Warm Up

Model:	L90C
Serial #:	039328

IMPORTANT: The machine must be warmed up prior to performing any of the tests described in this document.

IMPORTANT: Make sure that all assembly procedures are complete and signed off prior to performing these tests.

Note: Temperatures indicated are relevant for factory fill fluids only. Any substitution may require adjusting these temperatures.

Engine Warm up

1. Idle engine for 3 minutes.
2. Bring engine to 1000 rpm and hold for 3 minutes.
3. Bring engine to 1800 rpm and hold for 3 minutes.
4. Minimum engine coolant temperature: 180° F

Transmission Warm up

1. Release the parking brake.
2. Fully apply service brakes (brake pedal).
3. Shift transmission into 4th gear forward.
4. Bring engine to 1500 rpm, and hold for 30 seconds.
5. Shift transmission into neutral.
6. Bring engine to 1500 rpm, and hold for 15 seconds.
7. Repeat steps 3-6 until the transmission fluid reaches 200° F.
8. Shift transmission into 4th gear forward.
9. Bring engine to maximum throttle, and hold for 30 seconds.
10. Shift transmission into neutral.
11. Bring engine to maximum throttle, and hold for 15 seconds.
12. Repeat steps 8 through 11 until the transmission fluid reaches 230° F.
13. Fluid temperature should stabilize between values indicated on the transmission pressure test page.

Hydraulic System Warm Up

1. Minimum hydraulic oil operating temperature prior to starting the machine is 35° F.
2. Slowly operate hydraulic circuits by fully extending and retracting all of the cylinders for five minutes.
3. Move the machine to full work capacity slowly until the hydraulic oil has achieved an operating temperature of 95° F.
4. Maximum hydraulic oil operating temperature is 177° F.

Hydraulic Systems Pressure Settings

Model:	L90C
Serial #:	039328

NOTE: Hydraulic pressures should be set or observed at 1500 RPM. Check pressures in sequence shown and only when hydraulic oil is hot (above 115° F or 46° C).

	Min PSI	Max PSI	Set or Observed PSI	
Steering Main Relief :	2450	2550		1
Steering Circuit Relief :	na	na		2
LH HD/KO/Aux HD Main Relief :	2150	2250		3
LH HD Base End Circuit Relief :	2300	2500		4
LH HD Stem End Circuit Relief :	2300	2500		5
LH KO Base End Circuit Relief :	2300	2500		6
LH KO Stem End Circuit Relief :	1000	1200		7
LH Aux HD Base End Circuit Relief :	2300	2500		8
LH Aux HD Stem End Circuit Relief :	2300	2500		9
RH HD/KO/Aux HD Main Relief :	2150	2250		10
RH HD Base End Circuit Relief :	2300	2500		11
RH HD Stem End Circuit Relief :	2300	2500		12
RH KO Base End Circuit Relief :	2300	2500		13
RH KO Stem End Circuit Relief :	1000	1200		14
RH Aux HD Base End Circuit Relief :	2300	2500		15
RH Aux HD Stem End Circuit Relief :	2300	2500		16
Hoist/Tilt Main Relief :	2050	2150		17
Hoist Base End Circuit Relief :	2200	2400		18
Hoist Stem End Circuit Relief :	2200	2400		19
Tilt Base End Circuit Relief :	800	1200		20
Tilt Stem End Circuit Relief :	2200	2400		21
Accumulator Charge Manifold, Pilot Supply Manifold :	425	475		22
Accumulator Charge Manifold, Pilot Operating Reducing Valve :	425	475		23
Accumulator Charge Manifold, Brake Main Relief Valve :	3200	3300		24
Accumulator Charge Manifold, Accumulator Sense Valve :	2700	2800		25

Initials :	
Date :	

Pump Inlet Pressure Test

Model:	L90C
Serial #:	039328

Check pump inlet conditions on pumps equipped with diagnostic quick couplers. Record non applicable (**N/A**) if the pump is not included, and **No Port** if a diagnostic coupler is not called for on the pump installation documentation. Close hydraulic tank vent, prior to warming up hydraulic system.

	Min	Max	Observed	
Engine Idle Value (rpm):	740	760		26
Hydraulic Tank Temperature (°F):	100	130		27

	Required Engine RPM	Min PSI	Max PSI	Observed PSI	
Tandem Front, Implement Pump :	2090 - 2110	-2.5	15		28
Tandem Rear, Implement Pump :	2090 - 2110	-2.5	15		29
Steering Pump :	2090 - 2110	-2.5	15		30
Fan Drive Pump :	2090 - 2110	-2.5	15		31
Brake Pump :	2090 - 2110	-2.5	15		32

Engine Cooling Test

Place cardboard in front of Jacket Water core or the CAC/radiator assembly and load engine to elevate the jacket water temperature.

	Min	Max	Observed	
Fan Speed with Engine Coolant temp < 193° F (RPM) :	na	na		33
Temperature at which Fan Speed begins to increase (°F) :	na	na		34
Temperature at which Max Fan Speed is observed (°F) :	na	na		35
Observed Maximum Fan Speed at H.F.I. (RPM) :	na	na		36

Initials :	
Date :	

Transmission Pressure Test

Model: L90C
Serial #: 039328

	Min	Max	Observed	
Transmission Oil Temperature (°F) :	180	200		37

	Min PSI	Max PSI	Observed PSI	
Transmission Pressure, at Idle :	180	220		38
Converter In Pressure :	*Measured at Startup (no calculated value)*			39
Converter Out Pressure, At Idle / H.F.I. :	-15	125		40
Cooler In Pressure, At H.F.I. :	*Measured at Startup (no calculated value)*			41
Cooler Out Pressure, At H.F.I. :	*Measured at Startup (no calculated value)*			42
Lube Pressure (Port on Transmission Valve Plate), At H.F.I. :	12.5	12.5		43

Note: Calculate the Delta Pressure by subtracting the cooler out Pressure from the cooler in Pressure.

	Calculated Delta-P	
Maximum Calculated Delta Pressure (PSI) :	na	44

	Forward Clutch Engine at Idle			*Reverse Clutch Engine at Idle*			
	Min PSI	Max PSI	Observed PSI	Min PSI	Max PSI	Observed PSI	
1st Gear:	180	220		180	220		45
2nd Gear:	180	220		180	220		46
3rd Gear:	180	220		180	220		47
4th Gear:	180	220		180	220		48

Note: Calculate the maximum observed difference in clutch pressures by subtracting the lowest value of the eight observed clutch pressures from the highest value of the eight.

	Max Difference	
Maximum Observed Difference in Clutch Pressures:	5	49

	Min	Max	Observed	
Transmission Over-Temperature Activation Value (°F) :	na	na		50

Initials :

Date :

Brake System Test

Model: L90C
Serial #: 039328

	Min PSI	Max PSI	Observed PSI	
Brake application pressure * :	2250	2400		51
Secondary brake pressure ** :	1600	2400		52

* Idle engine for minimum 1 minute, release parking brake, depress brake pedal and record pressure at idle.

** Engine off, key on, release parking brake, depress pedal (hold 5 sec.), release pedal (off 5 sec.); repeat 5 times, record pressure on 6th depression.

	Min PSI	Max PSI	Observed PSI	
At Idle with the brake not applied, residual brake circuit pressure :	0	5		53
At HFI with the brake not applied, residual brake circuit pressure :	0	5		54
Brake cooling pressure (inlet to brake) :	na	na		55
Brake cooling pressure (outlet from brake) :	na	na		56
Accumulator #1 Charge Pressure :	1475	1525		57
Accumulator #2 Charge Pressure :	1475	1525		58
Accumulator #3 Charge Pressure :	1475	1525		59
Parking brake release pressure :	1500	2750		60

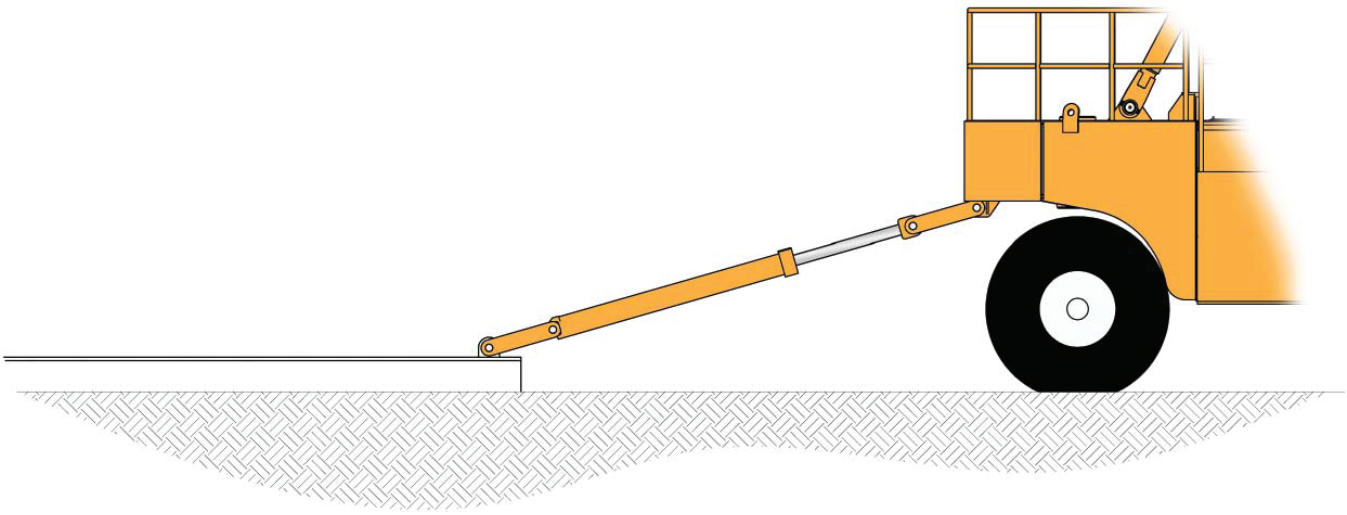
	Min PSI	Max PSI	Observed PSI	
Low brake pressure activation :	1550	1650		61

Initials :

Date :

Drawbar Test (Tractive Effort)

Model:	L90C
Serial #:	039328



Verify and record the following values prior to performing this test:

	Min	Max	Observed	
Hydraulic tank temperature (°F) :	100	160		62
Engine Idle Value (rpm) :	740	760		63
Engine High Free Idle Value (rpm) :	2100	2230		64
Converter stall (rpm) :	1880	1930		65
Converter & Hydraulic stall : (hoist end of stroke) (rpm)	1300	1450		66

Install pressure gauge on stem port.

Record cylinder pressure and stall rpm at converter stall in 1st, 2nd, 3rd and 4th gears.

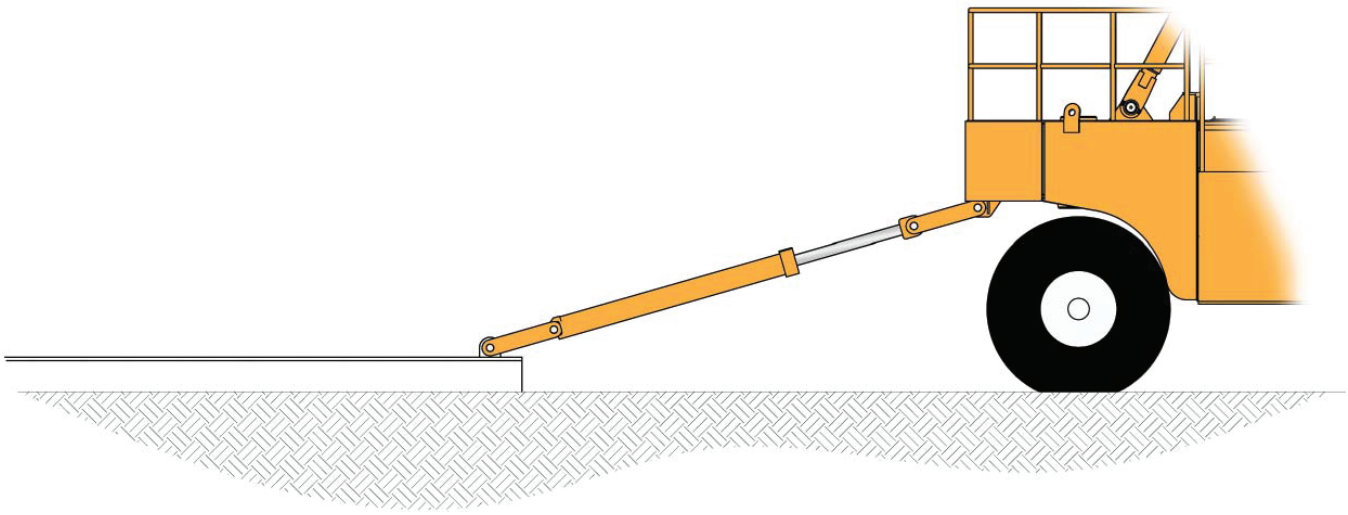
Note: Annular area of cylinder used for factory testing is 25.92 in^2

	Min	Max	Observed	
First Gear (if tire slips, record pressure at that moment) (PSI) :	1500	2350		67
Second Gear (PSI) :	800	1300		68
Third Gear (PSI) :	400	750		69
Fourth Gear (record NA if locked out) (PSI) :	150	450		70

Initials :	
Date :	

Brake Pull Test

Model:	L90C
Serial #:	039328



Install pressure gauge on stem port.

Pressurize stem port separately against service brake and then the parking brake.

Record pressure to move vehicle / slip brake.

When testing parking brake, release brake accumulator pressure to ensure service brakes are not actuated.

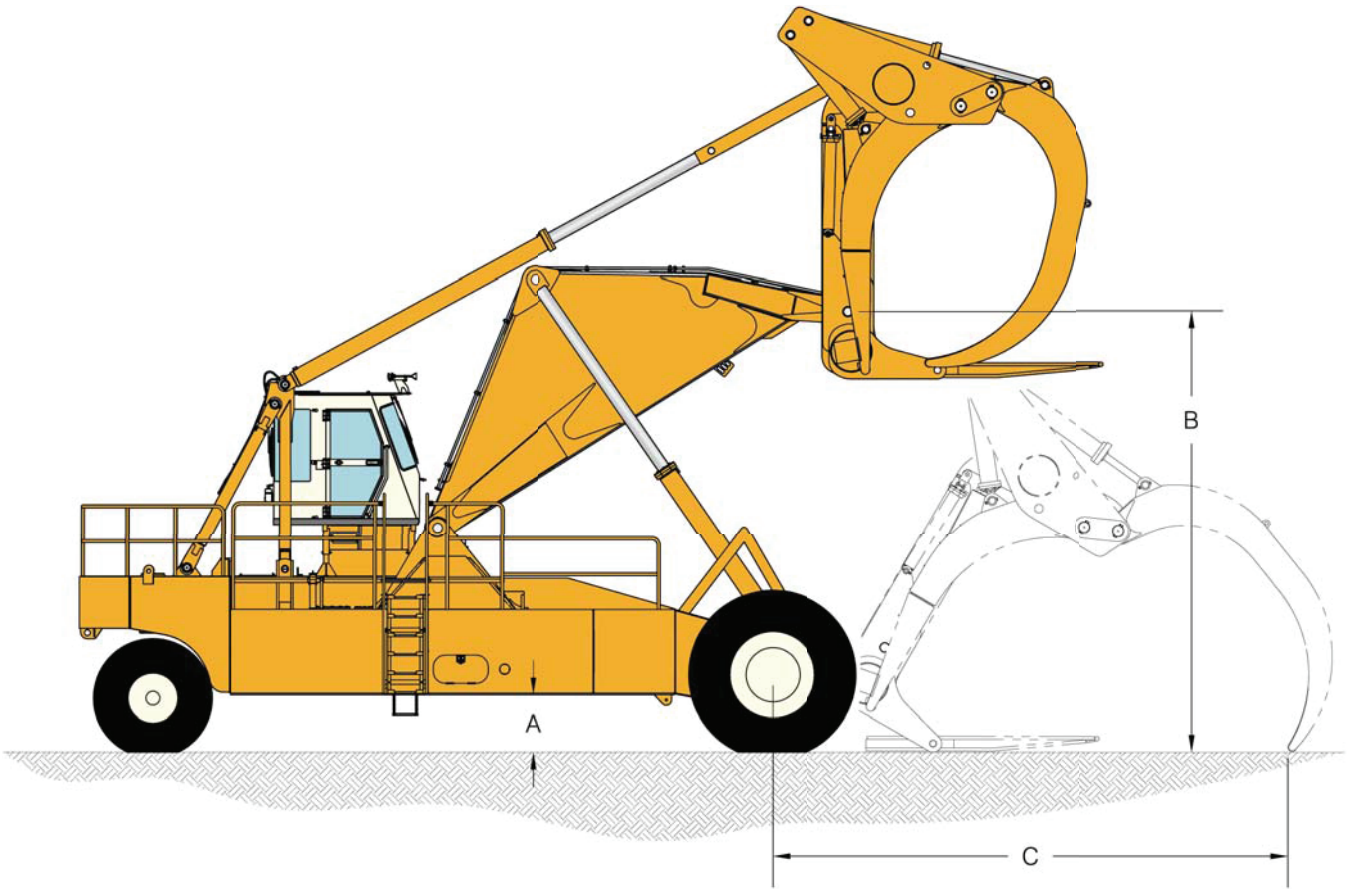
Note: Annular area of cylinder used for factory testing is 25.92 in^2.

	Min	Max	Observed	
Service Brake Test (psi) :	1300	1650		71
Parking Brake Test (psi) :	1400	1700		72

Initials :	
Date :	

Dimensions

Model:	L90C
Serial #:	039328



	Min	Max	Observed	
Ground Clearance, Chassis (A) :	**32”**	**36”**		73
Ground to Carriage Pivot Pin at Maximum Hoist (B) :	**242”**	**260”**		74
Axle to Holddown Tip at Maximum Reach (C) :	**275”**	**311”**		75

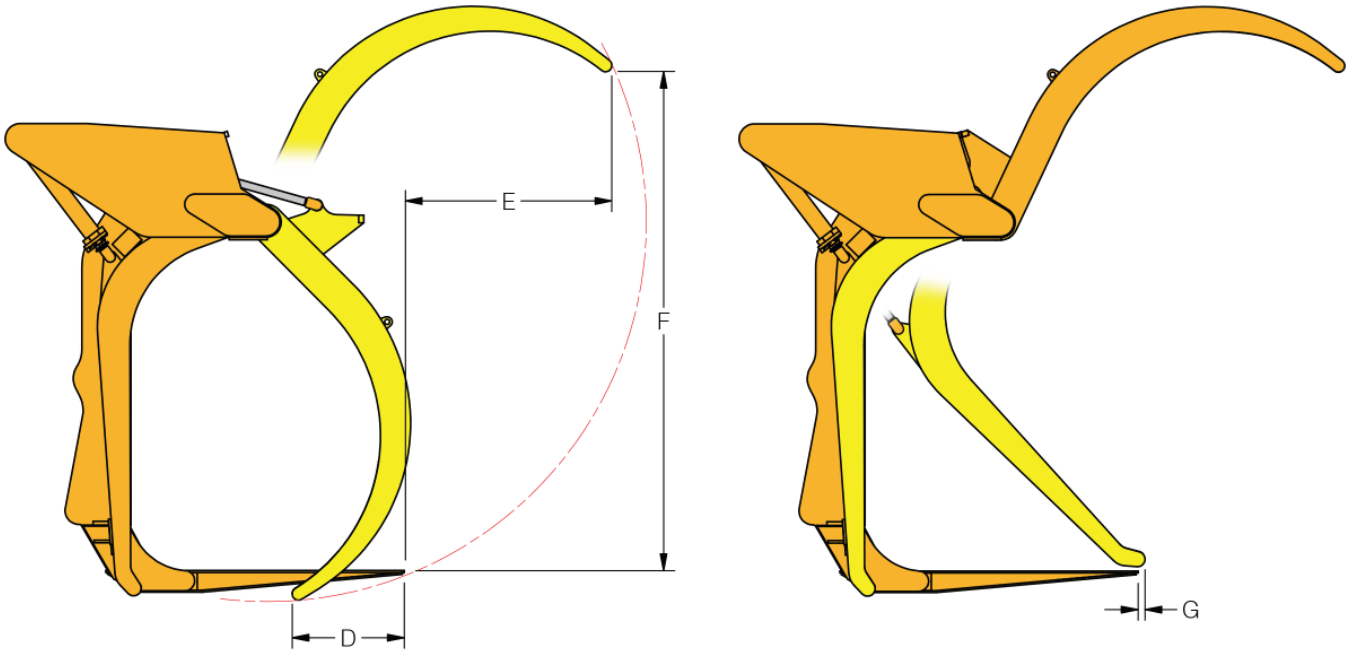
Initials :	
Date :	

Dimensions

Model:	L90C
Serial #:	039328

With Tine horizontal, verify dimensions D, E, F, and G.

Verify that the Kickoff Arm is flush or recessed (max 1/2”) from the carriage face when fully retracted.



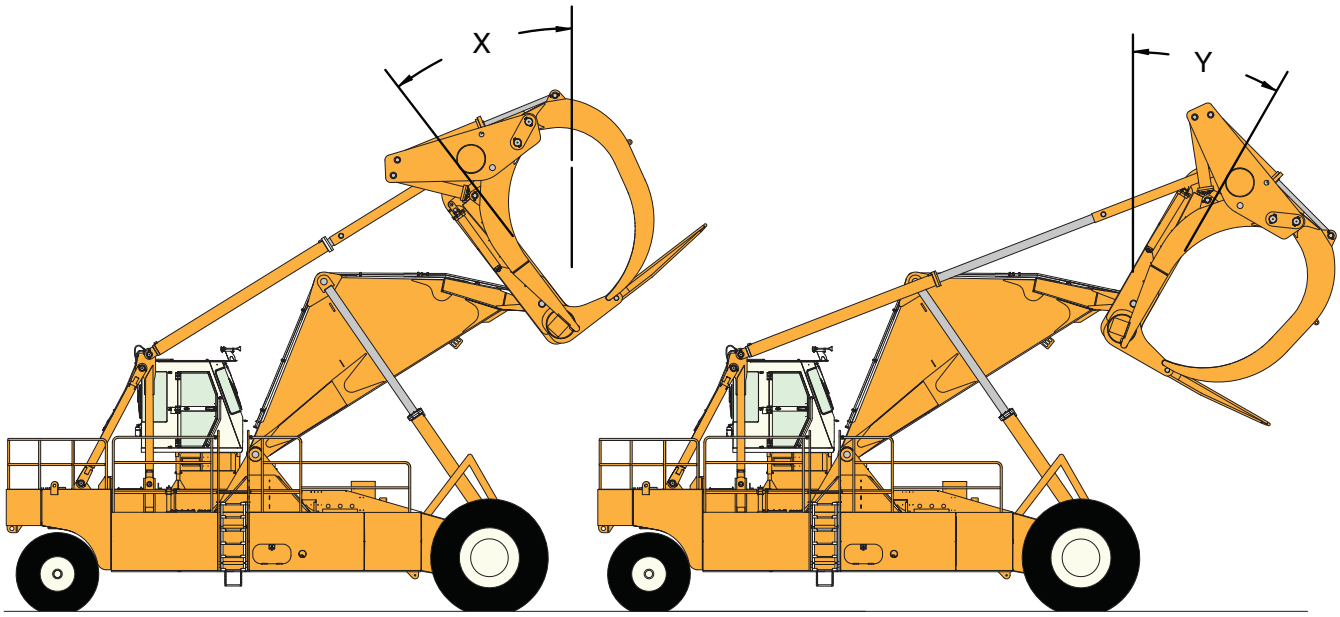
	Min	Max	Observed	
Tine Tip to HD Tip, Horizontal, HD Closed (D) :	**51”**	**61”**		76
Tine Tip to HD Tip, Horizontal, HD Open (E) :	**61”**	**73”**		77
Tine Tip to HD Tip, Vertical, HD Open (F) :	**201”**	**213”**		78
KO Arm Tip to End of Tine (G) :	**-3”**	**3”**		79

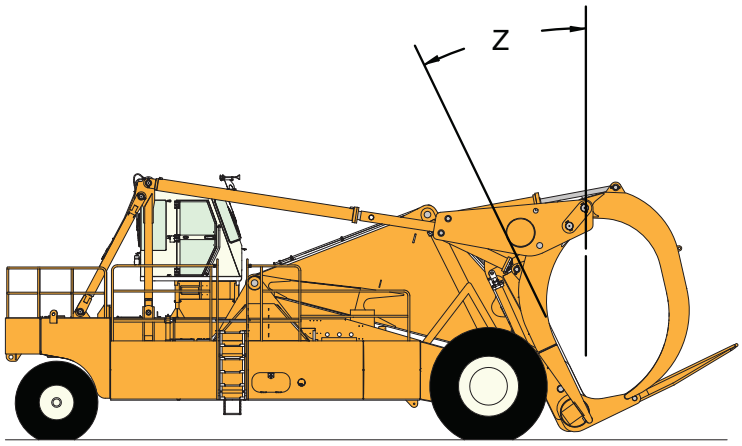
Is the KO arm flush or recessed (max 1/2”) from the carriage face when fully retracted? (Y/N) :		80

Initials :	
Date :	

Dimensions

Model:	L90C
Serial #:	039328





	Min	Max	Observed	
Carriage Angle from Vertical - Hoist Fully Extended, Tilt Fully Retracted (X) :	40°	46°		81
Carriage Angle from Vertical - Hoist Fully Extended, Tilt Fully Extended (Y) :	21°	27°		82
Carriage Angle from Vertical - Hoist Fully Retracted, Tilt Fully Retracted (Z) :	12°	18°		83
Axle Weight, Rear (Lbs) :	47,000	49,000		84
Axle Weight, Front (Lbs) :	90,000	100,000		85

Initials :	
Date :	

Cycle Times

Model: L90C
Serial #: 039328

		Engine Idle			Engine H.F.I			
		Min	Max	Observed (Sec)	Min	Max	Observed (Sec)	
Hoist Cylinder	Retract :	Measured at Startup (no calculated value)			14	24		86
	Extend :				14	24		87
Tilt Cylinder	Retract :	Measured at Startup (no calculated value)			7	12		88
	Extend :				9	12		89
RH Holddown Cylinder	Retract :	Measured at Startup (no calculated value)			3	6		90
	Extend :				4	6		91
LH Holddown Cylinder	Retract :	Measured at Startup (no calculated value)			3	6		92
	Extend :				4	6		93
RH Kickoff Cylinder	Retract :	Measured at Startup (no calculated value)			2	5		94
	Extend :				3	5		95
LH Kickoff Cylinder	Retract :	Measured at Startup (no calculated value)			2	5		96
	Extend :				3	5		97
RH Aux Holddown Cylinder	Retract :	Measured at Startup (no calculated value)			2	5		98
	Extend :				2	5		99
LH Aux Holddown Cylinder	Retract :	Measured at Startup (no calculated value)			2	5		100
	Extend :				2	5		101
Steering Wheel	Right-Left	Measured at Startup (no calculated value)			2	6		102
	Left-Right				2	6		103
Pushbutton Steering	Right-Left	Measured at Startup (no calculated value)			4	6		104
	Left-Right				4	6		105

		Min	Max	Observed (Turns)	
Steering Wheel Turns	Right-Left	4	6		106
	Left-Right	4	6		107

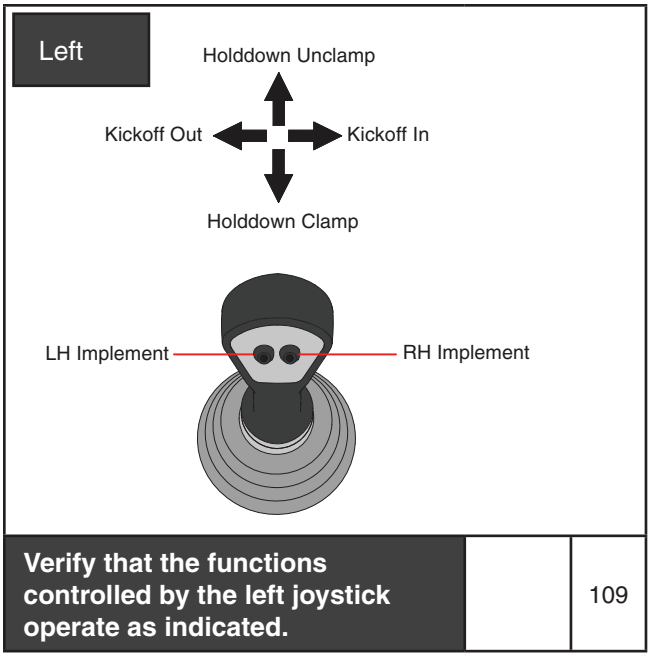
Initials :

Date :

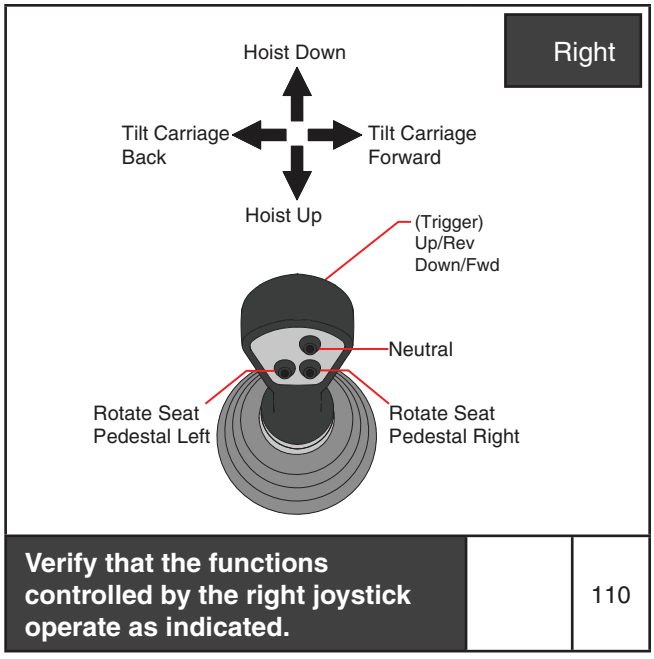
Performance Validation

Model:	L90C
Serial #:	039328

Record “Yes” or “No” in the box for each joystick to indicate if the machine operates as indicated.



Verify that the functions controlled by the left joystick operate as indicated.		109



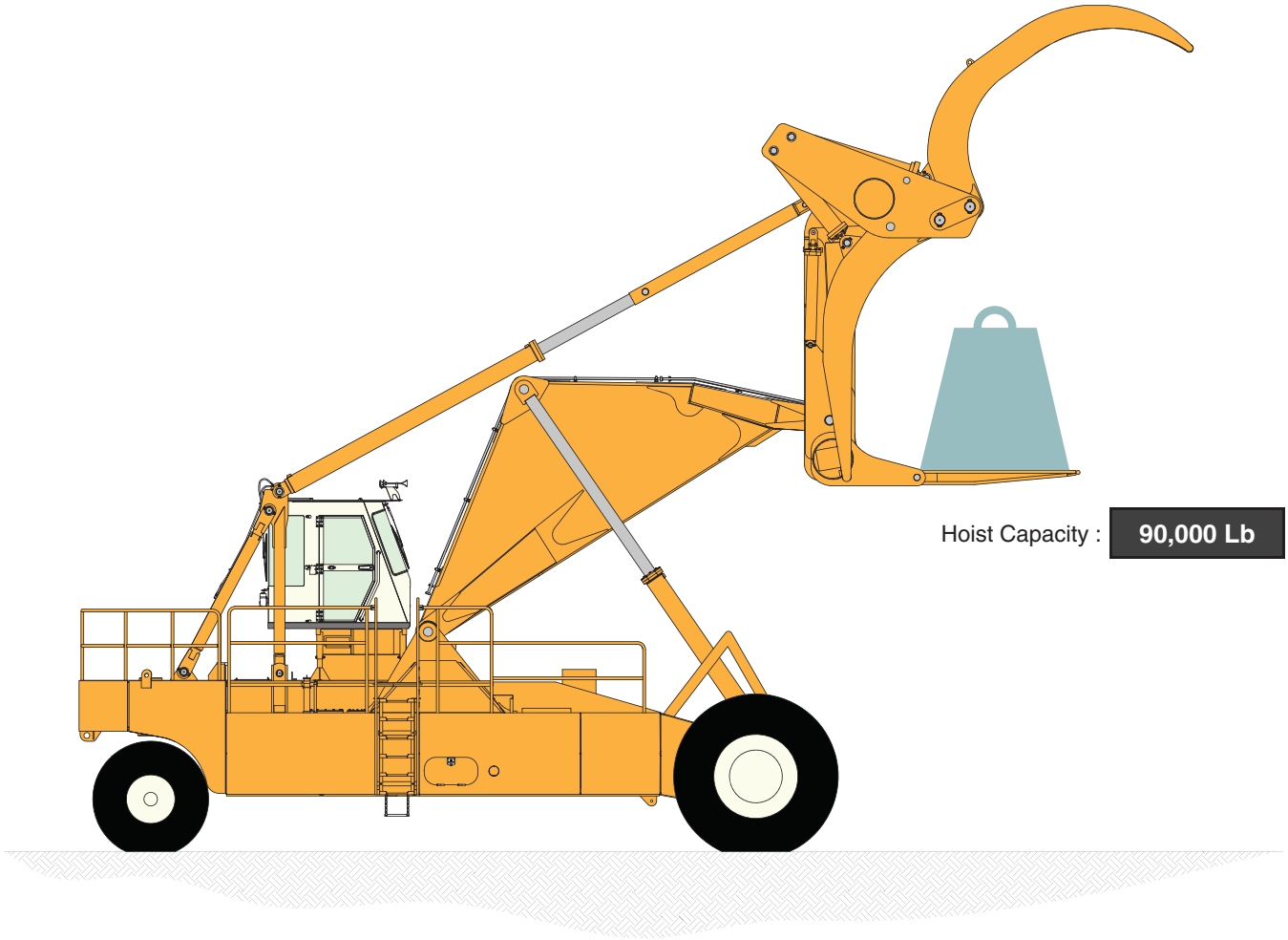
Verify that the functions controlled by the right joystick operate as indicated.		110

Initials :	
Date :	

Performance Validation

Model:	L90C
Serial #:	039328

Record “Yes” or “No” in the box to indicate if the machine can hoist the rated load.



Hoist Capacity : **90,000 Lb**

Verify that the machine can hoist the rated load.		111

Initials :	
Date :	