HUGHES MODEL
500P

Transition Handout

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INTRODUCTION AND GENERAL INFORNATION

The Hughes Model 500P is a Model 500HS specially modified for low noise and high gross weight operation. It is a single engine, light observation helicopter with fixed landing skids, five main rotor blades, four bladed tail rotor system, heavy duty main and tail rotor transmissions, and auxillary specialized systems that combine to provide the capability for night operations at high gross weights in remote areas. The basic flight crew for the aircraft is two pilots.

AIRFRAME

The basic 500HS airframe has been beefed up in the aft fuselage and tail boom. The tail boom skin thickness has been increased to allow greater side loads during flight and supports have been added at attaching points for additional structural integrity. Brackets have been added to attach a radar altimeter antenna module on the underside of the tail boom. Attachment provisions have been added to the underbelly for installation of the sensor turret, cooling assemblies and housing, also for the search and hover lights. The lower vertical stabalizer length has been increased to prevent striking the tail rotor (larger than the standard tail rotor) on the ground in extreme nose high attitudes. The aft fuselage exhaust fairing has been extended to enclose the modified exhaust system used for quieting the aircraft.

ELECTRICAL SYSTEM

1. Battery: Nickel-cadmium, 13 ampere hour, 19 cell, 24 volt located below cockpit floor on left side.
   Caution: Do not store with lead acid batterys.

2. External Power Receptacle: Three pole receptacle (positive, negative, and a guide pole) Allows external power (APU) to be connected to the aircraft electrical system.

3. Power selector Switch: PAGE 8
   Single pole, three position switch (Battery, External, and Off) Allows pilot to select source of power for the aircraft electrical system.

4. Starter-Generator System:

   a. Starter Switch- FORWARD END OF COLLECTIVE

   b. Starter Relay- ENG COMPARTMENT

   c. Starter Generator- RT. REAR
      30 V 150 A

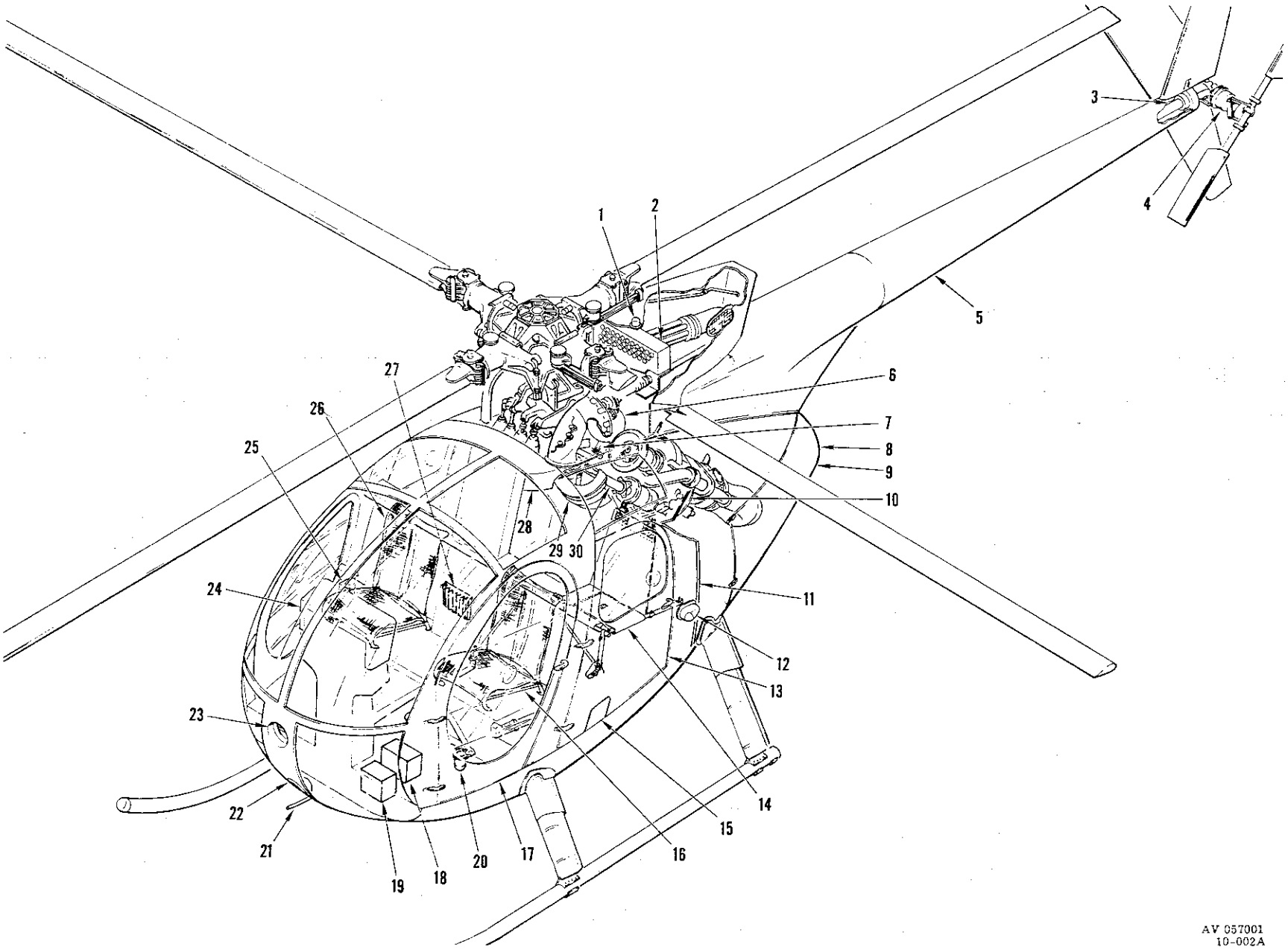


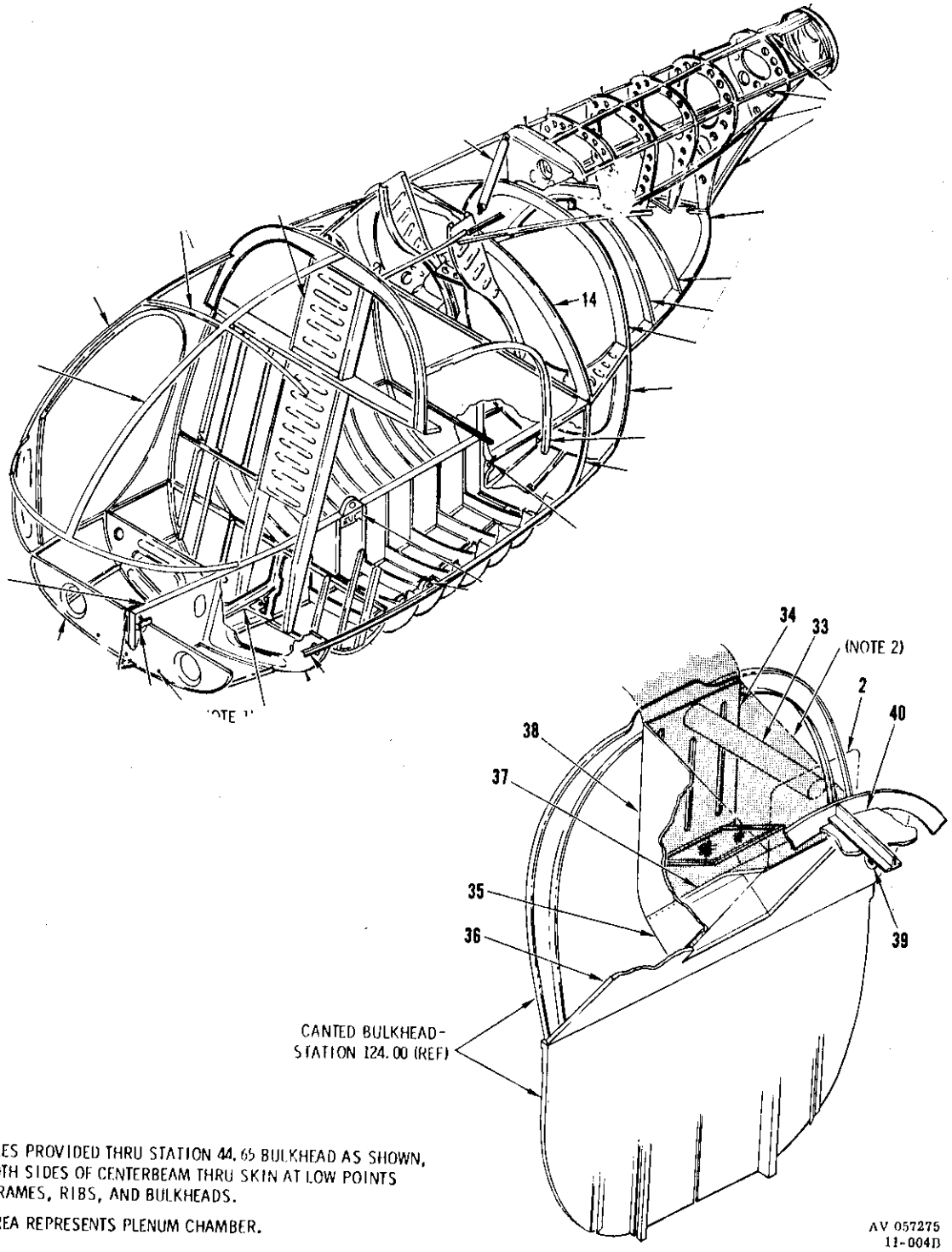
Figure 2–2. General arrangement diagram

Key to fig. 2-2

1. Upper anticollision light
2. Engine air filter (Series 3 acft)
3. Tail rotor drive shaft
4. Tail rotor transmission
5. Tail boom
6. Engine oil tank
7. Oil cooler
8. Engine exhaust tail pipes
9. LH engine access door (right side typical)
10. Engine
11. Firewall
12. LH navigation light
13. LH cargo compartment door
14. Left passenger troop seat (right side typical)
15. Armament access door
16. Copilot's seat
17. LH pilot's compartment door
18. Radio and navigation equipment
19. Battery
20. Lower anticollision light
21. Pitot tube
22. Landing/hover light
23. External air inlet
24. Instrument panel and console
25. External power receptacle
26. Pilot's seat
27. Map case (checklist)
28. Main rotor transmission
29. Oil cooler blower
30. Main drive shaft

This figure shows the Hughes military version of the standard model 500HS. The following differences will be noted on the Hughes Model 500P:

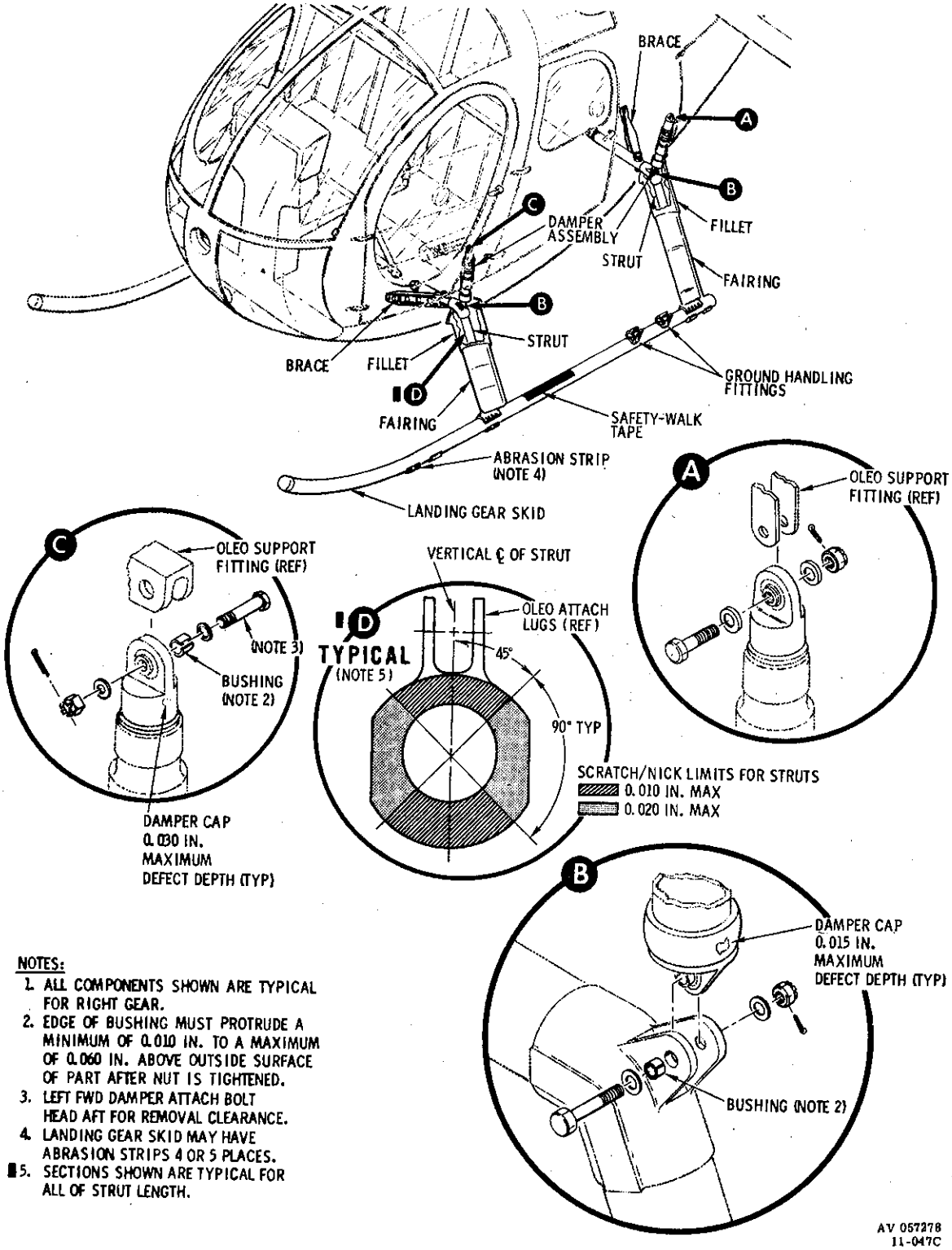
1. Five bladed Main Rotor System
2. Four Bladed Tail Rotor System
3. Addition of specialized systems
4. Deletion of the following numbered items: 1,2,12,15,20



NOTES:

1. DRAIN HOLES PROVIDED THRU STATION 44.65 BULKHEAD AS SHOWN, AND ON BOTH SIDES OF CENTERBEAM THRU SKIN AT LOW POINTS BETWEEN FRAMES, RIBS, AND BULKHEADS.
2. SHADED AREA REPRESENTS PLENUM CHAMBER.

Figure 4-9. Major bulkheads and structural members



NOTES:

1. ALL COMPONENTS SHOWN ARE TYPICAL FOR RIGHT GEAR.
2. EDGE OF BUSHING MUST PROTRUDE A MINIMUM OF 0.010 IN. TO A MAXIMUM OF 0.060 IN. ABOVE OUTSIDE SURFACE OF PART AFTER NUT IS TIGHTENED.
3. LEFT FWD DAMPER ATTACH BOLT HEAD AFT FOR REMOVAL CLEARANCE.
4. LANDING GEAR SKID MAY HAVE ABRASION STRIPS 4 OR 5 PLACES.
5. SECTIONS SHOWN ARE TYPICAL FOR ALL OF STRUT LENGTH.

Figure 4–12. Landing gear

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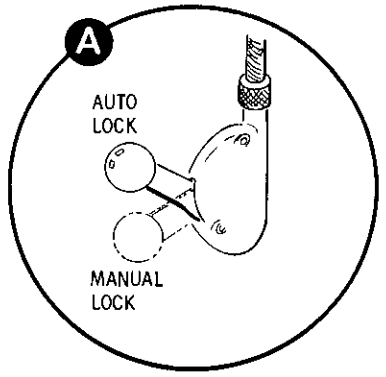
1. Observer/troop seat
2. Safety belt
3. Safety belt fitting
4. Inertia reel
5. Shoulder harness
6. Inertia reel control
7. Copilot's seat
8. Pilot's seat

*Inertia reel control for pilot's seat is located outboard of the pilot's seat on H-500P



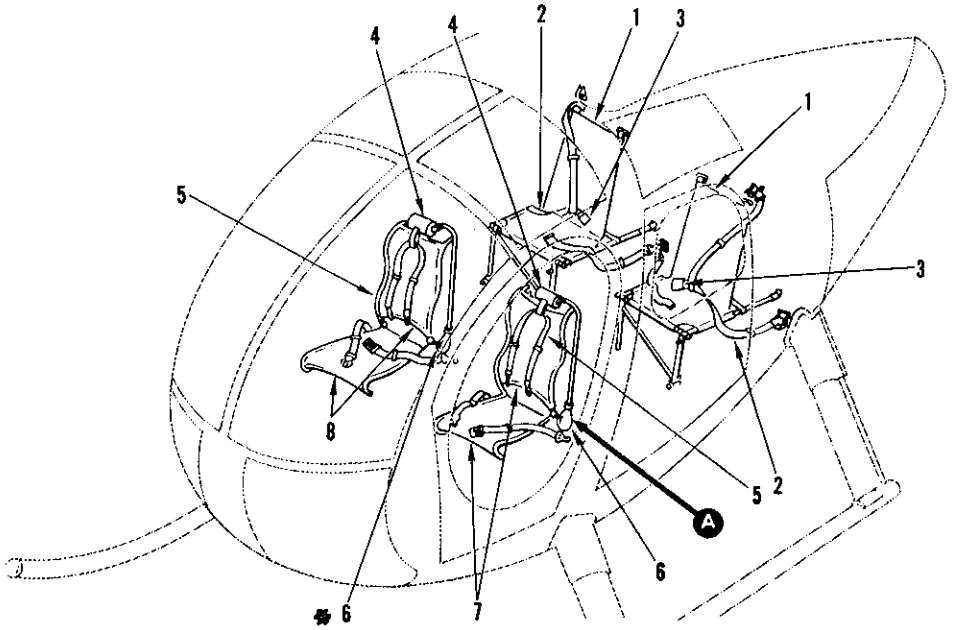


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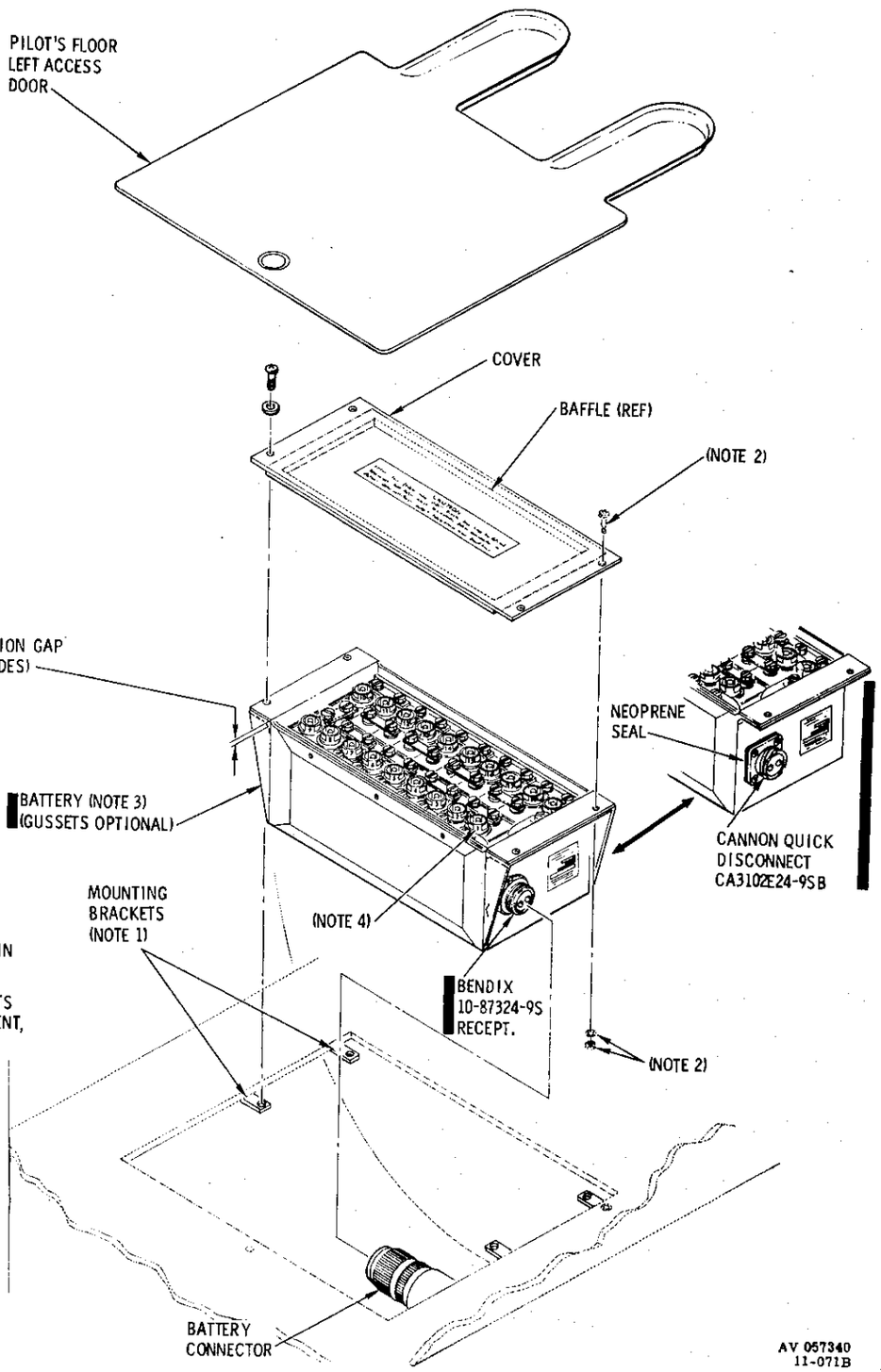
Figure 2-11. Seats, safety belts and shoulder harness



NOTES:

1. BATTERY LOCATION SHOWN IN FLOOR OPENING IS TYPICAL.
2. SCREWS, WASHERS AND NUTS SHOULD BE USED FOR SHIPMENT, HANDLING AND STORAGE.
4. CELLS ARE NUMBERED FOR REFERENCE ONLY.

Figure 12–6. Battery replacement

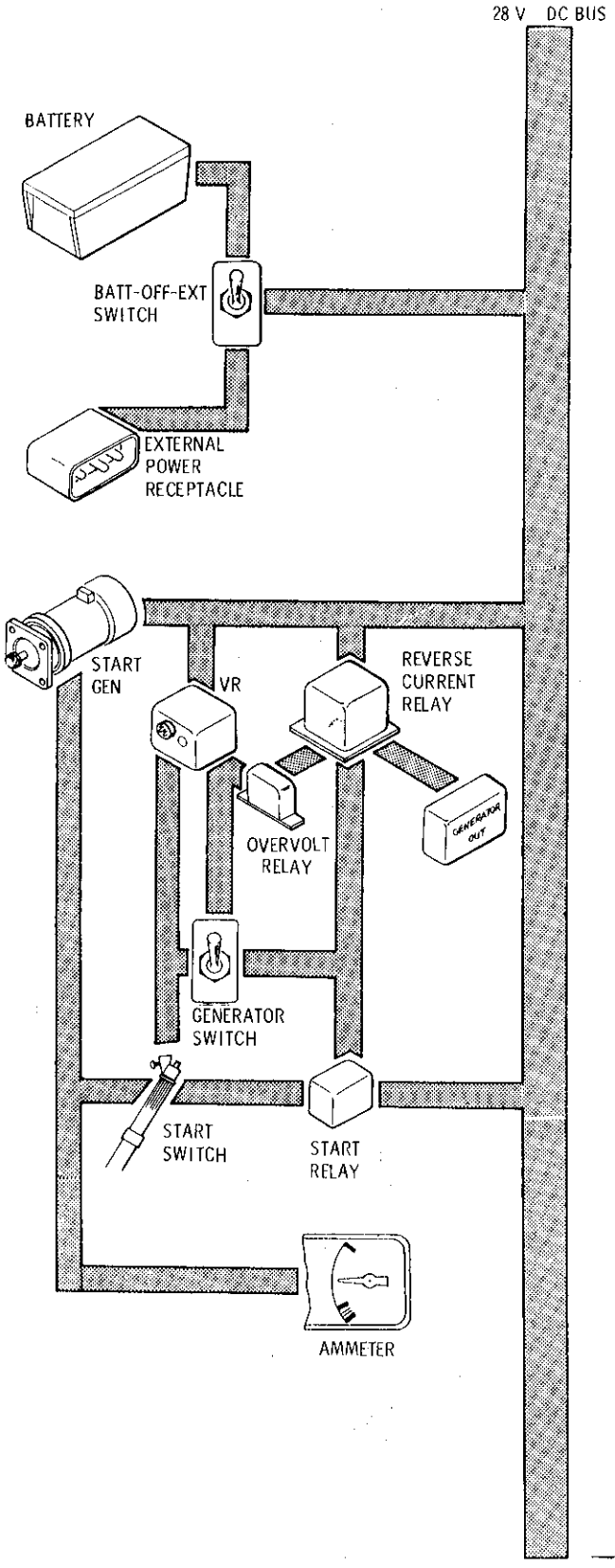


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Figure 2–10. Simplified power supply diagram

positive and negative conductors. The receptacle is located at the right-hand side of the pilot's seat, inside the compartment door.

2–64. Electrical Power Supply System.

The electrical system shown schematically in fig. 2–10 is supplied by a 28-volt, direct-current, 150-ampere, engine-driven generator, in conjunction with a 24-volt battery and an external power receptacle. Control of the electrical system is provided by the switches and circuit breakers on the electrical control console, and the circuit breaker panel located between the pilot's and co-pilot's seats. All circuits of the electrical system are protected by push-to-reset or switch-type circuit breakers. Alternating current is supplied by a static inverter for the directional gyro and attitude gyro.

2–65. Battery (BB-641/A).

The battery (19, fig. 2–2) is a 24-volt, 13-ampere-hour, 19-cell, nickel cadmium battery capable of starting the engine in temperatures down to −32°C (−25°F). It has vented cells, non-spillable caps, and a two-pin plus a polarity guide pin electrical receptacle connector. The battery is located beneath the left-hand floor access door, in the electronics compartment.

2–66. External Power Receptacle.

The external power receptacle (25, fig. 2–2) consists of a male connector that has three prongs: two large prongs and one small prong. The small prong provides a polarity guide while the other two are used as the

2–70. Generator.

The 150-ampere capacity starter-generator is mounted on the engine power and accessory gearbox and supplies 28-volt, direct-current power for operation of the aircraft electrical equipment and for battery charging. Generator operation is controlled by the GEN–OFF switch (21 or 58, fig. 2–9). At flight idle rpm and above, the voltage regulator automatically maintains the

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correct generator output voltage by varying the generator field current. On Series 1 and 2 aircraft, the generator field circuit is protected by a 15-ampere fuse (visible and accessibly secured to the instrument panel wiring harness forward of the panel). On Series 3 aircraft, the generator field circuit is protected by the GEN FLD circuit breaker (41, fig. 2–9) located on the circuit breaker panel. When an overvoltage condition occurs, an overvoltage relay is energized by the voltage regulator. The overvoltage relay opens the switch circuit of the reverse current relay to remove generator output from the bus. The reverse current relay prevents the battery from discharging through the generator when the output voltage falls below battery voltage. The aircraft electrical systems operate from the battery when the generator is OFF and the BATT–OFF–EXT switch is at BATT.

2–71. Generator Caution Light.

The generator caution light (18 or 42, fig. 2–8), marked GENERATOR OUT (or DC GEN), is a rectangular amber light mounted in the right-hand side of the instrument panel. If the GEN–OFF switch is in the GEN position and generator output voltage is less than battery voltage the caution light will be illuminated. On Series 3 aircraft, the caution light will flash and then remain illuminated after the MASTER CAUTION light/switch is reset. (Refer to para 2–30.)

2–72. Generator Switch.

A generator switch (21 or 58, fig. 2–9), marked GEN–OFF, is located on the electrical control console. When in the GEN position, the generator is connected to the 28v dc bus; when in the OFF position, the generator is disconnected from the bus. (Refer to para 2–32, 2–33, and 2–34 for other functions of generator switch.)

2–73. Power Selector Switch.

The power selector switch (5 or 33, fig. 2–9), marked BATT–OFF–EXT, is located on the electrical control console and provides a selection of power sources. When in the BATT position, it supplies either battery or generator power to the main bus. The EXT position disconnects the battery from the bus and supplies external power from an auxiliary power unit when this source is connected to the external power receptacle. The power selector switch does not control generator power; the generator circuit is controlled by the GEN–OFF switch only.

2–75. Ammeter.

A direct-current ammeter (20, fig. 2–8), marked DC AMP, is in a 3-pack instrument cluster along with the engine oil pressure indicator and engine oil temperature indicator. The ammeter is graduated from −150 to +150 amperes, with major graduations of −150, −75, 0, +75, and +150. An ammeter plus scale reading indicates the current demand of the aircraft electrical system during normal generator operation. Minus amperage is indicated only during engine starting and shows the current demand of the starter.

2–76. Flight Control Systems.

The flight control system includes three primary systems: the collective pitch control system which governs the rate of ascent or descent; the cyclic pitch control system that controls horizontal movement; and the antitorque control system that varies the heading of the aircraft. The aircraft also has three fixed airfoils on the tailboom; an upper vertical stabilizer, a lower vertical stabilizer, and a horizontal stabilizer mounted at a 25-degree angle upward from the horizontal. The surfaces serve to stabilize the aircraft during high speed forward flight. The horizontal stabilizer also maintains the aircraft in a relatively level attitude during high speed forward flight.

2–77. Collective Pitch Control System.

The collective pitch control system includes dual collective pitch sticks mechanically linked to the main rotor swashplate, which in turn controls rotor blade pitch. Raising the collective pitch stick increases the incidence of the main rotor blades, while lowering the stick decreases the main rotor blade incidence; this action varies the lift developed by the main rotor blades and thereby controls the rate of ascent or descent within the limits of engine power.

d. Generator Switch:
Allows pilot to relay 28 VDC power from the starter generator to the aircraft electrical system. Single pole, two pos. switch

e. Voltage Regulator:
Controls voltage output (28 VDC) of the starter generator

f. Reverse Current Relay:
Prevents reverse current flow from battery to starter generator during normal operation.

g. Overvoltage Relay:
Takes generator out of the electrical system in the event of an overvoltage output of 31.5 to 34.5 volts from the starter generator. The overvoltage relay automatically resets when voltage drops back to normal.

5. Warning Systems

a. Warning Lights
   (1) Engine Out--Activates when N1 turbine speed drops below fifty five (55%) per cent.
   (2) Main Transmission Oil Pressure or Temperature--Activates when main transmission oil pressure drops below fifteen (15 psi) and/or oil temperature exceeds 115 degrees Centigrade

b. Caution Lights
   (1) Fuel Filter--Indicates a pressure differential of .4 to .5 psi between the pump side and the engine side of fuel filter in the engine fuel pump.
   (2) Fuel Quantity Low/High Light--Indicates fuel low, approximately 35 lbs or ten minutes during normal operations. During fuel transfer light indicates aircraft main fuel tanks approaching full, approximately 365 lbs.,(Caution) High Light should be cross checked with fuel quantity guage to insure proper indication.
   (3) Generator Caution Light--Indicates generator failure or an overvoltage condition exist within the aircraft electrical system.
   (4) Chip Detector Light--Indicates accumulation of metal particles on one of the five chip detector plugs in the aircraft lubrication systems. A isolation switch in the cockpit allows the pilot to determine which plug is affected.

6. Aircraft Lighting

a. Interior Lighting:
   2 MAP LIGHTS
   REOSTAT LIGHTING

b. Exterior Lighting:
   LANDING LIGHT
   POSITION LIGHTS STD.

7. Cyclic Control Trim System:
   LAT TWIRE AS FIRST

8. AC Electrical System:
   STATIC 115V 400 C AC INVERTER
   FOR SYSTEM BIRD

9. Tachometer Generators:
   N1, N2, NR

10–11. N1, N2 and Rotor Tachometer Indicating Systems.

The N1 tachometer indicator (fig. 10–1) indicates the speed of the gas producer turbine in percent of rpm. The N2 and rotor tachometer indicator (fig. 10–1) provides two indications: the actual rpm of the main rotor is indicated on the inner scale with the small (R) pointer; the engine power turbine speed is indicated in percent of rpm on the outer scale with the long pointer. Three 3-phase, 2-pole, synchronous tachometer generators produce the voltages that energize the power turbine rpm (N2), gas producer turbine rpm (N1), and the main rotor rpm (NR) indicators. The N2 and N1 tachometer generators are located on the front of the engine accessories gearcase, and the NR tachometer generator is located by the tail rotor drive output shaft on the main transmission accessory section (fig. 10–3). The tachometer generators are connected through individual wiring circuits to the indicators; there is no interconnection with the main electrical system.

10–12. N1, N2 and Rotor Tachometer Indicators.

a. Troubleshooting. Refer to table 10–3.

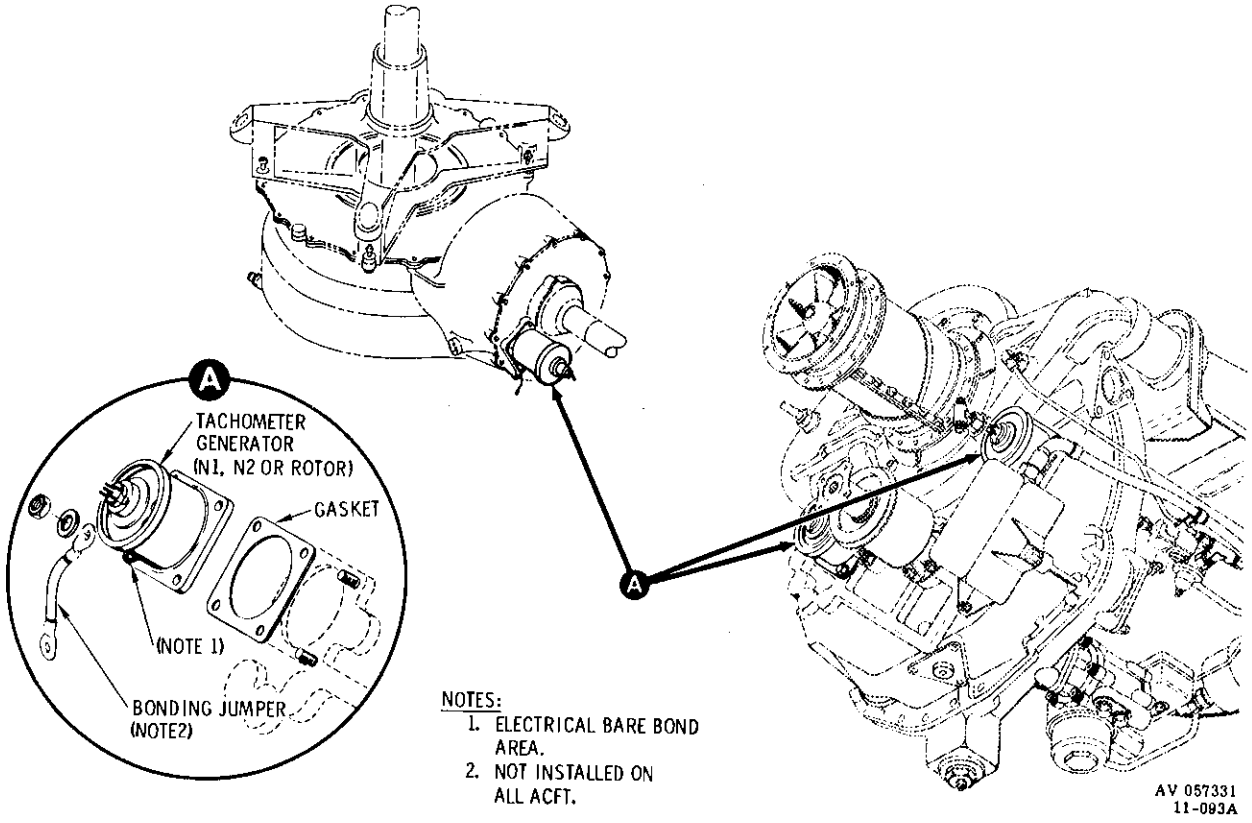

Figure 10–3. Tachometer generators

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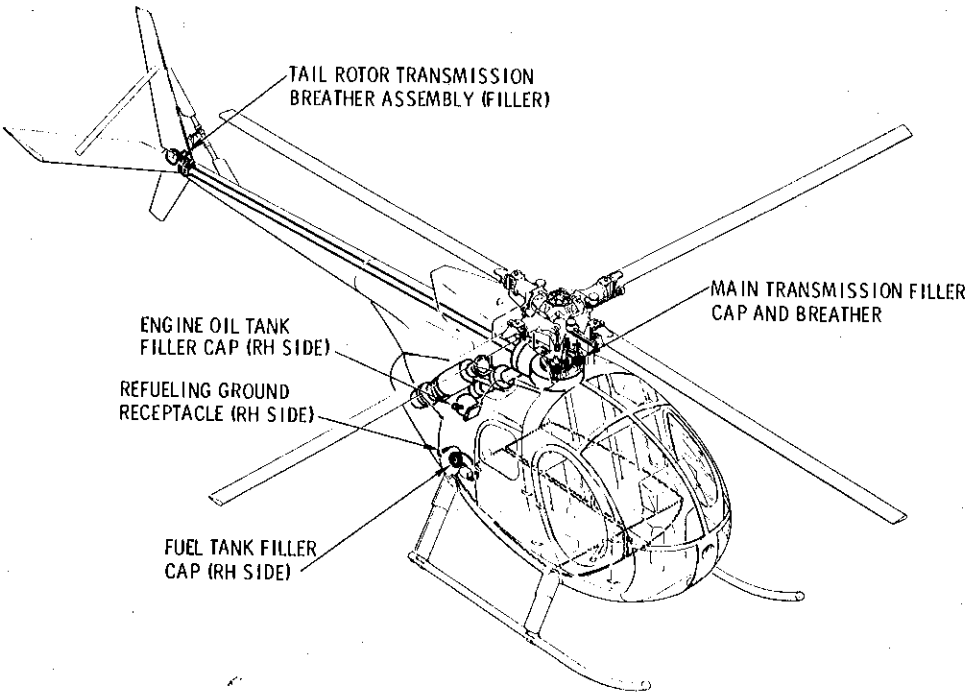

SERVICE POINT	CAPACITY
ENGINE OIL TANK (NON-SEALING AND SELF-SEALING)	3.0 U.S. QT
MAIN TRANSMISSION	6.5 U.S. PT OR * 8.0 U.S. PT
TAIL ROTOR TRANSMISSION	0.5 U.S. PT
FUEL TANK	61.5 U.S. GAL

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Figure 2-12. Servicing diagram

FUEL AND OIL SYSTEMS
Basic Aircraft

Fuel System

1. Description

2. Components

a. Fuel Cells: (2) [SHUT OFF VALVE

PRESS TYPE GRAVITY FED BLADDER TYPE
FUEL DELIVERED TO ENG FR LEFT CELL

b. Fuel Quantity Indicating System: SELF SEALING LOWER 50%
VISUAL REF

(1) FLOAT TYPE IN LEFT MAIN CELL
READ OUT IN LBS

c. Fuel Shutoff Valve:

d. Fuel Cell Vents:

PREVENTS CELL COLLAPSING WHEN FUEL CONSUMED.

EMERGENCY SHUT OFF MORE THAN 30° VERTICAL

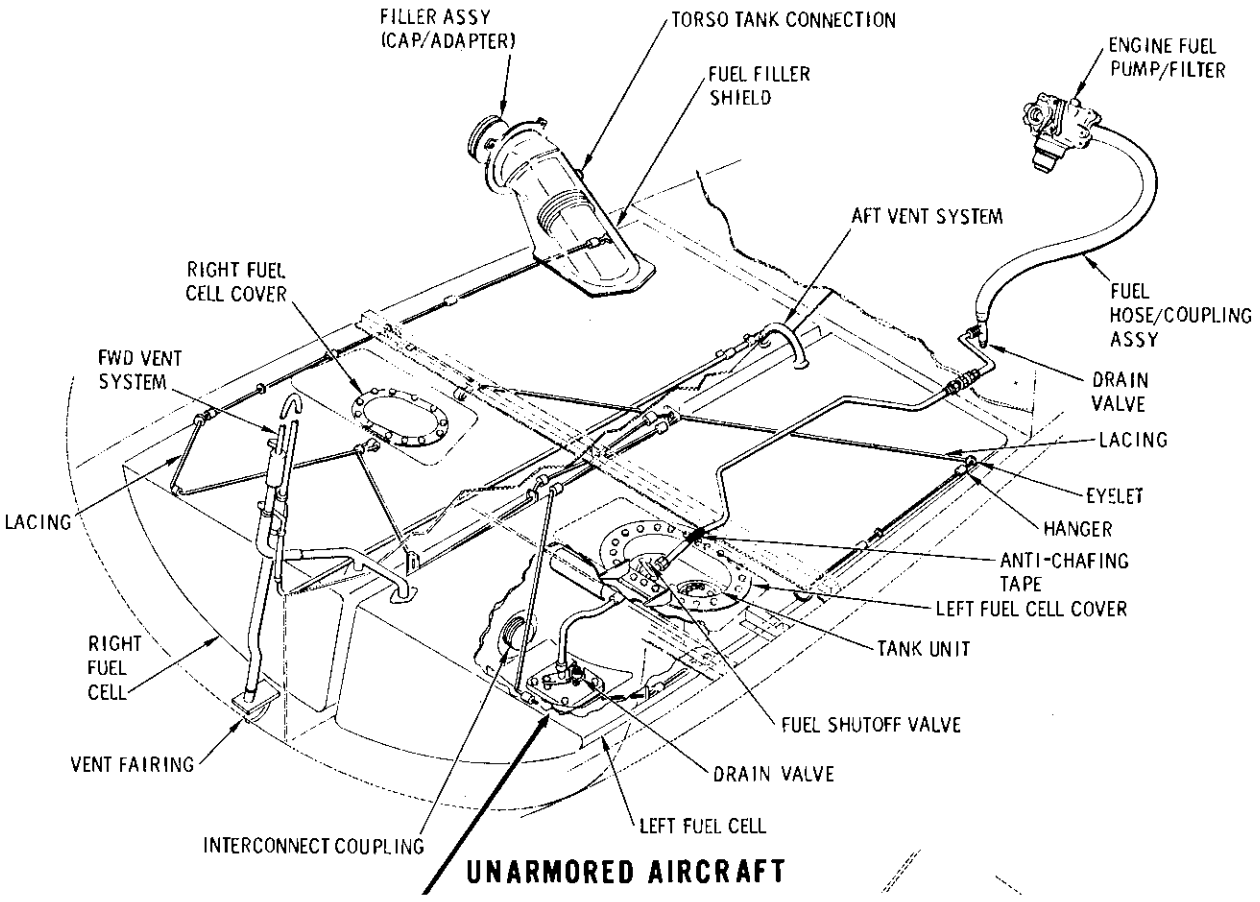
e. Fuel Pump and Filter Assembly:
(1) Fuel Pump/Engine Driven

ENG DRIVEN FUEL UNDER PRESS TO FUEL CONTROL
SINGLE ELEMENT GEAR DRIVEN

(2) Fuel Filter

FILTERS FUEL FR. FUEL CELL TO ENG DRIVEN PUMP

f. Electrical Fuel Pump: SUBMERGED 28 VDC
WILL NOT SUSTAIN (LEFT FUEL CELL) SINGLE STAGE
ENG OPS IF NO ENG DRIVE PUMP 9-20 PSI PRESS TO ENG FUEL PUMP
ON ABOVE 15,000 MSL 113 F
BY PASS DISCHARGE ALLOWS FUEL SHOULD PUMP FAIL



ARMORED AIRCRAFT

Figure 5–14. Fuel system

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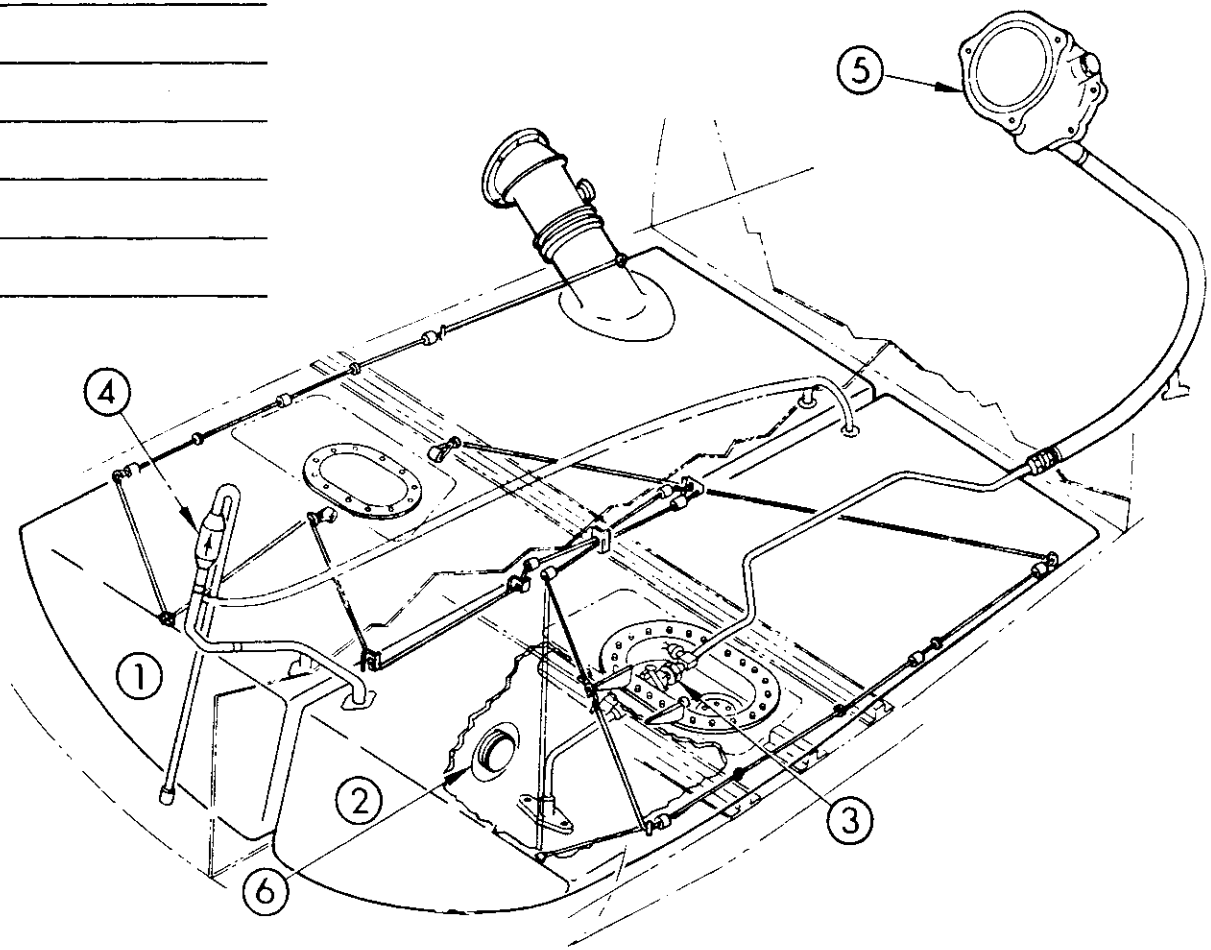
Identify the numbered components.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____



g. Fuel Drain Valves: (2)
(1) LEFT MAIN FUEL CELL
(2) BOTTOM OF ENG DRIVEN FUEL PUMP

Oil System (ENG)

1. Description
DRY SUMP ~~CIRCULAT~~ CIRCULATED SYSTEM

2. Components

a. Oil Tank:
(2) CIRCULAR VALVES
VENTED TO ENG ACC. GEAR BOX

b. Oil Cooler Blower:
BLOWS COOL AIR ON OIL COOLER OF MAIN TRANSMISSION, ENG COMPARTMENT, HEATING

c. Oil Cooler: RADIATOR TYPE ~~HEAT~~ EXCHANGER
MAINTAINS 185°F ALUMINIUM TUBES WELDED TO ~~VENTED TO ENG FROME~~ * ONE WAY CHECK VALVE
~~ACCESSORY GEAR BOX~~ PREVENT OIL FLOW TO ENG AFTER SHUT DOWN

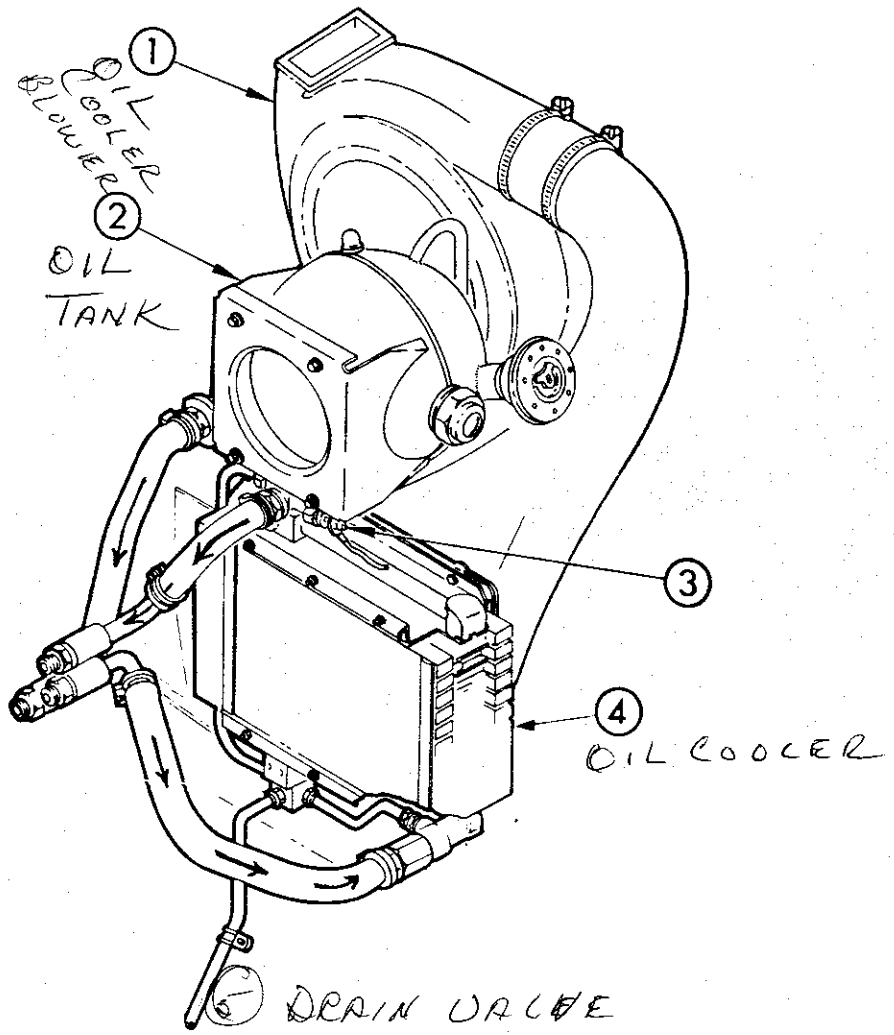
d. Drain Valve:
BOTTOM SIDE OF OIL COOLER & TANK
SPRING LOADED TO CLOSED POSITION.

e. Oil Temperature Sender:
LOCATED ON OIL TANK OUTLET
VARIABLE RESISTANCE TYPE

f. Engine Oil ~~Indicator~~ TEMPT.
LOWER CENTER PORTION OF INST. PANEL

Identify the numbered components.

1. OIL COOLER BLOWER
2. OIL TANK
3. OIL TEMPT. SENDER
4. OIL COOLER



FT RUCKER 040127

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250 series turboshafts –a herd of horses in a 40-inch-long package

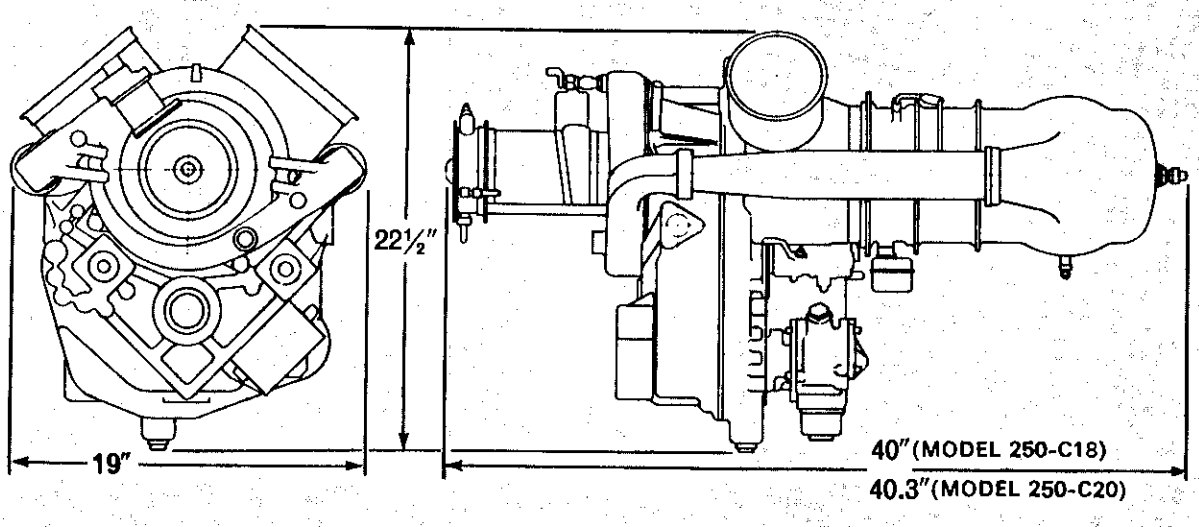
1. **Compressor:** Air enters the inlet and is compressed to over six atmospheres by the one centrifugal and six axial stages of the compressor.
2. **Air-transfer tubes:** High-pressure discharge air from compressor is transferred rearward to combustion section through two air-transfer tubes.
3. **Combustion:** Single combustor regulates and evenly distributes engine airflow.
4. **Fuel nozzle:** Fuel injected through single, duplex-type fuel nozzle.
5. **Turbines:** Hot combustion gases pass forward through first two-stage axial turbine, which drives compressor and then through second two-stage axial turbine, which drives power-output shaft.
6. **Exhaust:** After passing forward through turbine section, gases are exhausted upward through twin exhaust ducts.
7. **Power-output shaft—6000 rpm:** Energy of turbine section—after passing through appropriate gearing in accessories gear case—is available from an internally splined shaft, at either front or rear output pad.

Model 250-C18

FAA Type Certificate			E4CE	
Weight			141 ~~130~~ lbs.	
Fuel			Grade JP-4, JP-5, Commercial Kerosene	
Rating: Sea-level static—59°F. conditions				
Rating	Output Shaft			Measured Gas Temp. °F
	SHP (min)	SFC lb/SHP-hr	Speed RPM	
Takeoff	317	0.697	6000	1380	749 °C
Max. Cont.	270	0.706	6000	1280	693 °C
Cruise A (90%)	243	0.725	6000	1226	663 °C
Cruise B (75%)	203	0.762	6000	1148	620 °C

Model 250-C20

Weight			158 ~~155~~ lbs.	
Fuel			Grade JP-4, JP-5, Commercial Kerosene	
Rating: Sea-level static—59°F. conditions				
Rating	Output Shaft			Measured Gas Temp. °F
	SHP (min)	SFC lb/SHP-hr	Speed RPM	
Takeoff	400	* 0.630	6000	~~1400~~	743 °C
Max. Cont.	346	* 0.645	6000	~~1300~~	734 °C
Cruise A (90%)	311	* 0.661	6000	~~1247~~	706 °C
Cruise B (75%)	260	* 0.698	6000	~~1168~~	674 °C



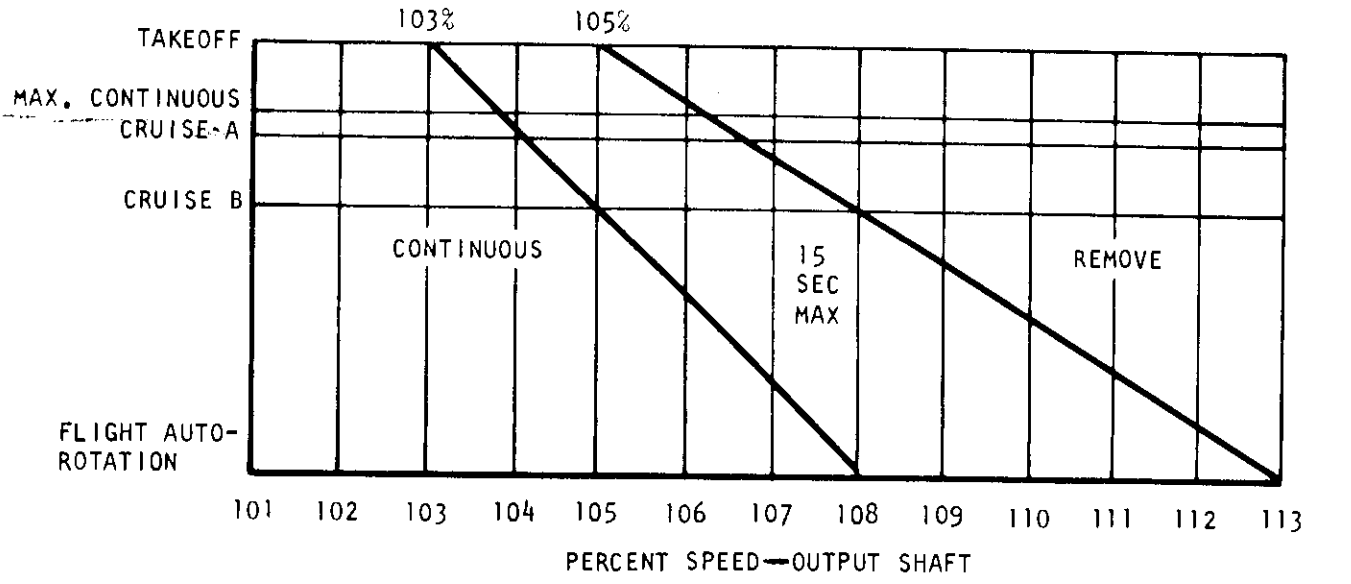


Figure 2-1. Maximum Allowable Output Shaft Speeds

TABLE II-1

Measured Gas Temperature Limits (TOT)

Steady State

Takeoff (5 min.)	793°C (1460°F)
30 Minute Power (applicable only in multi-engine helicopters when meeting one engine inoperative climb requirements)	793°C (1460°F)
Max Continuous (certification and emergency only)	777°C (1430°F)
Max Cruise and below	737°C (1358°F)

During Starting

Temp Range	*Time*	*Maintenance Action*
Up to 793°C (1460°F)	No limit	None.
793-927°C (1460-1700°F)	Over 10 sec	Inspect turbine.*
928-999°C (1700-1830°F)	Not allowed	Inspect turbine.*
Over 999°C (1830°F)	Not allowed	Remove turbine for heavy maintenance or overhaul.

NOTE

Refer to item 4, table III-3 when start temperature consistently exceeds 843°C (1550°F).

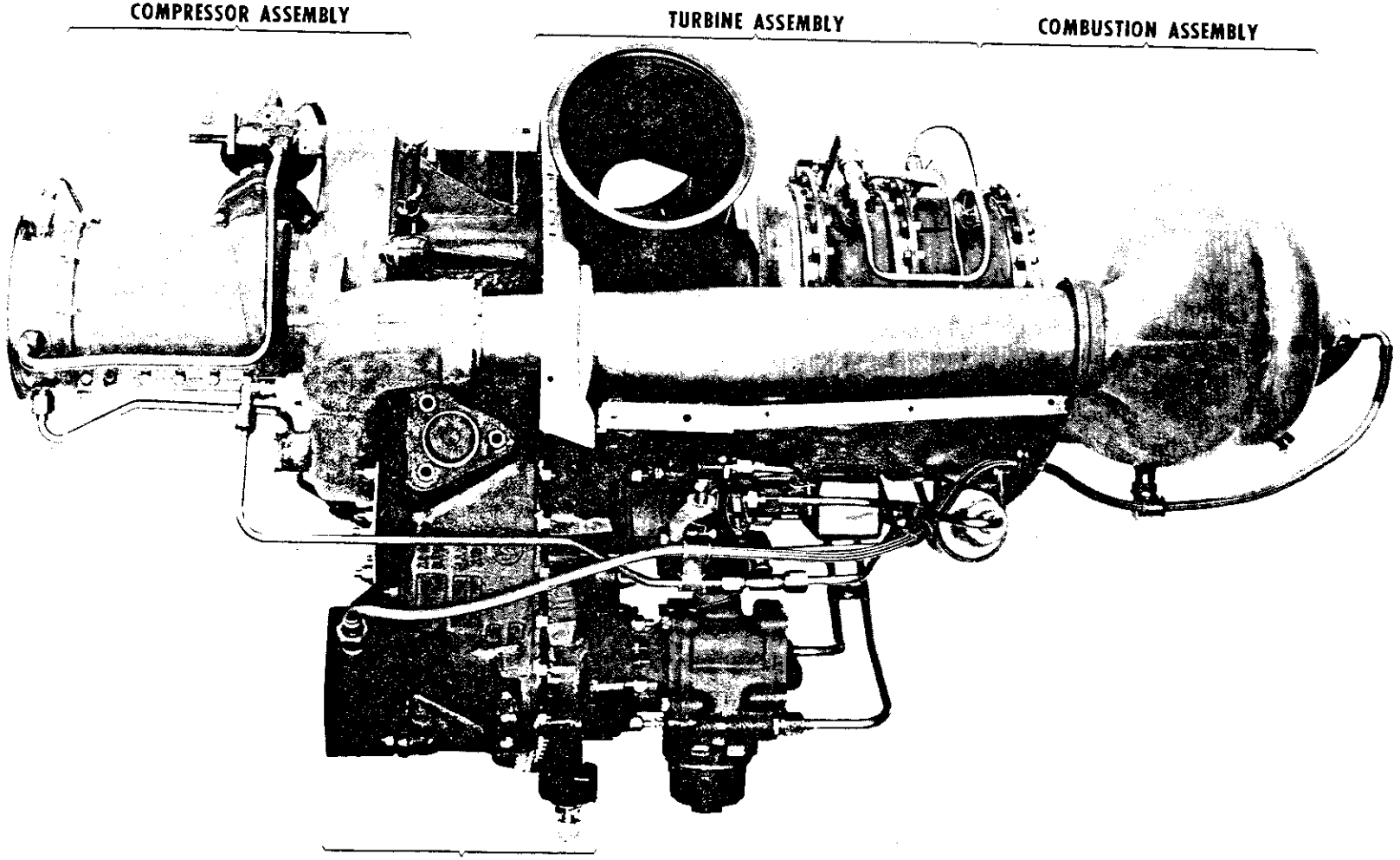
During Power Transient

Temp Range	*Time*	*Maintenance Action*
Up to 737°C (1358°F)	No limit	None.
737-793°C (1358-1460°F)	Until stabilized (5 min. max)	None.
793-843°C (1460-1550°F)	0 to 6 sec (intentional use of temperatures in excess of 793°C is not recommended)	None.
793-843°C (1460-1550°F)	Over 6 sec	Inspect turbine.*
844-927°C (1550-1700°F)	Not allowed	Inspect turbine.*
Over 927°C (1700°F)	Not allowed	Remove turbine for heavy maintenance or overhaul.

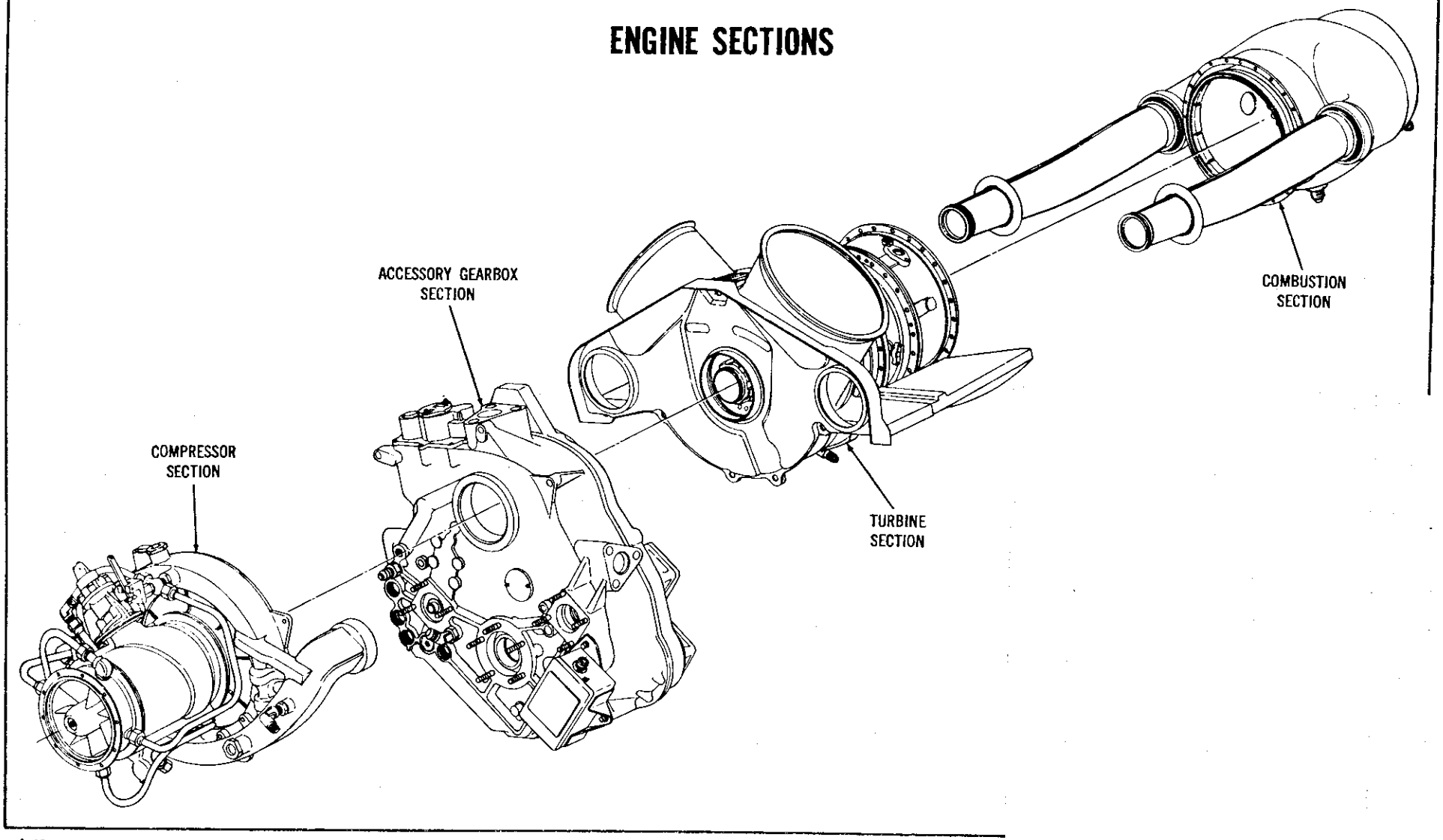
*Refer to Turbine, para 3-137
Note: The time-at-temperature limits are not additive and may be repeated without restrictions.

ALLISON 250 SERIES TURBO SHAFT ENGINE

MAJOR ASSEMBLIES



ENGINE SECTIONS



Allison DIVISION
GENERAL MOTORS CORP
INDIANAPOLIS, INDIANA 46206 U.S.A.

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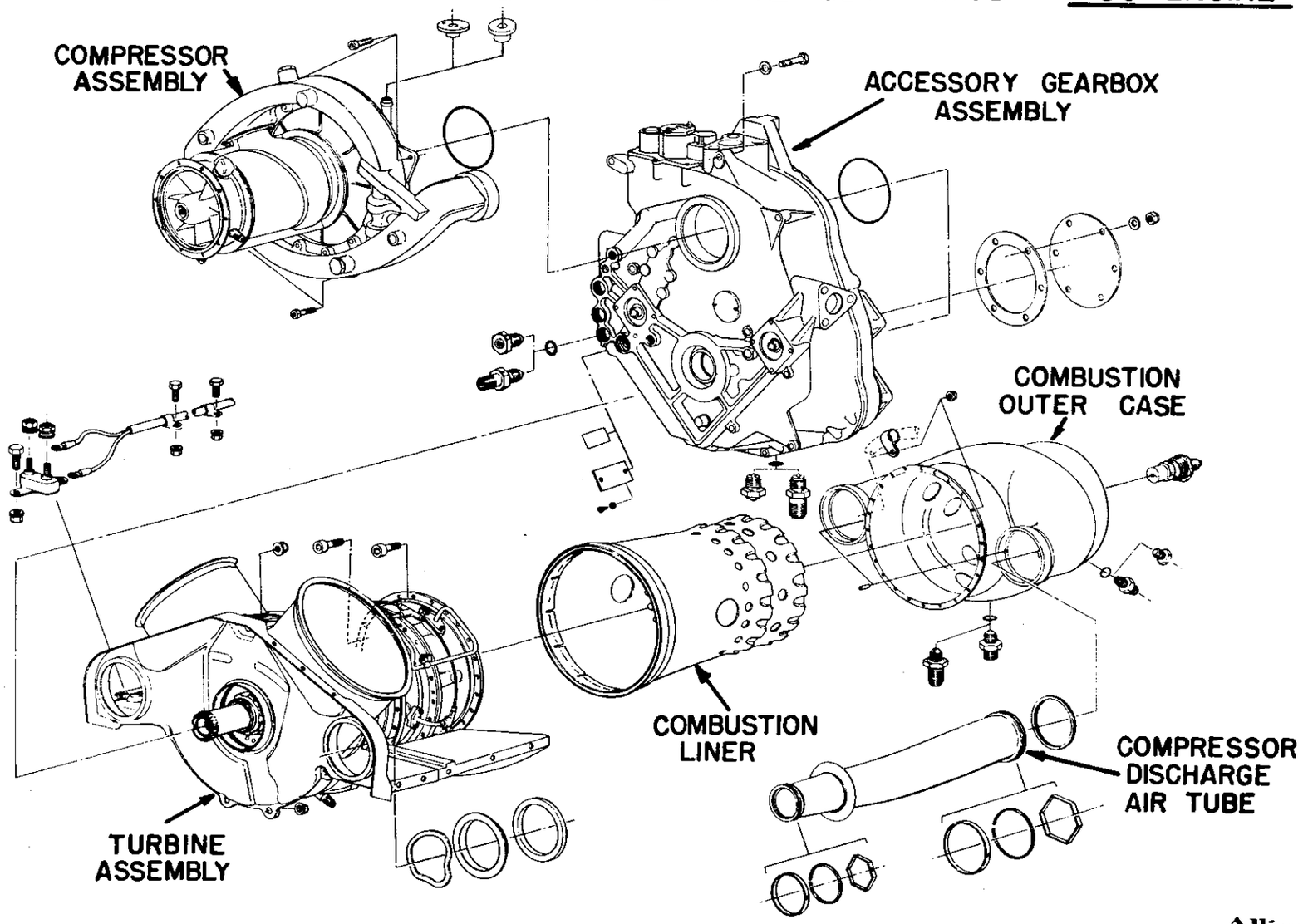
A.

BASIC ENGINE SECTIONS 250 ENGINE



REV. SEPT. 1969

Allison SERVICE SCHOOL

POWER PLANT

1. General Information: The power plant for the H-500P is a Allison Division Model 250-C20 turboshaft engine rated at 400 shp output. The engine consists of a multistage axial-centrifugal-flow compressor, a single combustion chamber, a two-stage gas producer turbine, and a two stage power-turbine which supplies the output power of the engine. The major engine components are a compressor, combustion section, turbine section, and power and accessory gearbox.

2. Common Abbreviations:
   N1----Gas Producer Turbine
   N2----Power Turbine
   Nr----Main Rotor RPM
   TOT---Turbine Outlet Temperature

3. Compressor Section:

6 axial 1 centrifugal

6.2 - 1 pressure ratio

front support

(1) houses #1 Bearing

(2) Oils " " "

(3) Scavenge " "

(4) anti ice (Bleed air

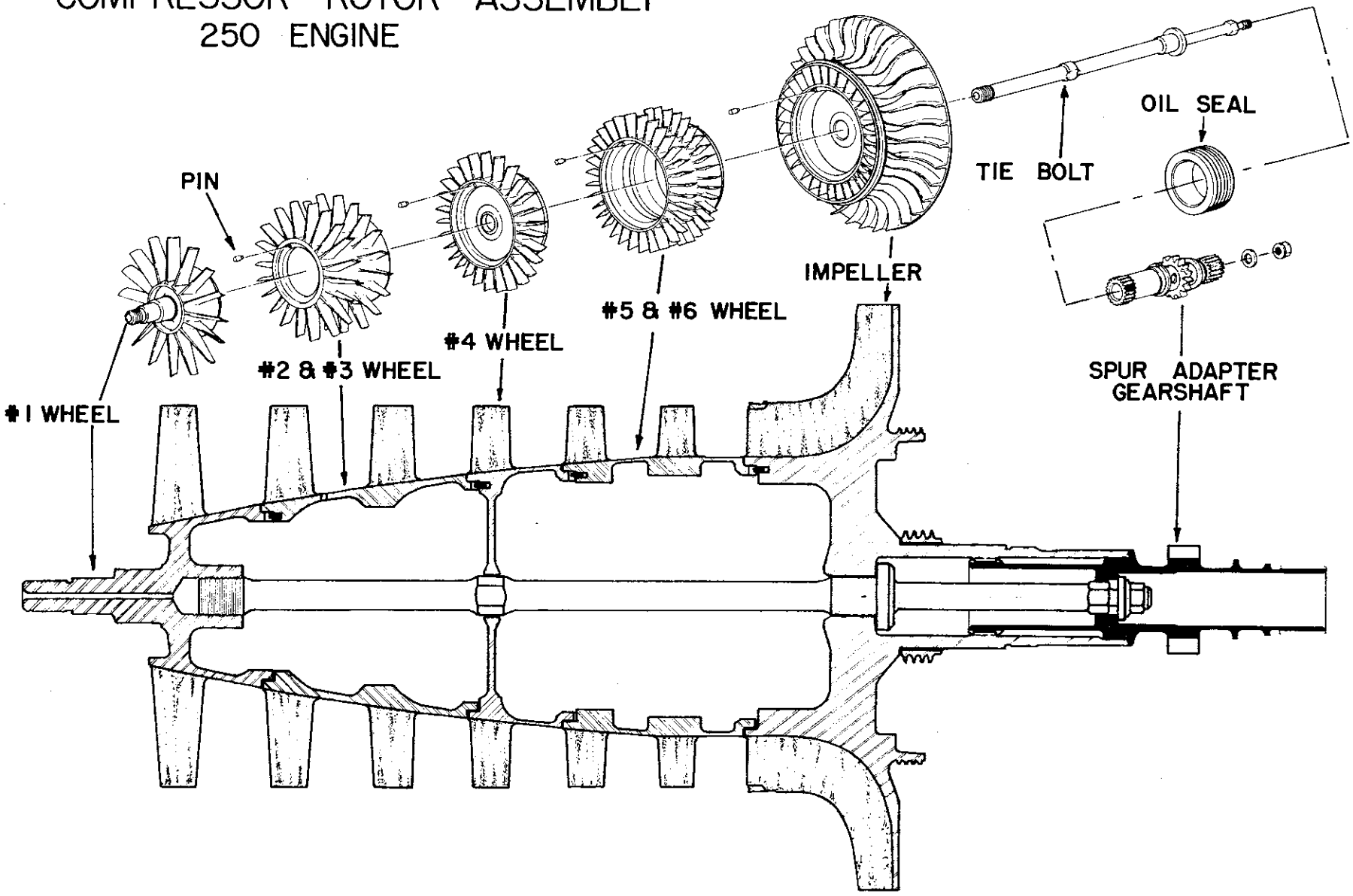
(5) directs air flow into rotors

thermal setting plastic provides min. clearance between rotor and sides of compressor housing.

4. Bleed Air System:

Provides rapid acceleration & prevents compressor stall

COMPRESSOR ROTOR ASSEMBLY
250 ENGINE



REV. MAY 1970

Allison
SERVICE SCHOOL

5. Combustion Assembly:

Primary liner - Provide cooling for dilution (2) mass air flow for flame control (3) for combustion and fuel air ratio
VGR

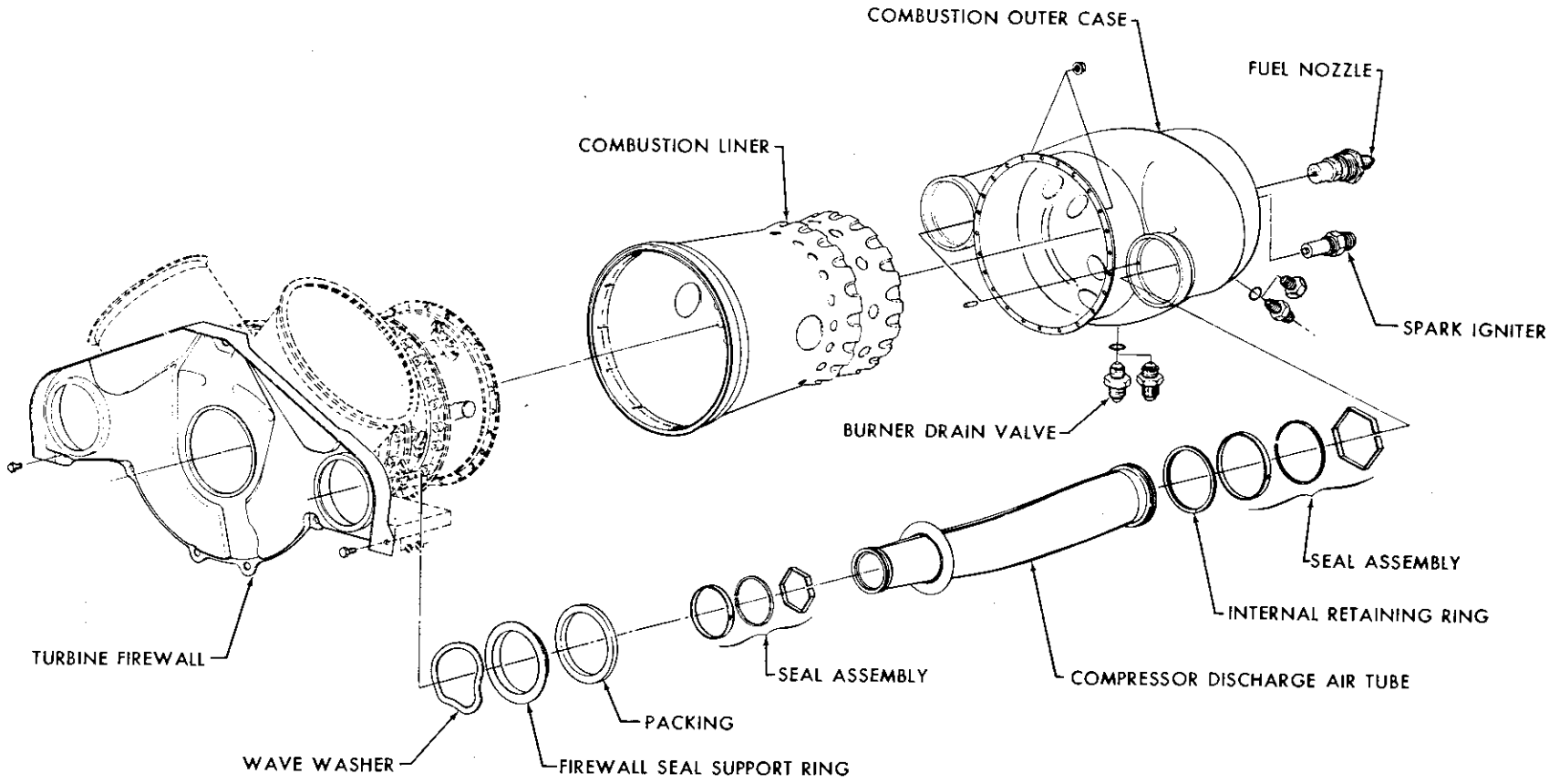
Burner drain valve

6. Turbine Assembly:

7. Accessory Gearbox Assembly:

Provides mounting and support for Eng
houses accessory gear train.
N2 22290 100% 2016 to drive shaft.

COMBUSTION ASSEMBLY



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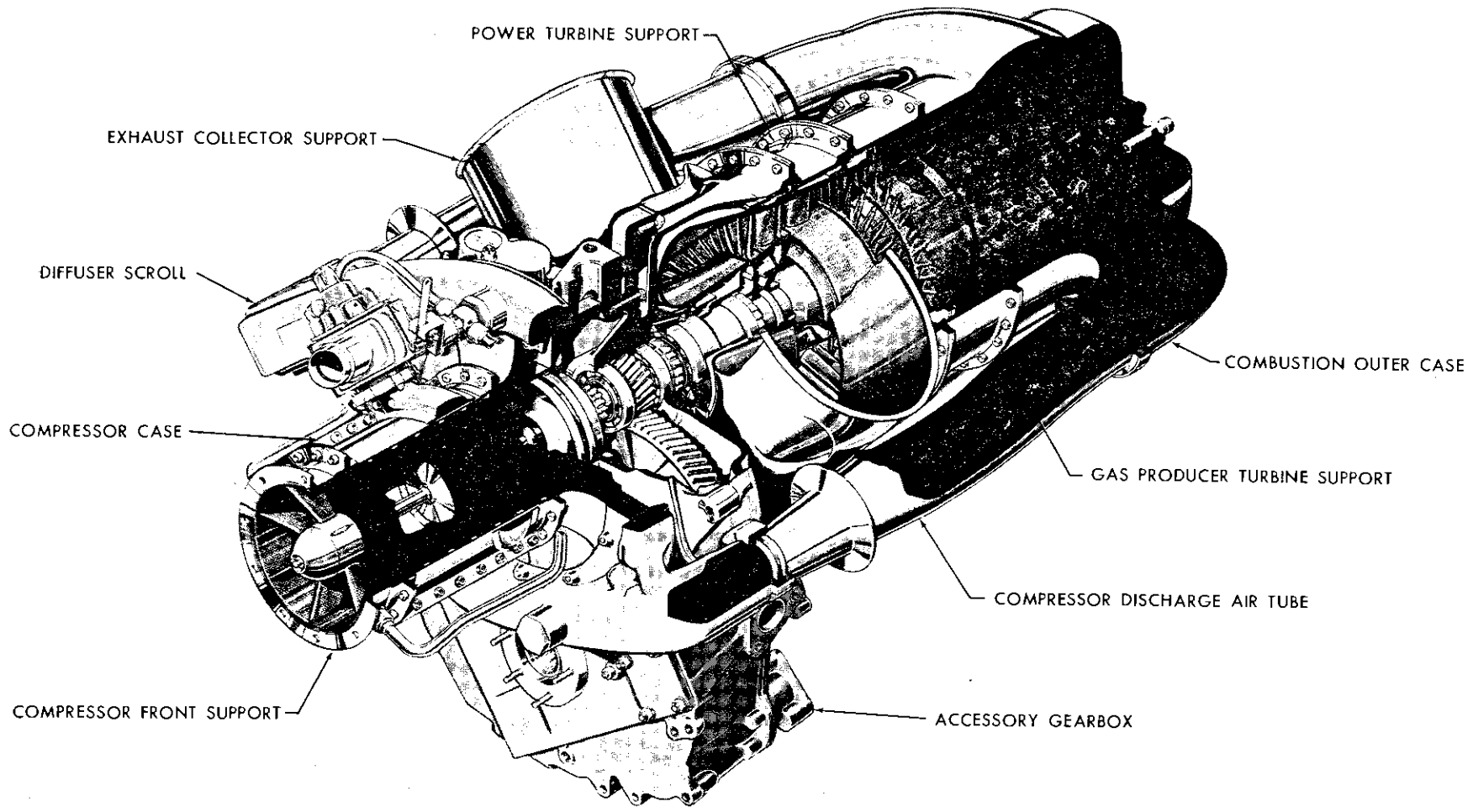
Intake
Compression
combustion
expansion
Exhaust

AIRFLOW AND COMBUSTION



INLET AIR | COMPRESSED AIR | FUEL | COMBUSTION GASES | EXHAUST GASES

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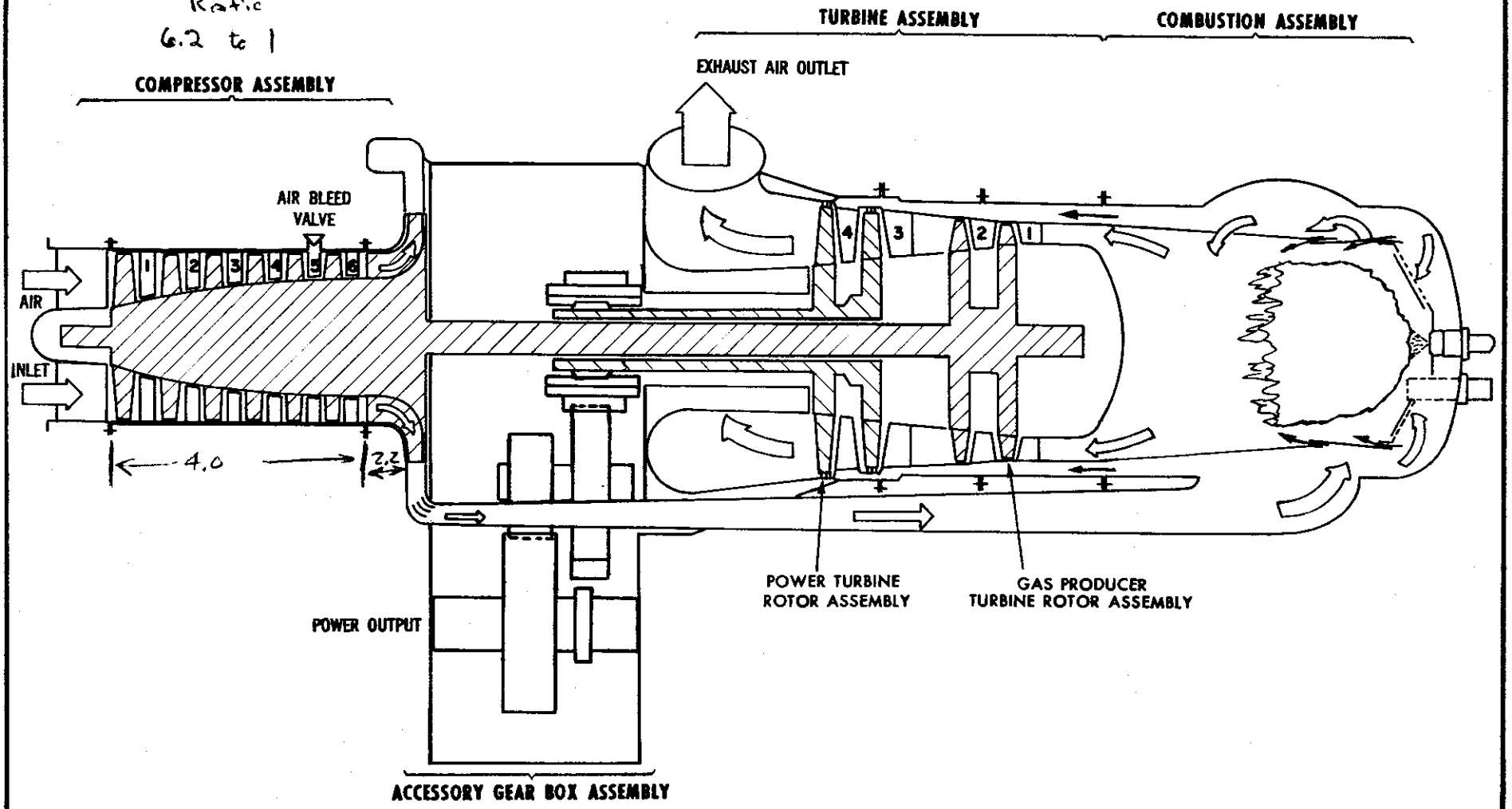
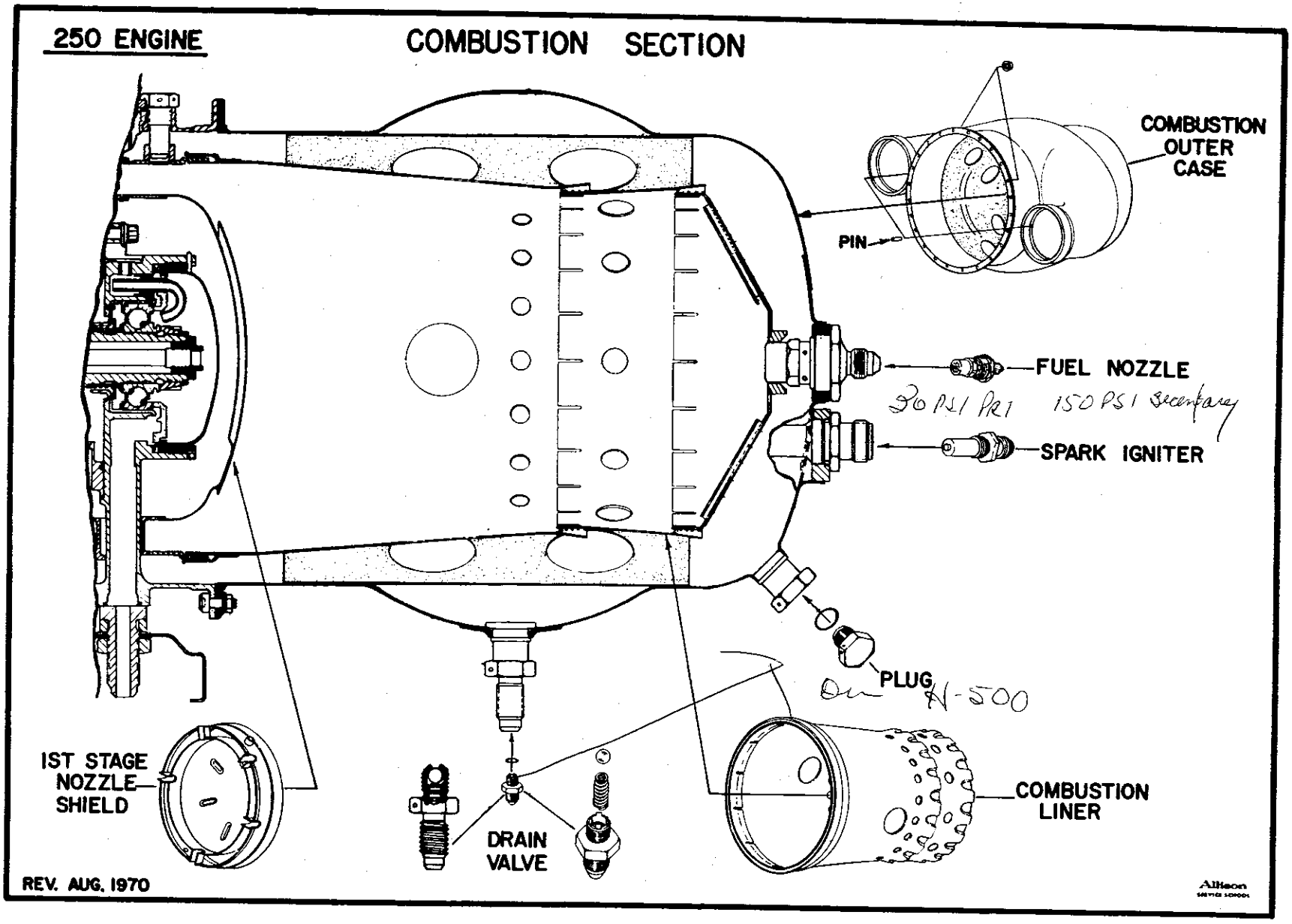
ALLISON INSTRUCTION CHART NO. 12-13
250 ENGINE
DATE 8-1-69

GAS FLOW SCHEMATIC

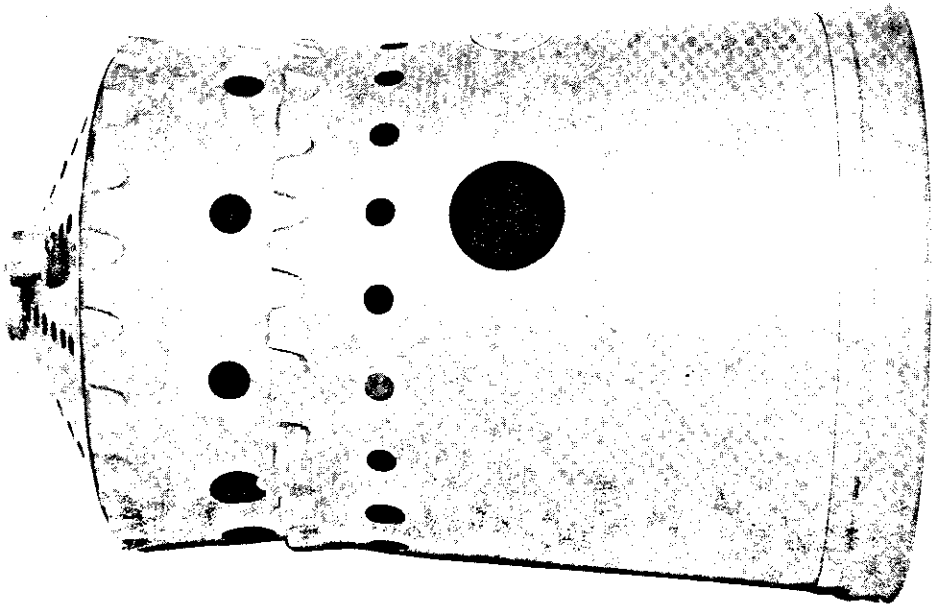
Pressure Rise Ratio 6.2 to 1



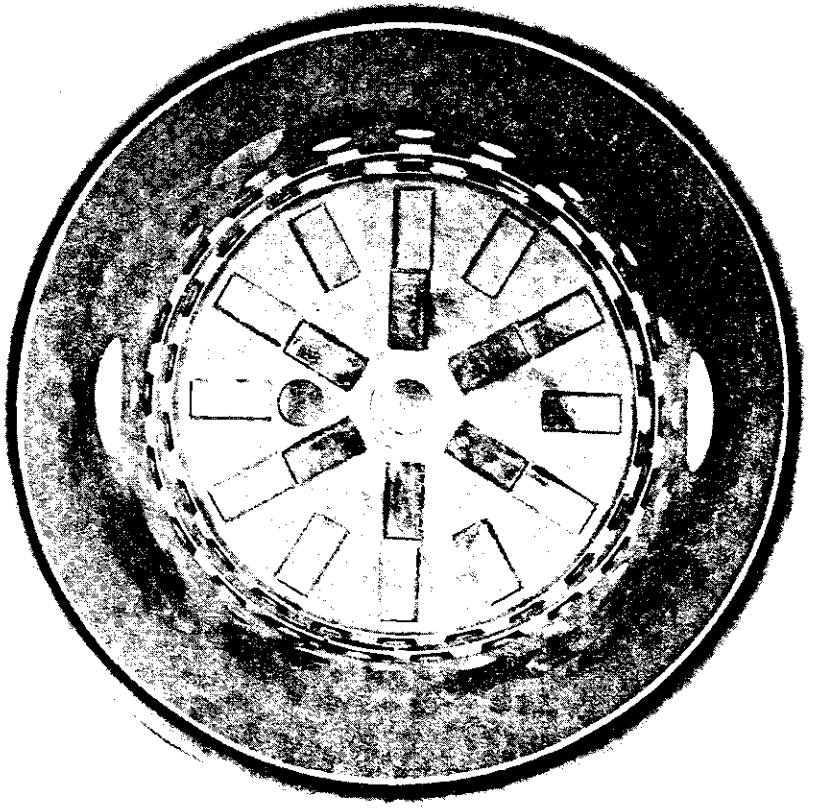
ALLISON INSTRUCTION CHART
250-C18 REV. MARCH 1971


250 ENGINE
COMBUSTION SECTION
COMBUSTION OUTER CASE
PIN
FUEL NOZZLE
30 PSI PRI
150 PSI secondary
SPARK IGNITER
PLUG
N-500
IST STAGE NOZZLE SHIELD
DRAIN VALVE
COMBUSTION LINER
REV. AUG. 1970
Allison

COMBUSTION LINER
250 ENGINE



OUTSIDE VIEW



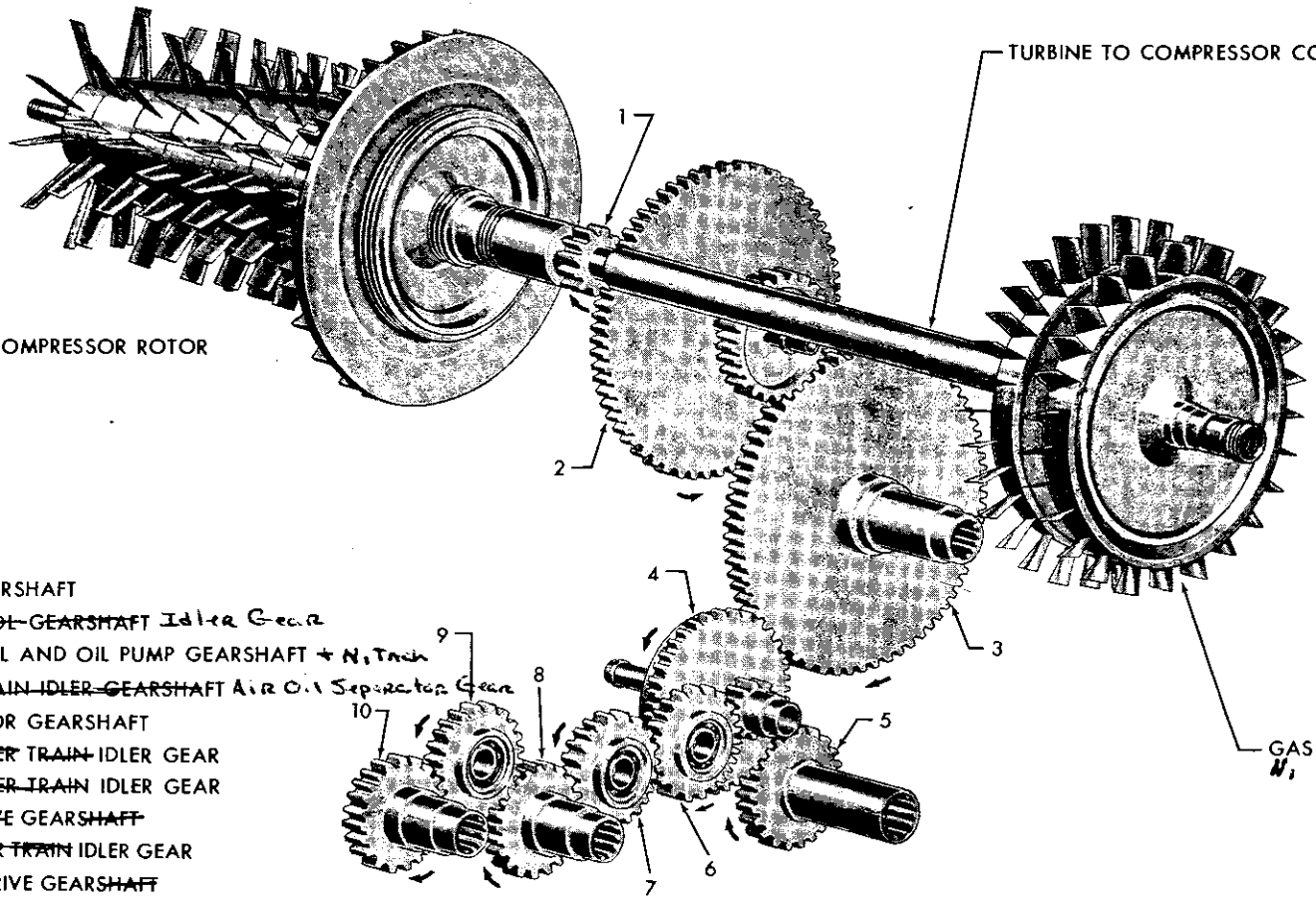
INSIDE VIEW

REV. APRIL 1968

Allison
SERVICE SCHOOL

32

GAS PRODUCER GEAR TRAIN
N_1



1 - SPUR ADAPTER GEARSHAFT
2 - ~~SPUR FUEL CONTROL GEARSHAFT~~ Idler Gear
3 - ~~SPUR~~ FUEL CONTROL AND OIL PUMP GEARSHAFT + N_1 Tach
4 - ~~GAS PRODUCER TRAIN IDLER GEARSHAFT~~ Air Oil Separator Gear
5 - STARTER GENERATOR GEARSHAFT
6 - ~~SPUR GAS PRODUCER TRAIN~~ IDLER GEAR
7 - ~~SPUR GAS PRODUCER TRAIN~~ IDLER GEAR
8 - ~~SPUR~~ FUEL PUMP ~~DRIVE~~ GEAR~~SHAFT~~
9 - ~~SPUR GAS PRODUCER TRAIN~~ IDLER GEAR
10 - ~~SPUR~~ ACCESSORY DRIVE GEAR~~SHAFT~~

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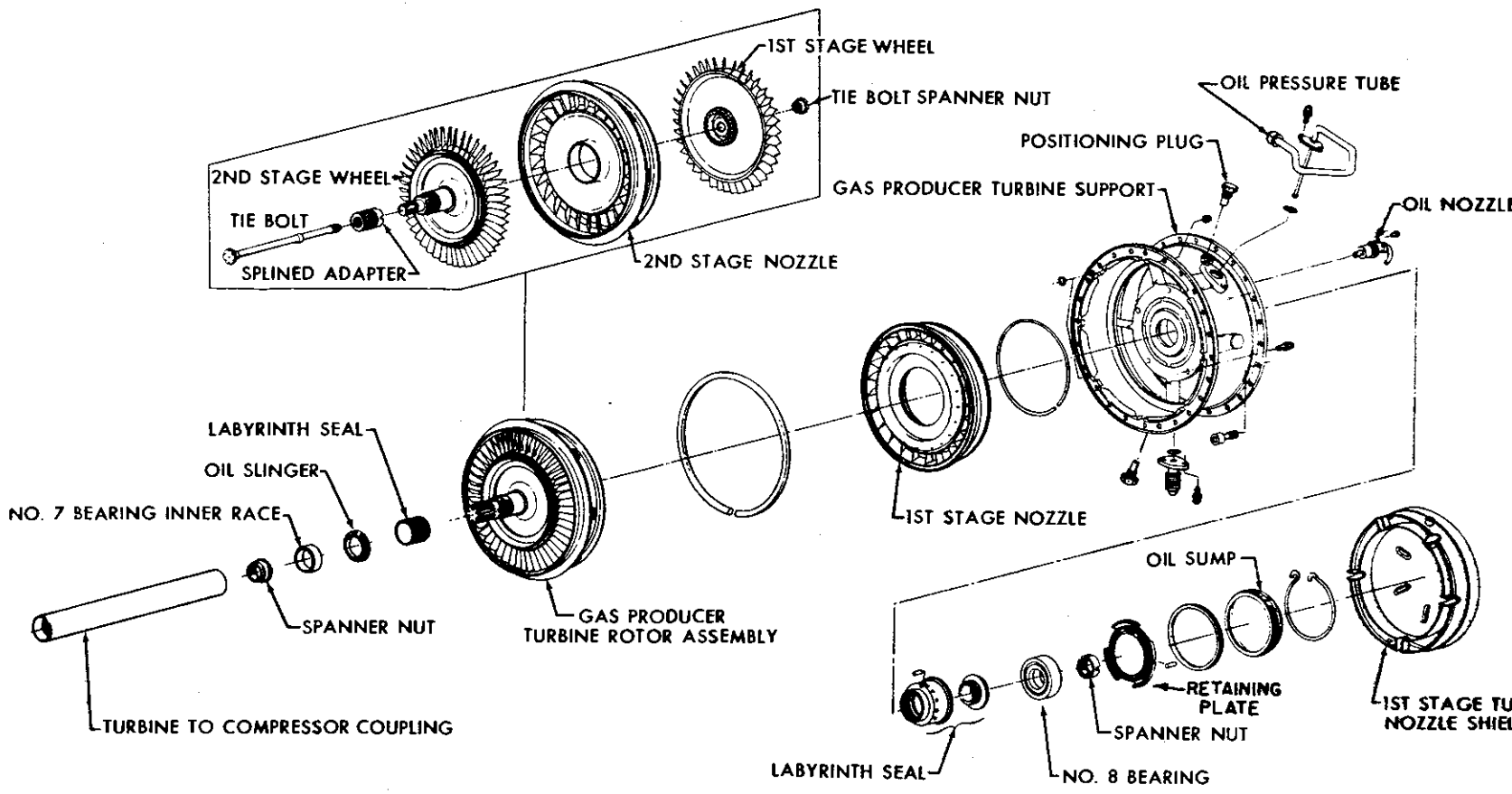
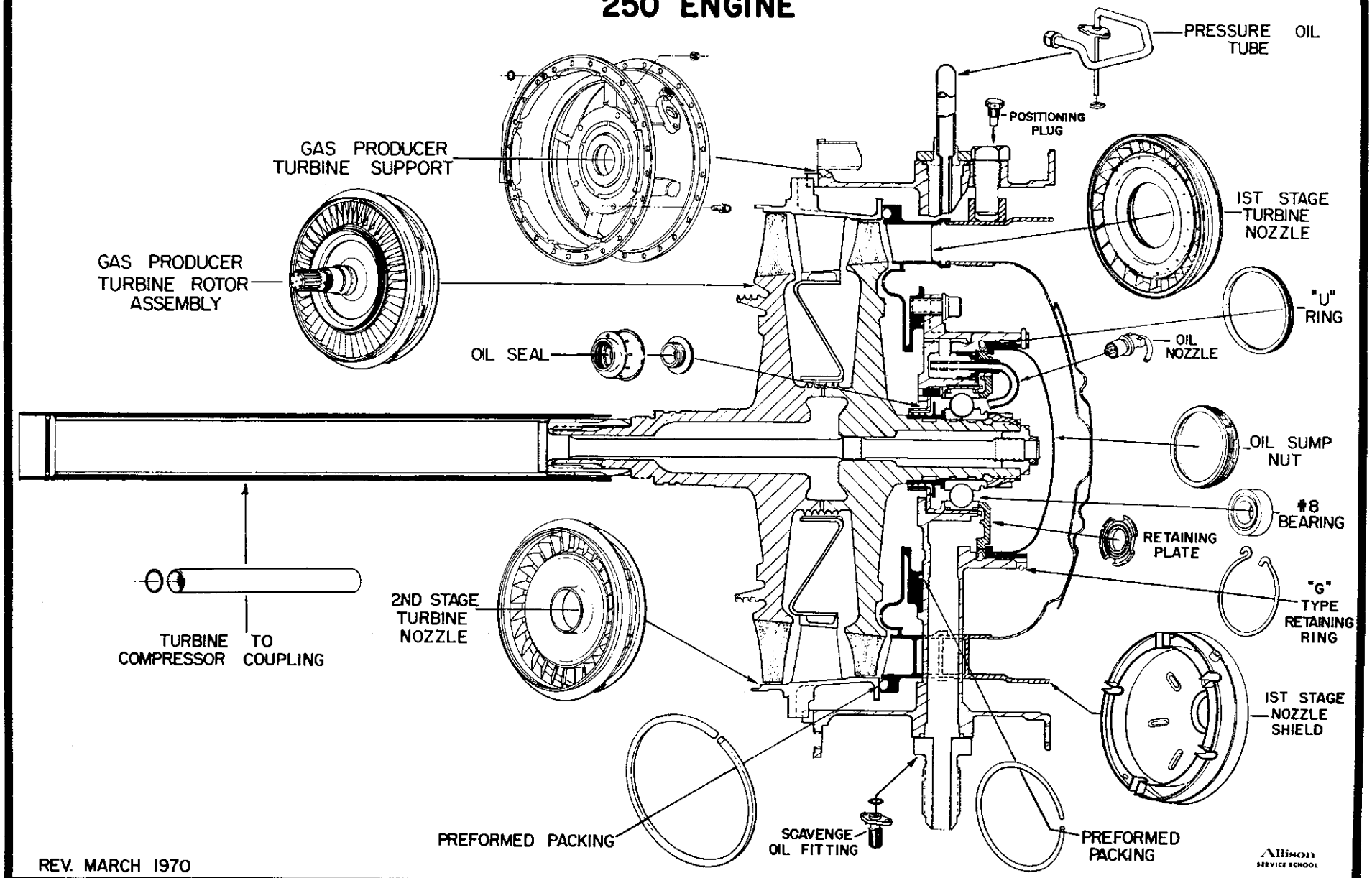
ALLISON INSTRUCTION CHART NO. 12-8
250 ENGINE
DATE 7-20-69

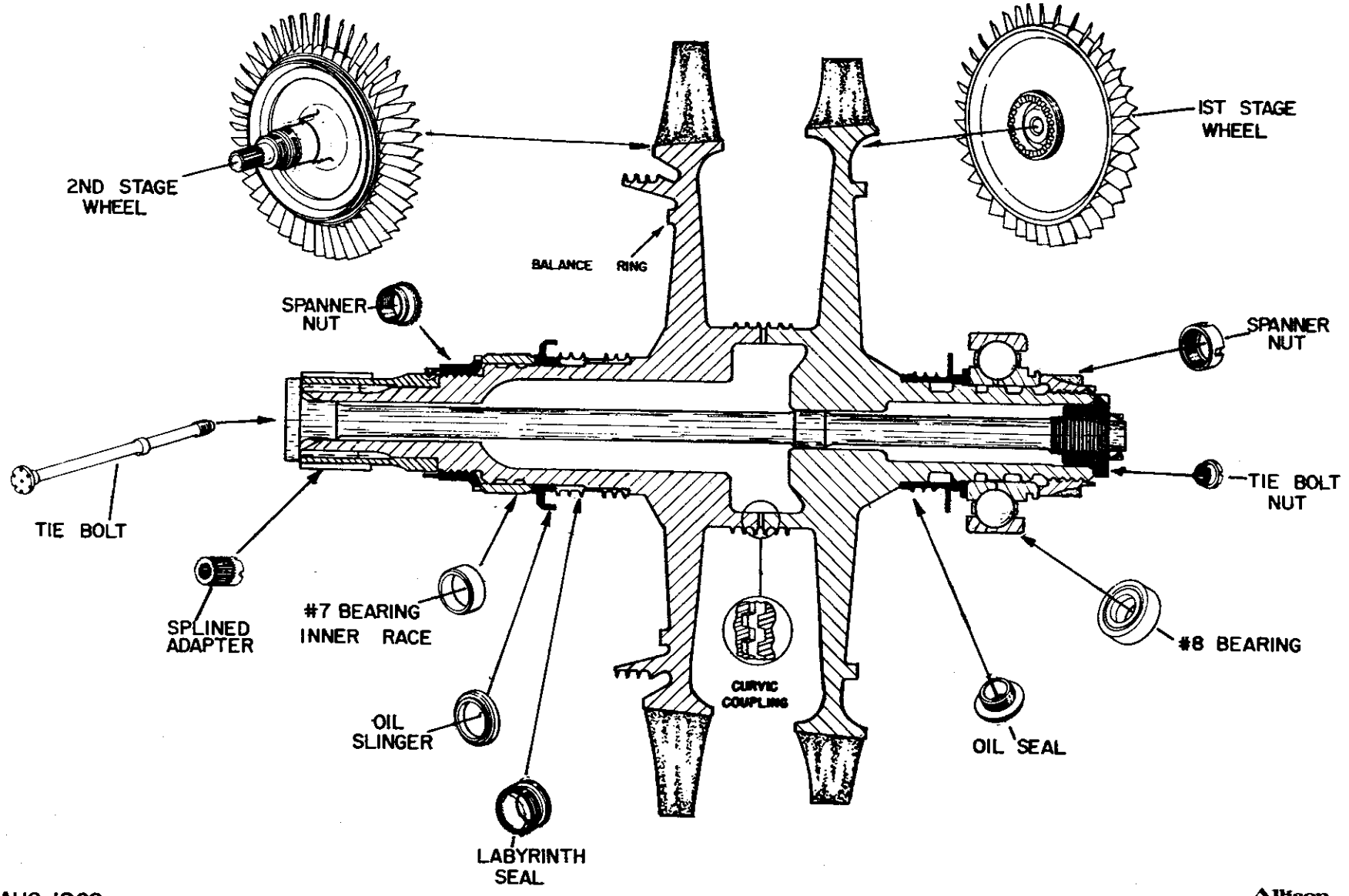
GAS PRODUCER TURBINE ASSEMBLY



GAS PRODUCER TURBINE SECTION
250 ENGINE



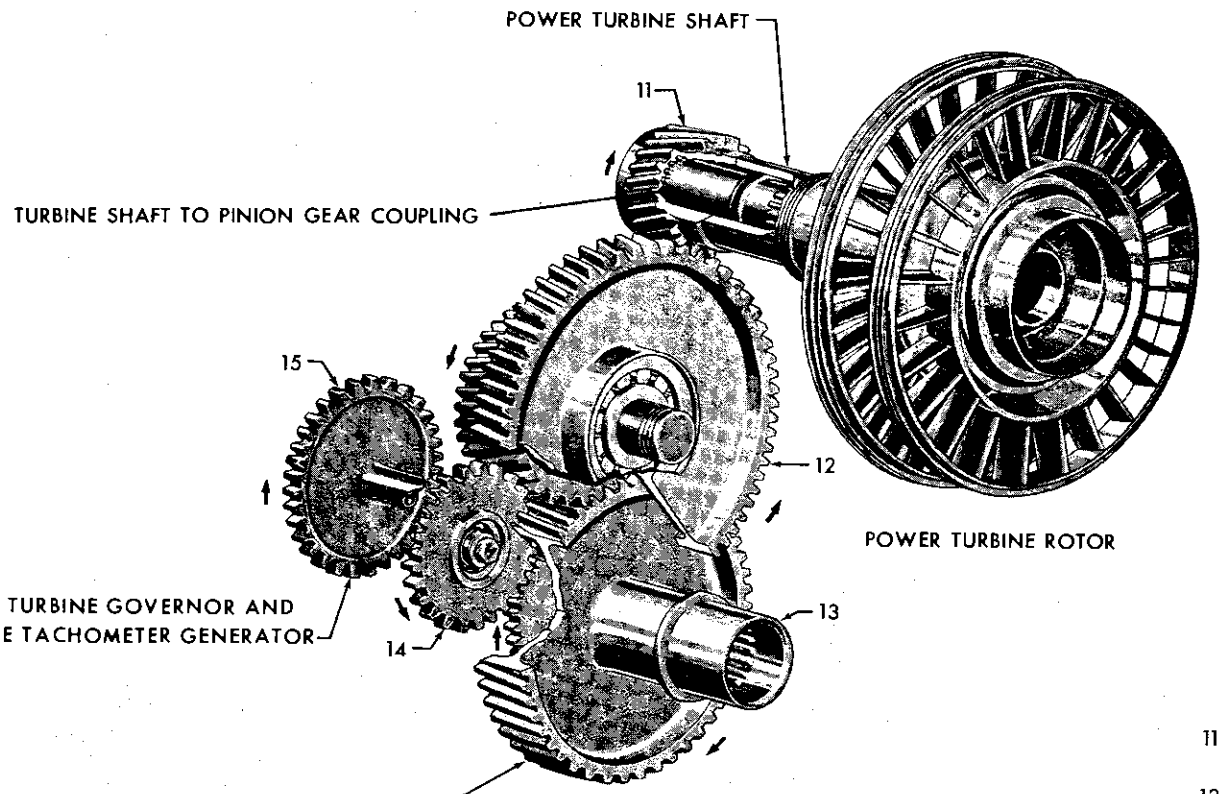
GAS PRODUCER TURBINE ROTOR ASSEMBLY
250 ENGINE



REV. AUG. 1968

Allison SERVICE SCHOOL

POWER TURBINE GEAR TRAIN



11 - HELICAL POWER TRAIN DRIVE (PINION) GEAR
12 - HELICAL TORQUEMETER GEARSHAFT
13 - HELICAL POWER TAKE-OFF GEARSHAFT
14 - SPUR POWER TRAIN IDLER GEAR
15 - SPUR POWER TRAIN TACHOMETER AND GOVERNOR GEARSHAFT

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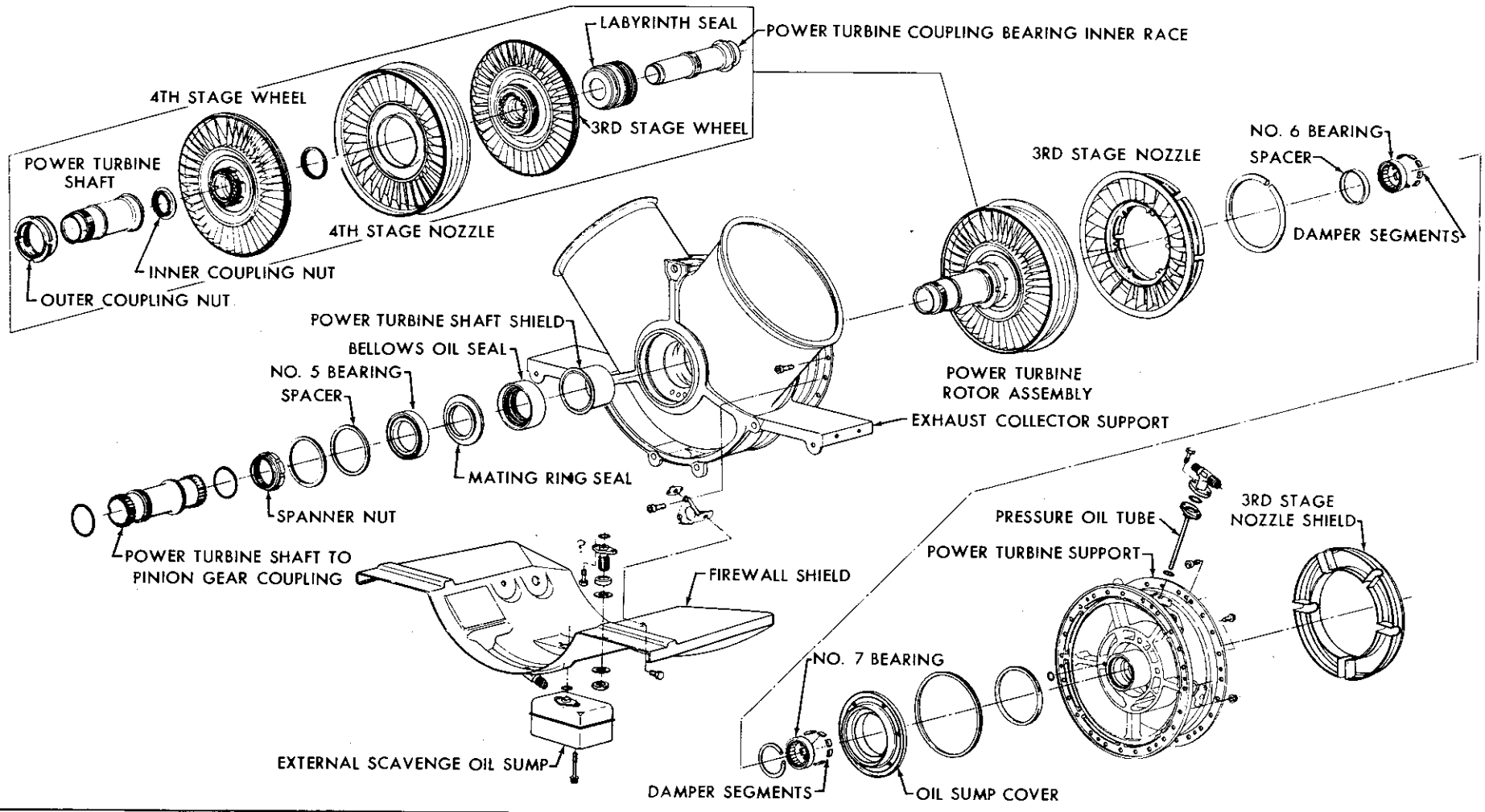
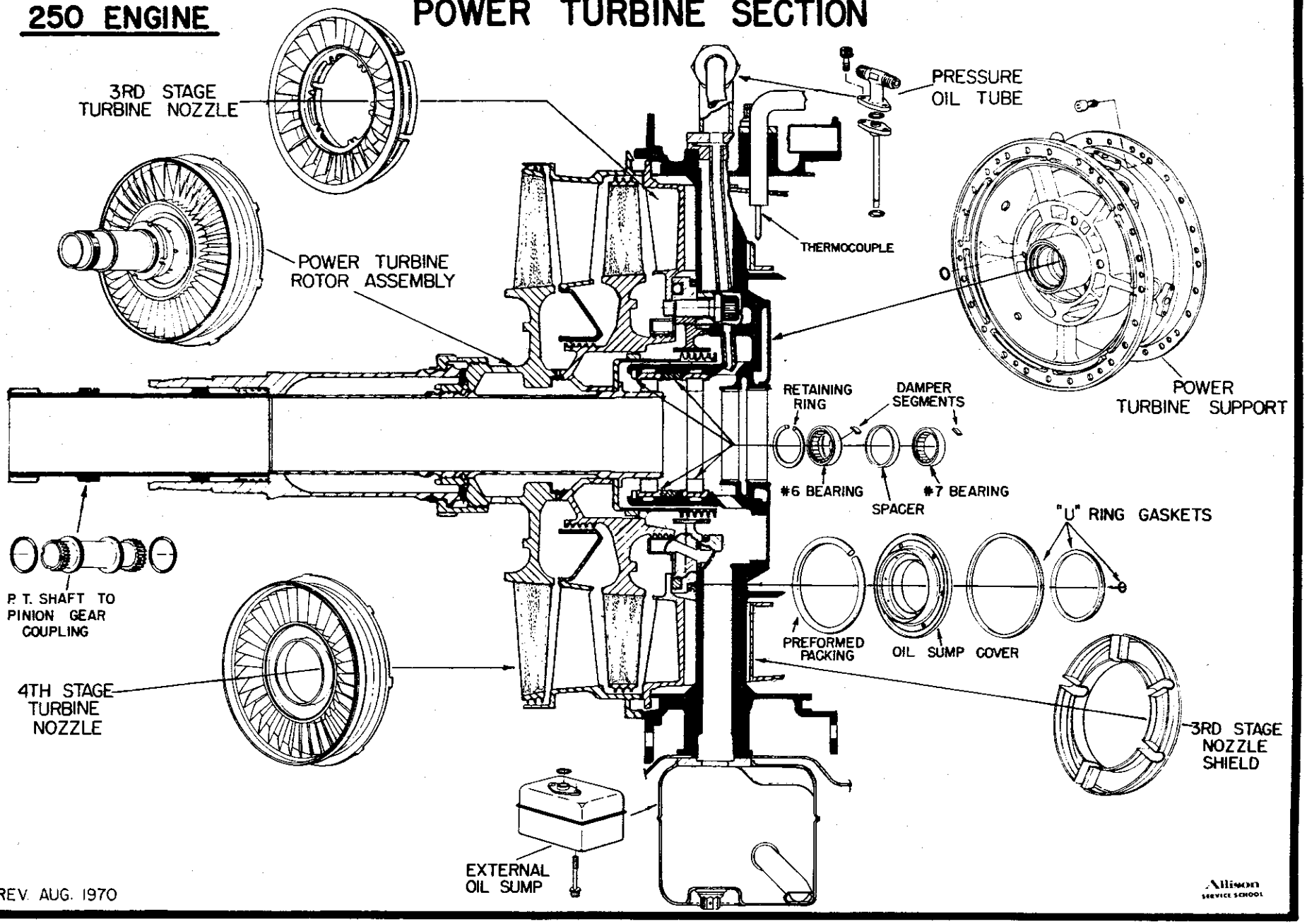
POWER TURBINE ASSEMBLY



250 ENGINE

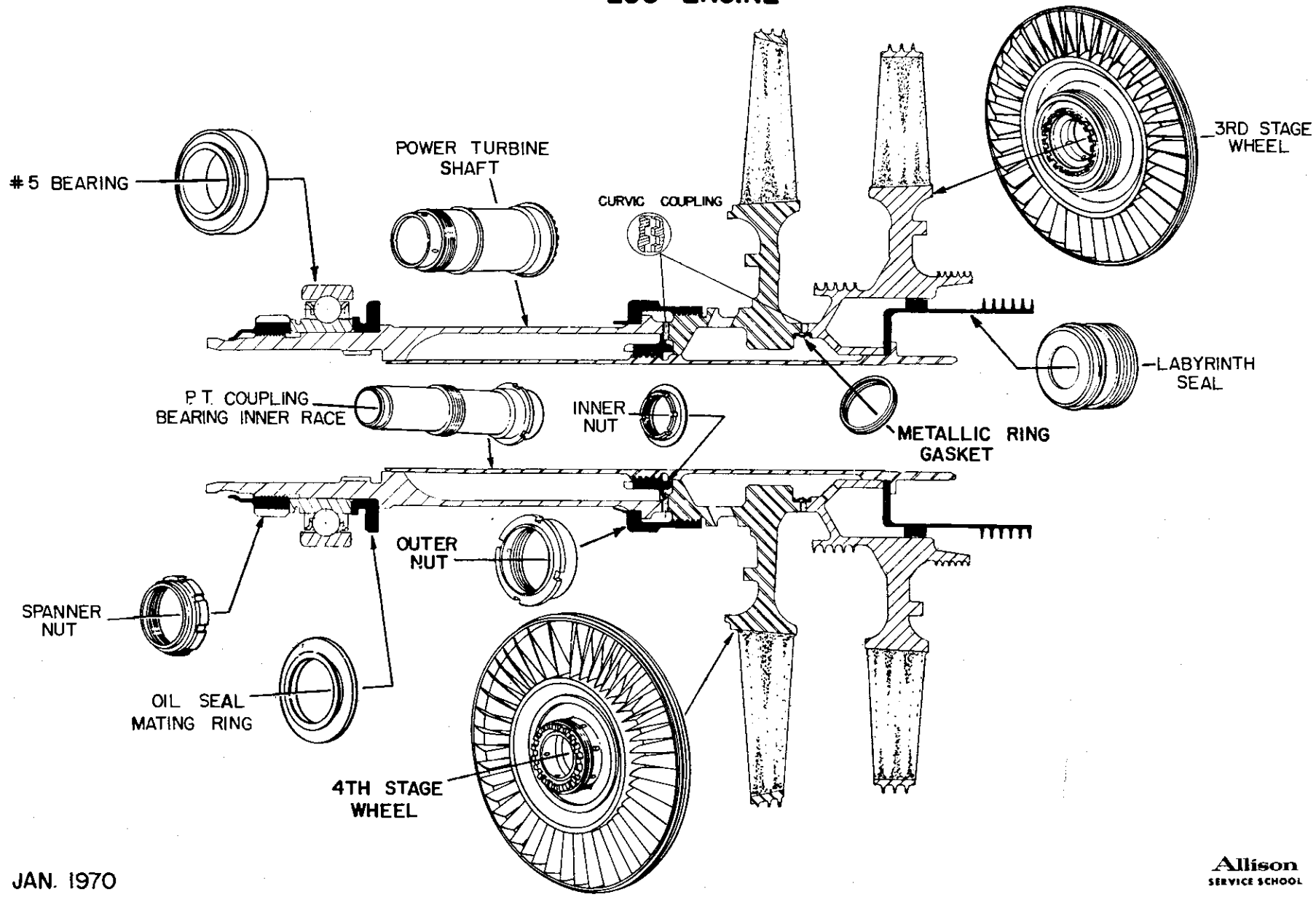
POWER TURBINE SECTION



REV. AUG. 1970

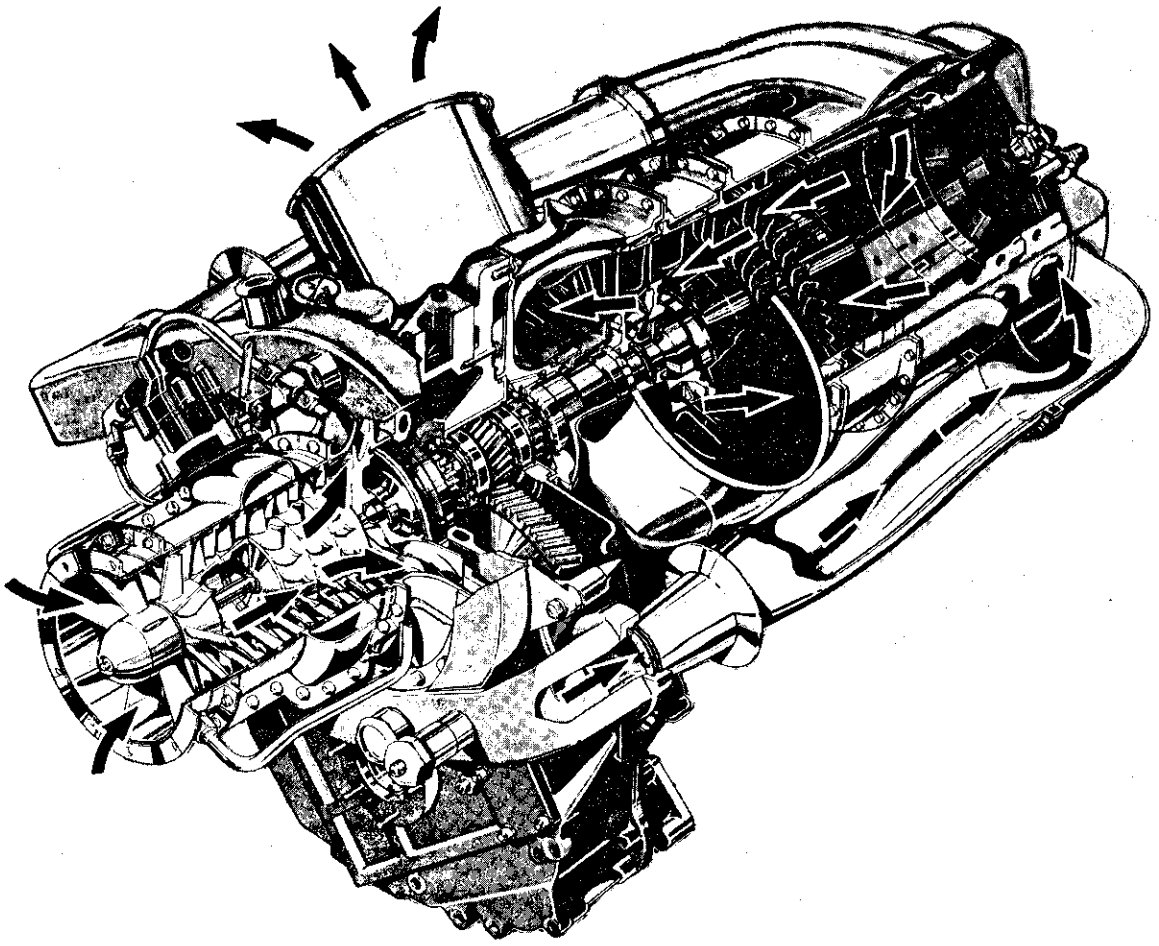
Allison SERVICE SCHOOL

POWER TURBINE ROTOR ASSEMBLY
250 ENGINE



REV. JAN. 1970

Allison SERVICE SCHOOL



265768

Figure 1-1. Engine Air Flow

1-11. POWER AND ACCESSORIES GEARBOX.

1-12. The main power and accessories drive gear trains are enclosed in a single gear case. The gear case serves as the structural support of the engine. All engine components including the engine mounted accessories are attached to the case. A two-stage helical and spur gear set is used to reduce rotational speed from 33,290 rpm at the power turbine to 6016 rpm at the output drive spline. Accessories driven by the power turbine gear train are the power turbine governor and an airframe furnished power turbine tachometer-generator. The gas producer gear train drives the compressor, fuel pump, gas producer fuel control, and an airframe furnished gas producer tachometer-generator. The starter drive and a spare drive are in this gear train.

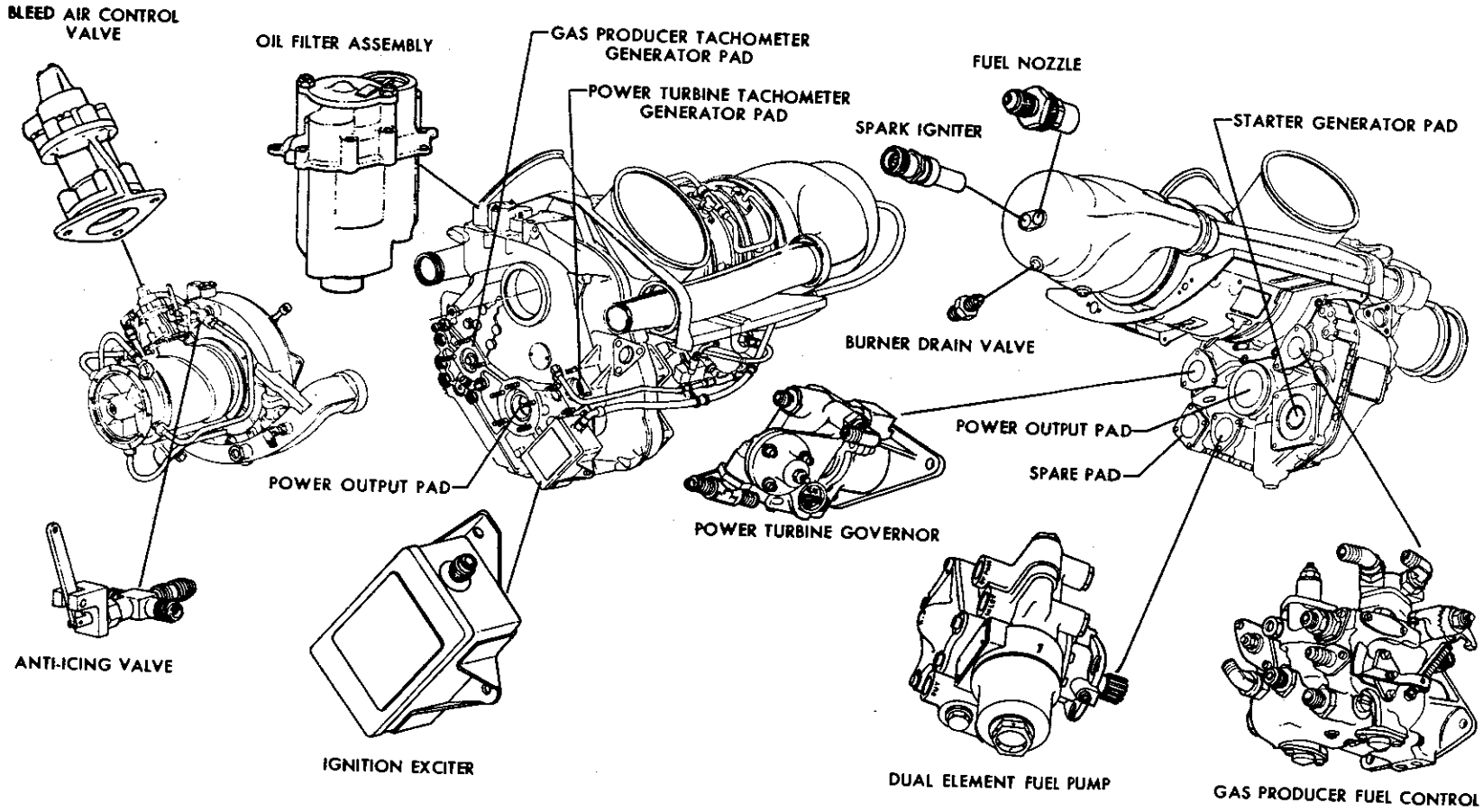


Figure 5–1.1. Engine component and accessory locations

8. Lubrication System:

Dry sump press type system

Oil pump spur gear positive displacement

Constant out put pump

Scavenge ① Compressor front support

② Accessory Gear Box

③ & rear sump

④ #8 bearing N-1

Oil pressure can be set by mechanic

9. Fuel System:

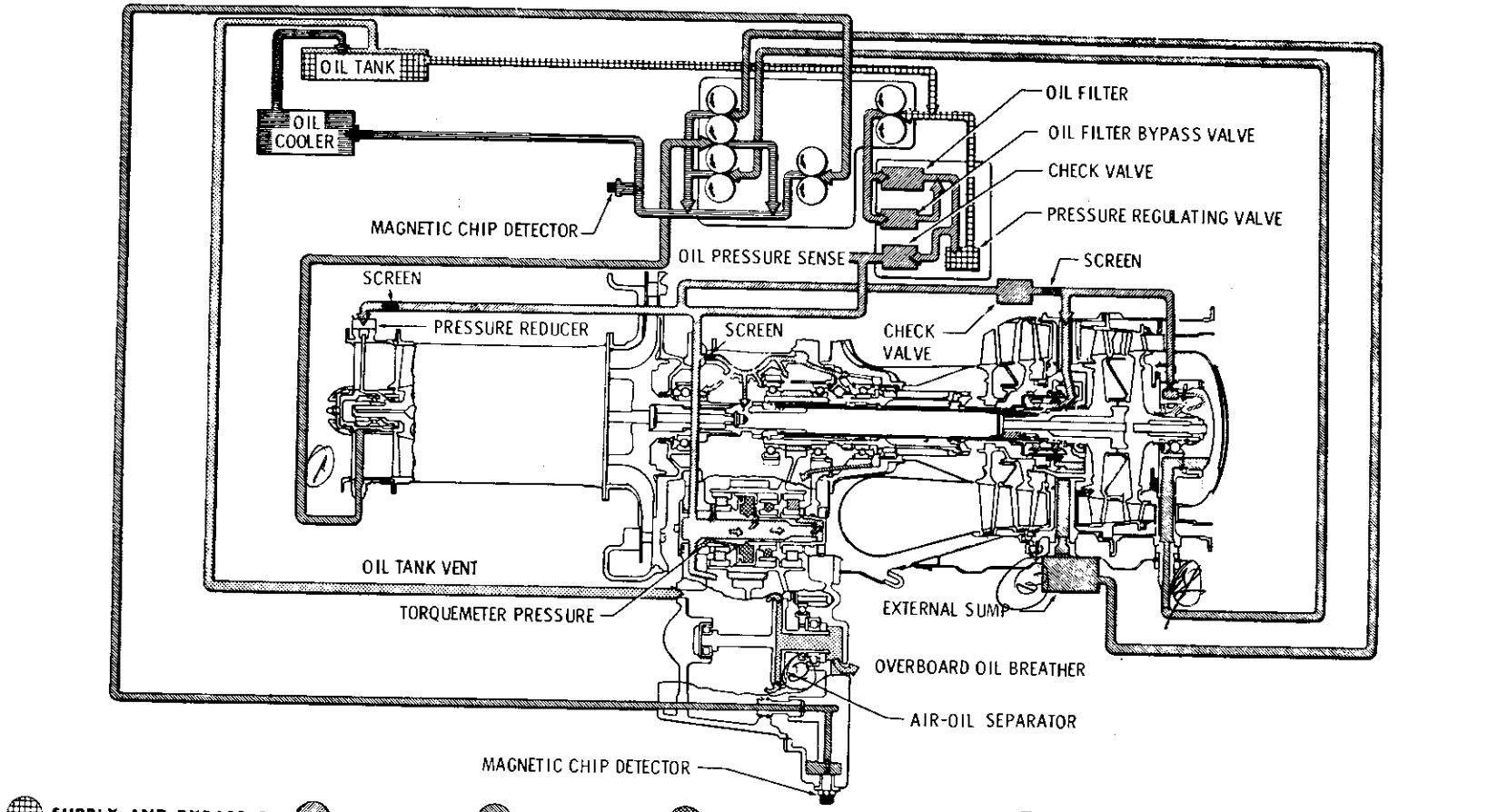
10. Engine Electrical System:

Ignition exciter step up 24 V DC 2000 V

Pulsating DC

Spark igniter

Starter Gen — 28 V 150 Amp



8396A

Figure 1-7. Lubrication System Schematic

11. Engine Instruments:

Oil press out put side of oil pump
Oil temp out put side of oil tank
N-1
N-2
TOT

12. Engine Warning System:

~~55~~ 50/0 light & audio
Audio must have gen on
light on with ~~Batt~~
Chip detectors
(1) Accessory Gear Box (2) input side of oil cooler

13. Engine Controls:

N-2 gov. trim

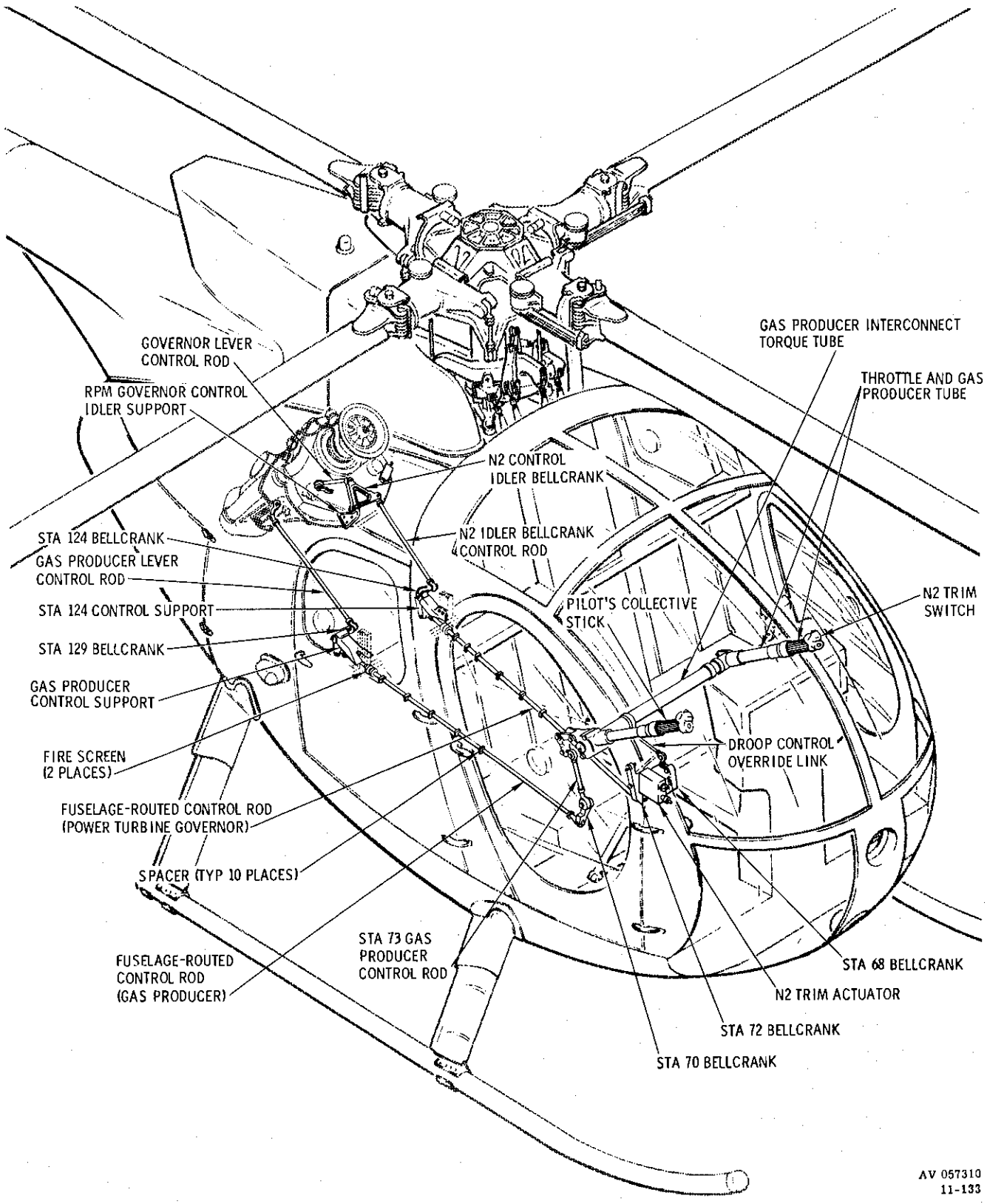


Figure 5-32. Engine power controls system

TRANSMISSION SYSTEM

1. Overrunning Clutch:
TRANSMITS POWER FR ENG TO MAIN TRANSMISSION CLOCK WISE, DISENGAGE WHEN: ① ENG FAILER ② PRACTICE AUTO'S ③ ANY TIME ROTOR EXCEEDS N-2

2. Main Drive Shaft: DYNAMICALLY BALANCED WITH FLEX COUPLING AND MOUNTING FLANGE ON EACH END. CONNECTS OVERRUNNING CLUTCH AND TRANSMISSION. **NO SCRATCHES OR DENTS

3. Oil Cooler Blower Assembly: IMPELLER TYPE 6000 RPM SAME AS DRIVE SHAFT

4. Main Rotor Transmission:
2 STAGE SPEED REDUCTION GEAR
① 6000 → 4200 — TAIL ROTOR DRIVE & ACCESSORY DRIVE TRANS
② FURTHER REDUCE TO 469 RPM TO MAIN TRANS

5. Main Rotor Transmission Lubrication: OWN INDEPENDENT SYSTEM (WET SUMP) PUMP LOCATED IN MAIN SUMP OF TRANSMISSION HOUSING, OIL FLOW PRESS SENDER
⑤ BEARINGS ⑥ OUTPUT GEAR COUPLING

6. Main Rotor Transmission Cooling: ACC GEAR TRAIN DRIVES ① ROTOR TACH ② TRANS OIL PUMP

7. Main Rotor Transmission Chip Detector System:
② One in high speed sump
One in bottom of main transmission

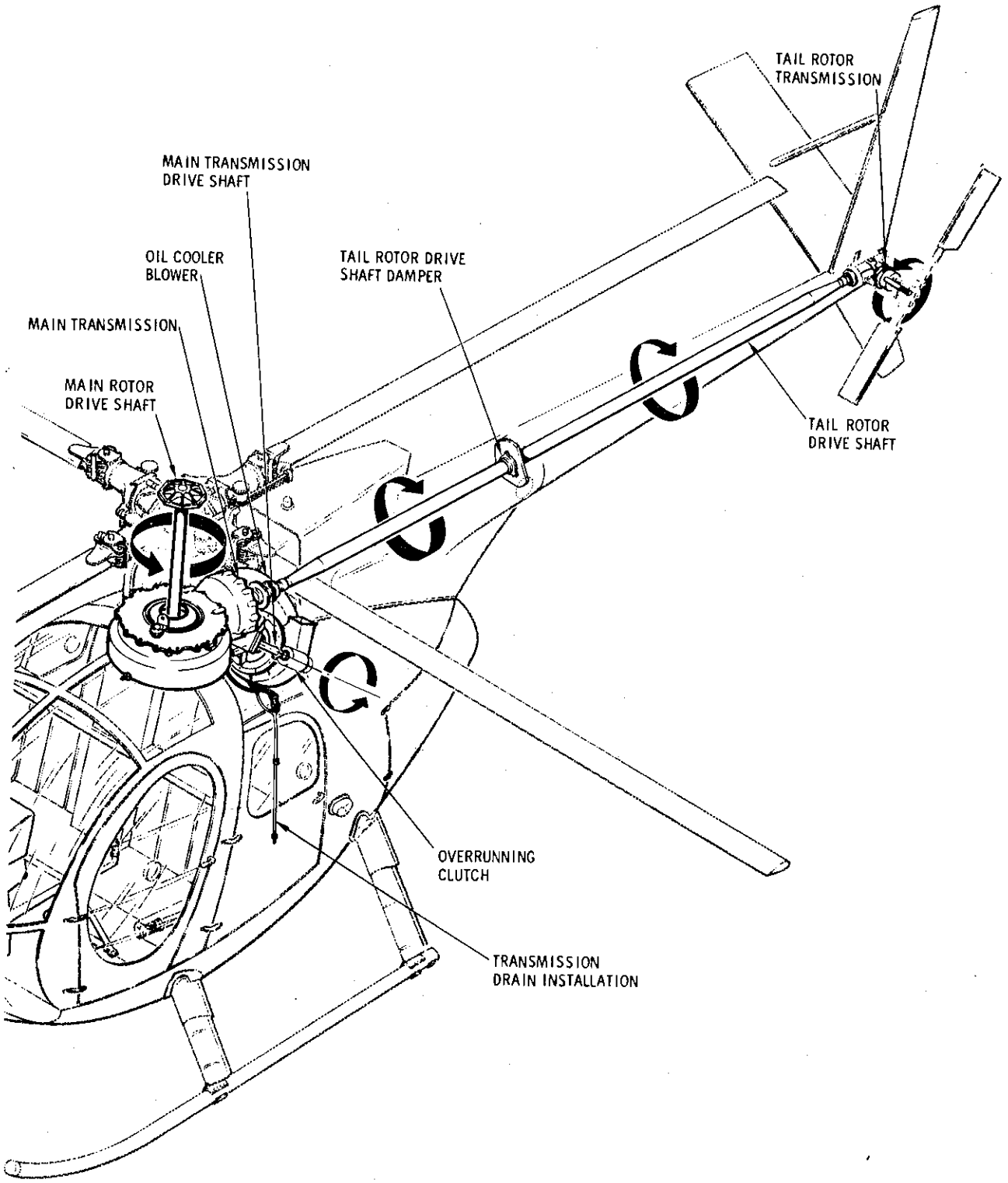


Figure 7-1. Power train system