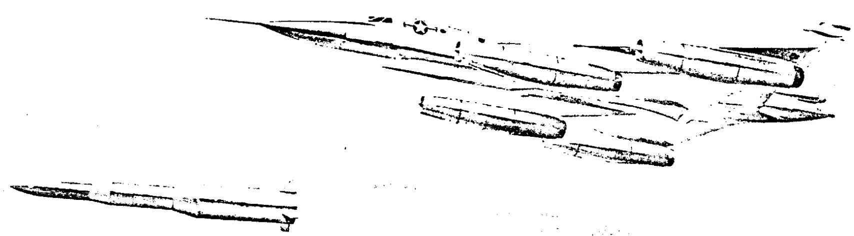
B-58 as a MISSILE LAUNCHER

GENERAL DYNAMICS

BASIC CONSIDERATIONS

This chart lists the primary factors which must be considered in determining the suitability of the B-58 as a missile carrier in any given application. The subsequent charts give, first, the general capabilities of the B-58 in each of these areas, and then cover specific examples illustrating these capabilities for missiles in the range of 50,000-70,000 pounds.

BASIC CONSIDERATIONS



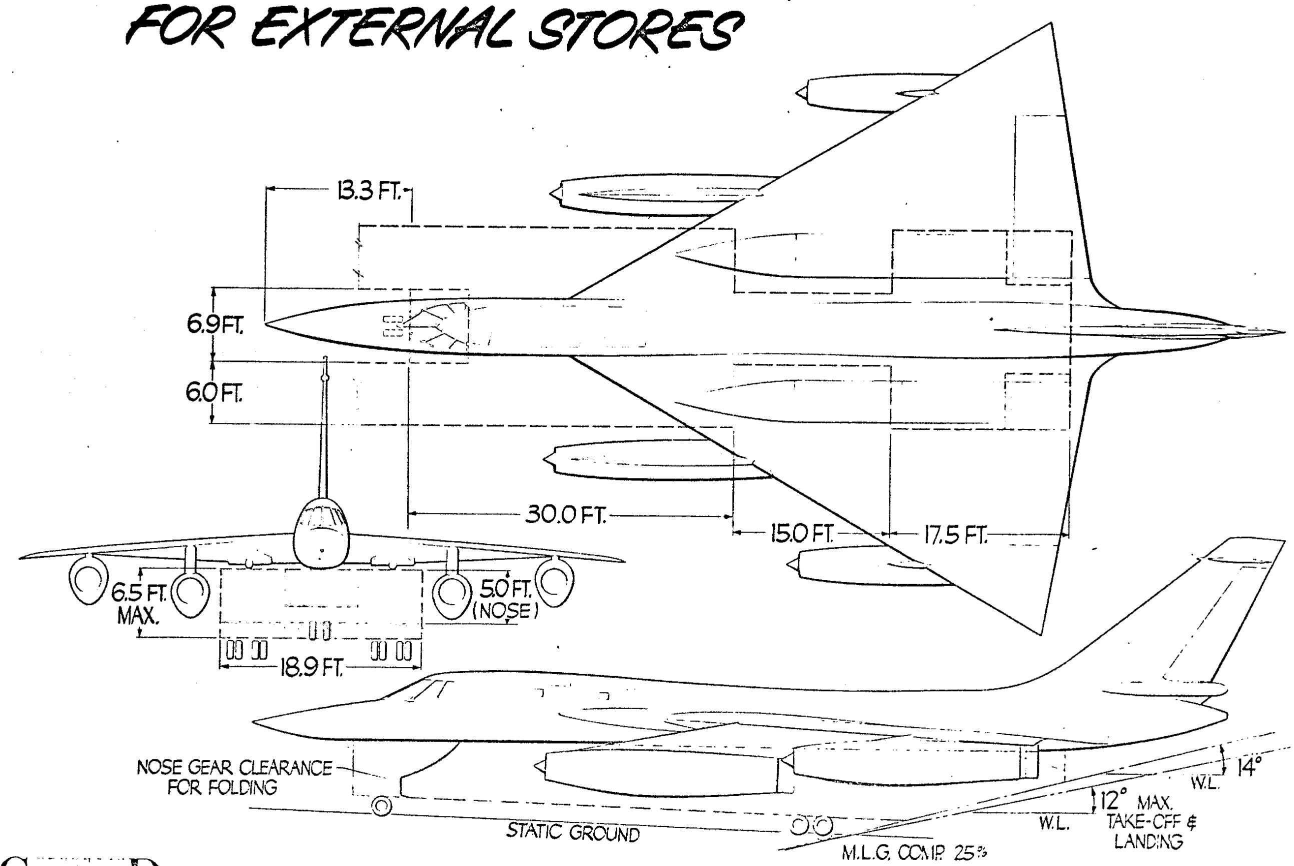
- GEOMETRY
- STRUCTURE
  - MAJOR - WING AND FUSELAGE
  - LOCAL - ATTACHMENTS, LANDING GEAR
- STABILITY, WEIGHT AND [illegible]
- SEPARATION
- AIRPLANE PERFORMANCE
  - MAXIMUM SPEED
  - RANGE

G[illegible]D

B-58 PHYSICAL BOUNDARIES FOR EXTERNAL STORES

The B-58 was designed to carry large centerline stores containing weapons, fuel, or other equipment as an integral part of its weapon system capability. Space available, as indicated on the chart, is determined by the physical boundaries of nose landing gear, main landing gear, engines, and ground clearance. Ground clearance is the most difficult of these to define because it must allow for missile loading and ground handling equipment space as well as for take-off and landing attitudes of the airplane which might be encountered under different conditions. For the present purpose, clearance for take-off and landing was established by requiring a 2-degree margin in airplane attitude above the normal maximum attitude. As normal practice, take-offs and landings are made with an airplane nose-up attitude of 9° to 12° between the waterline plane and ground. The pilot's view of the runway is lost at higher angles, therefore providing an excellent reference. On this basis, a 14° attitude (waterline to ground angle) was chosen as a reasonable boundary.

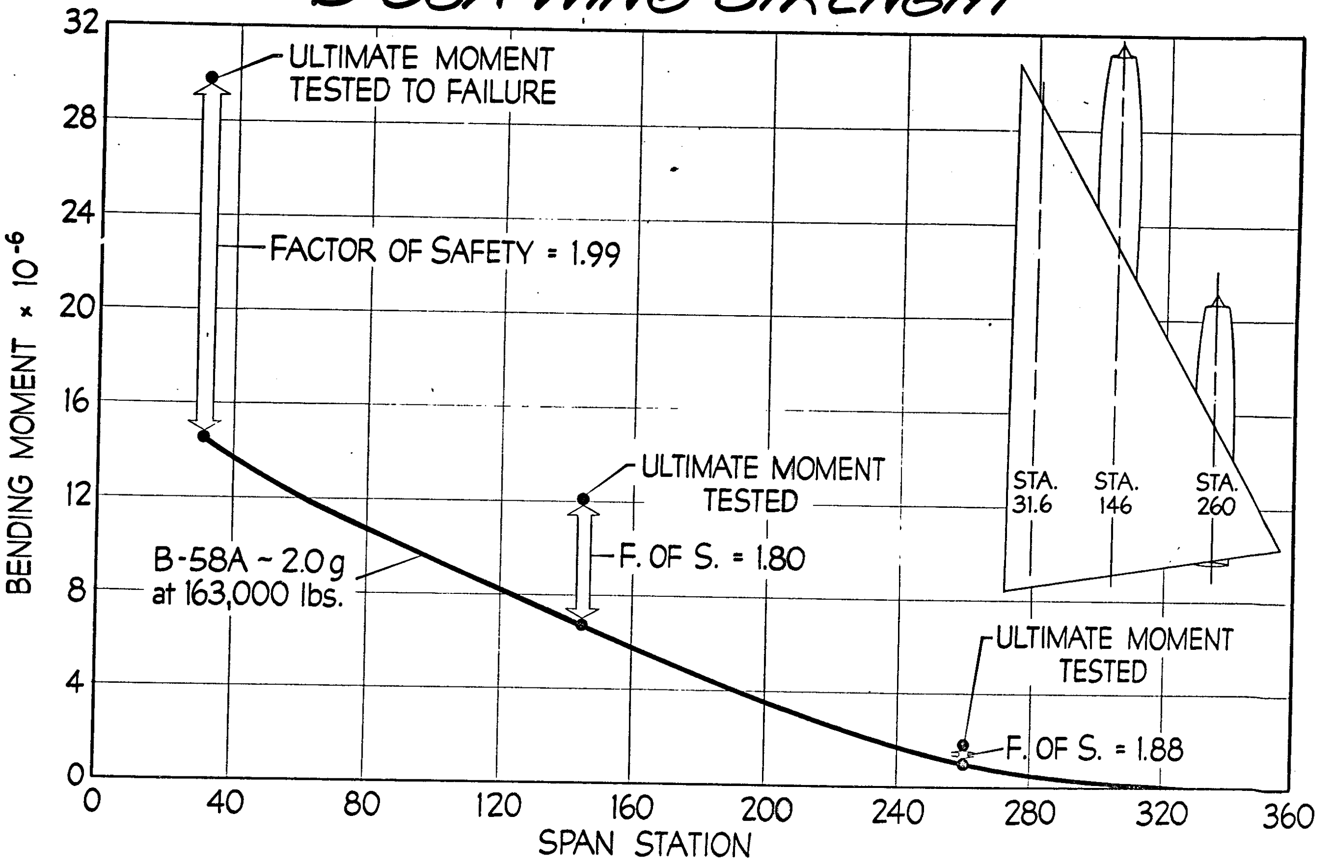
B-58 PHYSICAL BOUNDARIES FOR EXTERNAL STORES



B-58A WING STRENGTH

The bending moments shown on the opposite chart are based on the results of flight measured data and static tests of the B-58A. It should be noted that a substantial margin exists at each of the three key stations examined. The margin at Station 31.67 is based on actual failure of the wing during static test, while at Stations 146 and 260 the margin is based on the maximum moment tested. Since the wing failed at Station 31.67 it is reasonable to assume that the true margin at the other two stations is higher than shown.

B-58A WING STRENGTH

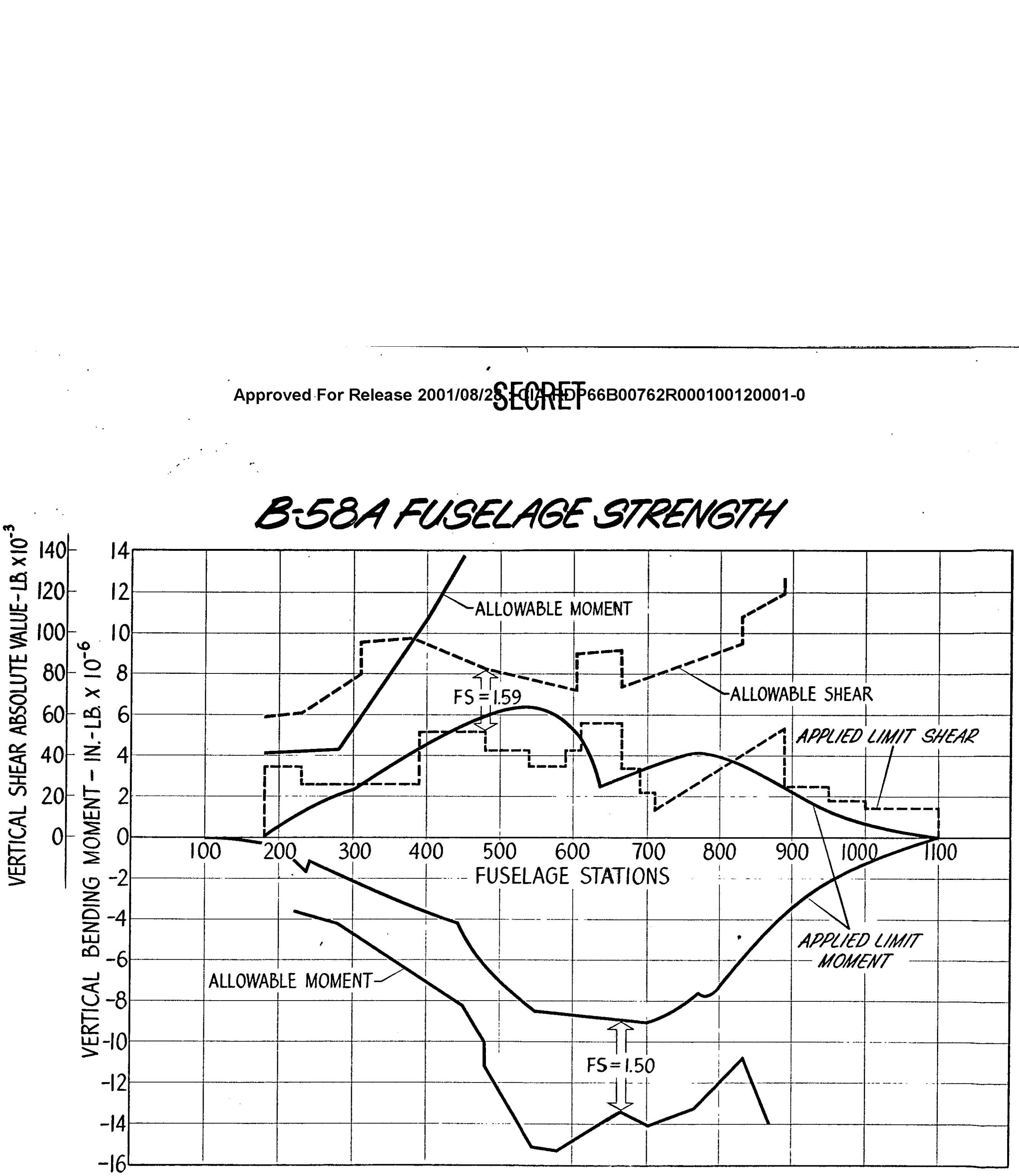


AD 0732
21 MAR 62

B-58A FUSELAGE STRENGTH

This chart depicts the envelope of the fuselage shear and moment capabilities. Superimposed on this plot are the actual applied shears and moments for the B-58A derived from all flight and ground conditions. The most critical area is in the vicinity of Station 600, which is the aft pod hook station.

B-58A FUSELAGE STRENGTH



AD 0733
21 MAR 62

CENTERLINE LOADING AND GEAR STRENGTH

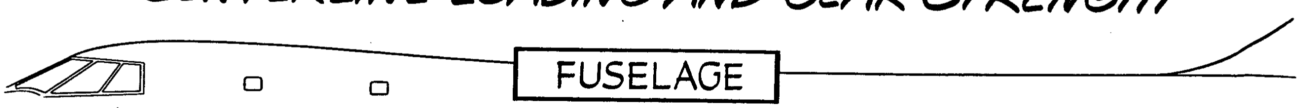
The chart on the right shows the centerline loading and gear strength capabilities of the current B-58A. There are two types of centerline stores carried by the B-58; they are the MB pods and the two-component pod (TCP). The hooks at Stations 385 and 600 are used by the two types as the main supporting structure. The "pogo" attachment at Station 847 is used only as stabilization for the tank portion of the TCP during release. The loads shown are the individual maximums and should not be used in combination.

The term ultimate strength means the maximum capability to accept loads in the direction shown.

Limit applied signifies the maximum load actually induced by either the MB pod or the TCP.

It should be noted that rolling moments are taken only by the twin hooks at Station 600.

CENTERLINE LOADING AND GEAR STRENGTH



	FWD. HOOK STA. 385	AFT HOOK STA. 600	"POGO STICK" STA. 847
ULT. STRENGTH	VERTICAL = 76,000 LBS. SIDE = 33,018 LBS.	VERT. SYM.= 140,000 LBS. (2 HOOKS) VERT. UNSYM.= 126,000 LBS. (1 HOOK) SIDE = 54,000 LBS. DRAG = 63,000 LBS.	VERTICAL = 40,000 LBS. DRAG = 52,000 LBS. SIDE = 15,300 LBS.
LIMIT APPLIED	VERTICAL = 50,500 LBS. SIDE = 22,000 LBS.	VERT. SYM.= 54,400 LBS. (2 HOOKS) VERT. UNSYM.= 84,000 LBS. (1 HOOK) SIDE = 33,000 LBS. DRAG = 37,200 LBS. (ARB. COND.)	VERTICAL = 11,300 LBS. DRAG = 22,400 LBS. SIDE = 4500 LBS.
FACTOR OF SAFETY	VERTICAL - 1.50 SIDE --- 1.50	VERTICAL SYM. - 2.58 VERTICAL UNSYM. - 1.50 SIDE ------- 1.64 DRAG ------- 1.70	VERTICAL --- 3.54 DRAG ----- 2.32 SIDE ------ 3.40

LANDING GEAR

	CENTER OF GRAVITY
MAXIMUM TAKE-OFF AND GROUND HANDLING WEIGHTS = 163,000 LBS.	29% MAC
DESIGN LANDING WEIGHT = 95,000 LBS. - SINKING SPEED = 9 FT./SEC.	FWD. C.G. = 21.6% MAC AFT C.G. = 29% MAC
MAXIMUM LANDING WEIGHT = 156,400 LBS. - SINKING SPEED = 5 FT./SEC.	FWD. C.G. = 26% MAC AFT C.G. = 29% MAC

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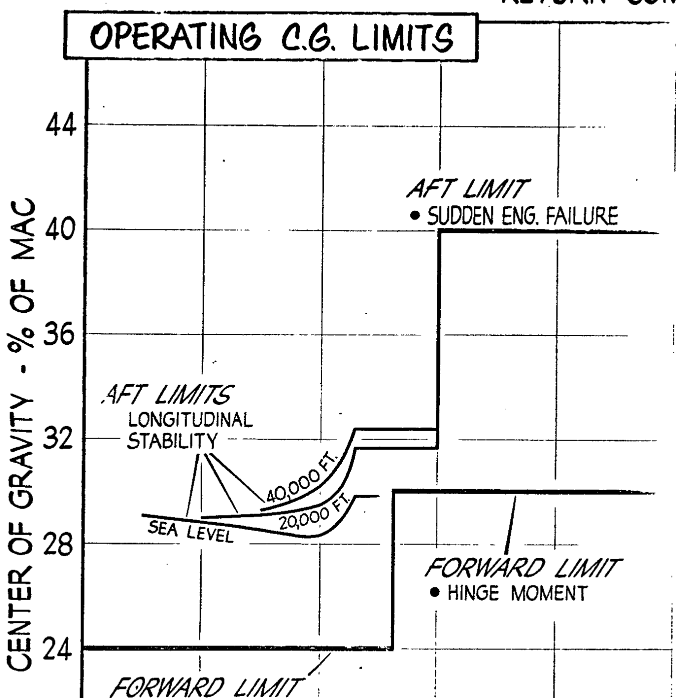
B-58A BALANCE CHARACTERISTICS

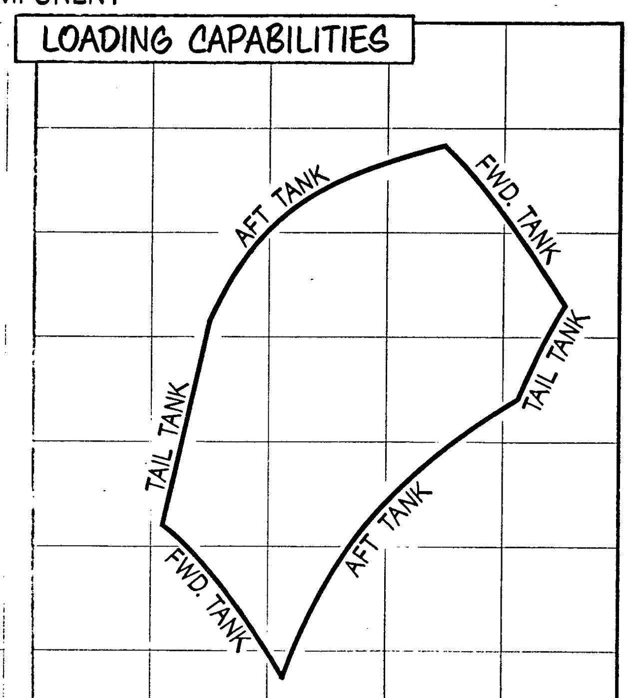
The B-58 return component has a dry weight of 58,500 pounds and a fueled weight of 129,500 pounds. The envelope of possible center-of-gravity (c.g.) locations is shown on the right side of the chart on the following page by means of a plot of c.g. (in percent of mean aerodynamic chord - MAC) versus gross weight. At a given gross weight, any c.g. within the envelope can be achieved by proper distribution of fuel between the various fuel tanks.

In addition to these physical c.g. restrictions, certain other limitations must also be observed, as indicated by the operating limits. The forward limit supersonically is defined by the maximum elevon hinge moment capability of one of the two elevon hydraulic systems, i.e., by the requirement that sufficient elevon control be available to maintain one g trim flight even if one of these systems should fail. The aft supersonic limit is defined by the requirement to maintain an adequate directional stability safety margin in the event of a sudden engine failure at design speed.

B-58A BALANCE CHARACTERISTICS

RETURN COMPONENT





AD 0736
21 MAR 62

B-58A BALANCE CHARACTERISTICS

COMPOSITE AIRPLANE WITH MB-1

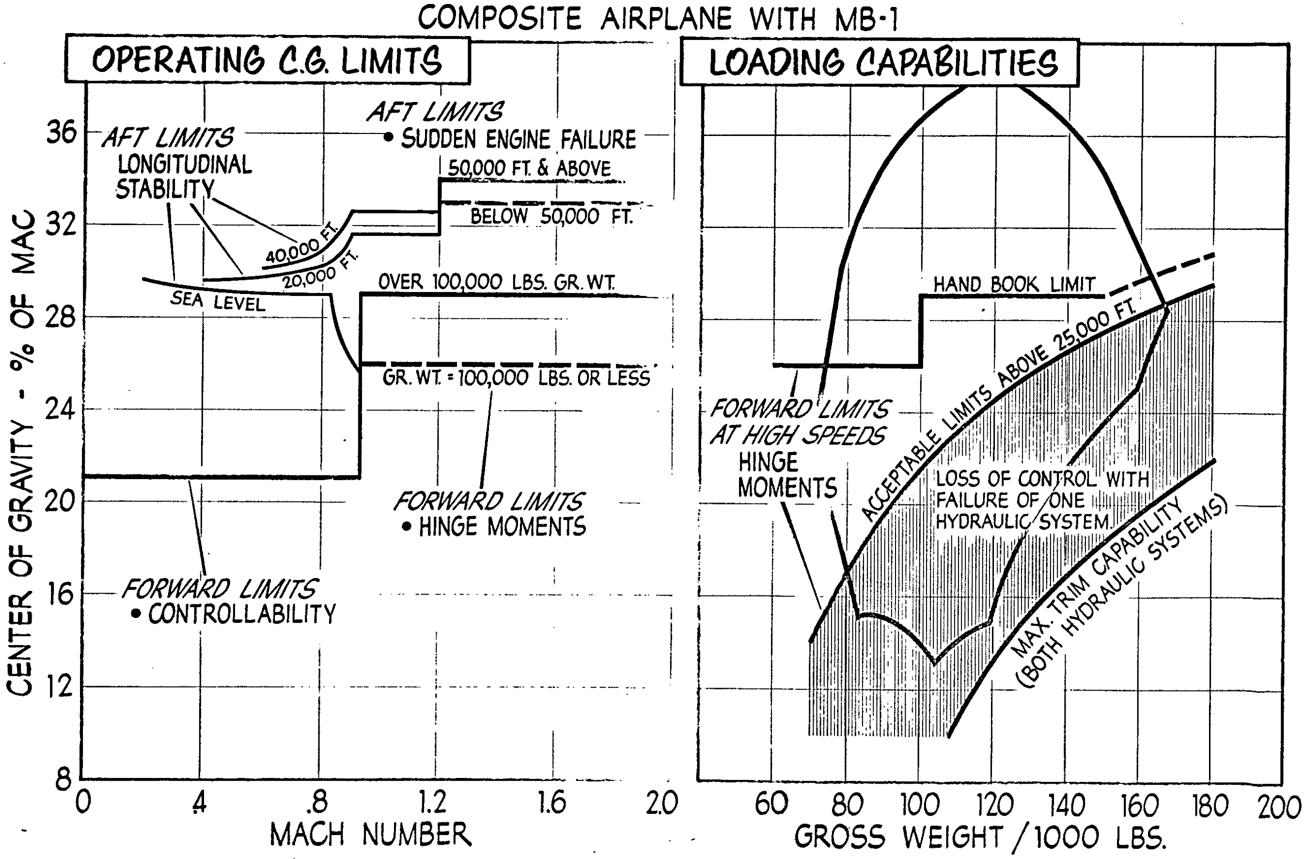
The composite configuration of the return component plus the MB-1 pod permits additional fuel capability, thus giving the loading capability indicated. The operating c.g. limits shown are defined by the same requirements as for the return component but, as indicated, the values are modified by the presence of the pod.

In addition to the loading capability, the graph on the right-hand side of the following page also shows the acceptable forward limits above 25,000 feet as compared to the nominal ("hand book") limits shown on the left. In order to achieve this increased forward limit it is necessary to incorporate certain modifications to the airplane control system, designated as the "wing heaviness fix."

"Wing heaviness" is the lateral unbalancing of fuel induced by small sideslips of the airplane and requires corrective aileron action and rudder deflections. The relaxed forward limit is allowed by the incorporation of automatic rudder positioning to provide continuous automatic directional trimming which essentially eliminates wing heaviness and results in very small aileron deflection. The design of the "fix" is complete and has been proposed to the Air Force in an ECP for incorporation in the entire B-58 fleet.

B-58A BALANCE CHARACTERISTICS

COMPOSITE AIRPLANE WITH MB-1



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AD 0735
21 MAR 62

EFFECT OF MISSILE RELEASE ON AIRPLANE RESPONSE

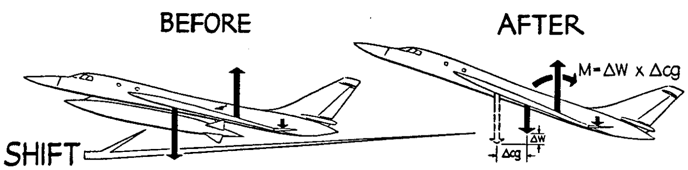
1. Direct Weight Change - The incremental load factor resulting from this is given by the ratio of the weight released to the return component weight. Only a reduction of the weight dropped can reduce this increment.

2. Center-of-Gravity Shift - In the cases of interest at present, the missile c.g. locations are such that the airplane c.g. shifts aft when the store is released. This aft c.g. shift causes a nose-up moment on the airplane making it pitch to a higher angle-of-attack which in turn causes a higher lift and more load factor on the airplane. The reduction of either the c.g. shift or the weight change will reduce this portion of the total incremental load factor. Drops using the autopilot reduce this effect by reducing the pitch-up of the airplane. Addition of the trim compensator would reduce the pitch-up and the incremental load factor even more than the autopilot.

3. Aerodynamic Interference From Missile - The exact interference from a given missile can be determined only by wind tunnel test. However, it is felt that the interference for the MB-1 pod, which was used for these studies, will be conservative. The load factor from interference is reduced by decreasing the c.g. travel or the use of the autopilot and/or trim compensator because the interference also causes the airplane to pitch up.

4

EFFECT OF MISSILE RELEASE ON AIRPLANE RESPONSE

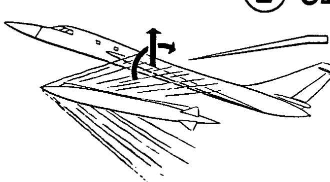


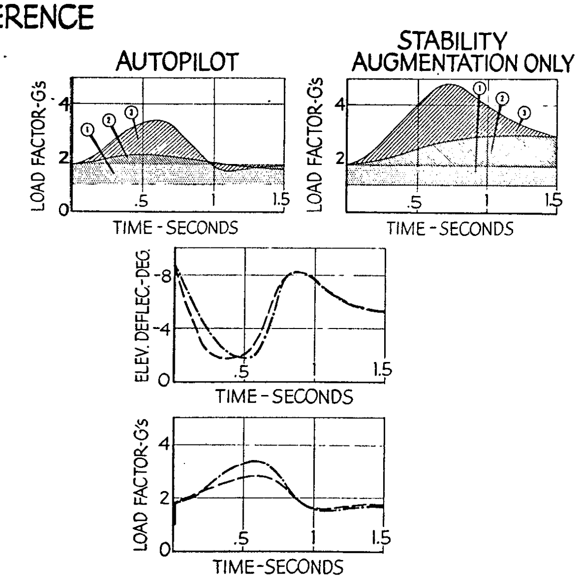
FACTORS AFFECTING RESPONSE:

(1) DIRECT WEIGHT CHANGE

(2) CENTER OF GRAVITY SHIFT

(3) AERODYNAMIC INTERFERENCE FROM MISSILE





TRIM COMPENSATION DEVICE

- PUTS IN STEP ELEVATOR TRIM CHANGE TO REDUCE AIRPLANE ROTATION
- REQUIRES INCORPORATION OF A TRIM COMPENSATOR SERVO OR ···

  A STEP SIGNAL TO AUTOPILOT IF DROPS ARE MADE ONLY ON AUTOPILOT. THIS IS EASIER BUT WILL ALSO PUT IN A STEP STICK MOTION.

-·-·— AUTOPILOT
---— AUTOPILOT +6° TRIM COMPENSATOR

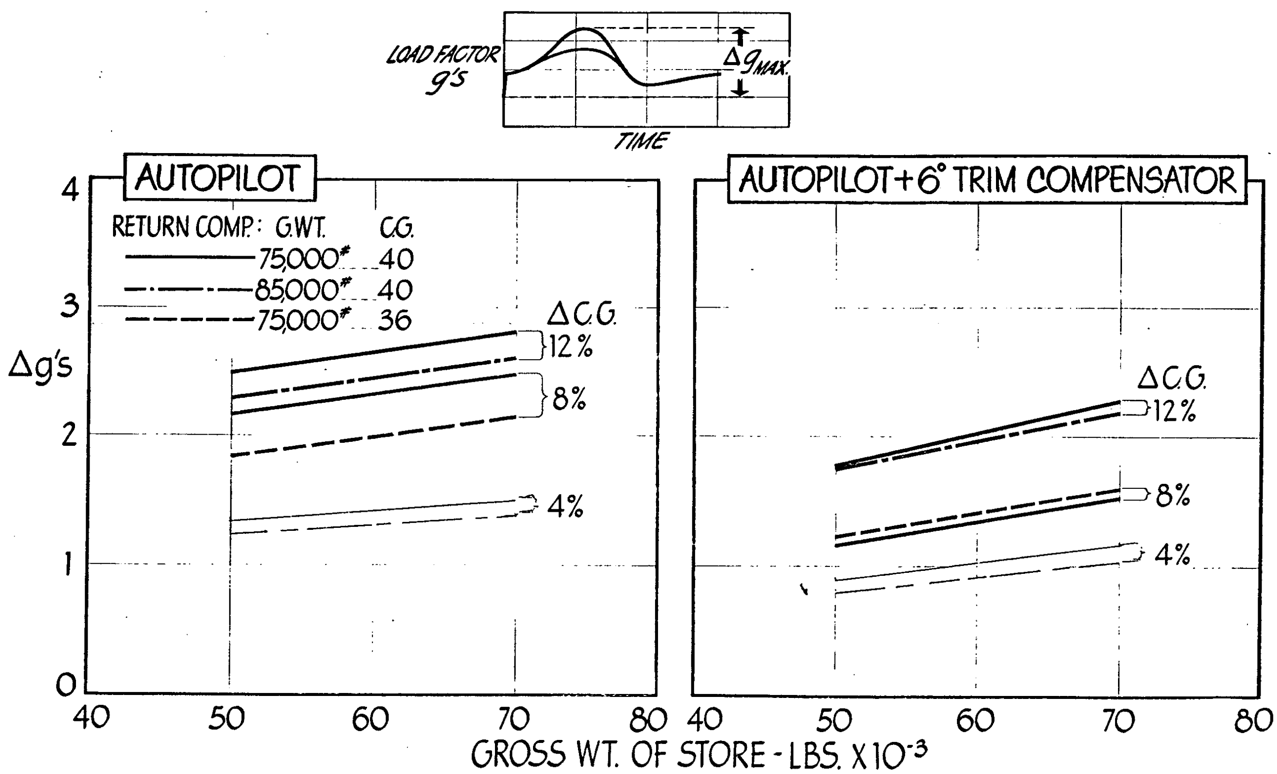
LO 0737
21 MAR 62

EFFECT OF STORE SIZE ON AIRPLANE RESPONSE

The chart on the opposite page can be used for determining the approximate incremental load factor for dropping various weight stores from the B-58. The curves show the effects of the weight of the return component, the weight of the store dropped, the c.g. shift, and the c.g. location of the return component. Both curves show that the most important factor in determining the incremental load factor is the c.g. shift. Addition of the trim compensator reduces the incremental load factor considerably and would be very desirable for large c.g. shifts. If the c.g. shift can be kept to about 4 percent or less, then the c.g. of the return component could probably be moved forward, reducing the incremental load factor even more and possibly eliminating the need for the trim compensator.

EFFECT OF STORE SIZE ON AIRPLANE RESPONSE

M=2.0 AT 45,000 FT. ALT.



B-58A AIRPLANE TAKE-OFF AND LANDING CHARACTERISTICS

The take-off and landing performance shown on the opposite page is applicable to all configurations of the B-58 and is based upon flight test.

TAKE-OFF

Normal operation calls for use of maximum afterburning power. These data are based upon rotation of the aircraft to approximately 10-1/2° deck angle (waterline-to-ground) at 150 knots before attaining lift-off speed. It should be noted that the unstick speeds are selected so as to ensure a one-engine out climb capability of at least 300 fpm. The tire limit speed shown (233 kts. TAS) is the maximum presently allowable for repeated operation.

Critical field lengths presented are indicative of field lengths required for operation.

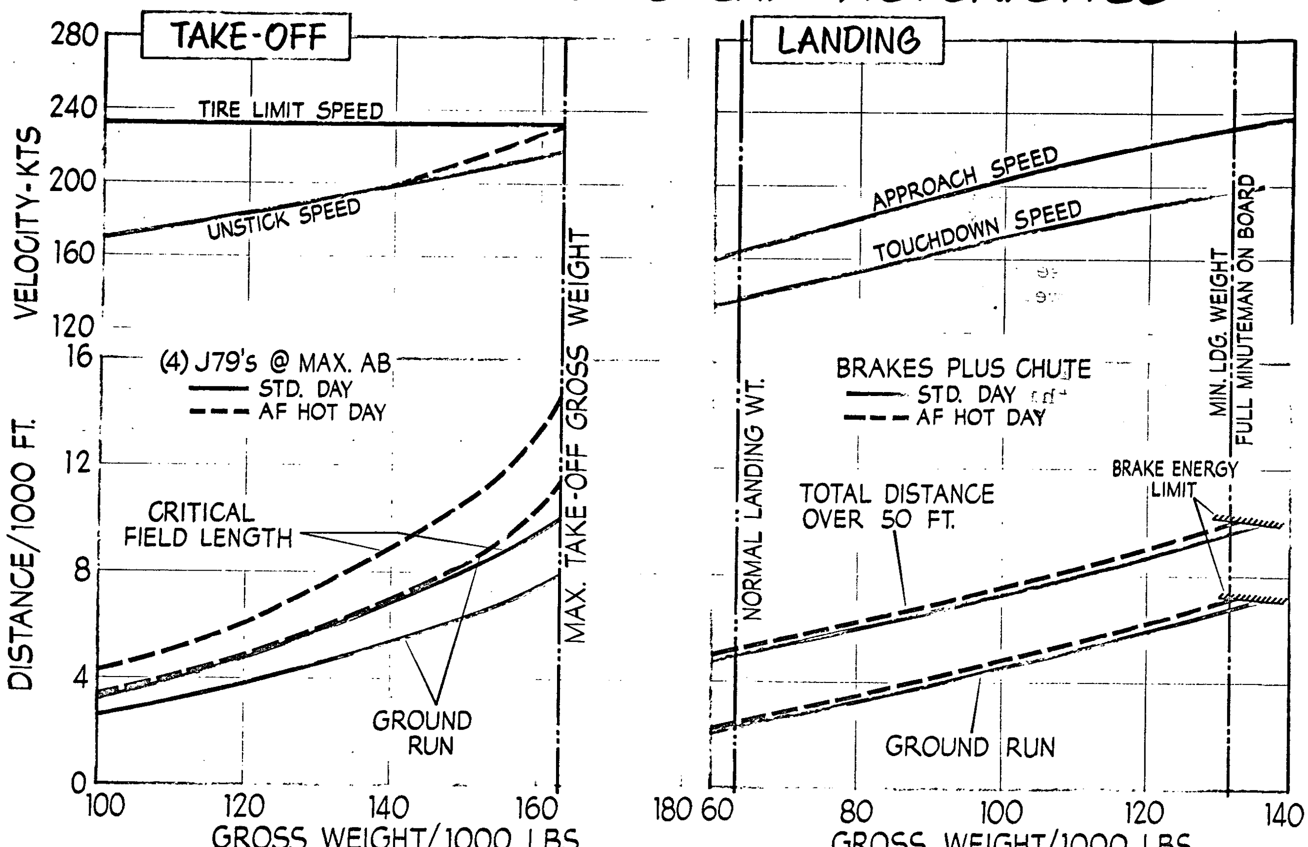
LANDING

Landing performance is presented for weights ranging from normal landing to the maximum allowable weight due to the brake energy limit.

The approach (flare) speeds are based on an 11° deck angle (approximately the maximum for adequate runway vision) along a 3° glide path. Normal landing touchdown speeds are based on an 11° deck angle. Five seconds after touchdown the nose gear is brought into contact with the runway; the drag chute is deployed; and full braking is applied to stop.

B-58A AIRPLANE

TAKE-OFF AND LANDING CHARACTERISTICS



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AD 0740
21 MAR 62

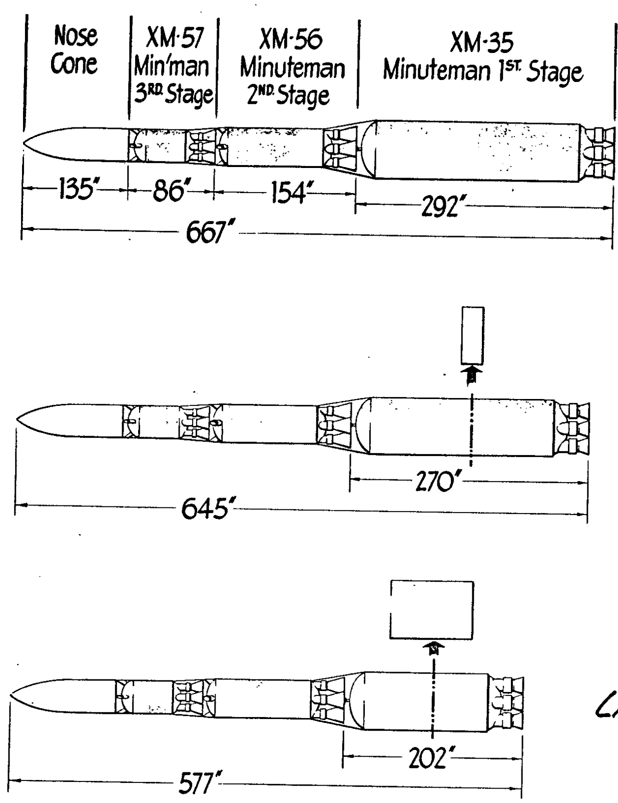
SPECIFIC MISSILES CONSIDERED

The results given in the preceding charts provide the basis for evaluating any given missile installation. They also indicate that a number of factors must be considered so that it is difficult to specify "maximum" missile weights or sizes. The general capabilities can be illustrated, however, by considering a specific family of missiles in which only one parameter is varied such as shown in the chart on the following page. Here the Minuteman missile with an arbitrary nose cone is used as the basic vehicle and the overall length (and weight) is varied by changing only the first stage as indicated.

The smallest of these missiles was selected as being about the largest in this family which could be accommodated with "minimum" airplane modifications (as defined in a subsequent chart). The second missile represents approximately the largest of the family that can physically be accommodated on the present B-58A, and the largest is the full Minuteman. The airplane modifications required in the latter cases are defined in later charts.

It should be pointed out that the limits defined are appropriate to this specific family only and that a different missile configuration might result in either higher or lower weight limits.

SPECIFIC MISSILES CONSIDERED



LAUNCH WT. - 68,000 LBS.

LAUNCH WT. - 63,600 LBS.

LAUNCH WT. - 51,300 LBS.

AD 0739
21 MAR 62

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EXISTING B-58 A WITH 51,300# MISSILE

AD 0742
21 MAR 62

MISSILE INSTALLATION AND AIRCRAFT MODIFICATION

51,300-POUND MISSILE

The 51,300-pound missile represents about the largest vehicle of this type that can be carried by the basic B-58 without making structural modifications to the airframe, or unduly restricting the operation. Only four basic modifications have to be made to the airplane. These modifications are summarized as follows: (1) addition of a trim compensator to the autopilot, (2) incorporation of the wing heaviness fix, (3) installation of the necessary missile launch computer and associated equipment, and (4) addition of another attach point between the airplane and missile pylon.

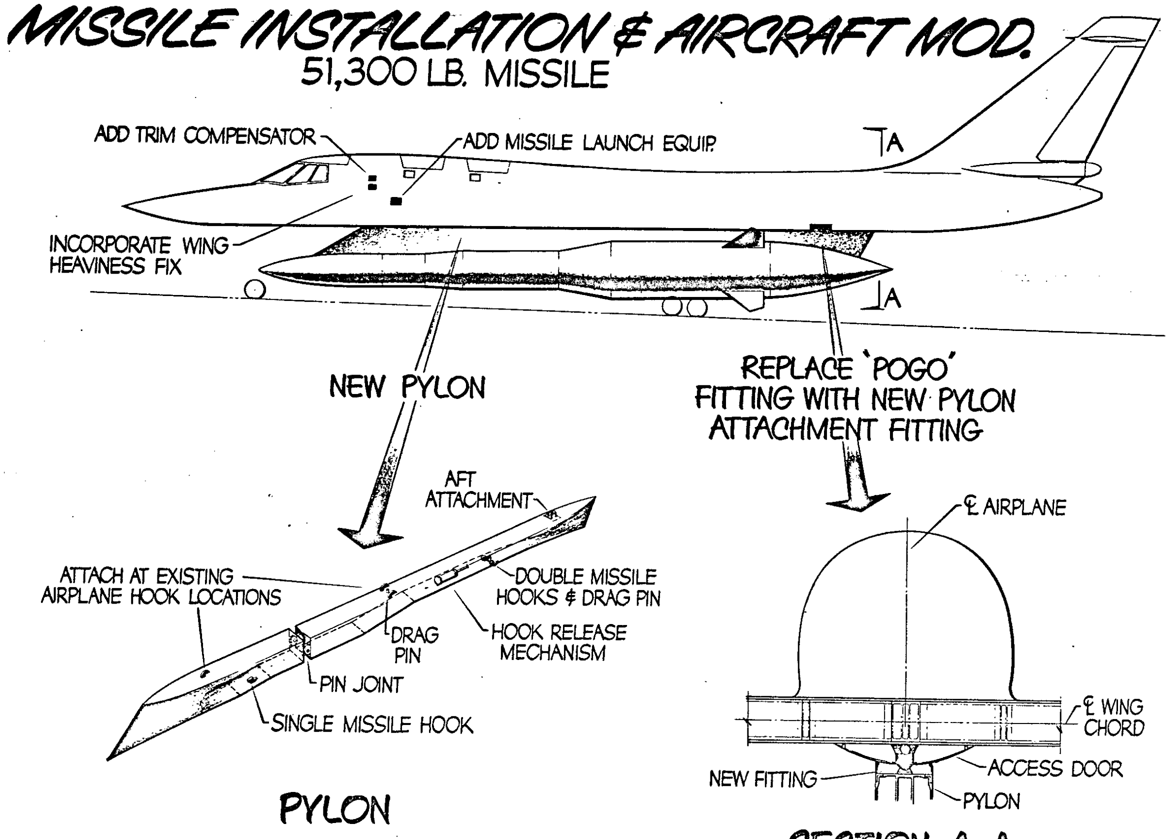
The trim compensator and wing heaviness fix have been described on previous charts.

Missile launch equipment may be installed within several available equipment areas and space can be made available on the second crew station panel for necessary controls. The missile release system will be integrated with the present bomb pod release system. Specifics of this system would depend on the particular application.

The additional pylon attach point needs only to provide vertical and lateral support to the pylon (single-pin joint attachment) and can be provided by simply replacing the present fuel pod release (Pogo) fitting with a new fitting to which the pylon is bolted. The new fitting can be made interchangeable with the present fitting and no other modifications are necessary.

The pylon will be designed as a missile support and adapter to the airplane. It will be fabricated in two parts joined with a pin joint as shown on the chart so that deflections of the airplane structure will have no effect on the magnitude of the vertical loads at the three attach points to the airplane. The present design for the pod hooks and release mechanism, modified as necessary for installation, will be used for missile attachment to the pylon.

The cost of these modifications (not including the launch computer and associated equipment) would be approximately $120,000, about half of which is for the new pylon. These modifications could be installed in an existing airplane in about two months.



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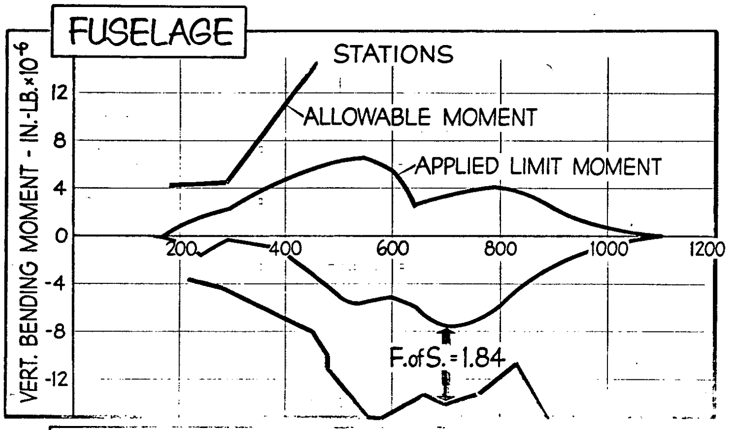
AD 0743
21 MAR 62

STRUCTURAL COMPATIBILITY

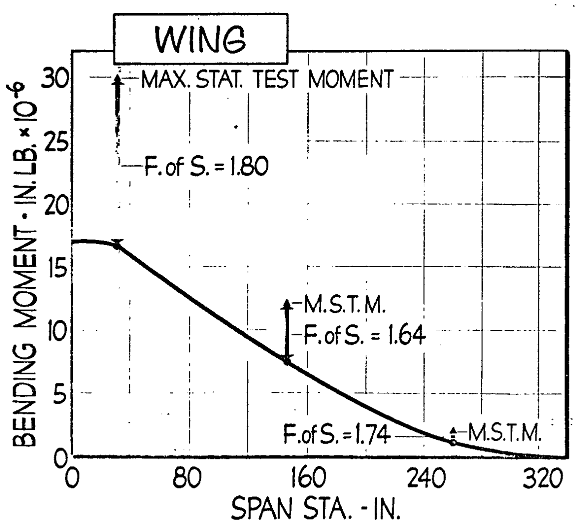
(52,000-POUND STORE)

This chart shows the effect of hanging a 52,000-pound store under the B-58A. It should be noted that the fuselage and wing overall strength has not been compromised since both show a factor of safety in excess of 1.5. The pylon attachment to the fuselage shows a factor of safety of 1.33 at Station 600 for an unsymmetrical condition. This load is produced by the rolling moment induced by two rather unlikely conditions, sudden engine failure and hardover rudder. The reason why these are considered unlikely is that the center of gravity must be on the aft limit while flying at the most adverse altitude and Mach number at the instant of failure. Since the stability center of gravity limits for this configuration are forward of the center of gravity used in this analysis it is very questionable if this load could actually be achieved. If more detailed analysis indicates that it is desirable to alleviate this condition at Station 600, it is a simple matter to redesign the fitting at Station 847 to accept rolling moments. This change is proposed for the two heavier stores.

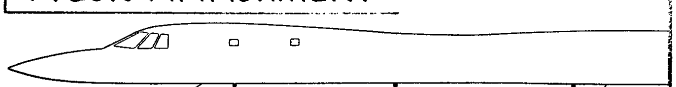
STRUCTURAL COMPATIBILITY-52,000 lb. STORE



$$\text{F. of S.} = \frac{\text{ULTIMATE STRENGTH}}{\text{APPLIED LOAD}}$$



PYLON ATTACHMENT



	STA. 385	STA. 600	STA. 847
ULTIMATE ALLOWABLE STRENGTH	Vert. = 76,000 lb. Side = 33,018 lb.	Vert. Sym. = 140,000 (2 hooks) Vert. Unsym. = 126,000 (1 hook) Side = 54,000 Drag = 63,300	Vert. = 40,000 Drag. = 52,000 Side = 15,300
APPLIED LOADS	Vert. 24,400 Side 8,190	Vert. Sym. = 54,600 (2 hooks) Vert. Unsym. = 95,000 (1 hook) Side = 7000 Drag = 41,500	Vert. = 25,000 Side = 7910
MIN. F.S.	3.04	1.33	MODIFIED

AD 0744
21 MAR 62

WEIGHT-BALANCE AND STABILITY LIMITS

51,300-POUND MISSILE

The chart on the following page illustrates the composite balance characteristics with the 51,300-pound missile as compared to the return component. Also shown are the stability and control limits which are of particular importance here. These are the composite forward limit and the line designated as the "aft drop limit."

The latter is simply the trace of composite conditions which correspond (after missile release) to the return component aft limit. Thus, missile release must occur forward of the "aft drop limit" in order that, after separation, the return component c.g. is forward of its aft limit. Composite flight may, however, be aft of this line.

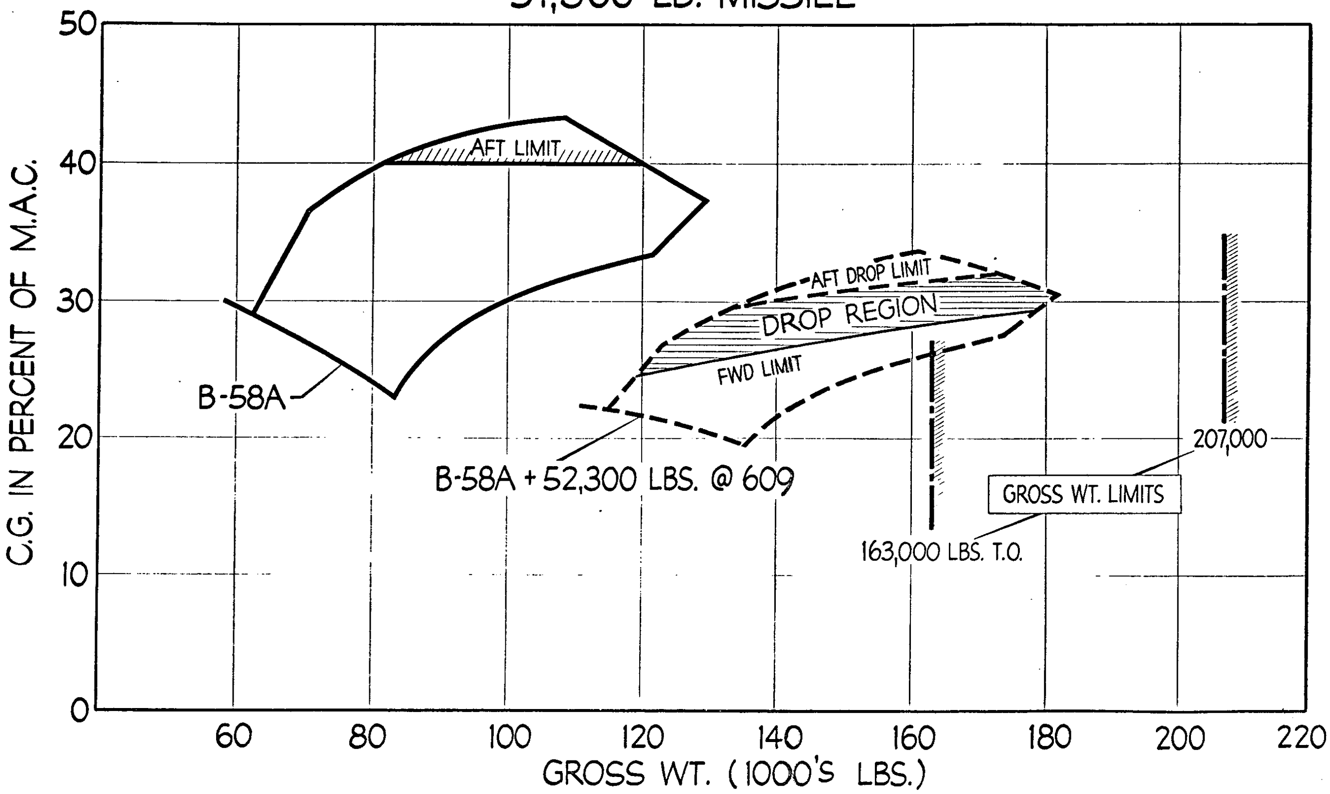
The forward limit is pertinent for two reasons. First, it must, of course, be forward of the "aft drop limit" in order that suitable drop conditions (drop region) can be achieved. Secondly, it defines the minimum composite gross weight (about 120,000 pounds in this case) and, hence, can affect airplane mission performance by limiting the amount of fuel which can be burned supersonically. It is for these reasons that it is desirable to incorporate the "wing heaviness fix" (discussed earlier) and permit more forward c.g. locations.

Another factor pertinent to the present application is the shape of the composite balance envelope on the high c.g. side. Normal practice is for supersonic flight to be conducted at a constant c.g. of 33% MAC. When the gross weight decreases to the point where the 33% line intersects the balance envelope, the c.g. must then shift forward along this aft physical limit. This results in increased static margin, hence requiring increased trim and, correspondingly, increased trim drag. This also represents an airplane performance penalty.

Also noted on the chart are the maximum gross weights (structural limits) at take-off (163,000 lb.) and in flight (207,000 lb.). As shown, full in-flight refueling can be accomplished in this case (182,000 lb.).

WEIGHT-BALANCE & STABILITY LIMITS

51,300 LB. MISSILE



AD 0745
21 MAR 62

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Approved For Release 2001/08/28 : CIA-RDP66B00762R000100120001-0

EXISTING B-58 A
WITH 63,600# MISSILE

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AD 074R
21 MAR 62

Approved For Release 2001/08/28 : CIA-RDP66B00762R000100120001-0

MISSILE INSTALLATION AND AIRCRAFT MODIFICATION

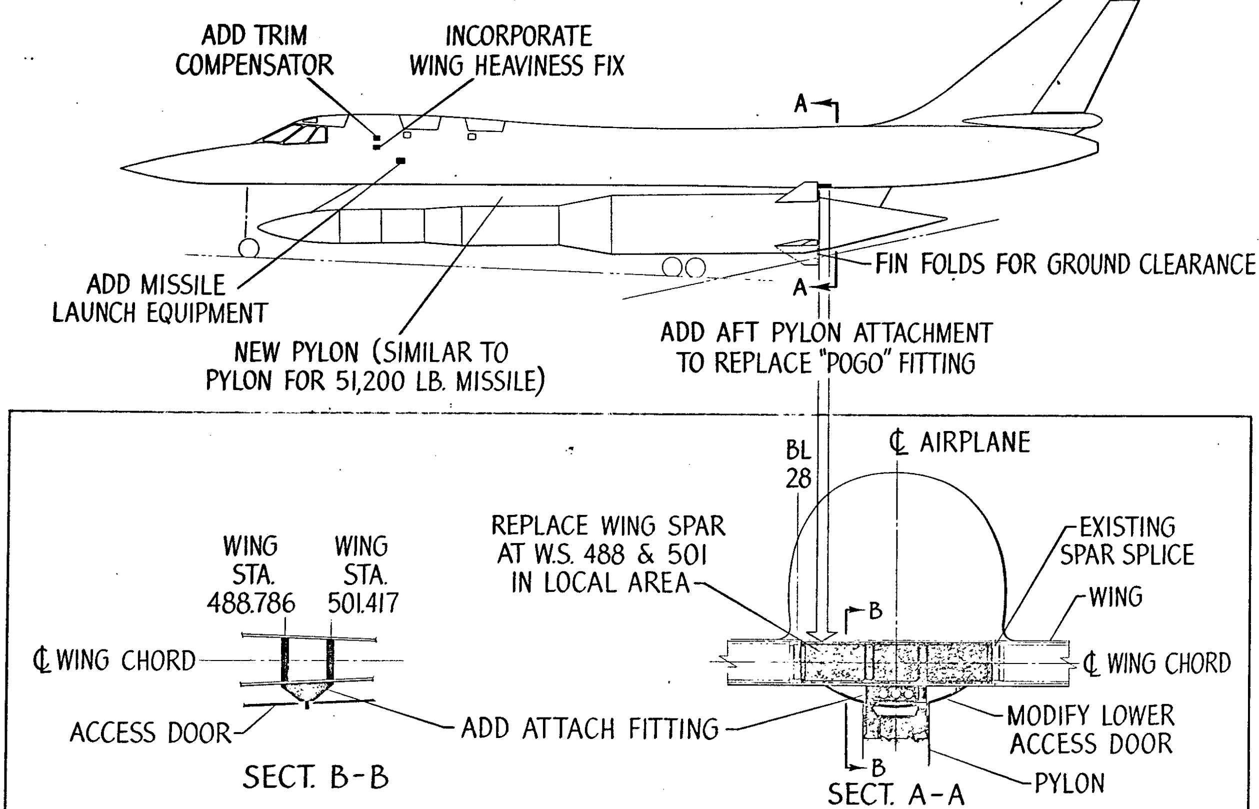
63,600-POUND MISSILE

The 63,600-pound missile is approximately the largest vehicle of this family which can be physically accommodated by the B-58 airplane. Modifications to the airplane are the same as those required for the 51,300-pound missile with the exception of the aft attachment of the pylon to the airplane. For the heavier missile it is necessary that this aft attachment be capable of reacting not only higher vertical and side loads but also a portion of the moment due to lateral inertia loads of the missile. Also, the wing spars fore and aft of the attachment must be strengthened in the local area and designed to accommodate the new pylon attachment fitting. The changes required are indicated in the chart on the following page.

The cost to make these modifications to an existing B-58 (excluding the missile launch computer and associated equipment) would be approximately $180,000 and would require about three months. Thus, the additional cost beyond the "minimum" changes for the 51,300-pound missile is slight.

MISSILE INSTALLATION & AIRCRAFT MODIFICATION

63,600 LB. MISSILE



AD 0749
21 MAR 62

STRUCTURAL COMPATIBILITY

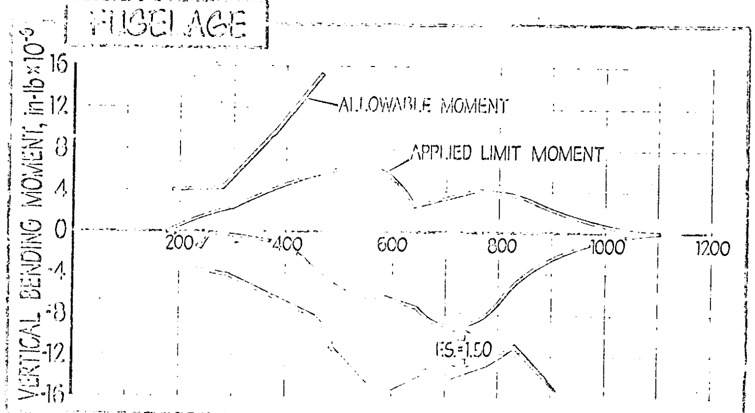
(64,000-POUND STORE)

As shown on the chart to the right, the overall wing and fuselage strength are adequate to accept the 64,000-pound missile without change. Rolling moments are taken by the fitting at Station 600 and at Station 847. This arrangement precludes the need for any changes to the hooks at Station 600.

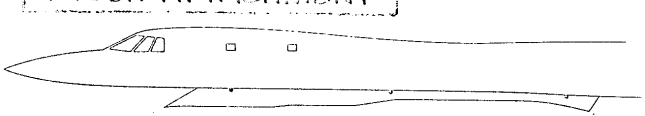
The load capacity of the drag pin at Station 600 is inadequate for a safety factor of 1.5. Although a positive factor of 1.24 exists without any change, it is possible to increase this factor to 1.5 with minor reinforcements in this area. It should be noted that this maximum drag condition occurs only under emergency ground conditions.

STRUCTURAL COMPATIBILITY [illegible]

FUSELAGE



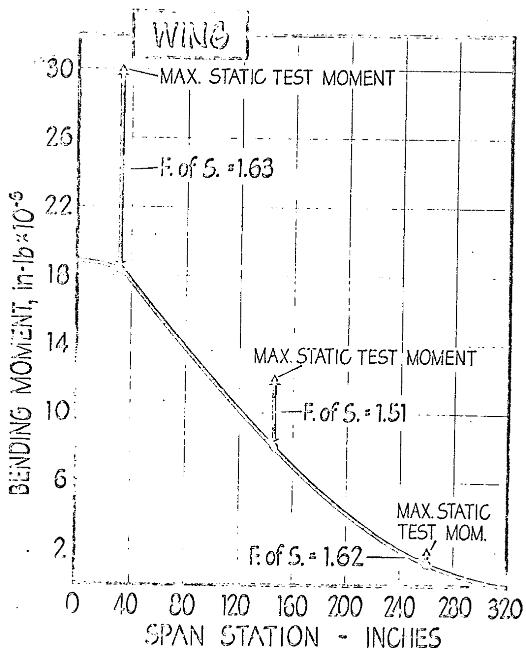
PYLON ATTACHMENT



	STA. 385	STA. 600	STA. 847
ULTIMATE ALLOWABLE STRENGTH	Vert....76,000 lb.	Vert.Sym.......140,000 (2 Hooks)	Vert....40,000
	Side....33,018 lb.	Vert.Unsym...126,000 (1 Hook)	Drag....52,000
		Side....54,000	Side....15,300
		Drag....63,300	
APPLIED LOADS	Vert....29,200 lb.	Vert.Sym.......49,800 (2 Hooks)	Vert. Sym. (2 Hooks)..49,000
	Side.......9,860 lb.	Vert.Unsym....34,450 (1 Hook)	Vert. Unsym.(1 Hook)..97,900
		Side....4,910	Side....13,700
		Drag....51,100	
MIN. F.S.	2.60	1.24	MODIFIED

$$F \text{ of } S = \frac{\text{ULTIMATE STRENGTH}}{\text{APPLIED LOAD}}$$

WING



AD 0750
21 MAR 62

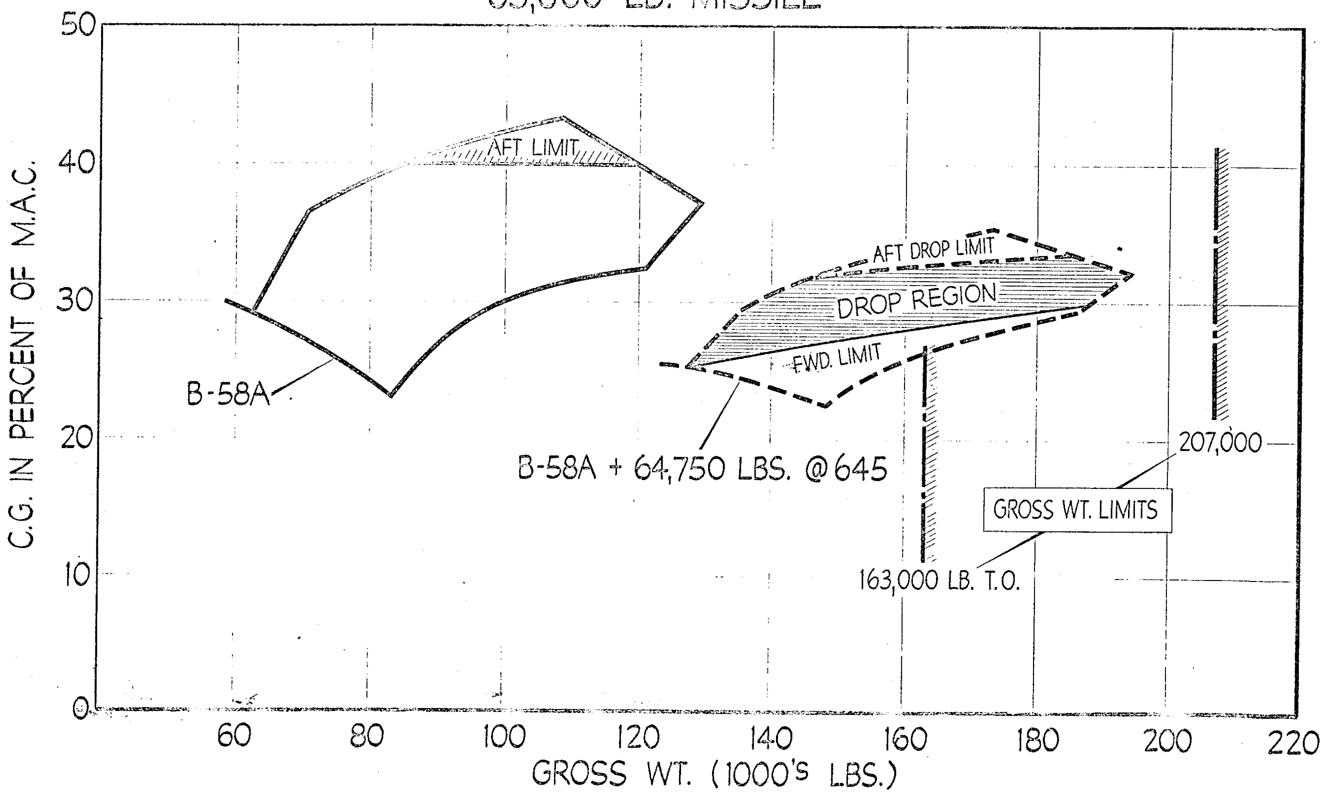
WEIGHT-BALANCE AND STABILITY LIMITS

63,600-POUND MISSILE

The previous discussion relative to the 51,300-pound missile configuration also applies here. The significant difference being that the composite balance envelope is shifted to the right due to the increased missile weight and its required location on the airplane.

WEIGHT-BALANCE & STABILITY LIMITS

63,600 LB. MISSILE



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STRETCHED B-58A WITH 68,000# MISSILE

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MISSILE INSTALLATION AND AIRCRAFT MODIFICATION

68,000-POUND MISSILE

The 68,000-pound missile is too long for installation on the basic B-58 airplane; however, versions of the B-58 with increased fuselage length and increased distance between the nose and main gear have been extensively studied in the past. These models had 60-inch forward fuselage extensions, and certain versions had modified tail cones, larger fins, etc. Considerable wind tunnel testing and detail design work was performed on these airplanes, particularly the "B" model. Therefore, a selection of basic airframe modifications studied in the past was made to create an airplane compatible with the 68,000-pound missile. These changes are indicated on the chart on the opposite page.

Although a 22-inch fuselage extension would be physically adequate to accommodate the missile, it is more desirable to utilize the design work previously accomplished for a 60-inch extension. This extension would be made by disconnecting the fuselage nose at an existing bulkhead and splicing in a new 60-inch long section. Aft of the new section the fuel tank area would be reworked to properly fair the upper contour. The volume in the extension would be utilized for additional fuel.

To maintain proper airplane balance the present tail cone containing the gun and fire control system would be replaced with a new tail cone containing fuel. Refairing and structural modifications to the area just forward of the tail cone would be necessary.

An increase in vertical fin area may be required for directional stability because of the forward fuselage extension. This would be accomplished by increasing the area of the leading edge and tip of the fin without modifying the basic structure. Such a tail has been designed and fabricated in the past in connection with the basic B-58 program.

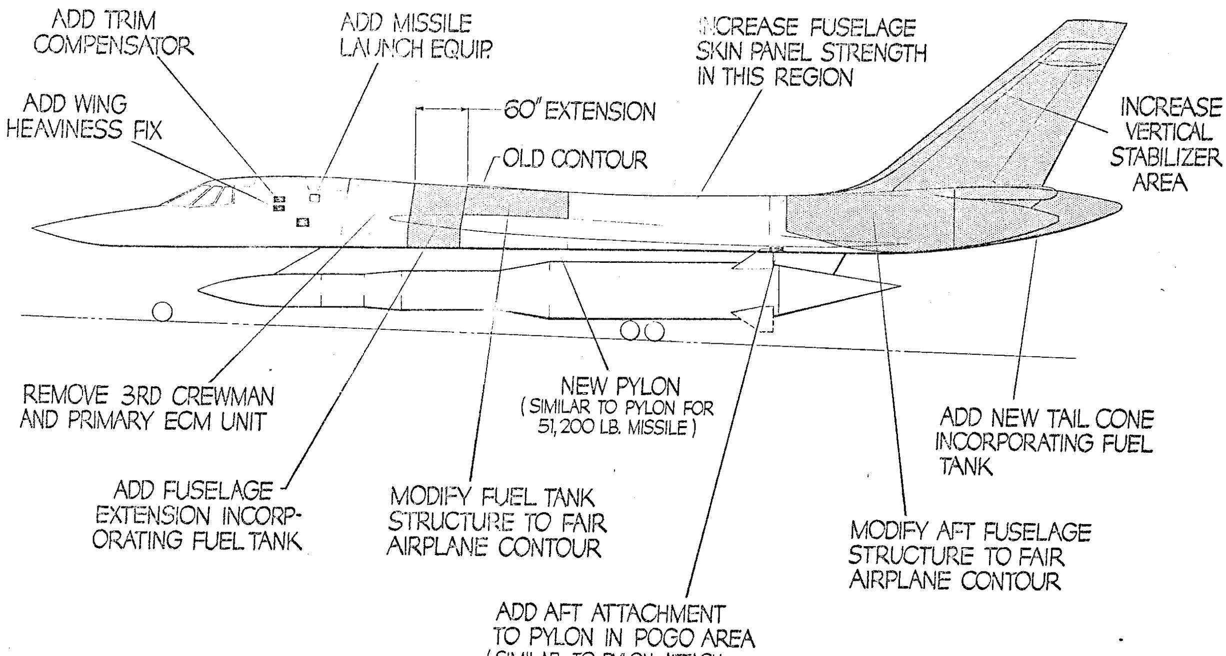
The third crewman, his escape capsule, and the primary electronic countermeasures equipment would be removed to improve airplane balance.

Other changes to the airframe and equipment would be similar to those described for the 63,600-pound missile installation on the basic B-58.

The cost of making these modifications to an existing B-58 (not including the missile launch computer and related equipment) would be approximately $1,500,000. About two-thirds of this cost is for increasing the fuselage length. These modifications would require about nine months to complete.

In view of the small increase in weight permitted over the 63,600-pound missile, this modification is not particularly attractive for the present missile family; however, it should be noted that with these modifications about 40 inches additional length can be accommodated above the largest missile in this family.

MISSILE INSTALLATION & AIRCRAFT MODIFICATION
68,000 LB. MISSILE



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STRUCTURAL COMPATIBILITY

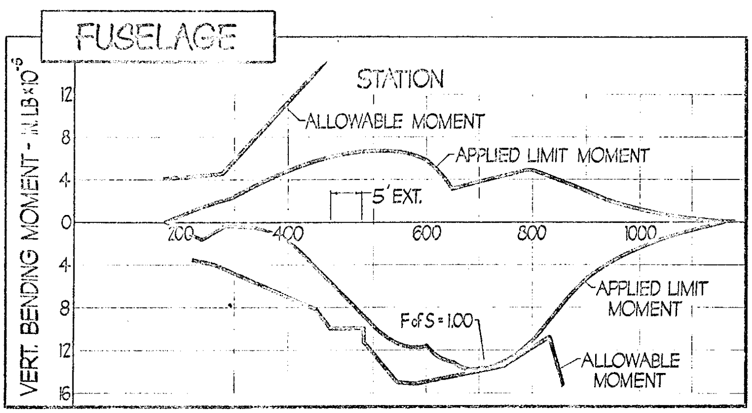
(70,000-POUND MISSILE)

The chart on the right depicts the effect of hanging a 70,000-pound store on the existing B-58A. The only modification made for this analysis was the change to the fitting at Station 847 to accept vertical and rolling loads. The effect on the various components is quite apparent. The wing shows factors of safety below 1.5; however, this should not be too alarming since by simply reducing the maneuver load factor from 2.0 to 1.8 a safety factor of 1.5 can be obtained. It should also be noted that the need for this maneuver reduction occurs only at the extreme gross weight after refueling. This is common practice in many operational aircraft.

In the case of the fuselage, fairly extensive reinforcements are necessary to obtain a safety factor of 1.5. Between Stations 470 and 850 it will be necessary to increase the thickness of the fuselage skins to withstand the increased shears and moments. Although the area covered by this reinforcement appears large it is not a difficult job and would not require new tools. Changes due to the 5-foot fuselage extension and the addition of the tail tank have been shown in a previous chart. The drag pin at Station 600 should also be changed due to excessive loading during emergency stops on the ground.

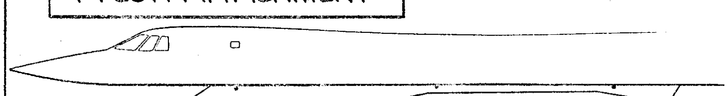
STRUCTURAL COMPATIBILITY - 70,000 LB. STORE

FUSELAGE



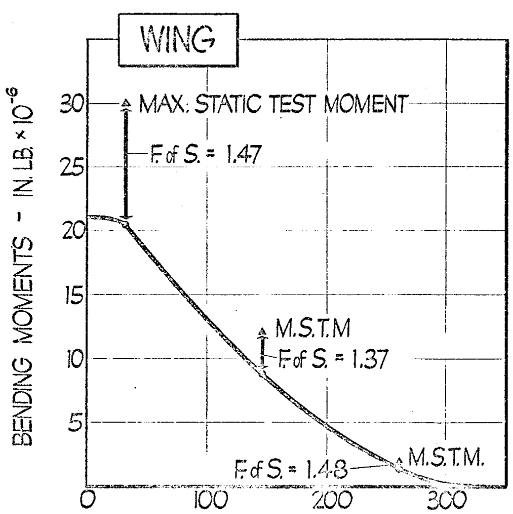
$$F \text{ of } S = \frac{\text{ULTIMATE STRENGTH}}{\text{APPLIED LOAD}}$$

PYLON ATTACHMENT



	STA. 325	STA. 600	STA. 847
ULTIMATE ALLOWABLE STRENGTH	Vert. = 76,000 lbs. Side = 33,018 lbs.	Vert. symm. = 140,000 (2 hooks) Vert. unsymm. = 126,000 (1 hook) Side = 54,000 Drag = 63,300	Vert. = 40,000 lbs. Drag = 52,000 Side = 15,300 lbs
APPLIED LOADS	Vert. = 32,100 Side = 9500	Vert. symm. = 52,300 (2 hooks) Vert. unsymm. = 36,600 (1 hook) Side = 6500 Drag = 56,000	Vert. symm. = 55,600 (2 hooks) Vert. unsymm. = 107,800 (1 hook) Side = 14,800
MIN. F.S.	2.36	1.13	MODIFIED

WING



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WEIGHT-BALANCE AND STABILITY LIMITS

68,000-POUND MISSILE

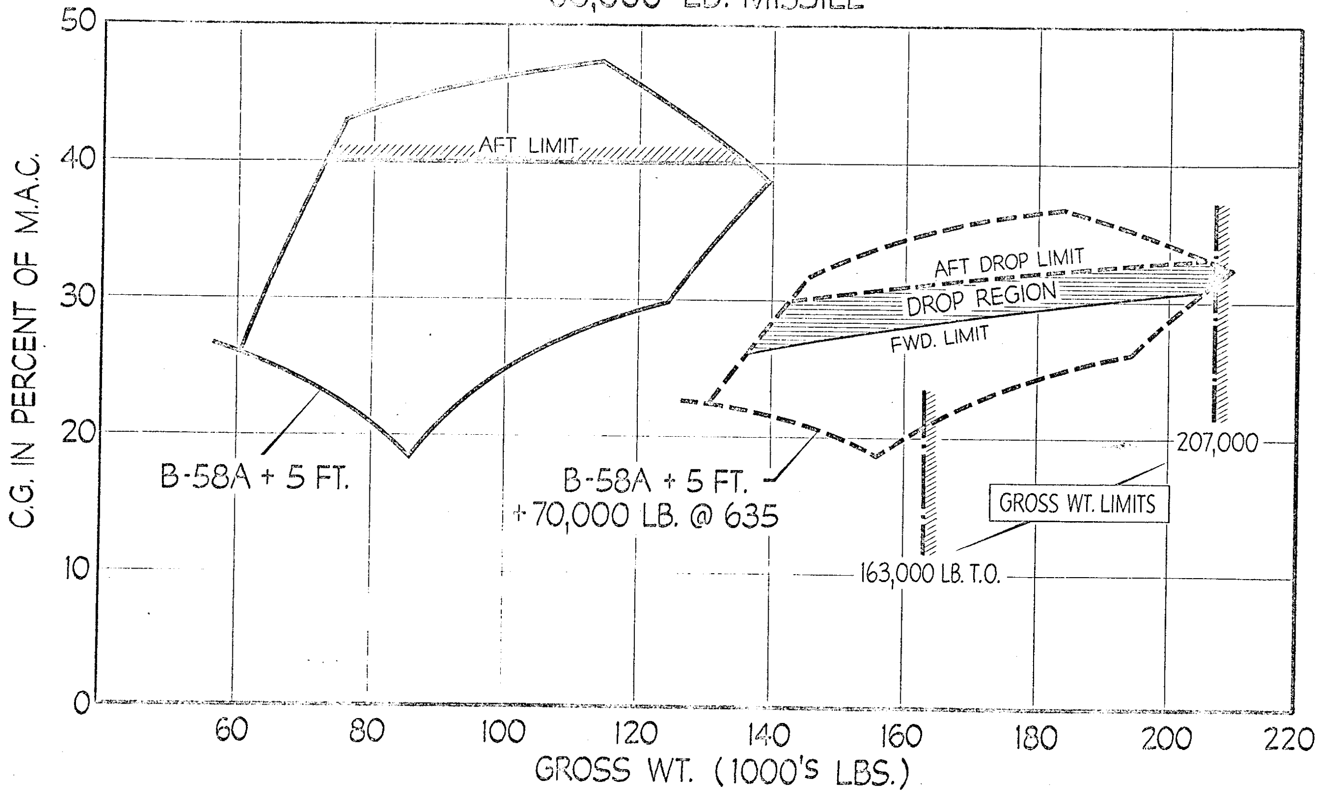
In general, the discussion relative to the 51,300-pound missile applies here also. In this case, however, the return component balance envelope is changed by the addition of the tail fuel tanks, the removal of the third crewman and his station, and the increased fuselage length.

The first two changes mentioned were both incorporated in order to move the c.g. envelope aft and thus permit a greater useable region between the forward stability limit and the aft balance envelope in the composite configuration.

In this case it should be noted that it is not possible to achieve complete in-flight refueling.

WEIGHT - BALANCE & STABILITY LIMITS

68,000 LB. MISSILE



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