

GROUP 3 TESTS AND ADJUSTMENTS

1. HYDRAULIC OIL CLEAN UP PROCEDURE USING PORTABLE FILTER CADDY

※ **Service equipment and tool**

- Portable filter caddy
- Two 4000mm × 1" 100R1 Hoses
- Quick disconnect fittings
- Discharge wand
- Connectors

※ **Brake system and steering system use oil from hydraulic oil tank. Flush all lines in the brake and steering system. Disassemble and clean major components for brake and steering system.**

Brake and steering components may fail if brake, steering system is not cleaned after hydraulic oil tank contamination.

- 1) If hydraulic system is contaminated due to a major component failure, remove and disassemble steering cylinders to clean debris from cylinders.
 - 2) Install a new return filter element. Inspect filter before installing new element.
- ※ **For a failure that creates a lot of debris, remove access cover from hydraulic oil tank. Drain and clean hydraulic oil tank of fill the specified oil to hydraulic oil tank through upper cover.**
- 3) To minimize oil loss, pull a vacuum in hydraulic oil tank using a vacuum pump. Connect filter caddy suction line to drain port at bottom of hydraulic oil tank using connector. Check to be sure debris has not closed drain port.
 - 4) Put filter caddy discharge line into hydraulic oil tank filler hole so end is as far away from drain port as possible to obtain a thorough cleaning of oil.

- 5) Start the filter caddy. Check to be sure oil is flowing through the filters.

Operate filter caddy approximately 10 minutes so oil in hydraulic oil tank is circulated through filter a minimum of four times.

- ※ **Hydraulic tank capacity : 60 l (15.9U.S. gal)**

Leave filter caddy operating for the next steps.

- 6) Start the engine and run it at high idle.

- ※ **For the most effective results, cleaning procedure must start with the smallest capacity circuit then proceed to the next largest capacity circuit.**

- 7) Operate all functions, one at a time, through a complete cycle in the following order: Clam, steering, bucket, and boom. Also include all auxiliary hydraulic functions.

Repeat procedure until the total system capacity has circulated through filter caddy seven times, approximately 30 minutes.

Each function must go through a minimum of three complete cycles for a through cleaning for oil.

- ※ **Filtering time for machines with auxiliary hydraulic functions must be increased because system capacity is larger.**

- 8) Stop the engine. Remove the filter caddy.

- 9) Install a new return filter element.

- 10) Check oil level in hydraulic oil tank ; Add oil if necessary.

2. TEST TOOLS

1) CLAMP-ON ELECTRONIC TACHOMETER INSTALLATION

- Service equipment and tools
Tachometer

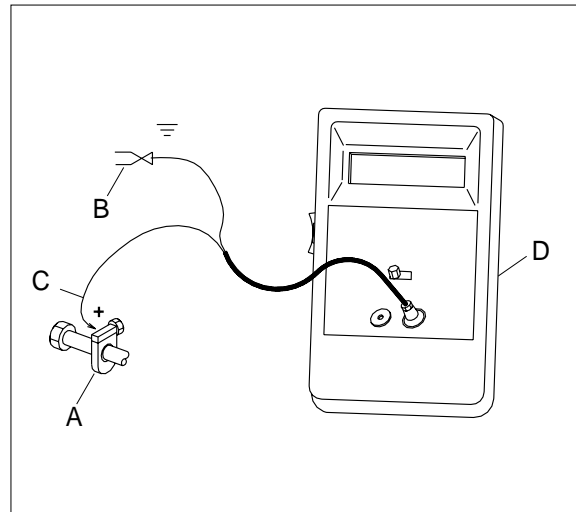
A : Clamp on tachometer

Remove paint using emery cloth and connect to a straight section of injection line within 100mm(4in) of pump. Finger tighten only-do not over tighten.

B : Black clip(-). Connect to main frame.

C : Red clip(+). Connect to transducer.

D : Tachometer readout. Install cable.



2) DIGITAL THERMOMETER INSTALLATION

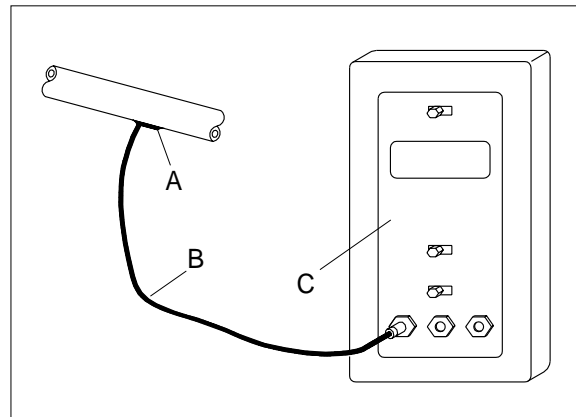
- Service equipment and tools
Digital thermometer

A : Temperature probe

Fasten to a bare metal line using a tie band. Wrap with shop towel.

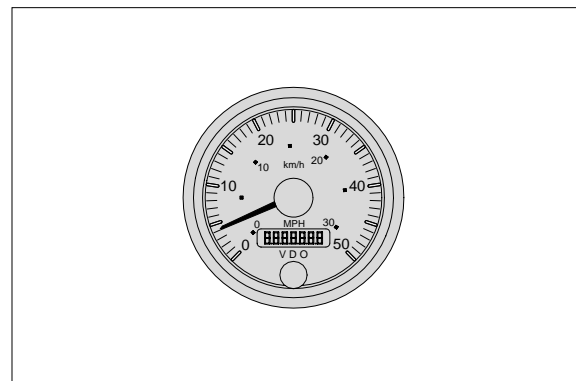
B : Cable

C : Digital thermometer



3) DISPLAY MONITOR TACHOMETER

The display monitor tachometer is accurate enough for test work.



3. STEERING SYSTEM RESTRICTION TEST

- **SPECIFICATION**

Oil temperature	$65 \pm 6^{\circ}\text{C}$ ($150 \pm 10^{\circ}\text{F}$)
Engine speed	High idle
Maximum pressure at steering unit	2.0Mpa (20bar, 285psi)

- **GAUGE AND TOOL**

Gauge 0~7.0Mpa (0~70bar, 0~1000psi) 1EA

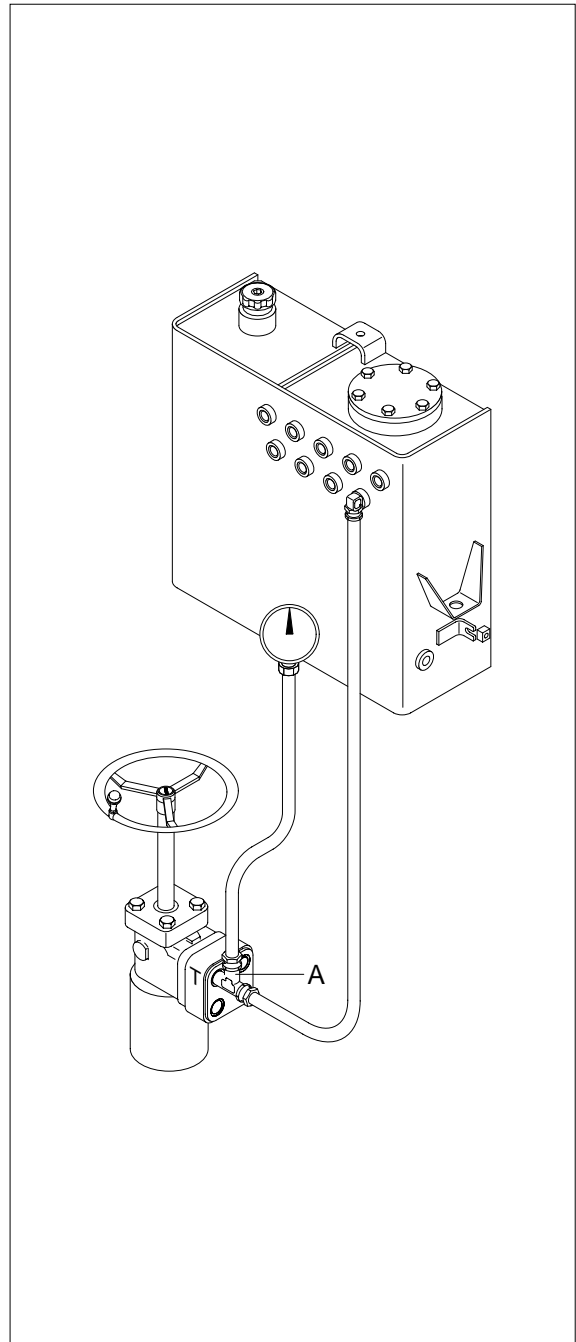
- This test will check for restrictions in the steering system which can cause overheating of hydraulic oil.

- 1) Install temperature reader. (See temperature reader installation procedure in this group.)
- 2) Heat hydraulic oil to specifications. (See hydraulic oil warm up procedure at page 6-57.)
- 3) Connect fitting(A) and gauge to steering unit.

▲ Do not operate steering or loader functions or test gauge may be damaged.

- 4) Run engine at specification and read pressure gauges.

If pressure is more than specification at the steering unit, inspect priority valve for a stuck spool. Make sure orifice plugs are installed in ends of priority valve spool. Check for plugged orifice in priority valve LS port.



4. STEERING UNIT LEAKAGE TEST

- **SPECIFICATION**

Oil temperature $40 \pm 6^{\circ}\text{C}$ ($100 \pm 10^{\circ}\text{F}$)

Engine speed High idle

Maximum leakage 5.7cc/10min

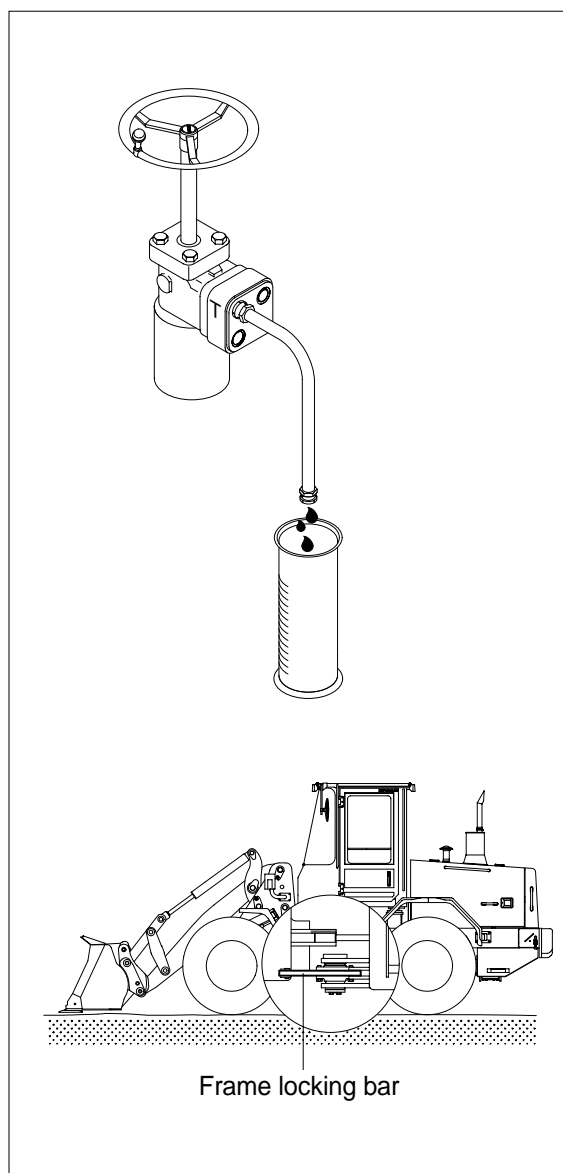
- **GAUGE AND TOOL**

Temperature reader

Measuring container (Approx 20 l)

Stop watch

- 1) Install frame locking bar to prevent machine from turning.
- 2) Install temperature reader. (See temperature reader installation procedure in this group.)
- 3) Heat hydraulic oil to specifications. (See hydraulic oil warm up procedure at page 6-57.)
- 4) Disconnect return hose from fitting. Install cap on fitting.
- 5) Run engine at specifications. Rotate steering wheel against locking bar using approximately 1.2kg · m of force. Measure oil flow from return hose for 1 minute.
- 6) Leakage is greater than specifications, repair or replace steering unit.



5. STEERING UNIT PRESSURE TEST

• SPECIFICATION

Oil temperature	$65 \pm 6^{\circ}\text{C}$ ($150 \pm 10^{\circ}\text{F}$)
Engine speed	High idle
Relief pressure	20.5~21.5Mpa (205~215bar, 3200~3300psi)

• GAUGE AND TOOL

Gauge 0~35.0Mpa(0~350bar, 0~5000psi)
Temperature reader

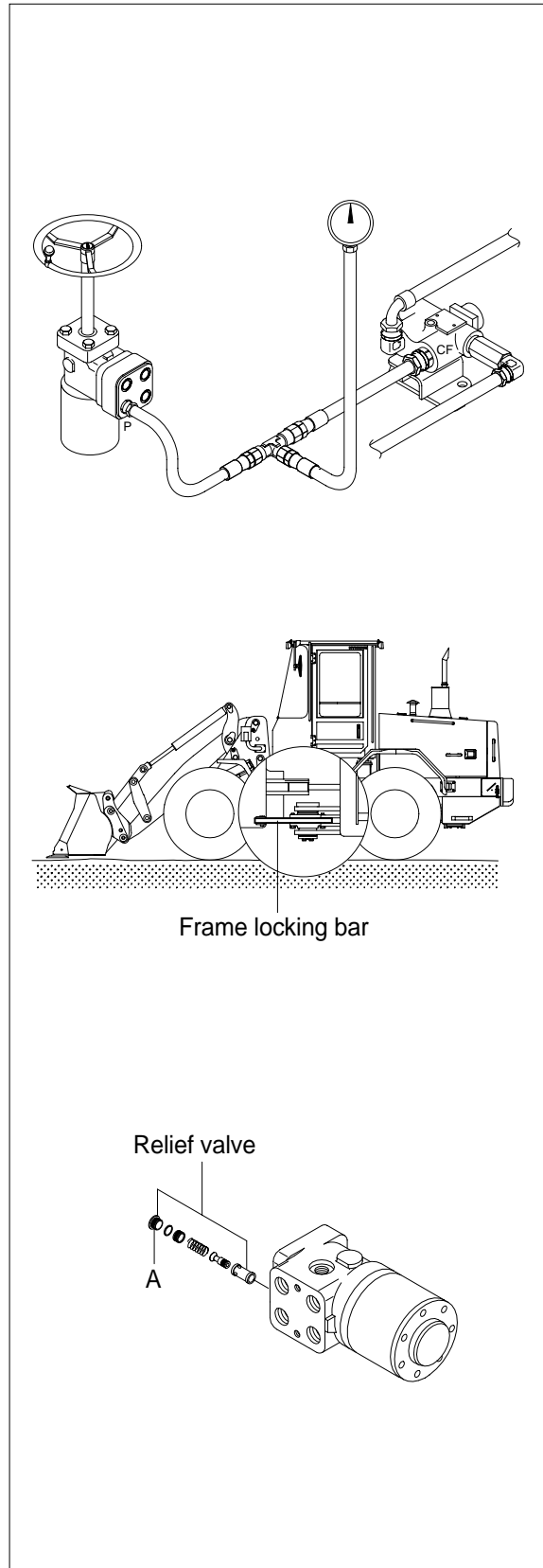
- 1) Connect test fitting and gauge to P port on steering unit.
- 2) Install temperature reader.(See temperature installation procedure in this group.)
- 3) Install frame locking bar.
- 4) Heat hydraulic oil to specifications.(See hydraulic oil warm up procedure at page 6-57.)
- 5) Run engine at specifications and turn steering wheel rapidly hold approximately 22N(5lb force) pressure on wheel with frames locked.

※ **If steering wheel is turned slowly, it will continue to with the frames locked. This will give an incorrect pressure reading.**

If steering wheel continues to turn rapidly with the frames locked, steering system leakage is indicated.

- 6) Read pressure gauge. This is the steering unit relief pressure.
- 7) If pressure is not to specification, remove the plug(A) from steering unit. Turn adjusting screw in relief cartridge using a hex head wrench to adjust pressure.

If pressure cannot be adjusted to specification, disassemble and inspect steering unit.



6. PRIORITY VALVE "LS" PORT FLOW TEST

• SPECIFICATION

Oil temperature	$40 \pm 6^{\circ}\text{C}$ ($100 \pm 10^{\circ}\text{F}$)
Engine speed	Low idle
LS port flow(Approx)	0.5 l /min(0.13gpm)

• GAUGE AND TOOL

Temperature reader
Measuring container
Stop watch

Priority valve LS port flow test will check for a plugged or missing orifice in the priority valve spool. A plugged orifice will block warm up flow to the steering unit which can cause thermal shock.(See for an explanation of thermal shock, page 5-19).

A missing orifice can cause the pump to be loaded to high pressure at all times causing overheating.

- 1) Install temperature reader.(See temperature reader installation procedure in this group.)
- 2) Heat hydraulic oil to specifications.(See hydraulic oil warm up procedure at page 6-57.)
- 3) Disconnect line from LS port and install plug(A).
- 4) Connect line(B) to priority valve.
- 5) Start engine and run at specification.
- 6) Measure flow from LS port for 1 minute.

If flow is low, low steering system neutral pressure or a plugged orifice in priority valve spool is indicated.

If flow is high, remove priority valve spool and inspect for a missing orifice.

Do hydraulic system restriction test in this group.

