T5054

DR. RELAFORD

CHK. T MOATS

REL. CK. J ELLIS

89982

87997

RED

E.N. NO. 05601

Cab Gauge Calibration Procedure

Table Of Contents

Drawing Objective

This drawing will show how to calibrate the programmable speedometers and tachometers that are currently being used.

Reference Drawings

EB1224 - Replacing Old Tachometer & Speedometer (Statex I & II)
EB1230 - Replacing Old Tachometer & Speedometer (Statex III)

UNIT RIG
CAD

CAB GAUGE CALIBRATION PROCEDURE

T5054

1. Speedometer Calibration Procedure For P/N 83378B & 83378C

General Information:

The ISSPRO 3-3/8" dia. programmable speedometer(Unit Rig P/N 83378B&C) is calibrated (programmed) by setting a combination of eight switches found in the rear of the instrument. The odometer and pointer are electronically linked together and both are calibrated when the switches are properly set. Program the speedometer before installing.

Calibration Procedure:

The speedometer is calibrated in pulses per mile. The conversion is as follows:

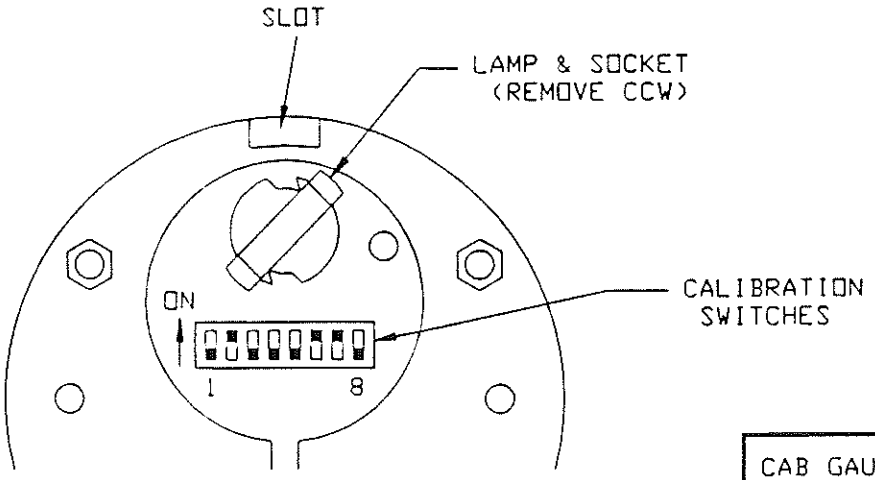
$$\frac{\text{Pulses}}{\text{Mile}} = \frac{\text{Frequency} \times 3600}{\text{Miles/Hour}}$$

Calculate the 'calibration number' from the appropriate formula above. (A minimum calibration number of 95310 is required to be within calibration range.) Refer to the 'Calibration Switch Setting' table (that is provided with each speedometer) with the 'calibration' number. Locate the row in which the calibration number is between the limits, then set the switches marked with an 'X' to the 'on' position (up).An example is for the 85 ton GE772XS with 1500 HZ and 37.7 MPH.

$$\frac{143236 \text{ pulses}}{\text{mile}} = \frac{1500 \times 3600}{37.7}$$

The switch setting would be 2, 6 and 7 'on'.

A Wheelmotor Calibration Switch Setting Table #1 has been provided on the next page of this drawing with the calibration numbers and switch setting numbers already calculated.



REAR VIEW OF SPEEDOMETER

DRAWN RELAFORD
ENG APP. T MOATS
REL. CK. J ELLIS
89982
87997
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CAB GAUGE CALIBRATION PROCEDURE

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Wheelmotor Calibration Switch Setting Table #1

Payload	Gear Ratio	Tire Size	Speed	Cal. #	Switches 'On'
85 tons	GE772XS 23.0:1	21,24,27 x 49 (RR=48.6 in)	37.7mph 60.7kph	143236	2,6,7
120 tons	GE772YS4 28.8:1	30.00 x 51 (RR=55.1 in)	34.2mph 55.0kph	157895	3,5,6,7
	GE772YS5 28.8:1	27.00 x 49 (RR=51.6 in)	31.9mph 51.5kph	169279	8
120 tons D.P.	GE776HS 23.0:1	30.00 x 51 (RR=55.1 in)	42.8mph 68.8kph	126168	1,2,3,7
	GE776HS 28.8:1	30.00 x 51 (RR=55.1 in)	34.2mph 55.0kph	157895	3,5,6,7
140 tons	GE791AS6 28.8:1	33.00 x 51 (RR=57 in)	35.3mph 56.8kph	152975	1,2,3,4,6,7
	GE791AS5 23.3:1	33.00 x 51 (RR=57 in)	44.2mph 71.1kph	122172	7
170 tons	GE776KS8B 28.8:1	36.00 x 51 (RR=61.1 in)	37.9mph 61.0kph	142480	1,6,7
	GE776KS5B 23:1	36.00 x 51 (RR=61.1 in)	47.4mph 76.3kph	113924	1,2,3,4,6
190 tons	GE788HS 26.1:1	36.00 x 51 (RR=61.1 in)	39.0mph 62.9kph	258462	2,4,5,6,8
	GE788FS 26.1:1	37.00 x 57 (RR=65.4 in)	41.8mph 67.3kph	241148	2,5,6,8
	GE788FS 21.7:1	37.00 x 57 (RR=65.4 in)	50.3mph 80.9kph	200398	2,4,5,8
	GE788HS 21.7:1	36.00 x 51 (RR=61.1)	46.9mph 75.5kph	214925	3,6,8
	GE788HS 26.8:1	36.00 x 51 (RR=61.1 in)	38.0mph 61.1kph	265263	1,3,4,5,6,8
	GE788FS 26.8:1	37.00 x 57 (RR=65.4 in)	40.6mph 65.3kph	248276	2,3,5,6,8
	GE788FS 22.4:1	37.00 x 57 (RR=65.4 in)	48.8mph 78.5kph	206557	1,2,3,4,5,8
	GE788HS 22.4:1	36.00 x 51 (RR=61.1)	45.5mph 73.2kph	221538	4,6,8
220/ 250 tons	GE787ES 32.4:1	40.00 x 57 (RR=68.4 in)	35.2mph 56.6kph	286364	1,3,7,8
	GE787FS 31.9:1	40.00 x 57 (RR=68.4 in)	35.7mph 57.4kph	282353	1,2,7,8
	GE787FS 26.6:1	40.00 x 57 (RR=68.4 in)	42.8mph 68.9kph	235514	5,6,8
	GE787FS 36.4:1	40.00 x 57 (RR=68.,4 in)	31.3mph 50.4kph	322045	5,7,8
	GE787FS 28.1:1	40.00 x 57 (RR=68.,4 in)	40.5mph 65.2kph	248834	2,3,5,6,8

Notes are on the next page

DR. RELAFORD
CHK. APP. T MOATS
ENGR. CK. J ELLIS

89982
87997
RED
E.N. NO. 85601

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CAB GAUGE CALIBRATION PROCEDURE

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Notes:
1. 772, 776 and 791 are at 1500 HZ; 787 and 788 are at 2800 HZ.
2. Wheelmotor speed came from GE publication GET 6308J, p.15.
3. Speedometer fine-tune adjust can be acquired by:
   a) referring to the ISSPRO Calibration Chart, or
   b) using the switches as a reversed binary switch. Switch #1 equals 2^0 through Switch #8 equals 2^7.

II. Speedometer Calibration Procedure For P/N 914538 & 55372

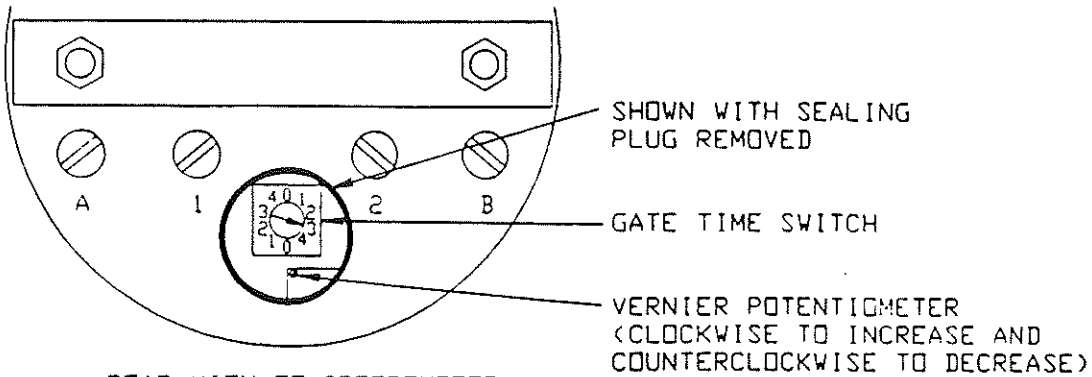
General Information:

The DYNALCO 3-3/8" dia. programmable speedometer(Unit Rig P/N 915538 & 55372) is calibrated (programmed) by setting a rotary dial switch found in the rear of the instrument. The gauge can be fine tuned with a vernier potentiometer. Program the speedometer before installing.

Calibration Procedure:

The speedometer is calibrated by first setting the gate time switch.
USE POSITION 1 FOR;
ALL GE788 AND GE787 WHEELMOTORS
ALL GE772/776/791 WHEELMOTORS WITH SPEEDS (SEE CHART ON PREVIOUS PAGE) FROM 21 TO 57 KPH/MPH
USE POSITION 2 FOR;
ALL GE772/776/791 WHEELMOTORS WITH SPEEDS (SEE CHART ON PREVIOUS PAGE) FROM 57 TO 99 KPH/MPH

The gauge can now be fine tuned by turning the vernier potentiometer.



REAR VIEW OF SPEEDOMETER

REFERENCE:
The GATE TIME SWITCH POSITION is determined using the following;

$$\text{GATE TIME (Seconds)} = \frac{\text{SPEED X 10}}{\text{FREQUENCY}}$$

POSITION 1: 0.14-0.38 seconds
POSITION 2: 0.38-0.76 seconds
POSITION 3: 0.76-1.51 seconds
POSITION 4: 1.51-3.02 seconds

DR.	RELAFORD
ENG. APP.	T MOATS
PEL. CK.	J ELLIS
89982	
87997	
RED	
E.N. NO. 85601	

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CAB GAUGE CALIBRATION PROCEDURE

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III. Tachometer Calibration Procedure For P/N 914537

General Information:

The DYNALCO 3-3/8" dia. programmable tachometer(Unit Rig P/N 914537). is calibrated (programmed) by setting a rotary dial switch found in the rear of the instrument. The gauge can be fine tuned with a vernier potentiometer. Program the tachometer before installing.

Calibration Procedure:

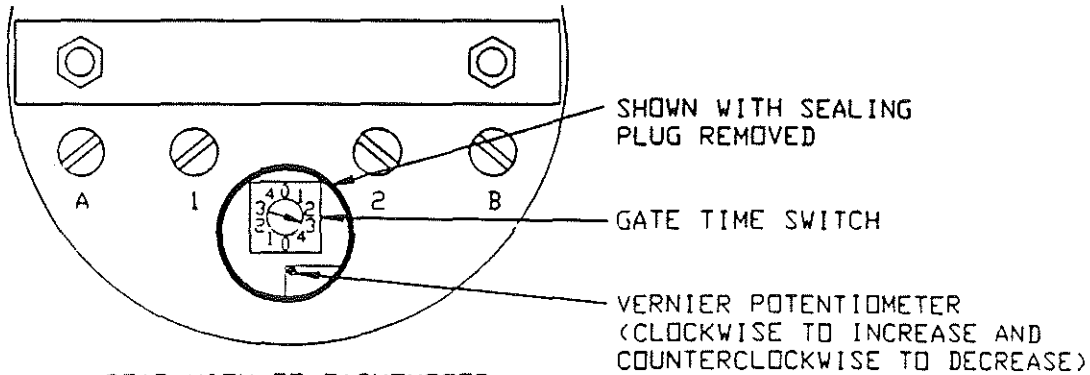
The tachometer is calibrated by first setting the gate time switch. The gate time is derived by the dividing the RPM into the frequency.

$$\text{GATE TIME} = \frac{\text{RPM}}{\text{FREQUENCY}} = \frac{1900\ \text{RPM}}{1583\ \text{Hz}} = 1.2\ \text{seconds}$$

Select the gate time switch position by the following chart.

POSITION 1: 0.14-0.38 seconds
POSITION 2: 0.38-0.76 seconds
POSITION 3: 0.76-1.51 seconds
POSITION 4: 1.51-3.02 seconds

In the majority of cases the gate time switch position will be #3. The gauge can now be fine tuned by turning the vernier potentiometer. Past history has shown that most of the gauges have been adjusted to almost the maximum limit of the vernier potentiometer.



REAR VIEW OF TACHOMETER

IV. Tachometer Calibration Procedure For P/N 83378E & 83378H

General Information:

The ISSPRO 3-3/8" dia. programmable tachometer(Unit Rig P/N 83378E&H) is calibrated (programmed) by setting a combination of eight switches on the rear of the instrument. Program the tach before installing.

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CAB GAUGE CALIBRATION PROCEDURE

T5054

Calibration Procedure:

The tachometer is calibrated in pulses per revolution. The tachometer calibration conversion starts with the following calculation:

$$\frac{\text{Pulses}}{\text{Rev}} = \frac{\text{\# of Gear Teeth}}{\text{Revs}} = \frac{50}{1} = 50 \text{ pulses/rev}$$

The set of switches on the back of the gauge is a reverse binary switch. (ie.- switch #1 equals 2
The following chart gives the number value for each switch:

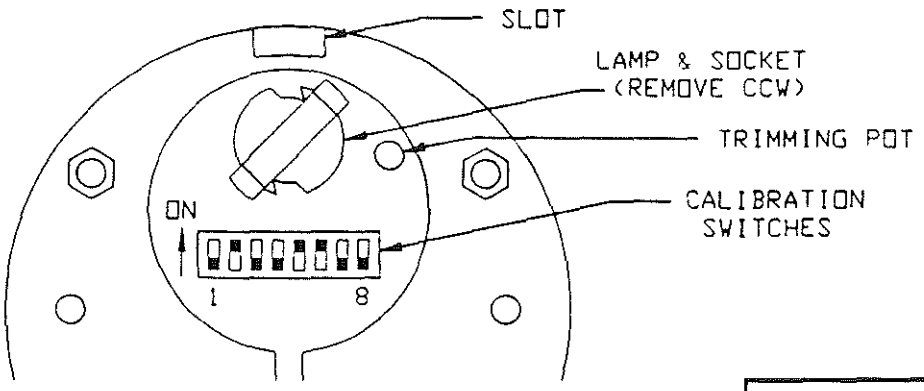
Switch #	Value
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

Add up the switch values up until this number equals to the number of pulses per revolution. The switch values used indicates which switches will be turned 'on' (up). All others will be off. The example below shows how the switches are determined by subtracting the switch value from the remainder of the pulses per revolution.

	REMAINDER	SWITCH VALUE		NEW REMAINDER	SWITCH #
START WITH	50 PULSES/REV	- 32	=	18	#6
	18	- 16	=	2	#5
	2	- 2	=	0	#2

The switches that would be turned 'on' are #2, #5, and #6.

NOTE: The switch settings can also be determined from the 'Switch Settings Table' that comes with every gauge.



REAR VIEW OF SPEEDOMETER

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ENG. APP. T MOATS
REL. CK. J ELLIS

89982
87997
RED
E.N. NO. 85501

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CAB GAUGE CALIBRATION PROCEDURE

T5054

T5080A

PURPOSE:

TO TEST THE WEIGH SYSTEM.

TEST EQUIPMENT REQUIRED:

DIGITAL VOLTMETER
SIGNAL GENERATOR TO SIMULATE MPU FOR SPEED

DRAWINGS REQUIRED:

** WEIGH SYSTEM SCHEMATIC **=SEE TRUCK SPEC FOR SPECIFIC DRAWING
S10628 CONTROL UNIT SCHEMATIC
S10629 DISPLAY SCHEMATIC
S10630 WEIGH SYSTEM SCHEMATIC

CONTROL UNIT/VISUAL CHECKS:

_____VERIFY THAT CORRECT EPROM IS INSTALLED.
SEE APPLICABLE 'CONTROL UNIT INSTALLATION' DRAWING FOR EPROM P/N
(IE A83987B SPECIFIES A84466C EPROM)
_____VERIFY THAT JUMPERS ON CPLC ARE ARRANGED PER A83987
_____CONTROL UNIT TERMINALS ARE TIGHT
_____WIRING IS COMPLETE AND ANY LOOSE WIRES ARE INSULATED
_____DISPLAY SWITCH ON DISPLAY IS TURNED ON.

TEST/ADJUSTMENT SETUP:

_____TURN ON 24VDC POWER (MASTER SWITCH).
_____TURN WEIGH SYSTEM POWER SWITCH ON (ON CONTROL UNIT INSIDE CONTROL BOX).
NOTE: DURING, REMAINDER OF TESTING, POWER IS LEFT ON EXCEPT TO CONNECT OR DISCONNECT WIRING FOR TEST VOLTAGES.

VOLTAGE CHECKS:

_____24V AT CPLC-+24V
_____10V AT CPLC-+10V
_____5V AT CPLC-+5V
_____15V AT TBW1-3
NOTES:
THE VOLTAGE LEVELS SHOWN ABOVE ARE NOMINAL VALUES ONLY

DISPLAY ON/OFF

_____TURN TOGGLE SWITCH (ON DISPLAY ASSY) OFF AND VERIFY THAT BACK LIGHTING OF 4 SWITCHES ON DISPLAY IS OFF
_____TURN SWITCH BACK ON AND VERIFY THAT BACK LIGHTING OF 4 SWITCHES ON DISPLAY IS ON.

DR	SLF
ENG. APP	GILLEY
PLC. CK	ELLIS
E.N. NO.	89626
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	87917
	87834

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WEIGH SYSTEM TEST

T5080A

LAPTOP COMMUNICATION CHECK:

_____CONNECT LAPTOP TO WEIGH SYSTEM SERIAL CONNECTOR FOR PC AND START WEIGH SYSTEM PROGRAM.

_____USE OPTION 1 TO VERIFY THAT WEIGH SYSTEM IS COMMUNICATING.

SET TIME/DATE:

_____USE OPTION 4 (UPLOAD CHECKS) TO SET TIME AND DATE.

SET DEFAULT VALUES INTO MEMORY:

_____USE OPTION 2 TO SETUP TRUCK VARIABLES PER WEIGH SYSTEM CONFIGURATION DATA DRAWING ON TRUCK SPEC.
USE ACTUAL SERIAL NUMBER OF TRUCK.

DIGITAL INPUT CHECKS:

_____USE OPTION 3 (DIAGNOSTIC TOOLS) THEN OPTION 2 (DISPLAY STATUS OF INPUT AND OUTPUT) TO DISPLAY IO STATUS.

_____PRESS SERVICE BRAKE, VERIFY DISPLAY CHANGES ACCORDINGLY.

_____PRESS RETARD PEDAL, VERIFY DISPLAY CHANGES ACCORDINGLY.

_____PRESS ACCELERATOR PEDAL, VERIFY DISPLAY CHANGES ACCORDINGLY.

_____APPLY HAND BRAKE, VERIFY DISPLAY CHANGES ACCORDINGLY.

_____APPLY LOAD BRAKE, VERIFY DISPLAY CHANGES ACCORDINGLY.

_____APPLY PARK BRAKE, VERIFY DISPLAY CHANGES ACCORDINGLY.

_____RAISE DUMP BODY, VERIFY DISPLAY CHANGES ACCORDINGLY.

TRUCK SPEED CHECK:

_____LEAVE LAPTOP ON SAME DISPLAY AS ABOVE.

_____CONNECT SIGNAL GENERATOR TO TB1-A & B. SET TO 1/10 THE VALUE ON THE APPLICABLE 'CONFIGURATION DATA WEIGH SYSTEM' DRAWING FOR 'Pulses in 1/10 mile/kilometer'
(IE 24902 PULSES = 2490HZ)

_____VERIFY THAT SPEED IS 36 (+/- 1)

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ENG APP	
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89626	
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WEIGH SYSTEM TEST

T5080A

T5080A

PRESSURE TRANSDUCER INPUT CHECKS:

_____LEAVE LAPTOP ON SAME DISPLAY AS ABOVE.
_____CHECK VOLTAGE AT JUNCTION BOX-A2 CLOSE TO LEFT FRONT PRESSURE TRANSDUCER AND VERIFY THAT DISPLAY READS THE SAME.
_____DISCONNECT PRESSURE TRANSDUCER AT JUNCTION BOX-A2 CLOSE TO LEFT FRONT PRESSURE TRANSDUCER AND VERIFY THAT VOLTAGE DISPLAYED GOES TO 0. RECONNECT TRANSDUCER WIRE.
_____CHECK VOLTAGE AT JUNCTION BOX-B2 CLOSE TO RIGHT FRONT PRESSURE TRANSDUCER AND VERIFY THAT DISPLAY READS THE SAME.
_____DISCONNECT PRESSURE TRANSDUCER AT JUNCTION BOX-B2 CLOSE TO RIGHT FRONT PRESSURE TRANSDUCER AND VERIFY THAT VOLTAGE DISPLAYED GOES TO 0. RECONNECT TRANSDUCER WIRE.
_____CHECK VOLTAGE AT JUNCTION BOX-A2 CLOSE TO LEFT REAR PRESSURE TRANSDUCER AND VERIFY THAT DISPLAY READS THE SAME.
_____DISCONNECT PRESSURE TRANSDUCER AT JUNCTION BOX-A2 CLOSE TO LEFT REAR PRESSURE TRANSDUCER AND VERIFY THAT VOLTAGE DISPLAYED GOES TO 0. RECONNECT TRANSDUCER WIRE.
_____CHECK VOLTAGE AT JUNCTION BOX-A6 CLOSE TO RIGHT REAR PRESSURE TRANSDUCER AND VERIFY THAT DISPLAY READS THE SAME.
_____DISCONNECT PRESSURE TRANSDUCER AT JUNCTION BOX-A6 CLOSE TO RIGHT REAR PRESSURE TRANSDUCER AND VERIFY THAT VOLTAGE DISPLAYED GOES TO 0. RECONNECT TRANSDUCER WIRE.

NOTE: IF PRESSURE TRANSDUCERS ARE NOT INSTALLED, CHECK FOR 15V IN JUNCTION BOXES AND APPLY APPROXIMATELY 1.5V TO TRANSDUCER SIGNAL TERMINAL TO SIMULATE PRESSURE TRANSDUCER OUTPUT.

TRUCK DISPLAY CHECK

_____VERIFY THAT THE TRUCK DISPLAY SHOWS SOME KIND OF INFORMATION.
_____LEAVE LAPTOP ON SAME DISPLAY AS ABOVE
_____VERIFY THAT DISPLAY SWITCH VOLTAGE IS ABOVE 9V
_____PRESS MENU SWITCH ON TRUCK DISPLAY AND VERIFY THAT DISPLAY SWITCH VOLTAGE IS BETWEEN 5.6V AND 6.4V
_____PRESS UP ARROW SWITCH ON TRUCK DISPLAY AND VERIFY THAT DISPLAY SWITCH VOLTAGE IS BETWEEN 4.4V AND 5.2V.
_____PRESS DOWN ARROW SWITCH ON TRUCK DISPLAY AND VERIFY THAT DISPLAY SWITCH VOLTAGE IS BETWEEN 3.4V AND 4.2V.
_____PRESS ENTER SWITCH ON TRUCK DISPLAY AND VERIFY THAT DISPLAY SWITCH VOLTAGE IS BETWEEN 1.9V AND 2.7V.

DIGITAL OUTPUT CHECKS:

_____USE OPTION 3 (DIAGNOSTIC TOOLS) THEN OPTION 3 (DISPLAY/CHANGE OUTPUT) TO DISPLAY IO STATUS.
_____CHECK RED LOAD LIGHTS.
_____CHECK AMBER LOAD LIGHTS.
_____CHECK EMPTY TRUCK SIGNAL
_____CHECK ALARM SIGNAL

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ENG. APP	
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WEIGH SYSTEM TEST

SHEET 3 OF 4

T5080A

T5080A

DISPATCH COMMUNICATION CHECK:

SKIP THIS STEP IF THE SYSTEM IS WIRED FOR THE LARGE DISPLAY OPTION, OR OTHER OPTION WHERE THERE IS NOT A 9 PIN CONNECTOR ON CABLE THAT WILL PLUG INTO LAPTOP. ALSO SKIP THIS STEP IF THE EPROM IS P/N A84466C.

_____VERIFY THAT THERE ARE NO JUMPERS CONNECTED ON RS232 CARD'S J1.

_____CONNECT LAPTOP TO WEIGH SYSTEM SERIAL CONNECTOR FOR DISPATCH AND START WEIGH SYSTEM PROGRAM.

_____USE OPTION 1 TO VERIFY THAT WEIGH SYSTEM IS COMMUNICATING.

_____USE OPTION 3 (DIAGNOSTIC TOOLS) THEN OPTION 1 (DISPLAY TRUCK SETUP VARIABLES) TO CONFIRM THAT DATA CAN BE TRANSFERRED.

LARGE DISPLAY CHECK:

SKIP THIS STEP IF 'LARGE DISPLAY OPTION' IS NOT INSTALLED.

_____VERIFY JUMPER ON RS232 CARD USED FOR LARGE DISPLAY IS PER THE SCHEMATIC.

_____PRESS THE 'MENU' BUTTON ON THE CAB DISPLAY. USE THE 'UP' AND 'DOWN' ARROW BUTTONS TO POINT TO 'LARGE DISPLAY OPT' (ITEM 20). PRESS 'ENTER' BUTTON. USE THE 'UP' AND 'DOWN' ARROW BUTTONS TO POINT TO '5 TEST LEDS'. PRESS 'ENTER' BUTTON TO START TEST AND RETURN TO DEFAULT DISPLAY.

_____VERIFY DISPLAY ON EACH SIDE OF TRUCK REPEATEDLY DISPLAYS 0,111,222,333,444,555,666,777,888,999,0,111,...

_____PRESS THE 'MENU' BUTTON ON THE CAB DISPLAY. USE THE 'UP' AND 'DOWN' ARROW BUTTONS TO POINT TO 'LARGE DISPLAY OPT' (ITEM 20). PRESS 'ENTER' BUTTON. USE THE 'UP' AND 'DOWN' ARROW BUTTONS TO POINT TO '4 OPTION 4'. PRESS 'ENTER' BUTTON TO STOP TEST AND RETURN TO DEFAULT DISPLAY.

DR SLF
ENG APP.
REL CK

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87917
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WEIGH SYSTEM TEST

T5080A

T5100M

CUSTOMER: EMPIRE MT4400 S/N103-107

A LAPTOP COMPUTER CONNECTED TO THE TRUCK WEIGH SYSTEM IS USED TO SETUP THE WEIGH SYSTEM FOR A SPECIFIC APPLICATION. THE WEIGH SYSTEM SOFTWARE REQUIRED IS INCLUDED ON A WEIGH SYSTEM DISK (P/N A83985F). THE INITIAL VALUES FOR THE SETUP VARIABLES ARE AS FOLLOW;

INITIAL VALUE	DESCRIPTION
103-107	Truck Serial Number
240	Rated Payload of Truck
5062	Front Suspension Scaling
4980	Rear Suspension Scaling
1000	Tractor/Trailer Weight Scaling
TON	Weight Unit of Measure
MILE	Distance Unit of Measure
28195	Pulse in 1/10 mile/kilometer
16	Default Display Mode
0	Chime Mode
40	Max Speed on Fly for Weight Update
14	Max Weight Delta During Fly Weight Update
1.4	Weight Delta for Stable Shovel Weight
276	Empty Weight Reading
3	Speed for Weigh Read Leaving Shovel
12	Adder for Weight Read Leaving Shovel
3	Max Speed for Brakes without Retarder

DR. SLF
ENG. APP. MASSIE
REL. CK ELLIS

90996
E.N. NO.

UNIT RIG CAD

CONFIGURATION DATA
WEIGH SYSTEM

T5100M

T5100N

CUSTOMER: TILDEN MT4400 S/N108-110

A LAPTOP COMPUTER CONNECTED TO THE TRUCK WEIGH SYSTEM IS USED TO SETUP THE WEIGH SYSTEM FOR A SPECIFIC APPLICATION. THE WEIGH SYSTEM SOFTWARE REQUIRED IS INCLUDED ON A WEIGH SYSTEM DISK (P/N A83985F). THE INITIAL VALUES FOR THE SETUP VARIABLES ARE AS FOLLOW;

INITIAL VALUE	DESCRIPTION
108-110	Truck Serial Number
240	Rated Payload of Truck
5062	Front Suspension Scaling
4980	Rear Suspension Scaling
1000	Tractor/Trailer Weight Scaling
TON	Weight Unit of Measure
MILE	Distance Unit of Measure
28195	Pulse in 1/10 mile/kilometer
16	Default Display Mode
0	Chime Mode
40	Max Speed on Fly for Weight Update
14	Max Weight Delta During Fly Weight Update
1.4	Weight Delta for Stable Shovel Weight
276	Empty Weight Reading
3	Speed for Weigh Read Leaving Shovel
12	Adder for Weight Read Leaving Shovel
3	Max Speed for Brakes without Retarder

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ENG. APP. MASSIE
REL. CK. ELLIS

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CONFIGURATION DATA
WEIGH SYSTEM

T5100N

T5100P

CUSTOMER: BORAX MT4400 S/N111-137

A LAPTOP COMPUTER CONNECTED TO THE TRUCK WEIGH SYSTEM IS USED TO SETUP THE WEIGH SYSTEM FOR A SPECIFIC APPLICATION. THE WEIGH SYSTEM SOFTWARE REQUIRED IS INCLUDED ON A WEIGH SYSTEM DISK (P/N A83985F). THE INITIAL VALUES FOR THE SETUP VARIABLES ARE AS FOLLOW;

INITIAL VALUE	DESCRIPTION
111-137	Truck Serial Number
240	Rated Payload of Truck
5062	Front Suspension Scaling
4980	Rear Suspension Scaling
1000	Tractor/Trailer Weight Scaling
TON	Weight Unit of Measure
MILE	Distance Unit of Measure
28195	Pulse in 1/10 mile/kilometer
16	Default Display Mode
0	Chime Mode
40	Max Speed on Fly for Weight Update
14	Max Weight Delta During Fly Weight Update
1.4	Weight Delta for Stable Shovel Weight
276	Empty Weight Reading
3	Speed for Weigh Read Leaving Shovel
12	Adder for Weight Read Leaving Shovel
3	Max Speed for Brakes without Retarder

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CONFIGURATION DATA
WEIGH SYSTEM

T5100P

T-5094A
DUMP SYSTEM TEST PROCEDURE
MT 4400

NOTE: *Record all information and pressures on the data sheets at the end of this procedure.*

I. Prior to engine start

A. Park the truck in a SAFE POSITION. It must be secured by means other than the friction brake system.

B. Verify that the steering system has been properly tested and adjusted.

C. Release all entrapped pressure in the system. Verify that the Dump Controller lever is in the Float position.

D. Verify that all hoses and fittings are tightened per the procedures in 02-579.

E. Verify that the trucks hydraulic tank is filled to the proper level with approved hydraulic oil.

F. Verify that the valve in the pump suction line is open.

G. If not previously tested, verify that the hydraulic reservoir is properly pressurized as follows:

1. Remove the air line from the engine to the center frame crossmember. Cap the engine air line.

2. Install a source of clean, dry compressed air, regulated to 35 psi (240 kPa) on the inlet to the crossmember.

3. Install a 0 to 50 psi (0 -350 kPa) pressure gauge on to the outlet line from the pressure regulator on the hydraulic tank to the tank itself. Fittings may need to be provided.

4. Turn on the air supply to the crossmember, verifying that it does not exceed 35 psi (240 kPa).

5. Verify that the pressure to the hydraulic tank is 10 +/- 1 psi (70 +/- 7 kPa). If not, adjust the regulator to obtain this pressure.

6. When complete, remove the equipment installed.

7. Repressurize the hydraulic tank to 10 +/- 1 psi (70 +/- 7 kPa).

H. Install 0-5000 psi (35 000 kPa) pressure gauges on the TSS and TSR test ports on the steering manifold.

NOTE: *There is a pressure gauge for checking system pressure in the hydraulic components box on the superstructure.*

I. If necessary, check the preliminary adjustment of the operation of the pilot raise and float proximity switches as follows:

NOTE: *If the switches have been previously installed and operating, this step may be omitted.*

1. Adjust the position of each of the two switches to approximately 3/32 inch (2.28 mm) from the edge of the corresponding washers.

2. Verify that the pilot valve is in the detented Float position.

3. Adjust the top of the lower washer, adjacent to the pilot-float switch, to align with the centerline of that switch.

4. Move the pilot valve to the detented Hold position.

5. Adjust the top of upper washer, adjacent to the pilot-raise switch, to align with the bottom of that switch.

J. Test the operation of the pilot raise and float proximity switches as follows:

NOTES:
1. The Master Switch must be On.
2. If the appropriate LEDs on the proximity switches do not operate, adjust the location of the washers or the clearance between the washer and the switch slightly as required.

1. Move the Dump Controller lever to the Lower position and hold.

2. Verify that the LEDs in both of the switches are on.

3. Move the Dump Controller lever to the detented Float position and release.

4. Verify that the:

   a. LED in the pilot raise switch is on.

   b. LED in the pilot float switch is off.

5. Move the Dump Controller lever to the detented Hold position and release.

6. Verify that the LEDs in both of the switches are on.

7. Move the Dump Controller lever to the Raise position and hold.

8. Verify that the:

   a. LED in the pilot float switch is on.

   b. LED in the pilot raise switch is off.

9. Return the Dump Controller lever to the Float position.

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10. Slowly move the Dump Controller lever to the Lower position while monitoring the operation of the LEDs.

11. Verify that the LEDs switch as outlined previously before the lever moves 1/2 of its travel.

12. Return the Dump Controller lever to the detented Float position.

K. If the truck has been sitting idle for an extended period of time or the steering pump or system has been drained since the last time the truck was started, fill the case drain on the steering pump with approved hydraulic oil.

L. Using the appropriate means for the electrical propulsion system installed, disable the truck's propulsion system to prevent its operation when the Shifter is moved to the forward or reverse position.

II. Test procedure

A. Verify that all air has been properly bled from the dry valve lines and cylinders as follows:

1. Start the truck and allow the engine to operate at low idle speed.

2. Verify that the Load and Park brakes systems are applied.

3. Verify that the Shifter is in the Neutral position.

4. Slightly loosen the pressurized lines on the dry valve cylinders rod end on each of the dump pump sections and allow all entrapped air to escape. Re-tighten each of the fittings when the procedure is complete.

5. Move the Shifter to the Forward position.

6. Slightly loosen the pressurized lines on the dry valve cylinders head end on each of the dump pump sections and allow all entrapped air to escape. Re-tighten each of the fittings when the procedure is complete.

7. Move the Shifter to the Neutral position.

B. Test the high pressure relief valve operation as follows:

1. Verify that the Shifter is in Neutral and the engine is operating at low idle speed.

2. If any work has been done on the dump system or its components or the condition of the system is unknown, raise and lower the dump body through several cycles to bleed all entrapped air from the system. Do not "force' the cylinders at either end of travel.

NOTE: *To improve this process, it is recommended that the dump body be raised in 2 to 3 ft. (0.6 to 0.9m) increments and that the Dump Controller lever be held in the Lower or "power-down" position until the dump body is within 2 to 3 ft. (0.6 to 0.9 m) of the frame.*

3. Raise the dump body to its fully raised position.

4. While holding the Dump Controller lever in the Raise position, verify that:

a. The dump system pressure (on the cabinet mounted gauge) is 2350 to 2450 psi (16 205 to 16 895 kPa). If not, readjust the relief valve in the main valve as required. Refer to information in the appropriate Unit Rig Mechanical Manual for detailed information on this adjustment.

b. The steering pump output pressure, measured at the TSS port on the steering manifold, is 2550 to 2650 psi (17 580 to 18 270 kPa).

c. The pressure in the steering accumulators remains at approximately 3500 psi (24 135 kPa).

5. Release the Dump Controller lever, allowing it to return to the detented Hold position.

6. Move the Dump Controller lever to the Lower position and allow the dump body to lower until it is resting on the dump body pads.

7. While holding the Dump Controller lever in the Lower position, verify that:

a. The dump system pressure (on the cabinet mounted gauge) is 1450 to 1550 psi (10 010 to 10 685 kPa). If not, readjust as required.

b. The steering pump output pressure, measured at the TSS port on the steering manifold, is 3450 to 3550 psi (23 790 to 24 480 kPa).

c. The pressure in the steering accumulators remains at approximately 3500 psi (24 135 kPa).

8. Release the Dump Controller lever, allowing it to return to the detented Float position.

9. Verify that the dry valve solenoid output pressure, measured at the TSR port on the steering manifold, is 465 to 505 psi (3 205 to 3 480 kPa).

10. Raise and lower the dump body through its entire operating range (with the engine operating at rated speed) for 5 complete cycles.

C. Test the system circulating pressure and operation of the dry valves as follows:

1. Stop the engine.

2. Install a low pressure, typically 0 to 200 psi (0 to 1400 kPa) gauge at the inlet to the dump valve. Additional fittings may be required.

3. Verify that the:

a. Shifter is in N (Neutral) position.

b. The Load and/or Park brake is applied or other provisions have been made to ensure that the trucks propulsion system is temporarily disabled, even if the Shifter is in the F (Forward) or R (Reverse) positions.

c. Dump Controller lever is in the detented Float position.

4. Start the truck engine.

5. Verify that the indicated circulation or system pressure indicated at the dump valve inlet does not exceed 40 psi (275 kPa). Record indicated pressure.

6. Accelerate the engine to rated speed and hold.

7. Verify that the indicated circulation or system pressure indicated at the dump valve inlet does not exceed 80 psi (550 kPa). Record indicated pressures.

8. Verify that the steering pump output pressure, measured on the gauge on the TSS port on the steering manifold, is 3475 to 3525 psi (23 960 to 24 300 kPa).

9. Verify that the dry valve solenoid output pressures, measured at the TSR port on the steering manifold, is 465 to 505 psi (3 205 to 3 4080 kPa).

10. Slow the engine to low idle speed.

11. Move the Shifter to the Forward position and monitor the time it takes for the pressure on the TSR mounted gauge to decrease to 0 psi (kPa). This is typically 5 to 10 seconds. Adjust the timer, if required.

12. Move the Shifter to the Neutral position. Verify that the pressure on the TSR port returns to 465 to 505 psi (3 205 to 3 480 kPa).

13. Move the Shifter to the Forward position. Verify that the pressure on the TSR mounted gauge again decreases to 0 psi (kPa) after 5 to 10 seconds.

14. Verify that the Shifter is in the Forward position and the Dump Controller lever is in the Float position.

15. Verify that the indicated circulation or system pressure indicated at the dump valve inlet does not exceed 25 psi (170 kPa). Record indicated pressure.

16. Accelerate the engine to rated speed. Make sure that the propulsion system is disabled.

17. Verify that the dry valve solenoid output pressures, measured at the TSR port on the steering manifold, is 0 psi (kPa).

18. Verify that the steering pump output pressure, measured on the gauge on the TSS port on the steering manifold is 3475 to 3525 psi (23 960 to 24 300 kPa).

19. Verify that the indicated circulation or system pressure indicated on the cabinet mounted gauge does not exceed 25 psi (170 kPa) more than at engine idle.

20. Record the indicated pressures.

21. Slow the engine to low idle speed.

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DUMP SYSTEM TEST PROCEDURE

22. Stop the engine. Remove the low pressure gauge on the dump valve inlet. Restart the engine and operate at low idle speed.

23. Move the Shifter to Forward.

24. Move the Dump Controller lever to the Lower position. Verify that the:

a. Pressure on the TSR port returns to 465 to 505 psi (3 205 to 3 480 kPa).

b. Dump Body Up indicator lights.

25. Move the Dump Controller lever to the Float position. Verify that the:

a. Pressure on the TSR port returns to 0 psi (kPa) after 5 to 10 seconds.

b. Dump Body Up indicator goes off.

26. Move the Dump Controller lever to the Hold position. Verify that the:

a. Pressure on the TSR port returns to 465 to 505 psi (3 205 to 3 480 kPa).

b. Dump Body Up indicator lights.

27. Move the Dump Controller lever to the Float position. Verify that the:

a. Pressure on the TSR port returns to 0 psi (kPa) after 5 to 10 seconds.

b. Dump Body Up indicator goes off.

28. With the Shifter still in the Forward position, move the Dump Controller lever to the Raise position and hold.

29. Verify that the steering pump output pressure, measured on the gauge on the TSS port on the steering manifold is 3475 to 3525 psi (23 960 to 24 300 kPa).

30. Release the Dump controller lever.

31. Move the Shifter to the Neutral position.

32. Move Dump Controller lever to the Raise position and hold.

33. Verify that the steering pump output pressure, measured on the gauge on the TSS port on the steering manifold decrease to approximately the same as the dump system pressure.

34. While still maintaining the Dump controller lever in the Raise position, move the Shifter to the Forward position.

35. Verify that the steering pump output pressure, measured on the gauge on the TSS port on the steering manifold returns to 3475 to 3525 psi (23 960 to 24 300 kPa).

36. Release the Dump Controller lever.

37. Stop the truck engine.

38. Turn off the Master Switch.

39. Disconnect the circuit from the Low Steering Pressure switch to the Neutral Relay. This can be done by removing and isolating either the 52A1 or 52A2 wire from TB11G or equivalent.

NOTE: *This simulates a low steering pressure condition.*

40. Turn on the Master Switch and restart the truck engine. Allow to operate at low idle speed.

41. Move Dump Controller lever to the Raise position and hold.

42. Verify that the steering pump output pressure, measured on the gauge on the TSS port on the steering manifold remains at 3475 to 3525 psi (23 960 to 24 300 kPa).

43. Release the Dump Controller lever.

44. Stop the engine.

45. Turn the Master Switch off.

46. Reconnect the wires removed to:

a. Simulate the Low Steering pressure condition.

b. Temporarily disable propulsion.

III. Test complete.

A. Remove the pressure gauge at the dump valve inlet.

B. Remove the pressure gauges on the steering manifold and install dust caps on all quick disconnect fitting.

C. Close the cover on the hydraulic components box.

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DUMP SYSTEM TEST PROCEDURE

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Customer: _____ S/N: _____
Date: _____

T-5094A
DUMP SYSTEM TEST PROCEDURE
MT 4400

TEXT STEP — CHECKED BY:

I. Prior to engine start

I. A. Truck in SAFE POSITION and wheels chocked. _____

I. B. Steering system properly tested and adjusted. _____

I. C. Dump Controller lever in Float position. _____

I. D. Hoses tightened per process 02-579. _____

I. E. Hydraulic tank full. _____

I. F. Suction gate valve open. _____

I. G. Hydraulic tank regulator set to 10 +/ 1 psi +/- 7 kPa) _____ psi (kPa) _____
Hydraulic tank repressurized to 10 psi (70 kPa) after equipment removal. _____

I. H Pressure gauges installed. _____

I. I. Pilot proximity switches adjusted: NA
Raise: _____ Float: _____

I. J. Pilot proximity switches LED's operate: NA
Raise: _____ Float: _____

I. K. Steering pump case drain filled. _____

I. L. Propulsion system temporarily disabled. _____

II. Test and Adjustment

II. A. Air bled from dry valves. _____

II. B. High pressure relief valve operating pressures.

Dump controller in Raise Position:
Dump system pressure: _____ psi (kPa)
Steering output pressure; (TSS) NA psi (kPa)
Steering accumulator pressure. NA psi (kPa)

Dump controller in Lower Position:
Dump system pressure: _____ psi (kPa)
Steering output pressure; (TSS) NA psi (kPa)
Steering accumulator pressure. NA psi (kPa)

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DUMP SYSTEM TEST PROCEDURE

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Customer: _____ S/N: _____
Date: _____

Dump controller in Float position:
Dry valve outlet pressure (TSR) NA psi (kPa) _____

II. C. System circulating pressures:

Gauge installed at the inlet to the dump valve. _____

Shifter in Neutral. Dump Controller in Float position. Engine at low idle speed.
Dump valve inlet pressure _____ psi (kPa) _____

Shifter in Neutral. Dump Controller in Float position. Engine at rated speed.
Dump valve inlet pressure _____ psi (kPa) _____
Steering pressure (TSS port) NA psi (kPa)
Dry valve solenoid pressure (TSR): NA psi (kPa) NA

Shifter in Forward. Dump Controller in Float position. Engine at low idle speed.
Dry valve timer adjusted. _____ seconds
Dry valve solenoid pressure (TSR): _____ psi (kPa) NA

Shifter in Neutral. Dump Controller in Float position. Engine at low idle speed.
Dry valve solenoid pressure (TSR): _____ psi (kPa) NA

Shifter in Forward. Dump Controller in Float position. Engine at low idle speed.
Dump valve inlet pressure _____ psi (kPa)
Dry valve solenoid pressure (TSR): _____ psi (kPa) NA

Shifter in Forward. Dump Controller in Float position. Engine at rated speed.
Dump valve inlet pressure _____ psi (kPa)
Dry valve solenoid pressure (TSR): _____ psi (kPa) NA

Pressure gauge removed at dump valve inlet. NA

Shifter in Forward. Dump Controller in Lower. Engine at low idle speed.
Dry valve solenoid pressure (TSR): _____ psi (kPa)
Dump Body Up indicator operation. _____ NA

Shifter in Forward. Dump Controller in Float. Engine at low idle speed.
Dry valve solenoid pressure (TSR): _____ psi (kPa)
Dump Body Up indicator operation. _____ NA

Shifter in Forward. Dump Controller in Hold. Engine at low idle speed.
Dry valve solenoid pressure (TSR): _____ psi (kPa)
Dump Body Up indicator operation. _____ NA

Shifter in Forward. Dump Controller in Float. Engine at low idle speed.
Dry valve solenoid pressure (TSR): _____ psi (kPa)
Dump Body Up indicator operation. _____ NA

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DUMP SYSTEM TEST PROCEDURE

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Customer: _____ S/N: _____
Date: _____

Shifter to Forward. Dump Controller to Raise. Engine at low idle speed.
Dump system pressure: _____ psi (kPa)
Steering output pressure; (TSS) _____ psi (kPa) NA

Wire remove to simulate low steering pressure. NA

Shifter in Neutral. Dump controller in Raise. Engine at low idle speed.
Steering output pressure; (TSS) _____ psi (kPa) NA

Wires previously remove to simulate low steering pressure replaced. NA

III. Test complete.

III. A&B. Gauges removed and dust caps installed. _____

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DUMP SYSTEM TEST PROCEDURE

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T-5095A
STEERING SYSTEM TEST PROCEDURE
MT 4400

NOTE: *Record all information and pressures on the data sheets at the end of this procedure.*

I. Prior to engine start

A. Park the truck in a SAFE POSITION. It must be secured by means other than the friction brake system. Verify that the front wheels are not chocked and all equipment and personnel are clear of the area in which the tires will move while turning.

B. Release all entrapped pressure in the system.

C. Verify that all hoses and fittings are tightened per the procedures in 02-579.

D. Verify that the trucks hydraulic tank is filled to the proper level approved hydraulic oil.

E. Verify that the valve in the pump suction line is open.

F. Verify that all equipment is installed and secured in place in steering linkage assembly.

G. If the engine is to be operated prior to hydraulic testing,:

1. ~~Brake~~ Steering ~~Steering~~ manifold

Turn manual drain valve provision on the automatic drain valve 1800

a. Remove the manual drain valve from the manifold.

b. Install a #10 O-ring boss plug in its place.

2. Brake manifold

a. Remove the two manual drain valves from the manifold.

b. Install a #8 O-ring boss plug in each valve's place.

NOTE: *These plugs must be removed and replaced with the appropriate manual valve assemblies prior to moving the truck or beginning any testing on the steering and/or brake system.*

H. Verify the nitrogen gas precharge pressure in the accumulators are as follows:

1. Steering (2 large) - 1450 to 1550 psi (9 995 to 10 685 kPa)

2. Brakes (3 smaller) - 950 to 1050 psi (6 555 to 7 245 kPa)

Follow the procedures outlined in the instructions for each style accumulator manufacturing Process 1-045.

NOTE: *The accumulators must be fully drained of all hydraulic pressure prior to checking gas pressure. This may be done by pulling the manual drain valve in the steering and brake manifolds to relieve the pressure in the systems.*

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I. Locate the following pressure gauges in the hydraulics components box on the superstructure:

1. Steering accumulator pressure.

2. Steering system or valve pressure.

J. Install a 0 - 5000 psi (0 - 35 000 kPa) pressure gauge on the quick disconnect fittings at the following locations:

1. The outlet port area of the rear of steering piston pump.

K. If not previously tested, verify that the hydraulic reservoir is properly pressurized as follows:

1. Remove the air line from the engine to the center frame crossmember. Cap the engine air line.

2. Install a source of clean, dry compressed air, regulated to 35 psi (240 kPa) on the inlet to the crossmember.

3. Install a 0 to 50 psi (0 -350 kPa) pressure gauge on to the outlet line from the pressure regulator on the hydraulic tank to the tank itself. Fittings may need to be provided.

4. Turn on the air supply and to the crossmember, verifying that it does not exceed 35 psi (240 kPa).

5. Verify that the pressure to the hydraulic tank is 10 +/- 1 psi (70 +/- 7 kPa). If not, adjust the regulator to obtain this pressure.

6. When complete, remove the equipment installed.

7. Repressurize the hydraulic tank to 10 +/- 1 psi (70 +/- 7 kPa).

L. If the truck has been sitting idle for an extended period of time or the steering pump or system has been drained since the last time the truck was started, fill the case drain on the steering pump with approved hydraulic oil.

M. Using the appropriate means for the electrical propulsion system installed, disable the truck's propulsion system to prevent its operation when the Shifter is moved to the forward or reverse position.

N. Install a voltmeter to monitor the operation of the steering accumulator drain solenoid in the steering manifold.

II. Main Steering System Test And Adjustment

A. Reconnect and properly torque to 02-579 specifications all hoses previously removed.

B. Check the pressure in the steering system as follows:

1. Turn the Master Switch On.

2. Start the engine and allow to run at low idle speed.

3. Verify that at approximately 2100 psi (14 480 kPa) the Low Steering Pressure indicator goes out.

NOTE: *This is an approximation test at this point. More detailed final testing will be done later.*

4. Verify that the steering accumulator pressure reading on the gauge in the component box increases slowly to 3450 to 3550 psi (23 790 to 24 480 kPa), then stabilizes.

NOTE: *If the pressure is not correct:*
1. Check all other pressures and determine the cause for the incorrect pressure.
2. Only after determining that the problem is an incorrectly adjusted steering pump compensator, adjust as outlined in the Unit Rig Mechanical manual.

5. With the engine still at low idle speed, turn the steering wheel back and forth repeatedly. Count the number of revolutions of the steering wheel. The normal is approximately 5-1/2 turns lock-to lock.

6. Discontinue the steering wheel movement and verify that the steering accumulator pressure returns to 3450 to 3550 psi (23 790 to 24 480 kPa).

7. Verify that the oil level in the hydraulic reservoir remains at normal operating levels. Stop the engine and refill the reservoir if required to obtain this level.

8. Record the pressure reading.

C. Steering system relief valve adjustment

1. Accelerate the engine to rated speed and hold.

2. Turn the steering wheel for a left or right turn until it "stops".

3. Verify that the pressure on the gauge in the component box marked "Steering Valve" is:

2600 to 2700 psi (17 930 to 18 620 kPa).

4. Release the steering wheel

5. Verify that the pressure returns to approximately 0 psi (kPa).

6. Slow the engine to low idle speed.

7. If the pressure is not at this level, the flow amplifier valve may be adjusted as follows:

a. Remove the cover on the top on the relief valve in the steering flow amplifier valve.

b. Using the appropriate metric hex head "Allen" wrench, turn the adjustment screw inward (to raise the pressure) or outward (to lower the pressure).

NOTE: *One full revolution of the adjustment screw equals approximately 550 psi (3 790 kPa).*

c. Accelerate the engine to rated speed and read pressure verify that the pressure is:

2600 to 2700 psi (17 930 to 18 620 kPa).

d. Repeat steps a through c until the proper pressure is obtained.

e. Slow the engine to low idle speed.

f. Secure the adjustment screw and replace the cap.

g. Record the final pressure.

8. Accelerate the engine to rated speed and cycle the steering by turning back and forth throughout the travel 3 additional times. Slow the engine to low idle speed.

NOTE: *If the steering wheel continues to turn or "freewheel" when turned by the operator with low to moderate force (with the bellcranks against the stop), it is an indication that the shock valves internal to the flow amplifier are set too low. If this occurs contact Unit Rig for adjustment or replacement information.*

9. Stop the engine.

D. Low Steering Pressure Switch Operation Test

1. Verify that:

a. The Low Steering indicator is not illuminated.

b. The truck shifter is in the Neutral position.

c. There is no external speed input signal to the truck propulsion control system.

2. Stop the engine. As the engine stops running:

a. Monitor the Low Steering indicator and steering pressure gauge connected to test port on the outlet of the steering pump.

2100 +/- 100 1480 +/- 690

b. Verify that at [redacted] psi ([redacted] kPa) the Low Steering Pressure indicator illuminates.

NOTE: *On some pressure gauge assemblies, it may be difficult to accurately read this low pressure as it is decreasing. The primary intent is to verify that the indicator lights before the pressure decrease to 0 psi (kPa).*

c. Verify that the truck's manual power supply system does not activate.

d. Stop the movement of the steering wheel.

(1) The pump stops operating.

(2) The indicator light in the center of the Manual Power Supply Switch is off.

f. Repeat steps c through e as required.

g. Discontinue the speed signal input to the control panel or remove the jumper wire.

NOTE: *This is not a continuous duty motor assembly and should not be operated continuously for extended periods of time.*

F. Testing Steering Accumulator Drain Systems

1. Turn the Master Switch Off.

2. Verify that the steering accumulator pressure gauge (in the hydraulic component box) pressure readings decrease rapidly as the accumulator drains to the tank through the solenoid valve in the steering manifold.

3. Verify that as the steering accumulator pressure decreases to approximately 0 psi (kPa).

4. Verify that the power to the drain valve coil switches off automatically (voltmeter returns to 0 volts) after approximately 150 seconds.

5. Remove the voltmeter.

6. Test the operation of the steering accumulator manual pressure drain valve as follows:

a. Turn the Master Switch on.

b. Start the engine.

c. Allow the pressure in the accumulator to rise until it exceeds 1500 psi (10 340 kPa), then stop the engine.

d. Pull the manual accumulator drain valve in the steering manifold to open.

e. Verify that the pressure in the steering accumulator decreases to "0" psi (kPa).

f. Release the manual drain valve to close.

III. Test complete

A. Install all covers removed.

B. Remove all blocking and lower the truck to the ground.

e. Record the actuation pressure.

E. Manual Power Supply System Test

1. If required, raise the truck until the front tires are clear of the floor and block securely in this position.

2. Verify that there is no speed signal input present in the FL275 panel.

3. With the engine stopped, turn the steering wheel back and forth until the pressure in the steering accumulators is less than 1750 psi (12 650 kPa).

4. Pull the Manual Steering Pump switch out to activate the system.

5. Verify this pressure increases then stabilizes at 1925 to 1975 psi (13 275 to 13 620 kPa) before the pump stalls or the pump's internal relief valve activates.

a. If the pressure is too high or low , it may be adjusted by means of the adjusting screw on the pump's relief valve. Secure the screw with the locking nut when the adjustment is complete.

b. If the motor stalls prior to obtaining this pressure, check the condition of the batteries, 24 Vdc circuitry, and pump/motor assembly.

6. Push the Manual Supply System Switch in to deactivate the pump assembly.

NOTE: *This is not a continuous duty motor assembly and should not be operated continuously for extended periods of time.*

7. To test the operation of the automatic activation of the manual supply system:

a. Activate the speed input portion of the system by either:

(1) Introducing an frequency signal through the wheel motor 1 or 2 input to the FL275 panel.

(2) Electrically "jumping" the contact on the manual steering relay closed by installing a jumper wire between terminals 30 and 87 on the relay.

b. Turn the steering wheel back and forth slowly while monitoring the steering accumulator pressure.

c. Verify that at 1520 to 1680 psi (10 480 to 11 585 kPa):

(1) The pump activates and begins supplying oil to the system.

(2) The indicator light in the center of the Manual Power Supply Switch is on.

d. Temporarily discontinue turning the steering wheel.

e. Verify that at 1850 +/- 80 psi (12 750 +/- 550 kPa) :

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Date: _____

T-5095A
STEERING SYSTEM TEST PROCEDURE
MT 4400

TEXT STEP		CHECKED BY:
I. Prior to engine start		
I. A.	Truck in SAFE POSITION and wheels chocked.	_____
I. B.	Pressure released in Steering accumulators.	_____
I. C.	Hoses tightened per process 02-579.	_____
I. D.	Hydraulic tank full.	_____
I. E.	Suction gate valve open.	_____
I. F.	Steering linkage installed and secured.	_____
I. G.	Bypass plugs installed.	_____
I. H.	Accumulators precharged with nitrogen: Steering (2) ___ ___ Brakes (3) ___ ___ ___	_____
I. J.	Pressure gauges installed.	_____
I. K.	Hydraulic tank regulator set to 10 +/ 1 psi +/- 7 kPa) _____ psi (kPa) Hydraulic tank repressurized to 10 psi (70 kPa) after equipment removal. ____	_____
I. L	Steering pump case drain filled.	_____
I. M.	Propulsion system temporarily disabled.	_____
I. N.	Voltmeter installed on steering accumulator drain solenoid valve.	_____
II. Main Steering System Test and Adjustment		
II. A.	Hoses reconnected.	_____
II. B.	Steering accumulator pressure: _____ psi (kPa) Steering wheel turns, lock-to-lock: _____	_____
II. C.	Steering system relief valve pressure: _____ psi (kPa)	_____
II. D.	Low steering pressure switch activates: _____ psi (kPa)	_____

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STEERING SYSTEM TEST PROCEDURE

Customer: ____________________ S/N: ____________
Date: ____________

I. E. Manual power supply system operation:

Manual: ____________ psi (kPa)

Automatic: On: ____________ psi (kPa)

Off: ____________ psi (kPa) ____________

II. F. Steering accumulator drain operates. ____________

III. Test complete.

III. A. Gauges removed and dust caps installed. ____________

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STEERING SYSTEM
TEST PROCEDURE

T-5096A
BRAKE SYSTEM TEST PROCEDURE
MT 4400

NOTE: *Record all information and pressures on the data sheets at the end of this procedure.*

I. Prior to engine start

IMPORTANT: ***Prior to beginning this test, the steering system must be properly tested and adjusted.***

A. Park the truck in a SAFE POSITION. It must be secured by means other than the friction brake system. Verify that the front wheels are not chocked and all equipment and personnel are clear of the area in which the tires will move while turning.

B. Release all entrapped pressure in the system.

C. Verify that all hoses and fittings are tightened per the procedures in 02-579.

D. Verify that the trucks hydraulic tank is filled to the proper level approved hydraulic oil.

E. Verify that the valve in the pump suction line is open.

F. Verify the nitrogen gas precharge pressure in the accumulators are as follows:

1. Brakes (3 smaller) - 950 to 1050 psi (6 555 to 7 245 kPa)

Follow the procedures outlined in the instructions for each style accumulator as outlined in the instructions in Manufacturing Process 1- 045.

NOTE: *The accumulator must be fully drained of all hydraulic pressure prior to checking gas pressure. This may be done by pulling the manual drain valves located on the brake manifold in the hydraulic components box on the superstructure.*

G. Verify that the gauges, mounted in the hydraulic components box on the superstructure are all operational.

H. If not previously tested, verify that the hydraulic reservoir is properly pressurized as follows:

1. Remove the air line from the engine to the center frame crossmember. Cap the engine air line.

2. Install a source of clean, dry compressed air, regulated to 35 psi (240 kPa) on the inlet to the crossmember.

3. Install a 0 to 50 psi (0 - 350 kPa) pressure gauge on to the outlet line from the pressure regulator on the hydraulic tank to the tank itself. Fittings may need to be provided.

4. Turn on the air supply and to the crossmember, verifying that it does not exceed 35 psi (240 kPa).

5. Verify that the pressure to the hydraulic tank is 10 +/- 1 psi (70 +/- 7 kPa). If not, adjust the regulator to obtain this pressure.

6. When complete, remove the equipment installed.

7. Repressurize the hydraulic tank to 10 +/- 1 psi (70 +/- 7 kPa).

I. Verify that if the pump has not been previously run, the steering pump case drain has been filled.

J. Using the appropriate means for the electrical propulsion installed, disable the truck's propulsion system to prevent its operation when the Shifter is moved to the forward or reverse position.

II. Test and adjustments

A. Accumulator Supply System

1. Reconnect and torque all hoses previously removed as outlined in the procedures in Section 10 - Miscellaneous.

2. Check the pressure in the brake accumulator supply system as follows:

a. Turn the Master Switch on.

b. Start the engine and allow to run at low idle speed.

c. Verify that at approximately 2100 psi (14 480 kPa) the Low Brake Pressure indicator goes out.

NOTE: *This is an approximation test at this point. More detailed final testing will be done later.*

d. Verify that the Supply Accumulator Pressure increases slowly to 3450 to 3550 psi (23 790 to 24 480 kPa), then stabilizes.

e. With the engine still at low idle speed, fully depress and release the Brake pedal repeatedly.

f. Verify that the supply pressure returns to 3450 to 3550 psi (23 790 to 24 480 kPa).

g. Record the pressure reading.

B. Bleeding the Service Brake System

NOTE: *Prior to beginning the bleeding procedure, consult the appropriate assembly drawings for the correct bleeder port which should be used in this installation, usually the highest points. Also it is recommended that a hose be used to direct oil away from the discs and linings into a catch can.*

1. With the engine still at low idle speed, fully depress the Brake pedal and hold.

EARL
BODEN
ELLIS

2. Verify that the system pressures do not exceed 2500 psi (17 240 kPa) on the front and 1500 psi (10 340 kPa) on the rear brake system gauges. If the pressures do exceed these limits, immediately release the Brake Pedal. Reapply partially and repeat this procedure.

3. Slowly and carefully open each bleeder valve and allow the oil to flow until it is free of air bubbles. Close each valve tightly when complete. Repeat for each service brake caliper assembly both front and rear.

IMPORTANT: *Remember when opening each bleeder valve that considerable pressure may be built up behind it and as a result oil may squirt out rapidly. It is best to open each valve with a slow, steady motion.*

4. Release the Brake pedal when the process is complete.

C. Bleeding the Park Brake System

NOTE: *The instructions for the use of the hose catch can and the opening of the bleeder valves outlined for the service brake calipers also apply for the park brake calipers.*

1. Move the Park Brake switch to the "Released" position and hold.

2. Bleed each park brake assembly in a manner similar to that used on the service brake calipers.

3. Release the Park Brake switch.

4. Move the Load Brake switch to the Release position.

D. Brake Pedal Control System Adjustment

1. Fully depress the Brake pedal and hold. Verify that the:

a. Foot brake pilot pressure (measured on the Load Brake gauge) is:

675 to 725 psi (4 655 to 5 000 kPa).

b. Front brake pressure is:

2300 to 2500 psi (15 860 to 17 240 kPa).

c. Rear brake caliper pressure is:

1450 to 1500 psi (10 000 to 10 340 kPa)

d. Stop or brake lights are lit.
Rear of truck
On top of the cab (if option installed)

2. Release the Brake pedal. Verify that the:

a. Pilot, front, and rear brake pressures return to 0 psi (kPa).

b. Stop or brake lights are off.

3. If the pressures found are not within the desired range, but are both too high or too low, it will be necessary to adjust the pilot pressure signal to the front and rear brake valve spools. This may be done as follows:

a. Release the Brake pedal.

b. Stop the truck engine.

c. Drain all pressure from the brake accumulators, using the manual accumulator drain valves.

d. Remove the Brake pedal and actuator assembly by loosening the locking nuts and washers securing the U-bolts to the assembly and removing the pivot pin.

e. Loosen the set screw securing the adjusting collar to the threads on the plunger.

f. Move the adjusting collar counter-clockwise (or toward the ends of the threads) to raise the pressure or clockwise (or to the non-threaded portion of the plunger) to lower the pressure.

NOTE: *Fine adjustments may require turning the valve in increments of as little as 1/8th turn.*

g. Retest the pressure as before. Installing the pivot pin and using a flat screwdriver or equivalent as a lever will allow you to depress the actuator without reinstalling the pedal/cam assembly.

h. Secure the collar by re-tightening the set screw to 25 to 30 inch-lb. (2.8 to 3.4 Nm).

i. Reinstall the pedal/cam assembly to the spool section.

j. Repeat the above steps until the adjustment is complete.

k. Apply and release the brakes a number of times. Verify that the pressure settings do not change. If they do, repeat the above process as required.

NOTE: *When the assembly is new or has been serviced, it is not uncommon for the pressures to decrease slightly due to the "seating" effect of the components.*

3. Release the Brake pedal. Verify that the:

a. Front and rear brake pressures return to 0 psi (kPa).

b. Stop or brake lights are all off.

4. If the pressure of either the front or rear system is too high or too low, but the other system and the pilot pressures are within tolerances, the appropriate individual spool on the brake control valve should be adjusted in an manner similar to that used to adjust the brake pilot valve.

5. If pressure remains in the system with the pedal released, adjust the pedal return stop behind the pedal assembly and retest.

6. Record the final pressure found - applied and released.

E. Brag Drag System Test

NOTE: *Refer to separate test instructions if this option is installed.*

F. Hand Brake System Adjustment

1. Fully apply the Hand Brake and hold. Verify that the:

a. Front and rear brake system pressures are as follows:

Front: 2300 to 2500 psi (15 860 to 17 240 kPa).
Rear: 1450 to 1500 psi (10 000 to 10 340 kPa)

b. Hand Brake indicator is lit.

2. Release the Hand Brake. Verify that the:

a. Front and rear brake pressures return to 0 psi (kPa).

b. Hand Brake indicator is off.

3. If the pressures found are not within the normal operating ranges:

a. Release the Hand Brake.

b. If both the front and rear systems must be increased or decreased, adjust single adjustment screw on the bracket on the controller valve as required.

c. If only the front or rear system requires adjustment, the individual spools should be adjusted as outlined in the instructions for the brake pedal controlled system earlier in this procedure.

NOTE: *This may affect normal previously adjusted brake pedal system operating pressures and should not be done unless absolutely necessary.*

d. Reapply the Hand Brake and retest.

e. If adjustments are made retest the pedal controlled system.

f. Secure the adjustment screw with jam nut when the adjustment is completed.

g. Record the final pressures.

5. Verify that the hand brake switch is adjusted to cause the indicator on the control to light as the handle nears the "fully applied" position (last 1/3 of the travel) and is off the remainder of lever travel.

G. Loading Brake System Testing

1. Verify that the Brake pedal and Hand Brake system are released.

2. Move the Load Brake switch to the Apply position.

3. Verify that the:

   a. Front brake pressure remains a 0 psi (kPa).

   b. Rear brake pressure increase to 1450 to 1500 psi (10 000 to 10 340 kPa).

   c. Load Brake indicator lights.

4. Move the Load Brake switch to the Release position.

5. Verify that the:

   a. Front and rear brake pressures return to 0 psi (kPa).

   b. Load Brake indicator turns off.

H. Park Brake System Testing

1. Verify that the park brake calipers are all in their released position and that the pressure in the system accumulators is 3450 to 3550 (23 790 to 24 480 kPa).

2. With the Hand Brake, Load Brake, and Brake pedal released, move the Park Brake switch to the Apply position, hold for a minimum of two seconds, then release. Verify that the:

   a. Park brake calipers remain released.

   b. Park brake system pressure is 3450 to 3550 psi (23 790 to 24 480 kPa).

   c. Park Brake indicator on the control is not lit.

3. Fully apply the Load Brake.

4. Move the Park Brake switch to the Apply position, hold for a minimum of two seconds, then release. Verify that the:

   a. Park brake calipers apply.

   b. Park brake system pressure is 0 psi (kPa).

   c. The Park Brake indicator on the control lights.

5. Release the Load Brake.

6. Move the Park Brake switch to the Release position, hold for a minimum of two seconds, then release. Verify that the:

a. Park brake calipers remain applied.

b. Park brake system pressure remains 0 psi (kPa).

c. Park Brake indicator on the control remains lit.

7. Apply the Load Brake.

8. Move the Park Brake switch to the Release position, hold for a minimum of two seconds, then release. Verify that the:

a. Park brake calipers are released.

b. Park brake system pressure is 3450 to 3550 (23 790 to 24 480 kPa).

c. Park Brake indicator on the control is not lit.

9. Stop the truck engine.

10. Using the same equipment used to bleed the brake calipers, slowly open one of the park brake caliper bleeders. Verify that the:

a. Oil flows briefly then stops, verifying the operation of the Park Brake release solenoid valve.

b. Park Brake indicator comes on when the park brake system pressure decreases to less than 1450 to 1550 psi (10 000 to 10 690 kPa).

11. Close the caliper bleed screw.

12 Record the switch actuation pressure.

13. Start the engine and allow to run at low idle speed. Bleed any entrapped air from the caliper tested.

14. Release the park brakes.

15. Stop the engine.

I. Low Brake Pressure Switch Test

1. Repeatedly apply and release the Brake pedal to decrease the hydraulic pressure in the accumulators.

2. Verify that the Low Brake Pressure indicator lights when the pressure decreases to 2050 to 2150 psi (14 135 to 14 825 kPa) on the gauge monitoring the supply accumulator pressure. Record this pressure.

NOTE: *The brakes must be applied slowly as the accumulator pressure approaches the set point in order to adequately verify the pressure switch setting.*

J. Optional Auto Apply System Test

1. Continue to apply and release the Brake pedal while monitoring the Brake Supply Accumulator Pressure and the front and rear brake system delivery pressures.

2. Verify that at 1350 to 1450 psi (9 310 to 10 000 kPa) pressure in the supply accumulator, the auto apply feature activates. This may be documented by the fact that the pressure on the brake systems do not return to "0" psi (kPa) when the pedal is released.

3. Record the actuation pressure.

4. Discontinue the pedal apply and release cycling.

K. Manual Accumulator Drain System Testing

1. Pull and hold one of the manual accumulator drain valves on the brake manifold.

2. Verify that the Brake Supply Accumulator pressure decreases to "0" psi (kPa).

3. Release the drain valve.

4. Restart the engine and allow the systems to recharge.

5. Repeat steps 1 through 4 for the other manual drain valve.

M. Propulsion System Interlock Testing

NOTE: *To properly test the system the:*
1. Truck's 24 volt and propulsion electrical systems must be installed and operational.
2. Engine should be off to prevent accidental movement and to ease in determining operation.
3. Brakes should all be released.

IMPORTANT: *It may be necessary to discontinue testing and restart the engine during this test to maintain adequate pressure to operated the brakes.*

1. Move the Shifter to the Forward position.

2. Depress the Throttle pedal. Verify that the contactors pick up and sequence.

3. Release the Throttle pedal. Verify that the contactors drop out.

4. Fully apply the Hand Brake lever and hold.

5. Depress the Throttle pedal. Verify that the contactors do not pick up.

6. Release the Throttle pedal.

7. Apply the park brakes.

8. Depress the Throttle pedal. Verify that the contactors do not pick up.

9. Release the Throttle pedal.

10. Release the Hand Brake lever. (Park brake remains applied.)

11. Depress the Throttle pedal. Verify that the contactors do not pick up.

12. Release the Throttle pedal.

13. Apply the Hand Brake.

14. Release the Park Brake and then release the Hand Brake.

15. Depress the Throttle pedal. Verify that the contactors pick up and sequence.

16. Release the Throttle pedal. Verify that the contactors drop out.

17. Apply the Load brake system.

18. Depress the Throttle pedal. Verify that the contactors do not pick up.

19. Release the Throttle pedal.

20. Release the Load brake system.

21. Depress the Throttle pedal. Verify that the contactor pick up and sequence.

22. Release the Throttle pedal. Verify that the contactors drop out.

III. Test Complete

A. Install the covers removed on the hydraulic components box.

B. Install the wheel motor covers.

T5096A

Customer: _____ S/N: _____
Date: _____

T-5096A
BRAKE SYSTEM TEST PROCEDURE
MT 4400

TEXT STEP		CHECKED BY:
I	Prior to engine start	
I. A.	Truck in SAFE POSITION and wheels chocked.	_____
I. B.	Pressure released in brake accumulators.	_____
I. C.	Hoses tightened per process 02-579.	_____
I. D.	Hydraulic tank full.	_____
I. E.	Suction gate valve open.	_____
I. F.	Accumulators precharged with nitrogen:	_____
I. G	Pressure gauges installed.	_____
I. H.	Hydraulic tank regulator set to 10 +/ 1 psi +/- 7 kPa) _____ psi (kPa) Hydraulic tank repressurized to 10 psi (70 kPa) after equipment removal. ____	_____
I. I.	Case drain filled (if required).	_____
I. J.	Propulsion system temporarily disabled.	_____
II	Test and Adjustment	
II. A.	Hoses reconnected. Brake accumulator supply pressure: _____ psi (kPa)	_____
II. B.	Service brake system bled.	_____
II. C	Park brake system bled.	_____
II. D.	Brake pedal control system operation:	_____

Apply: Pilot: _____ psi (kPa)
Front: _____ psi (kPa)
Rear: _____ psi (kPa)
Release: Pilot: _____ psi (kPa)
Front: _____ psi (kPa)
Rear: _____ psi (kPa)

Brake lights operate: ____

II. E.	Brake drag system operates:	_____

UNIT RIG CAD

BRAKE SYSTEM TEST PROCEDURE

T5096A

99140
E.N. NO.

T5096A

Customer: _____ S/N: _____
Date: _____

II. F. Hand brake control system operation: _____
Apply: Front: _____ psi (kPa)
Rear: _____ psi (kPa)
Release: Front: _____ psi (kPa)
Rear: _____ psi (kPa)

Indicator light operation: ____

II. G. Load brake control system operation: _____
Apply: Front: _____ psi (kPa)
Rear: _____ psi (kPa)
Release: Front: _____ psi (kPa)
Rear: _____ psi (kPa)

Indicator light operation: ____

II. H. Park brake system operation: _____
Apply: _____ psi (kPa)
Release: _____ psi (kPa)

Indicator light operation: _____ psi (kPa)

II. I. Low brake pressure switch activates: _____ psi (kPa) _____

II. J. Auto apply system operates. _____ psi (kPa) _____

II. K. Manual accumulator drain operates. _____

II. L Interlock system operates. _____

III. Test complete.

III. A. Gauges removed and dust caps installed. _____

UNIT RIG CAD

BRAKE SYSTEM TEST PROCEDURE

SHEET 11 OF 11

T5096A