Standard Aircraft Characteristics

F-89B

SCORPION

Northrop

TWO J35-A-21B
ALLISON

BY AUTHORITY OF
THE SECRETARY
OF THE AIR FORCE

15 SEP 53

53 WC-12001
**Mission and Description**

Navy Equivalent: None  
Mfr's Model: N-35  

The principal mission of the F-89B is the interception and destruction of hostile aircraft under night and inclement weather conditions.

This airplane carried a crew of two (pilot and radar operator) and is equipped with all-weather interception radar. It incorporates instrument landing system, thermal anti-icing, ejection seats, anti-G suit provisions, cabin pressurization and conditioning, split aileron type speed brakes, double slotted landing flaps, Zero Reader and E-1 Fire Control System.

**Development**

The F-89B is similar to the modified F-89A airplane except for minor structural and mechanical details (all F-89A's except two flight test airplanes, were modified to incorporate all the features of the F-89B).

Design Initiated: Sep 46  
First Flight (XF-89): Aug 48  
First Flight Prototype (YF-89A): Nov 49  
First Acceptance (P-89A): Sep 50  
First Acceptance (P-89B): Apr 51

Production Completed: Sep 51

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**POWER PLANT**

No. & Model: (2) J35-A-21B  
Mfr: Allison  
Engine Spec No.: 284A  
Type: Axial  
Length: 195.5'  
Diameter: 37.0"  
Weight (Dry): 2635 lb  
Tailpipe: Auto, Two-Position  
Augmentation: Afterburning

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**ENGINERATINGS**

S. L. S.  
Lb - RPM - MIN  
Max: 6800 - 7800 - 5  
MIL: 5100 - 7800 - 3o  
Nor: 4400 - 7500 - Cont  

*With afterburner operating  

NOTE: Values are for engine with fixed air inlet screens.

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**DIMENSIONS**

Wing Span*: 56.0'  
Incidence (Root): 1°30'  
(Tip): 1°30'  
Dihedral: 1°50'  
Sweepback (LE): 5°0'  
Length: 53.5'  
Height: 17.5'  
Tread: 21.9'  

*Includes non-jettisonable tip tanks

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**BOMBS**

NONE

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**GUNS**

No. Type Size Rds ea Location  
6..M-24A-1. 20mm, 200...Fuse, nose

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**ROCKETS**

NONE

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**ELECTRONICS**

UHF Command: AN/ARC-27  
VHF Navigation: AN/ARN-14  
Glide Path: AN/ARN-5B  
Radio Compass: AN/ARN-6  
Radio Ranging: AN/APG-33  
IFP: AN/APX-6  
Interphone: AN/AIC-2  
Marker Beacon: AN/ARN-12

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**MISSION AND DESCRIPTION**

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**WEIGHTS**

Loading: Lb  
Empty: 24,151(A)  
Basic: 25,530(A)  
Design: 32,898 - 5.67  
Combat (Area): 31,507 - 5.67  
Combat (Point): 32,169 - 5.67  
Max T. O.: 36,824 - 3.67  
Max Land: 32,898

(A) Actual  
* For Basic Mission  
† Limited by space  
# Limited by sinking speed

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**FUEL**

Location: No. Tanks Gal  
Wg, inbd: 2 214  
Wg, outbd: 2 535  
Fuse: 2 202  
Wg, ext: 2 608  
Total: 1559  
Grade: JP-4  
Specification: MIL-F-5624A

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**OIL**

Fus, eng: 4 (tot) 10.6  
Grade: 100  
Specification: MIL-O-6841

*Self-Sealing

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F-89B
## Loading and Performance—Typical Mission

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>INTERCEPT</th>
<th>MISSION</th>
<th>ESCORT</th>
<th>FERRY RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>POINT</td>
<td>AREA</td>
<td>POINT</td>
<td>AREA</td>
</tr>
<tr>
<td>TAKE-OFF WEIGHT (lb)</td>
<td>36,824</td>
<td>36,824</td>
<td>36,824</td>
<td>36,824</td>
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<tr>
<td>Fuel at 6.5 lb/gal (grade JP-4) (lb)</td>
<td>10,075</td>
<td>10,075</td>
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<tr>
<td>Payload (Ammunition) (lb)</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
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<tr>
<td>Wing loading (lb/sq ft)</td>
<td>57.7</td>
<td>57.7</td>
<td>57.7</td>
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<tr>
<td>Stall speed (power off) (kn)</td>
<td>111</td>
<td>111</td>
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<td>110</td>
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<tr>
<td>Take-off ground run at SL (ft)</td>
<td>2450</td>
<td>2450</td>
<td>2450</td>
<td>2400</td>
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<tr>
<td>Take-off to clear 50 ft (ft)</td>
<td>3440</td>
<td>3440</td>
<td>3440</td>
<td>3320</td>
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<tr>
<td>Rate of climb at SL (fpm)</td>
<td>9720</td>
<td>4330</td>
<td>4190</td>
<td>4280</td>
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<tr>
<td>Rate of climb at SL (One engine out) (fpm)</td>
<td>2450</td>
<td>2450</td>
<td>2370</td>
<td>2400</td>
</tr>
<tr>
<td>Time: SL to 40,000 ft (min/ft)</td>
<td>8.9</td>
<td>35.6</td>
<td>6.7/20,000</td>
<td>6.5/20,000</td>
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<tr>
<td>Time: SL to 50,000 ft (min)</td>
<td>22.8</td>
<td>13.3/30,000</td>
<td>12.8/30,000</td>
<td>12.8/30,000</td>
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<tr>
<td>Service ceiling (100 fpm) (ft)</td>
<td>49,100</td>
<td>40,000</td>
<td>37,800</td>
<td>38,200</td>
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<tr>
<td>Service ceiling (one engine out) (ft)</td>
<td>28,200</td>
<td>28,200</td>
<td>28,200</td>
<td>28,700</td>
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<tr>
<td>COMBAT RANGE (n, mi.)</td>
<td></td>
<td>300</td>
<td>207</td>
<td>754</td>
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<tr>
<td>COMBAT RADIUS (n, mi.)</td>
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<tr>
<td>Average speed (kn)</td>
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<td>425</td>
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<tr>
<td>Initial cruising altitude (ft)</td>
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<td>34,800</td>
<td>35,200</td>
<td>35,700</td>
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<tr>
<td>Final cruising altitude (ft)</td>
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<td>38,100</td>
<td>38,400</td>
<td>39,000</td>
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<tr>
<td>Total mission time (hr)</td>
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<td>1.55</td>
<td>1.36</td>
<td>1.92</td>
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<tr>
<td>TOTAL MISSION TIME</td>
<td></td>
<td>1.63</td>
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<tr>
<td>Interception altitude (ft)</td>
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<td>47,900</td>
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### COMBAT WEIGHT

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<tr>
<th></th>
<th>(lb)</th>
<th>(kn)</th>
<th>(fpm)</th>
<th>(ft)</th>
<th>(ft)</th>
<th>(fpm)</th>
<th>(ft)</th>
<th>(ft)</th>
<th>(ft)</th>
<th>(ft)</th>
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<tbody>
<tr>
<td>Combat altitude</td>
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<td>47,900</td>
<td>5000</td>
<td>47,900</td>
<td>5000</td>
<td>47,900</td>
<td>5000</td>
<td>47,900</td>
<td>5000</td>
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<tr>
<td>Combat speed</td>
<td>47,900</td>
<td>47,900</td>
<td>5000</td>
<td>47,900</td>
<td>5000</td>
<td>47,900</td>
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<tr>
<td>Combat ceiling (500 fpm)</td>
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<td>5000</td>
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<tr>
<td>Service ceiling (1000 fpm)</td>
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<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
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<tr>
<td>Service ceiling (one engine out)</td>
<td>31,600</td>
<td>31,600</td>
<td>31,600</td>
<td>31,600</td>
<td>31,600</td>
<td>31,600</td>
<td>31,600</td>
<td>31,600</td>
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<tr>
<td>Max rate of climb at SL (fpm)</td>
<td>11,000</td>
<td>11,000</td>
<td>11,000</td>
<td>11,000</td>
<td>11,000</td>
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<td>11,000</td>
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<tr>
<td>Max speed at optimum altitude (ft)</td>
<td>546/10,500</td>
<td>546/10,500</td>
<td>546/10,500</td>
<td>546/10,500</td>
<td>546/10,500</td>
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<td>546/10,500</td>
<td>546/10,500</td>
<td>546/10,500</td>
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<tr>
<td>Basic speed at 40,000 ft (kn)</td>
<td>489</td>
<td>489</td>
<td>489</td>
<td>489</td>
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<td>489</td>
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<tr>
<td>LANDING WEIGHT (lb)</td>
<td>28,080</td>
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<td>28,080</td>
<td>28,080</td>
<td>28,080</td>
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<td>28,080</td>
<td>28,080</td>
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<tr>
<td>Ground roll at SL (ft)</td>
<td>2450</td>
<td>2520</td>
<td>2520</td>
<td>2470</td>
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<td>2470</td>
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<td>2470</td>
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<tr>
<td>Total from 50 ft (ft)</td>
<td>3650</td>
<td>3650</td>
<td>3650</td>
<td>3650</td>
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</tbody>
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### PERFORMANCE BASIS:

- (a) Data source: Based on flight tests of F-99A.
- (b) Performance is based on powers shown on page 3.

### NOTES:

1. Max power
2. Mil power
3. Detailed descriptions of RADIUS and RANGE missions given on page 6
4. Includes 1.5 minutes for take-off and acceleration to best climb speed.
5. Allows for weight reduction during ground operation and climb acceleration to best climb speed.
6. Time to service ceiling
7. See note (b) page 6

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NOTES

FORMULA: POINT INTERCEPT MISSION I

Take-off, accelerate to best climb speed, climb to combat ceiling at maximum power, combat for 5 minutes at combat ceiling at maximum power and loiter at 35,000 ft for the maximum available time as maximum endurance speed. Allowances include 2 minutes at normal power and one minute at maximum power at sea level for start and take-off and 20 minutes at maximum endurance speed at sea level for reserve and landing.

FORMULA: AREA INTERCEPT MISSION II

Take-off, climb on course to cruise ceiling at military power cruise on course at long range speed at cruise ceiling, climb on course to combat ceiling at 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 one minute at maximum power at sea level for start and take-off, 5 minutes at maximum power at combat ceiling for combat, and 5% of initial fuel and 20 minutes at maximum endurance speed at sea level for reserve and landing.

FORMULA: RADIUS MISSION III

Take-off, climb on course to cruise ceiling at military power, cruise on course at long range speed at cruise ceiling, combat for 20 minutes, cruise to base at long range speed at cruise ceiling. Range free allowances include 5 minutes at normal power and one 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, and 5% of initial fuel and 20 minutes at maximum endurance speed at sea level for reserve and landing.

FORMULA: RANGE MISSION IV

Take-off, climb on course to cruise ceiling at military power, and cruise to destination at long range speed at cruise ceiling. Range free allowances include 5 minutes at normal power and one minute at maximum power at sea level for start and take-off, and 5% of initial fuel and 20 minutes at maximum endurance speed at sea level for reserve and landing.

GENERAL NOTES:

(a) For detailed planning refer to Technical Order AN ol-15FDB-1 and other applicable technical orders.

(b) Airspeed limited below 20,000 ft to 470 kts or 0.9 Mach number whichever is less (Airplane is temporarily limited below 20,000 ft to 425 kts or 0.9 Mach number by Interim T.O. ol-15FDB-173, 4 March 53 pending structural demonstrations.)

PERFORMANCE REFERENCE:


REVISION BASIS:

Initial Issue