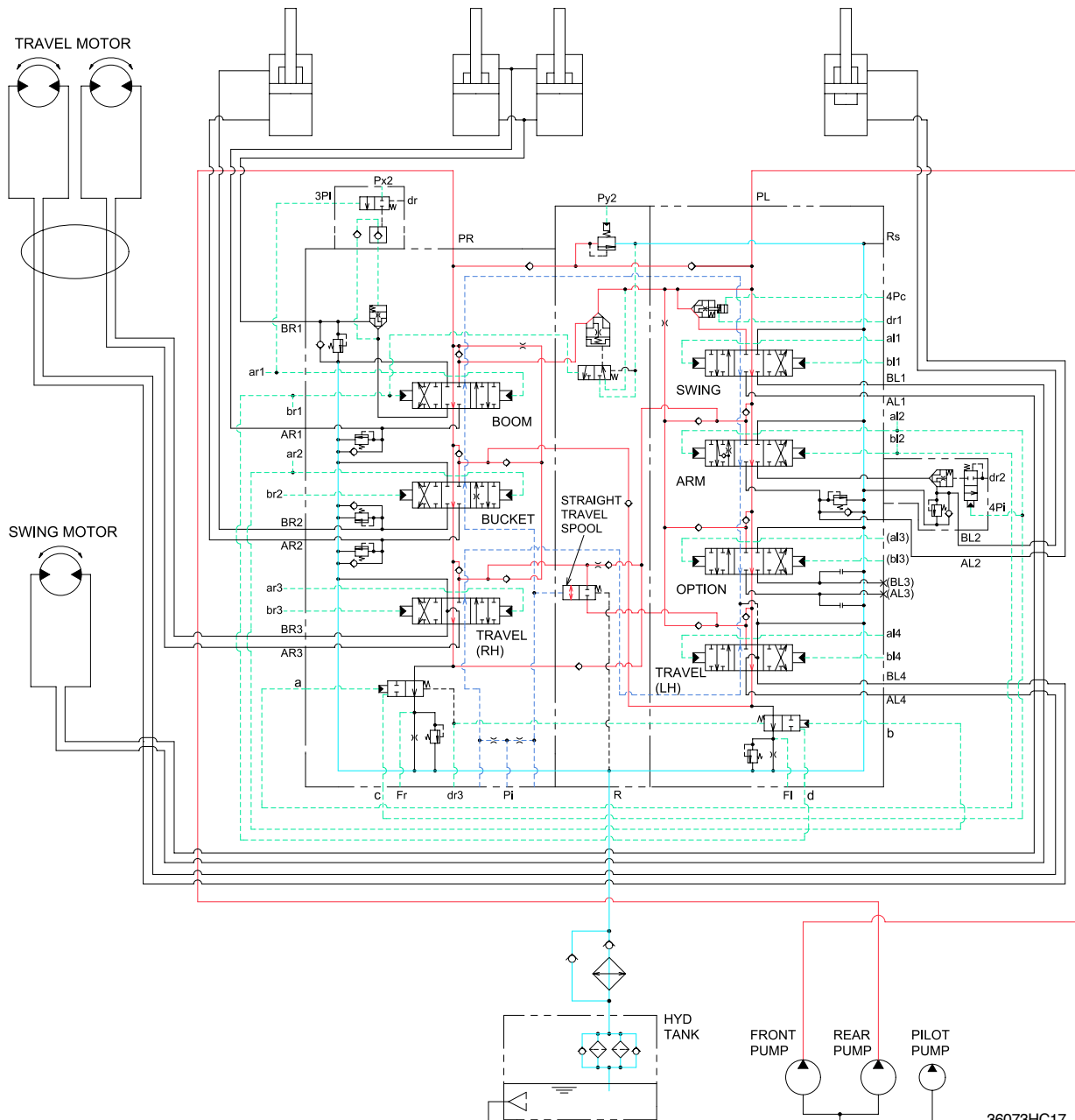


## GROUP 5 COMBINED OPERATION

### 1. OUTLINE



The oil from the front and rear pump flows through the neutral oil passage, bypass oil passage and confluence oil passage in the main control valve. Then the oil goes to each actuator and operates them. Check valves and orifices are located on these oil passage in the main control valve. These control the oil from the main pumps so as to correspond to the operation of each actuator and smooth the combined operation.

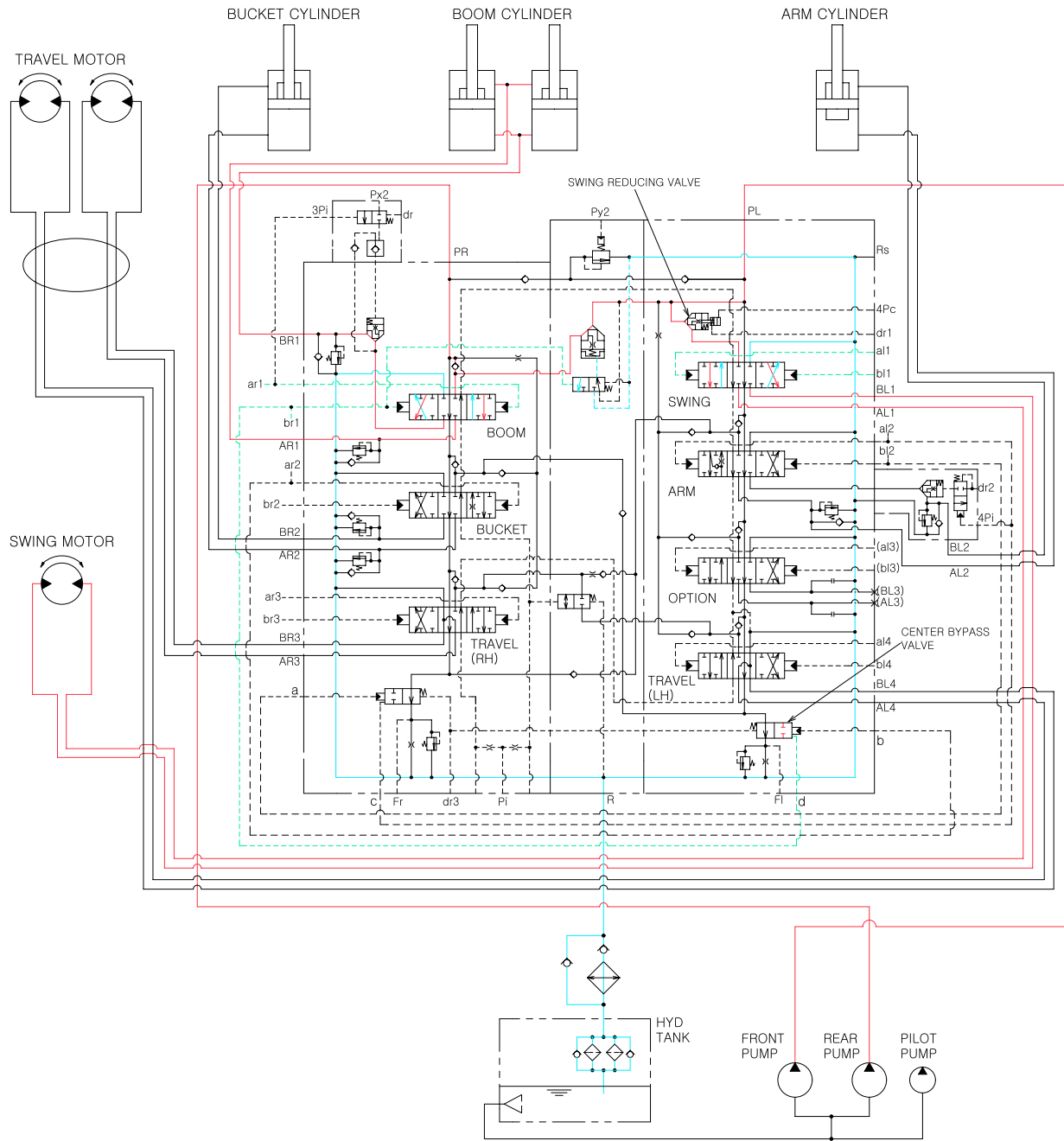
#### STRAIGHT TRAVEL SPOOL

This straight travel spool is provided in the main control valve.

If any actuator is operated when traveling, the straight travel spool is pushed to the right by the pilot oil pressure(pi) from the pilot pump.

Consequently, the left and right travel oil supply passage are connected, and equivalent amount of oil flows into the left and right travel motors. This keeps the straight travel.

## 2. COMBINED SWING AND BOOM OPERATION



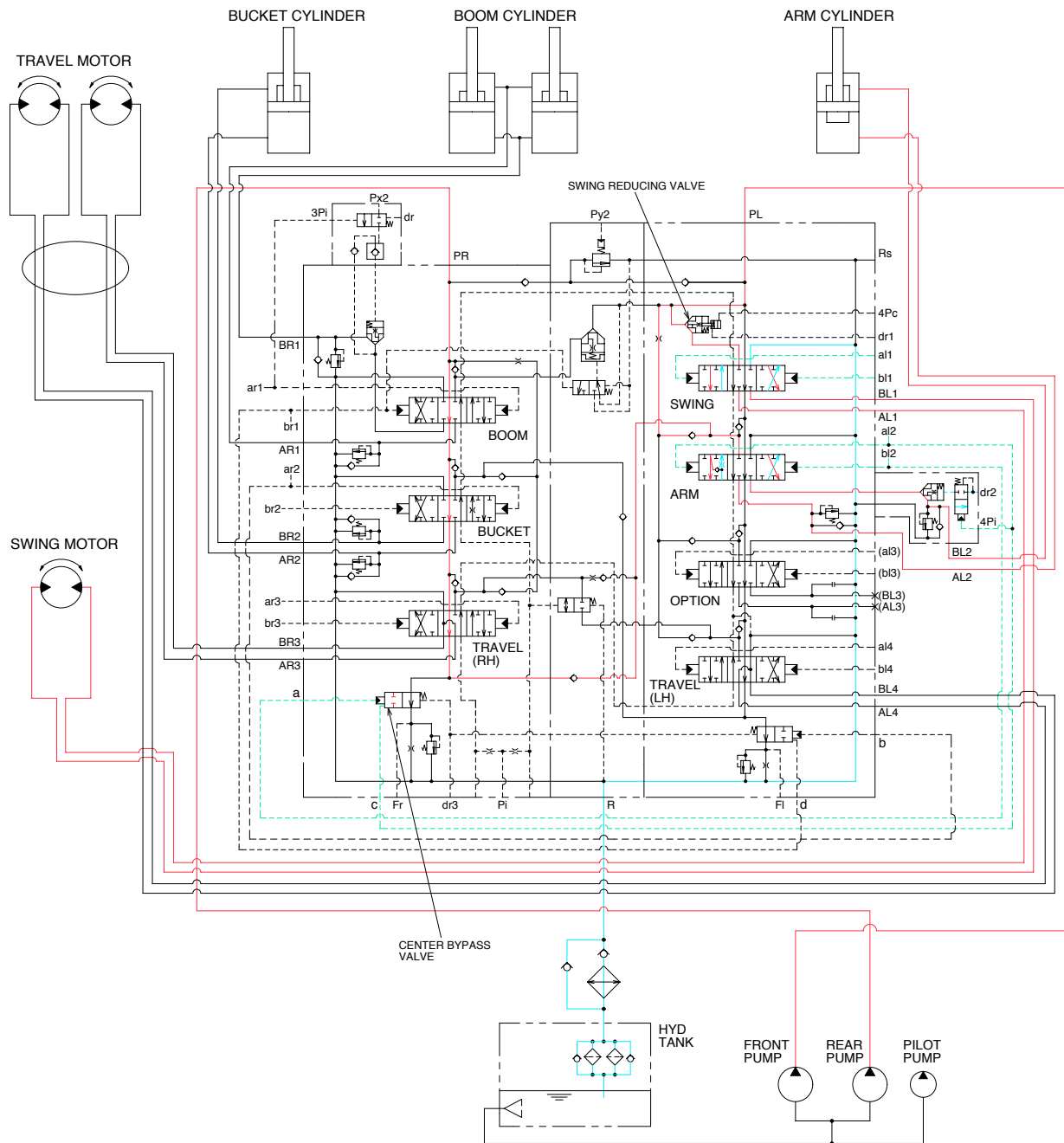
36073HC18

When the swing and boom functions are operated, simultaneously the swing and boom spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve. The oil from the front pump flows into the swing motor through the swing spool.

The oil from the rear pump flows into the boom cylinders through the boom spool in the left control valve.

At the same time, the pressure in the boom circuits can be high while the swing pressure is low, therefore the oil from the front pump flows into the boom cylinders through boom spool via confluence oil passage by logic valve in case boom up operation.

### 3. COMBINED SWING AND ARM OPERATION



36073HC19

When the swing and arm functions are operated, simultaneously the swing and arm spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve.

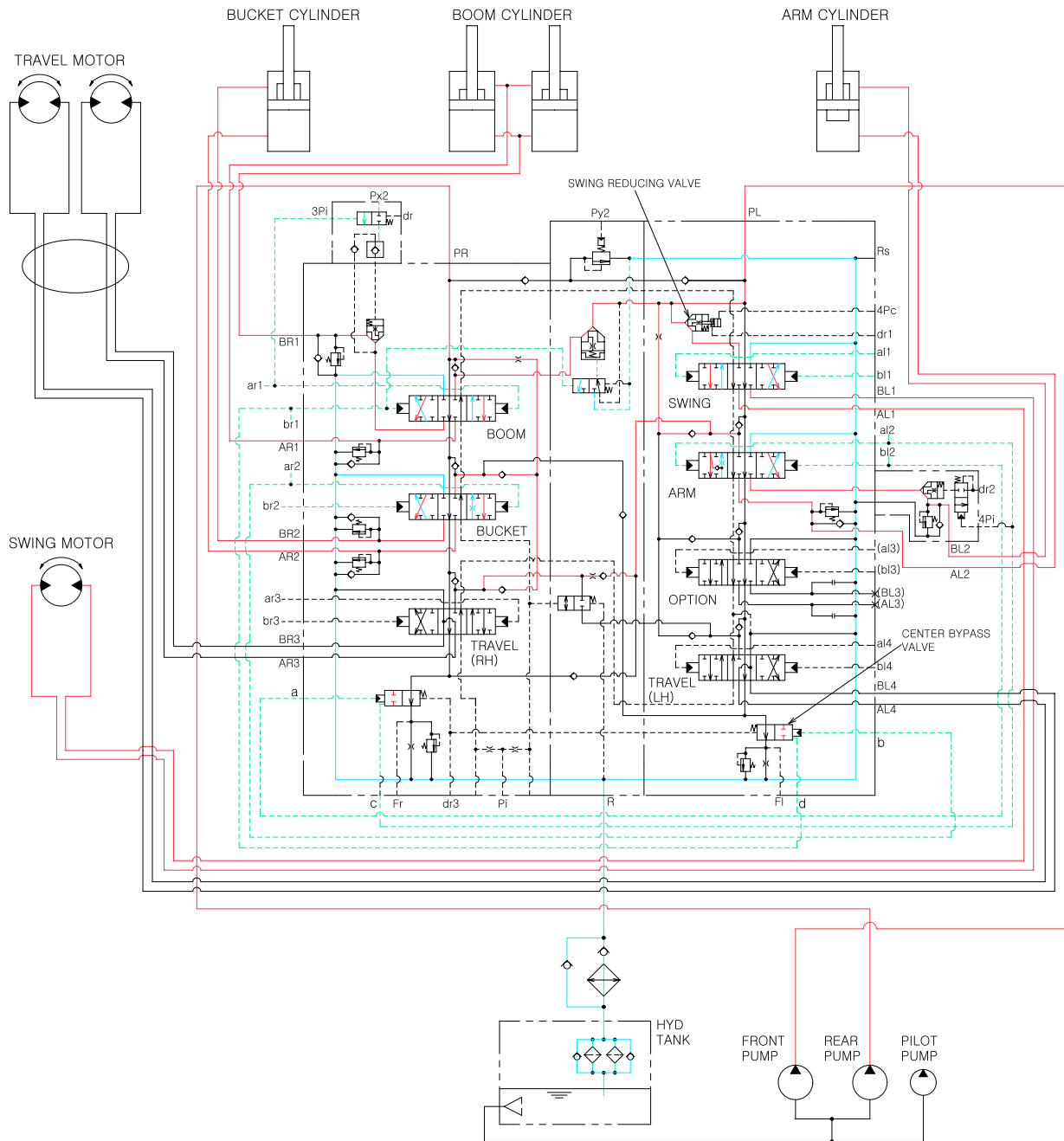
The oil from the front pump flows into the swing motor through the swing spool.

The center bypass valve is blocked by pilot pressure(a, c) and then the oil from the rear pump flows into the arm cylinder through the arm spool in the right control valve.

The superstructure swings and the arm is operated.



## 5. COMBINED SWING, BOOM, ARM AND BUCKET OPERATION

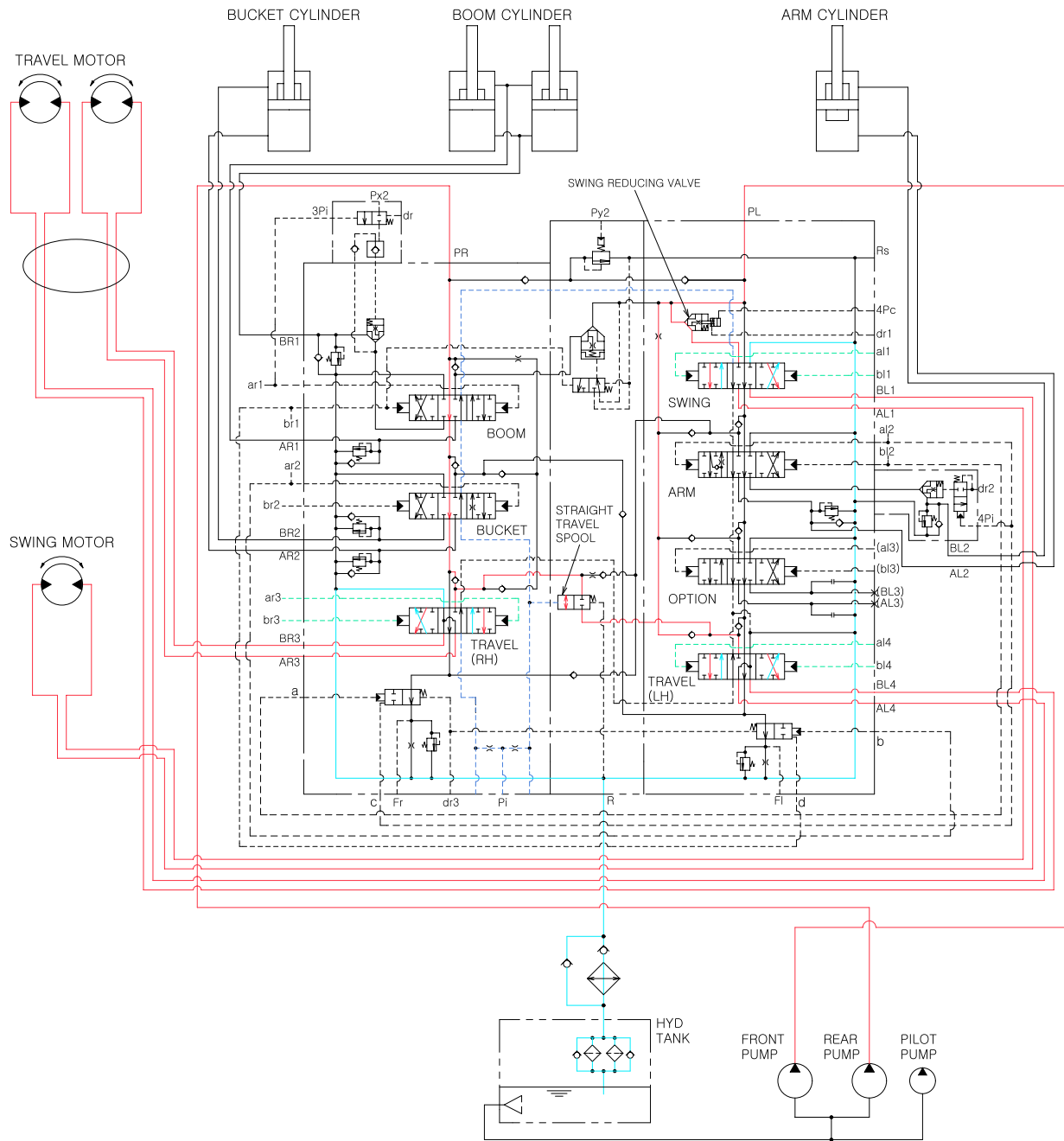


36073HC21

When the swing, boom, arm and bucket functions are operated, simultaneously the each spool in the main control valve is moved to the functional position by the pilot oil pressure from the remote control valve. The oil from the rear pump flows into the boom cylinders and bucket cylinder through the boom spool and bucket spool in the left control valve. The oil from the front pump flows into the swing motor and arm cylinder through the swing spool, arm spool and the parallel oil passage in the right control valve. Then the functions to each actuators.

According to the state of each actuators functioning, center bypass valve is blocked, the oil from front pump flows into the boom cylinders through the confluence oil passage by logic valve in case boom up operation.

## 6. COMBINED SWING AND TRAVEL OPERATION



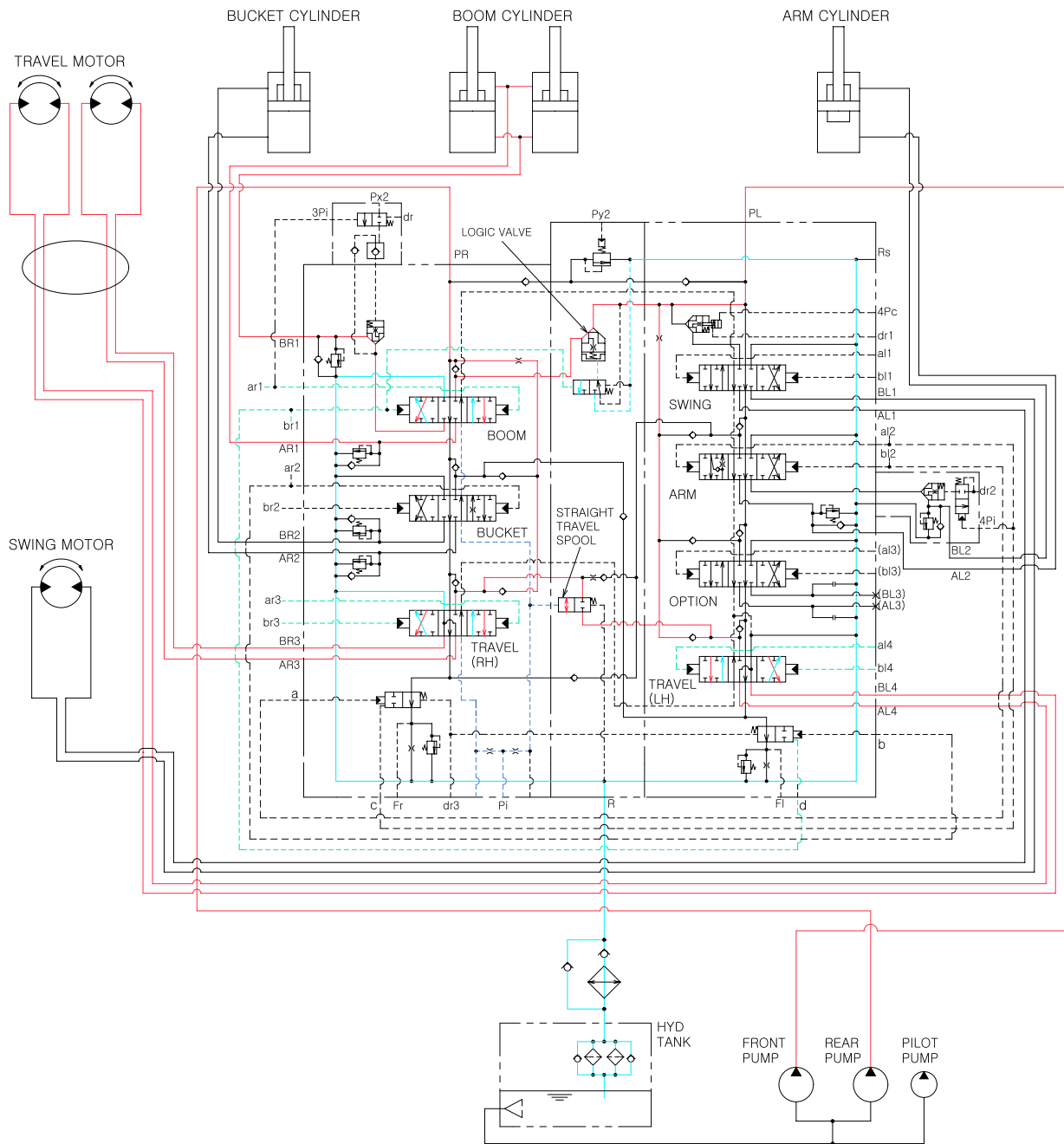
36073HC22

When the swing and travel functions are operated, simultaneously the swing spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve. At the same time, the straight travel spool is pushed to the right by the pilot oil pressure( $p_i$ ) from the pilot pump.

The oil from the front pump flows into the swing motor through the swing spool. The oil from the rear pump flows into the travel motors through the RH travel spool of the left control valve and the LH travel spool of the right control valve via the straight travel spool.

The superstructure swings and the machine travels straight.

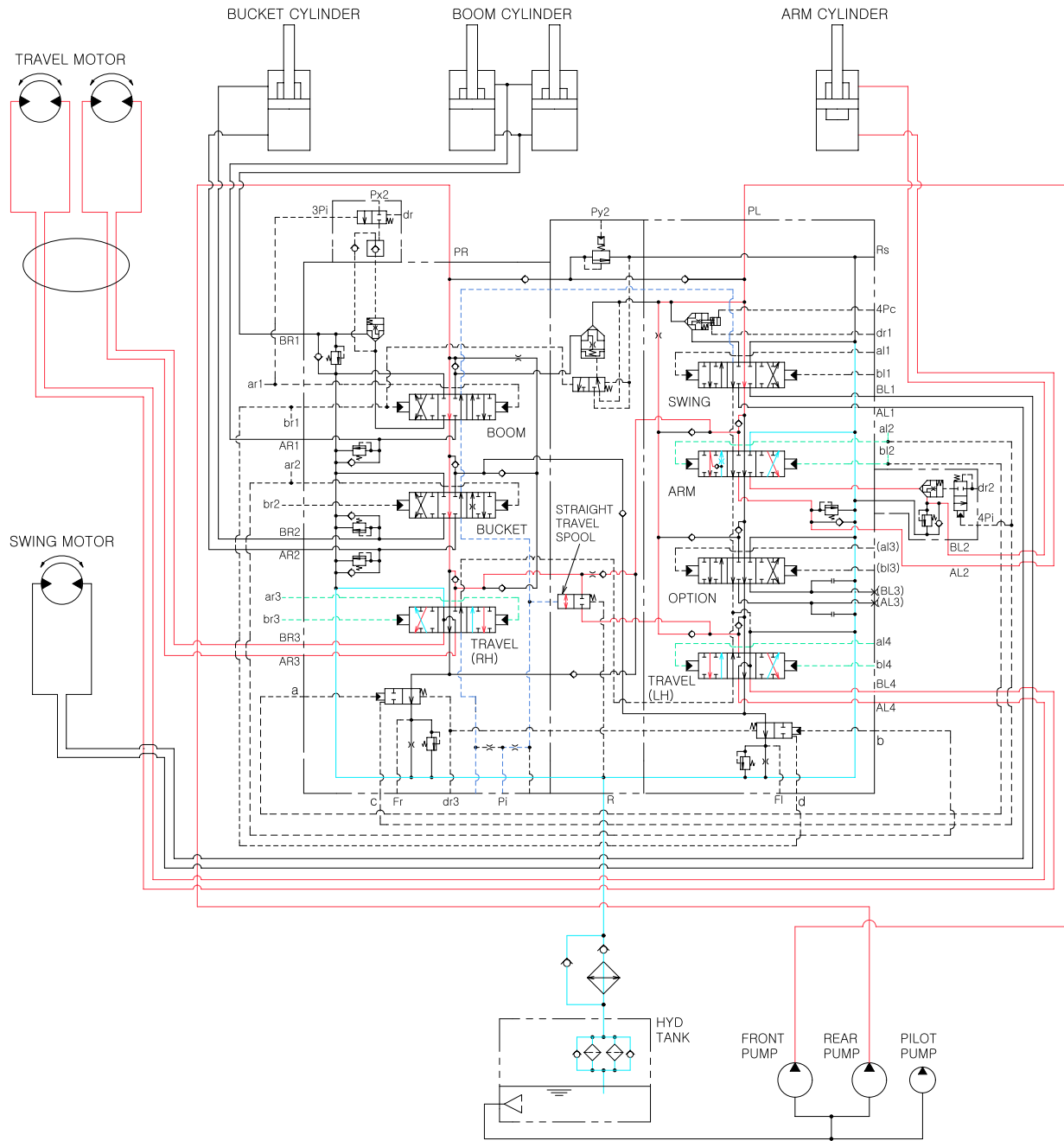
## 7. COMBINED BOOM AND TRAVEL OPERATION



36073HC23

When the boom and travel functions are operated, simultaneously the boom spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve. At the same time, the straight travel spool is pushed to the right by the pilot oil pressure (Pi) from the pilot pump. The oil from the front pump flows into the boom cylinders through the logic valve and boom spool via the parallel and confluence oil passage in case boom up operation. The oil from the rear pump flows into the travel motors through the RH travel spool of the right control valve and the LH travel spool of the left control valve via the straight travel spool. When the travel circuit pressure drops lower than boom pressure, as when traveling downhill, boom priority and smoothness are maintained because of the orifice. Thus the machine will continue to travel straight.

## 8. COMBINED ARM AND TRAVEL OPERATION

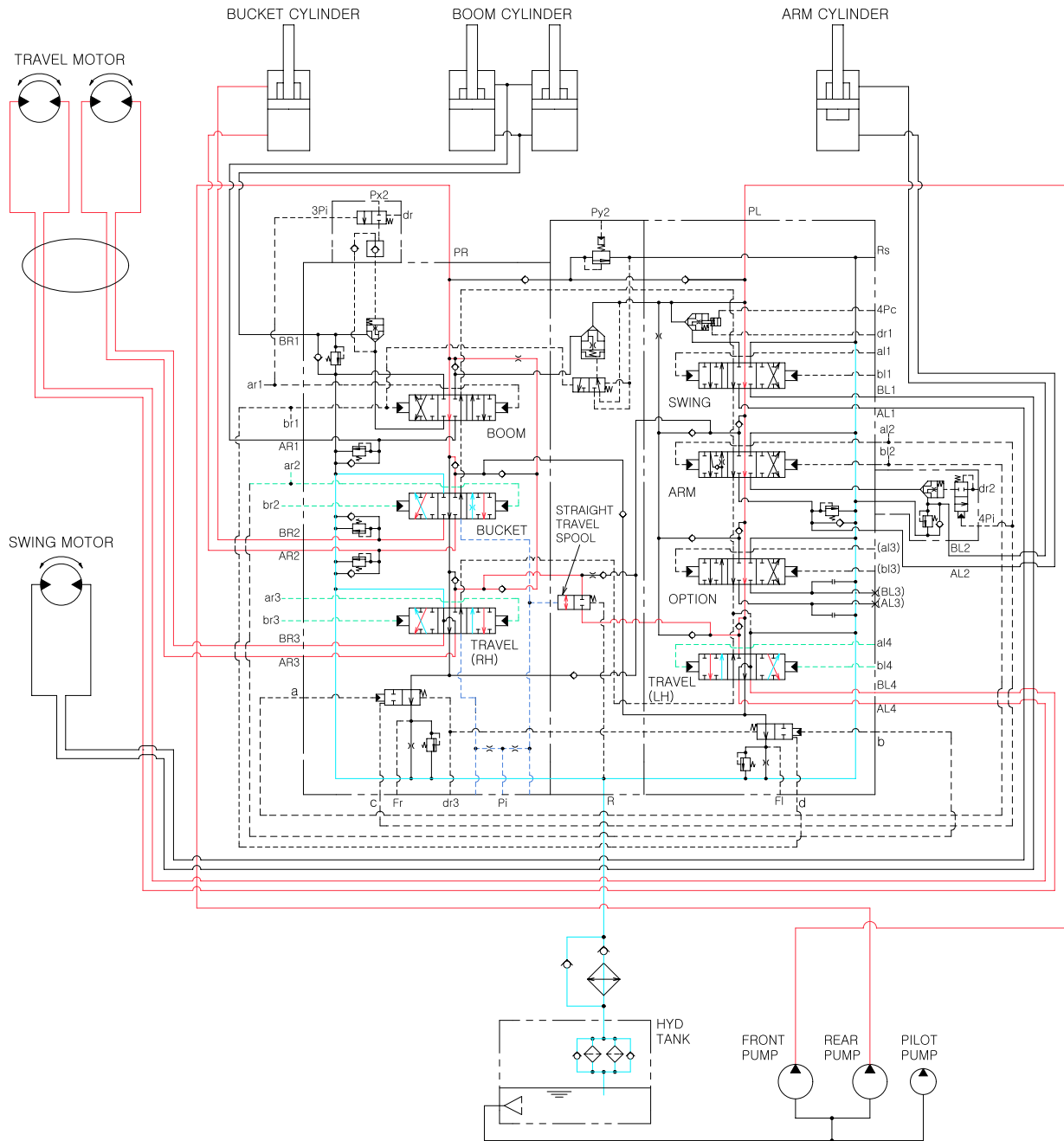


36073HC24

When the arm and travel functions are operated, simultaneously the arm spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve. At the same time, the straight travel spool is pushed to the left by the pilot oil pressure from the pilot pump. The oil from the front pump flows into the arm cylinder through the arm spool via the parallel and confluence oil passage. The oil from the rear pump flows into the travel motors through the RH travel spool of the right control valve and the LH travel spool of the left control valve via the straight travel spool.

When the travel circuit pressure drops lower than arm pressure, as when traveling downhill, arm priority and smoothness are maintained because of the orifice. Thus the machine will continue to travel straight.

## 9. COMBINED BUCKET AND TRAVEL OPERATION



36073HC25

When the bucket and travel functions are operated, simultaneously the bucket spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve. At the same time, the straight travel spool is pushed to the left by the pilot oil pressure from the pilot pump. The oil from the rear pump flows into the bucket cylinder through the bucket spool. The oil from the front pump flows into the travel motors through the RH travel spool of the right control valve and the LH travel spool of the left control valve via the straight travel spool of the control valve.

When the travel circuit pressure drops lower than bucket pressure, as when traveling downhill, bucket priority and smoothness are maintained because of the orifice.

In either case, the machine will continue to travel straight.