

GROUP 3 TESTS AND ADJUSTMENTS

1. HYDRAULIC OIL CLEAN UP PROCEDURE USING PORTABLE FILTER CADDY

※ **Service equipment and tool.**

- Portable filter caddy
- Two 3658mm(12ft) × 1" I.D. 100R1 hoses with 3/4 M NPT ends
- Quick disconnect fittings
- Discharge wand
- Various size fittings and hoses

※ **Brake system uses oil from hydraulic oil tank. Flush all lines in the steering system.**

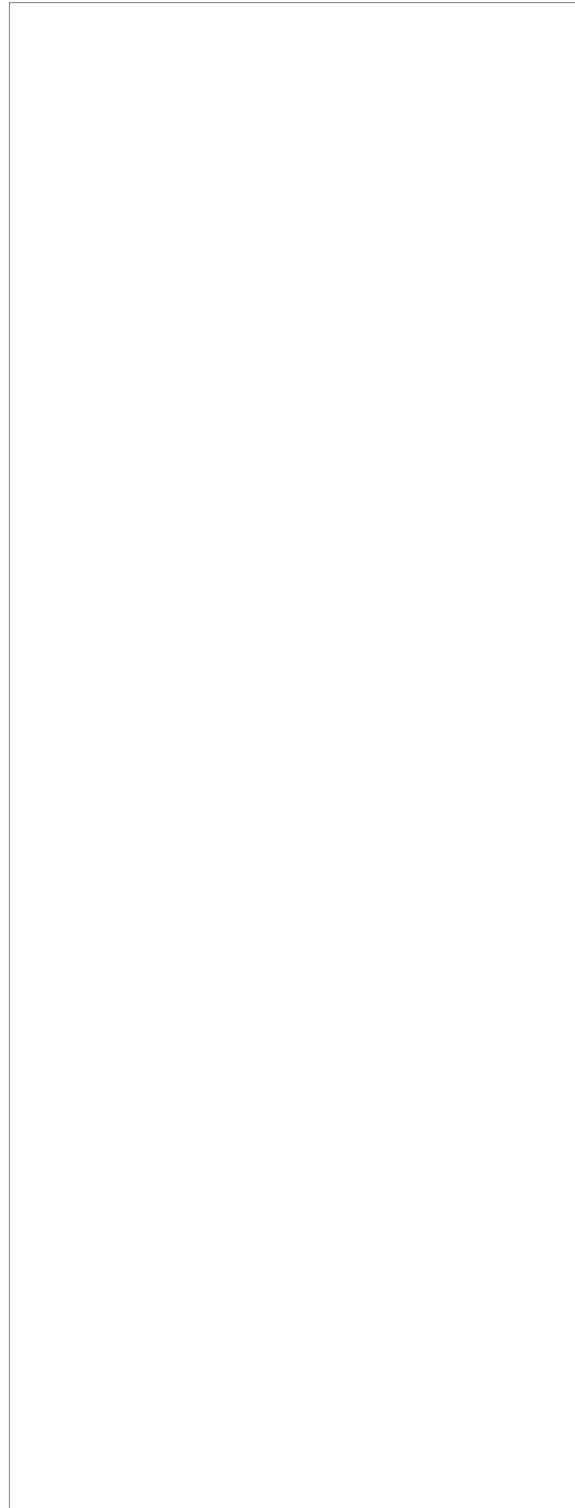
Disassemble and clean major components for steering system.

Steering components may fail if 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. Clean filter housing 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.**

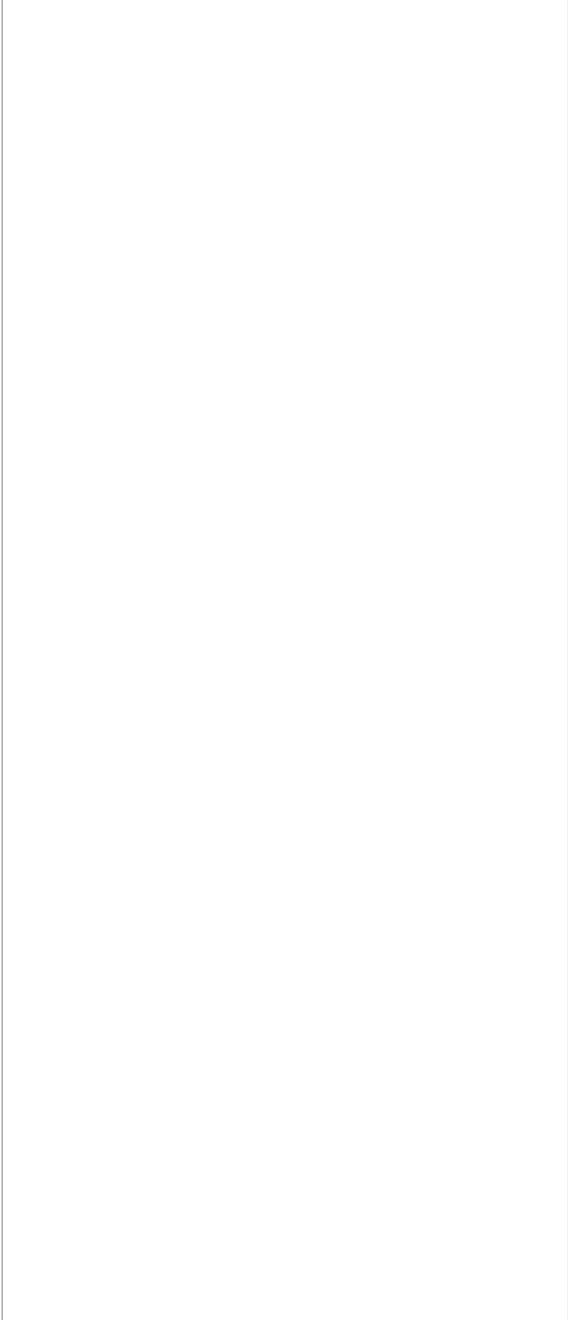
- 3) To minimize oil loss, pull a vacuum in hydraulic oil tank using a vacuum pump. Connect filter caddy suction line to drain port at bottom of hydraulic oil tank using connector. Check to be sure debris has not closed drain port.
- 4) Put filter caddy discharge line into hydraulic oil tank filter hole so end is as far away from drain port as possible to obtain a through 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 oil tank capacity 125 l (33U.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

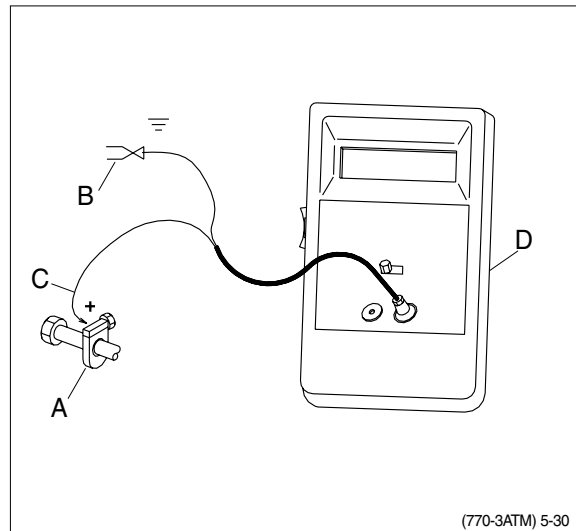
A : Clamp on tachometer.

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

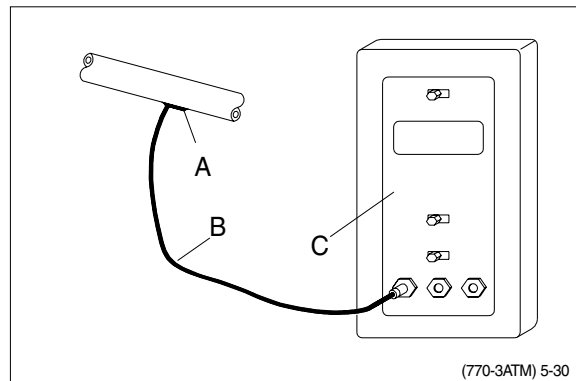
- Service equipment and tools
Digital thermometer

A : Temperature probe.

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

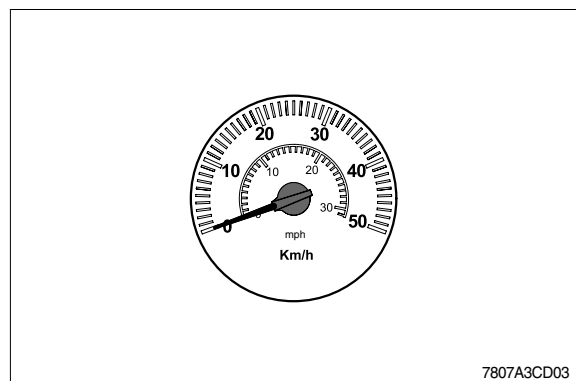
B : Cable.

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 $45 \pm 5^{\circ}\text{C}$ ($113 \pm 9^{\circ}\text{F}$)
Engine speed High idle
Maximum pressure 2.1MPa (21bar, 300psi)
at steering valve(EHPS)

- **GAUGE AND TOOL**

Gauge 0~7MPa (0~70bar, 0~1000psi) 2EA

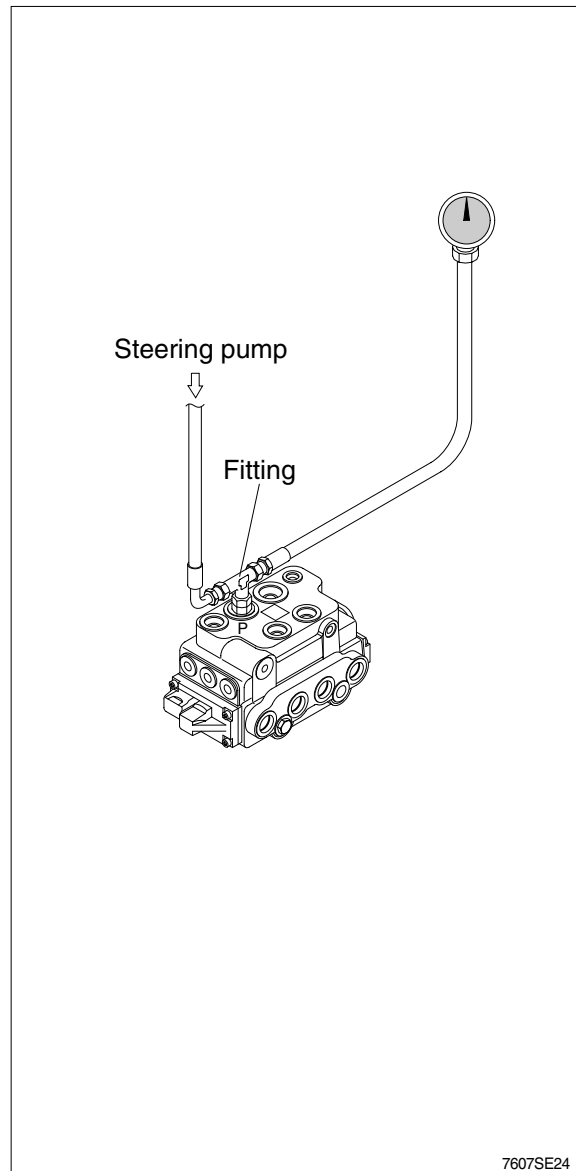
- This test will check for restrictions in the steering system which can cause overheating of hydraulic oil.

- 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 6-51).
- 3) Connect fitting and install gauge.

▲ 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 valve, inspect steering valve for a priority valve spool. Make sure orifice plugs installed in ends of priority valve spool.



4. STEERING UNIT LEAKAGE TEST

- **SPECIFICATION**

Oil temperature $45 \pm 5^{\circ}\text{C}$ ($113 \pm 9^{\circ}\text{F}$)

Engine speed High idle

Maximum leakage 7.5 l / min (2gpm)

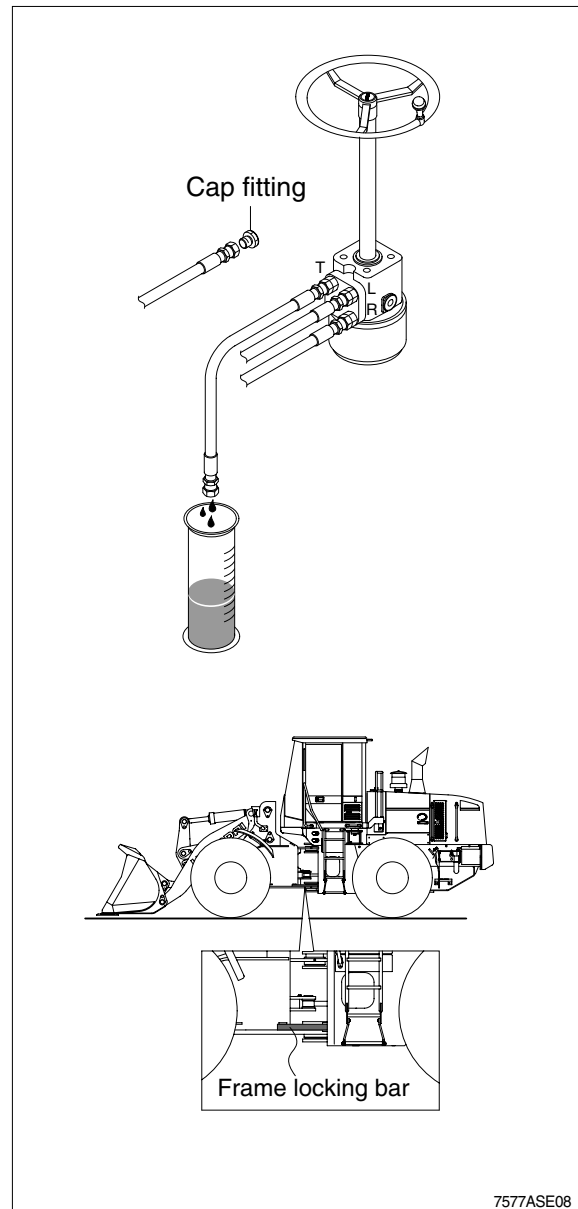
- **GAUGE AND TOOL**

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 6-51).
- 4) Disconnect return hose from fitting.
Install cap fitting.
- 5) Run engine at specifications. Rotate steering wheel against locking bar using approximately $1.2\text{kgf} \cdot \text{m}$ of force. Measure oil flow from return hose for 1 minute.
- 6) Leakage is greater than specifications, repair or replace steering unit.



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5. STEERING VALVE(EHPS) PRESSURE TEST

· SPECIFICATION

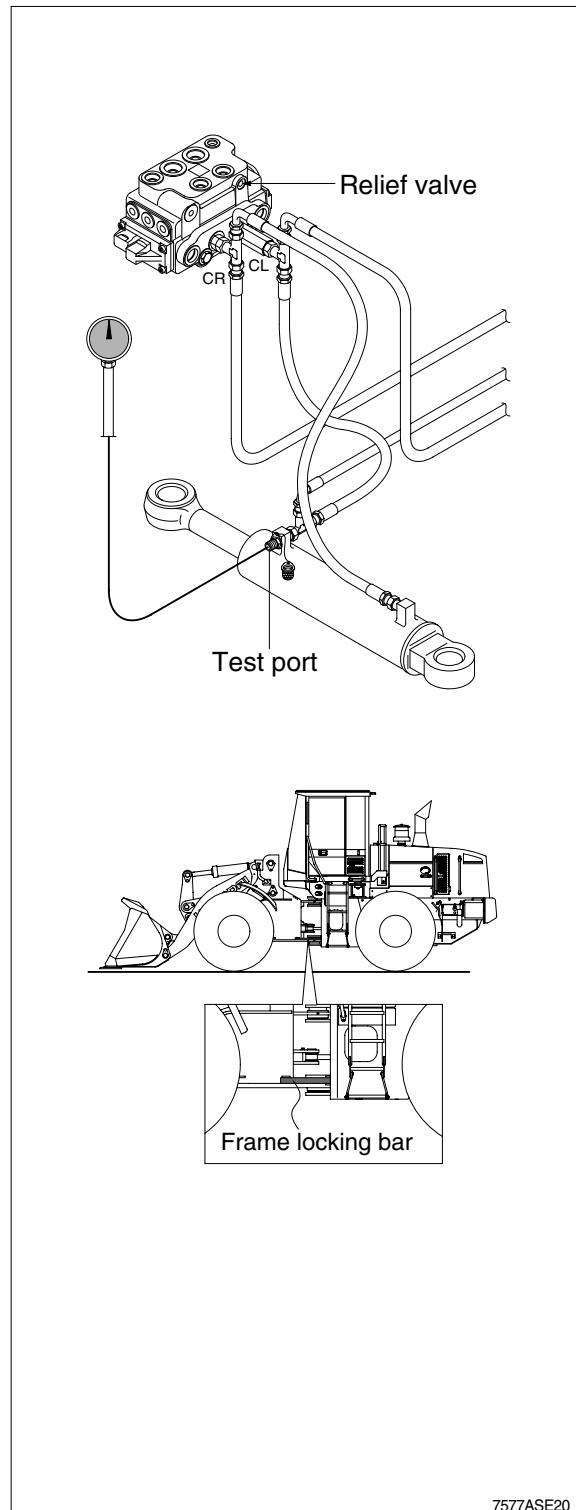
Oil temperature	45±5°C (113±9°F)
Engine speed	High idle
Oil pressure	20.1~21.1MPa (205~215bar, 2900~3100psi)

· GAUGE AND TOOL

Gauge	0~35MPa(0~350bar, 0~5000psi)
Temperature reader	

- 1) Connect gauge to test port.
- 2) Install temperature reader(See installation procedure in this group).
- 3) Install frame locking bar.
- 4) Heat hydraulic oil to specifications(See hydraulic oil warm up procedure at page 6-51).
- 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 valve relief pressure.
- 7) If pressure is not to specification, turn adjusting screw in relief cartridge using a hex head wrench(6mm) to adjust pressure.

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



6. STEERING VALVE(EHPS) RELIEF CARTRIDGE LEAKAGE TEST

· SPECIFICATION

Oil temperature $45 \pm 5^{\circ}\text{C}$ ($113 \pm 9^{\circ}\text{F}$)
Engine speed High idle
Maximum leakage 1 m l /min (16 drops per min)

· GAUGE AND TOOL

Temperature reader
Measuring container
Stop watch

- 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 6-51).
- 3) Install plug(A) in Ts port.
Disconnect line from T port on steering valve. Install plug in line.
- 4) Connect line(B) to steering valve.
- 5) Start engine and run at specification.
- 6) Measure oil leakage from T port.
- 7) If leakage is more than specification, disassemble and inspect relief cartridge for damage or debris.

