Standard Aircraft Characteristics

F-89H
SCORPION
Northrop

TWO J35-A-35
ALLISON

CONFIDENTIAL

7 OCT 57
### POWER PLANT

- **Nr & Model**: (2) J35-A-35
- **Mfr.**: Allison
- **Engine Spec**: NR 314C
- **Type**: Axial
- **Length**: 105.5"
- **Diameter**: 37.0"
- **Weight (dry)**: 2330 lb
- **Tail Pipe**: Auto, Two Position Augmentation, Afterburning

### ENGINE RATINGS

- **S.L. Static**: LB - RPM - MIN
  - Max: 7200 - 8000 - 5
  - Mil: 5450 - 8000 - 30
  - Nor: 4855 - 7680 - Cont
- **With afterburner operating**: None
  - Values are with inlet screens retracted.

### DIMENSIONS

- **Wing Span**: 59.7"
- **Incidence (root)**: 1°30'
- **Dihedral**: 1°
- **Sweepback (LE)**: 50°
- **Length**: 53.8'
- **Height**: 17.5'
- **Tread**: 21.9'
- **Includes non-jettisonable tip pods and tip pod fins.**

### MISSION AND DESCRIPTION

- **Navy Equivalent**: None
- **Mfr’s Model**: N-138

The principal mission of the F-89H is the interception and destruction of hostile aircraft during night and inimetal weather conditions.

This aircraft is a twin-engine, two-place (pilot and radar operator), all-weather interceptor. Armament consisting of GAR-1 missiles and FFAR rockets, is carried in the forward section of each wing tip pod and is fired by the E-9 Fire Control System. Two jettisonable fuel tanks are carried on pylons beneath the wing. Double slotted landing flaps and split-aileron type speed brakes supplement the full-power-operated high control system. Additional equipment includes yaw stabilizer, thermal anti-icing, E-11 auto-pilot, single-point refueling, ejection seats, anti-G suit provisions, and a low pressure oxygen system.

### DEVELOPMENT

The F-89H is similar to the F-89D except for installation of E-9 Fire Control System in lieu of the E-5 system, redetermination of the wing tip pods to incorporate missiles, rockets and auxiliary fuel, addition of a steerable nose wheel and a simplified fuel system.

- **Contract Date**: Mar 54
- **First Flight (Prototype)**: Dec 54
- **First Flight**: Oct 54
- **First Acceptance**: Nov 55
- **Production Completed**: Oct 56

### ROCKETS

- **NONE**

### BOMBS

- **NONE**

### GUNS

- **NONE**

### ELECTRONICS

- **UHF Command**: AN/ARC-27
- **VHF Navigation**: AN/ARN-14
- **Interphone**: AN/AIC-10
- **Glide Path**: AN/ARN-18
- **Radio Compass**: AN/ARN-2
- **Marker Beacon**: AN/ARN-12
- **IFF**: AN/APPX-6A
- **Fire Control System**: E-9
- **Flight Computer System**: A-2

### WEIGHS

- **Loading**: Lb
  - Empty: 25,753 (A)
  - Basic: 29,419 (A)
  - Design: 39,197 (A)
  - Combat (Point) #38,008 (A)
  - Combat (Area) #37,060 (A)
  - Max T.O. #47,621
  - Max Landing #39,477
- **(A) Actual**:
  - *For Basic Mission
  - ^Limited by Ldg. Gear Strength
  - †Limited by sinking speed

### FUEL

- **Location**: Nr
- **Tanks**: Gal
  - Wg, inbd: 2
  - Wg, outbd: 2
  - Wg, tip pod: 2
  - Wg, pylons: 2
  - Fus, fwd: 1
  - Fus, aft: 2
  - Total: 2369
- **Grade**: JP-4
- **Specification**: MIL-F-5624

### OIL

- **Fuselage**: 2 (tol) 7
- **Grade**: MIL-L-6081
## Loading and Performance—Typical Mission

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>BASIC MISSION</th>
<th>POINT INTERCEPT</th>
<th>AREA INTERCEPT</th>
<th>POINT INTERCEPT ALTERNATE</th>
<th>AREA INTERCEPT ALTERNATE</th>
<th>ESCORT</th>
<th>FERRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAKE-OFF WEIGHT (lb)</td>
<td>43,175</td>
<td>43,175</td>
<td>39,197</td>
<td>47,355</td>
<td>47,355</td>
<td>45,833</td>
<td>15,398</td>
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<tr>
<td>Fuel at 6.5 lb/gal (grade JP-4) (lb)</td>
<td>11,490</td>
<td>11,498</td>
<td>7520</td>
<td>15,398</td>
<td>15,398</td>
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<tr>
<td>Payload (internal rockets: 42-2.75 inch + 6-GAR-1) (lb)</td>
<td>1522</td>
<td>1522</td>
<td>1522</td>
<td>1522</td>
<td>1522</td>
<td>None</td>
<td></td>
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<tr>
<td>Wing loading (lb/sq ft)</td>
<td>71.3</td>
<td>71.3</td>
<td>64.6</td>
<td>78.2</td>
<td>78.2</td>
<td>75.6</td>
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<tr>
<td>Stall speed (power off) (kn)</td>
<td>118</td>
<td>118</td>
<td>113</td>
<td>124</td>
<td>124</td>
<td>122</td>
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<tr>
<td>Take-off ground run at SL (ft)</td>
<td>3500</td>
<td>3500</td>
<td>2800</td>
<td>4300</td>
<td>4300</td>
<td>3900</td>
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<tr>
<td>Take-off to clear 50 ft (ft)</td>
<td>5100</td>
<td>5100</td>
<td>4150</td>
<td>6300</td>
<td>6300</td>
<td>5800</td>
<td></td>
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<tr>
<td>Rate of climb at SL (fpm)</td>
<td>6300</td>
<td>3280</td>
<td>7000</td>
<td>3200</td>
<td>3200</td>
<td>3320</td>
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</tr>
<tr>
<td>Rate of climb at SL (one engine out) (fpm)</td>
<td>1910</td>
<td>1910</td>
<td>2210</td>
<td>1550</td>
<td>1550</td>
<td>1500</td>
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<tr>
<td>Time: SL to 40,000 ft (min/fly)</td>
<td>12.2</td>
<td>14</td>
<td>10.3</td>
<td>44</td>
<td>11.2</td>
<td>10.5</td>
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<tr>
<td>Time: SL to 50,000 ft (min/fly)</td>
<td>25.7</td>
<td>24.5</td>
<td>27.5</td>
<td>25.0</td>
<td>25.0</td>
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<tr>
<td>Service ceiling (100 fpm) (ft)</td>
<td>46,500</td>
<td>33,700</td>
<td>48,500</td>
<td>32,900</td>
<td>29,800</td>
<td>30,600</td>
<td></td>
</tr>
<tr>
<td>Service ceiling (one engine out) (ft)</td>
<td>23,600</td>
<td>23,500</td>
<td>26,800</td>
<td>19,000</td>
<td>19,000</td>
<td>20,100</td>
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<tr>
<td>COMBAT RANGE (n mi)</td>
<td>305</td>
<td>460</td>
<td>321</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>COMBAT RADIUS (n mi)</td>
<td>410</td>
<td>407</td>
<td>408</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Average cruising speed (kn)</td>
<td>31,600</td>
<td>28,900</td>
<td>29,400</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Initial cruising altitude (ft)</td>
<td>35,600</td>
<td>35,400</td>
<td>36,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final cruising altitude (ft)</td>
<td>1,58</td>
<td>2,37</td>
<td>1,94</td>
<td>2,78</td>
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<td></td>
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<tr>
<td>Total mission time (hr)</td>
<td>1.71</td>
<td>0.58</td>
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<td></td>
<td></td>
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<tr>
<td>TOTAL MISSION TIME (hr)</td>
<td>44,100</td>
<td>46,000</td>
<td></td>
<td></td>
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<tr>
<td>Interception altitude (ft)</td>
<td>37,060</td>
<td>46,000</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>COMBAT WEIGHT (lb)</td>
<td>38,009</td>
<td>34,411</td>
<td>38,737</td>
<td>39,197</td>
<td>32,300</td>
<td></td>
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<tr>
<td>Combat altitude (ft)</td>
<td>44,100</td>
<td>46,000</td>
<td>43,800</td>
<td>31,100</td>
<td>36,500</td>
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<tr>
<td>Combat speed (kn)</td>
<td>460</td>
<td>462</td>
<td>460</td>
<td>488</td>
<td>491</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combat climb (fpm)</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>3200</td>
<td>3100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combat ceiling (500 fpm) (ft)</td>
<td>44,100</td>
<td>46,000</td>
<td>43,800</td>
<td>43,600</td>
<td>47,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service ceiling (100 fpm) (ft)</td>
<td>48,000</td>
<td>48,000</td>
<td>35,500</td>
<td>39,200</td>
<td>39,600</td>
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<td></td>
</tr>
<tr>
<td>Service ceiling (one engine out) (ft)</td>
<td>27,800</td>
<td>14,000</td>
<td>12,800</td>
<td>12,400</td>
<td>18,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max rate of climb at SL (fpm)</td>
<td>7050</td>
<td>7850</td>
<td>6800</td>
<td>8150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max speed at optimum altitude (kn)</td>
<td>497</td>
<td>487</td>
<td>493</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic speed at 40,000 ft (kn)</td>
<td>33,662</td>
<td>33,662</td>
<td>33,662</td>
<td>33,862</td>
<td>32,295</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDING WEIGHT (lb)</td>
<td>30,970</td>
<td>30,970</td>
<td>30,970</td>
<td>30,970</td>
<td>30,970</td>
<td>2900</td>
<td></td>
</tr>
<tr>
<td>Ground roll at SL (ft)</td>
<td>3020</td>
<td>3020</td>
<td>3020</td>
<td>3020</td>
<td>3020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total from 50 ft (ft)</td>
<td>4810</td>
<td>4810</td>
<td>4810</td>
<td>4810</td>
<td>4810</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**
- Maximum power
- Military power
- Detailed description of RADIUS and RANGE Missions given on page 6
- Includes the following times for take-off and acceleration to climb speed: Mission 1, 2.0 min; Mission III, 1.7 min.

**PERFORMANCE BASIS:**
- (a) Data source: Based on Phase IV flight tests
- (b) Performance based on powers shown in page 3.
- See note (a), page 6
- At cruise ceiling

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F-89H

7 OCT 57
NOTES

FORMULA: POINT INTERCEPT MISSION I & III

Take-off and accelerate to climb speed with maximum power, climb on course to combat ceiling with maximum power, combat for 5 minutes at maximum power and combat ceiling, and loiter at 35,000 feet at maximum endurance speed for the maximum available time. Allowances include 2 minutes at normal power and 1 minute at maximum power at sea level for start and take-off, 3 minutes at maximum power at combat ceiling for combat, maximum available time at 35,000 feet at maximum endurance speed, and 20 minutes at maximum endurance speed at sea level for landing and reserve.

FORMULA: AREA INTERCEPT MISSION II & IV

Take-off and accelerate to climb speed with maximum power, climb on course to cruise ceiling at military power, cruise out at long range speed at cruise ceiling, climb on course to combat ceiling with maximum power, combat for 5 minutes, and cruise back to base at long range speed at cruise ceiling. Range free allowances include 2 minutes at normal power and 1 minute at maximum power at sea level for start and take-off, 3 minutes at maximum power at combat ceiling for combat, 5% of initial fuel and 20 minutes at maximum endurance speeds at sea level for landing and reserve. Pylon tanks used in Mission IV are dropped when empty. (See note b).

FORMULA: RADIUS MISSION V

Take-off and accelerate to climb speed with maximum power, climb on course to cruise ceiling at military power, cruise out at long range speed at cruise ceiling, combat for 20 minutes, and return to base at long range speed at cruise ceiling. Range free allowances include 5 minutes at normal power and 1 minute at maximum power at sea level for start and take-off, 5 minutes at maximum power and 15 minutes at military power at 35,000 ft for combat, 5% of initial fuel and 20 minutes at maximum endurance speed at sea level for landing and reserve. Pylon tanks are dropped when empty. (See note b).

FORMULA: RANGE MISSION VI

Take-off and accelerate to climb speed with maximum power, climb on course to cruise ceiling at military power, cruise out at cruise ceiling at 0.65 Mach number until all of tip pod fuel is used, continue cruise at cruise ceiling at long range speed. Range free allowances include 5 minutes at normal power and 1 minute at maximum power at sea level for start and take-off, and 5% of initial fuel plus 30 minutes at maximum endurance speed at sea level for landing and reserve. Pylon tanks are dropped when empty. (See note b).

GENERAL NOTES:

(a) Below 20,000 feet, limit IAS = 470 in or M = 0.9, whichever is less.
(b) For Missions IV, V, and VI, tip tanks empty before pylon tanks.

REVISION BASIS:

To reflect Phase IV flight test data.