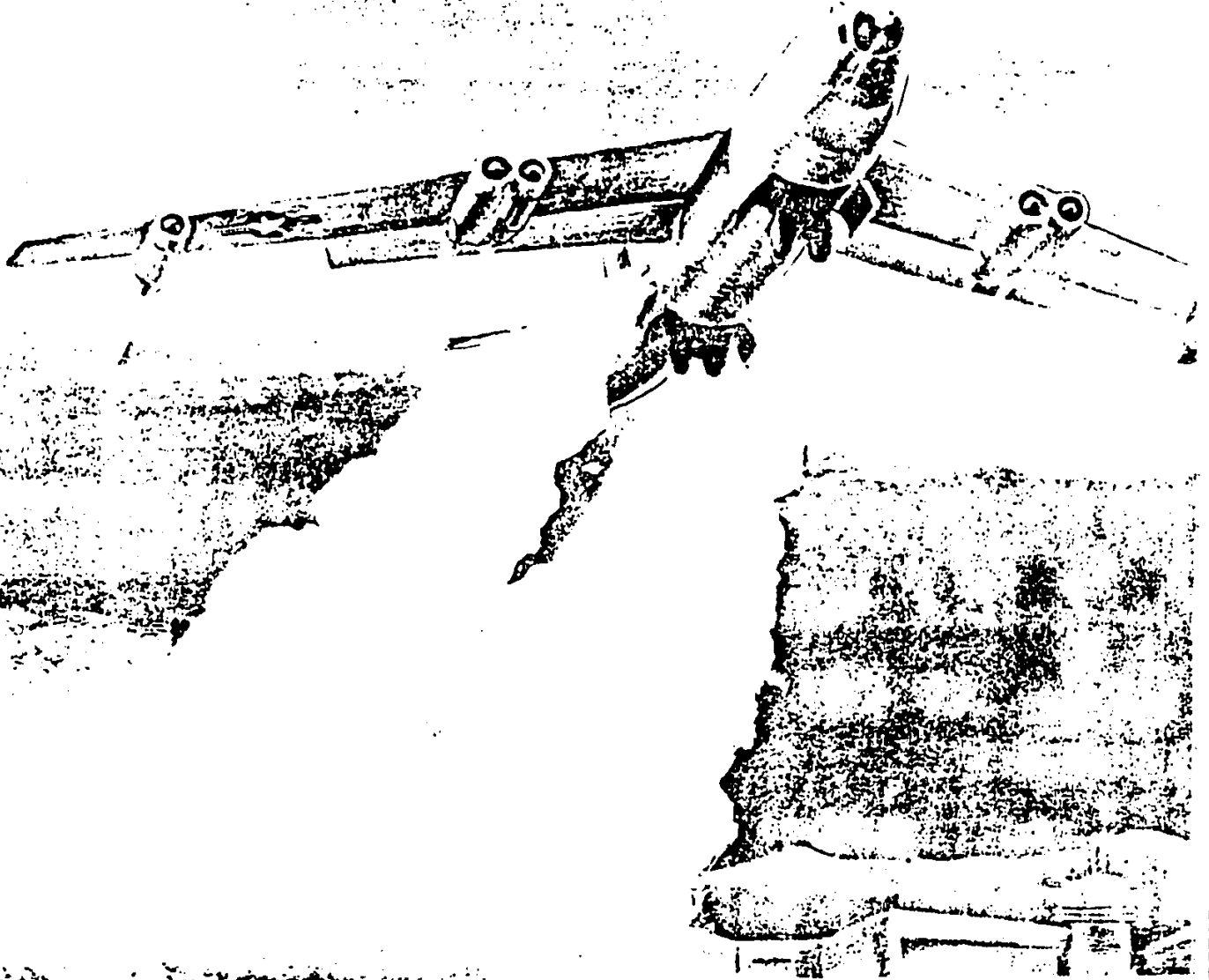


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Commander's Conference

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Strategic Air Command

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12 Feb 57

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HEADQUARTERS STRATEGIC AIR COMMAND
OFFUTT AIR FORCE BASE
NEBRASKA

12 February 1957

Welcome to the SAC Commanders' Conference and to our new Control Center.


This is the first major meeting to be held in our new facility. The beginning of the year 1957 marked the successful end of the first decade of Security through Global Air Power. During this decade, we have developed the first truly long range strategic bomber force with a strike capability unexcelled in military history. This goal has been achieved over many seemingly insurmountable obstacles. Problems were solved through ingenuity, determination and hard work by all of you and in many instances at the expense of personal considerations.

Today, we are faced with retention of this potent strike capability, and at the same time must labor relentlessly to maintain "readiness", develop "alert", and effect "dispersal". The integration of new weapon systems -- the B-52 and KC-135-- and in the near future, the IRBM and the ICBM, will place increasing demands upon all of us. Attendant problems are magnified each day as money, manpower, and material grow scarce and facilities become more crowded.

It now behooves SAC Commanders to extend even further effort towards providing that guidance, discipline and leadership which will

instill pride in the organization we have developed together and which will create within the individual a desire to remain a part of this organization.

This conference is designed to permit the mutual exchange of ideas between all of us, to advise the commanders in the field as to the resources they may expect within the immediate future, and to hear from the commanders any suggestions which they believe may be helpful to my staff and me. I hope you will all feel free to participate accordingly.


CURTIS E. LEMAY
General USAF
Commander-in-Chief

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CONCEPT OF LARGE SCALE EXERCISES AND ROTATIONS

Large Scale Exercises. In view of the increase in the number of combat ready units which will be available during 1958, the execution of 6 large scale exercises will be required instead of 5 which were planned for previous years. These 6 exercises will be conducted during the period September through March FY 58, and will be based on the following ground rules:

a. Each combat ready unit will be scheduled for one overseas readiness exercise during FY 1958.

b. Will consist of homogeneous EWP forces that will saturate particular tanker task forces and forward area bases. Each numbered Air Force will normally be scheduled for 2 major exercises during the period September through March. Exceptions may be required for individual units to participate in other exercises in order to maintain a homogeneous force in keeping with FY 58 Emergency War Plans.

c. Exercises to be based on maximum realism in keeping with current Emergency War Plans tactics, timing, and support requirements.

d. It is planned that EWP weapons will be carried on all bomber aircraft. Final authority for dispersal of weapons during

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these exercises is presently being negotiated with the Air Staff and Department of Defense.

e. Task force commanders and staffs will be deployed to selected forward areas during the conduct of these exercises.

f. All large scale exercises will be executed and controlled by this headquarters. It is planned that the first major exercise for each numbered Air Force will be executed on a pre-planned basis with timing based on mass penetration of designated H hour control lines. The second major exercise for each numbered Air Force to be executed on minimum notice - non-deployed units to be launched based on current generation rates - deployed units to be launched to meet designated HHCL times.

2. To insure coordinated planning for these exercises, appropriate SAC operations plans will be published for each large scale exercise. These plans to be disseminated to the numbered Air Forces and overseas Air Divisions as soon as possible subsequent to the preparation of the FY 58 Emergency War Plans. Upon receipt of the SAC operations plan, the numbered Air Force and overseas Air Divisions will publish appropriate operations plans and submit to this headquarters, lateral command and subordinate units. These operations plans will subsequently be executed by this headquarters based on the above ground rules. Those exercises to be executed

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on minimum notice will be further coordinated with appropriate agencies to insure that support requirements will be fulfilled on a timely basis. (MATS support airlift, air rescue, enroute base support, etc.). Specific details to insure proper control and support of minimum notice exercises will be coordinated by this headquarters in conjunction with the numbered Air Forces and/or overseas Air Divisions.

3. The major objectives of these large scale exercises are as follows:

a. To realistically test the Emergency War Plans capability of all combat ready units and task force locations.

b. To exercise task force commanders and staffs under actual operating conditions.

c. To exercise forward base facilities and support activities.

d. To test all EWP planning factors and tactics prior to finalizing the FY 59 Emergency War Plans.

Rotational Requirements.

1. Based on initial FY 58 EWP planning, SAC will be required to maintain units on rotation as indicated below:

UK - 1 bomb wing, 5 KC-97 aircraft

Morocco - 1 bomb wing, 15 KC-97 aircraft

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Thule - 15 B-47 aircraft, 20 KC-97 aircraft

Harmon - 20 KC-97 aircraft

Goose - 20 KC-97 aircraft

Eielson - 15 B-47 aircraft . Elmendorf - 15 KC-97 Aircraft

Andersen - 1 bomb wing, 5 KC-97 aircraft

2. Duration and frequency of rotations. To reduce the frequency and cost of rotational requirements with the least disruption to the build-up program, IRAN schedules and other scheduled activities, overseas rotations will be scheduled for 90 day TDY periods. Based on the 90 day rotational policy, all KC-97 squadrons and medium bomb wings would be required to rotate approximately each 18 months to an overseas area. The decision to extend all SAC overseas rotations to 90 days instead of 60 days TDY was based on the following advantages:

- a. Will eliminate 5 bomb wing and 8 tanker squadron rotations.
- b. Will reduce TDY costs approximately \$455,000 annually. (To and from costs for 5 bomb wing and 8 tanker unit rotations).
- c. Will reduce MATS airlift support by approximately 155 round trip sorties to overseas distances.
- d. Will permit greater continuity between rotational requirements and other heavy operational commitments scheduled for FY 58. (Build-up programs, IRAN schedules, unit moves, etc).

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3. This headquarters has under study a proposal for a new concept for meeting rotational requirements which would drastically reduce the period of TDY for aircrew personnel. However, due to the many ramifications of this proposal, it is doubtful that this new concept can be included in the FY 58 rotational plans until a service test is accomplished.

SAC-CONAD JOINT TRAINING MISSIONS

1. Recent discussions between CINCSAC and CINCONAD have resulted in the requirement or need for increased emphasis upon joint training missions. Large scale missions, such as "Texas League" or "Cracker Jack", last year's big SAC-CONAD defense exercise, increase the vulnerable posture of SAC units and the amount of operational data gained is relatively small for such large missions when compared to the effort expended. Small missions of the "Party Line" type - the 376th ECM support mission on the West Coast during last fall - however, have indicated that valuable operational data can be obtained through such relatively small controlled operations.

2. Conflicts have resulted in the past between SAC and CONAD with reference to NIKE participation in joint exercises. In particular, NIKE units refused to admit SAC observers to the sites and

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B-52 "STRATOFORTRESS"

The B-52 is a swept-wing, eight engine, axial flow turbojet, heavy bomber designed to fill SAC's requirement for an intercontinental bombardment and reconnaissance weapon system. Through the use of general purpose capsules, some B-52's can perform photographic, electronic, and weather reconnaissance. Normal crew of six consists of pilot, co-pilot, two bombardier-navigators, ECM operator, and tail gunner.

a. B-52A's, production numbers 1, 2, and 3 are being utilized as permanent test aircraft.

b. B-52B production numbers 4 through 53 have an ECM pod-carrying capability produced at Boeing, Seattle. SAC will receive 49. Present planning indicates that the 6th Bombardment Wing will receive 18 B-52B's from the 93d after Iran. Six more will be transferred direct to the 6th Bombardment Wing and will go into Iran at a later date. The 6th Bombardment Wing will be equipped as follows: 30 B-52D's with ASB-4 Bombing Equipment

18 B-52B's with MA-6 Bombing Equipment

The 93rd Bombardment Wing will be equipped as follows:

25 B-52D's with ASB-4

27 B-52B's of which a portion will continue to support Iran.

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c. The B-52C aircraft are heavy-weight, ECM pod-carrying aircraft and will be based at Westover AFB. A total of 35 B-52C aircraft have been produced at Boeing, Seattle.

d. B-52D aircraft are being produced after production article number 88 at Boeing Airplane Company, Wichita and Boeing Airplane Company, Seattle.

e. The B-52 model improved aircraft (B-52H) will be production number 501 and should become available about October 1958.

Characteristics and Performance

			B-52H	B-52B	B-52C&D
Wing Span	(ft)	185.0			
Length	(ft)	156.6			
Height	(ft)	48.3	41		
Take-off	(lbs)		483,500	405,000	450,000

Status

The impact of accelerated B-52 production will manifest itself in the form of a greater number of wings in being earlier than previously proposed. Nine wings are now scheduled to be equipped by the end of FY 1958 instead of seven wings and the eleven wing program will be realized earlier in FY 1959 than planned.

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CONVAIR B-58

The B-58 is a high altitude, supersonic, delta wing aircraft powered by four J-79-GE engines. The aircraft's small size and high performance capabilities maximize the present state of the art. This weapon system employs the inter-changeable pod concept to provide capability for bombing, missile launching, or specialized reconnaissance.

Four types of pods have been designed for the B-58. The type MA-1 controlled bomb pod will be used as a powered air-to-surface missile. The Type MB-1 free fall bomb pod is to be utilized as a conventional bomb. The type MC-1 photo reconnaissance pod will be used for obtaining photographic data. The type MD-1 ferret-reconnaissance has been designed for use in gathering electronic information.

Following is a brief description of the characteristics of the B-58 as well as some performance data on the aircraft:

WING SPAN	56 feet, 10 inches
FUSELAGE LENGTH	96 feet, 9 inches
MAX TAKEOFF GROSS WEIGHT	158,000 pounds

Carrying a 10,000 pound bomb and employing a dash radius of 500 NM the B-58 has the following combat radius:

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(Altitude approximately 55,000 feet and speed Mach 2)

Unrefueled	1750 NM radius
Refueled with KC-135	3200 NM radius

(At approximately 2500 NM)

The first flight of the B-58 occurred in November 1956 and as of 7 January 1957, the aircraft completed eight preliminary test flights. All flights at that time were conducted using the return component (without pods). Flight altitudes of 35,000 feet were reached and speeds of Mach 1.31 were attained.

The test program will include maximum speed tests on the return component as well as the pods and will include drop tests on the pods at subsonic and supersonic speeds. The Bomb/Nav equipment to be installed in later aircraft will be stellar inertial type manufactured by the Sperry Gyroscope Company. The B-58 utilizes a 20 MM Gatling gun as armament and has a very limited passive defense capability.

Present Air Force contracts call for the production of 13 test aircraft. The production of additional aircraft for the inventory has not been negotiated at the present time. If a decision is made by April 1957 to buy the B-58 for the inventory, the first production model will become available in April 1959 and first wing strength of 50 aircraft can be attained in March 1960.

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SAC position. Due to the limited range and defensive capability of the B-58, SAC has not endorsed the program. The program is being closely monitored by representatives from this Command.

CONVAIR B-58 GROWTH VERSION

Convair Division of General Dynamics Corporation is presently studying a Growth Version of the B-58. This aircraft will have the same general characteristics of the B-58. Increase in fuselage length and re-design of the wing will constitute the major changes in the configuration.

Following is a brief description of the characteristics of the Growth Version which has been UNOFFICIALLY presented to this headquarters:

WING SPAN	62 feet
FUSELAGE LENGTH	106 feet, 9 inches
MAX TAKEOFF GROSS WEIGHT	185,170 pounds

Carrying a 10,000 pound bomb and employing a dash radius of 500 NM the Growth Version has the following combat radius:

Unrefueled radius	2550 NM radius
Refueled with KC-135	4250 NM radius

(at approximately 3200 NM)

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SAC position: Although the standard B-58 shows little promise as a SAC vehicle the growth version may have a future as an interim follow-on bomber between the B-47/B-52 and WS-110A.

Convair is expected to submit an official proposal to the Air Force in March 1957 concerning the B-58 Growth Version. The performance characteristics of the Growth Version will be based on flight test data secured from the B-58 test program as well as wind tunnel and flight test data secured from the F-102 program. This command will press for an expeditious evaluation of the proposal by ARDC.

WS-110A

The purpose of 110A weapon system is to develop at an early data a strategic bomber force capable of accurate delivery of nuclear warheads over intercontinental distances. Deep penetrations at high supersonic speeds are required for maximum weapons delivery capability. Special weapons delivery by air-to-surface missiles will be included as an alternate load capability.

The performance requirements call for 85% reliability of the entire weapons system. In addition to the reliability requirement, the following performance minimums were listed:

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- a. Unrefueled radius of 4,000 nautical miles (includes 1,000 NM dash).
- b. 60,000 feet minimum target altitude.
- c. 40,000 feet subsonic cruise altitude.
- d. Mach .9 subsonic cruise speed.
- e. Maximum supersonic speed during target dash. (Consistent with the "state of the art" for the time period.)

In addition to the above minimums, the following requirements were listed as desired performance factors:

- a. Extended radius of 5,500 nautical miles, including 2,000 NM dash. (This radius can be achieved through the employment of tanker support if necessary.)
- b. Target altitude of 75,000 feet.

The original requirement calls for delivery of first wing aircraft in 1963.

Although the requirements listed above remain valid, studies have indicated that all of the performance requirements are not attainable unless a significant "break through" in engine development, high energy fuels, and for new design techniques can be realized. As an interim measure, the minimum requirements were therefore reduced to:

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Unrefueled radius of 3,000 nautical miles of which 750 nautical miles would be at combat dash speed and a minimum altitude of 60,000 feet.

Pursuant to the amended minimum requirements, Boeing Airplane Company and North American Aviation Incorporated continued their development studies on WS-110A. The program was placed in Phase I which was to terminate with a mockup of each proposal in the fall of 1957. On 18 October 1956, Hq USAF terminated Phase I of the 110A program. The weapons system was placed in a study category for the remainder of fiscal year 1957. Both airframe contractors have been directed to devote the remainder of fiscal year 1957 to the study and application of high energy fuels, boundary layer control, airframe design for all supersonic flight, and floating or folding wing tips.

The future of WS-110A as a SAC vehicle is contingent upon advances in the state of the art, budgetary allowances available during fiscal year 1958, and the operational feasibility of the B-58 Growth Version.

SAC position: This Command will continue to press for the development and production of either the B-58 Growth Version or an interim WS-110A on a priority immediately below the B-52/KC-135 program. If a B-58 Growth Version is ultimately developed and included in the SAC inventory, this Command will promote the development of WS-110A as a follow-on.

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In the event that SAC receives an interim 110A weapon system, the Command would press for a model improvement program to increase the combat effectiveness of the 110A weapon system.

KC-135 (BOEING)

The KC-135 is a swept-wing, four engine, turbojet aircraft designed to fill SAC's requirement for a high speed tanker to support the B-52 weapon system. The primary mission of the airplane is aerial refueling with a secondary mission of a cargo and/or personnel transport. Aircraft number 46 and up will have provisions for cargo and a "live aboard" capability.

The following is a brief description of the characteristics of the KC-135 as well as some data on the aircraft's performance:

WING SPAN	130.8 feet
LENGTH	134.5 feet
MAX GROSS WEIGHT	Aircraft 1 through 29 - 275,000 lbs., Aircraft 30 and up - 297,000 lbs.
ENGINES	Aircraft 1 through 189 - J-57-P43W, Aircraft 190 on - J-57-P59W
CRUISE SPEED AND ALTITUDE	Mach .8 at 35,000 feet

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MAX SPEED	Mach . 92 at 35,000 feet
OFF LOAD RATE	900 gallons per minute
OFF LOAD CAPABILITY OVER BASE	170,000#
BUDDY RULES	1,500 NM OUT 111,000#
	2,500 NM OUT 65,500#

The first KC-135 flew in October 1956. The first KC-135 will be delivered to SAC in May 1957. Ten tanker squadrons will be equipped with KC-135's by September 1958.

SAC Position: In order to realize a truly intercontinental capability, SAC must promote the procurement of tankers on a 1 . 1 ratio with B-52 aircraft.

F-101A (McDONNELL)

The F-101A is a single-place, transonic fighter powered by two axial-flow J-57 engines with afterburners. This aircraft can deliver special stores against enemy targets utilizing either the low altitude (LABS) or toss bombing techniques.

For a typical long-range mission, the F-101 carries a total of 21,000 lbs of fuel. The A/C has provisions for either the probe and drogue or flying boom type fuel transfer during in-flight

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refueling operations. An in-flight refueling concept has been developed for the F-101A which is known as the "buddy system." A standard F-101A A/C is equipped with a refueler tank containing a folding tube fuel transfer system. With this arrangement one F-101A can transfer fuel in-flight to another F-101 thereby augmenting its radius of action by approximately 50% without utilizing KC type tanker aircraft. This system makes EVERY FIGHTER A TANKER AND EVERY TANKER A FIGHTER.

Performance

Normal cruise speed	.86M
Combat ceiling	51,000
Max level flight speed	1.7M
Time to climb to 45M	2.5 Min
Combat radius w/TX-28 unrefueled	1050 NM
Combat radius w/Buddy refueled	1550 NM
Ferry Range (unrefueled)	2200 NM
Ferry Range (Buddy refueled)	3100 NM

Recently an all weather navigation and strike capability was very successfully demonstrated in this aircraft. This for the first time gives the Strategic Fighter the capability to strike targets under all conditions.

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GAM-63 (RASCAL)

The RASCAL is a supersonic, boost-glide, air-to-surface missile designed for external carriage on the DB-47 aircraft. It is under development by the Bell Aircraft Corporation. RASCAL is powered by a three chamber liquid rocket engine which develops 12,000 pounds thrust. Gross weight at launch is 18,500 pounds. The missile is 32 feet long and its tail span is 16.7 feet. After launch, the missile is boosted to approximately Mach 3 and an altitude of 70,000 feet. From this point, the missile glides toward the target area. When the missile is about one minute away from the target, it begins its 35 degree supersonic dive to the target. It is terminally guided by a Radar-Inertial system developed by Bell Aircraft. The ground return from the unattended search radar in the nose of the missile is transmitted over a microwave link to the carrier aircraft and presented on a PPI scope. From this presentation, the guidance operator in the carrier aircraft identifies the target area. By means of a tracking handle, he places the cross hairs in the target area. This action, through a radio command link directs the missile to the target. RASCAL is designed to deliver a 2,800 pound (2-3 MT) warhead within a 1,500 foot CEP at a range of 90 miles.

There are two squadrons planned for the 321st Bomb Wing at Pinecastle Air Force Base, Florida. The first squadron is

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scheduled to be operational in March 1958. The second in December 1958. Unit Equipment for one squadron is 45 missiles. Recent funding information indicates only 22 missiles in the FY 57 budget. SAC has recommended that in view of the funding situation, only one DB-47/GAM-63 be programmed.

SAC has stated a requirement for a B-52/ASM with the following general characteristics:

Range	350 NM minimum
Speed	2.0 Mach
Altitude	60,000 feet
Warhead	"D" 2.5
CEP	9,000 feet
Available	1960

At the present time, Air Research and Development Command and Hq USAF are engaged in selecting a contractor to develop an air-to-surface missile which will satisfy these characteristics.

Due to the build-up of defenses and subsequent penetration problems, SAC has programmed the B-52/ASM high on our list of priorities for development.

SM-62 (SNARK)

The SNARK is an intercontinental surface-to-surface subsonic

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winged missile under development by Northrup Aircraft. It is zero launched by two solid rocket boosters which operate for 4 seconds. The gross weight including boosters is approximately 60,000 pounds. Its span is 42 feet. Its length 67 feet. The power plant is a J-57 turbo-jet engine. It cruises at Mach .9 for its 5,250 nautical mile flight. It is programmed to deliver a 6,400 pound warhead in its ballistic nose within a 2 NM CEP. Guidance is non-emanating stellar-inertial.

The SNARK is programmed to be deployed on existing Air Force installations in northern US. The first of eight Squadrons (1 wing) is scheduled to be operational in the first quarters of CY 1959. Due to its estimated high vulnerability and questionable reliability, SAC has consistently doubted the value of SNARK. This Command has frequently recommended to the Air Staff that this program be discontinued at the end of Employment and Suitability Testing. Most recent information indicates four squadrons in the SAC inventory by mid CY 1960.

SM-64A (NAVAHO)

The NAVAHO is an intercontinental, supersonic, surface-to-surface canard type missile under development by North American Aircraft. It is vertically launched by liquid Rocket Engines which

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develop 405,000 pounds thrust. The 170,000 pound booster separates from the missile at approximately 60,000 feet at Mach 3.45. The 120,000 pound Navaho is powered by two Wright Ram-Jet engines developing 11,300 pounds thrust each. It is designed to deliver a 6,400 pound warhead (4.5 MT) 5335 NM with a 2 NM CEP. An alternate payload is the 9,000 pound Class "B" warhead (15-20 MT) delivered 5,000 NM with a slight improvement in CEP. Guidance is non-emanating all-inertial. The missile cruises at Mach 3.25. Its flight path is a climb/cruise profile from approximately 57,000 feet to an end cruise altitude of 82,000 feet. The dive-in to the target is near vertical with an impact velocity of about Mach 1.

SAC has consistently supported the development of the SM-64A NAVAHO. Its performance gives every indication that it will have a capability to supplement the manned bomber force. Most recent information indicates the NAVAHO could be operational in the 1962 time period. Unit equipment for the 12 squadron Navaho wing is 144 missiles.

SM-75 (THOR)

The THOR is a single stage, intermediate range, surface-to-surface ballistic missile under development by the Western

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Development Division of ARDC. It is vertically launched by a single Liquid Rocket Engine which develops 150,000 pounds thrust. Gross weight at launch is approximately 110,000 pounds. The missile is 65 feet long and the tank diameter is 8 feet. Since the THOR is a single stage rocket, there is no staging separation problem, however, the stabilized nose cone separates from the tankage section. Final cut-off velocity of 15,000 F/sec (Mach 15) is reached by two 1,000 pound thrust vernier rocket engines. At its apogee, the nose cone is approximately 350 NM altitude. The weapon is designed to deliver a 1 MT warhead 1,500 NM within a 2 NM CEP. Flight time over this distance is 17 minutes. Impact speed is approximately Mach 1. Primary guidance is all-inertial by AC Spark Plug with a back up radio-inertial system by Bell Telephone.

Air Research and Development Command is charged with the responsibility of developing an Initial Operational Capability consisting of one squadron (15 vehicles) by July 1959 and building up to four squadrons by December 1960. Future plans for IRBM indicates three wings in the SAC inventory. The initial wing of IRBM's is planned for deployment to the UK. The intermediate range ballistic missile is low on SAC's priority for development due to its overseas siting locations and its ensuing difficulty in obtaining sufficient strategic warning to launch an attack.

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SM-65 (ATLAS)

The ATLAS is a one and one-half stage, intercontinental, surface-to-surface ballistic missile under development by the Western Development Division of ARDC. It is vertically launched by Liquid Rocket Engines which develop 360,000 pounds thrust. Gross weight at launch is 243,000 pounds. It is 81 feet long and the tank diameter is 10 feet. At approximately 2 minutes after launch and 30 miles altitude, the half stage containing two booster engines is separated. A 60,000 pound thrust sustainer engine and two 1,000 pound thrust vernier engines propel the vehicle to a cut-off velocity of 23,500 F/sec (Mach 23). At this point, a stabilized nose cone separates from the tankage. At its apogee, the nose cone is approximately 500 NM. The weapon is designed to deliver a 1 MT warhead, 5,500 NM within a 5 NM CEP. Flight time over this distance is 33 minutes. Impact speed is approximately Mach 1. Guidance is Radio-Inertial by General Electric.

The SM-68 TITAN is a follow-on ICBM development with the same general performance characteristics as the ATLAS. The TITAN differs from ATLAS in staging and guidance. TITAN is a two stage vehicle. Its guidance will be Radio-Inertial by Bell Telephone or All-Inertial by ARMA. It is SAC's desire to eliminate one of the ICBM programs at the earliest practicable time.

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Air Research and Development Command is charged with the responsibility of developing an Initial Operational Capability consisting of one squadron (10 vehicles) in 1959 and building to eight squadrons by March 1961. Camp Cooke, California has been selected as the first Ballistic Missile site. Future plans for ICBM indicates five wings in the SAC inventory. Although SAC has had no voice in the emphasis or priority placed upon the ATLAS program, we have not opposed this priority and emphasis. There is a school of thought that the intercontinental ballistic missile is the ultimate weapon and can, and should, replace the manned bomber. This Command is, of course, directly opposed to such thinking. At best, ATLAS, with its programmed yield and CEP, can do only a portion of the strategic task and can only supplement the manned bomber fleet.

PENETRATION AIDS

1. The penetration problem is continually getting harder. The enemy defenses are getting increasingly tougher. Realizing this situation, SAC has expressed strongly its need for penetration aids, both active and passive.

2. Following are descriptions of aids desired to support our strategic bomber force:

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a. Decoys. Two different missiles are being developed - air launched and ground launched decoys.

(1) Goose. A long range, ground launched decoy which will simulate B-47 and B-52 aircraft to enemy radars, and confuse and saturate the enemy's radar defenses.

It is a fibreglass, delta wing, surface-to-surface missile; 34 ft long with a wing span of 24 ft. It J-83 engine has a thrust of 2400 lbs, and weighs 295 lbs.

(a) Missile has a range of 5000 NM and a speed of Mach .85; altitude 50,000 ft.

(b) It is tentatively planned to construct 10 sites with 228 missiles per site. The complete system is required to launch 1000 missiles in the first hour after first alert.

(c) The operational date for this system is August 1959. It is contemplated that the program will be completely funded.

(2) Quail. These air launched decoys will be used primarily against local defenses. It is a delta wing decoy, 12.6 ft long, with a wing span of 5.5 ft. Its J-85 engine has a thrust of 2400 lbs and weighs 259 lbs. The missile has a range of 500 NM; altitude 50,000 ft;

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and speed of .85 Mach. The launch gear per bomb bay will weigh about 1600 lbs. The B-47 can carry two decoys and a bomb, while the B-52 can carry four decoys and a bomb. The operational dates are: B-47, March 1960; B-52, July 1960. The total SAC inventory will be 2453.

- (3) SAC has extremely high confidence in decoys as a penetration aid and has urgently requested complete funding for production and development.

b. Radar Buster Missile - Crossbow. The primary purpose of this missile is to home on and destroy enemy ground radar stations. The B-47 is capable of simultaneously carrying two missiles externally and a bomb internally. These missiles degrade the range of the carrier by 11%. The missile is 16 ft long with a wing span of 12.5 ft. The target frequency is S, L, and X bands. At present the program has been reoriented to radar seeker development only.

- (1) SAC has continually expressed a desire for this capability, but has put a higher priority on decoys. Therefore, due to a shortage of funds, this program has been relegated to a seeker development status.

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c. Bomber Defense Missile. The requirement for a bomber defense missile was established to provide a long range defense against missile-bearing interceptors. The missile is a semi-active type with a range of 10 NM. The missile weighs approximately 600 lbs with a 50 lb HE warhead. Both the B-52 and 110A BDM programs have been placed in a technical development status. Primary work will be done on surveillance systems for a bomber missile system.

- (1) SAC has always desired a long range active defense for our bombers, but due to a delay in delivery of a BDM system for the B-52 this program has been deleted. SAC still has a requirement for an active defense for future bombers.

SAC-RAND STUDY

1. In February 1955 a joint study of penetration aids for the strategic bomber force was undertaken by Headquarters USAF, the RAND Corporation, and Headquarters Strategic Air Command.
2. The purpose of the study was to examine various systems proposed as aids in penetrating the enemy defenses and to determine the relative costs and effectiveness of these systems in the role of penetration aids. Systems examined were Quail, Goose, Crossbow, ASM, Rascal, and Snark, and B-52 Bomber Defense Missile.

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3. Typical strikes were gamed under both tension and alert situations. Various levels of defense were considered, and most of the effort was devoted to the western area, higher level of enemy defense.

4. Quality, quantity, and location of the enemy defense - consisting of missiles, interceptors, and ground radars - were estimated, and a typical enemy defense posture determined for the 1960 period. Against these defenses, SAC provided plans for two different bomber strikes. First, under a tension period and, second, under the condition that a surprise attack would be made on the United States. Only the bombers on the alert status are employed for the surprise strike analyzed.

5. Several thousand campaigns were analyzed, using penetration aids in various types, numbers, and combinations. Also, various levels of defense were used in the studies, from the toughest to the low level of defense.

6. As a result of the numerous campaigns analyzed over a six months period, the following conclusions were drawn:

a. Electronic countermeasures (ECM) are highly desirable in all situations examined but require supplementation by other aids.

b. Air launched aids plus ECM can insure reasonable success where defense levels are low and when penetration is shallow.

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- c. Not enough airborne aids can be carried to insure success against high level of defense and a deep penetration.
 - d. Ground-launched aids can furnish the additional support necessary when air-launched aid is inadequate.
 - e. Of the ground launched aids (Goose and Snark), Goose is preferable on a cost basis.
 - f. Quail, Crossbow, B-52 ASM, and additional Goose are comparable on a cost basis when supported by Goose. Quail is generally preferred.
 - g. On a cost basis, B-52 BDM is less valuable as a penetration aid than Quail, Crossbow, or B-52 ASM.
 - h. Rascal has a negative pay-off as a penetration aid. This is due to the loss of a bomb against a primary target.
 - i. Combination of Quail, Crossbow, and B-52 ASM and Goose cost approximately the same as cost of Goose alone.
7. The summary of SAC penetration aid requirements are:
- a. Advanced ECM for the entire bomber force.
 - b. Goose, Quail, Crossbow, and B-52 ASM to support the alert force.
- | | |
|----------|-------|
| Goose | 2,277 |
| Quail | 2,453 |
| Crossbow | 328 |
| B-52 ASM | 347 |
- c. B-52 BDM - analyse Phase I studies.

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SPECIAL ECM REPORT

1. SAC feels today, as it has in the past, that ECM offers the greatest pay-off in the defense of the bomber force. This has been confirmed by our war gaming, joint exercises, the SAC-RAND study, and SAC-ADC maneuvers. However, it was very difficult to satisfy ourselves that the ECM program was receiving the attention and guidance its top priority indicated; to the contrary, it appeared the program was alarmingly neglected. As a result, a survey of the program was directed. A highly qualified team of 11 ECM observers, made up of personnel from SAC, Hq USAF, and ARDC was formed. In the period 4 November through 4 December, this team looked into the program in the Air Staff, ARDC, industry, and universities. The headlines of this group's findings are:

- a. ECM is priority penetration aid.
- b. ECM R&D is not being supported financially.
- c. Virtually no tube program (heart of ECM).
- d. SAC future requirements had not been stated.
- e. ECM technique developments not properly directed.
- f. B-58 ECM is unacceptable to SAC.
- g. A carcinotron jammer program must be greatly expedited.

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h. CCM threat requires ECM performance over that now being planned.

i. AF management of ECM must be improved.

j. An ELINT program must be improved in step with the ECM program.

2. During World War II, 400 engineers were employed in this country to work on electronic countermeasures. Thirty-five million dollars was spent on R&D, resulting in over 500,000 ECM equipments (exclusive of chaff) being produced at a cost of approximately three hundred million dollars. At the close of the war, 90% of the German ultra high frequency engineers were employed in an attempt to develop counter-countermeasures against the allied ECM effort.

3. A great many new ECM techniques or tricks are being developed; these will require the use of new microwave electron tubes, the principal types of which are the magnetrons, carcinotrons, and traveling wave tubes. New techniques also are becoming available in counter-countermeasures area for use in the air defense systems. The survey team found over 60 specific counter-countermeasure tricks under development for use in the 1960 period of radars. Therefore, it was concluded that in order for electronic countermeasures to maintain superiority over the counter-countermeasures activities of the air defense it must incorporate higher

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power, greater frequency coverage, more versatility, and be backed up with an adequate electronic intelligence effort. One of the most important factors in the future of ECM is the microwave electron tube. The importance of this tube to ECM may be compared to the importance of the jet engine to the airplane. Performance of the ECM systems, so far as frequency coverage and power output are concerned, is directly associated with the performance of the tubes available for use in the systems. The high powered microwave tube is certainly the heart of the program. In the next six years there will be three principal eras, characterized by the availability of microwave tubes for use in ECM systems. These are: the magnetron era, 1955 - 1958; the carcinotron era, 1958 - 1961; and the traveling wave tube era, 1961 and on.

4. The conclusions of the team in regard to R&D were:

- a. Technique and component development has been seriously limited by funding.
- b. Lack of funds has stopped important ECM projects, and is holding up ECM sub-systems (B-52 and 110A).
- c. Specialized equipment does not meet SAC concept.
- d. ALQ -5 has best growth potential.
- e. The ECM microwave tube basic research and development program is deficient.

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f. There is a lack of guidance for the ECM microwave tube research and development program.

5. One of the main objectives of this team was to develop a concept of ECM operation for the future. It is believed that the method of employing ECM contributes at least 50% to its total effectiveness, and the performance requirements of the equipment must be directly associated with the manner in which SAC will employ it.

6. The conclusions of the team concerning the future use of ECM are as follows:

a. In the alert situation (Case II), loss of timing and control of a diluted strike force places greater dependence and a new dimension of performance and reliability on future ECM systems.

b. During the 1958-1960 time period, carcinotron type jammers must fill the gap between the mechanical sweep jammers and the ECM sub-system to offset the air defense counter-countermeasure advances and the limitations imposed by an alert plan strike effort.

c. The use of atomic air defense weapons places greater dependence upon ECM systems to deny acquisition and to impose greater guidance errors against surface-to-air missiles and air-to-air missiles.

d. In the alert concept, greater emphasis must be placed upon direct defense of the bomber due to limited mutual support, low level attacks, and the possibility of daylight operations.

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7. A summary of the basic ECM requirements for future SAC ECM systems are:

a. Must fit SAC concept:

- (1) Case I - characterized by period of tension, stand-down of forces, deployment and adequate warning.
- (2) Case II - characterized by absence of tension period, minimum warning and dilution of the strike force.
- (3) Atomic warhead in enemy air defense weapons.

b. Minimum vulnerability:

- (1) Counter-countermeasures.
- (2) Miscalculation.

c. Performance:

- (1) Multiple techniques.
- (2) Traffic capacity.
- (3) Frequency coverage.
- (4) Power output.

8. One of the most controversial issues in ECM in the past has been how many systems are required to adequately protect the total force as well as the individual airplane. Listed below are some of the basic considerations used in determining the number of ECM systems required in each aircraft. Shown are the minimum and probable requirements.

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<u>a. Threat</u>	<u>Minimum</u>	<u>Probable</u>
<u>(1) Individual protection</u>		
Air to air	1	2
Ground to air	1	2
<u>(2) Mutual support</u>		
EW/GCI Low	1	$f \times P = N_1$
EW/GCI High	<u>1</u>	<u>$f \times P = N_2$</u>
	4	$N_1 + N_2 + 4$

9. As shown above, the probable number of mutual support systems is a product of the frequency coverage and power output performance of the ECM systems. Thus it may be said that two ECM systems with sufficient frequency coverage and power output may adequately cover two threats. On the other hand, if inadequate power is available (for example, half the power required) four ECM low power systems will be needed to duplicate the performance of two with adequate power. Conversely, in the other dimension, if the systems have sufficient power but insufficient frequency coverage to counter the total threat, more systems would be required to provide adequate frequency coverage.

10. Shown below are some typical situations which might occur and which would require varying numbers of ECM systems. It will be seen that the effect of ECM system performance, the degree of

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frequency diversity in the enemy's defense system, and the method of employment (Case I or Case II) are the principal factors in determining the number of systems required.

		THREAT			
		AAM	SAM	Mut Supp	Total
a.	<u>CASE I</u>				
	(1) <u>Minimum</u>				
	Adequate ECM Power) Minimum Frequency) Diversity)	1	1	2	4
	(2) <u>Maximum</u>				
	Inadequate ECM Power) Maximum Frequency) Diversity)	2	4	4	10
b.	<u>CASE II</u>			Art Supp	
	(1) <u>Minimum</u>				
	Adequate ECM Power) Minimum Frequency) Diversity)	1	1	4	6
	(2) <u>Maximum</u>				
	Inadequate ECM Power) Maximum Frequency) Diversity)	2	4	8	14

c. Range of holes: 4 - 14.

11. The effect of aircraft performance, principally speed, has an influence on the number of ECM systems required. For example, a Mach 3 110 performing against a 1956 air defense system would need

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little penetrations capability other than its speed. However, air defense does not remain static, and the 110 might need a great deal of ECM equipment in the 1956 - 1970 time period. Furthermore, the effect of the method used in employing the equipment is important. A 110 employed in a Case I situation might need less ECM in either of the above time periods than under a Case II situation. The important factor is that the ECM installation in future weapon systems must be designed for the worst time period that it will be employed in and under the worst situation (Case I or Case II).

12. In conclusion, future SAC requirements may be summarized as follows:

a. Basic

- (1) All future ECM systems must meet Case I and Case II requirements.
- (2) Carcinotron must fill the gap between the ALT-6 and traveling wave tube.

b. Weapons Systems

- (1) B-58
 - (a) DECM system unacceptable for general SAC use.
 - (b) System can be improved by trade-offs.
- (2) WS-110A
 - (a) ECM sub-system contractor needed.
 - (b) SAC input prior to contractor selection.

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c. B-52

- (1) Improved ECM system in 1960.
- (2) No system on contract.
- (3) Modified AN/ALQ-5.

d. B-47

- (1) 1958-1960: Carcinotron augmentation.
- (2) 1960-1965: Unattended sub-system (ALQ-5).

13. Although today's presentation has not permitted a complete review of the team's findings and conclusions, the following is a summary of their recommendations:

- a. SAC provide a coordinated statement of future ECM system requirements.
- b. USAF/ARDC recognize the tube as the primary ECM component and fund accordingly.
- c. 110ECM sub-system be funded early to allow selection of associate contractor.
- d. Carcinotron program for bridging ALT-6 to sub-system period be initiated immediately for use in 1957-1960 time period.
- e. A SAC-ARDC-Boeing-Sperry team prepare a B-52 ECM sub-system program embodying the ALQ-5, using a 1960 inventory date.

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f. Techniques and systems development be aligned with SAC concept (CASE I and CASE II).

g. The importance of the ELINT program be recognized - the program keep pace and be integrated with the ECM program - a survey be conducted to determine deficiencies.

h. USAF establish a level and calibre of management consistent with recognized importance and dollar impact of ECM ELINT programs.

CLASS IV AND V MODIFICATION PROGRAM FOR THE B/RB-47

1. This headquarters was advised by Headquarters USAF early in November 1956 that because of the fund limitations a decision had been made to delete a number of Class V modifications scheduled for SAC aircraft in FY 57. We will discuss only the B/RB-47, since this is the area most affected by USAF action.

2. Because the fund limitations would not permit accomplishment of all our desired modifications, a complete and thorough review of the Class IV and V modifications was made. All modifications requested, on which less than 75% of the required funds had been expended, were considered. Of the modifications considered, some were selected for cancellation and the remainder placed in an order

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of priority. Those modifications with 75% or more of their funds already expended were not considered, as it appeared obvious that they would be completed. In establishing the priority and cancellation list, operational requirements were primary among the many factors considered.

3. This command strongly opposed the action taken by USAF to delete external weapon carriage modification of the RB-47. We felt this modification would add immeasurable flexibility and capability to the accomplishment of the mission assigned. Although we provided a list of required modifications in the order of priority to USAF, the importance of accomplishing all of the modifications was emphasized. It was pointed out that it was essential that our force be modernized and improved to permit continued combat capability, this being particularly important when considering the reduction in R&D and new weapons procurement forced by the fund limitations.

4. Based on the best available cost information, a review of the FY 57 class IV and V mod programs resulted in a minimum requirement of 292.1 million dollars to start or complete those modifications considered essential (a deficit of 46.6 million). It was further pointed out that some of these programs are just being started in FY 57 and will require even larger expenditures in FY 58. Based on cost data available in this headquarters, a minimum of 333.8 million

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dollars should be programmed for FY 58 to support all Class IV mods and those Class V mods considered essential. (Estimated funding for FY 58 will leave a deficit of 88.3 million.)

5. In view of this, SAC recommended the following action to USAF:

a. Every effort be made to have additional funds programmed for FY 58 class IV and V mods.

b. A class V modification review board, with representation from USAF, SAC, and AMC be established to periodically review all Class V mod programs and maintain an operational priority list.

c. That the following mods be cancelled:

AN/ASH-4 Bhangmeter	*(B)
Stationkeeping and rendezvous	*(B)
SCR-718	*(RB)
Auto Gain Switch	*(RB)
Crossbow	*(B)
Data Storage Tube	(B/RB)
Auto Evasive Computer Tie-in	(B)
Bail-out Spoiler	(B/RB)

*Cancelled by USAF

d. The following priority list of SAC firm and tentative mods be completely funded:

(1) ECM 6 holer	(B)
(2) 2 40 KVA alternators	(B/RB)
(3) LABS 150 AC	(B)
(4) LABS - Remainder of force	(B) T

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- (5) Class "D" Special Weapons (B) T
- (6) External Weapon Capability (RB) T Cancelled by
USAF
- (7) Extended Track & Dual Offset (RB)
- (8) 10" Indicator (RB)
- (9) ECM 6 holer (RB)
- (10) 6 Additional Blue Cradle Aircraft (B) T
- (11) High Resolution Radar (RB) T
- (12) Radius Extension (B/RB)
- (13) APN- 69 (B/RB)
- (14) Ni-CAD Batteries (B/RB) T
- (15) External ECM Pods (B)
- (16) Astro-Doppler (B) T
- (17) LOX (RB)
- (18) Single Channel VHF (B/RB) T
- (19) 4th Crew Position (B/RB)
- (20) IRCM (B/RB) T
- (21) Mod for Quail (B) T
- (22) Defensive ECM (B)
- (23) APX-27 (Air to Air) (B/RB)
- (24) 3d 40 KVA alternator (B/RB)
- (25) SELCAL (B/RB) T
- (26) APX-25 (Air to Ground) (B/RB)

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(27) ARN-21 (TACAN)	(B/RB)
(28) MA-1 Altimeter	(B/RB)
(29) 28 VDC receptacle	(B/RB)
(30) Mod - APD - 4	(RB)
(31) QRC, RB-47H	(RB)

T = indicates tentative modification.

6. In addition to this action, Hq SAC is in the process of setting up an aggressive modification review board which will review all modifications prior to the joint USAF-SAC-AMC review board.

7. The latest action on the modification program was a letter from General LeMay to General Twining which covered essentially the same information presented here. No answer has been received to date.

CURRENT ECM SYSTEMS

B-47 PHASE V MANNED ECM POD

1. The Phase V B-47 manned capsule is a pressurized unit the same size as the bomb bay. The carrier airplane (inventory 329) can be completely changed from an ECM escort aircraft to a bomb carrier, or vice versa, in 17 hours.

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2. Capsule provisions include capacity for two operators, who face backward and eject downward. Current configuration includes configurations of ECM equipment, which are:

Low: - 30 - 1000 mc

High: - 1000 - 5000 mc

Full: - 30 - 5000 mc

Each loading consists of receivers, transmitters, power supplies, antennas, cabling, etc to cover the desired range.

3. Current distribution of the capsules (48) is to allocate 6 to each of 8 wings. An expedited program has begun to phase the capsule and its capability into the EWP, with a greatly accelerated training program.

4. A requirement has been submitted for modernization of the current ECM capsules. Phase I of this requirement provides for the full use of the 6 jammer ECM installation by the operators. This is a quick field retrofit program. Phase II will provide for a new ECM system which will involve the use of a new ECM tube called the Bitermitron.

5. Use of the Phase V ECM capsule will be primarily as a backup to the unattended B-47 force and will allow capsule operators to counter signals outside the pre-set frequency range of the unattended B-47 force. In the local defense area, it is anticipated the capsule will be used to counter Soviet missile complexes (Yo-Yo).

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B-47 PHASE VI ECM CAPABILITY

1. This installation will be standard in the B/RB-47 force.

Approximately 131 new production aircraft and all aircraft cycling through IRAN will be provided with this capability except infra-red countermeasures (IRCM) which is currently planned for incorporation beginning in summer 1957. The installation is characterized by being unattended and is highly dependent upon the accurate pre-setting of the equipment prior to take-off.

2. Phase VI installation is divided into four parts:

- a. Warning Receiver. The APS-54, 2600 - 11,000 mc range, provides audio and visual radar warning and determines when chaff, IRCM, and the X band jammer will be employed.

- b. Chaff. The chaff installation provides two hoppers (8 cartons each), one in each ATO compartment, or a total of 16 cartons in each aircraft. Controls are located at the co-pilot's station. Chaff will be employed for providing false targets (random dispensing) and for breaking lock on tracking type radars (burst technique).

- c. Jamming Installation. Five of the 6 jammers are employed in mutual support of the total bomber force to destroy the air defense early warning-GCI capability. One jammer (X band) is provided to protect the individual bomber. The jammers are summarized below:

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- 1 ALT-7 - VHF band - Rus Dumbo radars
- 1 ALT-7 - UHF band - Fishnet IFF systems
- 3 ALT-6 - S band - Token
- 1 ALT-6 - X band - Fresco D, Flash Light, fighters.

d. IRCM. B-47 infra-red countermeasures consists of four flare dispensing units. Units are installed and replaced from outside the aircraft. They are wired in such way that the flares can be fired sequentially. Each battery will contain approximately 50 flares.

EXTERNAL ECM PODS

1. The external ECM configuration is a tank-like structure 30" in diameter and 22' long. It will be attached to the waise of the aircraft, one on each side on an inclined pylon, and so located as to allow opening of the bomb bay door. It is not jettisonable.
2. Basic purpose of the pod is to provide an escort ECM capability which permits retention of the bombing capability as contrasted to 376th Bomb Wing Blue Cradle. Range degradation is 7-1/2% when both pods are carried. Pods currently are programmed to three units - 40th, 303d, 320th Bomb Wings.
3. The current configuration provides that each pod may carry four ALT-6 jammers or 600 lbs of chaff, or two ALT-6 jammers and 300# of chaff, for a total of 8 jammers or 1200# of chaff in the two pods. Thus a pod-equipped aircraft could carry 900# of chaff and 14 jammers considering 6 jammers and chaff load in basic aircraft.

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BLUE CRADLE

1. Blue Cradle is a code name for ECM racks which occupy the bomb bay of the 376th Bomb Wing aircraft.

2. With 20 KVA alternator, only 10 jammers of the total capability of 12 can be operated. An alternate capability of all chaff is provided (6000 lbs); also half chaff and half jammers can be carried.

3. Modernization with 40 KVA alternators, to allow full capacity of jammers (basic 6 plus 12, for total of 18 jammers and 900 lbs of chaff) is now in progress. A requirement is being submitted which will provide the 376th Bomb Wing with an ECM system using the new carcinotron tubes. These systems are to be tested by the 376th Bomb Wing to determine the optimum techniques and tactics and for use of this system in the B-47 inventory in the 1958-1960 time period.

RB-47H

1. With the exception of the APD-4, standard intercept equipment is used throughout. The principal difference between the RB-47H and earlier ferrets is the performance capability of the aircraft itself.

2. The RB-47H provides three ECM operator positions with a combined search capability of 30 - 33,000 mc, and a direction finding capability of 65 - 33,000 mc.

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3. The RB-47H is the best that could be accomplished considering the time period in which it was developed. However, the electronic reconnaissance equipment is now inadequate for detecting and analyzing the increased electromagnetic transmissions.

4. A requirement has been submitted for an improved APR-9 receiver. The improved APR-9 would have an increased sensitivity and lower noise level, an FM detection capability, reduced radiated interference, and an improved video response.

5. An improved recording media, the ALH-2 tape recorder, will be installed this year. This recorder is especially designed for recording intercepted signals, whereas its predecessors, the wire recorders - originally were intended for voice recording.

6. The ALD-4 (Convair-Melpar RB-58 ferret system), installed in a wing pod, with the approximate dimensions of the external fuel tank and weighing approximately 1100 pounds, is under consideration as a method for appreciably increasing the ferret capabilities of the RB-47H during the 1959 time period. A requirement for a completely new reconnaissance sub-system has been submitted, but this may not be available before 1962 or 1963.

ERB-47

1. There is a deficiency in the ability of standard ferrets to collect sufficient data for effective use in technical intelligence.

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Recognition of this deficiency has been made at various conferences in intelligence matters. Particular reference is made to the world wide electronic intelligence conference 29 March - 1 April 1955 at Headquarters USAF.

2. The ERB-47 is designed to collect detailed information on signal parameters. It has the same frequency coverage as the RB-47H (30 - 33,000 m.c), with the added capability of taking pulse-to-pulse pictures and making video and high fidelity audio recordings. Probability of intercept has been sacrificed somewhat since one operator was removed from the standard RB-47H. However, this is not too important as the aircraft usually will be scheduled to fly against a particular signal in an attempt to obtain additional information.

3. The concept for an ERB states that it will be modified periodically as the mission requirements dictate and/or as better equipment becomes available.

B-52 DEFENSIVE ECM PROGRAM

1. The installation resulting from this program will become standard in the B/RB-52 force; and, with the exception of IRCM, will be available from new aircraft production this spring (SEBAC 116, WIBAC 23). Field modification teams will provide this capability during 1957 to aircraft already delivered. Effectivity

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point for the IRCM has not been established; but it is expected that this capability will be provided in new production aircraft the latter part of 1957 and provisions will be included in the B-52 IRAN program for aircraft already delivered.

2. Like the B-47, this installation is divided into four parts:

a. Warning Receivers. The B-52 is provided with two APS-54 systems. One system provides the same frequency coverage (2600 - 11,000 mc) as the B-47 and will be employed in the same manner. The second APS-54 system covers the X band region only, and antenna coverage is oriented so as to provide discrimination between signals originating from the ground and those radiated by an airborne system. This latter feature will provide an additional capability for employing chaff, IRCM, and X band jammers.

b. Chaff. The chaff installation provides two hoppers (10 cartons each, for total of 20 cartons), which are located in the waist of the aircraft. Ejection of the chaff bundles is upward, with chaff passing above the horizontal stabilizer. The controls are located at the ECM observer's station. Chaff will be employed for providing false targets (random dispensing) and for breaking lock on tracking type radars (burst technique).

c. Jamming Installation. A capacity for 9 jammers is provided in this installation. Seven of the jamming systems are devoted

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to mutual support of the total bomber force to destroy the air defense early warning-GCI capability. Two jammers (X band) will provide protection to the individual bomber. An important capability in the B-52 is the defensive ECM observer, providing the ability to adjust jamming systems while in flight, thus permitting changes in sweep rates, frequencies, antennas, etc. An additional set of antennas is provided for 7 of the 9 jammers, allowing jamming energy to be concentrated directly below the bomber when passing over the target defenses. Controls for changing the GCI antennas to this mode of operation while in flight are provided the ECM observer. The jammers are summarized below:

1 ALT-7: VHF band - Rus Dumbo radars.

1 ALT-7: UHF band - Fishnet IFF systems.

5 ALT-6: S band - Token. (Dual antenna system)

2 ALT-6: X band - Fresco D, Flash Light, fighters.

(Alternate antennas for use against local defenses.)

d. IRCM. The B-52 IRCM consists of 6 flare dispensing units. Units are installed and replaced from outside the aircraft, as in the B-47. Controls which adjust the interval, duration, and quantity of flares dispensed (which are fixed in the B-47 prior to take off) are available to the B-52 defensive ECM operator so that settings may be varied to suit the situation. Due to the greater IR

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response of the B-52 over that of the B-47 (8 J-57s as compared to 6 J-47s), the B-52 flares are longer and fewer can be carried in each flare battery. It is now estimated that each battery will contain approximately 30 flares.

3. Future Improvements. Due to the increased air defense threat, an additional capacity to carry jamming systems is being provided the B-52. The 501st B-52 will provide a 14 jammer capability as compared to the 9 jammers now planned. In this program, three additional systems are added in the S band and two additional systems are added in X band. Further, additional ECM receiving equipment is provided (APR-9), and the warning receiver (APS-54) provides quadrantal direction finding, and provides additional coverage through K band. Although a definite program does not exist at this time, requirements are being submitted for establishment of a completely new electronic countermeasures sub-system for use in the 1961 version of the B-52.

B-52 GENERAL PURPOSE CAPSULE

1. Reconnaissance capability in the B-52 is provided by a pressurized capsule which fits into the bomb bay. A total of 17 capsules were produced, 15 of which were programmed for SAC. Production aircraft numbers 4 through 89 have carrying provisions. There are provisions for two electronic reconnaissance operators, who are provided with downward ejection seats.

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2. The capsule also contains photo and weather reconnaissance equipment, which is remotely operated from the front end.

3. The electronic reconnaissance equip covers the frequency range from 30 to 10,750 mc. The APD-4 could not be satisfactorily installed due to the original policy which specifies that the capsule be self contained.

4. One capsule was lost in December 1956 in the crash of a B-52. However, a flight test program was completed at Castle AFB before the capsule was lost.

5. Fourteen capsules are to be assigned to the 99th wing at Westover. Five capsules will be installed and the remainder will be placed in storage at SAAMA.

RB-57D-2

1. The RB-57D-2 (a one operator ferret) was designed to meet the ever-increasing need for more effective airborne electronic reconnaissance equipment.

2. In brief, the ferret system is composed of standard intercept, analysis, and recording equipment plus the APD-4 and data reduction equipment. All are integrated to permit the rapid acquisition and interpretation of data on electromagnetic emissions. Significant improvement over standard ferret systems is the inclusion of the ASQ-22V, semi-automatic ferret system, which provides a means of converting information obtained by the electronic reconnaissance equipment to binary coded electrical impulses and then records them on magnetic

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tape. Other information may be recorded on photographic film.

The output of this equipment is subsequently reduced to usable form with ground-based data reduction equipment.

3. Primary limitation is probability of intercept. One operator has more equipment than he can effectively monitor and program.