AC GENERATION SYSTEM

ALTERNATING CURRENT GENERATING SYSTEM

The Alternating Current Generating System produces constant voltage/frequency electrical power for distribution to the aircraft.

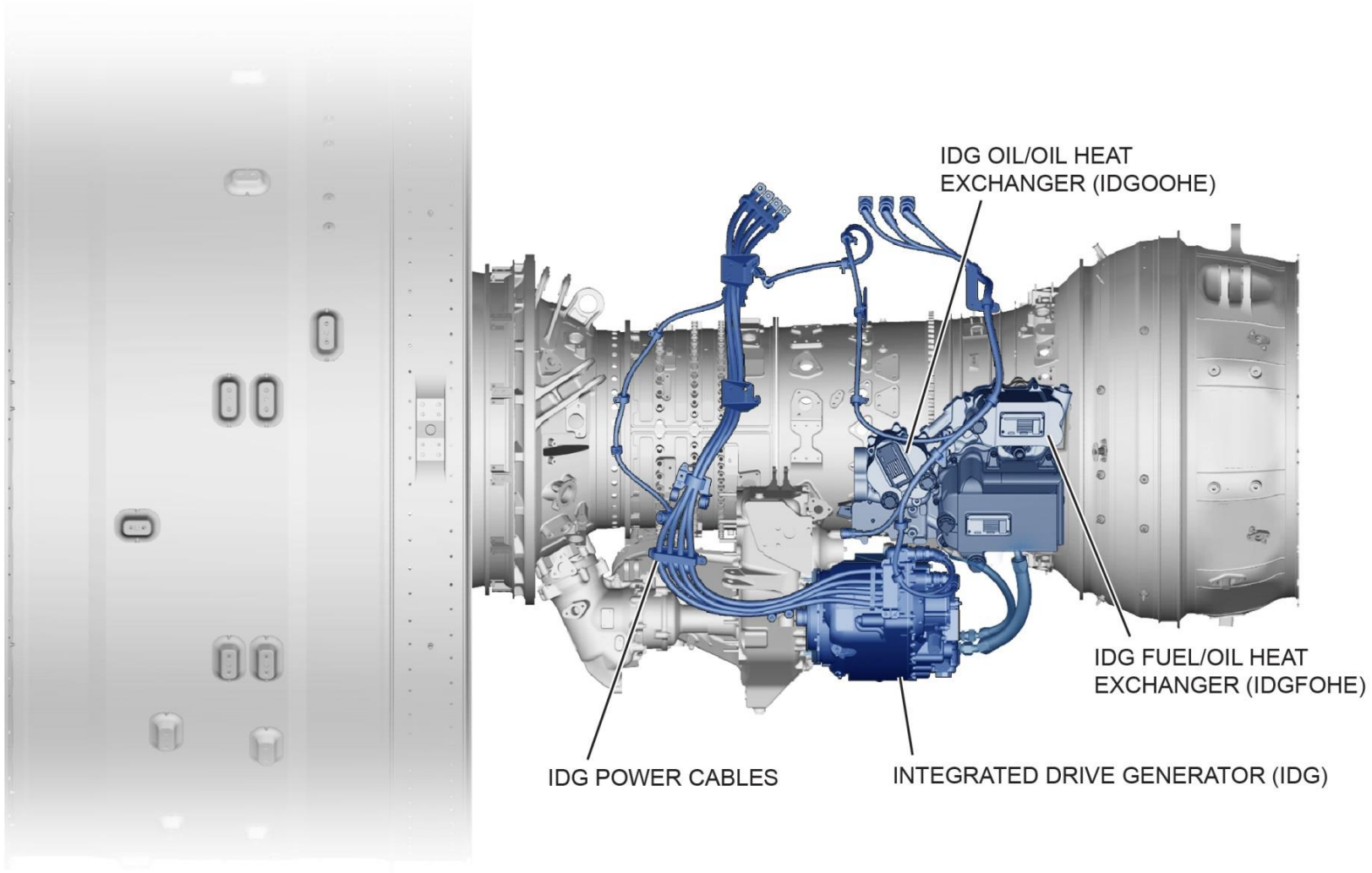
Components are listed below.

Integrated Drive Generator IDG

IDG Oil/Oil Heat Exchanger IDGOOHE

IDG Fuel/Oil Heat Exchanger IDGFOHE

Interconnecting power cables and control wiring


IDG OIL/OIL HEAT
EXCHANGER (IDGOOHE)
IDG FUEL/OIL HEAT
EXCHANGER (IDGFOHE)
IDG POWER CABLES
INTEGRATED DRIVE GENERATOR (IDG)

Integrated Drive Generator (IDG)

Purpose:

The Integrated Drive Generator hydroelectrically converts variable speed shaft power into a constant frequency of 400Hz AC electrical power at 115/200 volts.

Location:

The IDG is located at the rear of the Main Gearbox at 6:00.

Description:

The IDG consists of a Constant Speed Drive (CSD) unit and a generator installed in a magnesium cast housing.

The housing is connected to the Main Gearbox by a Quick Attach/Detach (QAD) ring.

Operation:

The engine-driven CSD unit converts the input speed supplied by the Main Gearbox to a constant rotational speed of 24,000 rpm.

This speed is then sent from the CSD to the generator, which keeps a frequency of 400Hz.

The CSD unit has a disconnect mechanism to disengage the input shaft attached to the Main Gearbox. Disconnection is necessary to prevent internal mechanical damage if an IDG oil cooling system failure should occur.

The input shaft is disengaged via a switch on the flight deck electrical panel that energizes the disconnect solenoid.

The IDG cannot be reconnected in flight.

If the IDG is operated for 50 hours in the disconnect mode without reset, the component must be removed.

Reset is done only on the ground with the engine shut down, by manually moving the pawl with the IDG reset ring.

IDG drive splines are lubricated by the engine oil cooling system, which supplies a stream of oil to the centre of the shaft.

Oil from the shaft goes through the splines and is released into the gearbox cavity through radial holes in the shaft.

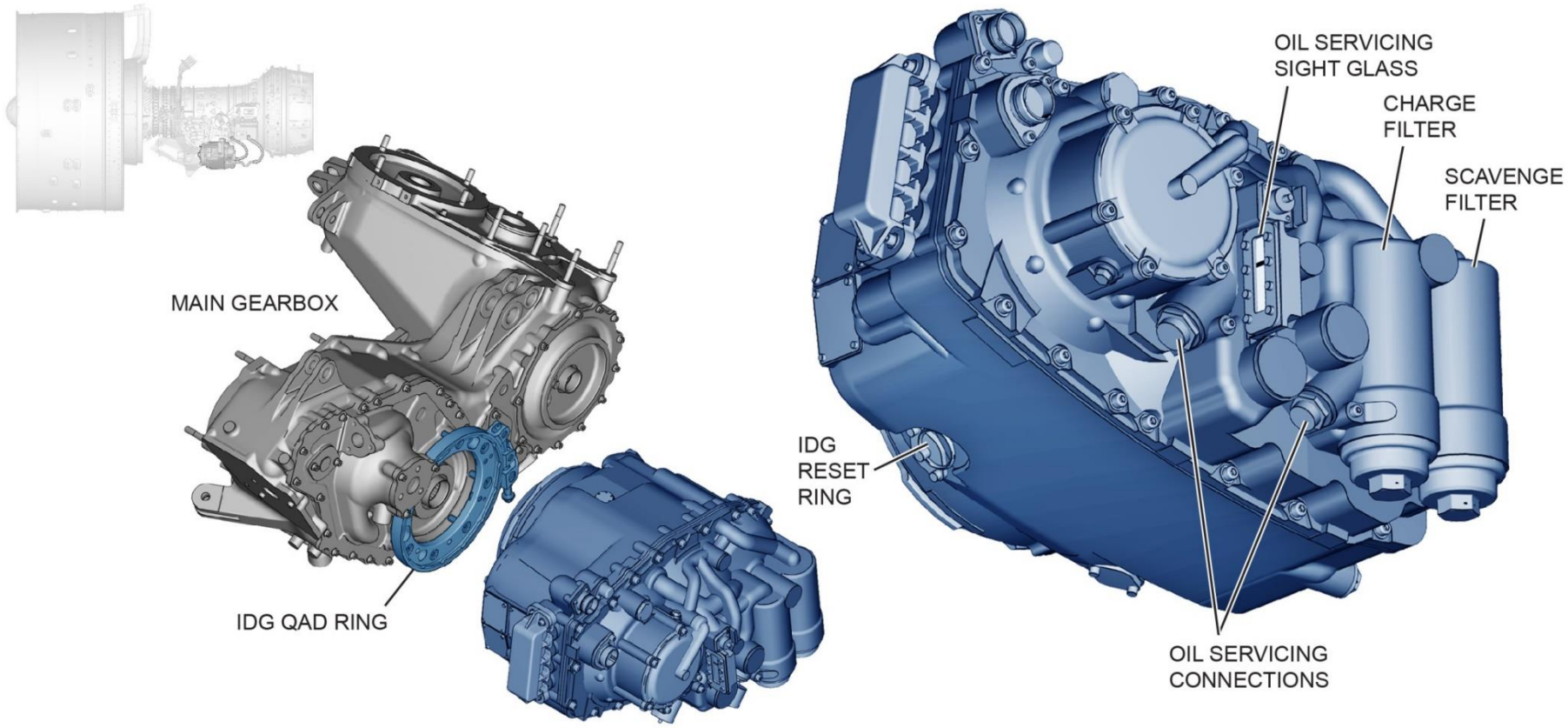
The IDG has an oil sight glass to check oil level and correct oil service.

Safety Conditions

CAUTION

MAKE SURE THAT YOU APPLY ONLY SUFFICIENT PRESSURE WITH THE JACK TO HOLD THE WEIGHT OF THE IDG.

TOO MUCH PRESSURE ON THE IDG OR FAILURE TO HOLD THE IDG CORRECTLY CAN CAUSE DAMAGE TO THE INPUT SHAFT SEAL.


MAIN GEARBOX
IDG QAD RING
OIL SERVICING
SIGHT GLASS
CHARGE
FILTER
SCAVENGE
FILTER
IDG
RESET
RING
OIL SERVICING
CONNECTIONS

IDG Oil/Oil Heat Exchanger (IDGOOHE)

Purpose:

The IDG Oil/Oil Heat Exchanger controls the temperature of IDG oil.

Location:

The IDGOOHE is mounted to the Thermal Management System manifold at 9:00.

Description:

Proper temperature of IDG oil is critical for frequency control, as well as for lubrication of IDG bearings and gears.

Heat is transferred from the IDG's self-contained, passive oil system to the Oil/Oil Heat Exchanger.

Operation:

In hot conditions, oil flows from the IDG to the core of the Oil/Oil Heat Exchanger, transferring heat.

This usually occurs when the engine is at idle and the generator oil system is hotter than the engine oil system.

In normal conditions, heat is transferred to the IDG oil from the engine oil.

The oil continues downstream to the IDG Fuel/Oil Heat Exchanger, where more cooling may take place.

Safety Conditions

WARNING

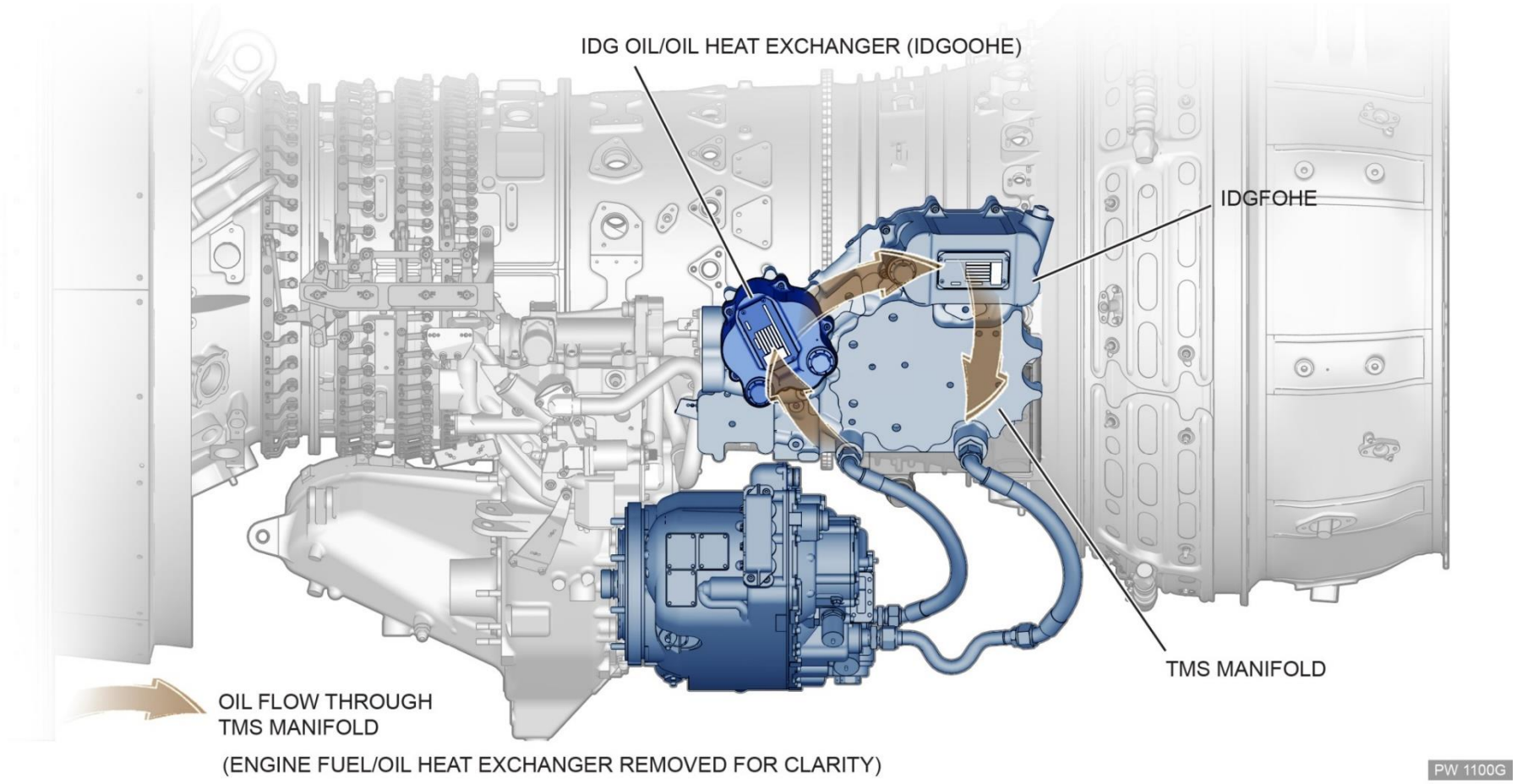
WAIT 5 MINUTES MINIMUM TO MAKE SURE THAT THE OIL SYSTEM IS NOT PRESSURIZED BEFORE DOING THIS PROCEDURE.

IF YOU DO NOT OBEY THIS WARNING, INJURY CAN OCCUR.

CAUTION

DO NOT LET THE FUEL SPILL ON THE ENGINE. YOU MUST IMMEDIATELY REMOVE UNWANTED FUEL WITH A CLOTH.

THE FUEL CAN CAUSE DAMAGE TO SOME ENGINE PARTS.


IDG OIL/OIL HEAT EXCHANGER (IDGOOHE)
IDGFOHE
TMS MANIFOLD
OIL FLOW THROUGH
TMS MANIFOLD
(ENGINE FUEL/OIL HEAT EXCHANGER REMOVED FOR CLARITY)
PW 1100G

IDG Fuel/Oil Heat Exchanger (IDGFOHE)

Purpose:

The IDG Fuel/Oil Heat Exchanger controls the temperature of IDG oil.

Location:

The IDGFOHE is mounted to the Thermal Management System manifold at 9:30.

Description:

The IDGFOHE removes heat from IDG oil by transferring it to the engine fuel.

The cooled oil is then sent to lubricate and cool the IDG.

Operation:

Engine fuel flows through internal tubes in the IDGFOHE.

The tubes pass through the IDG oil core, which has baffles to increase the surface area for heat transfer.

An oil bypass valve in the IDGFOHE helps to hold the IDG oil minimum temperature by mixing uncooled oil from the IDG with cooled oil from the IDGFOHE.

The oil bypass valve is a passive operation, viscosity control valve and operates independent of the Electronic Engine Control.

At engine start-up, when IDG oil temperature is low, the valve is in full bypass position.

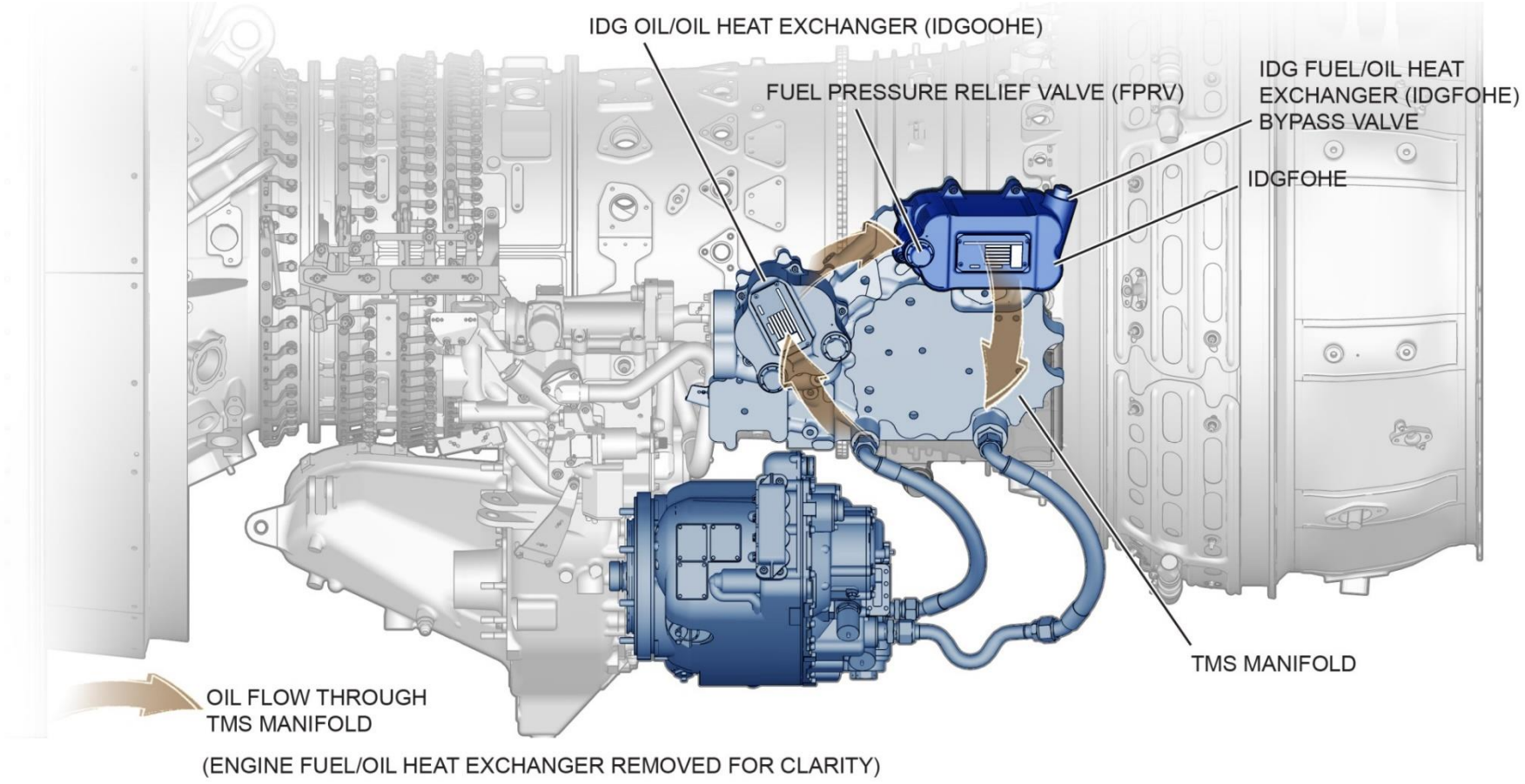
At moderate temperatures, the valve controls the oil flow, mixing uncooled oil from the IDG and cooled oil from the fuel/oil heat exchanger.

The oil is then returned to the IDG.

At the high end of the IDG oil temperature range, the valve is in non-bypass (full cooling) position, and 100 percent of the IDG oil flows through the fuel/oil heat exchanger.

The Fuel Pressure Relief Valve (FPRV) is installed in the IDGFOHE. It is normally in the closed position.

If the inlet pressure to the IDGFOHE rises above a pre-set limit, the FPRV will open to allow fuel to exit the IDGFOHE through a separate passage.


IDG OIL/OIL HEAT EXCHANGER (IDGOOHE)
FUEL PRESSURE RELIEF VALVE (FPRV)
IDG FUEL/OIL HEAT EXCHANGER (IDGFOHE) BYPASS VALVE
IDGFOHE
TMS MANIFOLD
OIL FLOW THROUGH TMS MANIFOLD
(ENGINE FUEL/OIL HEAT EXCHANGER REMOVED FOR CLARITY)

Power Cables

Purpose:

The IDG power cables conduct power from the IDG to the aircraft.

Location:

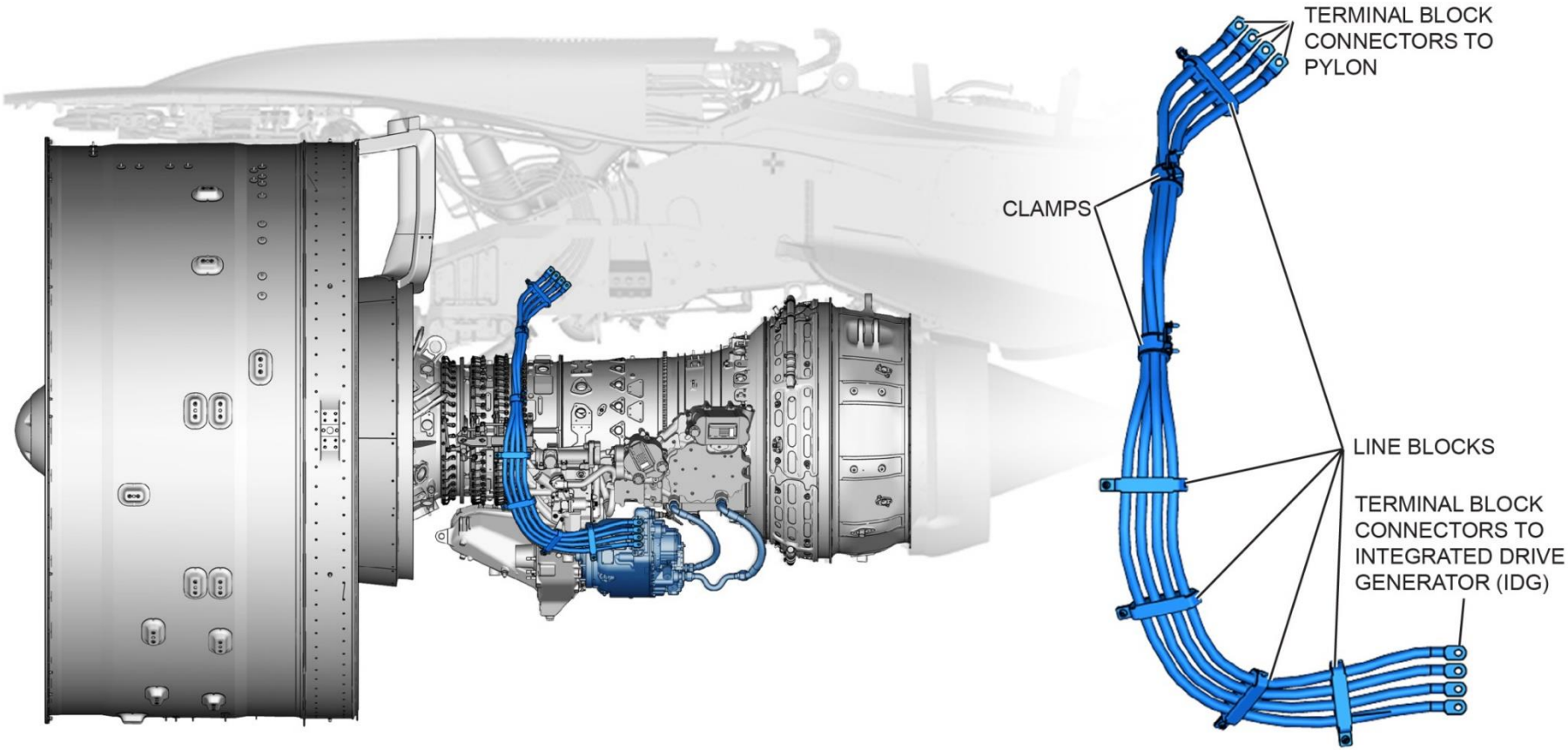
The cables are located on the left side of the engine core.

Description:

Four individual (unbundled) cables are connected to terminal blocks at each end. Line blocks and clamps hold the cables in position along the left side of the engine core.

Operation:

The cables supply IDG-generated 200/115Vac 400Hz power to operate the aircraft electrical systems.


TERMINAL BLOCK CONNECTORS TO PYLON
CLAMPS
LINE BLOCKS
TERMINAL BLOCK CONNECTORS TO INTEGRATED DRIVE GENERATOR (IDG)

IDG Oil Servicing

Wait at least five minutes after engine shutdown before you perform the oil check below.

1. Use a flashlight to find the oil level sight glass on the rear side of the IDG.

2. Wipe the sight glass with a clean, lint-free cotton cloth.

If the oil level in the sight glass is in the high or low red zone, or is not indicated, you must service the oil. If the oil is in the green zone, the level is satisfactory and does not need servicing.

3. To service the oil, use the service cart set at a maximum pressure of 35 psi (241.3kPa). Fill the IDG with PWA 521 Engine Oil (P03-001), until a minimum of one quart (946.3 grams) of oil comes out of the overflow drain hose.

Safety Conditions

WARNING

BE CAREFUL WHEN YOU WORK WITH THE OIL SYSTEM AND USE SUFFICIENT PROTECTION FOR THE HANDS AND EYES.

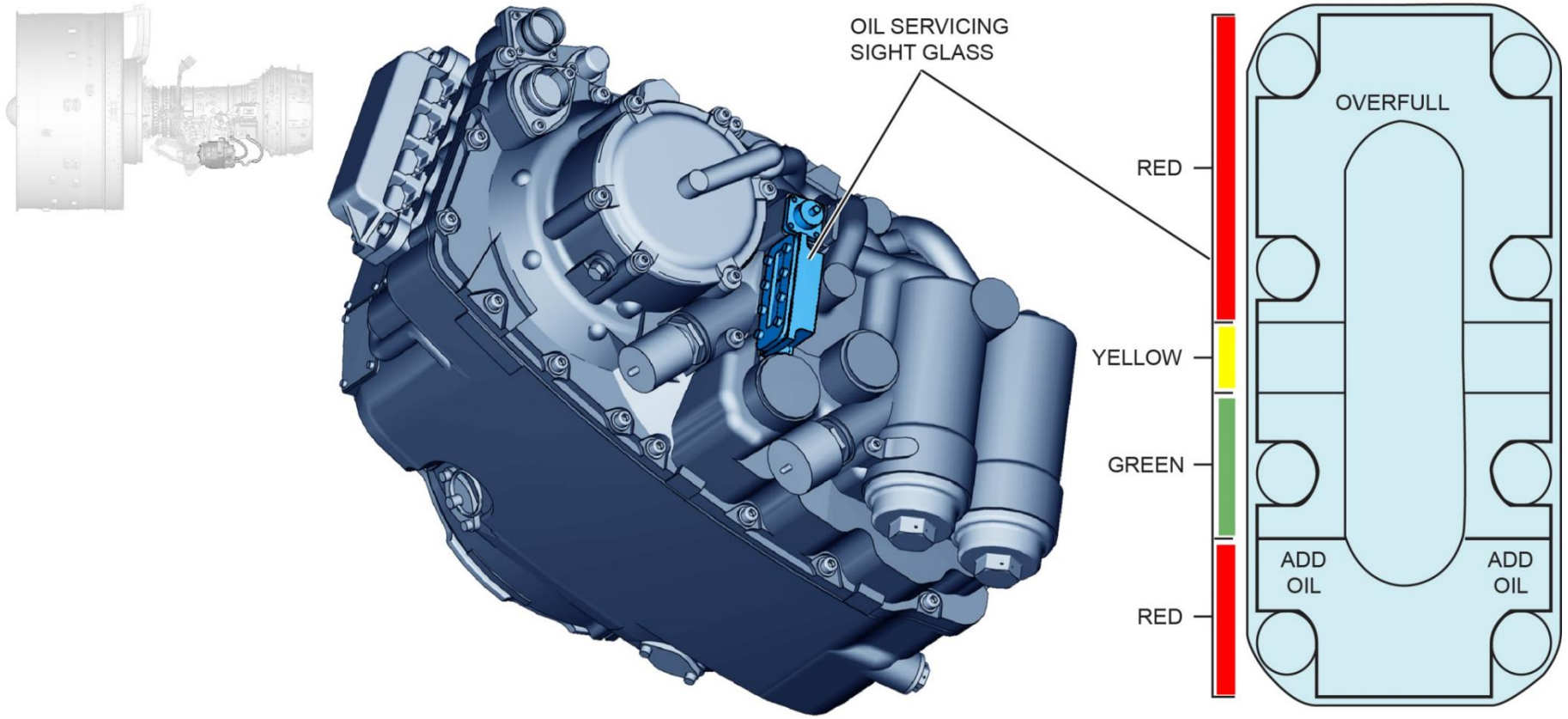
THE OIL IS HOT AND CAN CAUSE BURNS.

YOU MUST PUT THE DRAIN HOSE INTO A COLLECTOR/CONTAINER BEFORE YOU CONNECT THE DRAIN HOSE TO THE IDG OVERFLOW DRAIN CONNECTOR.

MAKE SURE THE DRAIN HOSE HANGS STRAIGHT DOWN.

MAKE SURE THAT THE HOSE IS ABOVE AND NOT INTO THE FLUID IN THE COLLECTOR/CONTAINER. WHEN YOU CONNECT THE DRAIN HOSE TO THE IDG, YOU RELEASE THE PRESSURE IN THE IDG OIL SYSTEM.

WHEN YOU RELEASE THE PRESSURE, OIL AND AIR WILL SPRAY FROM THE END OF THE HOSE. SOME HOT OIL UNDER PRESSURE CAN COME OUT OF THE OVERFLOW DRAIN HOSE WHEN IT IS CONNECTED.


OIL SERVICING
SIGHT GLASS
RED
YELLOW
GREEN
RED
OVERFULL
ADD
OIL
ADD
OIL

IDG Oil Servicing (Cont.)

4. Disconnect the pressure fill hose.

5. Drain the oil.

6. Disconnect the overflow drain hose.

7. Install the dust caps on the IDG overfill drain and pressure fill valves.

CAUTION

YOU MUST USE THE CORRECT SPECIFICATION OF CLEAN NEW OIL WHEN YOU ADD OR REPLACE THE OIL IN THE IDG. INCORRECT OILS CAN CAUSE DAMAGE TO THE IDG.

SOLVENTS THAT CONTAIN CHLORINE SHOULD NOT BE USED TO CLEAN EQUIPMENT REQUIRED TO SERVICE THE IDG WITH OIL.

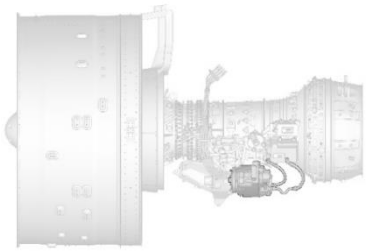
CHLORINE CONTAMINATION CAN CAUSE RAPID DETERIORATION OF OIL AND SUBSEQUENT GENERATOR DAMAGE.

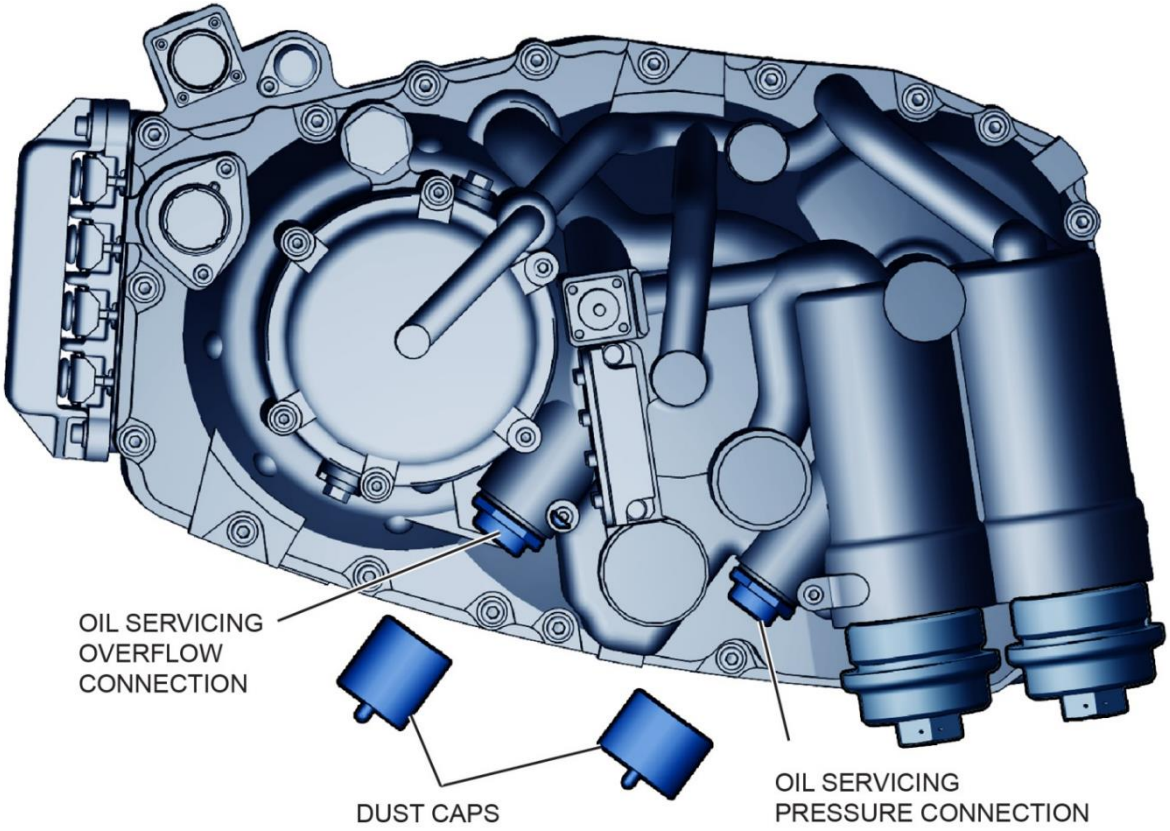
DO NOT CHANGE THE OIL FOR A DISCONNECTED IDG. THE OPERATION OF A DEFECTIVE IDG CAN CAUSE DAMAGE TO EQUIPMENT.

MAKE SURE THE DRAIN VALVE HOSE IS CONNECTED TO THE OIL DRAIN TO THE CORRECT LEVEL IN THE IDG.

TOO MUCH HEAT CAN OCCUR IF THE IDG IS FILLED WITH TOO MUCH OIL.

DO NOT DISCONNECT THE OVERFLOW DRAIN HOSE UNTIL THE FLOW DECREASES TO SINGLE DROPS.




OIL SERVICING
OVERFLOW
CONNECTION
DUST CAPS
OIL SERVICING
PRESSURE CONNECTION

INTENTIONALLY BLANK