

TRAINING MANUAL

CFM56-5A

COMPONENT IDENTIFICATION ANSWERBOOK

APRIL 2000



COMPONENT IDENTIFICATION ANSWERBOOK



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GENERAL COMPONENT IDENTIFICATION ANSWERBOOK



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ENGINE CONFIGURATION EXERCISE OBJECTIVES

Given an Engine Configuration Exercise, the student will *identify* and match the *purpose* of :

- ... selected components of the Engine Buildup Unit
- ... selected borescope ports or plugs
- ... selected components of the Fan Module
- ... selected components of the Core Module
- ... selected components of the HPT Module
- ... selected components of the LPT Module
- ... selected components of the AGB Module
- ... selected components of the TGB Module
- ... selected components of the IDG Cooling system
- ... selected components of the Fuel and Control system
- ... selected components of the Ignition system
- ... selected components of the Air system
- ... selected components of the Indicating system
- ... selected components of the Oil system
- ... selected components of the Start system

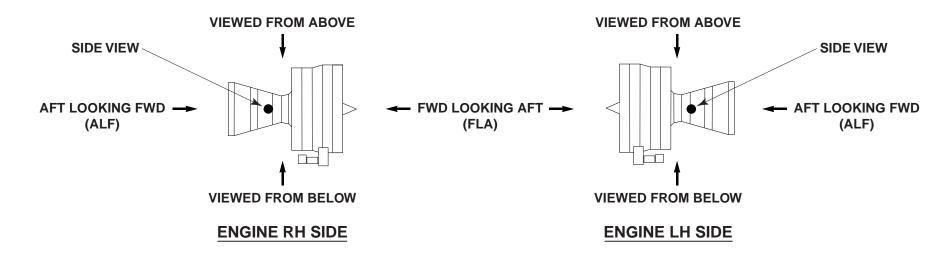


ENGINE CONFIGURATION EXERCISE

General

Enter the item number in the left hand column that corresponds with the identification of the line, accessory or component shown in the picture. Then enter the item number in the right hand column that corresponds with the purpose for the line, accessory, or component shown in the picture.

VIEWING POINT KEY:



MATCH THE NAME OF THE COMPONENT TO THE CORRECT ANSWER.



ENTER NUMBER HERE

	ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
		Fuel flow transmitter	1	Supplies clean fuel to the combustion chamber
\setminus		Fuel pump		Provides a cockpit indication
	\1	Fuel nozzle filter		Cools the engine oil
		Main oil/fuel heat exchanger		A 2-stage unit that pressurizes supply fuel



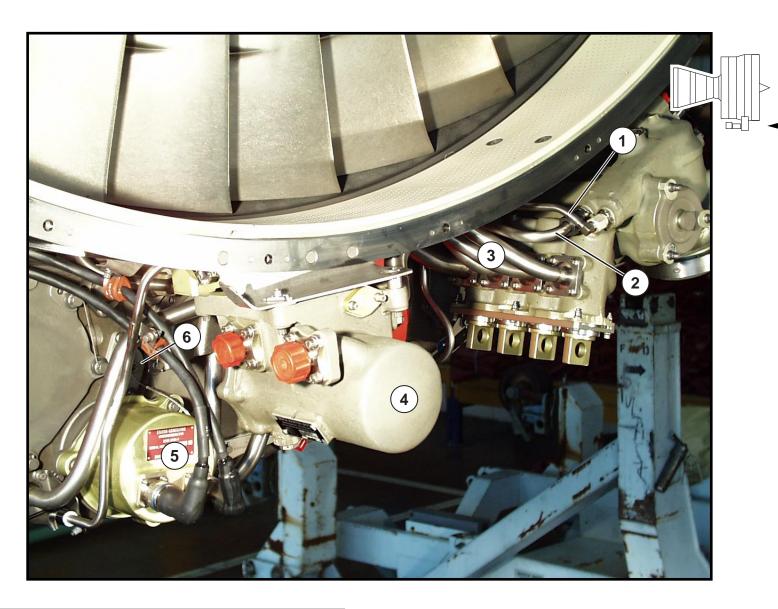


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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
1	Acoustical panel	2	Form the first rotor stage of the primary airflow and accelerate the secondary airflow
4	Abradable liner	5	Retains the fan blade spacers and accomodates the balancing screws
6	Balancing screws	1	Provides sound attenuation
5	Spinner rear cone	4	Provides a rub land for the fan blades
3	Spinner front cone	3	Prevents the formation of ice
2	Fan blades	6	Restore LP rotor balance



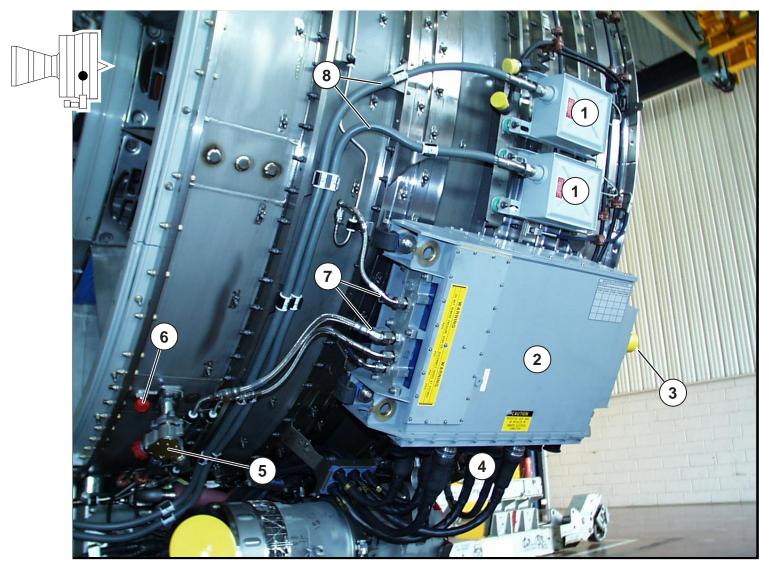


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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
2	AGB/TGB oil supply line	1	Provides lubrication oil to No.4 and No.5 bearings
5	Control alternator	3	Return oil from gearboxes and sumps
6	Handcranking drive pad	5	Powers the ECU after engine start
1	Rear sump oil supply line	6	Allows manual driving or locking of the HP rotor
3	Scavenge lines	4	Uses cold fuel by-passed by the HMU
4	IDG (Integrated Drive Generator) oil cooler	2	Provides lubrication oil shared by the AGB & TGB





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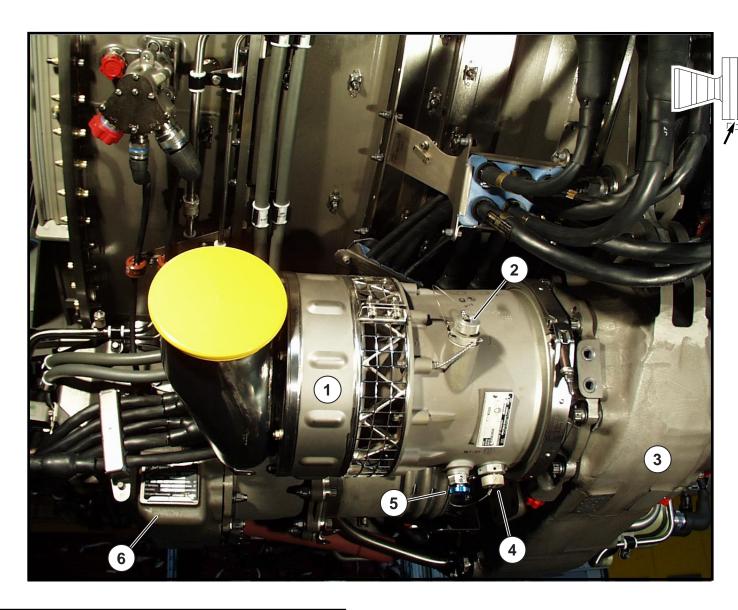
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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
3	Cooling air outlet	1	Store and discharge high voltage pulses to the igniters
6	Forward sump drain port	3	Exits through a port in the fan compartment
4	Electrical connectors	7	Interface between pneumatic lines and ECU pressure sub-system
1	Ignition exciters	2	FADEC system computer
8	Ignition leads	5	Provides LP rotor speed parameters to the ECU and EVMU
2	ECU (Electronic Control Unit)	8	Route high voltage pulses to the igniters
5	N1 speed sensor	4	Interface for ECU/engine and ECU/aircraft electrical systems
7	Pressure connectors	6	Lets out oil leaks from the fwd sump labyrinth seals





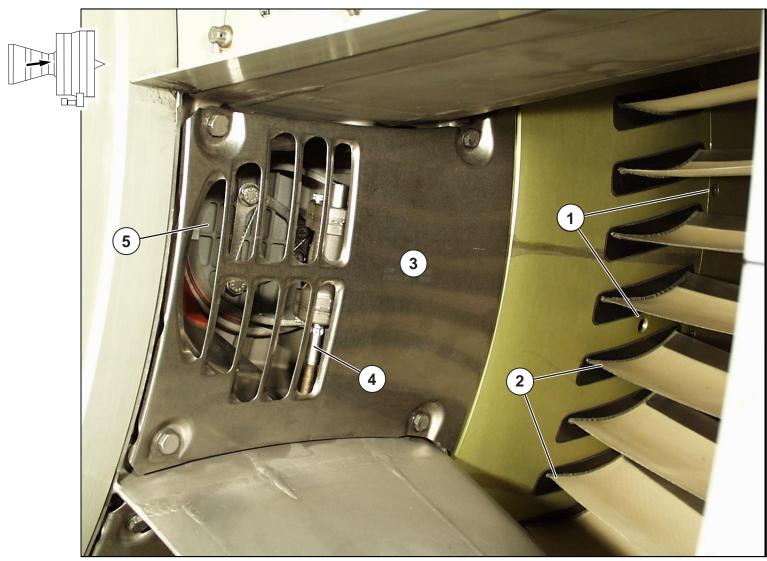


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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
5	Oil drain port	1	Gives N2 rotation during start, using air pressure
4	Oil overflow port	3	Supports and drives engine & aircraft accessories
1	Air starter	2	For oil replenishment
6	TGB (Transfer GearBox)	5	For oil drainage or contamination check
2	Oil filling port	4	For drainage of excess oil
3	AGB (Accessory GearBox)	6	Transmits torque from radial drive shaft to horizontal drive shaft





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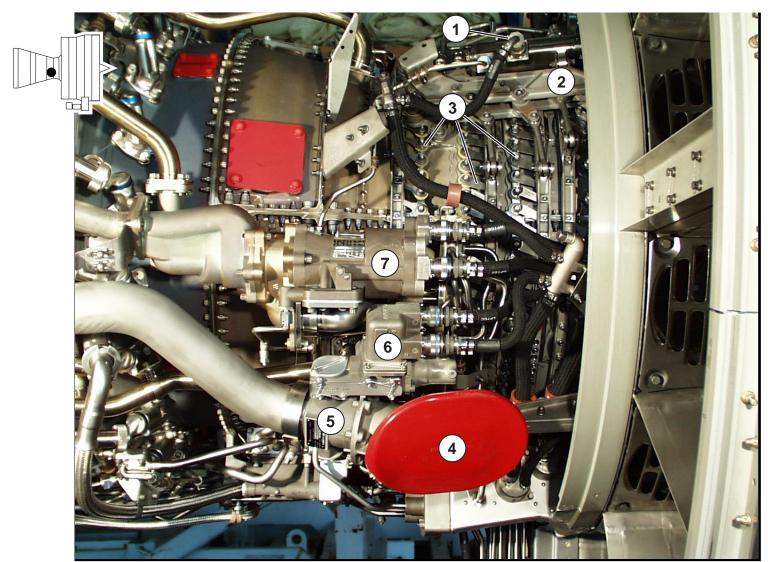
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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
1	Borescope ports	2	Vanes that direct and smooth secondary airflow
2	OGV's (Outlet Guide Vanes)	1	Unplugged holes for booster inspection
5	VBV (Variable Bleed Valve) door	4	1 of 11, that keep all VBV's synchronized during their stroke
4	Flexible drive shaft	3	Provides access to the VBV's and by-passes primary airflow into secondary when VBV's are open
3	Fan duct panel	5	1 of 12, that regulate the amount of air discharged into the HPC inlet





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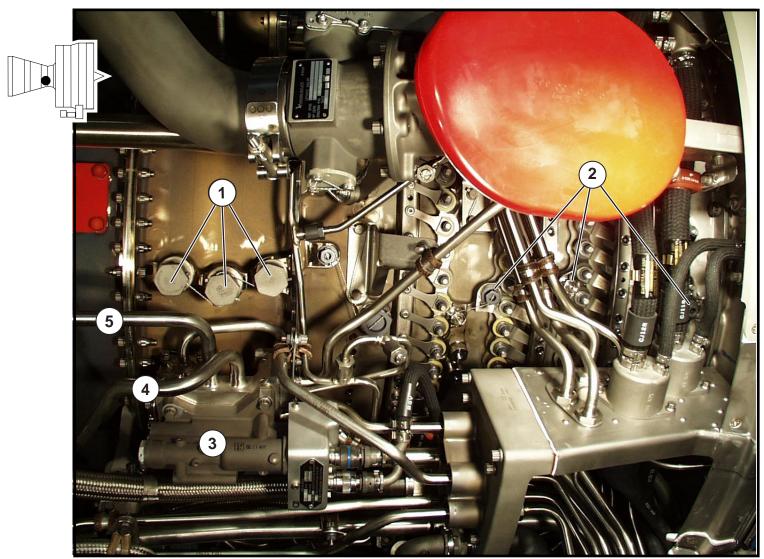


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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
3	VSV's (Variable Stator Vane) stages 1, 2 & 3	1	Transmits data to the ECU for closed loop control
1	VSV position indicator	5	Optimizes LPT clearances and provides LPT case cooling
5	LPTCC valve (Low Pressure Turbine Clearance Control)	2	For the simultaneous action of the VSV's
7	HPTCC valve (High Pressure Turbine Clearance Control)	6	Transmits data to the ECU for closed loop control
2	RH bellcrank assembly	3	Optimize HPC efficiency and improve stall margin during start
4	Air scoop	7	Mixes and delivers 5th and 9th stage compressor air for HPT clearance optimization
6	LPTCC position sensor	4	Air inlet for the LPTCC valve

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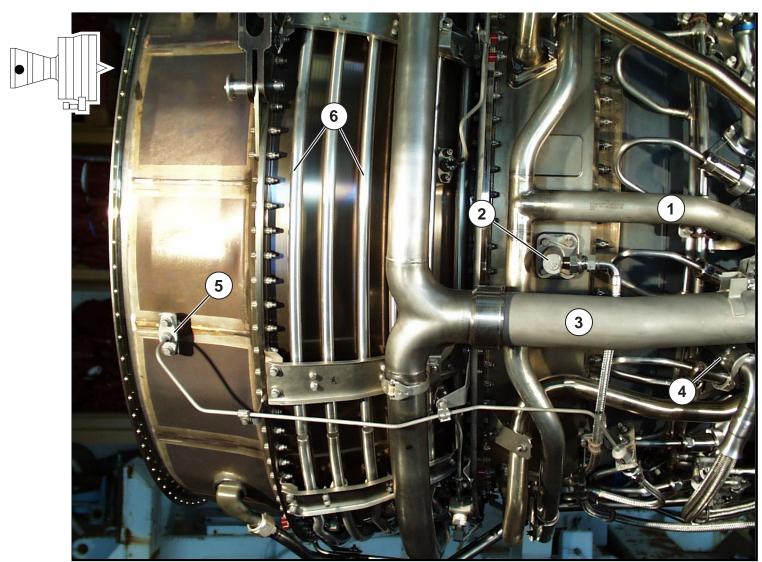
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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
2	Borescope ports S1-S3	5	Supplies the other 10 fuel nozzles depending on the BSV position
1	Borescope ports S7-S9	2	For inspection of the HPC front section
4	Fuel line to unstaged manifold	1	For inspection of the HPC rear section
3	BSV (Burner Staging Valve)	5	Always supplies 10 fuel nozzles
5	Fuel line to staged manifold	3	Interrupts fuel supply to 10 fuel nozzles





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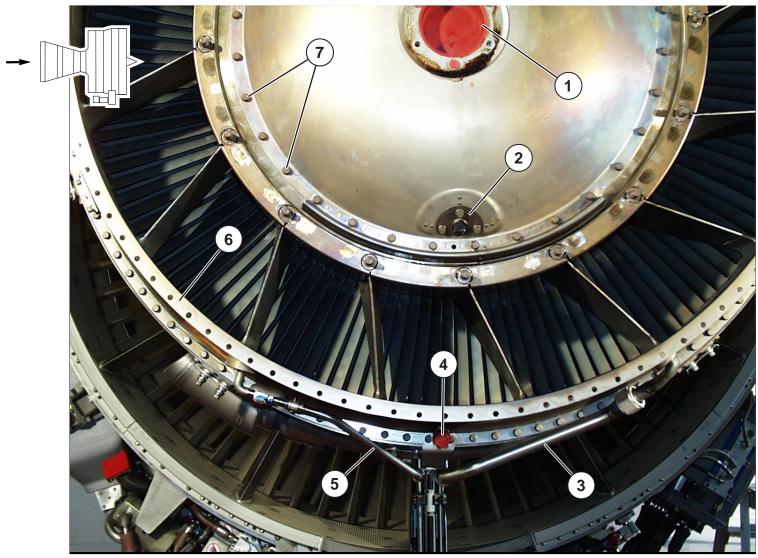
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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
1	HPTCC air manifold	2	Provides HPT shroud support temperature data to the ECU
5	T5 sensor	1	Distributes HPC 5th and 9th stage bleed air onto the HPT shroud support
2	T-case sensor	3	Delivers fan discharge air to the cooling tubes
4	RH igniter plug	5	Provides LPT discharge temperature data to the ECU
3	LPTCC air manifold	6	Blow cooling air on the LPT case for rotor clearance control
6	LPT case cooling tubes	4	Generates sparks inside the combustion chamber for fuel ignition





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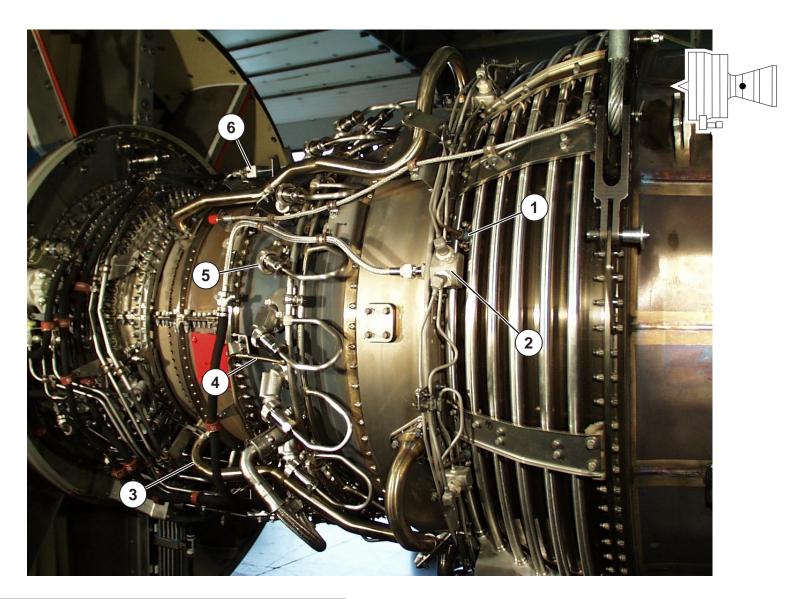
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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
2	Rear sump drain	1	Prevents the ignition of air and oil vapors in the exhaust system
1	Flame arrestor (location)	2	Drains oil leaks from rear sump labyrinth seals
5	Rear sump oil supply line	3	Returns oil to the lube unit
4	LPT case drain	6	Provides attachment for the exhaust nozzle
7	Studs	5	Provides lubrication oil to the No.4 and 5 bearings
6	Turbine rear flange	4	Drains oil and water from the LPT
3	Rear sump oil scavenge line	7	Provide attachment for the exhaust plug

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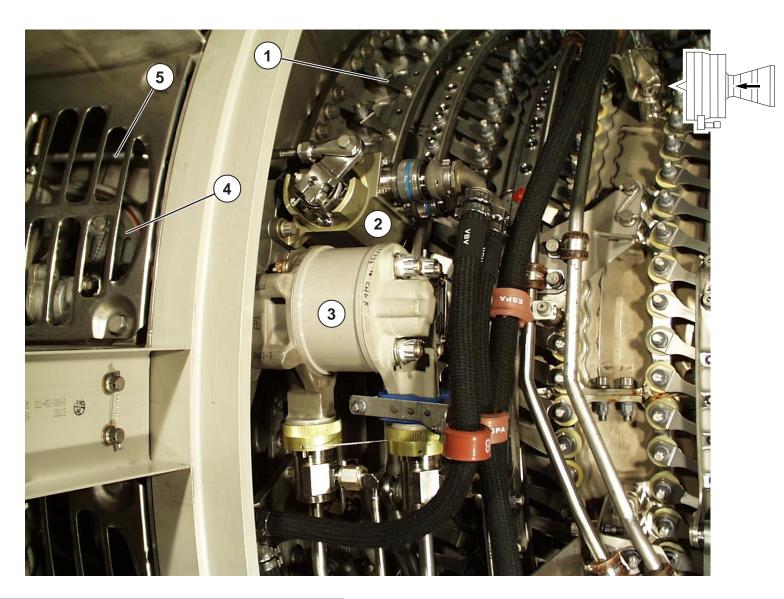


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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
4	PS3 pickup	3	1 of 4, delivers cooling air to LPT stage 1 nozzles
1	T49.5 sensor	2	Collects all temperature signals and sends them to the ECU
6	T3 sensor connector	5	1 of 20, injects fuel inside the combustion chamber
2	EGT harness main junction box	6	Collects and transmits compressor discharge temperature data to the ECU
5	Fuel nozzle	1	1 of 9, measures exhaust gas temperature
3	HPC 4th stage bleed air tube	4	Sends HPC discharge pressure data to the ECU





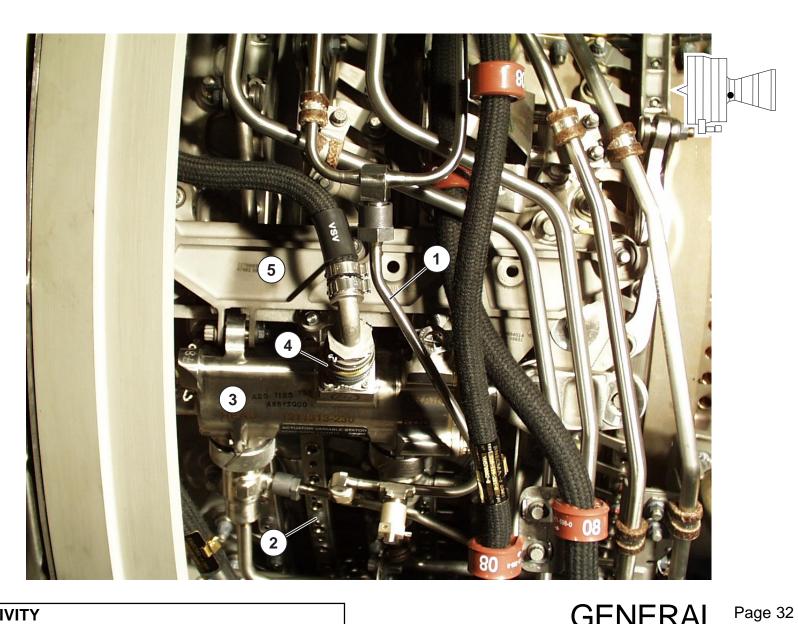
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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
1	Inlet guide vanes	3	Fuel-powered by the HMU, drives the VBV doors
4	Master VBV door	2	Sends a feedback signal to the ECU for closed loop control
2	VBV position indicator	1	Optimize booster airflow into HPC rotor stage 1
3	VBV fuel gear motor	5	Connects the master VBV to the position indicator
5	VBV feedback rod	4	Driven by the fuel gear motor, drives in turn all other VBV doors







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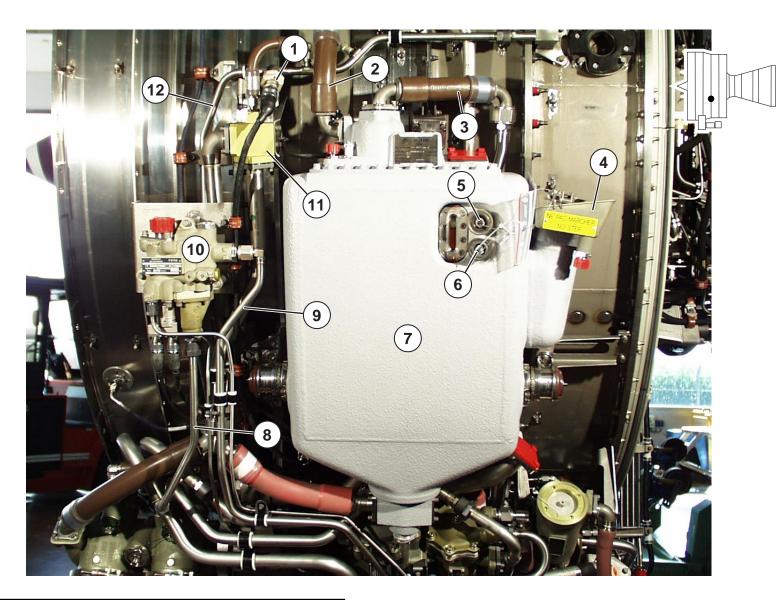
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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
4	VSV feedback sensor	1	Collects fuel leaks within the gear motor
1	VBV fuel gear motor drain line	3	1 of 2, drives a bellcrank assembly
2	VSV actuation ring	5	1 of 2, drives the VSV actuation rings
3	VSV actuator	4	1 of 2, transmits VSV position data to the ECU for closed loop control
5	LH bellcrank assembly	2	1 of 4, changes the angular position of the VSV's







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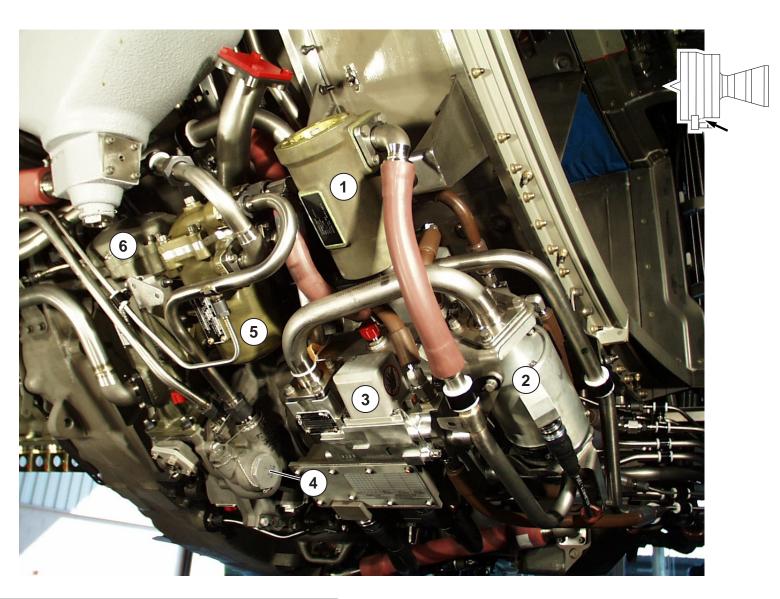


ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
1	TEO sensor	5	Lets out oil overflow during remote filling
10	FRV (Fuel Return Valve)	8	Brings in fuel from the IDG oil cooler
2	Oil return hose	6	Used to replenish the tank with the engine on-wing
7	Oil tank	1	Provides a temperature value used for the IDG oil cooling system and the FRV
3	Vent hose	9	Brings in fuel from the LP stage of the fuel pump
11	Anti-siphon device	7	Stores engine lubrication oil
4	Gravity filler cap	10	Returns part of the hot fuel to the A/C tanks for recirculation
12	Forward sump oil supply line	2	Returns oil from lube unit / heat exchangers
5	Overflow port	11	Depressurizes the lube unit oil supply hose at engine shut-down
8	Hot fuel line	3	Connected to TGB for oil pressure balance
6	Remote filling port	12	Lubricates the No.1, 2 and 3 bearings
9	Cold fuel line	4	Used during engine servicing to replenish the tank







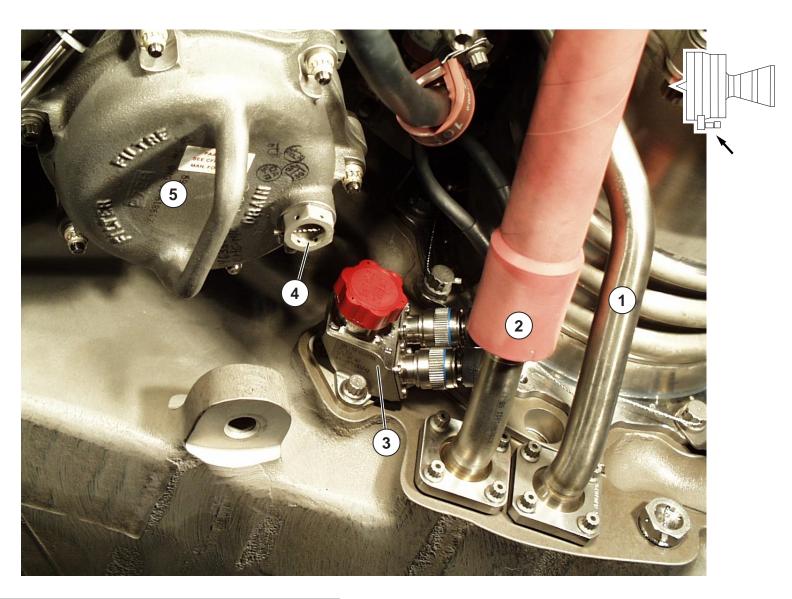


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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
2	Fuel flow transmitter	1	Supplies clean fuel to the combustion chamber
4	Fuel pump	2	Provides a cockpit indication
1	Fuel nozzle filter	6	Cools the engine oil
3	HMU (Hydro-Mechanical Unit)	5	Prevents ice particles from entering servo- mechanisms
5	Servo fuel heater	3	Fuel metering/servo-fuel regulator
6	Main oil/fuel heat exchanger	4	A 2-stage unit that pressurizes supply fuel



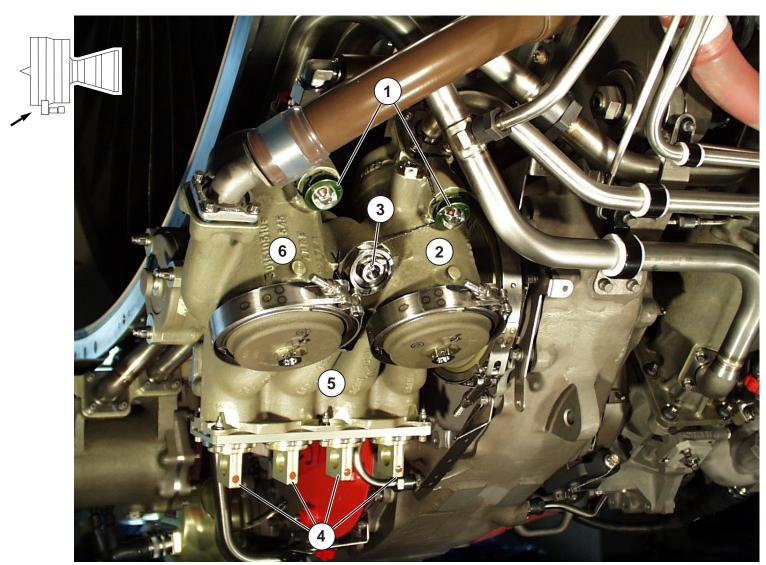


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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
2	TGB sump scavenge line	1	Returns oil to the lube unit
3	N2 speed sensor	4	To drain the fuel filter cavity
4	Fuel filter drain	2	Returns oil to the lube unit
5	Fuel filter cover	3	For HP rotor speed indication to the ECU & EVMU
1	Rear sump scavenge line	5	For easy access to fuel filter cartridge





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ITEM NO.	IDENTIFY THE LINE, ACCESSORY OR COMPONENT	ITEM NO.	SELECT THE PURPOSE THAT MATCHES THE LINE, ACCESSORY OR COMPONENT
2	Scavenge filter	1	One per filter, "pop out" type
1	Clogging indicators	4	Collect magnetic particles in the oil scavenged from sumps and gearboxes
3	Pressure relief valve	5	Provides lubrication oil to sumps and gearboxes
5	Lubrication unit	3	Protects the supply pump from abnormal output pressure buildup
4	Magnetic chip detectors	6	Filtering capacity 15 microns
6	Supply filter	2	Filtering capacity 25 to 32 microns



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21.	VSV position indicator	

VSV's (Variable Stator Vane) stages 1, 2 & 3



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