

B-1B

FACT BOOK

**North American Aircraft
Rockwell International**

15 JUN 89
CHG 1 - 11 AUG 89
CHG 2 - 02 FEB 90
CHG 3 - 15 MAR 91
CHG 4 - 16 APR 92
CHG 5 - 20 JUL 95

INTRODUCTION
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INTRODUCTION

This B-1B Fact Book is a collection of white papers and briefing material on a variety of subjects related to the B-1B. The purpose of this document is to provide a ready source of information for use in daily activities. Although this book is not intended for public distribution, individual sheets may be provided to constituents at the discretion of recipients. When reviewed in total this document should provide a general review of many key topics associated with the B-1B program and its history. However, it is not the primary purpose of this document to provide current program status. Users should refer to other sources for specific program status.

This update to the Fact Book encapsulates pertinent information on the B-1B Program, highlighting the following sections:

- Section A - General Aircraft Description & Assignments
- Section B - Mission Performance
- Section C - Defensive Systems
- Section D - Weapon Systems
- Section E - Achievements / Awards
- Section F - Maintenance Improvements
- Section G - Enhancements / Improvements
- Section H - Logistics Support
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Improvements to the aircraft (Section G). Also included are informative sections on; (Section F) and a Summary (Section H). A listing of OPR's for each section and subjects within that section is provided. These OPR's can be contacted for additional details and support as required.

The introductory section has been expanded to enhance the use of this book. The information in this section is presented in briefing format. Included are; Corporate and Division organizational charts, Mission Statements and Goals.

You will find a small section preceding the Fact Book. It is a brief company profile to acquaint you with Rockwell International, its diverse nature, its leaders, its history, and its pride.

The Fact Book will be updated periodically, new topics will be added as appropriate. The master copy of this document is prepared and maintained by the Research & Engineering Dept. If excerpts are used from these sheets, all elements of the Fact Book format should be removed so that they are not confused with the original document. Use of the Fact Book for purposes other than those specified herein should be approved by Howard Chambers, Vice President Strategic Systems and B-1B Program Manager, North American Aircraft. Suggestions for changes/additions/improvements to this book should be forwarded to: W. Zamboni, or J. Ramirez, Div. 011, Dept., 722, MC SL06, Tels 797-1399 & 797-2096 respectively.

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| Meeker, D. | D/722, 011 - SL02 |
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| Ming, D. | D/720, 011 - SL30 |
| Modiest, L. | D/722, 011 - SL02 |
| Norfleet, J. | D/521, 114 - PI08 |
| O'Brien, M. | D/723, 114 - PI59 |
| Parke, R. | D/722, 011 - SL06 |
| Parke, R. | D/722, 011 - SL56 |
| Parks, L. | D/521, 114 - PI08 |
| Pasco, R. | D/440, 011 - SK77 |
| Ralston, J. | Gen (Sel.) - HQ ACC |
| Ramirez, J. | D/722, 011 - SL06 |
| Rapp, J. | D/722, 011 - SL15 |
| Rodriguez, G. | D/521, 114 - PI08 |
| Romero, J. | D/724, 011 - SK63 |
| Rosenthal, J. | D/722, 011 - SL15 |
| Ruder, D. | D/722, 114 - PI21 |

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| Schmidt, H. | D/723, 011 - SL30 |
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| Scruggs, S. | DCMO, 011 - SK32 |
| Skillman, N. | D/722, 011 - SL25 |
| Smith, T. | D/723, 011 - SL30 |
| Steadman, G. | D/727, 011 - SL27 |
| Stephenson, R. | D/440, 011 - ABIL |
| Storm, J. | D/727, 011 - SL27 |
| Terry, B. | D/521, 011 - PI08 |
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| Worcester, D. | D/722, 011 - SL06 |
| Wright, J. | D/440, 011 - ABIL |
| Yosan, J. | D/727, 011 - SL27 |
| Zamboni, W. | D/722, 011 - SL06 |
| Zinn, D. | D/751, 001 - HAMP |

A. B-1B AIRCRAFT DESCRIPTION

Subject: B-1B AIRCRAFT DESCRIPTION

The B-1B, a multi-role bomber, is designed to function as a flexible asset in the ACC strategic Single Integrated Operational Plan (SIOP). The aircraft is designed to stand alert for up to 30 days with a minimum of maintenance and be airborne within minutes of a scramble order. The aircraft is fully self contained and can be operated from remote locations.

The B-1B is capable of operation in a nuclear weapons environment (overpressure, thermal flash and radiation, electromagnetic pulse and transient radiation effects).

While designed as a penetrator, the aircraft can handle a variety of conventional munitions and nuclear weapons missions.

This swing-wing aircraft is equipped with four General Electric F-101-GE-102 afterburning turbojet engines, extensive offensive and defensive avionics systems and an onboard central integrated test system.

- **PERFORMANCE**

- Mach 1.2 at altitude
 - Mach .95 at sea level

- **ENGINES**

- General Electric (4)
 - F101-GE-102
 - Thrust (sea level static) 30,700 lb. (ea.)

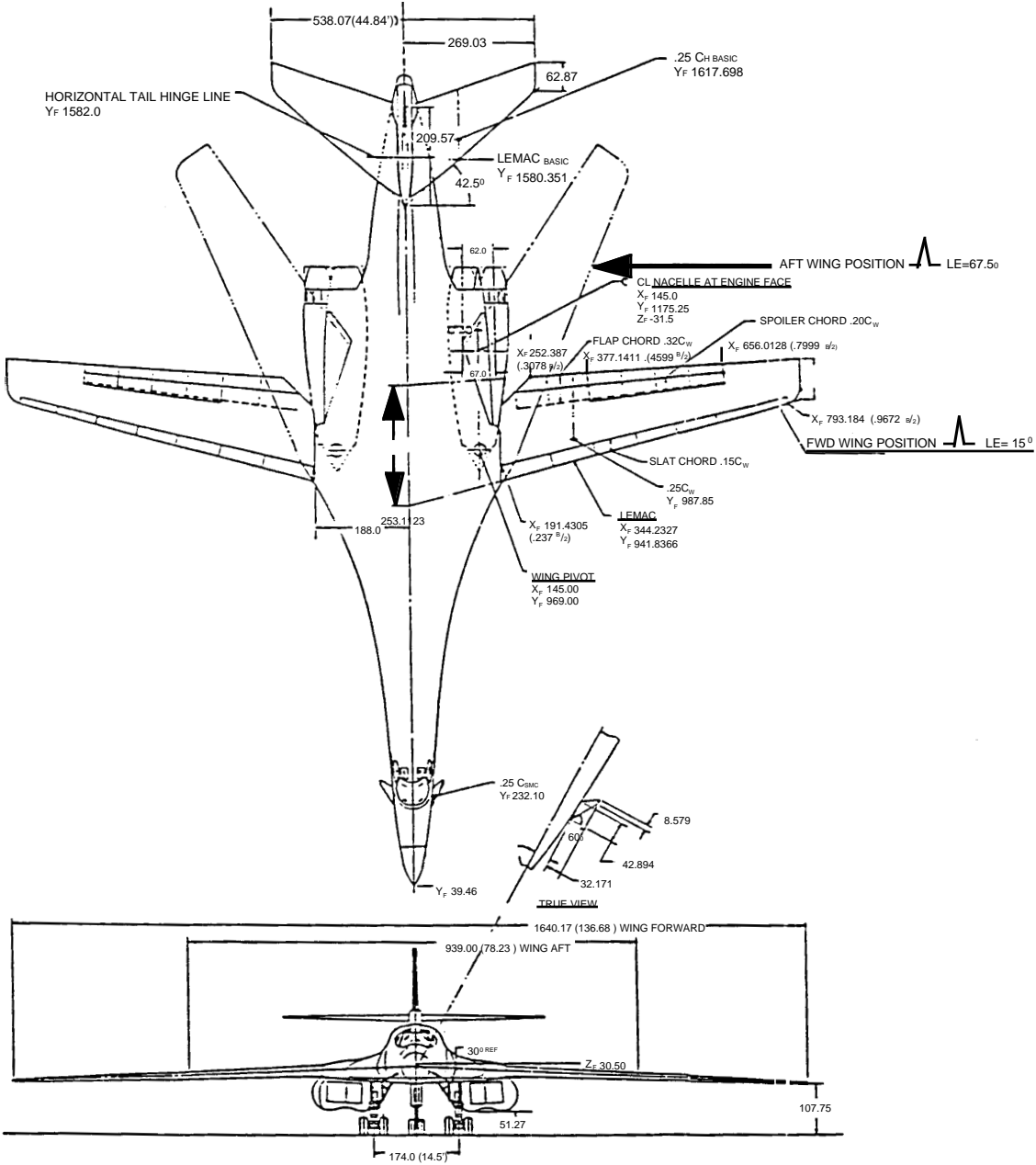
- **WEIGHTS (LB.)**

- | | |
|-----------------|---------|
| Maximum Taxi | 477,000 |
| Maximum Flight | 477,000 |
| Maximum Payload | 133,800 |
| Internal | 75,000 |
| External | 58,800 |
| Weight Empty | 186,807 |

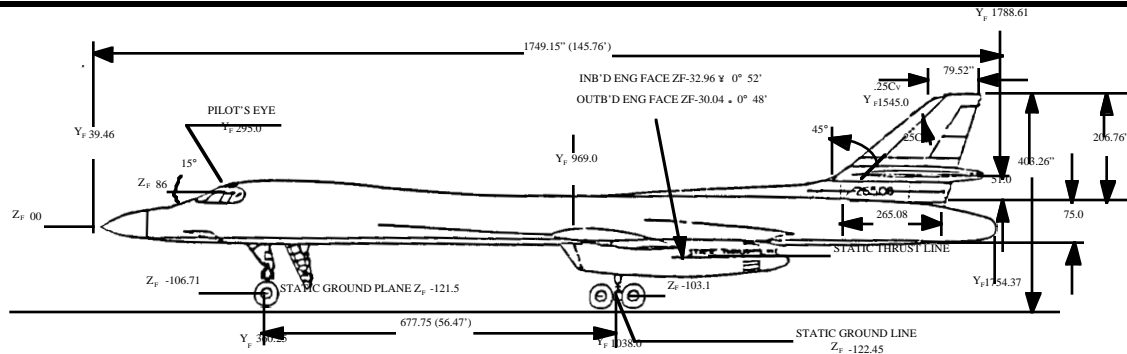
- **30 YEAR SERVICE LIFE**

B-1B IS A FLEXIBLE ACC ASSET

TOP VIEW AND FRONT VIEW



| GEOMETRIC DATA | | | | | |
|---|-------------------------------|--------------------|-----------------------|------------------------------|----------------------------------|
| ITEM | WING FWD POS | WING AFT POS | HORIZONTAL TAIL TOTAL | VERTICAL TAIL TOTAL | STRUCTURAL MODE CTRL |
| AREA ~ SQ. FT | 1946.0 | 1946.0 REF | 509.0 | 247.4 | 11.5 |
| ASPECT RATIO | 9.6 | 3.14 | 3.95 | 1.2 | 2.5 |
| TAPER RATIO | .35 | --- | .30 | .30 | .20 |
| THICKNESS RATIO | REF: LINES DRAWINGS | | .07 ROOT .04 TIP | .10 ROOT .03 ZF126 TO TIP | .05 |
| AIRFOIL SECTION | NA 69-190-2 IIB-2.1.1 | | MDDP 902101 | MDDP 902201 | MDDP 902802 |
| LEADING EDGE SWEEP | 15.0° | 67.5° | 42.5° | 45° AT .25C | 60° |
| DIHEDRAL ANGLE | -1.94° | --- | 0° | --- | -30.0° |
| INCIDENCE ANGLE | 2° @XF 165.163 0° TIP | --- | 0° | --- | DEFL - 20.0° |
| MAC LENGTH ~ INCHES | 184.053 | --- | 149.385 | 188.954 | 29.55 |
| MAC LOC ~ INCHES | 344.2327 | --- | 110.373 | 84.825 | 12.511 TRUE |
| CONTROL SURFACE DATA | | | | | |
| ITEM | FLAP | SPOILER | SLAT | RUDDER | HORIZ. TAIL |
| TYPE | SINGLE SLOTTED | UPPER SURFACE ONLY | POWERED | --- | ALL MOVABLE |
| AREA ~ SQ. FEET | 310.38 | 115.0 | 187.62 | 60.6 | 474.5 |
| DEFLECTION | 25° | 0° TO 70° UP | 20.0° | FLAP DN -25° FLAP UP -10° | PITCH +10° - 20° ROLL -20° |
| LANDING GEAR DATA | | | | | |
| ITEM | MAIN | | AUXILIARY | | |
| TIRE SIZE & TYPE | B46 X 16.0 - 23.5 TWIN TANDEM | | 35 X 11.5 - TWIN | | |
| PLY RATING | 30 | | 24 | | |
| ROLLING RADIUS ~ INCHES | 19.35 | | 14.79 | | |
| FLAT RADIUS ~ INCHES | 15.10 | | 11.3 | | |
| STRUT ~ TOTAL STROKE ~ IN | 16.50 | | 21.0 | | |
| STRUT-STATIC TO COMPRESSED | 3.5 | | 7.0 | | |
| PROPULSION DATA | | | | | |
| FOUR GENERAL ELECTRIC F101-GE-102 ENGINES | | | | | |



A-1c

| B-1B Aircraft Assignments | | |
|---|----------------------------|------------------------------------|
| 45 A/C Dyess AFB | | 26 A/C Ellsworth AFB |
| (2) 83-0065 | (42) 85-0082 | (21) 85-0061 |
| (3) 83-0066 | (60) 86-0100 | (26) 85-0066 |
| (4) 83-0067 | (61) 86-0101 | (35) 85-0075 |
| (5) 83-0068 | (63) 86-0103 | (37) 85-0077 |
| (6) 83-0069 | (65) 86-0105 | (38) 85-0078 |
| (7) 83-0070 | (67) 86-0107 | (39) 85-0079 |
| (8) 83-0071 | (68) 86-0108 | (43) 85-0083 |
| (10) 84-0050 | (69) 86-0109 | (44) 85-0084 |
| (11) 84-0051 | (70) 86-0110 | (45) 85-0085 |
| (13) 84-0053 | (72) 86-0112 | (46) 85-0086 |
| (14) 84-0054 | (77) 86-0117 | (47) 85-0087 |
| (15) 84-0055 | (79) 86-0119 | (49) 85-0089 |
| (16) 84-0056 | (80) 86-0120 | (50) 85-0090 |
| (17) 84-0057 | (82) 86-0122 | (52) 85-0092 |
| (18) 84-0058 | (83) 86-0123 | (53) 86-0093 |
| (19) 85-0059 | (84) 86-0124 | (54) 86-0094 |
| (22) 85-0062 | (86) 86-0126 | (56) 86-0096 |
| (25) 85-0065 | (90) 86-0130 | (58) 86-0098 |
| (27) 85-0067 | (92) 86-0132 | (59) 86-0099 |
| (31) 85-0071 | (95) 86-0135 | (62) 86-0102 |
| (32) 85-0072 | (97) 86-0137 | (71) 86-0111 |
| (33) 85-0073 | (100) 86-0140 | (73) 86-0113 |
| (34) 85-0074 | | (74) 86-0114 |
| | | (88) 86-0128 |
| | | (89) 86-0129 |
| | | (93) 86-0133 |
| A/C Manufactured in Lots | 11 A/C McConnell AG | 11 A/C GSU Det 34 Ellsworth |
| Lot I - A/C 1 Only | (20) 85-0060 | (51) 85-0091 |
| Lot II - A/C 2 thru 8 | (24) 85-0064 | (57) 86-0097 |
| Lot III - A/C 9 thru 18 | (29) 85-0069 | (64) 86-0104 |
| Lot IV- A/C 19 thru 52 | (32) 85-0072 | (76) 86-0116 |
| Lot V-A/C 53 thru 100 | (33) 85-0073 | (78) 86-0118 |
| | (34) 85-0074 | (81) 86-0121 |
| GAANG - Georgia Air | (42) 85-0082 | (85) 86-0125 |
| National Guard to be | (60) 86-0100 | (91) 86-0131 |
| equipped with B-1B's | (61) 86-0101 | (94) 86-0134 |
| in the near Future | (63) 86-0103 | (98) 86-0138 |
| | (65) 86-0105 | (99) 86-0139 |
| A/C Lost in Accidents with Brief Explanation | | 2 A/C Edwards AFB |
| (12) 84-0052 --Lost 09-25-87 @ La Junta, Colorado | | |
| (23) 85-0063 --Lost 11-09-88 @ Dyess AFB, Texas | | (9) 84-0049 |
| (36) 85-0076 --Lost 11-17-89 @ Ellsworth AFB S.D. | | (28) 85-0068 |
| (66) 86-0106 --Lost 12-01-92 @ IR 165, Van Horne TX | | |

Subject: TOOL DISPOSITION**Background:**

During peak production of the B-1B in the mid-1980s, a total of approximately 167,000 production tools were being utilized by Rockwell (the B-1B airframe contractor) or suppliers. When the last production B-1B 86-0140 (100) was delivered in April 1988, a carefully planned procedure was implemented. This plan provided for:

- (a) Storage of all critical tooling deemed essential for after-production needs, including battle damage repair, structural modifications required by changing mission needs, and spares.
- (b) Keep most expensive tooling and only discard tooling that can be replaced quickly and inexpensively.
- (c) Retain long lead time tooling that would require a substantial period of time to rebuild.
- (d) A portion of the non-dimensional special tooling was sent to Air Force operational and maintenance bases and the balance was scrapped. This category includes such items as work platform ramps around aircraft and large cargo containers for shipping major subassemblies.

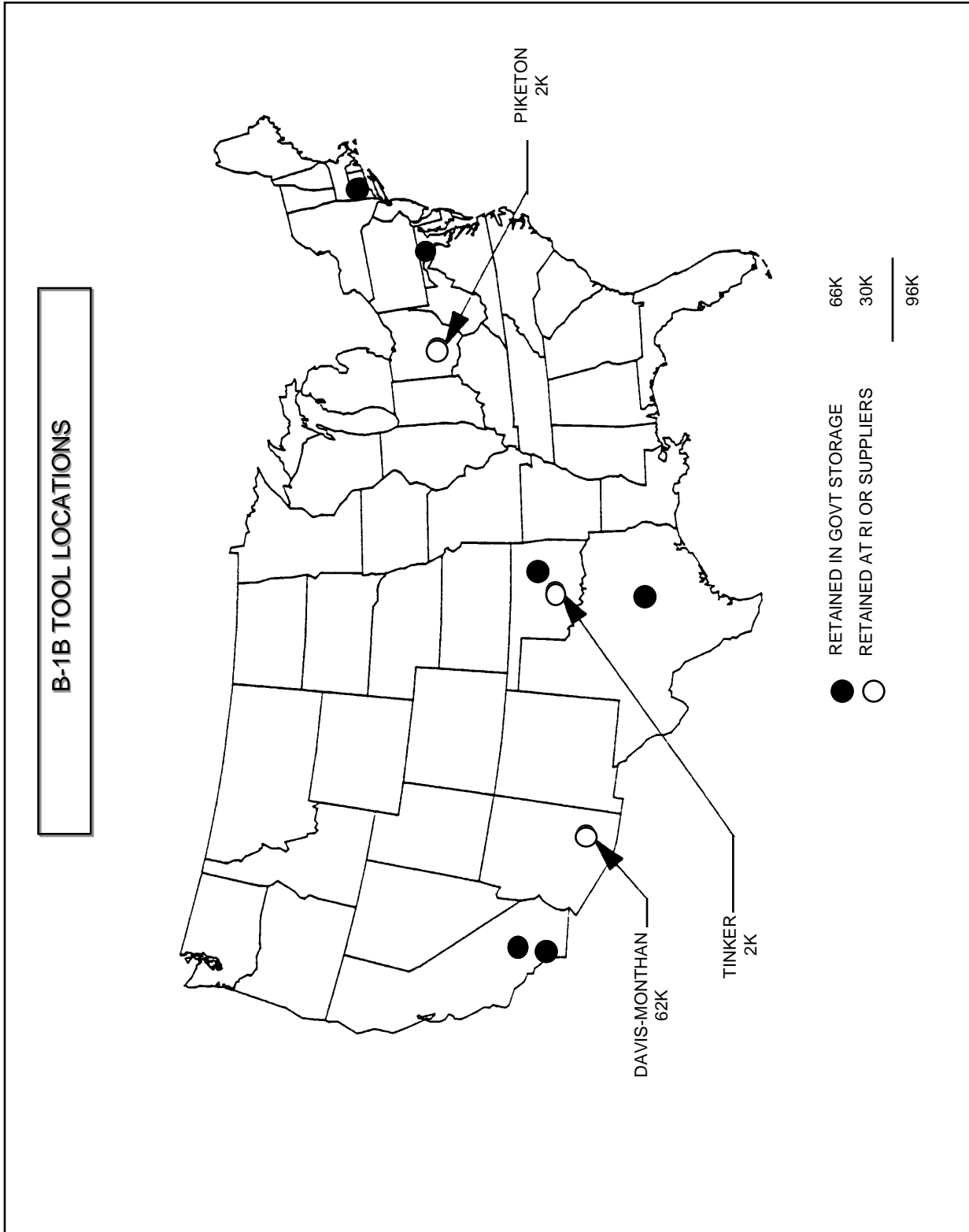
Facts:

As a result of the implementation of the above plan, approximately 57 percent of peak production tooling was retained in government storage and at Rockwell or suppliers; however, this retained tooling represents 80 percent of the total value (cost) of all B-1B tooling and includes all of the long lead time tooling. Additional tooling that may be required would only represent 20 percent of overall tooling value and this supplemental tooling required could also be made quickly. A total of 96,000 tools are currently available with 66,000 in Government storage; and 30,000 at Rockwell and suppliers. This is illustrated in the following figure.

Status:

Tools not in Government storage or use are available as contingency tooling or spares:

***MOST B-1B TOOLING IS IN STORAGE AND AVAILABLE TO
SUPPORT MODIFICATIONS***



B. MISSION PERFORMANCE

Subject: SIOP PENETRATION MISSION

Background:

The B-1B is part of the Single Integrated Operational Plan (SIOP) which allocates strategic assets to specific targets. The B-1B SIOP penetration mission profile consists of four phases: Takeoff and Cruise; Penetration and Weapon Delivery; Withdrawal; and Recovery.

Takeoff for SIOP missions occur from continental U.S. bases. Cruise length is variable depending on the target and mission and is accomplished at best cruise altitude with inflight refueling as required. At penetration, the B-1B descends to 200 feet AGL and accelerates to a minimum of 0.85 Mach. Withdrawal is accomplished at the same altitude at a minimum of 0.55 Mach. Recovery for a SIOP mission occurs at a non-U.S. base and may include a climb to cruise altitude as necessary.

The exact penetration distance flown varies with the specific category of B-1B mission. Mission flexibility is afforded with the carriage of internal fuel in any or all of the weapon bays through the installation of non-jettisonable, cylindrical fuel tanks. For the longest missions, two bays may be loaded with fuel and only one bay with weapons.

The SIOP penetration mission is one of five Specification Missions for the B-1B used as a design reference. The other four being Shoot-Pen, Standoff, World Wide Power Phase I, and World Wide Power Phase. The penetration mission is most commonly used for mission analysis at this time.

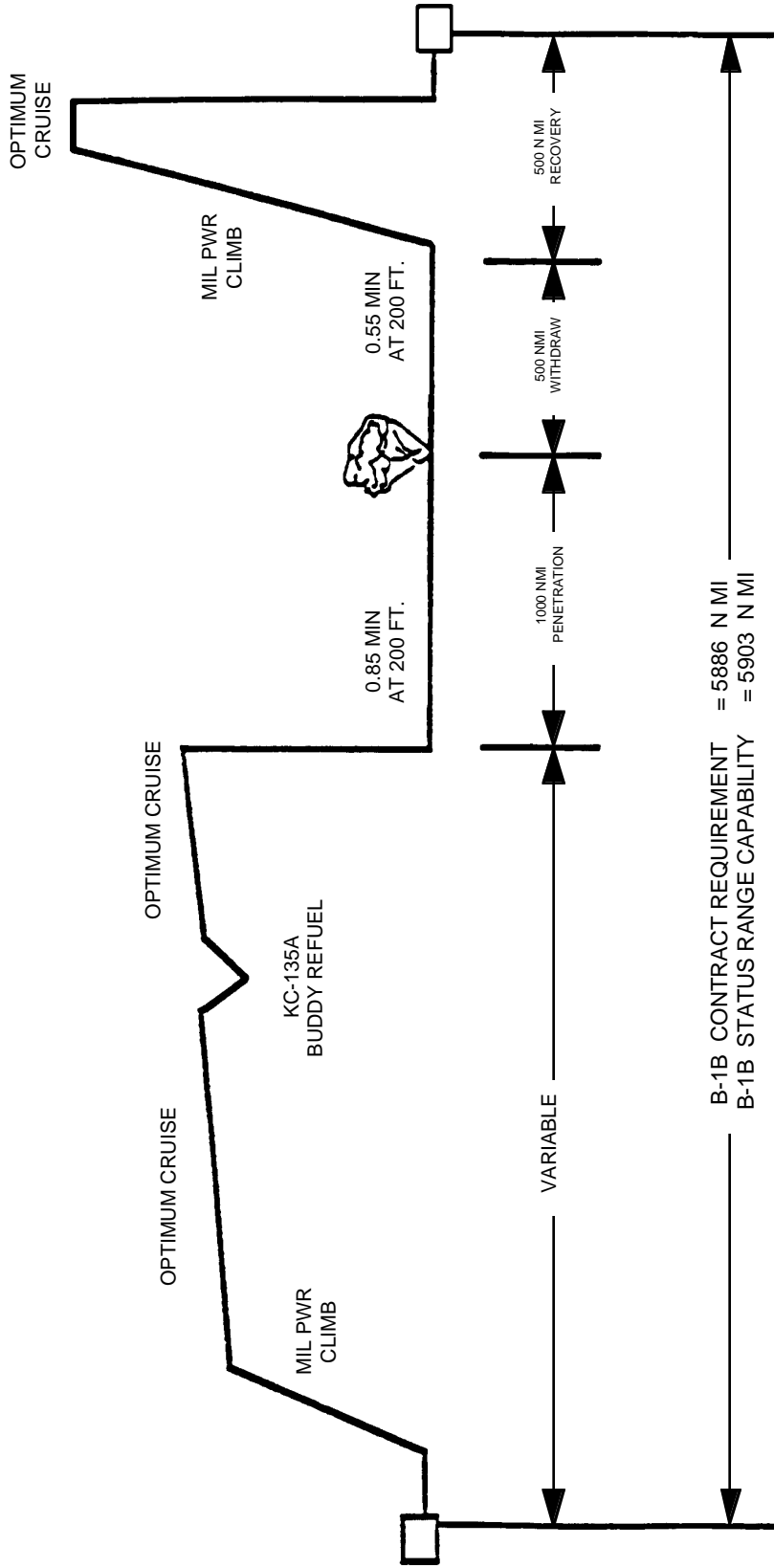
Table B-1: SIOP Mission Specification Requirements with 24 SRAM-A Carried Internally

| Parametric | Value |
|--|---------------|
| Takeoff gross weight | 433,406 lbs. |
| Takeoff fuel | 187,560 lbs. |
| Payload | 53,040 lbs. |
| Operating weight (less fuel & payload) | 192,806 lbs. |
| Calculated range | 5,903 n.miles |
| Specification range requirement | 5,886 n.miles |

Status:

The existing fleet of B-1B aircraft is capable of meeting the range and payload requirements for the SIOP penetration mission.

Figure B-1: SIOP DESIGN MISSION PROFILE



Subject: B-1B MISSION RANGE

The B-1B has been evaluated for the performance of several types of missions. Several of these missions are described in the following table to illustrate the mission flexibility and performance of the B-1B. The Single Integrated Operational Plan (SIOP) Specification Mission, a primary strategic mission of the B-1B, is included as reference.

| Mission | Profile | Weapons | Refueler | Range |
|----------------|----------------|----------------|-----------------|--------------|
| Spec SIOP | Hi-Lo-Hi | 24 SRAM A | KC-135A | 5903 NM |
| | | | KC-135R | 6360 NM |
| | | | KC-10A | 7358 NM |
| Conventional | Hi-Lo-Hi | 56 MK82 | KC-135R | 8400 NM |
| | | | KC-10A | 9466 NM |
| ACM Standoff | Hi | 16 ACM | NONE | 4425 NM |
| | | | KC-135R | 5430 NM* |
| Penetration | Hi-Lo-Lo | 16 SRAM A | KC-10A | 5963 NM* |
| | | | 2 x KC-135R | 7220 NM* |

* Includes 3016 NM at 200 feet and .85 Mach

Subject: AUTOMATIC TERRAIN FOLLOWING (ATF) RANGE

The B-1B has the capability to perform ATF for very long distances. The distance has increased considerably since the program began.

Further increases in range can be achieved through the addition of external fuel tanks or through the decrease in wing sweep during the penetration phases of a mission. While these enhancements have been studied in some detail, there are currently no plans for implementation.

Today (SEF Aircraft)

| | |
|-----------------------------------|---------|
| 0.85M, 67.5 degree sweep | 3016 NM |
| 0.55M-0.85M, 55-67.5-degree sweep | 3905 NM |

Enhancements

| | |
|---------------------------------------|---------|
| 0.45M-0.85M, 35-67.5 degree sweep | 4200 NM |
| plus | |
| External Fuel Tanks (six 1000 gallon) | 4670 NM |

AUTOMATIC TERRAIN FOLLOWING FOR VERY LONG DISTANCES

Subject: AUTOMATIC TERRAIN FOLLOWING**Background:**

The B-1B's survivability when penetrating defenses will depend in part on its ability to fly low to avoid radar detection. Therefore, the B-1B is equipped with Terrain Following and Terrain Avoidance radar modes.

The B-1B is designed to fly in an Automatic Terrain Following (ATF) mode at 200 feet above ground level, in all weather, and at night. The B-1B incorporates several ATF modes. One mode, known as "hard ride," closely follows terrain contours and is intended for use in high threat environments. "Soft ride" does not approximate the contour of the ground as closely, providing a smoother flight.

The ATF function produced frequent false fly-up signals during initial use by operational air-crews. As a result, the Air Force suspended ATF training until software modifications were made and tested.

After ATF software modification testing and the B-1B bird strike modification (refer to Bird Strike, page G-4), low-level training was resumed in 1989.

Facts:

The current ATF hardware with block 4.5 software is a fully functional and tested ATF system which meets the ACC mission requirement for both hard and soft rides.

ACC air-crews are routinely using the ATF system to train for combat missions.

EARLY ATF PROBLEMS SOLVED, SYSTEM WORKS WELL