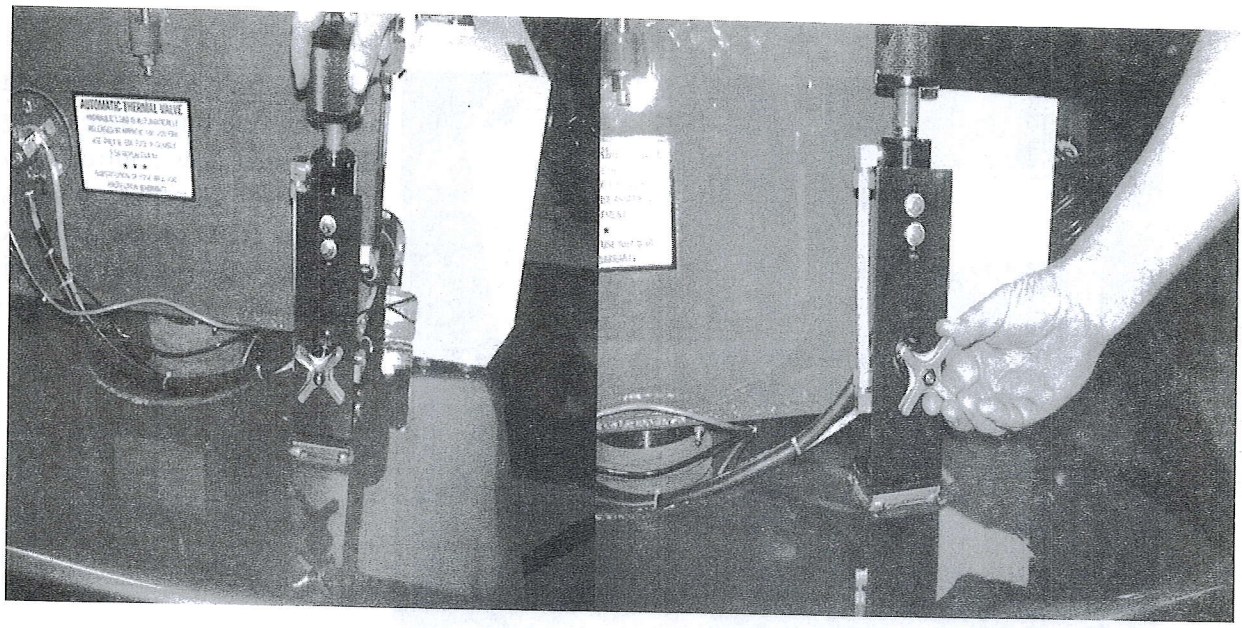
8. Connect dynamometer water inlet supply. ***NOTE:*** At this point it is most important to check water volume. Reference Cooling Requirements – Section 3.

9. If the end user changes the standard preset plumbing, they must make sure the water outlet is larger than or equal to the incoming water supply. This will eliminate any unnecessary back pressure inside the tank that would reduce water seal life.



10. Turn on the water supply to fill the dynamometer. In cases of close loop systems, the end user must check the water level test valve before operating the dynamometer.

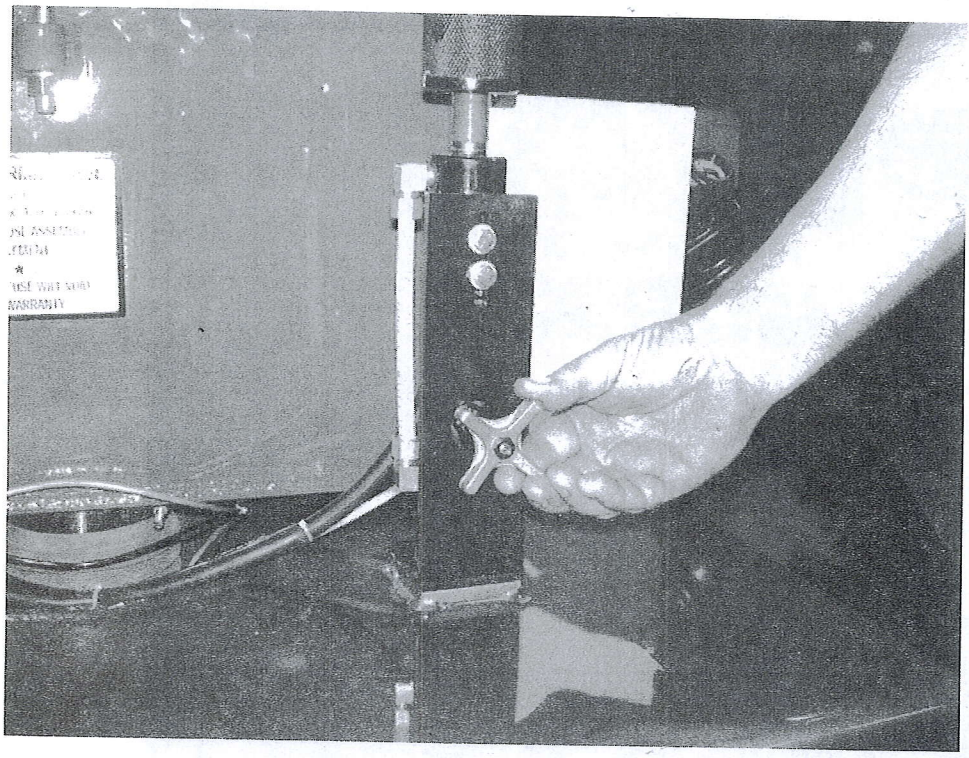
NOTE: For non-closed loop systems, the end user must make sure the water is running out of the drain hose before operation of the dynamometer. This will ensure that the water level inside the top tank is at full capacity.



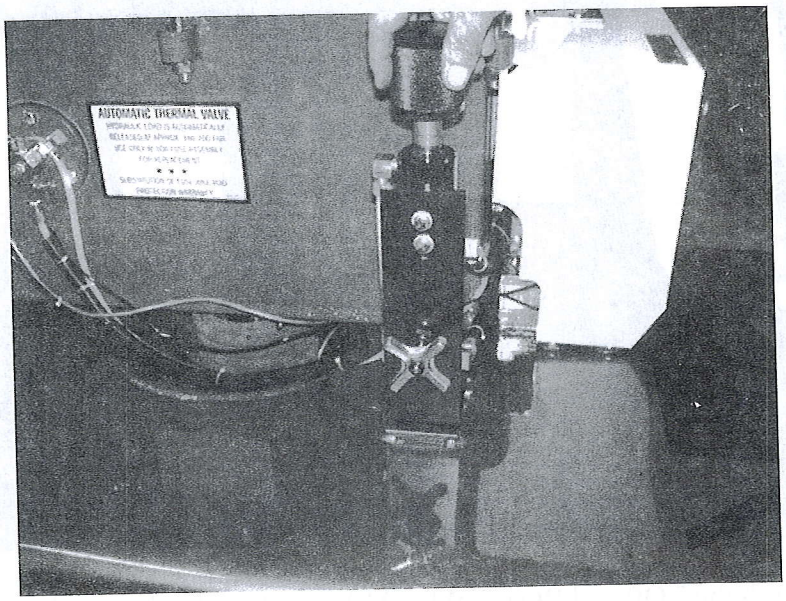
11. Prior to starting the test, both the TOP and BOTTOM VALVES of the load control valve must be open. To open both valves, turn counterclockwise.

12. Start tractor and allow it to reach normal operating temperature.

13. When the tractor is at proper operating temperature, engage the tractor PTO and advance speed control level to maximum RPM.



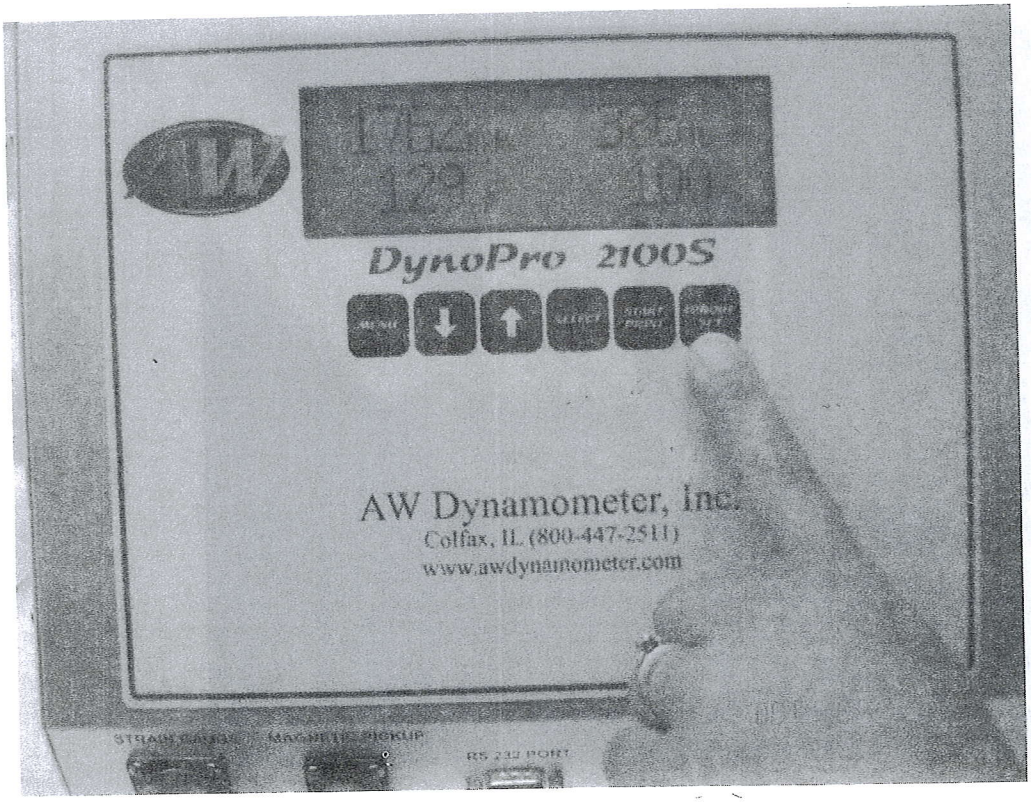
14. To begin the dyno test, close the main bypass valve on the bottom of the manual control flow valve.



15. To apply load to the tractor, turn the fine tune valve on top of the manual flow control valve clockwise. Continue to apply load until the RPM on the 2100S Dyno Pro computer reaches its desired rated RPM per the Nebraska test specs.

16. To stop the dyno test, rotate the fine tune valve counter clockwise and then open the main bypass valve on the bottom of the manual flow control valve.

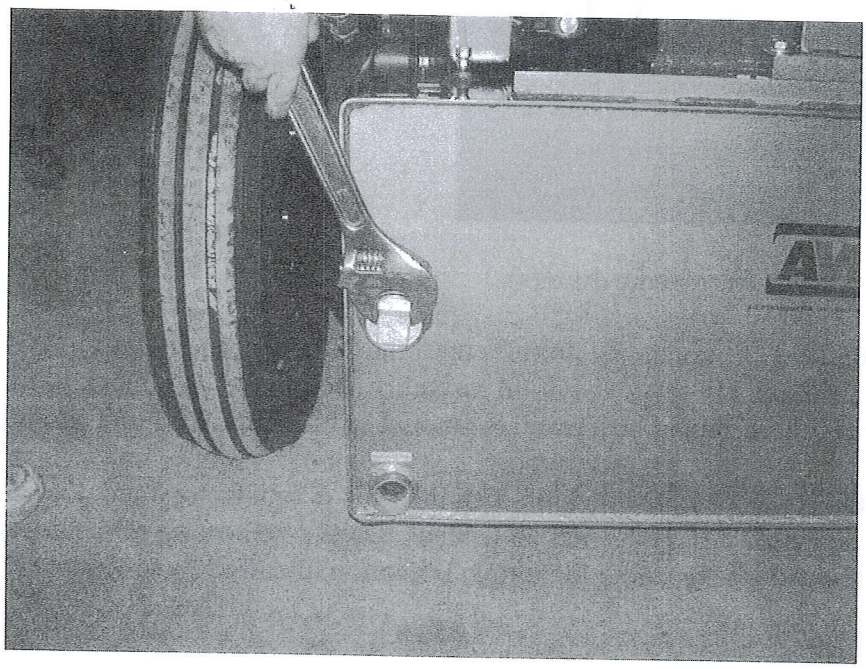
** If an emergency occurs during the test, the main bypass valve can be opened to relieve all hydraulic pressure within the brake system.



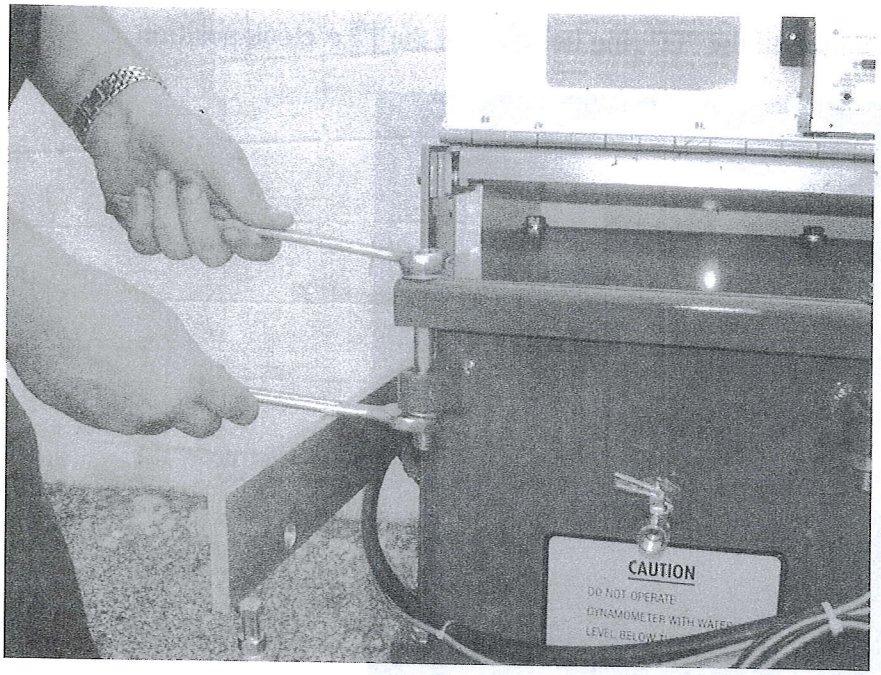
17. **TORQUE RISE**: In order to find peak torque, the end user will select the torque set button on the 2100S **AT RATED RPM**. Once the torque set button has been selected, the torque % value on the 2100S screen will display 100%. The end user will then pull the tractor down to the recommended specifications per the Nebraska test specs. (Example: 50% torque rise = 150% on the 2100S screen display.)

SECTION 6
INSPECTION/SERVICING BRAKE DRUM UNIT

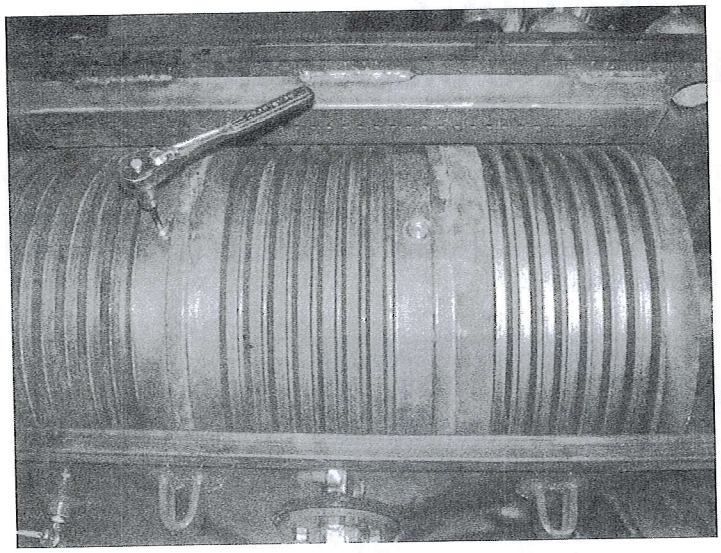
The Synthetic Oil (Part #20405 Rml Oil) inside the Load Unit of the Model 200, Model 375, NEB 200, NEB 400, NEB 600 and the NEB 800 Ag PTO Dynamometers must be inspected every 25 hours to determine the condition of the oil. Normal coloration of the 405 Synthetic Oil should be a honey brown color with transparency.



1. Drain the water from the bottom base tank until the water level is below the brake drum.



2. Remove reservoir lid using two ¾ wrenchs.



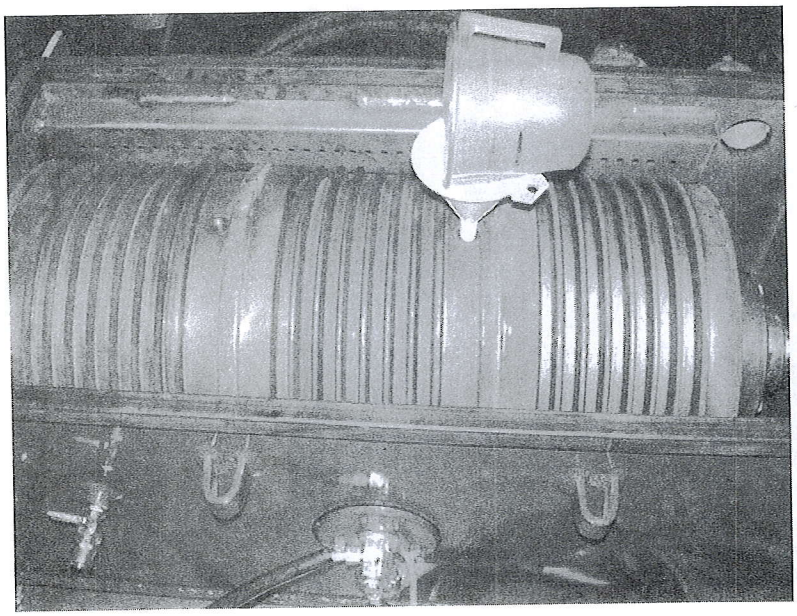
3. Remove "O" ring plugs from brake drum(s).

4. To inspect the 405 Rml Oil, rotate the drum(s) until the "O" ring plug holes are at the 7 o'clock position then quickly rotate the drum assembly back to the 12 o'clock position. During this process, there should be a residual amount of oil on the load unit assembly.

5. If the Synthetic Oil is a honey brown color, then the fluid is satisfactory and does not need to be drained or replaced. *** If the 405 oil is black due to overheating of the drums caused by lack of water or exceeding the torque limitation, then follow procedure #6 below.

6. To drain all of the 405 oil, rotate the drums until the "O" ring holes are on bottom at the 6 o'clock position. Continue to drain for 5-10 minutes.

7. Rotate the load unit until the "O" ring holes are at the 12 o'clock position.



8. Replenish 1 pint (.24 l) of 16 ounces of 405 Rml synthetic oil per drum.

9. Insert and tighten the plugs.

10. Attach the dynamometer to the PTO of the tractor. Before engaging the tractor, make sure the operator has an electronic heat gun to detect the heat inside the drum. Do not exceed 140 degree F inside the drum.

11. *NOTE:* No water is used during flushing cycle.

12. Start the tractor and spin the PTO @ 500-600 Rpm's for 5-10 minutes.

13. Disengage PTO and stop the tractor engine.

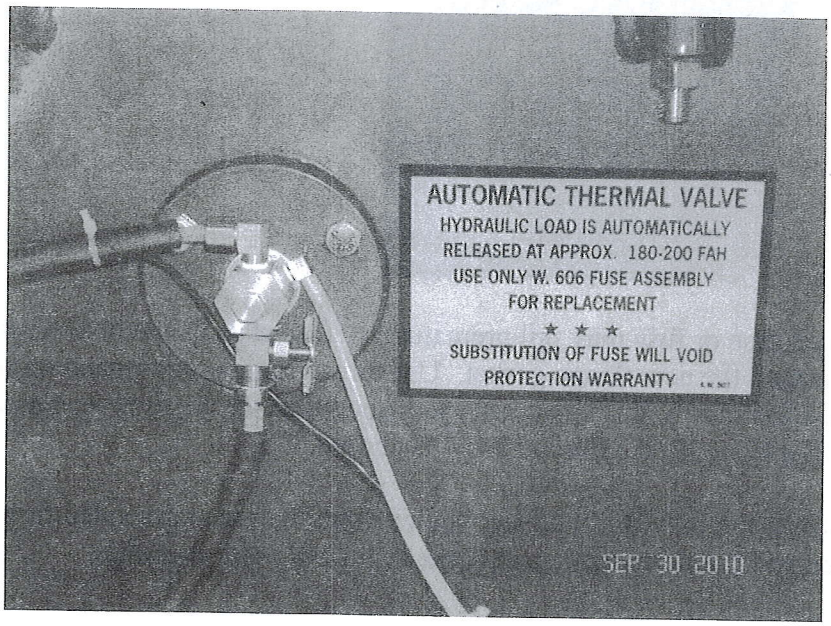
14. Begin to drain the oil from the brake drum(s). (5-10) minutes.

NOTE: If oil appears extremely dirty or dark, a second flushing is recommended. Dark oil indicates extreme heat due to lack of water or passing the torque limitation on the dyno.

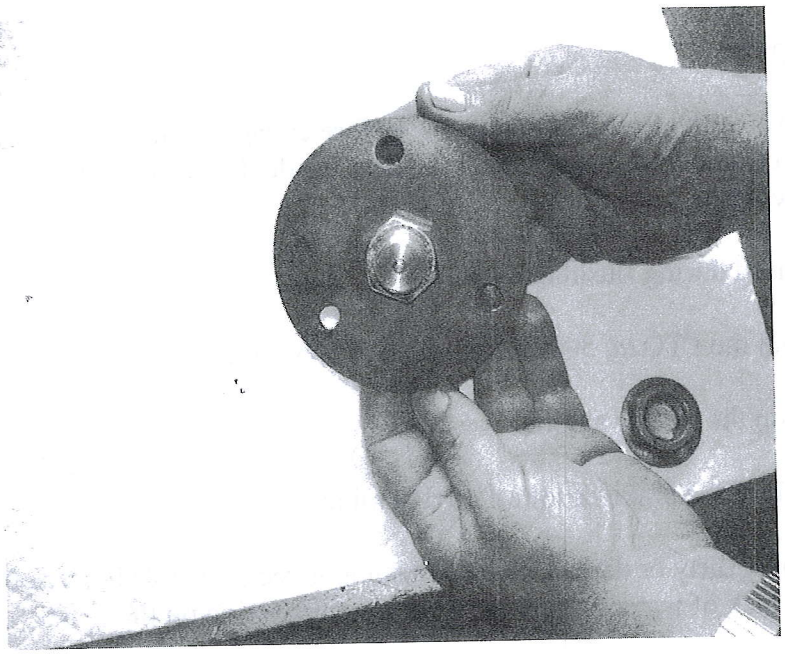
15. If the oil appears transparent and has a honey brown color it is successful and you can continue the draining of the brake drum 5-10 minutes. Replenish each individual brake drum with 6-8 ounces of new Rml 405. Fasten "O" ring hole snug tight.

16. Replace the reservoir lid and fill with water. *** Make sure the tightening of the top lid was hand tight and not performed with an air ratchet. Over tightening the lid gasket will cause it to split and will not seal properly.

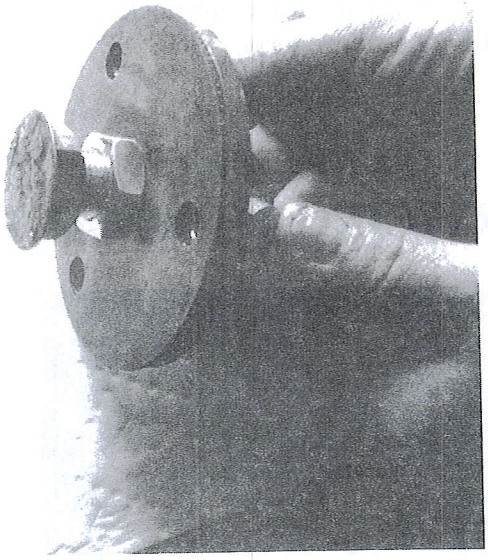
SECTION 7
SERVICING THERMAL FUSE



1. Remove the water inside the top tank.



2. Remove the three bolts from thermal fuse flange. Push thermal fuse hydraulic release plunger back into housing. Remove the existing ½ of the blown fuse and install the new fuse onto the thermal fuse assembly.



NOTE: Do not over-tighten fuse or fuse may fail prematurely. Reinstall flange onto reservoir and use a silicone sealer around the new flange gasket. Use thread sealing compound on bolt threads. If the thermal fuse has blown, it is a necessity to inspect/service the dynamometer's load unit. See Inspection/Servicing Brake Drum Unit – Section 6.

CAUTION: Do not substitute thermal fuse with any device other than recommended fuse No. 10606. Such a substitution will result in damage to brake drum and void warranty.

SECTION 8
TROUBLESHOOTING DYNAMOMETER

1. Vibration
2. Will not load
3. Will not unload
4. Low power reading
5. High power reading
6. Erratic loading
7. Overheating
8. Shearing pins
9. Damage to water seals, bellows or lid gasket
10. Smoke or vapor
11. Unstable torque and power reading

Possible Cause:

1. Vibration

A. Misalignment
B. Adapter hookup
C. Lose shear pins
D. Damaged U-Joint
E. Damaged Driveline
F. Dynamic bearing problem
G. Power absorption module problem
H. Resonant vibration

Possible Remedy:

A. Realign drive shaft
B. Check assembly for correct fit and run out
C. Properly tighten shear pins and use a lock nut
D. Replace U-Joint
E. Replace drive-line
F. Determine cause and correct
G. Change the rotation mass of the prime mover or dynamometer or install a resilient coupling

Possible Cause:

2. Will Not Load

A. Low on hydraulic oil
B. Thermal fuse release
C. Hydraulic pressure shut off valve closed
D. Damaged hydraulic line
E. Defective chain or sprocket
F. Hydraulic directional valve in wrong position
G. Defective hydraulic pump

Possible Remedy:

A. Fill to proper level with 10 weight hydraulic oil
B. Replace thermal fuse Section 13. Refer to Section 4
C. Open hydraulic valve
D. Replace hydraulic line with original equipment. If unable to determine cause, consult factory for service
E. Replace with new components
F. Position bi-directional valve to proper direction
G. Replace hydraulic pump

Possible Cause:

3. Dynamometer will not unload

A. Defective control valve
B. Defective dynamic bearing
C. Restricted hydraulic return line
D. Defective power absorption module

Possible Remedy:

A. Remove valve stem and clean as required
B. Determine cause and correct
C. Find restriction and correct as required
D. Reference to Section 11, 12 in operator manual. If unable to

determine cause, consult factory for service

Possible Cause:

4. Low Power Reading
   A. Torque meter out of calibration
   B. Cradle restriction of load cell movement
   C. RPM pickup improperly gapped
   D. Improper weight values used during calibration
   E. Improper engine fuel specification
   F. Improper engine RPM specification

Possible Remedy:

   A. Calibrate torque meter (See Section 9 for analog read-out Section 10A for Power Computer)
   B. Remove restriction as required
   C. Adjust air gap to .010 - .015
   D. Calibrate torque meter with properly known weights (See Section 00). Obtain the correct weight using a very reliable scale
   E. Adjust to proper OEM specifications
   F. Adjust to proper OEM specifications

Possible Cause:

5. High Power Reading
   A. Torque meter out of calibration
   B. Outside force applying load on cradle movement
   C. Improper weight values used during calibration
   D. Improper specs being used on test
   E. Excessive over-fueling

Possible Remedy:

   A. Calibration torque meter (See Section 9 for analog readout and Section 10A for Power Computer)
   B. Remove force and re-balance torque meter
   C. Calibrate torque meter with properly known weights (see Section 11B)
   D. Refer to tractor manual for correct specification
   E. Reduce to OEM specification

Possible Cause:

6. Erratic loading (loads and unloads)
   A. Operator making rapid load valve adjustments
   B. Low on hydraulic oil
   C. Defective chain and sprocket
   D. Defective power absorption module
   E. Incorrect operation of control valve
   F. Fuel injector problems
   G. P.T.O. in tractor slipping

Possible Remedy:

   A. Make gradual adjustments (See Section 7 for proper procedure)
   B. Refill reservoir to proper level with 10 weight hydraulic oil (one-half to two-thirds full)
   C. Replace with new components as required
   D. Refer to Section 11, 12. If unable to determine cause consult factory for service.
   E. Make gradual adjustments
   F. Determine cause and repair as required
   G. Determine cause and repair as required

Possible Cause:

7. Overheating
   A. Inadequate water supply

Possible Remedy:

   A. Refer to Section 4, Cooling Requirements

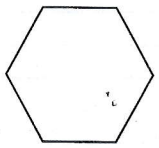
Possible Cause:

8. Shearing driveline pins
   A. Excessive torque load
   B. Incorrect shear pin
   C. Resonant vibration
   D. Defective driveline
   E. Load control valve closed during system start up
   F. Defective power absorption module

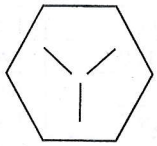
Possible Remedy:

A. Reduce torque load
B. Use proper shear bolts per chart

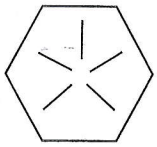
NOTE: When selecting the proper bolt, make sure the bolt is not plated and has the proper length of shoulder, so you do not drive through the thread, Use of incorrect shear pins can cause premature shearing or damage to driveline components.



NO MARKS
GRADE 2
200
Neb 200
Neb 230



3 MARKS
GRADE 5
375
Neb 400
Neb 460



5 MARKS
GRADE 8
Neb 600
Neb 690

C. Change the rotating mass of the prime mover or dynamometer or install a resilient coupling
D. Replace driveline
E. Open both controls prior to test (Refer to Section 7)
F. Refer to Section 11, 12, if unable to determine cause, consult factory for service

Possible Cause:

9. Damage to water seals, bellows, or lid gasket.

A. Excessive water pressure
B. Restriction on final drain hose

Possible Remedy:

A. Reduce water pressure
B. Correct restriction or use larger drain hose. Refer to Section 4 on "Cooling Requirements." Shorten the distance to the final drain

Possible Cause:

10. Smoke or Vapor

A. Internal problems with power absorption module

Possible Remedy:

A. Stop test immediately and determine cause. Refer to Section 13 on "Inspection & Maintenance." Continued running in this mode denotes a problem. To continue with this problem can result in severe damage to the equipment as well as personal injury. If unable to determine cause, consult factory service immediately.

Possible Cause:

11. Unstable torque and/or power readings

A. Internal problems with power absorption module.

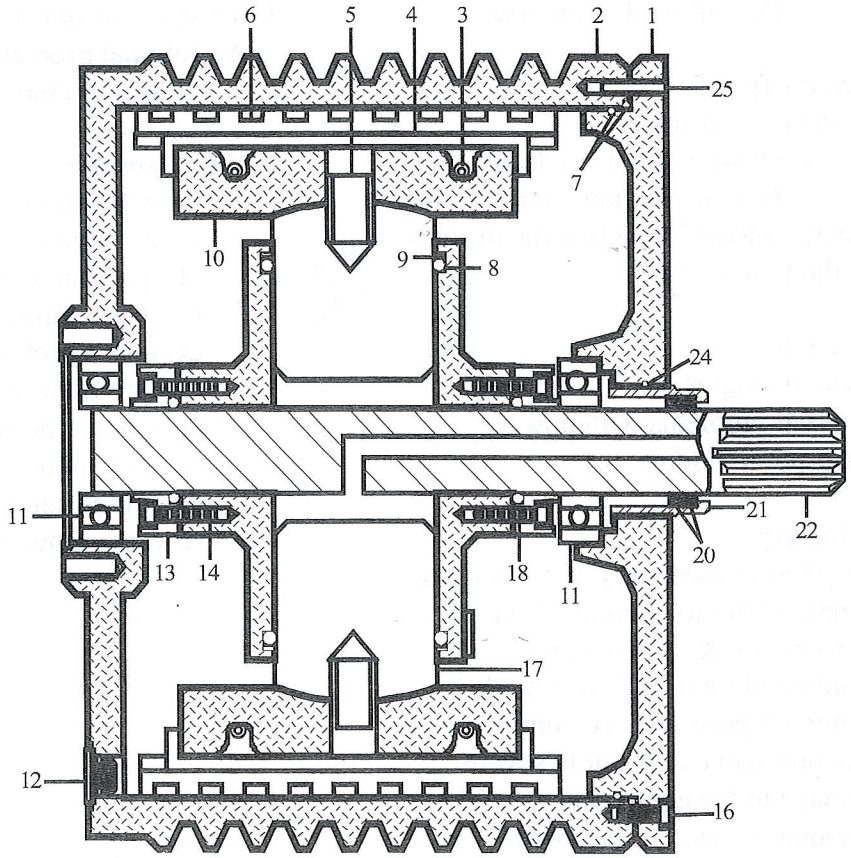
Possible Remedy:

A. Stop test immediately and determine cause. Refer to Section 9 on "Inspection & Maintenance." Continue running in this mode denotes a problem. To continue with this problem can result in severe damage to the equipment as well as personal injury. If unable to determine cause, consult factory service immediately.

SECTION 9
PARTS

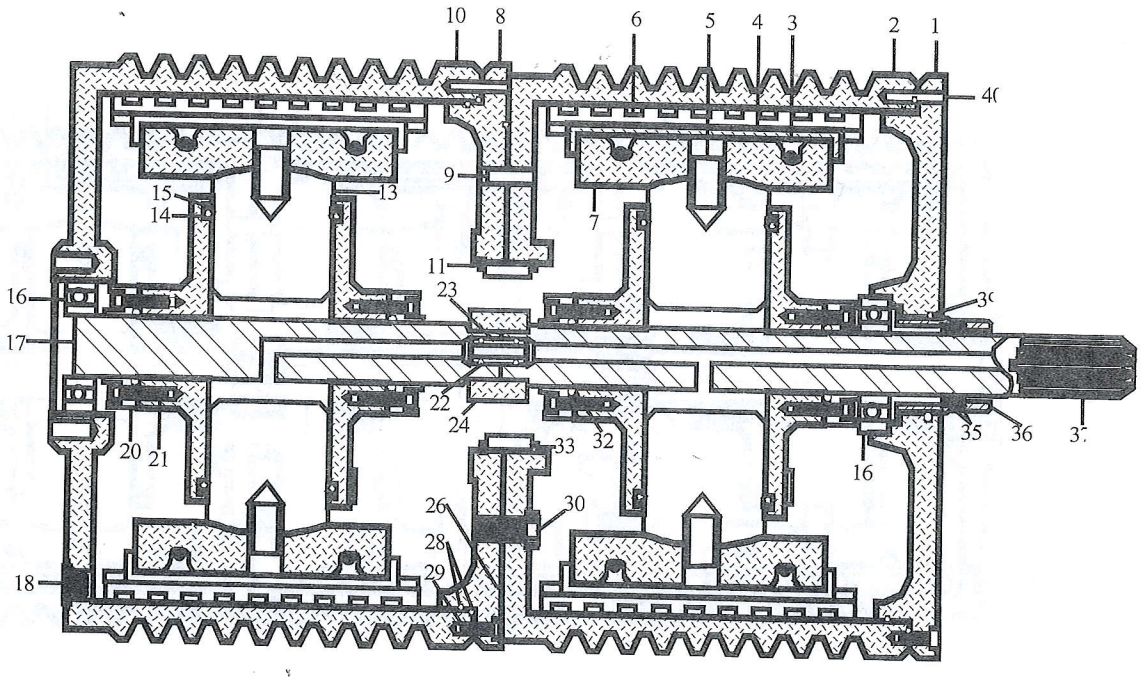
960100 SINGLE BRAKE ASSY. NEB 200

ITEM	QTY	PART #	DESCRIPTION
1	1	700011	Rear Brake Lid
2	1	10100	Front Brake Rotor
3	4	10170	Brake Shoe Spring
4	2	10285	Metal Back-up Plate
5	4	10169	Piston Guide Pin
6	2	10113	Brake Liner (2 pc. = 1 Set)
7	2	700026	"O" Ring - viton - (Brake Lid)
8	4	10167	"O" Ring - viton - (Brake Piston)
9	4	10168	Piston "O" Ring Backup
10	4	10104	Brake Shoe
11	2	10140	Bearing
12	1	90901	1/2 - 20 "O" Ring Stainless Steel Plug
13	2	10185	"O" Ring Collar Housing
14	8	210405	1/4 - 20 x 3/4 Sockethead Capscrew
16	6	210615	3/8 - 16 x 1 Sockethead Capscrew
17	4	10105	Brake Piston 2 1/4"
18	2	10186	"O" Ring Viton (Collar Housing)
20	2	700050	Viton Oil Seal
21	1	700006	Rear Water-Oil Seal Sleeve
22	1	881800	Cylinder Block Assy. (20T - Single)
24	1	700005	"O" Ring Viton
25	2	10731	3/8 x 1 Spring Pin



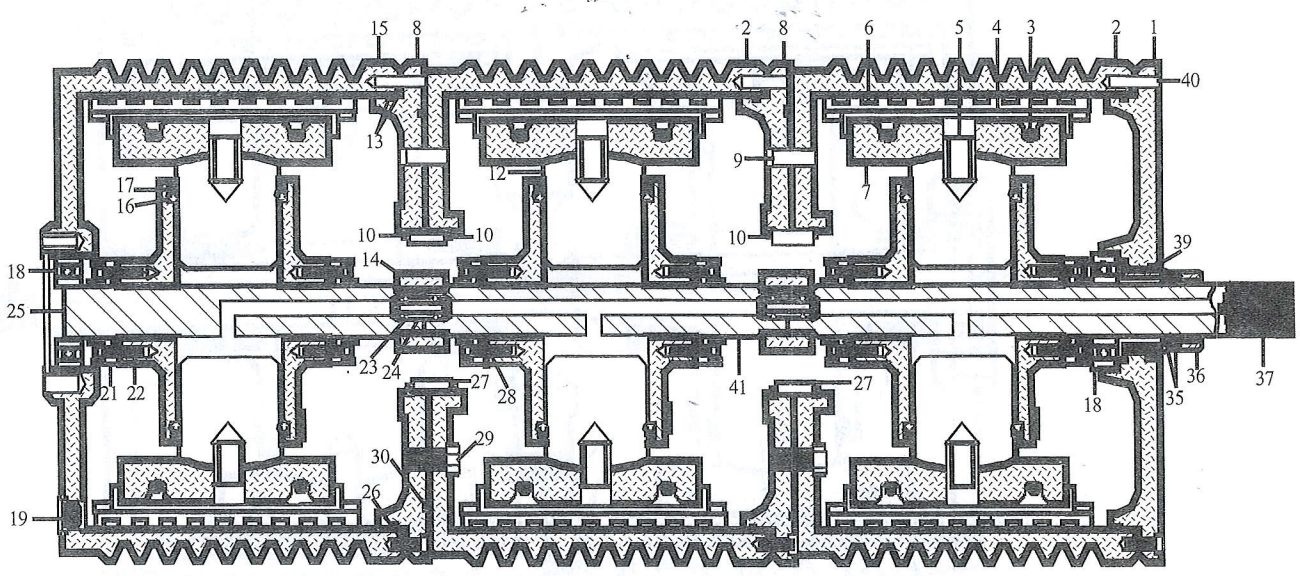
960200 DOUBLE BRAKE ASSY. 375, NEB 400

ITEM	QTY	PART #	DESCRIPTION
1	1	700011	Rear Brake Lid
2	1	10704	Rear-Intermediate Brake Rotor
3	8	10170	Brake Shoe Spring
4	4	10285	Metal Backup Plate
5	8	10169	Piston Guide Pin
6	4	10113	Brake Liner (2 pc. - 1 set)
7	8	10104	Brake Shoe
8	1	10705	Intermediate - Connector Lid
9	2	10169	1/2" Spring Pin
10	1	10100	Front Brake Rotor
11	1	10708	Brake Rotor - Connector Lid Pilot
13	8	10105	Brake Piston 2 1/4"
14	8	10167	"O" Ring - Viton (Brake Piston)
15	8	10168	Piston "O" Ring Backup
16	2	10140	Bearing
17	1	881900	Cylinder Block Assy. (20T Front)
18	2	90901	1/2 - 20 "O" Ring Plug (Stainless Steel)
20	4	10185	"O" Ring Collar Housing
21	16	210405	1/4 - 20 x 3/4 Sockethead Capscrew
22	2	10548	"O" Ring Vilon - Hydraulic Connector
23	1	10706	Hydraulic Oil Connector
24	1	700055	Splined Connector (20T)
26	1	700026	"O" Ring Viton
28	4	700026	"O" Ring Viton
29	16	210615	3/8 - 16 x 1 Sockethead Capscrew
30	6	210812	1/2 - 13 x 1 Hex Hd. Capscrew
32	4	10186	1/4" "O" Einf Viton (Collar Housing)
33	2	10710	Snap Ring
35	2	700050	Viton Oil Seal
36	1	700006	Rear Water - Oil Sleeve
37	1	882100	Rear Cylinder Block Assy. (20T)
39	1	700005	"O" Ring
40	4	10731	3/8 x 1 Spring Pin



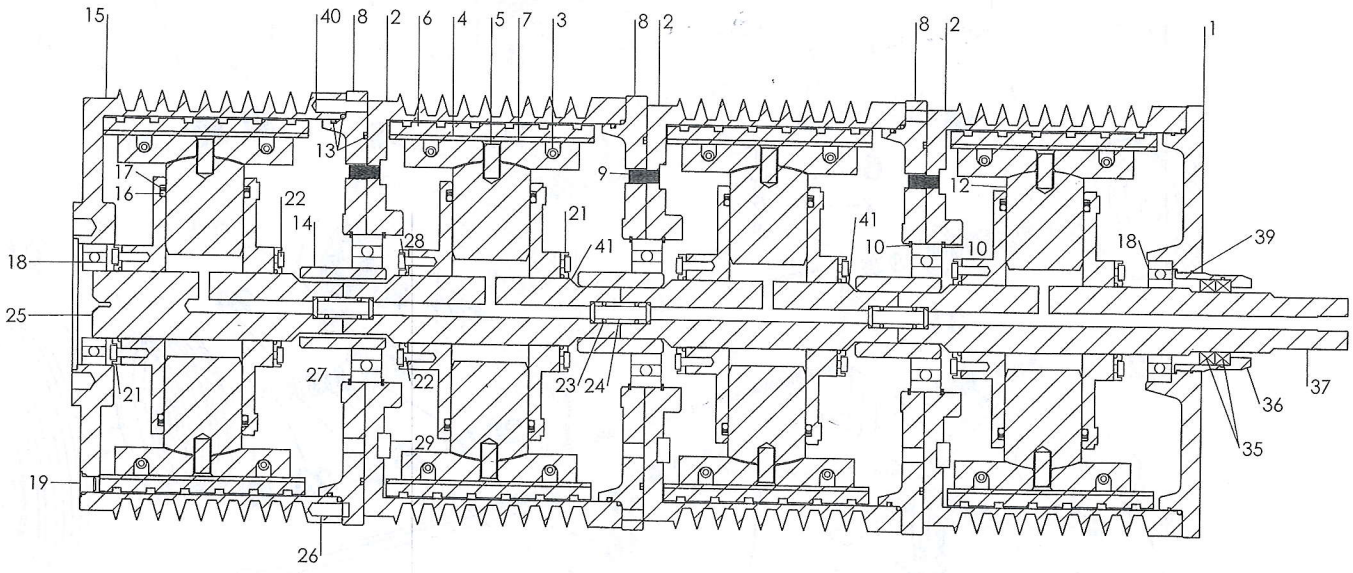
960300 TRIPLE BRAKE ASSY. NEB 600

ITEM	QTY	PART #	DESCRIPTION
1	1	700011	Rear Brake Lid
2	2	10704	Rear - Intermediate Brake Rotor
3	12	70170	Brake Shoe Springs
4	6	10285	Metal Backup Plate
5	12	10169	Piston Guide Pin
6	6	10113	Brake Liner (2 pc. = 1 set)
7	12	10104	Brake Shoe
8	2	10705	Intermediate Connector Lid
9	4	10169	1/2" Spring Pin
10	4	10710	Snap Ring
12	12	10105	Brake Piston (2 1/4")
13	6	700026	"O" Ring Viton
14	2	700055	Splined Connector (20 T)
15	1	10100	Front Brake Rotor
16	12	10167	"O" Ring (Brake Piston)
17	12	10168	Piston "O" Ring Backup
18	2	10140	Bearing
19	3	90901	1/2 - 20 "O" Ring Plug (Stainless Steel)
21	6	10185	"O" Ring Collar Housing
22	24	210405	1/4 - 20 x 3/4 Sockethead Screw
23	4	10548	"O" Ring Viton - Hydraulic Connector
24	2	10706	Hydraulic Oil Connector
25	1	881900	Cylinder Block Assy. (20 T Front)
26	24	210615	3/8 - 16 x 1 Sockethead Capscrew
27	2	10708	Brake Rotor - Connector Lid Pilot
28	6	10186	"O" Ring Viton (Collar Housing)
29	12	210812	1/2 - 13 x 1 Hex Hd. Capscrew
30	2	700026	"O" Ring Viton
35	2	700050	Viton Oil Seals
36	1	700006	Rear Water - Oil Sleeve
37	1	882100	Cylinder Block Assy. (20 T Rear)
39	1	700005	"O" Ring
40	6	10731	3/8 x 1 Spring Pin
41	1	882000	Cylinder Block Assy. (20 T - Intermediate)



960800 QUADRUPLE BRAKE ASSY. NEB 800

ITEM	QTY	PART #	DESCRIPTION
1	1	700011	Rear Brake Lid
2	3	10704	Rear – Intermediate Brake Rotor
3	16	70170	Brake Shoe Springs
4	8	10285	Metal Backup Plate
5	32	10169	Piston Guide Pin
6	8	10113	Brake Line (2pc. = 1 set)
7	16	10104	Brake Shoe
8	3	10705	Intermediate Connector Lid
9	6	10169	1/2" Spring Pin
10	6	10710	Snap Ring
12	16	10105	Brake Piston (2 1/4")
13	11	700026	"O" Ring Viton
14	3	700055	Splined Connector (20 T)
15	1	10100	Front Brake Rotor
16	16	10167	"O" Ring (Brake Piston)
17	16	10168	Piston "O" Ring Backup
18	2	10140	Bearing
19	4	90901	1/2 – 20 "O" Ring Plug (Stainless Steel)
21	8	10185	"O" Ring Collar Housing
22	32	210405	1/4 – 20 x 3/4 Sockethead Screw
23	6	10548	"O" Ring Viton – Hydraulic Connector
24	3	700055	Hydraulic Oil Connector
25	1	881900	Cylinder Block Assy. (20 T Front)
26	32	210615	3/8 – 16 x 1 Sockethead Capscrew
27	3	10709	Intermediate Bearings
28	8	10186	"O" Ring Viton (Collar Housing)
29	18	210812	1/2 – 13 x 1 Hex Hd. Capscrew
35	2	700050	Viton Oil Seals
36	1	700006	Rear Water – Oil Sleeve
37	1	882100	Cylinder Block Assy. (20 T Rear)
39	1	700005	"O" Ring
40	8	10731	3/8 x 1 Spring Pin
41	2	882000	Cylinder Block Assy. (20 T Intermediate)

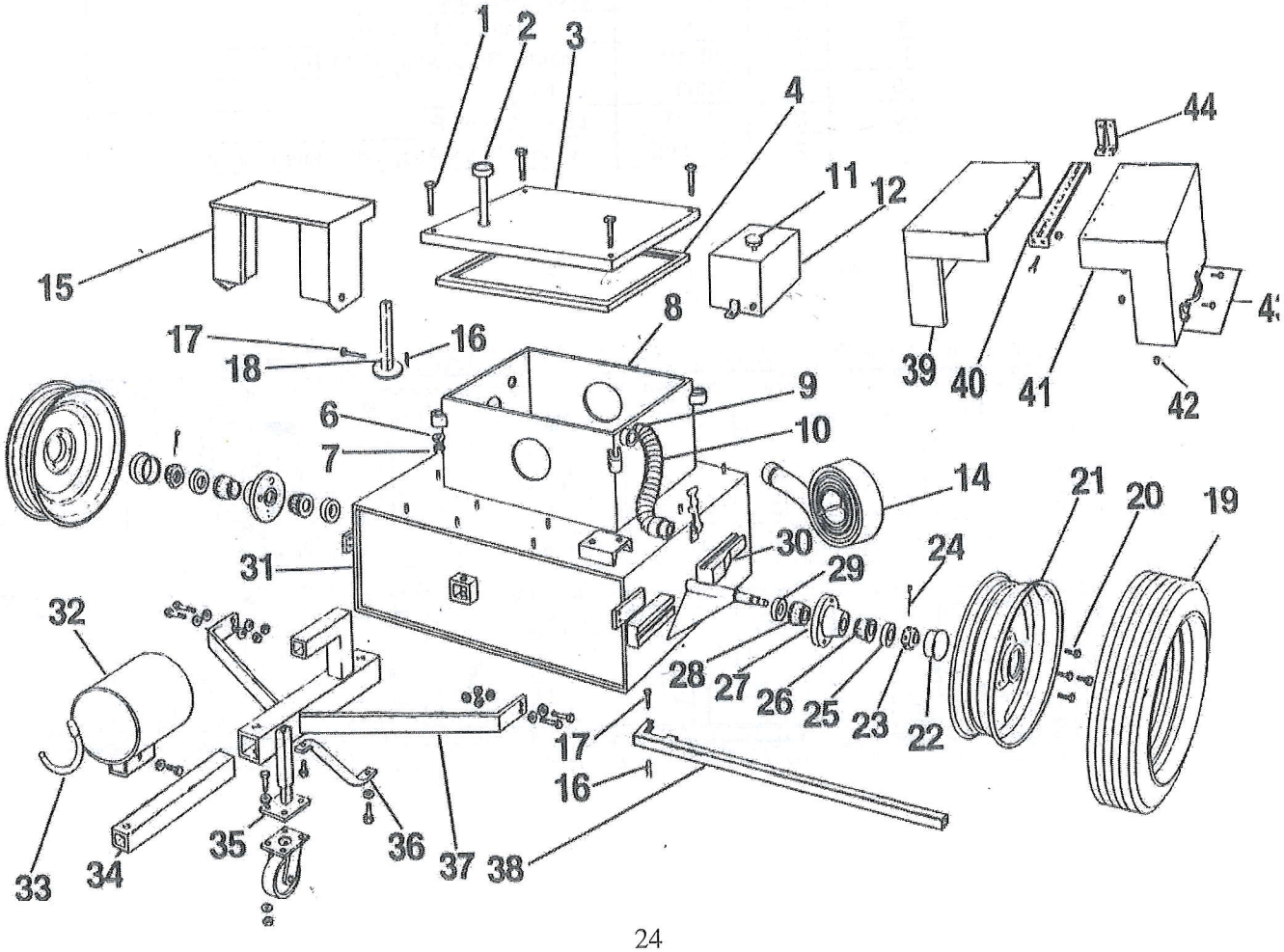


MODELS 200 AND 375

ITEM	QTY	PART #	DESCRIPTION
1C	4	210815	1/2 - 13 x 3 1/2 Hex Head Capscrew
1D	6	210815	1/2 - 13 x 3 1/2 Hex Head Capscrew
2	1	10237	Temperature Gauge
3C	1	10151	Top Tank Lid (200)
3D	1	10721	Top Tank Lid (375)
4C	1	10152	Lid Gasket (200)
4D	1	10733	Lid Gasket (375)
5	1	90911	Hose Box
6	1	210803	Flat Washer
7	1	210804	Nut
8C	1	940100	Tank Assy.
8D	1	940200	Tank Assy.
9	1	20527	Clamp
10	1	101004	Hose
11	1	101061	Breather Vent
12C	1	10737	Oil Reservoir (200)
12D	1	10555	Oil Reservoir (375)
14	1	101030	Drain Hose
15	1	881610	Dog House Assembly
16	1	20208	Snap Ring
17	1	10755	Roll Pin
18	1	10157	Jack Stand
19	2	10189	Tire
20	1	10908	Bolt
21	2	10901	Rim
22	2	10910	Hub Cap

ITEM	QTY	PART #	DESCRIPTION
23	1	10907	Nut
24	1	10905	Cotter Pin
25	1	10906	Washer
26	1	10903	Bearing
27	1	10902	Wheel Hub
28	1	10904	Bearing
29	1	10909	Seal
30	2	10861	Brake Block
31C	1	940100	Bottom Tank
31D	1	940200	Bottom Tank
32	1	101098	Shield
33	1	90917	PTO Rest
34	1	10744	Tongue Extension
35	1	10771	Caster Assembly
36	1	10280	Brace
37	1	10740	Tongue
38	1	10760	Test Bar
39D	1	881630	Right Hand Sheet Metal Cover
40	1	881640	Center Hinge Assy.
41D	1	881620	Left Hand Sheet Metal Stops
42D	6	20391	Rubber Sheet Metal Stops
43D	2	20322	Handle Assy.
44	2	881650	Center Hinge Bracket
NP	1	10503	Hydraulic Pump (Not Pictured)

C = 200 D = 375

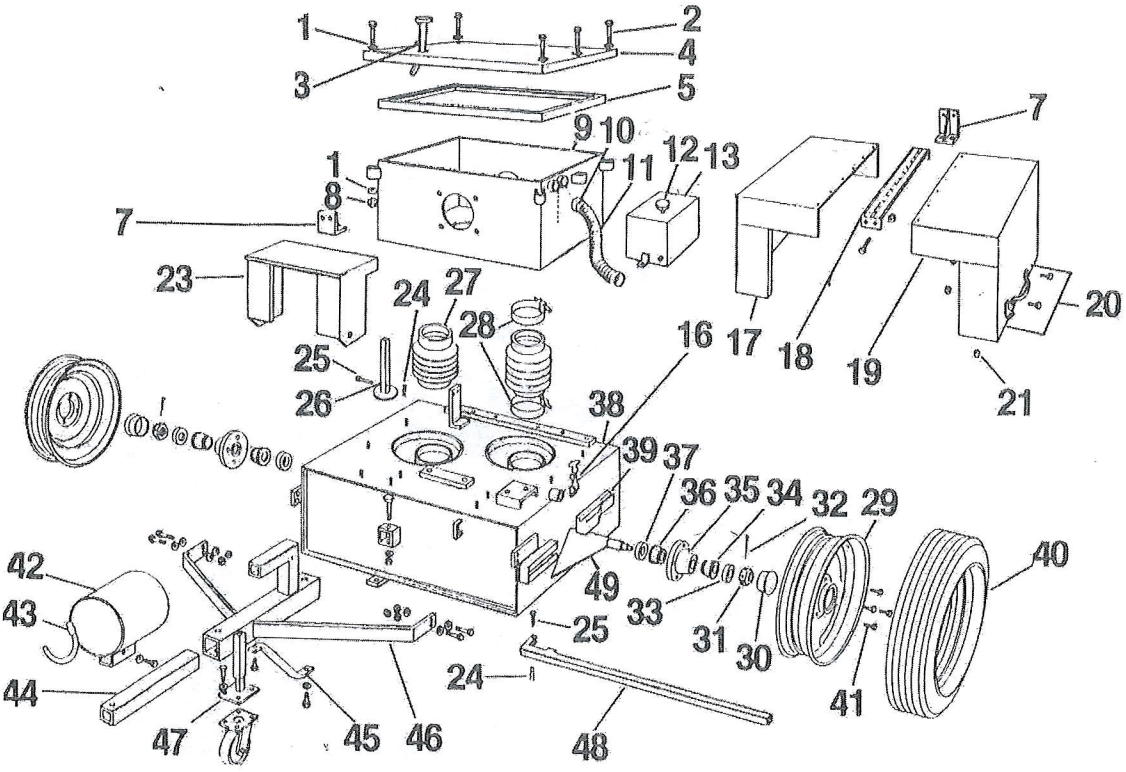


MODELS NEB 200, NEB 400, NEB 600

ITEM	QTY	PART #	DESCRIPTION
1A	8	210803	1/2" Flat Washer
1B	12	210803	1/2" Flat Washer
1C	16	210803	1/2" Flat Washer
2A	4	210815	1/2 - 13 x 3 1/2" Hex Head Capscrew
2B	6	210815	1/2 - 13 x 3 1/2" Hex Head Capscrew
2C	8	210815	1/2 - 13 x 3 1/2" Hex Head Capscrew
3	1	10237	Temperature Gauge
4A	1	10151	Top Tank Lid (NEB 200)
4B	1	10721	Top Tank Lid (NEB 400)
4C	1	151595	Top Tank Lid (NEB 600)
5A	1	10152	Lid Gasket (NEB 200)
5B	1	10733	Lid Gasket (NEB 400)
5C	1	20145	Lid Gasket (NEB 600)
7	2	881650	Center Hinge Bracket
8A	4	210804	1/2 - 13 Hex Nut
8B	6	210804	1/2 - 13 Hex Nut
8C	8	210804	1/2 - 13 Hex Nut
9A	1	940450	Top Tank - NEB 200
9B	1	940550	Top Tank - NEB 400
9C	1	940650	Top Tank - NEB 600
10A	4	20527	Hose Clamp
10B	4	20527	Hose Clamp
10C	4	20528	Hose Clamp
11A	2	240110	1 1/2" Formed Inlet Hose
11B	2	240110	1 1/2" Formed Inlet Hose
11C	2	240115	2" Formed Outlet Hose
12	1	101061	Oil Breather Vent
13A	1	10737	Oil Reservoir Assy.
13B	1	10555	Oil Reservoir Assy.
13C	1	10555	Oil Reservoir Assy.
16B	3	101027	Rubber Hold Down
16C	1	101027	Rubber Hold Down
17B	1	881630	Rubber Hand Sheet Metal Cover
18A	1	881640	Center Hinge Assy.
18B	1	881640	Center Hinge Assy.
18C	1	881640	Center Hinge Assy.
19B	1	881620	Left Hand Sheet Metal Cover
19C	1	881620	Left Hand Sheet Metal Cover
20B	2	20322	Handle Assy.
20C	2	20322	Handle Assy.

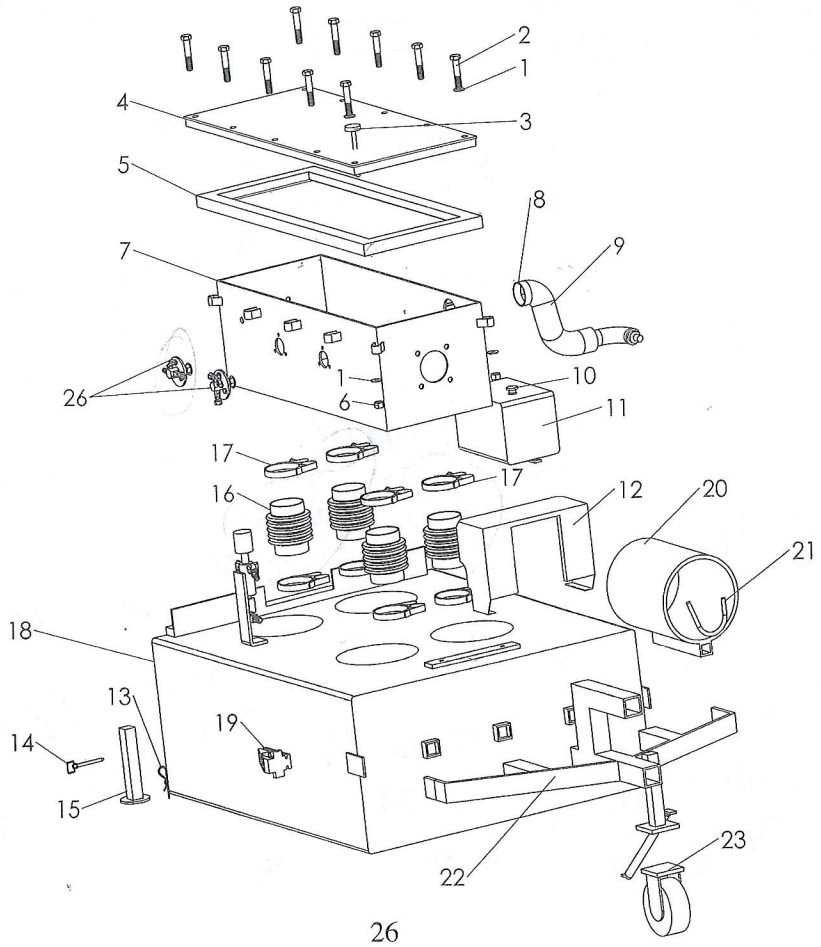
ITEM	QTY	PART #	DESCRIPTION
21B	6	20391	Rubber Sheet Metal Stops
21C	6	20391	Rubber Sheet Metal Stops
23A	1	881610	Dog House
23B	1	881610	Dog House
23C	1	881615	Dog House
24	2	10775	# 7 Hitch Pin
25	2	10755	3/8 x 1 3/4 Clevis Pin
26	1	10157	Jack Stand Assy.
27	2	10911	Flexible Bellows
28	4	101024	Tee-Bolt Hose Clamp
29	2	10901	Rim
30	2	10910	Hub Cap
31	2	10907	Nut
32	2	10905	Cotter Pin
33	2	10906	Washer
34	2	10903	Outer Bearing
35	2	10902	Wheel Hub
36	2	10904	Inner Bearing
37	2	10909	Seal
38A	1	940400	Lower Tank (Neb 200)
38B	1	940600	Lower Tank (Neb 400)
38C	1	940800	Lower Tank (Neb 600)
39	2	10861	Brake Block
40	2	10189	6.0 x 15 Tire
41	8	10908	Bolt
42	1	880900	PTO Shield
43	1	9+0917	PTO Rest
44	1	10744	Tongue Extension
45	1	10280	Tongue Brace
46A	1	10740	Tongue Brace
46B	1	10740	Tongue Brace
46C	1	151590	Tongue
47	1	880500	Caster Wheel Assy.
48	1	10760	Master Torque Test Bar
49	1	941400	Bolt On Axle Assy.
NP	1	10503	Hydraulic Pump

A = NEB 200 Dynamometer
B = NEB 400 Dynamometer
C = NEB 600 Dynamometer



NEB 800 LEGEND

ITEM	QTY	PART #	DESCRIPTION
1	20	210803	1/2" Flat Washer
2	10	210818	1/2" - 13 X 4" Hex Head Capscrew
3	1	10237	Temperature Gauge
4	1	20146	Top Tank Lid
5	1	883450	Lid Gasket
6	10	210804	1/2" - 13 X 4" Hex Nut
7	1	940750	Top Tank
8	4	20258	Hose Clamps
9	2	240115	2" Formed Outlet Hose
10	1	101061	Oil Breather Vent
11	1	10555	Oil Reservoir Assembly
12	1	881611	Dog House
13	2	10775	#7 Hitch Pin
14	2	10755	3/8" x 1 3/4" Clevis Pin
15	1	10157	Jack Stand Assy.
16	4	10911	Flexible Bellows
17	8	101024	Tee-Bolt Hose Clamps
18	1	940800	Lower Tank
19	2	10861	Brake Block
20	1	880900	Ag Shield
21	1	90917	PTO Rest
22	1	151592	Tongue
23	1	880500	Caster Wheel Assy.
24	1	10764	Master Torque Test Bar (Not Shown)
25	1	10503	Hydraulic Pump (Not Shown)
26	1	10600	Thermal Fuse Assy.



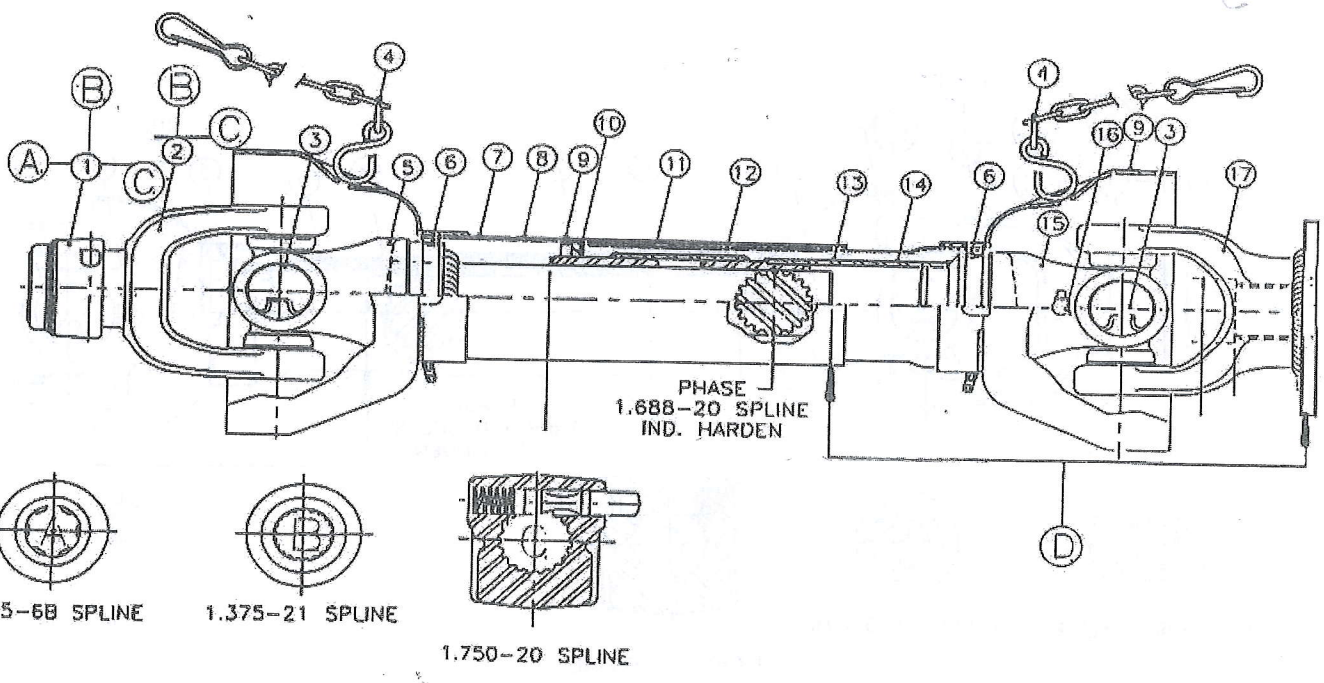
ALL MODELS

ITEM	PART #	DESCRIPTION
1A (note 1)	881047	Slide lock Repair Kit (1.375 - 6B) A
1B (note 1)	881047	Slide lock Repair Kit (1.375 - 21) B
1C (note 2)	881049	Slide lock Repair Kit (1.75 - 20) C
2A	881040	1.375 - 6 B Splined Yoke Assy.
2B	881042	1.375 - 21 Splined Yoke Assy.
2C	881050	1.750 - 20 Splined Yoke Assy.
3	881070	U-Joint Repair Kit
4	881078	CE Chain & Hook Assy.
5	881064	Yoke & Shaft Assy.
6 (note 3)	881058	Non Rotating Guard Repair Kit
7	881082	Safety Sign
8	881083	Certification label
9	881084	Warranty Decal
10	881081	Centralizer Bearing
11	881075	Outer CE Guard
12	881074	Inner CE Guard
13	881083	Certification label
14	881082	Safety Sign
15	881062	Yoke & Tube Assy.
16	881099	Grease Fittings
17	881060	Shear Pin Yoke Assy.
A	881082	1.375 - 6 B Complete Front Half Assy. (CE)
B	881083	1.375 - 21 Complete Front Half Assy. (CE)
C	881084	1.750 - 20 Complete Front Half Assy. (CE)
D	881085	Dynamometer Rear Half Assy. (CE)

Note 1 - 881047 includes: 1 - 881043 Slide Collar
1 - 881044 Spring
2 - 881046 Pawls

Note 2 - 881049 includes: 1 - 881051 Safety Pin
1 - 881052 Spring

Note 3 - 881058 includes: 2 - 881080 Bearing
1 - 881081 Centralized Bushing



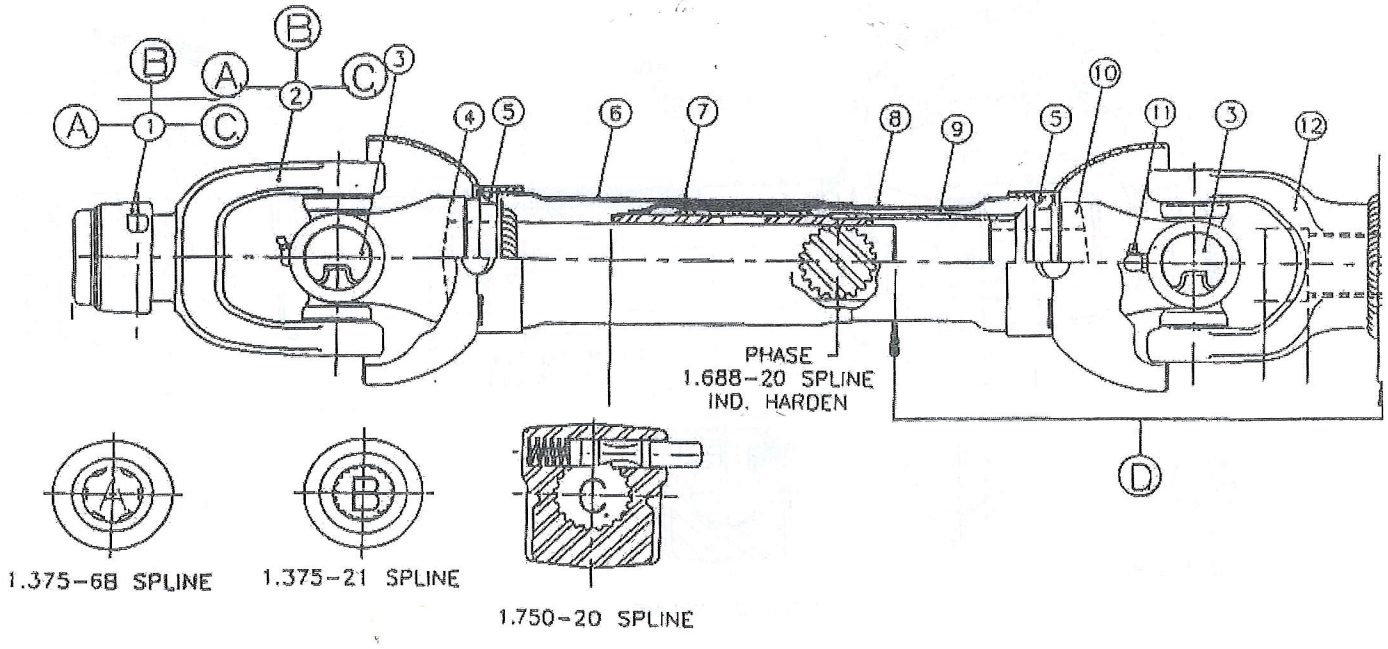
ALL MODELS

ITEM	PART #	DESCRIPTION
*1A (Note 1)	881047	Slide lock Repair Kit Spline (A)
*1B (Note 1)	881047	Slide lock Repair Kit Spline (B)
*1C (Note 2)	881049	Slide lock Repair Kit Spline (C)
2A	881040	1.375 - 6 B Splined Yoke Assy.
2B	881042	1.375 - 21 Splined Yoke Assy.
2C	881050	1.750 - 20 Splined Yoke Assy.
3	881070	U-Joint Repair Kit
4	881064	Yoke & Shaft Assy.
*5 (Note 3)	881057	Nylon Bearing Repair Kit
6	881048	Safety Sign
7	881033	Outer Guard - Rotate
8	881029	Inner Guard - Rotate
9	881048	Safety Sign
10	881062	Yoke & Tube Assy.
11	881099	Grease Fitting
12	881060	Shear Pin Yoke Assy.
13	881072	Bronze Pilot Bushing
A	881032	1.375 - 6 B Complete Front Half Assy.
B	881034	1.375 - 21 Complete Front Half Assy.
C	881036	1.750 - 20 Complete Front Half Assy.
D	881030	Dynamometer Rear Half Assy.
	881031	Dynamometer Rear Half w/12" Ext.

Note 1 – 881047 includes: 1 - 881043 Slide Collar
1 - 881044 Spring
2 - 881046 Pawls

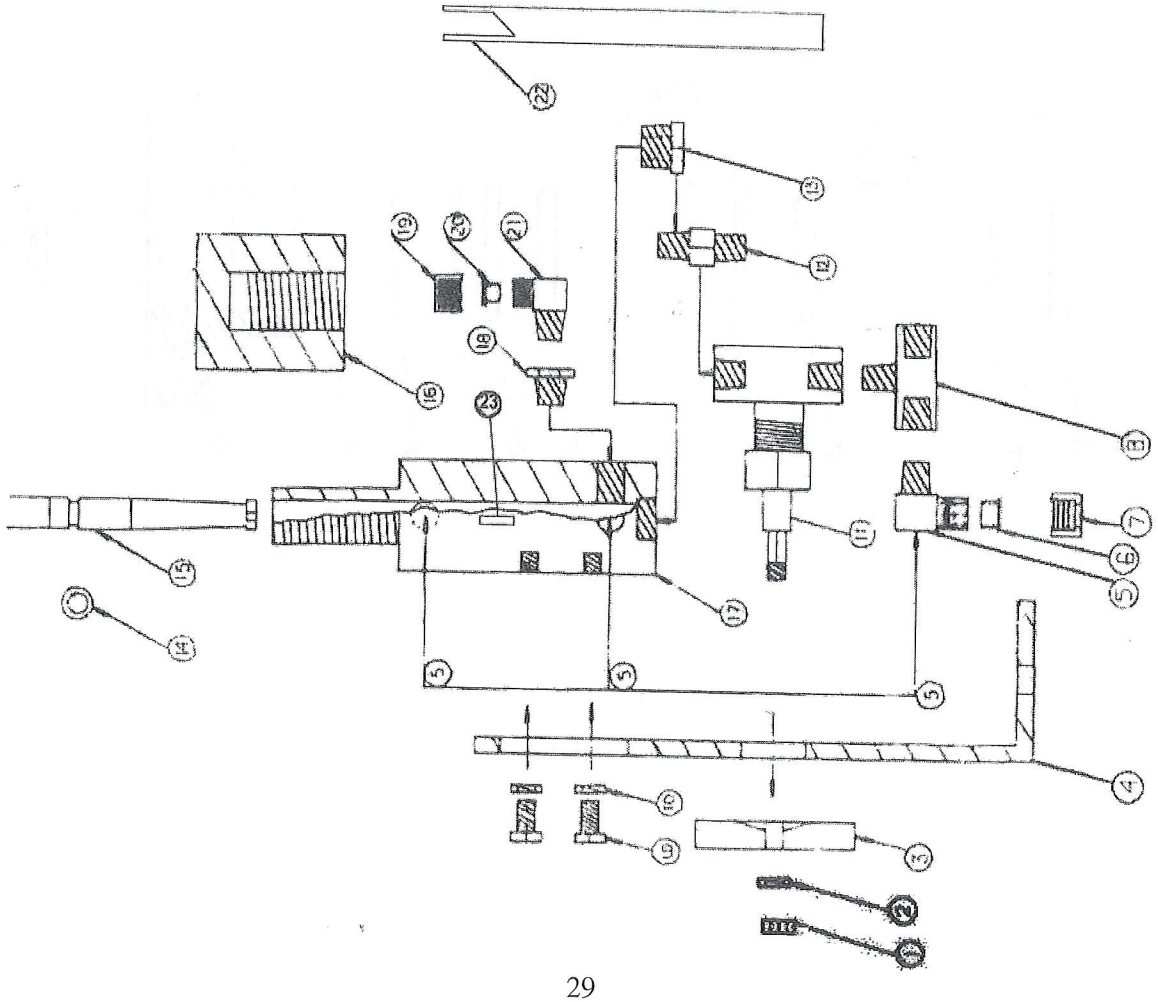
Note 2 – 881049 includes: 1 - 881051 Safety Pin
1 - 881052 Spring

Note 3 – 881057 includes: 1 - 881055 Nylon Bearing
1 - 881056 Snap Ring



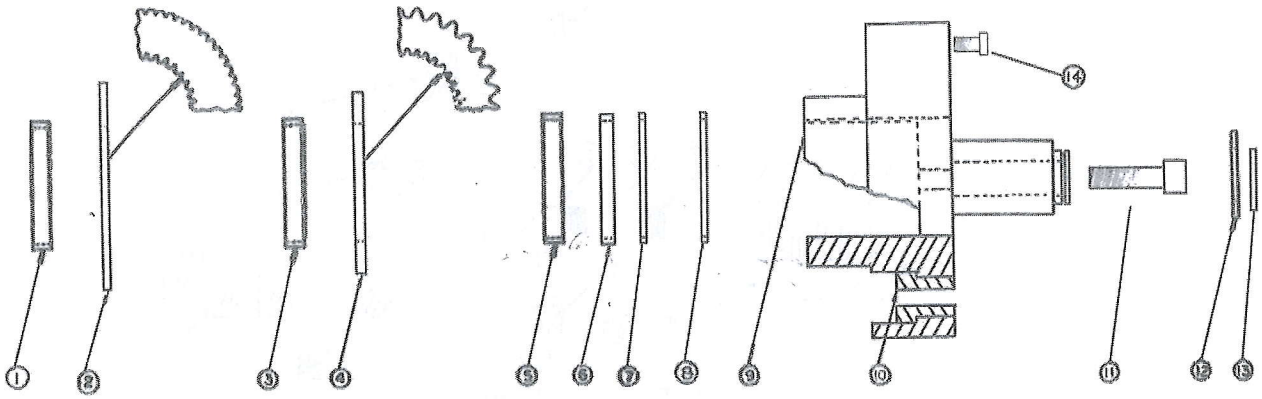
LOAD CONTROL VALVE

ITEM	PART #	DESCRIPTION
1	210403	1/4" - 20 Hex Nut
2	210402	1/4" Lock Washer
3	950811	Tee Valve Handle
4	950815	Mounting Bracket
5	300310	1/4" NPT Male - 3/8 Nylon Elbow
6	300630	3/8" Brass Compression Sleeve
7	300635	3/8" Nylon Compression Nut
8	300320	1/4" NPT Branched Tee Fitting
9	210411	1/4" - 20 x 518" Hex Head Capscrew
10	210402	1/4" Lock Washer
11	950810	Off - On Control Valve
12	300409	1/4" NPT Brass Nipple
13	300720	3/8" NPT - 1/4 NPT Adapter Bushing
14	90916	"O" Ring - Control Valve Stem
15	20623	Control Valve Stem
16	20622	Load Control Knob
17	950805	Load Control Valve Body
18	300705	1/4" NPT - 1/8" NPT Adapter Bushing
19	300625	1/4" Nylon Compression Nut
20	300620	1/4" Nylon Compression Sleeve
21	300215	1/8" NPT Male - 1/4" Nylon Elbow
22	151530	3/8 Light Wall Tubing
23	950803	Spring



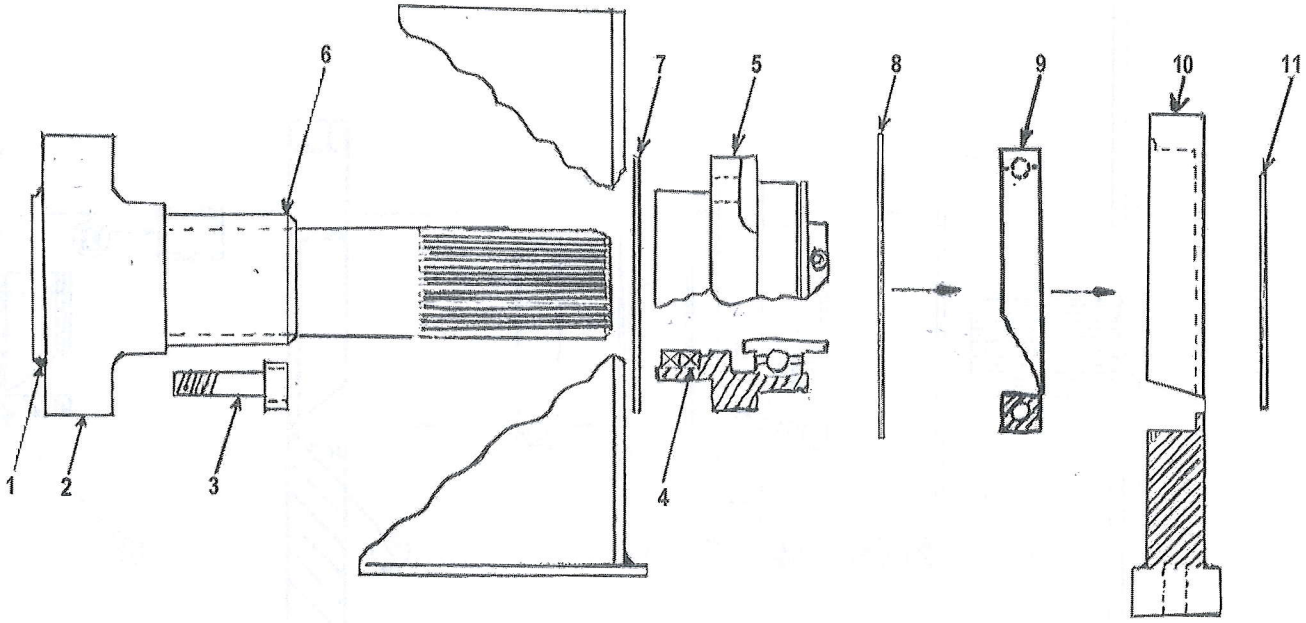
FRONT SHAFT ASSEMBLY

ITEM	PART #	DESCRIPTION
1	881543	2 1/2" OD x 2 3/16" x .375 Spacer
2	881547	60 Tooth OD x 34 Tooth 10 Gear
3	881543	2 1/2" OD x 2 3/16" x .375 Spacer
4	881520	35A30 x 34 T Drive Sprocket
5	881543	2 1/2" OD x 2 3/16" x .375 Spacer
6	881544	2 1/2" OD x 2 3/16" x .250 Spacer
7	880315	2 1/2" OD x 2 3/16" x .060 Spacer
8	880315	2 1/2" OD x 2 3/16" x .060 Spacer
9	881500	Shear Pin Flange Assy.
10	10092	Shear Pin Bushing
11	210617	3/8" - 16 x 1 3/4" Socket Head Capscrew
12	10093	PTO Retainer Washer
13	10138	Snap Ring
14A	210611	Shear Pin Bolt (for 200, NEB 200, NEB 230)
14B	210612	Shear Pin Bolt (for 375, NEB 400, NEB 460)
14C	210613	Shear Pin Bolt (for NEB 600, NEB 690)



INPUT SHAFT & FRONT CRADLE ASSEMBLY

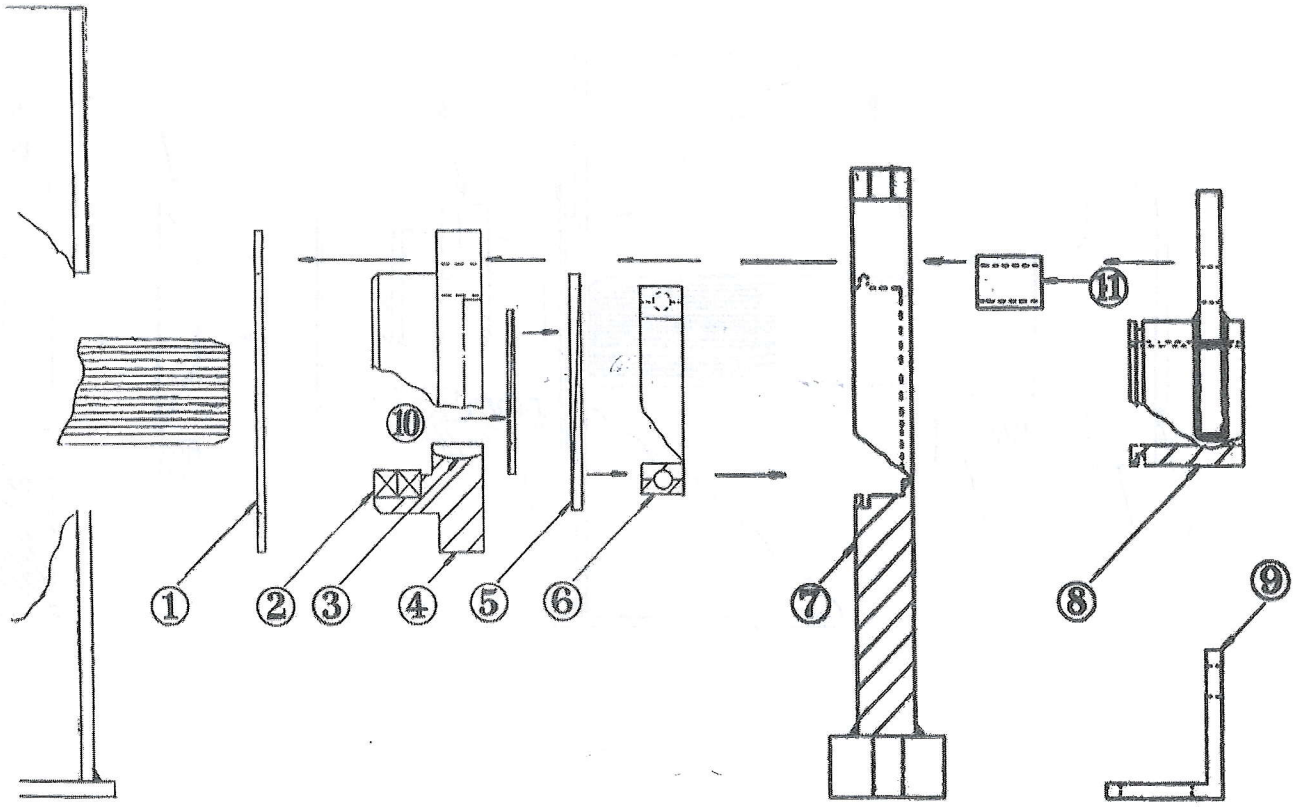
ITEM	PART #	DESCRIPTION
1	700017	"0" Ring - Viton
2	880300	Input Shaft Flange Sleeve Assembly 2 3/16" *(Part 880300 has been changed to 880400 which requires a 700100 2 1/4" input bearing.)*
3	210810	1/2" - 13 x 2 1/4" SS Hex Head Capscrew
4	70002	Water Seals
5	20352	Dynamic Input Bearing
6	700300	Dynamic Input Bearing 2 3/16" (current model uses 70100)
7	10127	Flange Gasket
8*	20420	Snap Ring
9*	20418	Cradle Bearing
10*	880100	Cradle Bearing Trunion Mount
11*	20419	Snap Ring
**** NOT REQUIRED ON MODELS 200, 375***		



Seal Kit

REAR CRADLE ASSEMBLY

ITEM	PART #	DESCRIPTION
1	10127	Flangle Gasket
2	700002	Viton Water Seal
3	10129	Rear Torque Shaft Bushing
4	700009	Rear Seal Housing
5*	20421	Snap Ring
6*	20417	Rear Cradle Bearing
7*	880200	Rear Cradle Mount Assy.
8*	886000	20 T Torque Arm Assy.
9*	101040	Torque Arm Rail
10*	20422	Snap Ring
11*	101033	Spacer
5 Through 11 Not Required for Model 200 and 375		



SECTION 10
DECAL REPLACEMENT REORDERING

PART NUMBER	DESCRIPTION
5100	CAUTION – Do not use or operate.....
507	AUTOMATIC THERMAL VALVE
508	CAUTION – DO NOT OPERATE.....
509	IMPORTANT NOTICE
521	WARNING—BRAKE BLOCK MUST BE....
5102	DANGER—ROTATING DRIVELINE
504	IMPORTANT – ATTACH DRAIN HOSE
513	USE S.A.E. 10 WEIGHT HYDRAULIC OIL

SECTION 11
DIRECT FLYWHEEL TESTING *

NOTE: Under no circumstances are the unbalanced agricultural drive shafts to be operated at speeds over 1500 RPM!

A balanced, high-speed driveline and shield must be used when exceeding 1500 RPM (part #883900 high speed drive line w/shield).

Not recommended for Model 200 or 375
Nebraska Model Only