KOBELCO

SERVICE MANUAL

HYDRAULIC EXCAVATOR

SK09SR

S5PA0001E 02

APPLICABLE:
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3.9 DOZER AND ADJUSTABLE CRAWLER FRAME WIDTH OPERATING CIRCUIT

- The operation is conducted by the operating lever, which drives the cable.
- Dozer / Crawler width operations are selected with shifting selector valve.

3.9.1 Dozer Lowering Operating Circuit

(1) Dozer Operation

Put the shifting lever provided under the operator seat, to down side. Then shift the selector valve provided on the swivel joint (6), to dozer side.

When the operating lever is pushed forward, the dozer spool in control valve (1) is shifted by the pulling up motion of the cable. Since the pilot oil pressure is not utilized for it, as the same case as the swing, this is activated regardless to the safety lock lever.

(2) Main Circuit

1) Supply Circuit for Cylinder (11)

The oil discharged from P1 port on variable pump in pump assy (2) enters into P1 port on control valve (1), and is led to A5 port through dozer valve. The pressurized oil passed through swivel joint (6) is supplied to H side of dozer cylinder (11) to activate dozer lowering motion.

2) Prevention of Dozer Lowering due to its own Weight

A check valve opening at 14 kg/cm² (200 psi) is provided in the return circuit of dozer valve on control valve (1). Therefore, if the dozer operating lever is operated while the engine is at a standstill, the dozer does not lower due to its own weight, because the oil pressure corresponding to the dozer weight is less than 14 kg/cm² (200 psi).

3.9.2 Adjustable Crawler Frame Width (Crawler width) Operating Circuit

Put the selector valve on swivel joint (6) to crawler width side (shifting lever is raised upper side). As same as dozer operating lever, when the operating lever is pushed forward, pressurized oil is supplied to H side [R side] of adjusting cylinder (12) to expand [retract] the crawler width. The reverse operation of the lever results to the retraction [expansion] of crawler width.

For the crawler width adjusting operation, the machine must be lifted up with the attachment and dozer to make the crawler shoes at free conditions.

Note : The explanation in [ ] are applicable for the following Machine Nos.
SK09SR : PA02-01827~

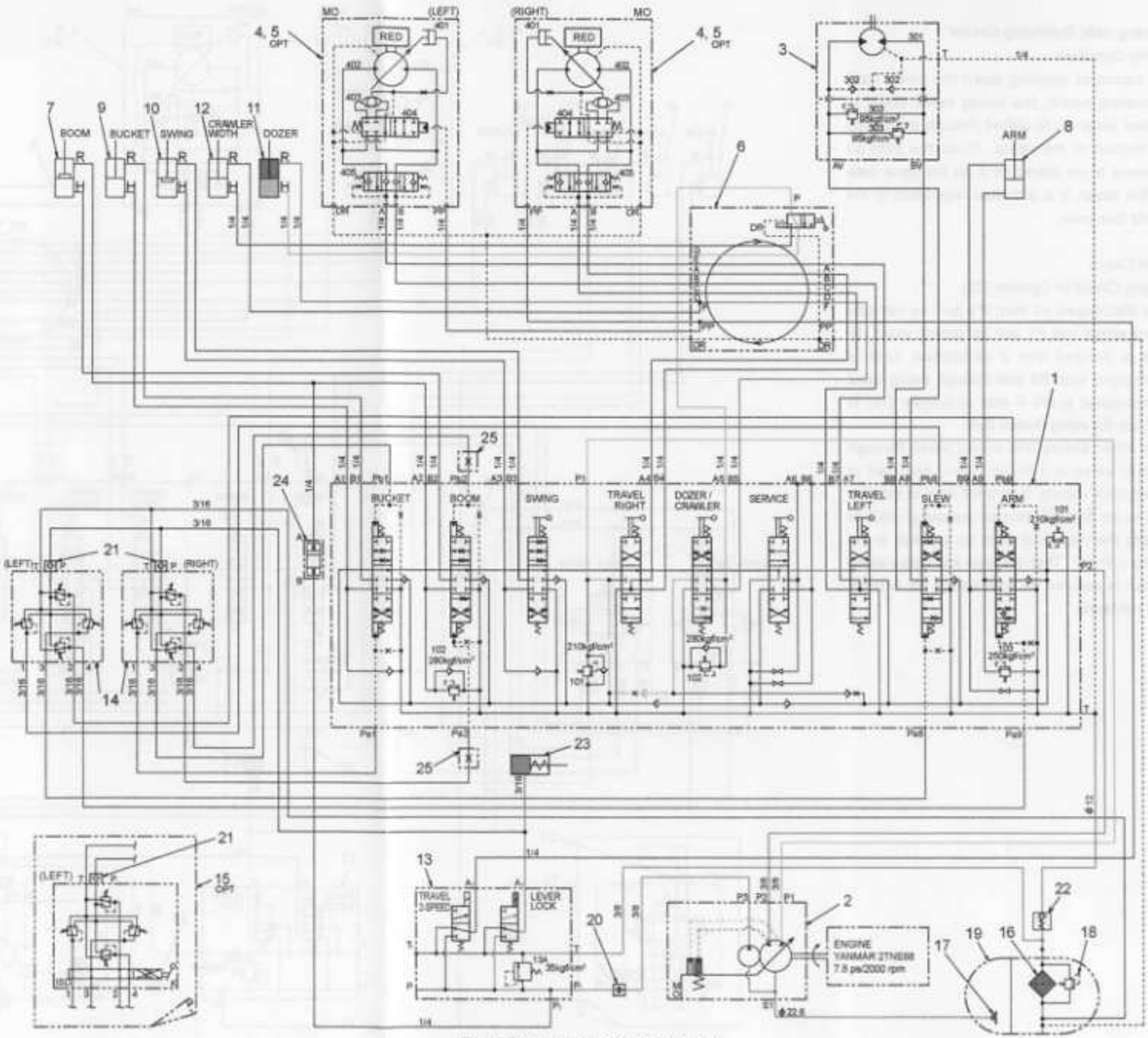


Fig.12 Dozer lowering operation circuit

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(2) Relief Valve

Troubled Condition	Possible Causes	Remedy
Pressure does not rise at all	1. Seizure on main poppet, sleeve or pilot poppet which is kept at opened condition, or dust is caught by valve seat	Check each poppet if dust is caught into sliding part. Confirm smooth and light sliding on each part. Clean up all parts.
Relief pressure is unstable	1. Defect on seat of pilot poppet	Replace defective parts.
	2. Seizure of piston main with main poppet	Remove defects on surface. Clean up all parts.
Relief pressure is abnormal	1. Worn-out due to dust	Replace worn-out parts.
	2. Loosening of lock nut and adjuster	Readjust pressure, and tighten lock nut with specified torque
Oil leakage	1. Failure on each seat. Worn-out of O-ring	Replace defective or worn-out parts. Confirm smooth and light sliding of each part.
	2. Seizure on each part due to dust	Check each part for scratches and notches, or forein material. Clean up all parts.

(3) General Matters for Hydraulic System

Troubled Condition	Possible Causes	Remedy
Hydraulic system does not operate properly or does not operate at all.	1. Failure on pump	Check pressure, or replace pump
	2. Failure on relief valve	Check relief valve as per maintenance procedures, or replace pump to new one.
	3. Failure on cylinder, etc.	Repair or replace defective cylinder.
	4. Too heavy load	Check pressure in circuits.
	5. Cracks on valve	Replace valve as assembly.
	6. Spool does not move up to stroke end	Check spool movement and operating linkage.
	7. Too low oil level in tank	Replenish tank with hydraulic oil
	8. Clogging of filter in circuit	Make clean filter, or replace filter to new one.
	9. Choke of piping in circuit	Check piping for choke.

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1. Specifications and Performance

1-1 2TNE68

* **Output conditions:** Intake back pressure ≤ 250 mmAq, Exhaust back pressure ≤ 550 mmAq, other conditions complying with JIS D 1005-1986. After minimum 30 hour's run-in.

	Item		Model / Unit	2TNE68										
SPECIFICATIONS	Application		—	VM						CH		VH		
	Type		—	Vertical, 4-cycle water-cooled diesel engine										
	Combustion system		—	Special swirl pre-combustion chamber										
	No. of cylinders – Bore × Stroke		mm	2 – 68 × 72										
	Displacement		ℓ	0.523										
	Firing order		—	1 – 2										
	Revolution speed		rpm	2000	2200	2400	2600	2800	3000	3000	3600	3200	3400	3600
	Output*	Continuous rating	kW(HP)	—	—	—	—	—	—	7.72 (10.5)	9.12 (12.4)	—	—	—
		Max. rating	kW(HP)	5.74 (7.8)	6.25 (8.5)	6.84 (9.3)	7.43 (10.1)	7.94 (10.8)	8.46 (11.5)	8.46 (11.5)	10.0 (13.6)	8.68 (11.8)	9.19 (12.5)	9.64 (13.1)
	Max. revolution speed at no load		rpm	2180$^{-50}_{0}$	2375$^{-50}_{0}$	2570$^{-50}_{0}$	2780$^{-50}_{0}$	2970$^{-50}_{0}$	3180$^{-50}_{0}$	3180$^{-50}_{0}$	3780$^{-50}_{0}$	3425$^{-50}_{0}$	3640$^{-50}_{0}$	3850$^{-50}_{0}$
	Min. revolution speed at no load			≤800						≤1500		≤800		
	Direction of rotation		—	Counterclockwise (viewed from flywheel)										
	Power take off		—	Flywheel										
	Compression ratio		—	23.0										
	Fuel injection timing (FID, b.T.D.C.)		deg	14±1						16±1				
	Compression pressure		MPa (kgf/cm²)	3.24±0.1 (33±1), at 250 rpm										
	Fuel injection pressure		MPa (kgf/cm²)	11.8$^{+1.0}_{0}$ (120$^{+10}_{0}$)										
	Recommended diesel gas oil		—	ISO 8217 DMA, BS 2869 A1 or A2 (Cetane No. 45 min.)										
	Lubrication system		—	Forced lubrication with trochoid pump										
	Lubricating oil capacity Max/Effective		ℓ	1.6/0.6						2.3/1.0				
	Recommended lubricating oil		—	API grade CC class or higher										
	Cooling system		—	Liquid cooling/Radiator										
	Cooling water capacity		ℓ	0.6 (for engine only)										
	Cooling fan No. of blade × dia.		mm	Discharge type, 5 × φ290										
	Crank V-pulley dia./ Fan V-pulley dia.		mm	φ95/φ85										
	Governor		—	Mechanical centrifugal governor (All speed type)										
	Starting system		—	Electrical										
	*1 Dimensions L × W × H		mm	373.5 × 417 × 498 / 383.5 × 417 × 498						383.5 × 409 × 540		373.5 × 417 × 540 / 383.5 × 417 × 540		
	*1 Dry weight		kg	55 / 65						65		55 / 65		
PERFORMANCE	Governing performance (full speed range)	Transient speed difference	%	≤12						≤10		≤12		
		Steady state speed band	%	≤9	≤8	≤7		≤6		≤5		≤7		
		Recovery time	sec	≤6										
		Fluctuation of revolution	rpm	≤30						≤20		≤30		
	L.O. press.	Rated operation	MPa (kgf/cm²)	0.25±0.05 (2.5±0.5)		0.29±0.05 (3.0±0.5)			0.34±0.05 (3.5±0.5)					
		Idling		≥0.06 (≥0.6)										

*1. Designation of engine dimension and dry weight in numerals.
CL/CH application: engine with flywheel housing
VM/VH application: engine with back plate/with flywheel housing

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3.6 BOOM OPERATING CIRCUIT

The operation is conducted by the pilot oil pressure.

3.6.1 Boom Raising Operating Circuit

(1) Pilot Circuit

1) Boom Spool Shifting

When the operating lever is put at boom raising position, the pilot secondary pressure oil is discharged from pilot valve (14). The pressurized oil entered into Pb2 port on control valve (1) shifts the boom valve spool to connect the circuits for variable pump and boom cylinder.

(2) Main Circuit

1) Supply Circuit for Cylinder (7)

The oil discharged from P1 port on variable pump of pump assy (2) enters into P1 port on control valve (1). The oil discharged from B2 port through boom valve is supplied to H side of boom cylinder (7) to raise the boom.

3.6.2 Boom Lowering Operating Circuit

(1) Pilot Circuit

1) Boom Spool Shifting

When the operating lever is put at boom lowering position, the pilot secondary pressure oil is discharged from pilot valve (14), and enters into Pa2 port on control valve (1) to shift the boom valve spool.

(2) Main Circuit

1) Supply Circuit for Cylinder (7) and Return Oil Circuit

The pressurized oil discharged from P1 port on variable pump is led to boom valve provided on control valve (1), and supplied to R side of boom cylinder (7) to lower the boom. The oil returned from H side of cylinder (7) enters into B2 port on control valve (1), and returns to the tank through boom valve. And to prevent rapid lowering of the boom at single operation for the boom, a flow rate restricting (by-pass) mechanism is provided on the spool of boom valve, as same as in the slew valve and swing valve.

3.6.3 Damper Cylinder (24)

Applicable Machine Nos.
PA02-00101~01826

The damper cylinder (24) is connected to pressure oil side of pilot valve and rod side of boom cylinder (7), and has a function so called accumulator effect to restrict and attenuate the pressure variation of rod side.

Especially, this effectively acts for shock absorption and anti-hunt at stop of boom raising or lowering.

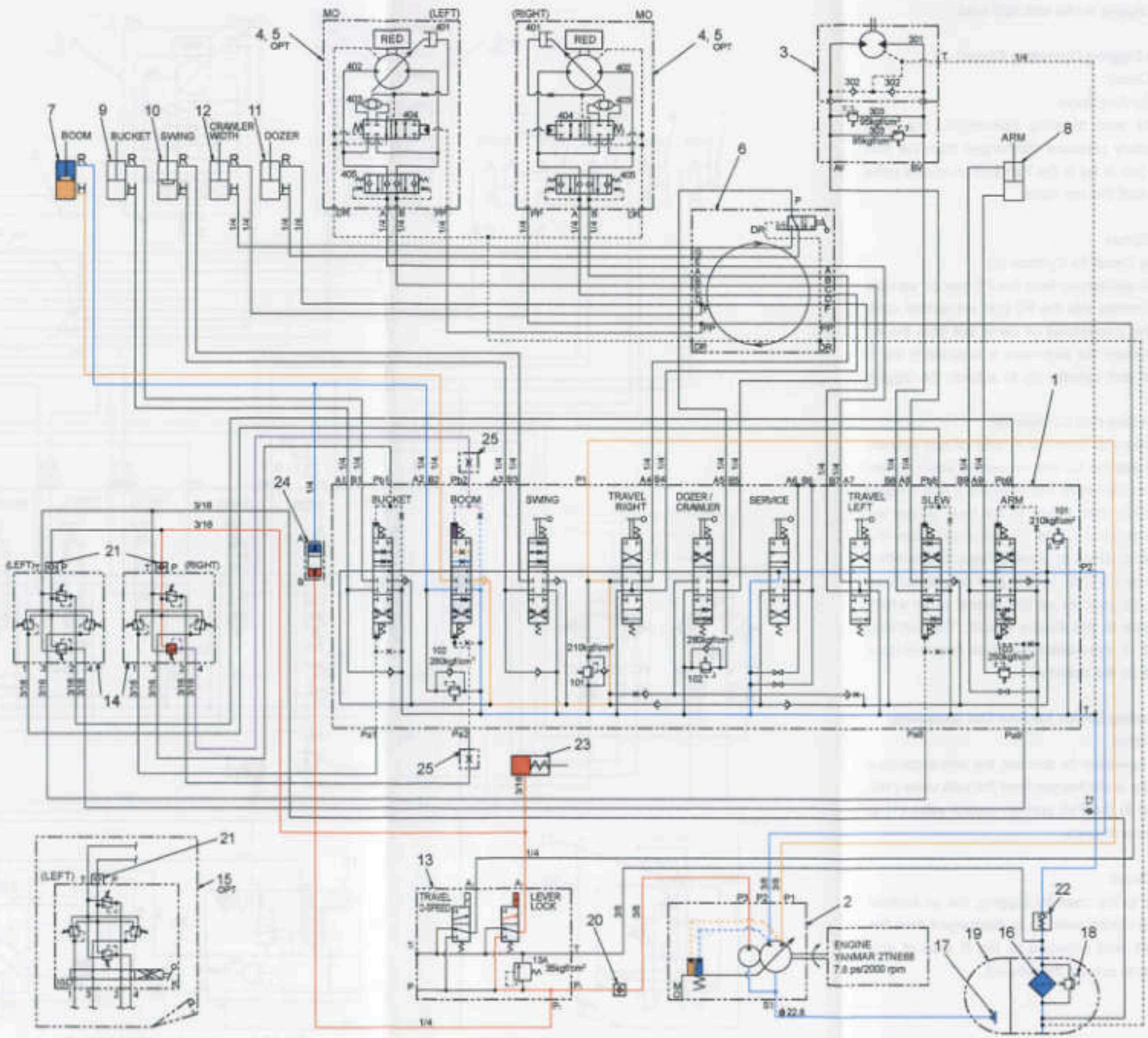


Fig.9 Boom raising operating circuit

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