## General Description

The TF30-P-1 engine is an axial flow gas turbine engine with an annular burner having eight through flow combustion chambers, a nine stage low pressure compressor unit including a three stage fan, and a seven stage high pressure compressor unit. The low pressure compressor unit is connected by a through shaft to the three low pressure turbine wheels and the high pressure compressor unit is connected independently by a hollow shaft to the high pressure turbine wheel. The fan and compressor air inlets are common and both airflows are combined in a common afterburner and are discharged through a single variable area convergent jet nozzle. The engine is equipped with a blow-in-door ejector.

### Availability

- Development Contract Awarded: October 1962
- Engine Mock-up Inspection: July 1963
- Experimental Engine: February 1964
- Mock-up for Aircraft: August 1963
- Installation Engine: February 1965
- 60 Hr. Preliminary Flight Rating Test: June 1964
- 150 Hr. Endurance Tests: July 1965

### Procurement

- Final Price (CY65): $3673,184 (P-1)
- Final Price (CY65): $3677,161 (P-1A)

### Status

Production completed in April 1967.

## Specific Features

- **Compressor**: Axial flow, twin spool
  - LP Rotor: 9 stages (includes 3 fan stages)
  - HP Rotor: 7 stages
- **Maximum Design Pressure Ratio (SLS)**: 17.6:1
- **Bypass Ratio**: 1:1:1
- **Combustion Chamber**: 8 unit, can-annular, through flow
- **Turbo**: Axial flow, 4 stage
  - LP Rotor: 3 stages
  - HP Rotor: 1 stage
- **Turbine Cooling**: High pressure turbine blades and vanes air cooled
- **Maximum Allowable Turbine Inlet Temperature**: 2030°F
- **Exhaust Nozzle**: Convergent, variable area, with blow-in-door ejector
- **Ignition**: Two 6 joule exciters, engine driven alternator, two igniters, automatic relight
- **Power Control**: Hydromechanical main and A/B fuel controls
- **Fuel**: MIL-T-5624, Grade JP-4 or JP-5
- **Oil**: MIL-L-23699, MIL-L-7808 (below -40°F)
- **Maximum Oil Consumption**: 0.2 gal/hr avg.
- **Accessory Drive Provisions**: Six
- **Thrust to Weight Ratio**: 4.78:1 (P-1)
  - 4.74:1 (P-1A)

## Size & Weight

- **Length**: 235.5 inches
- **Maximum Diameter**: 48.0 inches
- **Maximum Radial Projection**: 31.0 inches
- **Dry Weight (P-1)**: 3869 lbs.
- **Dry Weight (P-1A)**: 3899 lbs.

## Utilization

- F-111A Fighter Aircraft (two P-1 engines) (USAF)
- F-111B Fighter Aircraft (two P-1A engines) (USN)
### PERFORMANCE

#### GUARANTEED RATINGS AT STANDARD SEA LEVEL STATIC CONDITIONS

<table>
<thead>
<tr>
<th>RATING</th>
<th>THRUST (lb)</th>
<th>RPM</th>
<th>SFC (lb/hr/lb)</th>
<th>MEAS. GAS TEMP. (°F)</th>
<th>AIRFLOW (lb/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAXIMUM</strong> (45 min)</td>
<td>18,500</td>
<td>14,200/10,050</td>
<td>2.50</td>
<td>1920</td>
<td>240</td>
</tr>
<tr>
<td>INTERMEDIATE (Military) (45 min)</td>
<td>10,750</td>
<td>14,200/10,050</td>
<td>0.630</td>
<td>1930</td>
<td>235</td>
</tr>
<tr>
<td>MAXIMUM CONTINUOUS (Normal)</td>
<td>8,500</td>
<td>13,850/9,100</td>
<td>0.580</td>
<td>1680</td>
<td>213</td>
</tr>
<tr>
<td>80% MAX. CONTINUOUS</td>
<td>7,650</td>
<td>13,250/8,750</td>
<td>0.570</td>
<td>1600</td>
<td>202</td>
</tr>
<tr>
<td>75% MAX. CONTINUOUS</td>
<td>6,750</td>
<td>12,900/8,250</td>
<td>0.565</td>
<td>1500</td>
<td>184</td>
</tr>
<tr>
<td>IDLE</td>
<td>645 (Max)</td>
<td>8,200/7,850</td>
<td>900 lb/hr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### GUARANTEED RATINGS AT STANDARD ALTITUDE CONDITIONS

<table>
<thead>
<tr>
<th>RATING</th>
<th>ALTITUDE (11)</th>
<th>FLIGHT MACH NO.</th>
<th>THRUST (12)</th>
<th>SFC (1lb/hr/lb)</th>
<th>MEAS. GAS TEMP. (°F)</th>
<th>AIRFLOW (lb/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAXIMUM</strong> (45 min)</td>
<td>65,000</td>
<td>2.2</td>
<td>5,030</td>
<td>2.92</td>
<td>1970</td>
<td>72</td>
</tr>
<tr>
<td>INTERMEDIATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAXIMUM CONTINUOUS (Normal)</td>
<td>36,089</td>
<td>0.9</td>
<td>2,470</td>
<td>0.87</td>
<td>1630</td>
<td>95</td>
</tr>
<tr>
<td>Partial Aug. (45 min)</td>
<td>S. L.</td>
<td>1.2</td>
<td>19,100</td>
<td>2.10</td>
<td>1970</td>
<td>455</td>
</tr>
</tbody>
</table>

#### GUARANTEED OPERATING LIMITS

<table>
<thead>
<tr>
<th>ABSOLUTE ALTITUDE (FEE'T)</th>
<th>75,000 at 3.18 ram pressure ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIMITING MACH NO. AT SEA LEVEL STD. CONDITIONS</td>
<td>1.2</td>
</tr>
</tbody>
</table>

**ARDC MODEL ATMOSPHERE 1956 MS RAM EFFICIENCY**

- Guarantee Points
- 36,089 ft (1.8 Mn) A/B
- 36,089 ft (1.8 Mn)
- Sea Level (0.9 Mn)
- 36,089 ft (0.9 Mn) Static

**NOTES**

Afterburning is accomplished by use of spray rings and V-gutter flameholders in the main engine gas stream. Spray rings, used in conjunction with an aerodynamic flameholder, are used to accomplish afterburning in the fan air stream. The afterburner is canted 2½° to accommodate aircraft installation requirements. The -1A is identical to the -1 except that it incorporates a fuel filter-heater instead of a fuel filter.