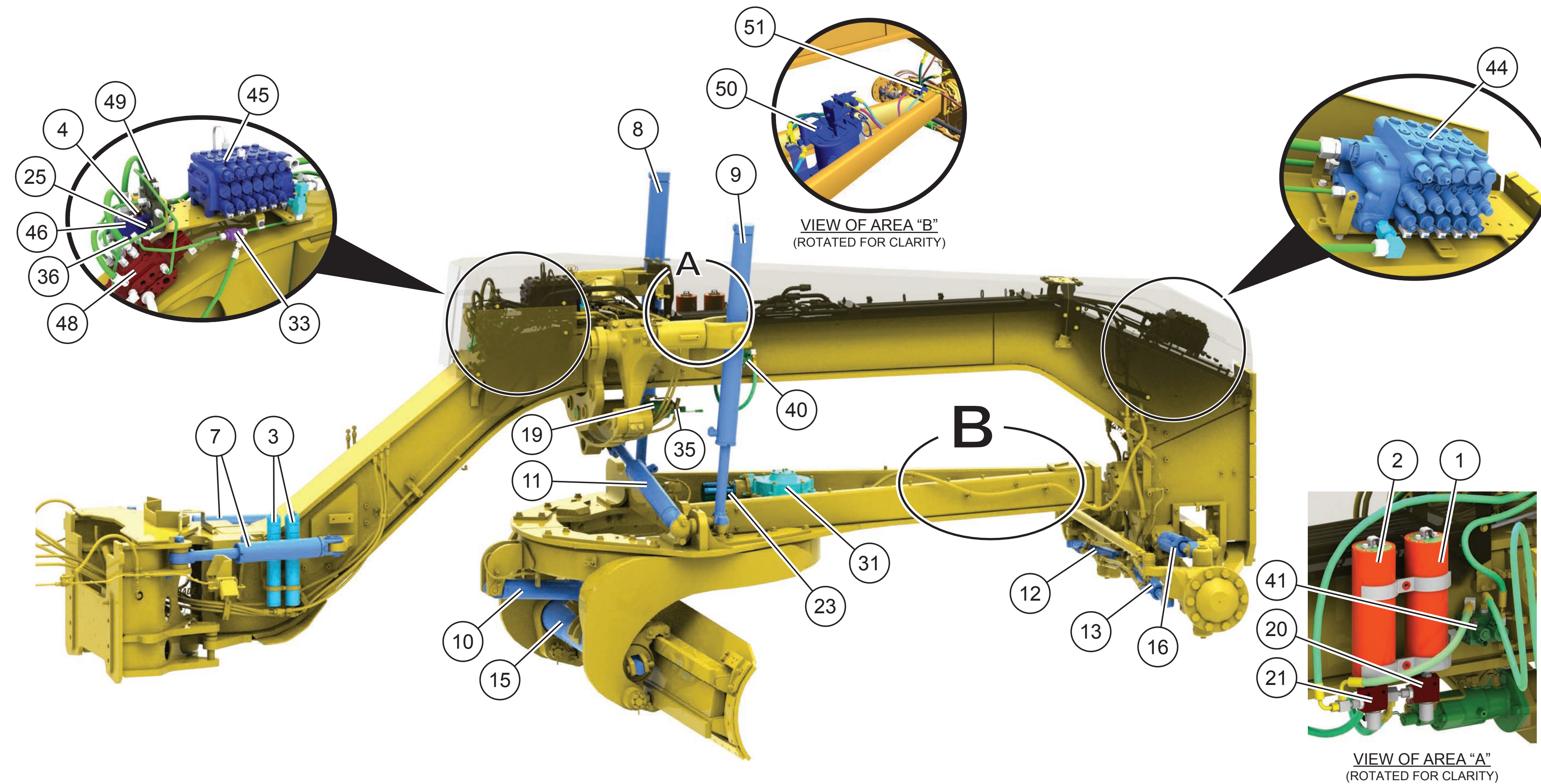




REN9033-06  
August 2017



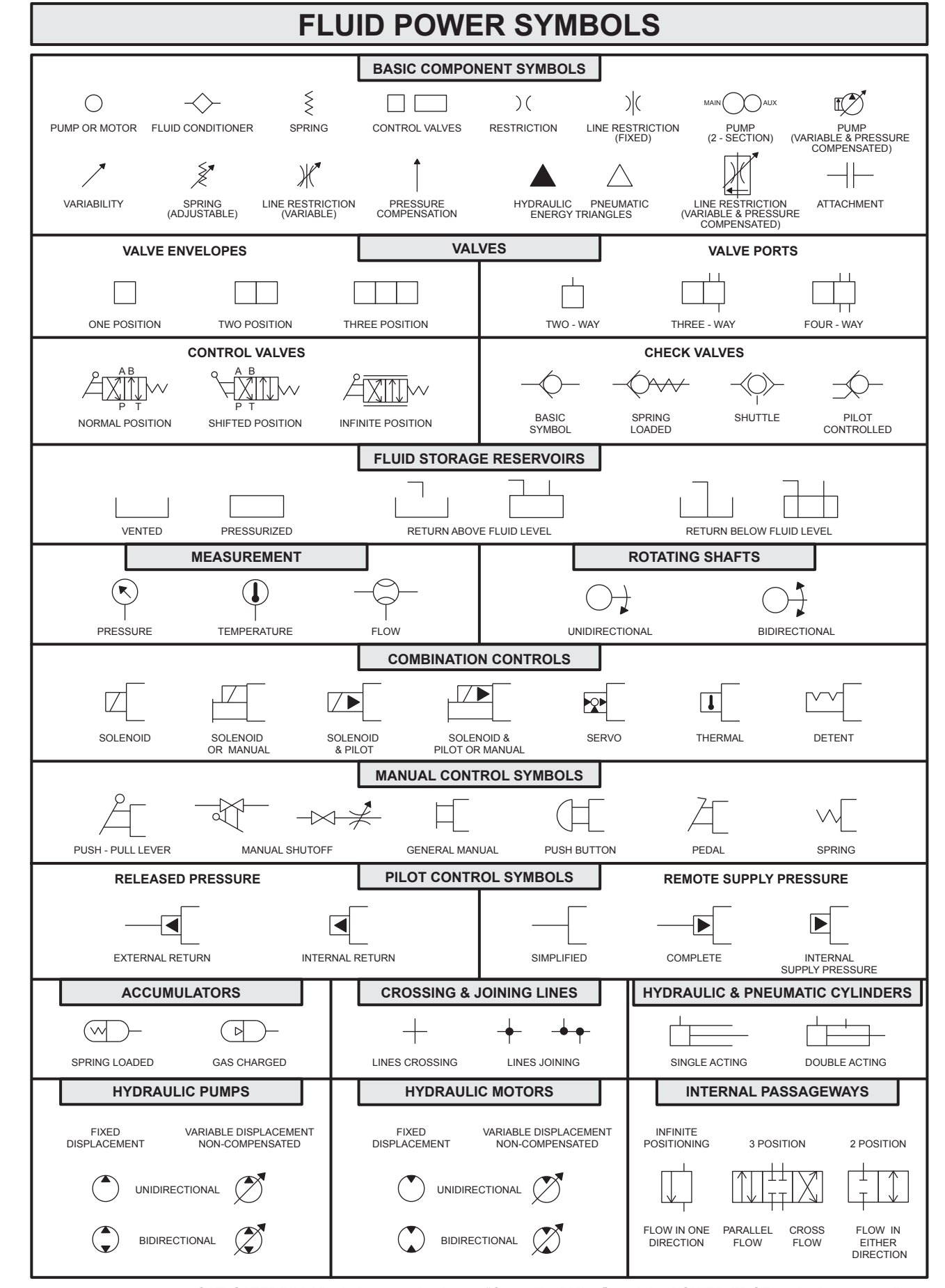
# Schematic

## 16M Motor Grader Hydraulic System

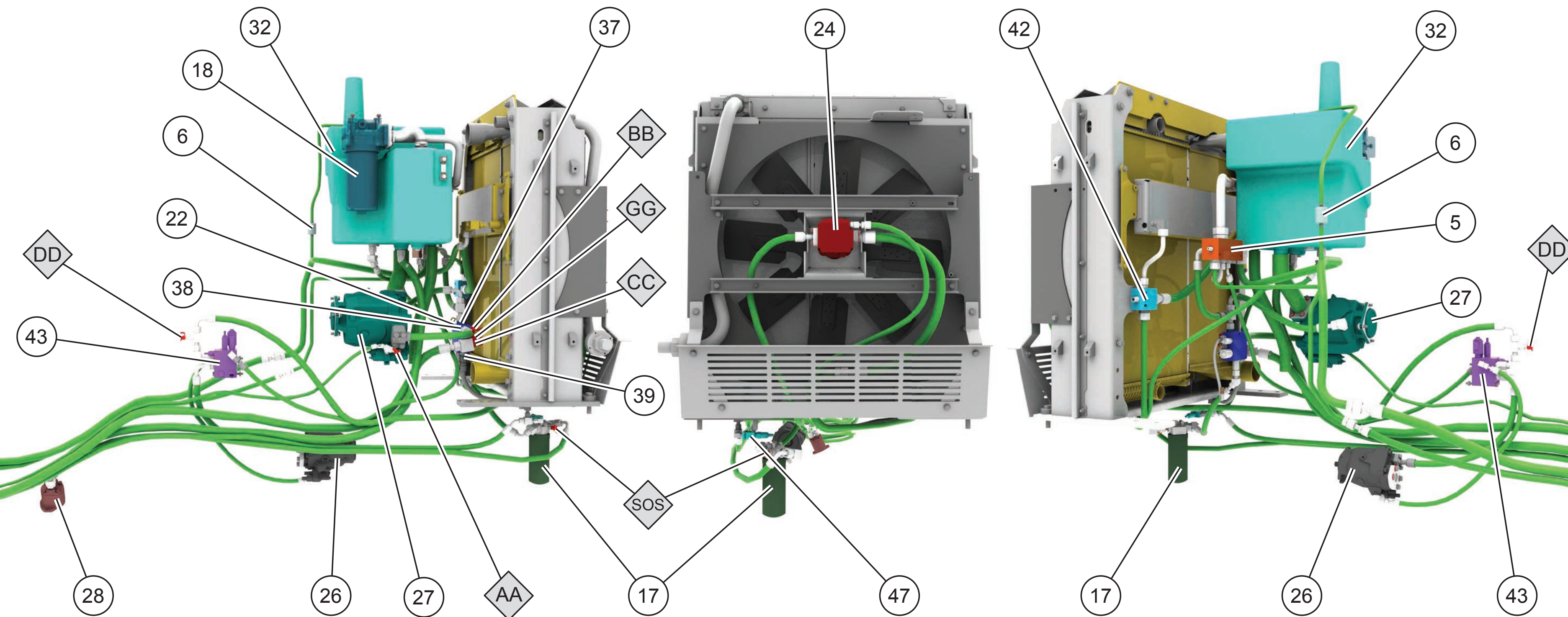
BMH1-UP  
RSH1-UP

Volume 1 of 2: Standard

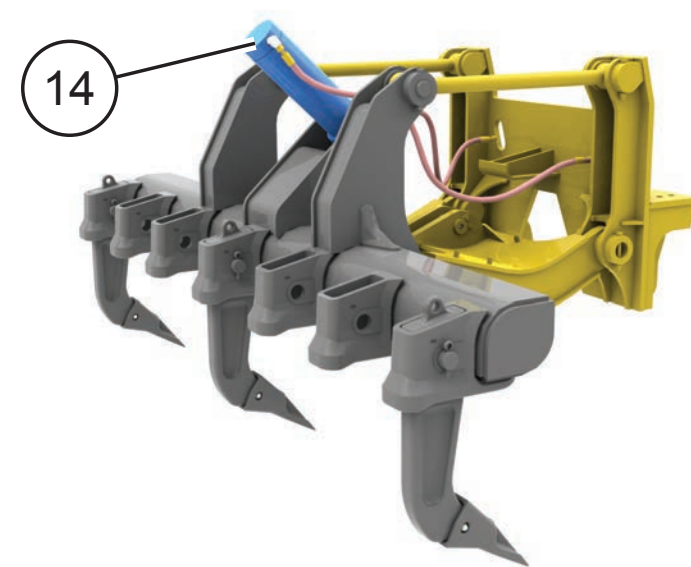
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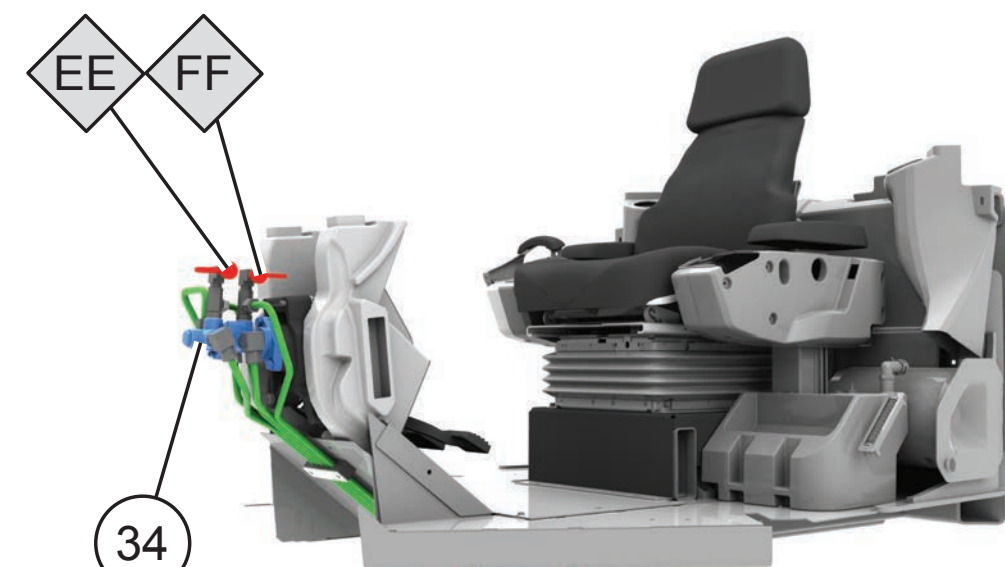
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HYDRAULIC TANK AND PUMP CIRCUIT



RIPPER

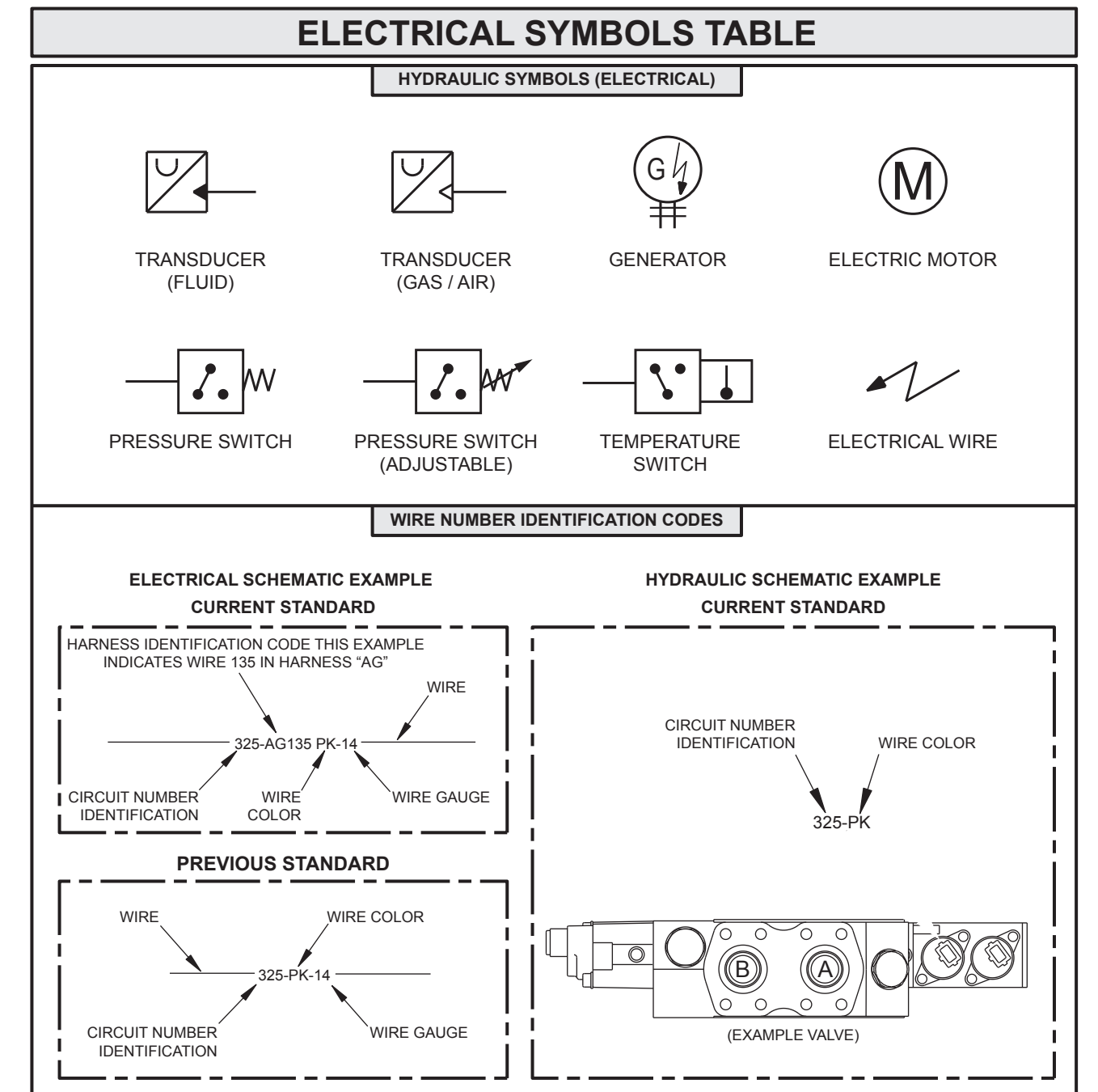


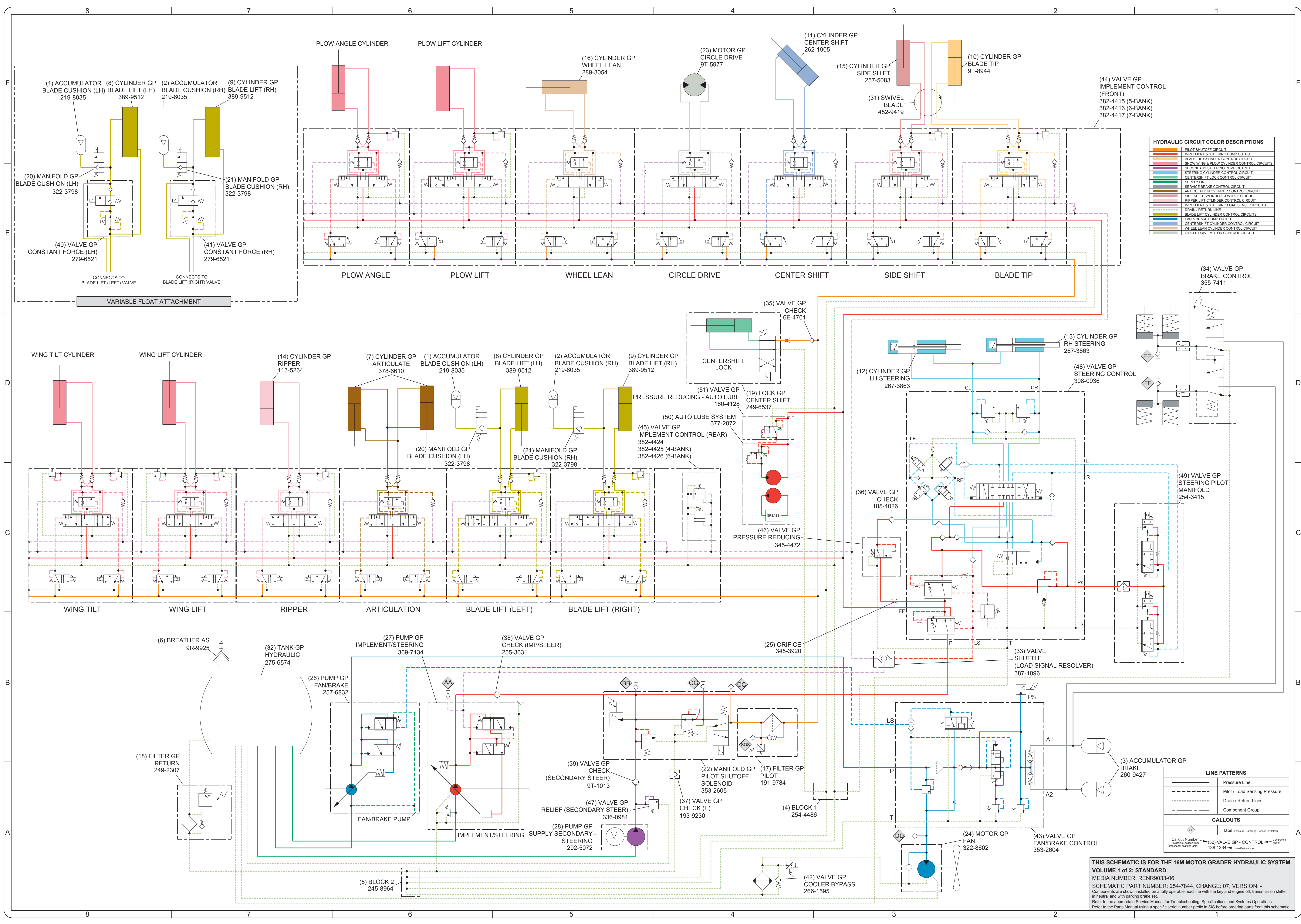
BRAKE CONTROL VALVE

Component Location - Volume 1			
Description	Part Number	Machine Location	Schematic Location
Accumulator - Blade Cushion (LH)	219-8035	1	D-5, F-8
Accumulator - Blade Cushion (RH)	219-8035	2	D-5, F-8
Accumulator Gp - DE Brake	260-9427	3	A-2, B-2
Block 1	254-4488	4	A-3
Block 2	245-8994	5	A-6
Brake As	285-8925	6	B-7
Cylinder Gp - Articulate	290-8074	7	D-6
Cylinder Gp - Blade LH (LH)	389-9512	8	D-5, F-8
Cylinder Gp - Blade LH (RH)	389-9512	9	D-5, F-7
Cylinder Gp - Blade Tip	37-8944	10	F-3
Cylinder Gp - Center Shift	282-1905	11	F-4
Cylinder Gp - LH Steering	287-3863	12	D-3
Cylinder Gp - RH Steering	287-3863	13	D-2
Cylinder Gp - Ripper	113-8264	14	D-7
Cylinder Gp - Side Shift	287-5083	15	F-3
Cylinder Gp - Wheel Lean	289-3054	16	F-5
Filter Gp - Pilot	391-8784	17	B-4
Filter Gp - Return	248-2307	18	A-7
Lock Gp - Center Shift	248-6537	19	D-4
Manifold Gp - Blade Cushion (LH)	322-3768	20	D-5, E-8
Manifold Gp - Blade Cushion (RH)	322-3768	21	D-5, E-7
Manifold Gp - Pilot Shutoff Solenoid	283-1790	22	B-4
Motor Gp - Circle Drive	37-8977	23	F-4
Motor Gp - Fan	322-9902	24	A-3
Orifice	345-3820	25	C-3
Pump Gp - Fan/Brake	257-6832	26	B-6
Pump Gp - Implement/Steering	339-7134	27	B-6
Pump Gp - Suppl Secondary Steering	292-5072	28	A-5
Swivel - Blade	452-9419	31	F-3
Tank Gp - Hydraulic	278-8574	32	B-7
Tank Gp - Lubrication	377-2072	33	D-4
Valve - Shuttle (Load Signal Resolver)	387-1066	33	B-3
Valve Gp - Brake Control	355-7411	34	D-1
Valve Gp - Check	185-4026	35	D-4
Valve Gp - Check	185-4026	36	C-3
Valve Gp - Check (E)	185-8230	37	A-4
Valve Gp - Check (Imp/Steer)	255-3631	38	B-5
Valve Gp - Check (Suppl Steer)	377-0213	39	A-5
Valve Gp - Constant Force (LH)	279-6521	40	E-8
Valve Gp - Constant Force (RH)	279-6521	41	E-7
Valve Gp - Cooler Bypass	289-1595	42	A-4
Valve Gp - Fan/Brake Control	333-3604	43	A-2
Valve Gp - Implement Control (Front)	(B-Bank) 382-4415 (C-Bank) 382-4416 (D-Bank) 382-4417 (E-Bank) 382-4424	44	E-2
Valve Gp - Implement Control (Rear)	(B-Bank) 382-4425 (C-Bank) 382-4426	45	C-4
Valve Gp - Pressure Reducing	382-4426	46	C-3
Valve Gp - Pressure Reducing (Autolube)	160-4128	51	D-4
Valve Gp - Relief (Suppl Steer)	338-0981	47	A-5
Valve Gp - Steering Control	358-0936	48	C-2
Valve Gp - Steering Pilot Manifold	254-3415	49	C-1

Always check component part numbers with Parts Manual for your specific machine.

Tap Location - Volume 1 Pressure and Sampling		
Tap Number	Description	Schematic Location
AA	Implement / Steering Pump Load Sense	B-6
BB	Implement / Steering Pump Pressure	B-5
CC	Imp/Supply Pressure	B-4
DD	Fan Motor Supply Pressure	A-3
EE	Service Brake LH Pressure	D-1
FF	Service Brake RH Pressure	D-1
GG	Pilot Shutoff Pressure	B-4
SOS	Hydraulic Oil Sampling	B-4





**HYDRAULIC CIRCUIT COLOR DESCRIPTIONS**

Red	PILOT SHUTOFF CIRCUIT
Orange	IMPLEMENT & STEERING PUMP OUTPUT
Yellow	BLADE TIP CYLINDER CONTROL CIRCUIT
Green	SNOW WING & PLOW CYLINDER CONTROL CIRCUITS
Blue	SECONDARY STEERING PUMP OUTPUT
Purple	STEERING CYLINDER CONTROL CIRCUIT
Light Blue	CENTERSHIFT LOCK CONTROL CIRCUIT
Dark Blue	SUPPLY LINE
Light Green	SERVICE BRAKE CONTROL CIRCUIT
Light Purple	ARTICULATION CYLINDER CONTROL CIRCUIT
Light Orange	SIDE SHIFT CYLINDER CONTROL CIRCUIT
Light Yellow	POWER LIFT CYLINDER CONTROL CIRCUIT
Light Red	IMPLEMENT & STEERING LOAD SENSE CIRCUITS
Light Blue	DRAIN / RETURN LINE
Light Green	BLADE LIFT CYLINDER CONTROL CIRCUITS
Light Purple	FAN & BRAKE PUMP OUTPUT
Light Blue	CENTERSHIFT CYLINDER CONTROL CIRCUIT
Light Orange	WHEEL LEAN CYLINDER CONTROL CIRCUIT
Light Yellow	CIRCLE DRIVE MOTOR CONTROL CIRCUIT

**LINE PATTERNS**

Red line	Pressure Line
Orange line	Pilot / Load Sensing Pressure
Green line	Drain / Return Lines
Blue line	Component Group

**CALLOUTS**

AA	Tap(s) Pressure, Sampling, Sensor, or Meter
BB	Control Location (to Component Location)
CC	Control Location (to Component Location)
DD	Control Location (to Component Location)
EE	Control Location (to Component Location)
FF	Control Location (to Component Location)
GG	Control Location (to Component Location)
HH	Control Location (to Component Location)
II	Control Location (to Component Location)
JJ	Control Location (to Component Location)
KK	Control Location (to Component Location)
LL	Control Location (to Component Location)
MM	Control Location (to Component Location)
NN	Control Location (to Component Location)
OO	Control Location (to Component Location)
PP	Control Location (to Component Location)
QQ	Control Location (to Component Location)
RR	Control Location (to Component Location)
SS	Control Location (to Component Location)
TT	Control Location (to Component Location)
UU	Control Location (to Component Location)
VV	Control Location (to Component Location)
WW	Control Location (to Component Location)
XX	Control Location (to Component Location)
YY	Control Location (to Component Location)
ZZ	Control Location (to Component Location)

THIS SCHEMATIC IS FOR THE 16M MOTOR GRADER HYDRAULIC SYSTEM  
VOLUME 1 of 2: STANDARD  
MEDIA NUMBER: REN9033-06  
SCHEMATIC PART NUMBER: 254-7844, CHANGE: 07, VERSION: -  
Components are shown installed on a fully operable machine with the key and engine off, transmission shifter in neutral and with parking brake set.  
Refer to the appropriate Service Manual for Troubleshooting, Specifications and Systems Operations.  
Refer to the Parts Manual using a specific serial number prefix in SIS before ordering parts from this schematic.



REN9033-06  
August 2017

# Schematic

## 16M Motor Grader Hydraulic System

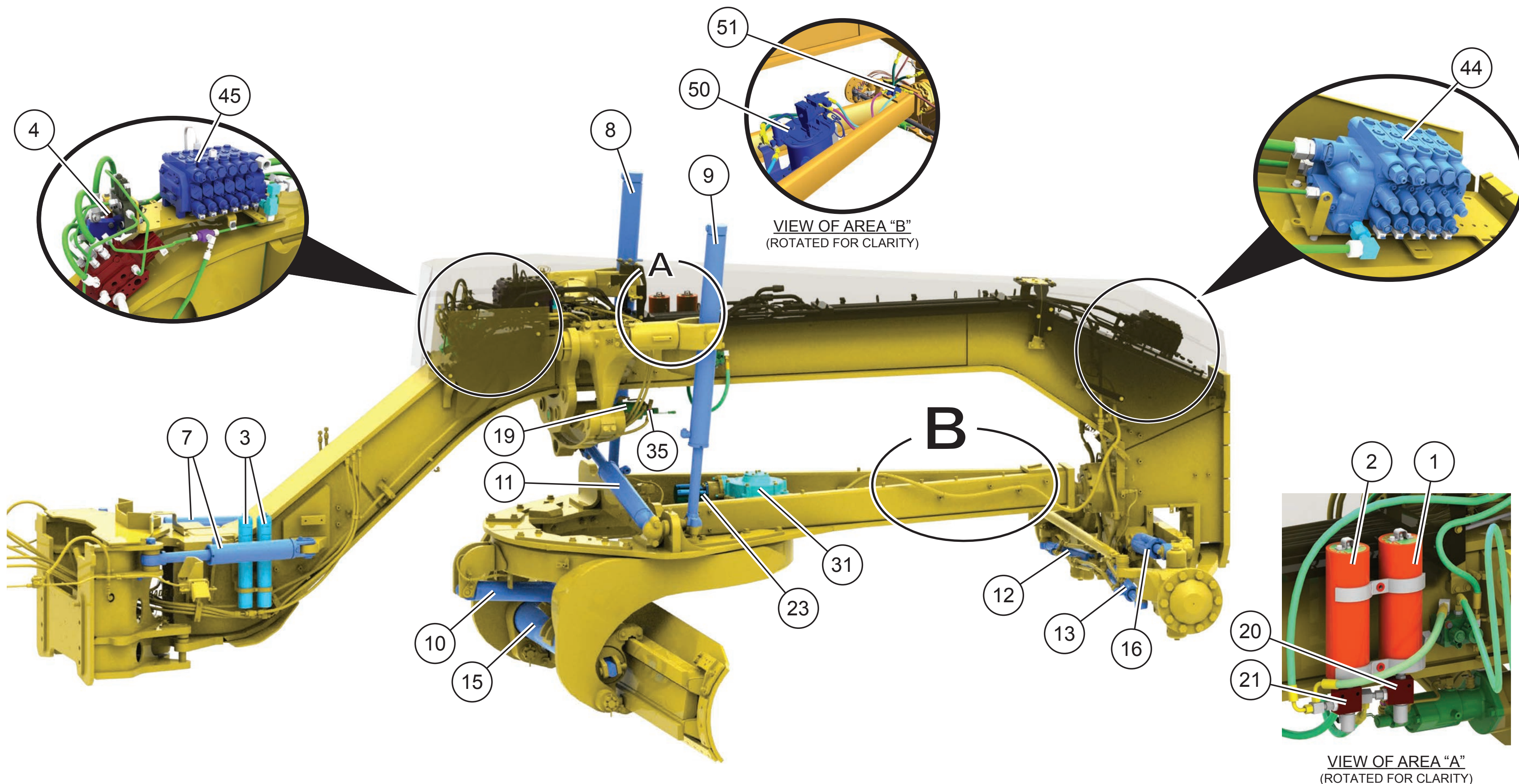
BSH1-UP  
RSH1-UP

Volume 2 of 2: Gen 2 Steering Kit Attachment

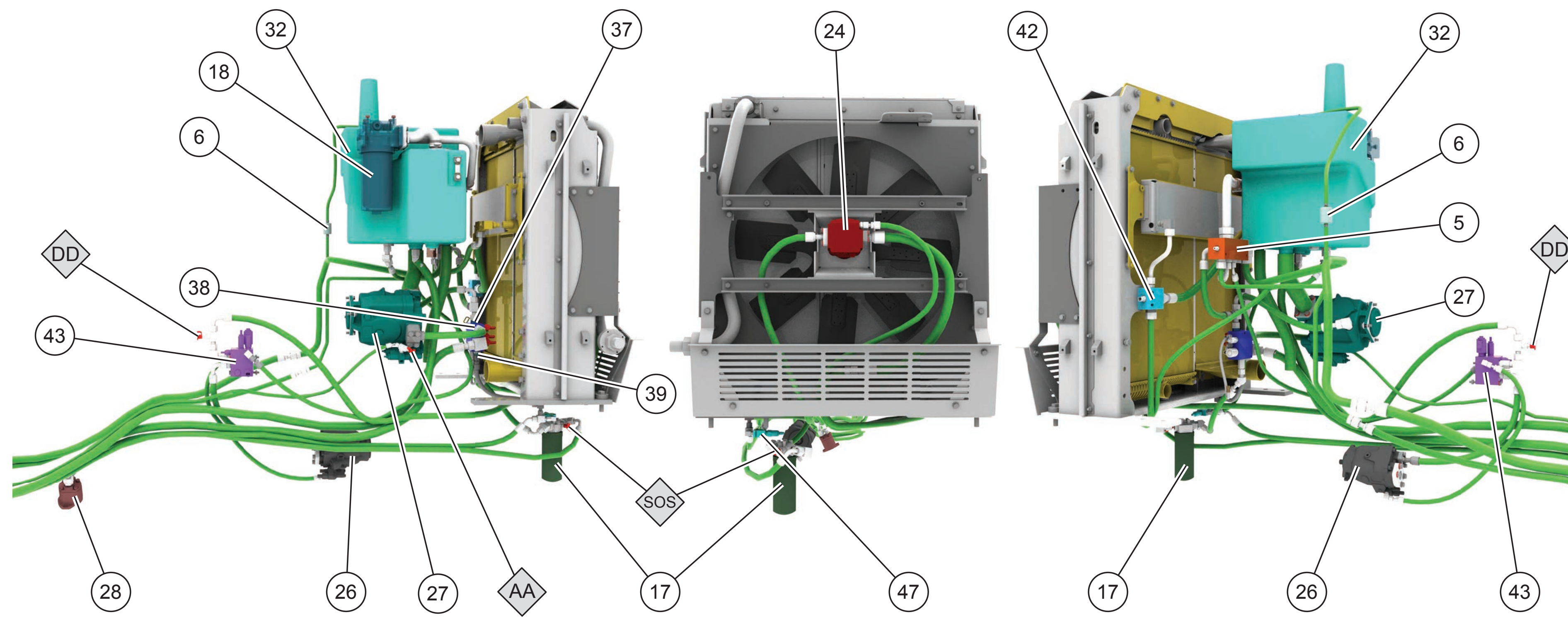
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FLUID POWER SYMBOLS			
BASIC COMPONENT SYMBOLS			
PUMP OR MOTOR	FLUID CONDITIONER	SPRING	CONTROL VALVES
RESTRICTION	RESTRICTION (FIXED)	PUMP (AVAILABLE & PRESSURE COMPENSATED)	RESTRICTION (ADJUSTABLE)
VARIABLE	SPRING (ADJUSTABLE)	LINE RESTRICTION (VARIABLE)	PRESSURE COMPENSATED
HYDRAULIC ENERGY TRANSFER	HYDRAULIC ENERGY TRANSFER	PNEUMATIC ENERGY TRANSFER	LINE RESTRICTION (AVAILABLE & PRESSURE COMPENSATED)
ATTACHMENT	ATTACHMENT	ATTACHMENT	ATTACHMENT
VALVE ENVELOPES		VALVES	
ONE POSITION	TWO POSITION	TWO-WAY	THREE-WAY
THREE POSITION	FOUR-WAY	FOUR-WAY	FOUR-WAY
CONTROL VALVES		CHECK VALVES	
NORMAL POSITION	SHIFTED POSITION	INFINITE POSITION	SHUTTLE
SPRING LOADED	SHUTTLE	SHUTTLE	SHUTTLE
SHUTTLE	SHUTTLE	SHUTTLE	SHUTTLE
FLUID STORAGE RESERVOIRS			
VENTED	RETURN ABOVE FLUID LEVEL	RETURN BELOW FLUID LEVEL	RETURN BELOW FLUID LEVEL
MEASUREMENT		ROTATING SHAFTS	
PRESSURE	TEMPERATURE	FLOW	UNIDIRECTIONAL
UNIDIRECTIONAL	BI-DIRECTIONAL	UNIDIRECTIONAL	BI-DIRECTIONAL
COMBINATION CONTROLS			
SOLENOID	SOLENOID & PLOT OR MANUAL	SOLENOID & PLOT OR MANUAL	SOLENOID & PLOT OR MANUAL
SOLENOID & PLOT OR MANUAL	SOLENOID & PLOT OR MANUAL	SOLENOID & PLOT OR MANUAL	SOLENOID & PLOT OR MANUAL
MANUAL CONTROL SYMBOLS			
PUSH-PULL LEVER	MANUAL SHUTOFF	GENERAL MANUAL	PUSH BUTTON
PEDAL	SPRING	SPRING	SPRING
RELEASED PRESSURE		PILOT CONTROL SYMBOLS	
EXTERNAL RETURN	INTERNAL RETURN	SIMPLIFIED	COMPLETE
COMPLETE	COMPLETE	COMPLETE	COMPLETE
ACCUMULATORS		CROSSING & JOINING LINES	
SPRING LOADED	GAS CHARGED	LINES CROSSING	LINES JOINING
LINES CROSSING	LINES JOINING	LINES CROSSING	LINES JOINING
HYDRAULIC PUMPS		HYDRAULIC & PNEUMATIC CYLINDERS	
FIXED DISPLACEMENT	VARIABLE DISPLACEMENT NON-COMPENSATED	FIXED DISPLACEMENT	VARIABLE DISPLACEMENT NON-COMPENSATED
UNIDIRECTIONAL	BI-DIRECTIONAL	UNIDIRECTIONAL	BI-DIRECTIONAL
UNIDIRECTIONAL	BI-DIRECTIONAL	UNIDIRECTIONAL	BI-DIRECTIONAL
INTERNAL PASSAGeways			
INFINITE POSITIONING	3 POSITION	2 POSITION	2 POSITION
FLOW IN ONE DIRECTION	PARALLEL FLOW	CROSS FLOW	FLOW IN EITHER DIRECTION

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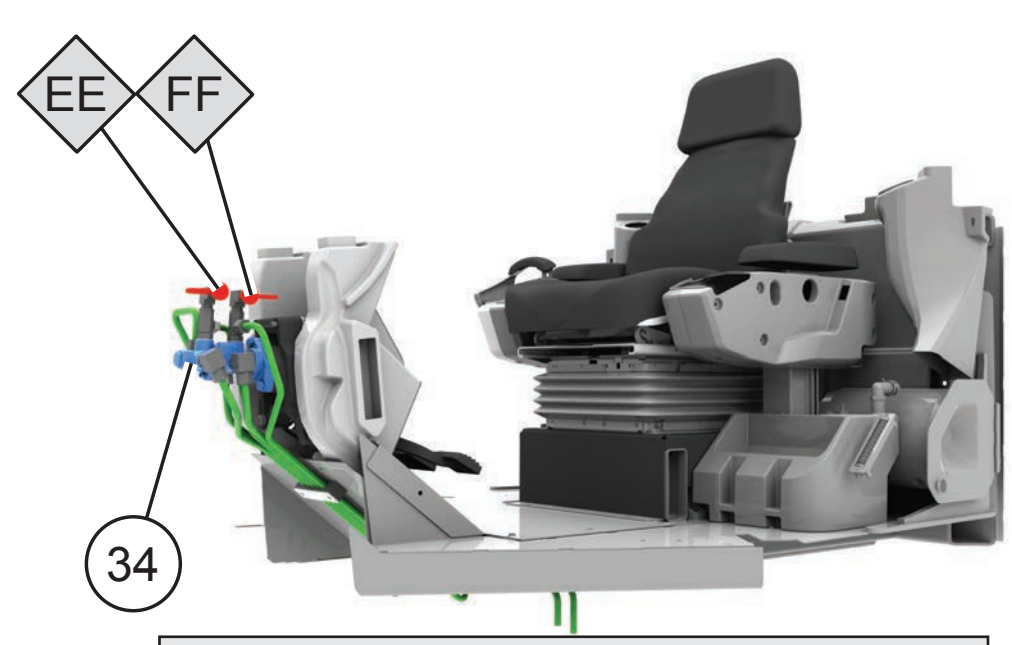
IMPLEMENT CONTROL VALVE AND CYLINDER CIRCUIT



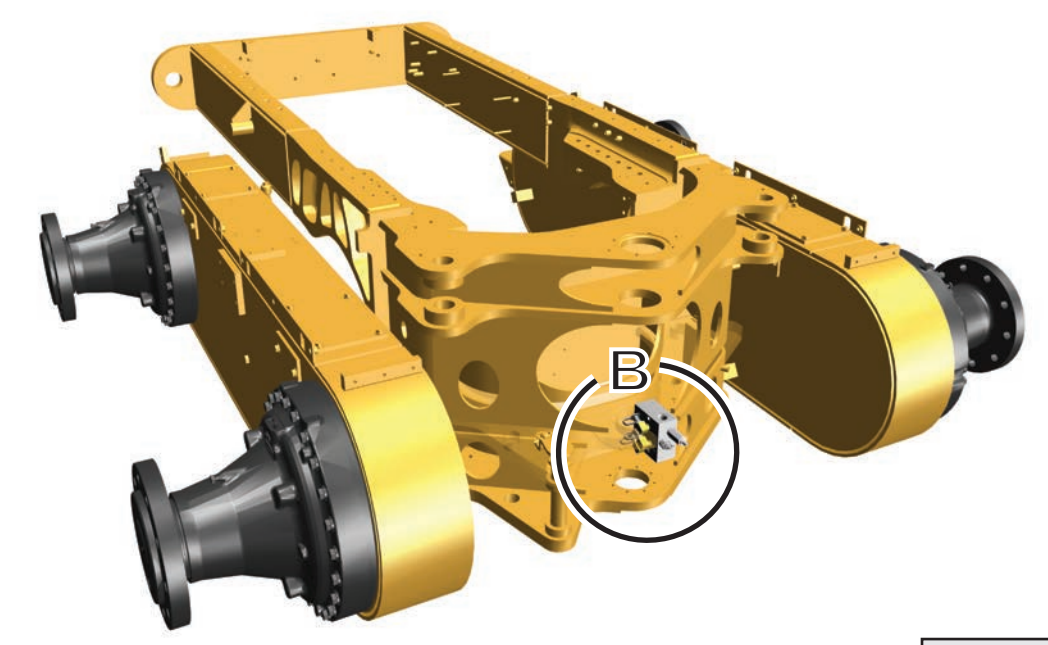
HYDRAULIC TANK AND PUMP CIRCUIT



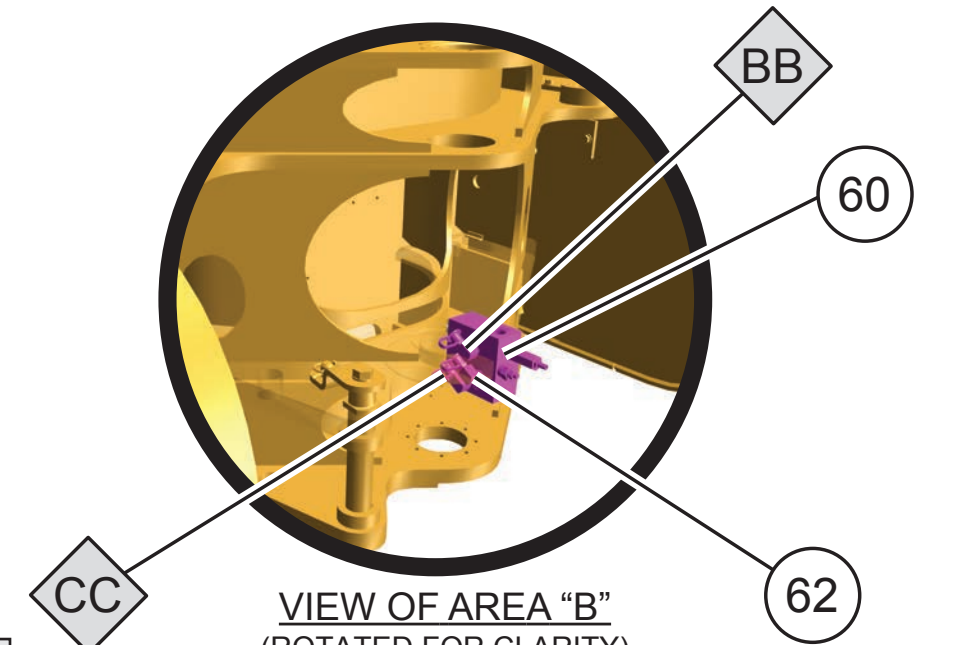
STEERING CONTROL CIRCUIT



BRAKE CONTROL VALVE



MANIFOLD CONTROL



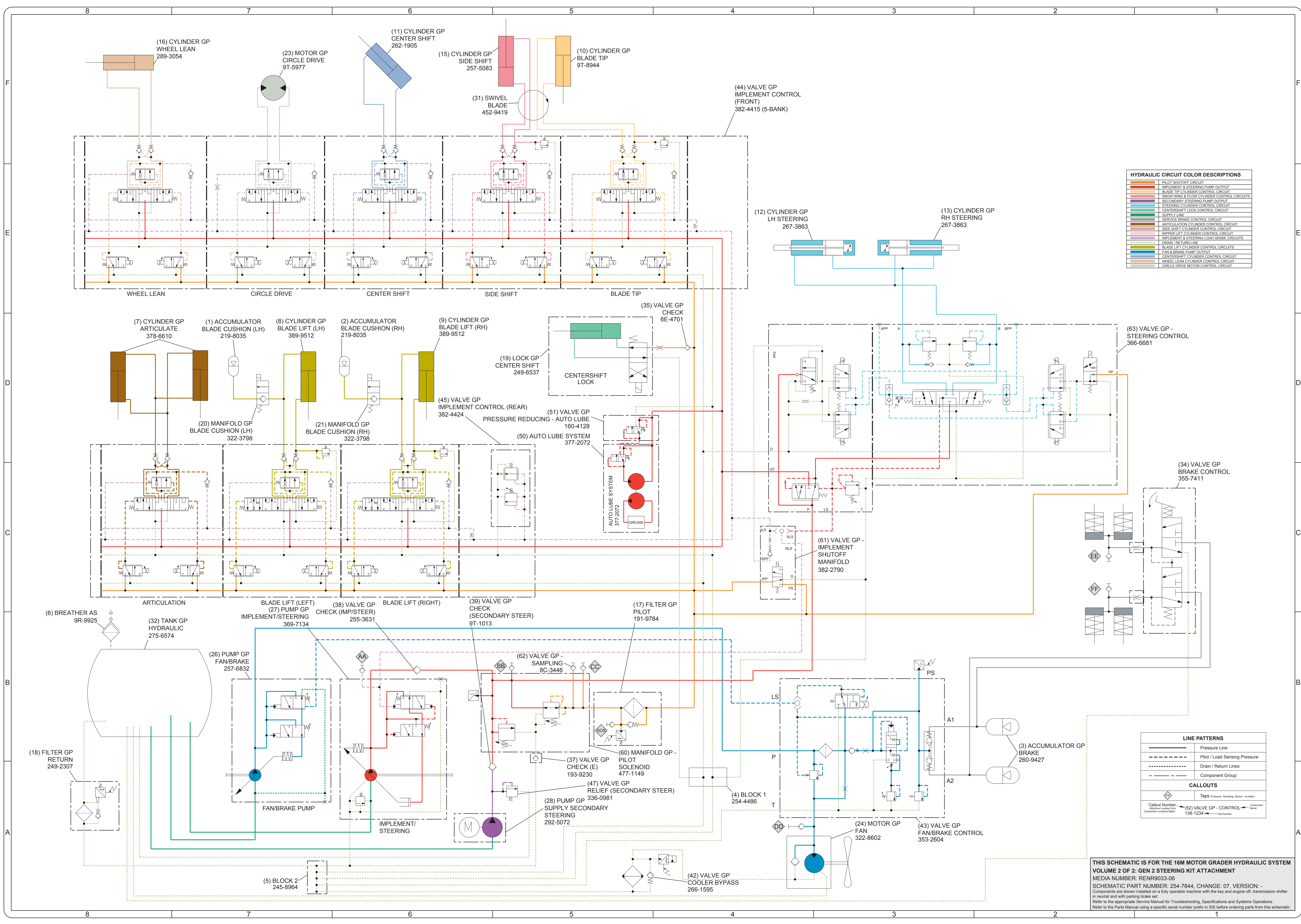
Component Location - Volume 2			
Description	Part Number	Machine Location	Schematic Location
Accumulator - Blade Cushion (LH)	219-8035	1	D-7
Accumulator - Blade Cushion (RH)	219-8035	2	D-8
Accumulator Gp - CE Brake	200-9837	3	A-2, B-2
Block 1	254-4486	4	A-7
Block 2	245-8964	5	A-7
Breather As	80-9925	6	B-8
Cylinder Gp - Articulate	200-8074	7	D-8, D-7
Cylinder Gp - Blade Lift (LH)	389-8512	8	D-7
Cylinder Gp - Blade Lift (RH)	389-8512	9	D-6
Cylinder Gp - Blade Tip	17-8944	10	F-5
Cylinder Gp - Center Shift	262-1905	11	F-8
Cylinder Gp - LH Steering	267-3883	12	E-4
Cylinder Gp - RH Steering	267-3883	13	E-3
Cylinder Gp - Side Shift	257-6983	15	F-6
Cylinder Gp - Wheel Lean	289-3054	16	F-8
Filter Gp - Pilot	191-9784	17	B-5
Filter Gp - Return	249-2017	18	A-8
Lock Gp - Center Shift	249-6537	19	D-5
Manifold Gp - Blade Cushion (LH)	322-3788	20	D-7
Manifold Gp - Blade Cushion (RH)	322-3788	21	D-6
Manifold Gp - Pilot Solenoid	471-1149	60	B-5
Motor Gp - Circle Drive	57-5077	23	F-7
Motor Gp - Fan	322-8602	24	A-3
Pump Gp - Fan/Brake	257-6632	26	B-7
Pump Gp - Implement/Steering	309-7134	27	B-4
Pump Gp - Suppl Secondary Steering	292-5072	28	A-5
Swivel - Blade	452-8419	31	F-5
Tank Gp - Hydraulic	275-6674	32	B-8
Tank Gp - Lubrication	377-2072	50	D-5
Valve Gp - Brake Control	358-7411	34	C-1
Valve Gp - Check	6E-4701	35	D-4
Valve Gp - Check (E)	193-8205	37	B-5
Valve Gp - Check (Imp/Steer)	255-3831	38	B-6
Valve Gp - Check (Suppl Steer)	9T-1013	39	A-4
Valve Gp - Cooler Bypass	268-1905	42	A-4
Valve Gp - Fan/Brake Control	353-2004	43	A-3
Valve Gp - Implement Control (Front)	382-4415	44	F-4
Valve Gp - Implement Control (Rear)	382-4424	45	C-5
Valve Gp - Implement Shuttle Manifold	382-2790	61	C-4
Valve Gp - Pressure Reducing (Aux/Brake)	160-4138	51	D-5
Valve Gp - Relief (Suppl Steer)	336-0981	47	A-5
Valve Gp - Sampling	8C-3446	62	B-5
Valve Gp - Steering Control	366-6681	63	D-2

Always check component part numbers with Parts Manual for your specific machine.

ELECTRICAL SYMBOLS TABLE			
HYDRAULIC SYMBOLS (ELECTRICAL)			
TRANSducer (FLUID)	TRANSducer (GAS / AIR)	GENERATOR	ELECTRIC MOTOR
PRESSURE SWITCH	PRESSURE SWITCH (ADJUSTABLE)	TEMPERATURE SWITCH	ELECTRICAL WIRE
WIRE NUMBER IDENTIFICATION CODES			
ELECTRICAL SCHEMATIC EXAMPLE CURRENT STANDARD		HYDRAULIC SCHEMATIC EXAMPLE CURRENT STANDARD	
<p>WIRE NUMBER IDENTIFICATION</p> <p>WIRE COLOR</p> <p>WIRE GAUGE</p> <p>325-AG135-PK-14</p>		<p>CIRCUIT NUMBER IDENTIFICATION</p> <p>WIRE COLOR</p> <p>325-PK</p>	
PREVIOUS STANDARD		EXAMPLE VALVE	
<p>WIRE NUMBER IDENTIFICATION</p> <p>WIRE COLOR</p> <p>WIRE GAUGE</p> <p>325-PK-14</p>		<p>(EXAMPLE VALVE)</p>	

Tap Location - Volume 2 Pressure and Sampling		
Tap Number	Description	Schematic Location
AA	Implement / Steering Pump Load Sense	B-6
BB	Implement / Steering Pump Pressure	B-5
CC	Pilot Supply Pressure	B-8
DD	Fan Motor Supply Pressure	A-4
EE	Service Brake LH Pressure	C-2
FF	Service Brake RH Pressure	C-2
SOS	Hydraulic Oil Sampling	B-6

REN9033-06 VOL 2 of 2  
30 Page, (Dimensions: 39 inches x 28 inches)



**HYDRAULIC CIRCUIT COLOR DESCRIPTIONS**

- PILOT SHUTOFF CIRCUIT
- IMPLEMENT & STEERING PUMP OUTPUT
- BLADE TIP CYLINDER CONTROL CIRCUIT
- SNOW WING & FLOW CYLINDER CONTROL CIRCUITS
- SECONDARY STEERING PUMP OUTPUT
- STEERING CYLINDER CONTROL CIRCUIT
- CENTERSHIFT LOCK CONTROL CIRCUIT
- SUPPLY LINE
- SERVICE BRAKE CONTROL CIRCUIT
- ARTICULATION CYLINDER CONTROL CIRCUIT
- SIDE SHIFT CYLINDER CONTROL CIRCUIT
- RIPPER LIFT CYLINDER CONTROL CIRCUIT
- IMPLEMENT & STEERING LOAD SENSE CIRCUITS
- DRAIN / RETURN LINE
- BLADE LIFT CYLINDER CONTROL CIRCUITS
- FAN & BRAKE PUMP OUTPUT
- CENTERSHIFT CYLINDER CONTROL CIRCUIT
- WHEEL LEAN CYLINDER CONTROL CIRCUIT
- CIRCLE DRIVE MOTOR CONTROL CIRCUIT

**LINE PATTERNS**

- Pressure Line
- Pilot / Load Sensing Pressure
- Drain / Return Lines
- Component Group

**CALLOUTS**

- TAPS (Pressure, Sampling, Sensor - by letter)
- Callout Number (Main Location/Steer)
- (52) VALVE GP - CONTROL
- 138-1234 (Part Number)

**THIS SCHEMATIC IS FOR THE 16M MOTOR GRADER HYDRAULIC SYSTEM**  
**VOLUME 2 OF 2: GEN 2 STEERING KIT ATTACHMENT**  
 MEDIA NUMBER: REN9033-06  
 SCHEMATIC PART NUMBER: 254-7844, CHANGE: 07, VERSION: -  
 Components are shown installed on a fully operable machine with the key and engine off, transmission shifter in neutral and with parking brake set.  
 Refer to the appropriate Service Manual for Troubleshooting, Specifications and Systems Operations.  
 Refer to the Parts Manual using a specific serial number prefix in SIS before ordering parts from this schematic.