INTRODUCTION

TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.
  - Be sure to thoroughly read this manual for correct product information and service procedures.
  - If you have any questions or comments, at if you found any errors regarding the contents of this manual, please contact using “Service Manual Revision Request Form” at the end of this manual. (Note: Do not tear off the form. Copy it for usage.):

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    TEL: 81-29-832-7084
    FAX: 81-29-831-1162

ADDITIONAL REFERENCES

- Please refer to the materials listed below in addition to this manual.
  - The Operator’s Manual
  - The Parts Catalog
  - The Engine Manual
  - Parts Catalog of the Engine
  - Hitachi Training Material

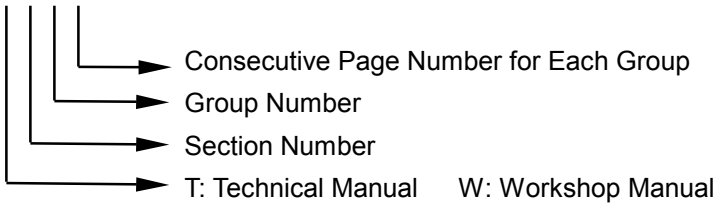
MANUAL COMPOSITION

- This manual consists of three portions: the Technical Manual (Operational Principle), the Technical Manual (Troubleshooting) and the Workshop Manual.
  - Information included in the Technical Manual (Operational Principle):
    technical information needed for redelivery and delivery, operation and activation of all devices and systems.
  - Information included in the Technical Manual (Troubleshooting):
    technical information needed for operational performance tests, and troubleshooting procedures.
  - Information included in the Workshop Manual:
    technical information needed for maintenance and repair of the machine, tools and devices needed for maintenance and repair, maintenance standards, and removal/installation and assemble/disassemble procedures.

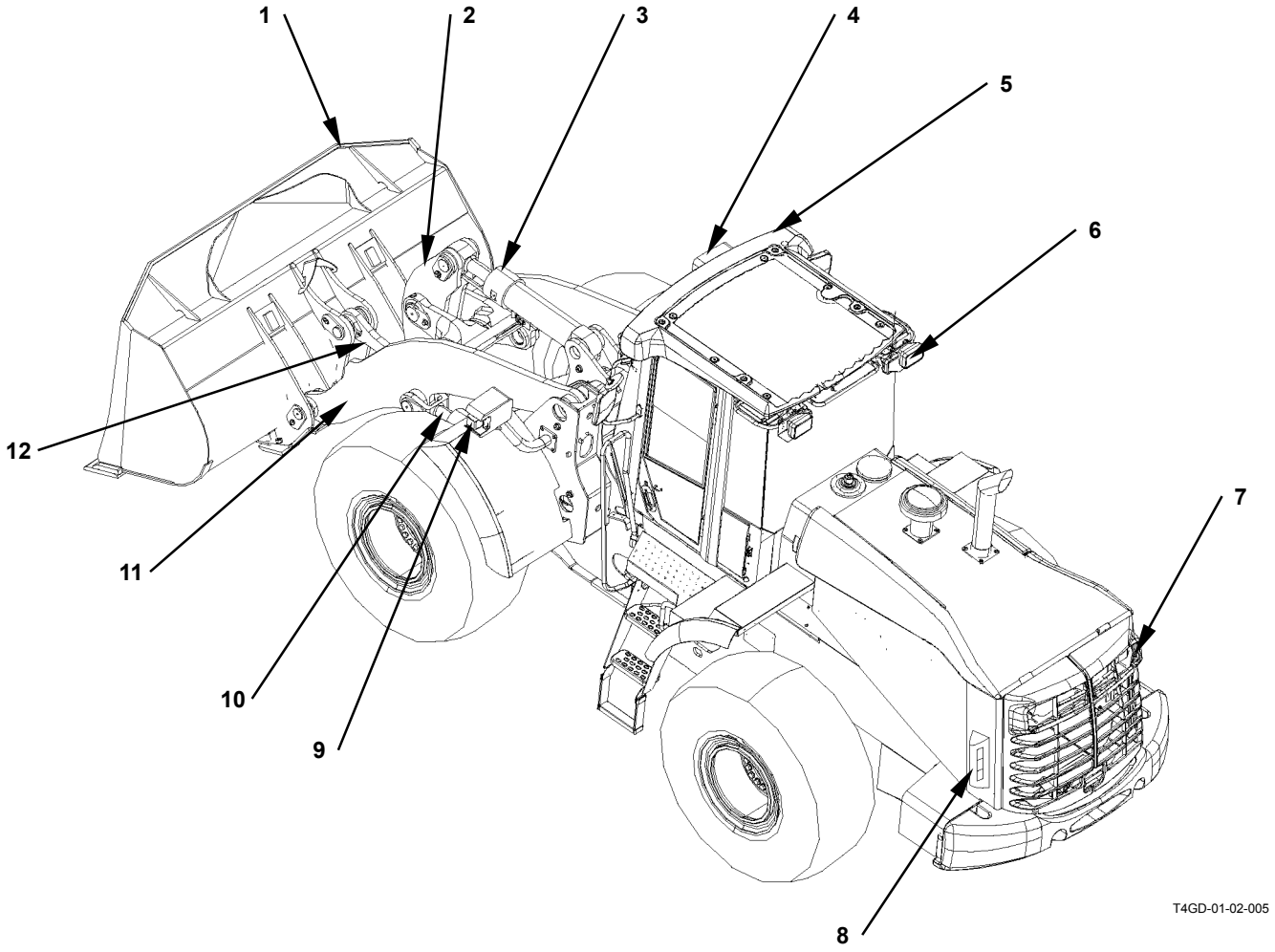
PAGE NUMBER

- Each page has a number, located on the center lower part of the page, and each number contains the following information:

  Example : T 1-3-5

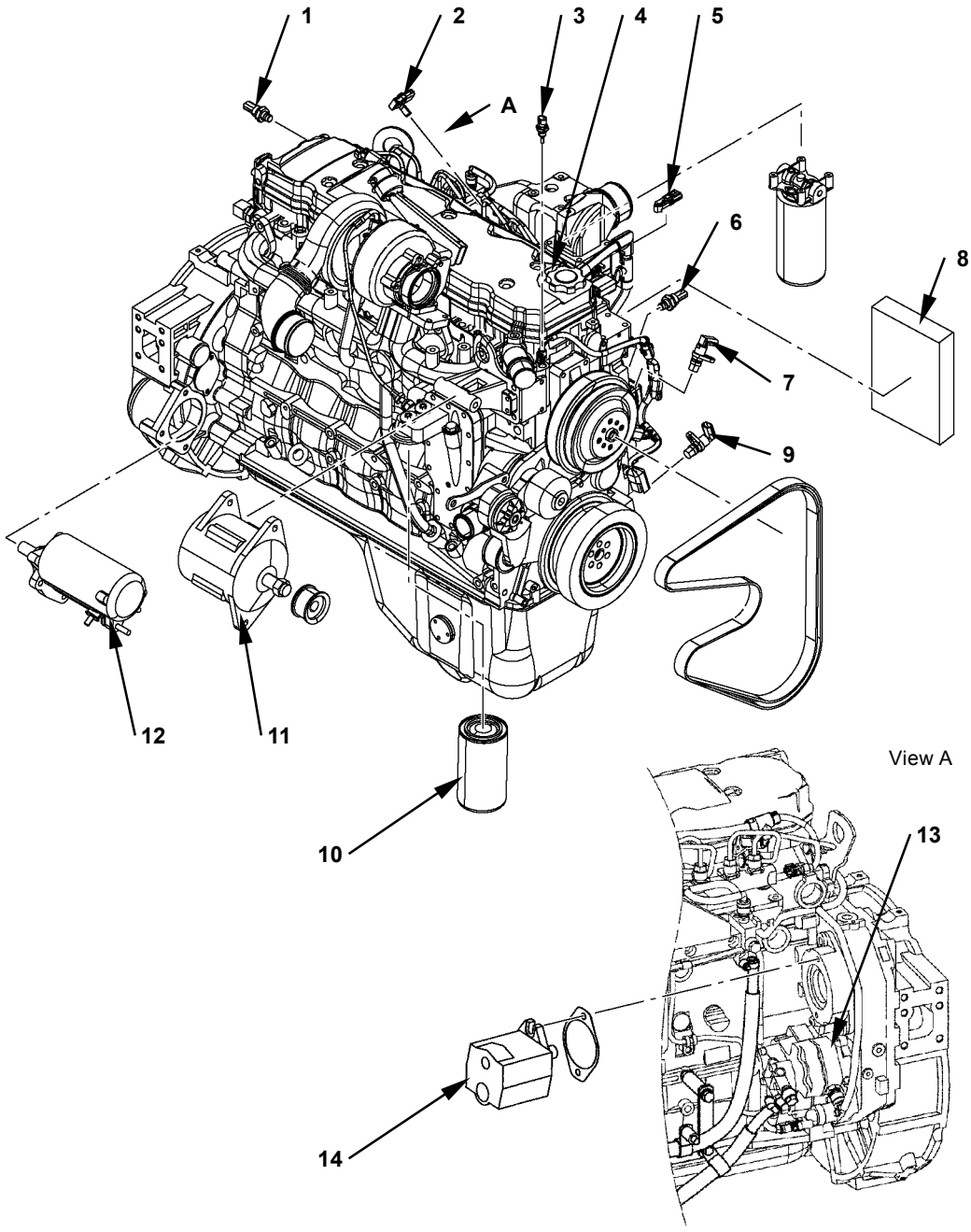


MAIN COMPONENT (OVERVIEW)



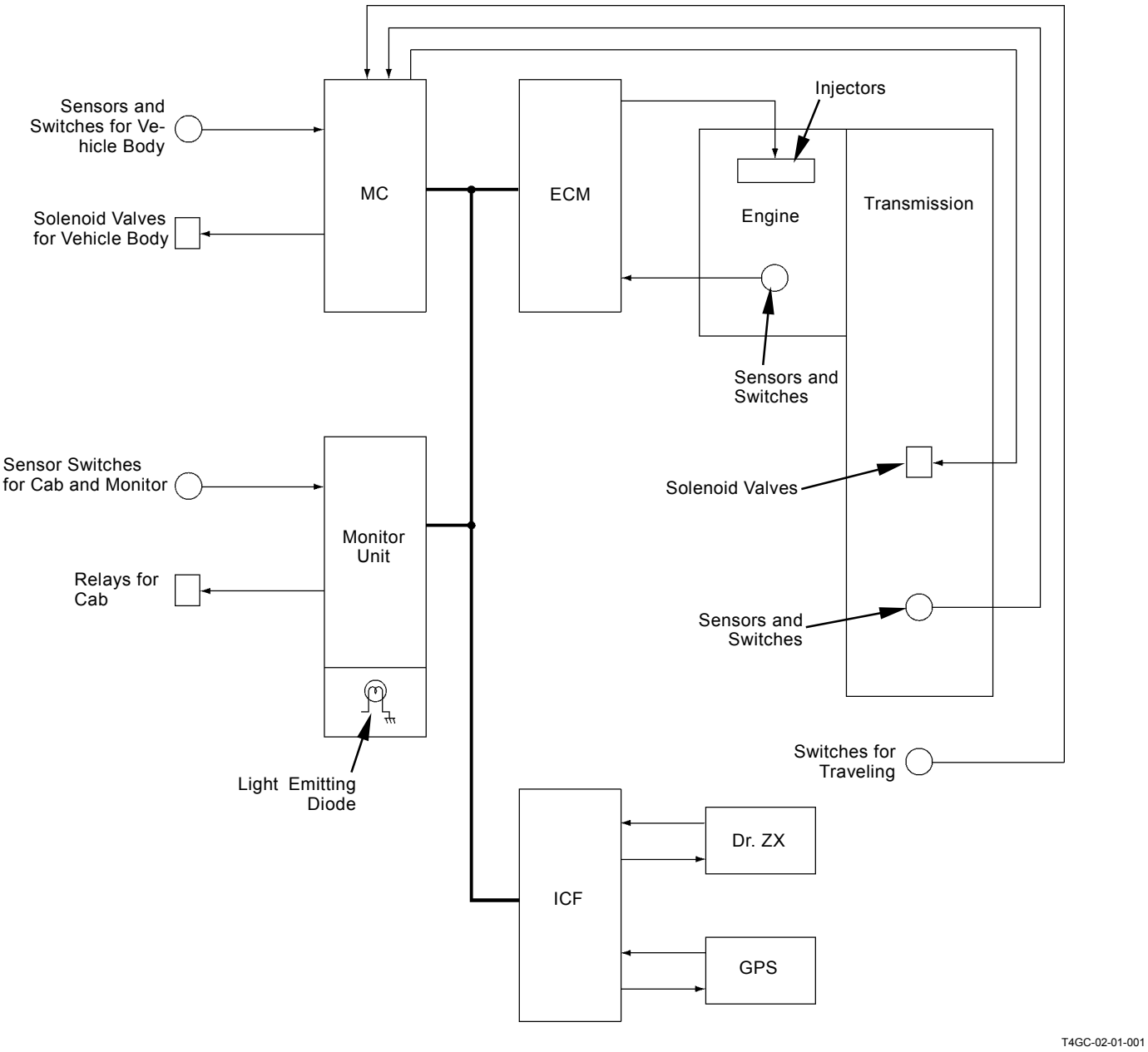
1 - Bucket	4 - Head Light	7 - Rear Working Light	10 - Lift Arm Cylinder
2 - Bell Crank	5 - Front Working Light	8 - Rear Combination Light (Turn Signal, Hazard Light, Clearance Light, Brake Light and Back Light)	11 - Lift Arm
3 - Bucket Cylinder	6 - Rear Working Light (Optional)	9 - Turn Signal, Hazard Light and Clearance Light	12 - Bucket Link

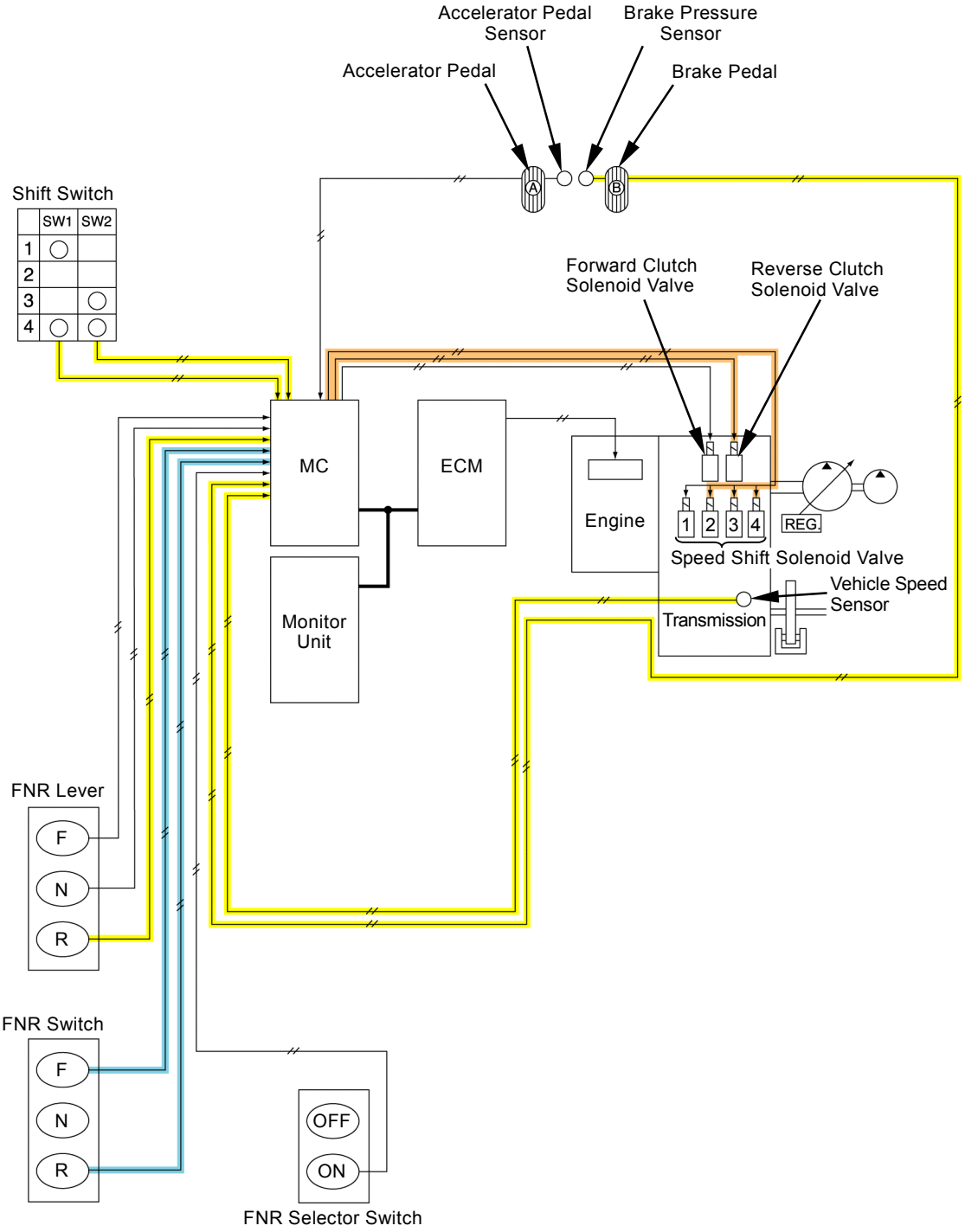
ENGINE AND FAN PUMP



T4GD-01-02-009

1 - Common Rail Pressure Sensor
2 - Intake Manifold Pressure / Intake Manifold Temperature Sensor
3 - Coolant Temperature Sensor
4 - Injector
5 - Ambient Pressure Sensor
6 - Engine Oil Pressure Switch
7 - Engine Position Sensor (Camshaft)
8 - ECM
9 - Engine Speed Sensor (Crankshaft)
10 - Engine Oil Filter
11 - Alternator
12 - Starter
13 - High-Pressure Pump
14 - Fan Pump


Sensors and Switches for Vehicle Body
Solenoid Valves for Vehicle Body
MC
ECM
Injectors
Engine
Transmission
Sensors and Switches
Sensor Switches for Cab and Monitor
Monitor Unit
Relays for Cab
Light Emitting Diode
Solenoid Valves
Sensors and Switches
Switches for Traveling
ICF
Dr. ZX
GPS
T4GC-02-01-001



NOTE: The illustration shows the signal flow in case the FNR lever is set in reverse and the brake pedal is depressed while traveling forward at speed 4 exceeding the allowable speed for shifting the FNR clutch.

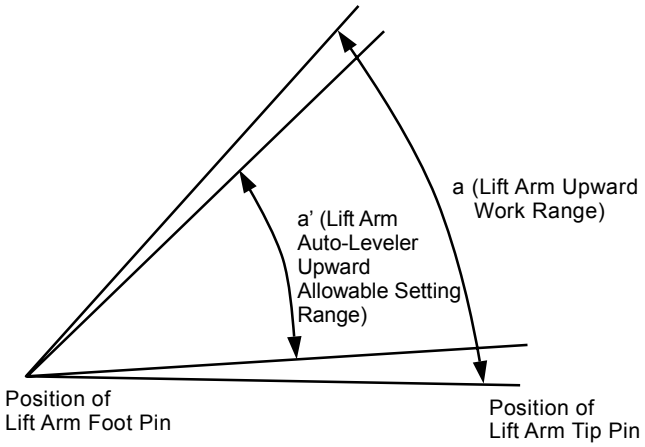
Lift Arm Auto-Leveler Upward Control (Optional)

Purpose: To locate the lift arm between the horizon and the highest position

Operation:

1. If the SET position of the lift arm auto-leveler upward set switch is selected after the lift arm is located within the allowable location of the lift arm auto-leveler (a' in the illustration), the signal from the lift arm angle sensor is memorized by MC, and that is the lift arm auto-leveler upward stop location.

NOTE: When the lift arm is outside a', although the SET position of the lift arm auto-leveler upward set switch is selected, the lift arm auto-leveler upward stop position cannot be set. In case setting was thus unsuccessful, or setting in a different position is needed, again set the lift arm auto-leveler upward stop position.

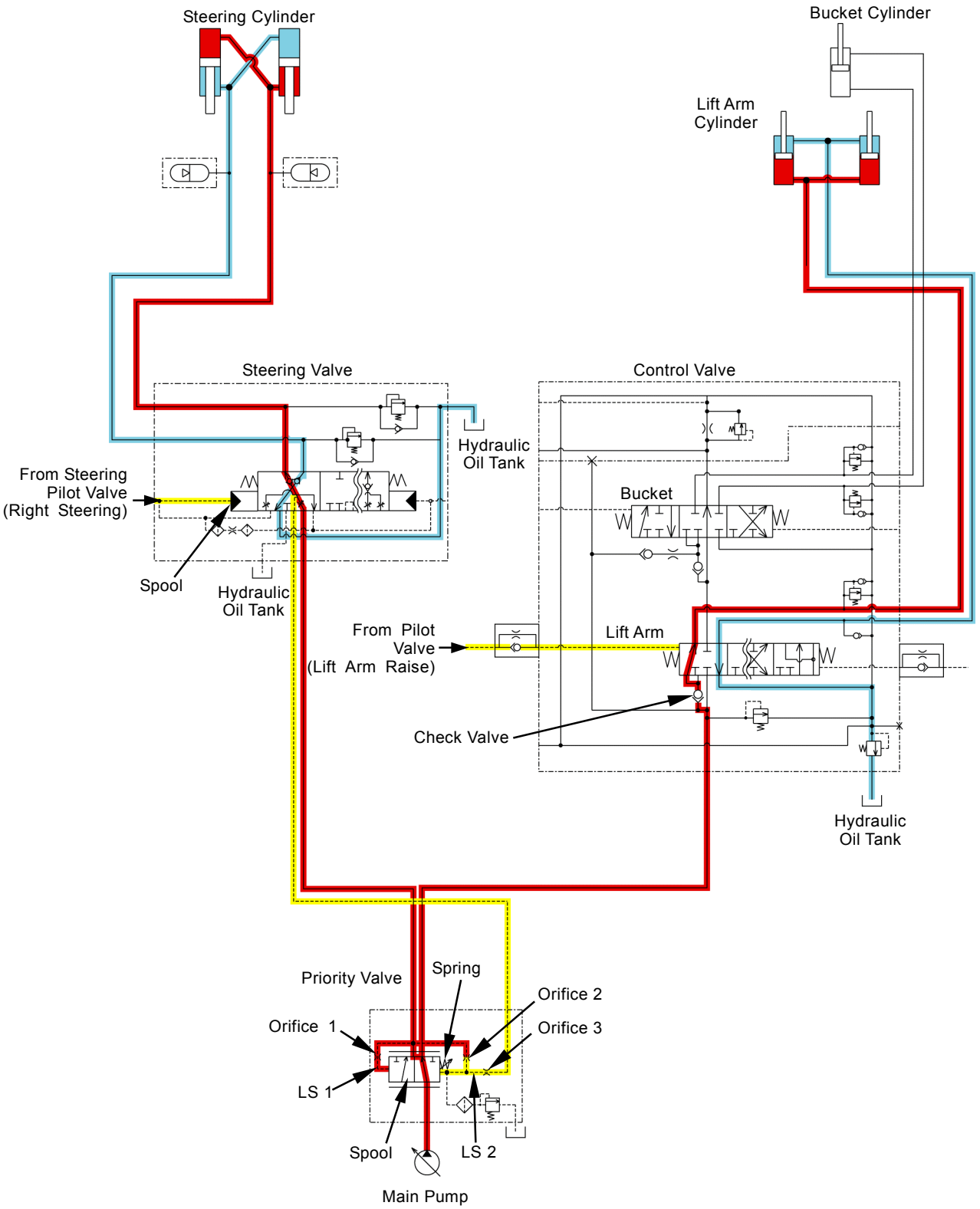


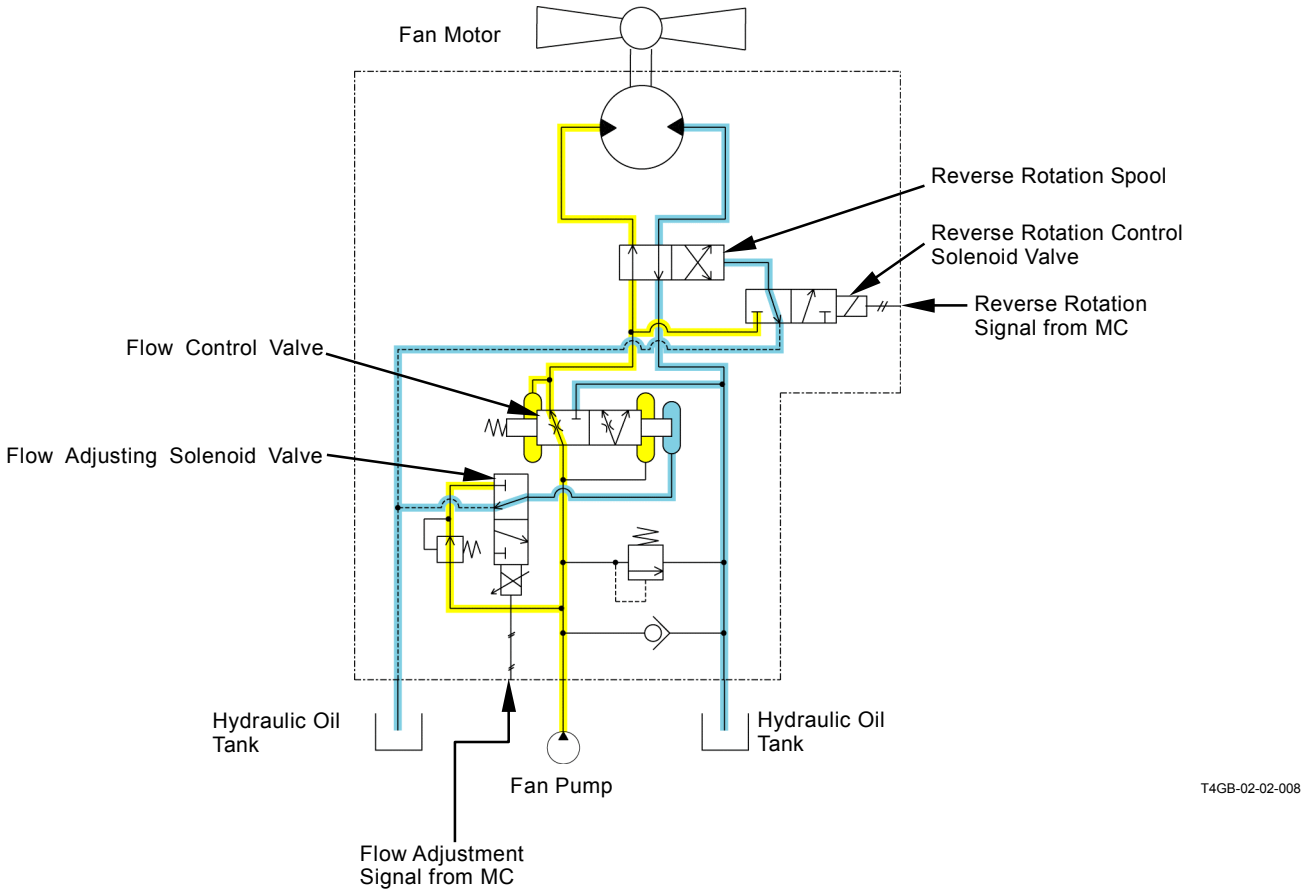
2. When the lift arm auto-leveler upward switch is turned ON, terminal A-25 of MC is grounded, and excites the electromagnet on the lift arm raise side of the pilot valve. When the lift arm control lever is moved to the lift arm raise detent position (position to pull farther than the raise position), the lift arm control lever is retained by the electromagnet on the lift arm raise side, and pressure oil from the pilot valve is supplied to the control valve.
3. Pressure oil from the main pump flows to the bottom side port of the lift cylinder through the lift arm spool in the control valve, and raises the lift arm.
4. When the lift arm angle sensor moves to the lift arm auto-leveler upward stop position, terminal A-25 of MC is hot grounded, and the electromagnet on the lift arm raise side is unexcited. Thus the lift arm control lever returns to the neutral position, and pressure oil from the pilot valve stops flowing to the control valve.
5. As the lift arm spool in the control valve also returns to neutral, the lift arm stops at the lift arm auto-leveler upward stop position.

NOTE: Above the lift arm upward set position, the electromagnet on the lift arm raise side is always excited.

NOTE: In case the lift arm angle sensor is abnormal, the lift arm auto-leveler upward control is not made.

IMPORTANT: In case either the lift arm angle sensor or MC has been replaced, make learning control of the lift arm angle sensor. (Refer to the OPERATIONAL PERFORMANCE TEST/Adjustment.)


Steering Cylinder
Bucket Cylinder
Lift Arm Cylinder
Steering Valve
Control Valve
Hydraulic Oil Tank
From Steering Pilot Valve (Right Steering)
Spool
Hydraulic Oil Tank
Bucket
From Pilot Valve (Lift Arm Raise)
Lift Arm
Check Valve
Hydraulic Oil Tank
Priority Valve
Spring
Orifice 2
Orifice 3
Orifice 1
LS 1
Spool
LS 2
Main Pump
T4GB-02-02-013



NOTE: The illustration shows the pressure oil flow without any control.

Alternator Operation

- The alternator consists of field coil FC, stator coil SC and diode D.
- At the beginning, no current is flowing through field coil FC. When the rotor starts rotating, alternate current is generated in stator coil SC by the rotor remanent magnetism.
- When current flows through field coil FC, the rotor is further magnetized so that the generating voltage increases. Thereby, current flowing through field coil FC increases. Therefore, generating voltage increases further and the batteries start charging.

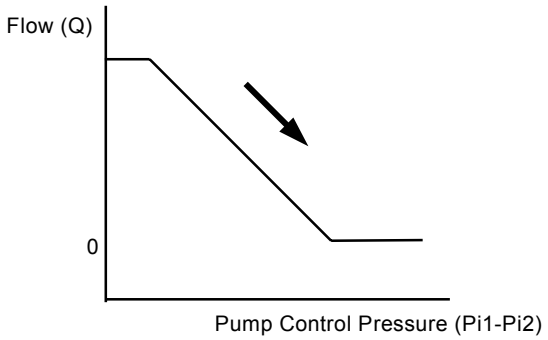
Operation of Regulator

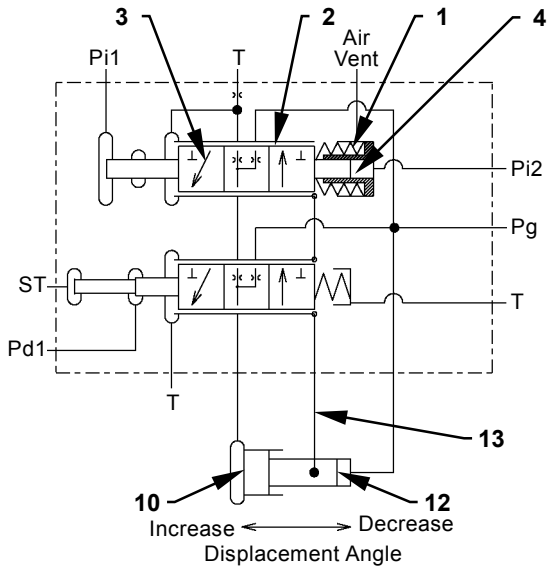
- The regulator is an IC chip, which maintains generating voltage at a constant level.
- When generating voltage exceeds the set-voltage, the regulator decreases current through field coil FC. This decreases generating voltage of stator coil SC.
- When generating voltage becomes lower than the set-voltage, the regulator increases current through field coil FC. This increases generating voltage of stator coil SC.
- The above operation is repeated so that the alternator generating voltage is kept constant.

Control by Pump Control Pressure

Decreasing Flow

1. When the control lever stroke is reduced, pressure difference (difference between pressure Pi1 and Pi2) arising at the flow control valve in the control valve is larger.
2. Pump control pressure Pi1 pushes spool 1 (3) and spool 1 (3) moves toward the arrow.
3. Therefore, primary pilot pressure Pg is led to servo piston 1 (10).
4. As there are two servo pistons 1 (10), swash plate (11) tilts toward the flow decreasing direction.
5. Movement of swash plate (11) is transmitted to sleeve 1 (2) through feedback lever link (13). Sleeve 1 (2) moves toward the movement of spool 1 (3).
6. Pilot primary pressure Pg to servo piston 1 (10) is blocked when sleeve 1 (2) has moved the same distance as spool 1 (3). Therefore, servo piston 1 (10) stops and the flow decrease is completed.

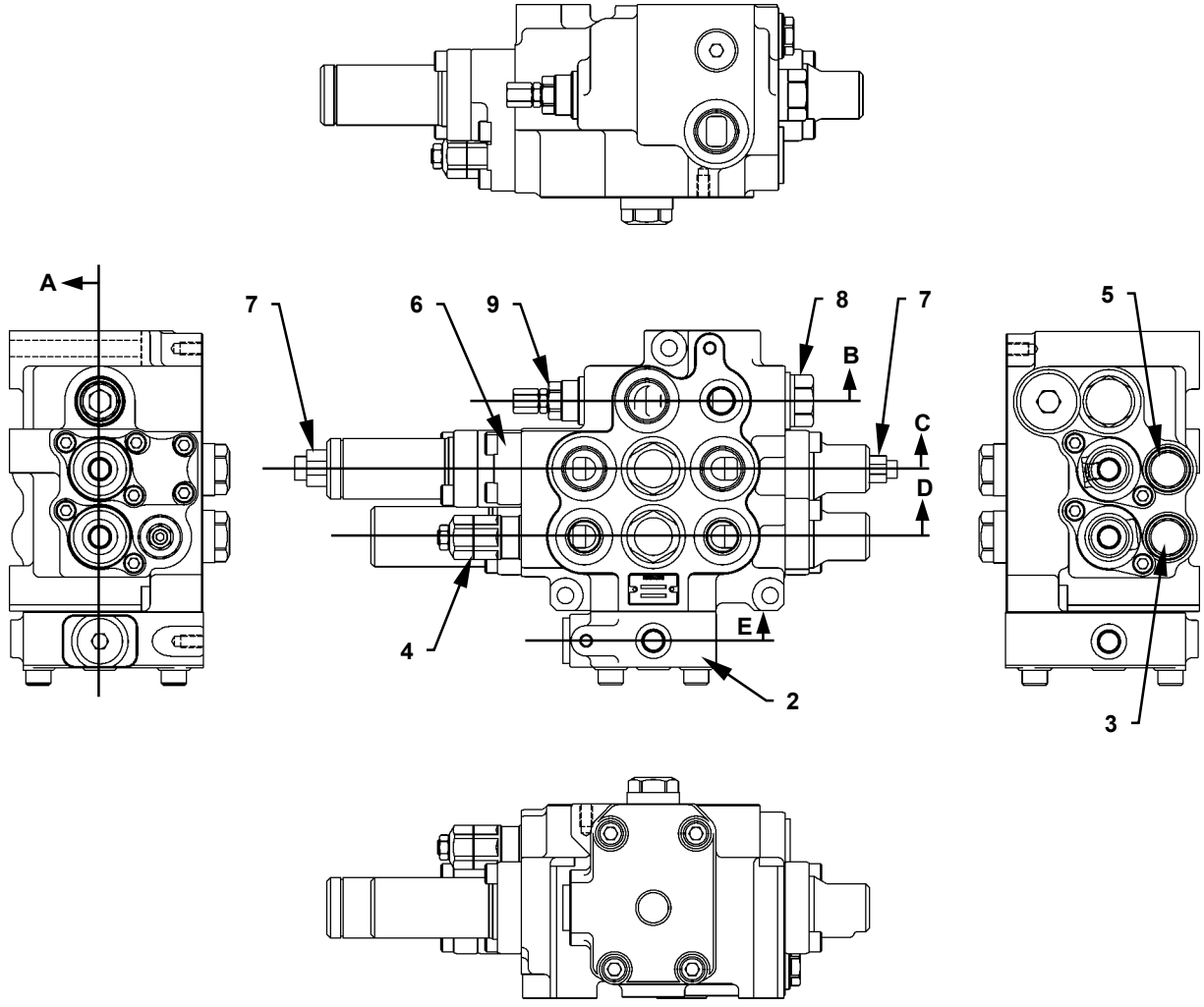




T4GB-03-01-006

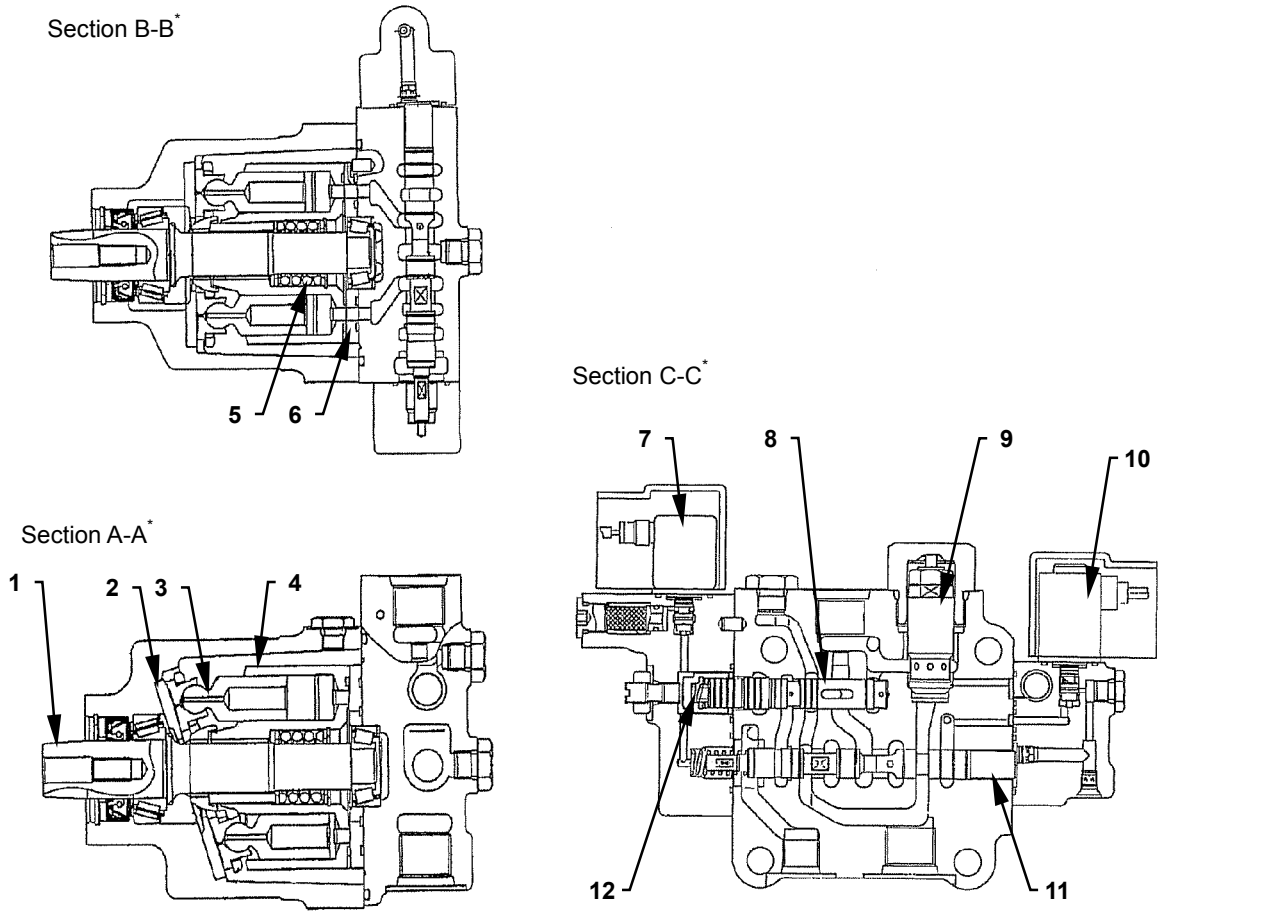
1 - Spring
2 - Sleeve 1
3 - Spool 1
4 - Piston
10 - Servo Piston 1
11 - Swash Plate
12 - Servo Piston 2
13 - Feedback Lever Link

Pd1 - Own Pump Pressure
ST - Torque Control Pressure
T - Returning to Hydraulic Oil Tank
Pi1 - Pump Control Pressure 1
Pi2 - Pump Control Pressure 2
Pg - Primary Pilot Pressure (From Pilot Pump)



T4GB-03-02-004

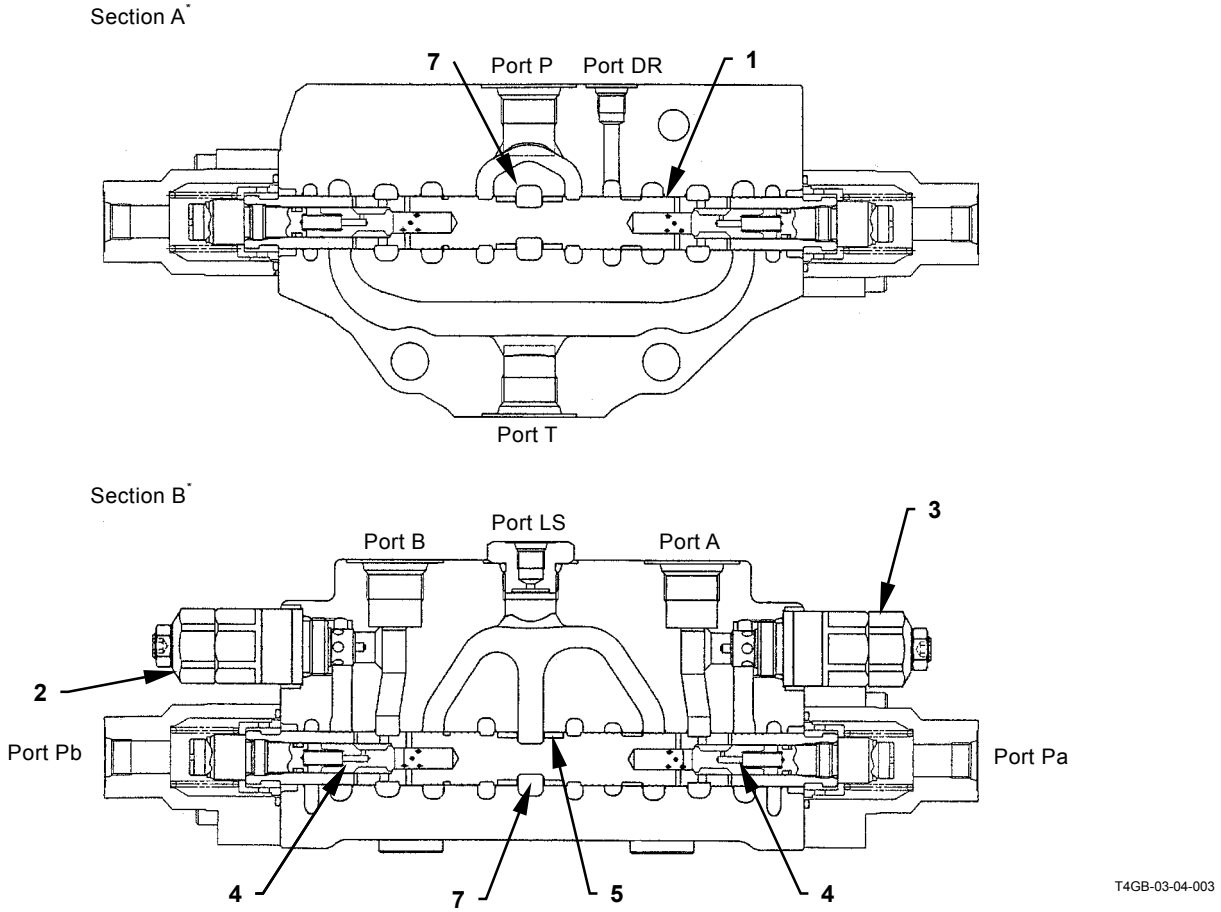
1 - Bucket Flow Rate Control Valve
2 - Negative Control Valve
3 - Overload Relief Valve (Bucket: Bottom Side)
4 - Overload Relief Valve (Bucket: Rod Side)
5 - Overload Relief Valve (Lift Arm: Bottom Side)
6 - Make-Up Valve (Lift Arm: Rod Side)
7 - Restriction Valve
8 - Low-Pressure Relief Valve
9 - Main Relief Valve
10 - Load Check Valve (Arm Lift Circuit)
11 - Load Check Valve (Bucket Circuit)



T4GB-03-03-002

1 - Shaft
2 - Thrust Plate
3 - Piston
4 - Cylinder Block
5 - Center Spring
6 - Valve Plate
7 - Flow Rate Adjustment Solenoid Valve
8 - Flow Rate Control Valve
9 - Relief Valve
10 - Reverse Rotation Control Solenoid Valve
11 - Reverse Rotation Spool
12 - Flow Rate Control Valve Spring

*: Refer to T3-3-1.



1 - Spool
2 - Overload Relief Valve
3 - Overload Relief Valve
4 - Load Check Valve
5 - Variable Orifice
6 - Fixed Orifice
7 - Passage A

*: Refer to T3-5-1

OPERATION

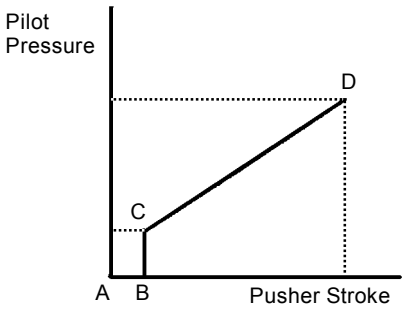
At Neutral (Pusher Stroke: Between A and B)

1. At the neutral position of the control lever, spool (7) completely blocks pressure oil of port P. As the outlet port is connected to port T through the notch part of spool (7), pressure at the output port is equal to pressure in the hydraulic oil tank.
2. When the control lever is moved slightly, cam (1) is tilted, and pusher (2) and spring guide (4) are pushed in. Pusher (2) and spring guide (4) remain mutually connected, move downward while compressing return spring (6).
3. At this time, spool (7) is pushed by balance spring (5) and moves downward until the clearance in part A becomes zero.
4. During this movement, the output port remains connected with port T and pressure oil is not supplied to the output port.

NOTE: The lever stroke during the period when part A becomes zero is the play of the control lever.

During Metering or Pressure Decrease (In Pusher Stroke: Between C and D)

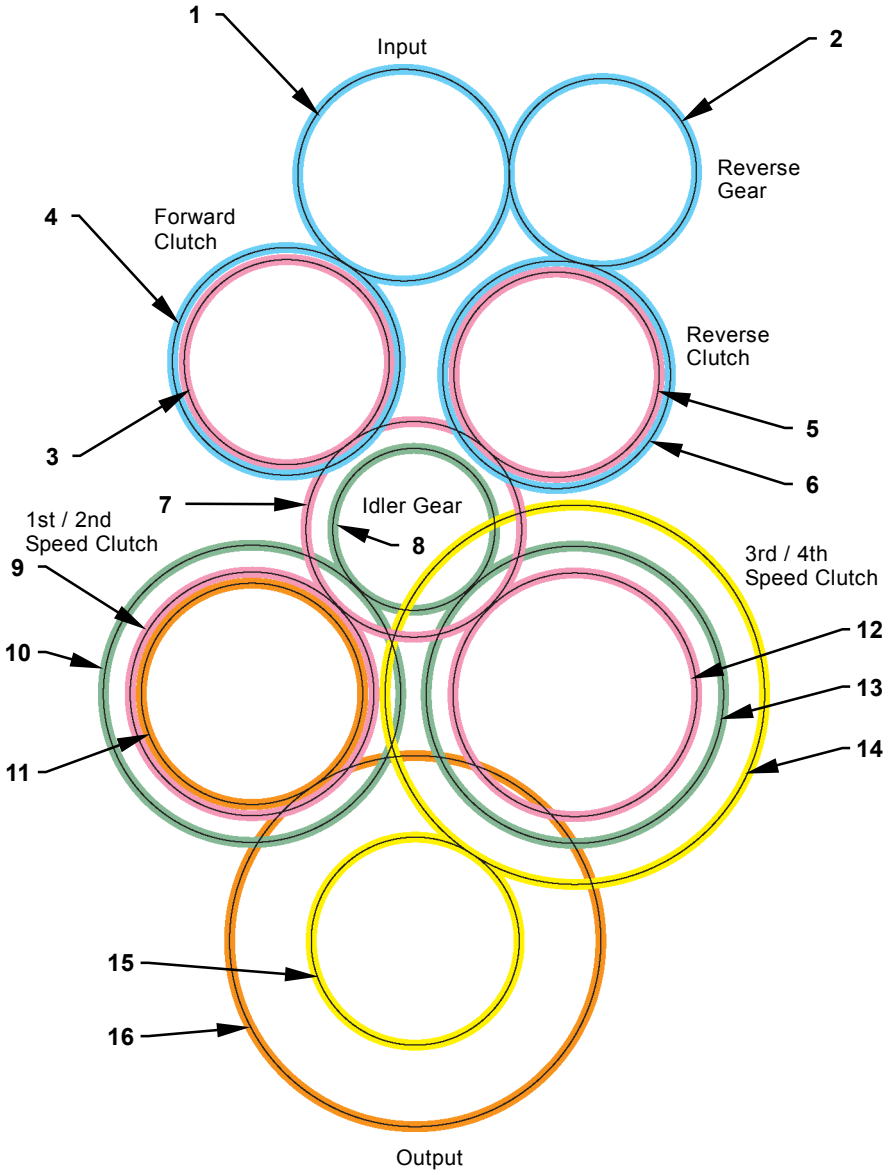
1. When the control lever is further tilted, the hole part on spool (7) is connected to notch part (B).
2. Pressure oil of port P flows into the output port through notch part (B) and the hole part on spool (7), and pressure at the output port is raised.
3. Pressure at the output port acts on the bottom of spool (7) and tends to push spool (7) upward.
4. In case the force pushing spool (7) upward is smaller than the spring force of balance spring (5), balance spring (5) is not compressed. Therefore, port P and the output port remain connected, and pressure at the output port keeps rising.
5. When pressure at the output port rises further, the force pushing spool (7) upward increases. If this force becomes larger than the force of balance spring (5), spool (7) moves upwards by compressing balance spring (5).
6. When spool (7) moves upward, notch part (B) closes and pressure oil stops flowing from port P to the output port. And pressure increase at the output port is stopped.
7. In this way, balance spring (5) is compressed by the amount spool (7) is pushed downward, and pressure at the output port is the balanced pressure acting on spool (7) and the spring force.



T1F3-03-09-004

Output Diagram

Transmission of Power



T4GC-03-09-002

1 - Input Gear
2 - Reverse Gear
3 - F-R Gear
4 - F Hub Gear
5 - F-R Gear
6 - R Hub Gear
7 - Idler Gear
8 - Idler Gear
9 - 2nd Speed Hub Gear
10 - 1st Speed Hub Gear
11 - Low-Range Gear
12 - 4th Speed Hub Gear
13 - 3rd Speed Hub Gear
14 - High-Range Gear
15 - Output Gear
16 - Output Gear