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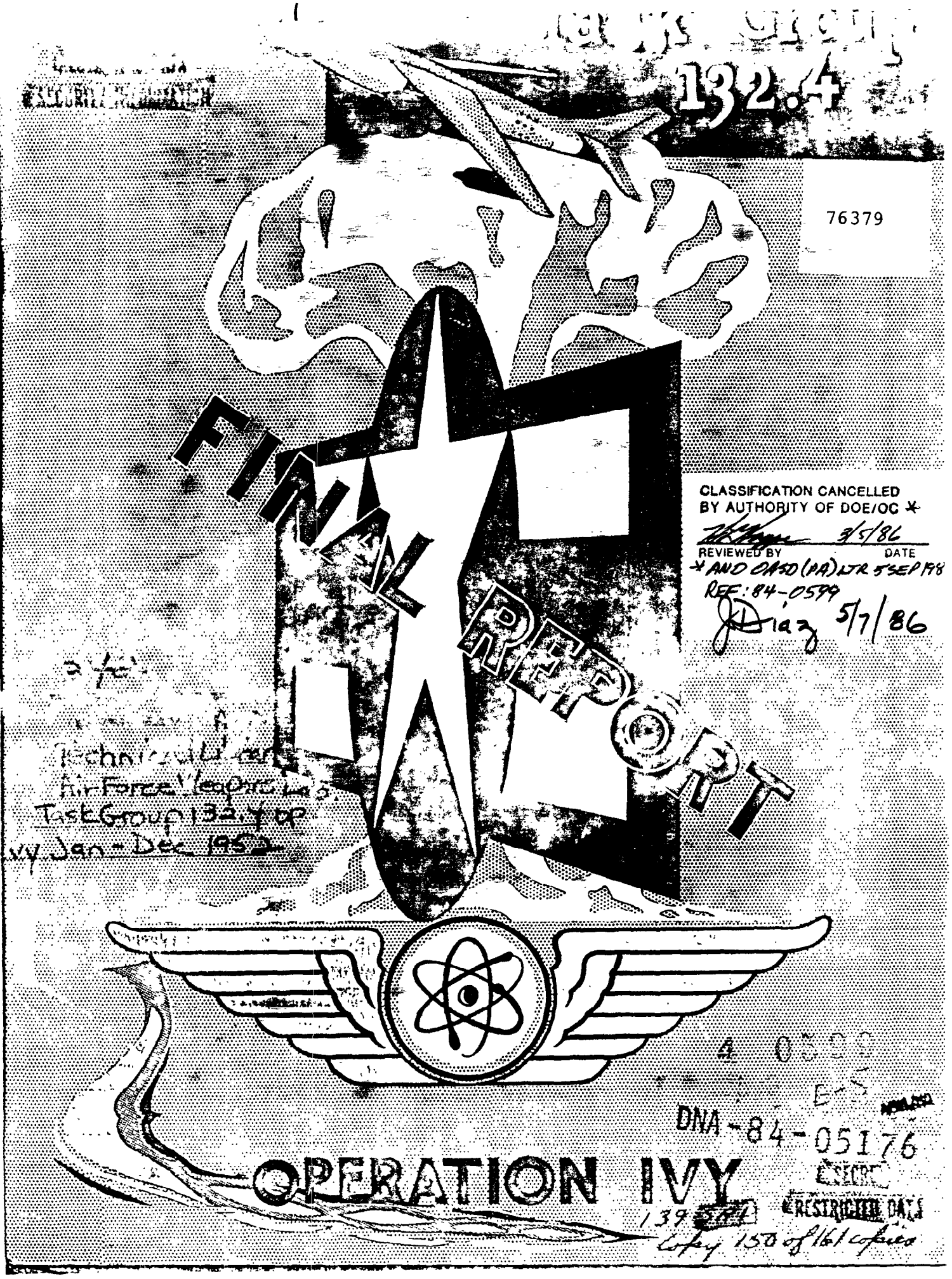

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FINAL REPORT

TASK GROUP 132.4

KIRTLAND AFB NEW MEXICO

KWAJALEIN, MARSHALL IS.

JAN — DEC

1952

CONTENTS

MAJOR GENERAL P. W. CLARKSON
COMMANDER, JOINT TASK FORCE 132


Brig. Gen. F. E. Glanitzberg

FOREWORD

Operation IVY was conceived as a nuclear test to be executed outside the continental United States, as a climax to intensive and exacting preparations. As viewed in retrospect, IVY was clearly a challenge to science, and to all participants as well.

The pages which follow tell the Air Force story of what had to be done, how it was done, and the results produced from a combination of efforts. The prosaic fact of accomplishment does not reveal the superb teamwork of a joint effort, in every sense of the word, which underlies the significance of Operation IVY.

Success in completing this mission was achieved largely by the ability of the Air Force, Navy, Army, and Civilian agencies to weld complex elements into a single, harmonious force; each component having a special function, yet all possessed of a unanimity of purpose to advance the knowledge of atomic energy.

This team spirit was conspicuously evident at all stages of the preparation for and conduct of operations. Task Group 132.4, Provisional, was provided with personnel, equipment, and numerous special skills from every major command of the United States Air Force. Especially gratifying was the teamwork and cooperation shown by the Task Units supplied by the Strategic Air Command, Military Air Transport Service, and the Air Research and Development Command, meeting for the first time on KWAJALEIN ISLAND.

The excellent results of these overseas tests were achieved, not by independent effort of individuals or units, but rather through coordinated actions by all four Task Groups as well as associated Civilian and Military contributors.

Frederic E. Glantzberg

FREDERIC E. GLANTZBERG
Brigadier General, U.S.A.F.
Commander, Task Group 132.4

MISSION

The mission of Task Group 132.4, Provisional in Operation IVY was to provide air support for the scientific test programs set up by the Atomic Energy Commission and the Department of Defense. The test programs which required the bulk of the air support were the air drop of the KING weapon, the collection of atomic cloud samples, measurement of the effects of heat and blast on tactical aircraft, and the taking of documentary photographs.

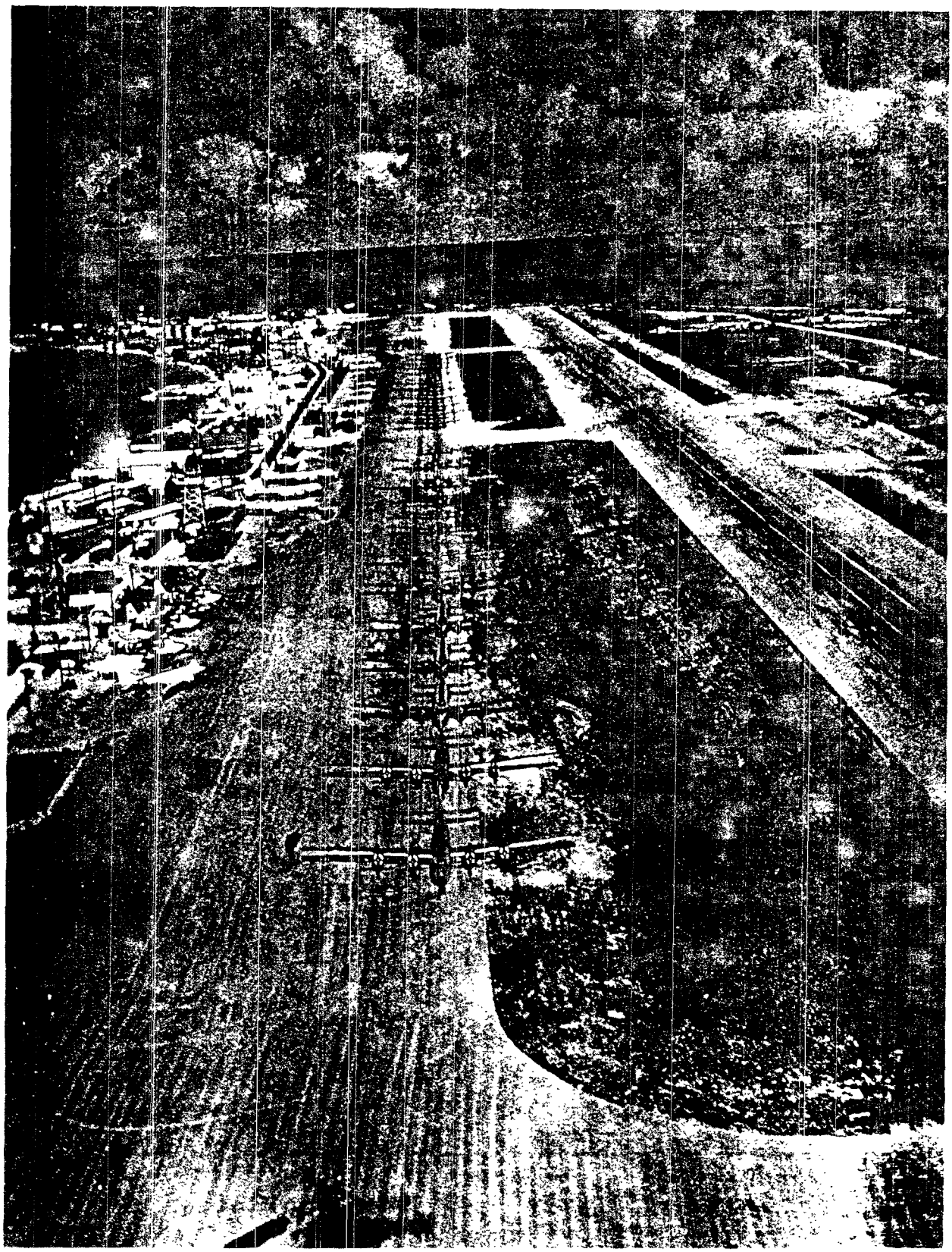
From this broad concept of the mission, operational objectives were derived which it was determined could be performed best by a Test Aircraft Unit, a Test Services Unit, and a Test Support Unit.

Responsibilities under the Test Aircraft mission included the air drop of the KING weapon, with associated transit time measurement and tone release transmissions; atomic cloud penetration and sampling operations, together with measurements of blast, gust and thermal radiations; airborne control of mission aircraft; air drop of telemetering capsules; and provision of airborne scientific test apparatus to conduct additional experimental measurements as required. Implementation of the air drop task entailed air transportation for components of the KING weapon and the services of qualified personnel for loading the weapon aboard the drop aircraft.

Among the responsibilities of the Test Services mission were functions of weather analysis and forecasting, based upon data obtainel by established ground stations and air reconnaissance. Air Rescue Service and air-to-ground and point-to-point communications similarly were provided. Additional tasks included documentary photographic coverage, air transportation for shipment of radioactive samples to the United States, and flights to track the movement of the radioactive cloud after each detonation. Overseas airlift support was furnished throughout the operation.

The Test Support mission contributed inter-island airlift by means of liaison aircraft and helicopters and inter-atoll airlift support for the Task Force in conjunction with administrative and proficiency flying for all rated Task Force personnel. Further requirements allied to this task were the operation of all airbase facilities on ENIWETOK ISLAND, to include complete air terminal facilities, garrison housekeeping augmentation, and preparations for extensive post-shot decontamination operations. At KWAJALEIN ISLAND, the Naval installation was augmented to provide for the operation and maintenance of Task Group aircraft and support for personnel of Task Group 132.4, Provisional.

Overall planning and direction of the Air Force in support of Operation IVY was the responsibility of Headquarters, Task Group 132.4, Provisional. For the purpose of positive coordination and control throughout this mission, supervisory personnel for the Air Operations Centers established at WAJALEIN and afloat consisted of staff members who were assigned directly from the Task Group Headquarters.



AFWL/HO

Aircraft Were

1. Drop A Bo

2. Collect Ato

3. Measure De
   Tactical

4. Take Pictur

Necessary To . . .

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Aircraft

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[redacted]

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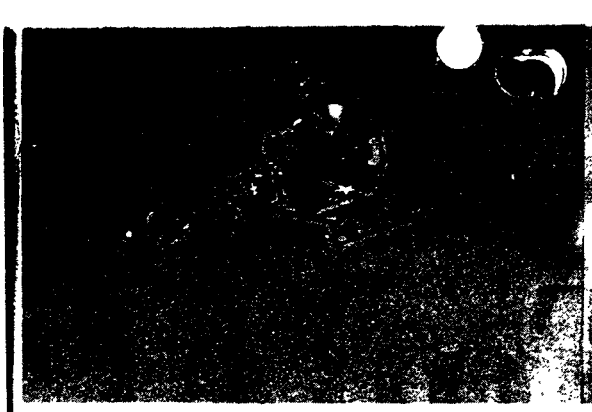
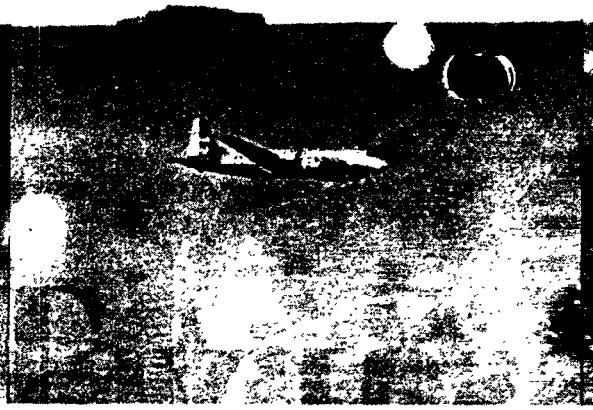


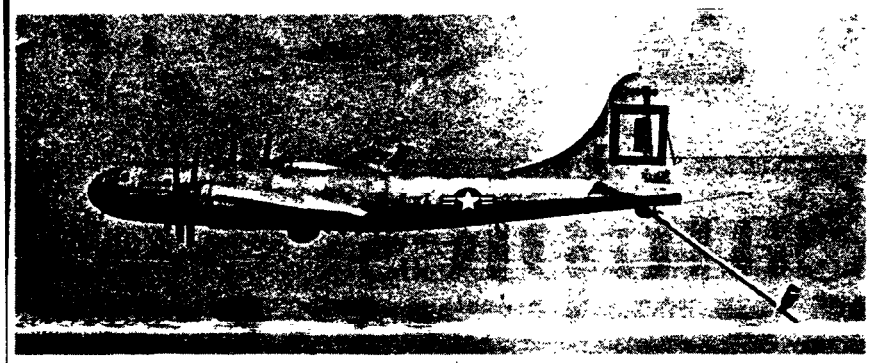
H-13



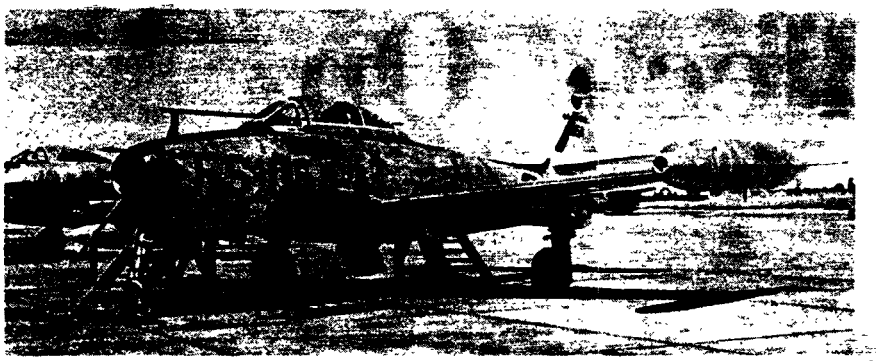
C-54

Task Group

KB-29



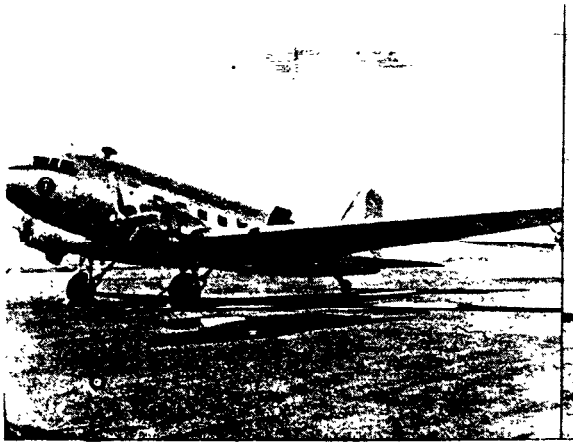
F-84G



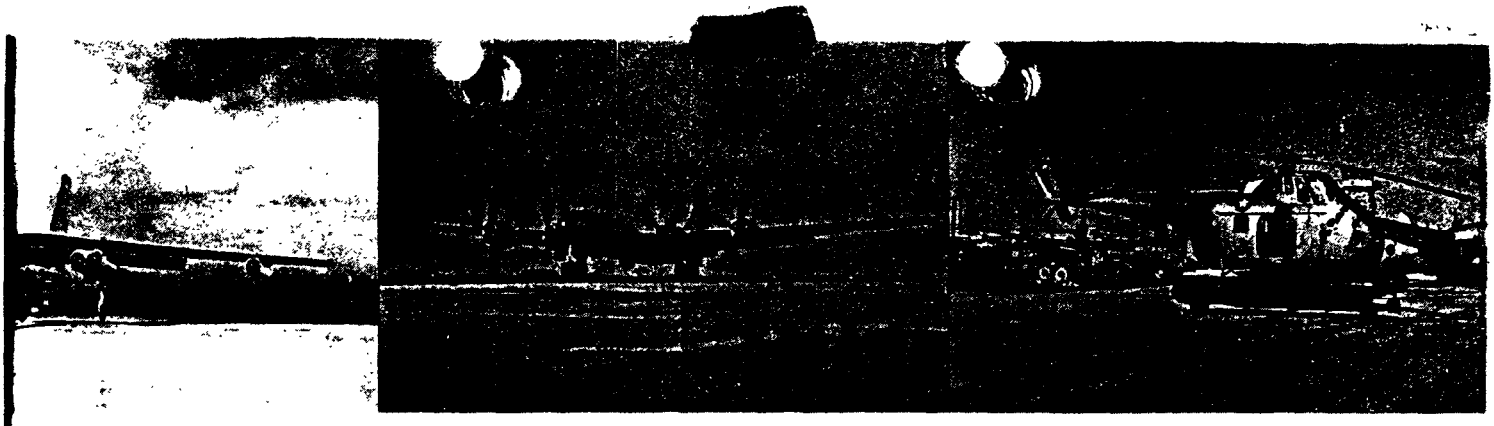
F-84	16	C-54	3
KB-29	10	C-47	4
B-29	2	WB-29	10
B-36H	2	L-13	15
B-50	2	H-19	3
B-36D	1	H-13	3
B-47	1	B-17	1
EB-29	2	SA-16	2
RB-50	1	SB-29	2

18 TYPES – 80 A/C

C-47



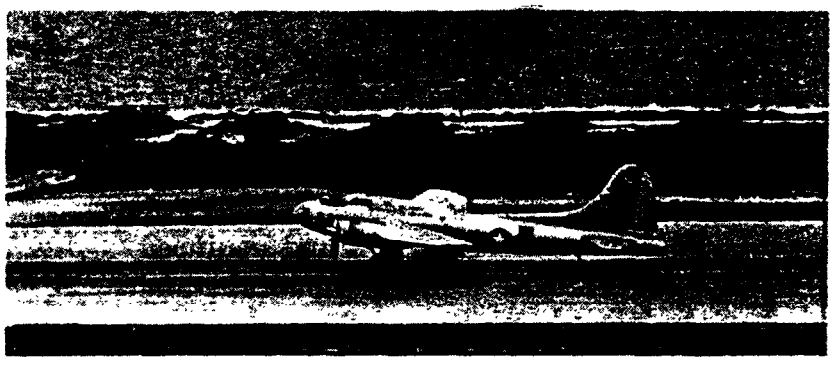
SA-16



B-29 H-19

132.4 Aircraft

B-17



-SOURCE-

AC-31 ARDC-26 MATS-17

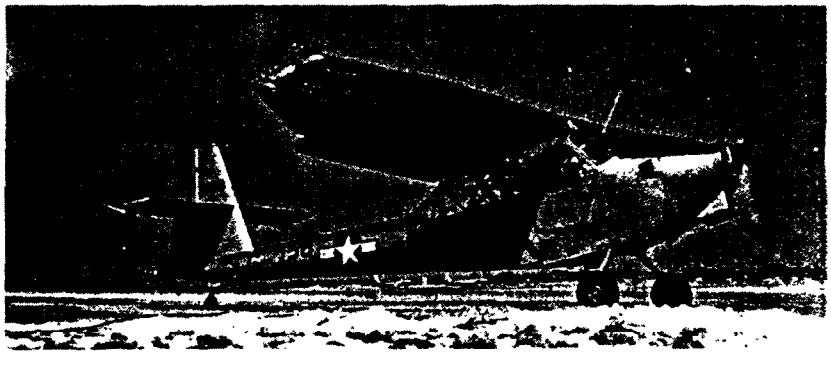
AC-2 APG-1 ARMY-3

-LOCATION-

KWAJALEIN - 59

ENIWETOK - 21

L-13



-OTHER A/C-

(KWAJALEIN)

3-R6D	12-P2V
3-C-54	3-VIP
1-C-47	2-PBM

SB-29 B-50

The Bomb Drop

The drop of the KING shot weapon was of paramount importance to the Air Force. From the results of the KING weapon drop will come immediate decisions concerning the atomic weapon stock pile and the concept of strategic warfare.

The KING weapon was a high yield nuclear bomb of approximately twice the yield of any weapon previously dropped from an aircraft. Therefore, the B-36H, latest model of the Air Force's biggest bombers and equipped with the most modern bombsight and the latest bomb bay configuration, was selected to drop this bomb.

Since all B-36H aircraft have important roles in the Emergency War Plan, it was decided not to seriously modify them to accommodate the special telemetering equipment required to measure the important transit time of the bomb. As a result, two (2) B-50D aircraft of the Special Weapons Center, equipped with the necessary test equipment, were selected to accompany the B-36 on the bomb run.

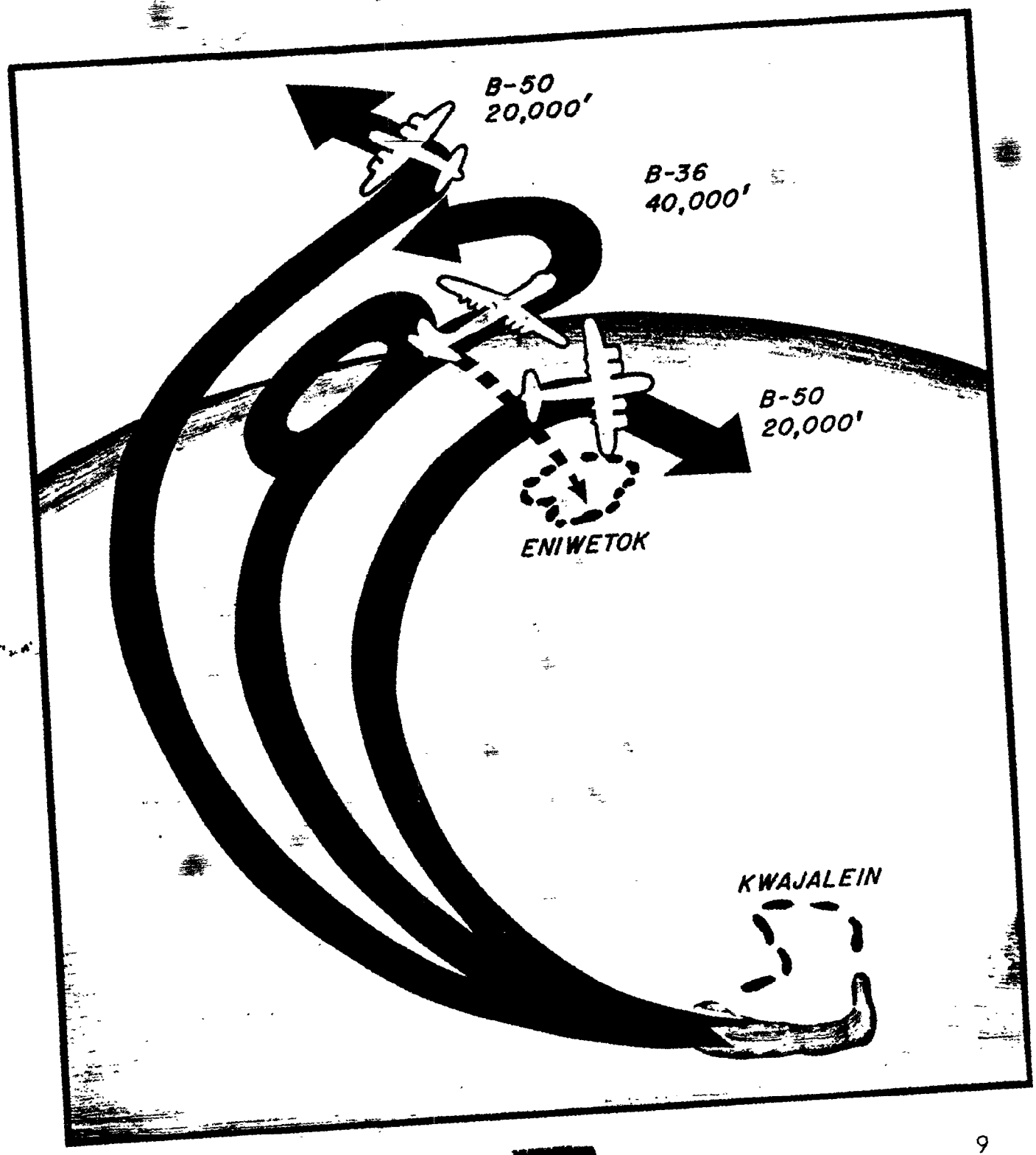
The weapon was carried to the forward area in a C-124 cargo aircraft, off loaded at KWAJALEIN and transported to the USS CURTISS for "ring out" and storage until use. The Sandia Corporation prepared the bomb for drop and it was loaded by the B-36 crew. In-flight insertion of the capsule was performed by the bombardier in the normal manner.

The flight pattern was a result of the requirement for a timing accuracy of plus ten (10) or minus twenty (20) seconds. The B-36 orbited, reducing the timing error with each turn, until it made the final turn onto the bomb run. The B-50's were ahead of and lower than the drop aircraft.

The target consisted of oil drums mounted on pilings arranged in the form of a cross at ground zero. Small radar reflectors were mounted on the center drums. In conjunction with the target, an offset aiming point consisting of a large radar reflector was installed at a position one thousand nine hundred (1,900) feet due south of ground zero. The large reflector was visible by radar from ranges of sixty (60) miles, and the smaller target itself was visible optically from a distance of twenty-five (25) miles. Actual release was visual.

[redacted]

Drop Flight Pattern



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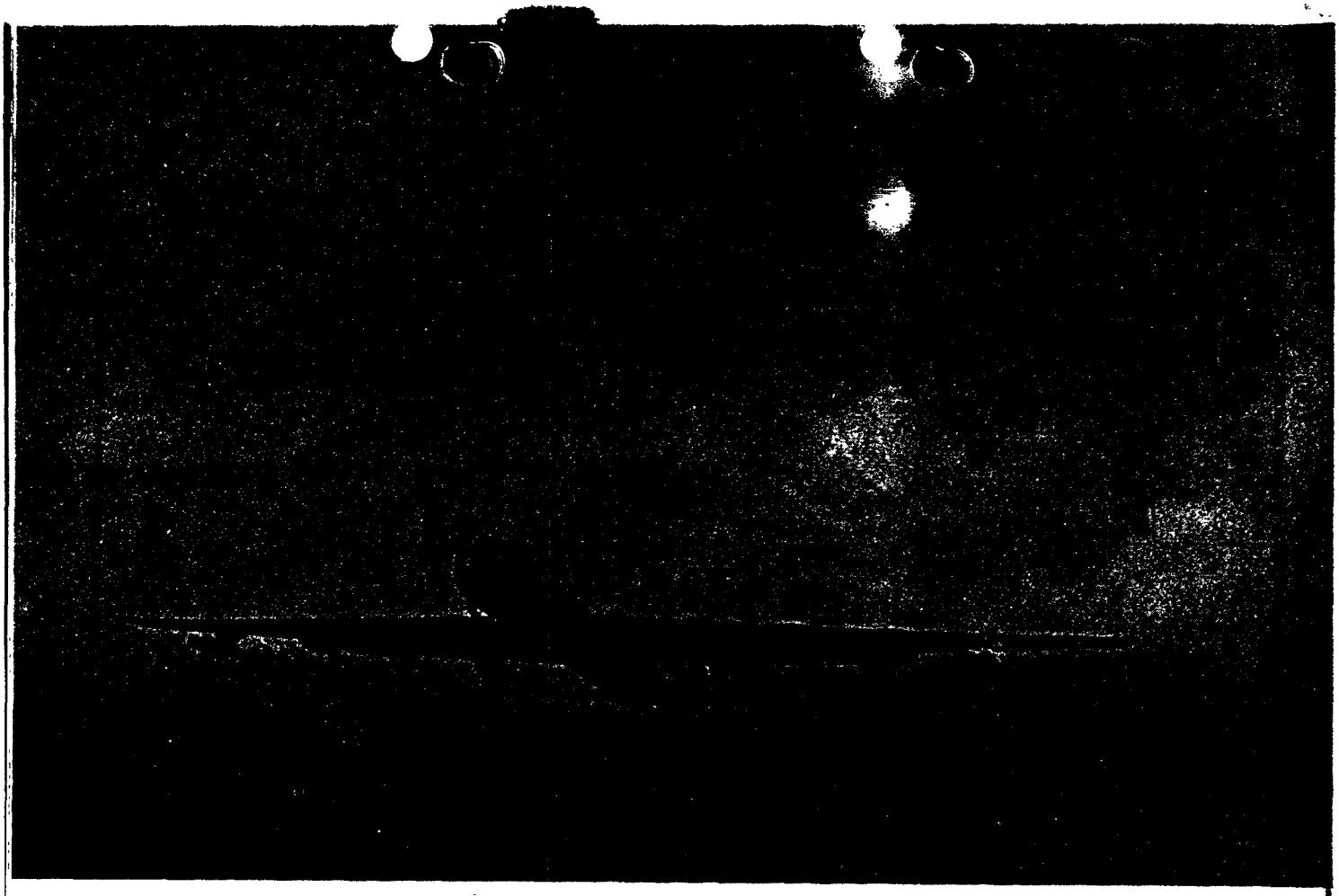
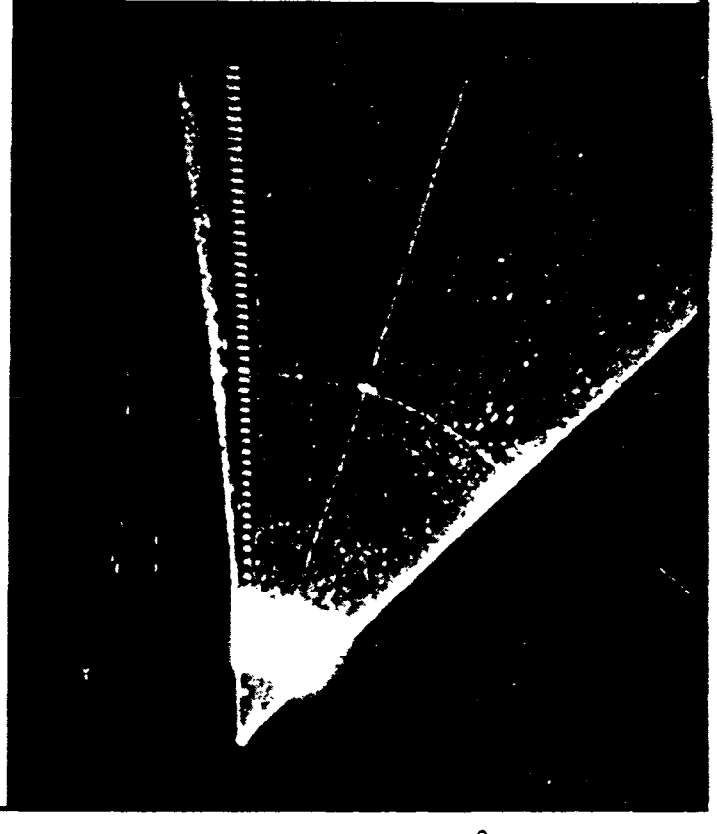


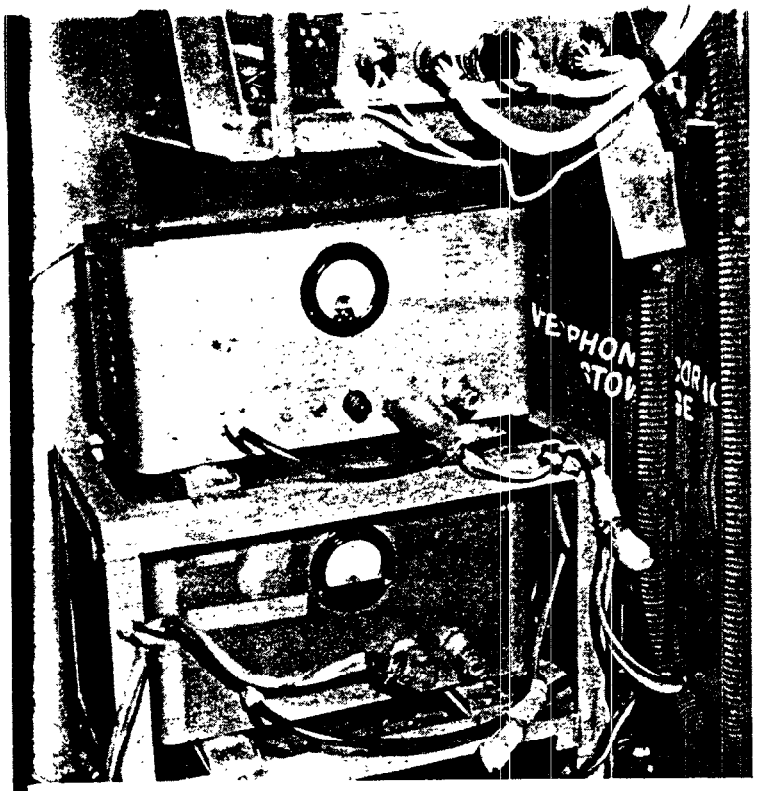
B-36 Taking Off at KWAJALEIN on KING Day

Indirect Bomb Damage Assessment

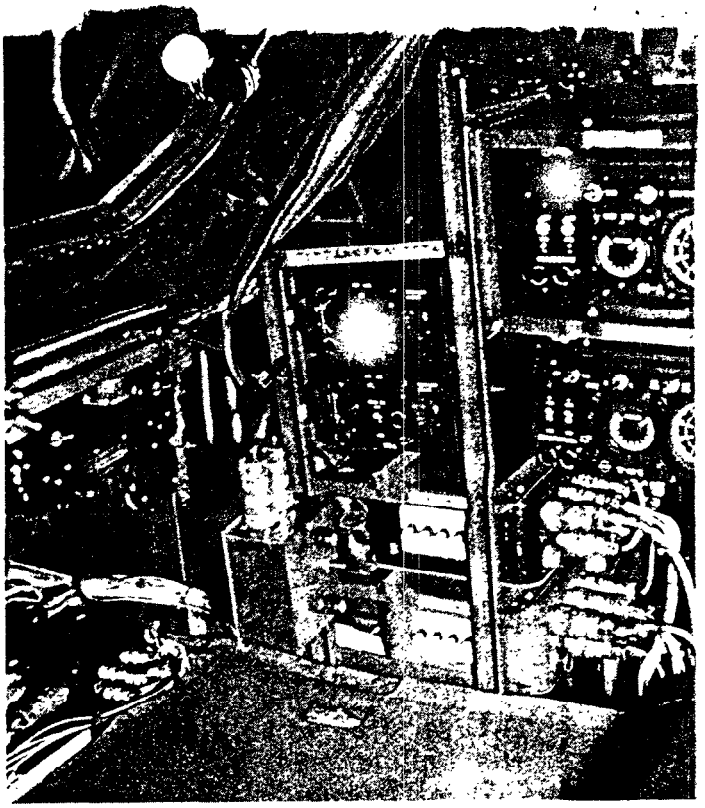
B-36H DROP AIRCRAFT MISSION SUMMARY

TAKE OFF	ON TIME
ALTITUDE	40000
H-HOUR TIME ERROR	-1
CIRCULAR BOMBING ERROR	215'





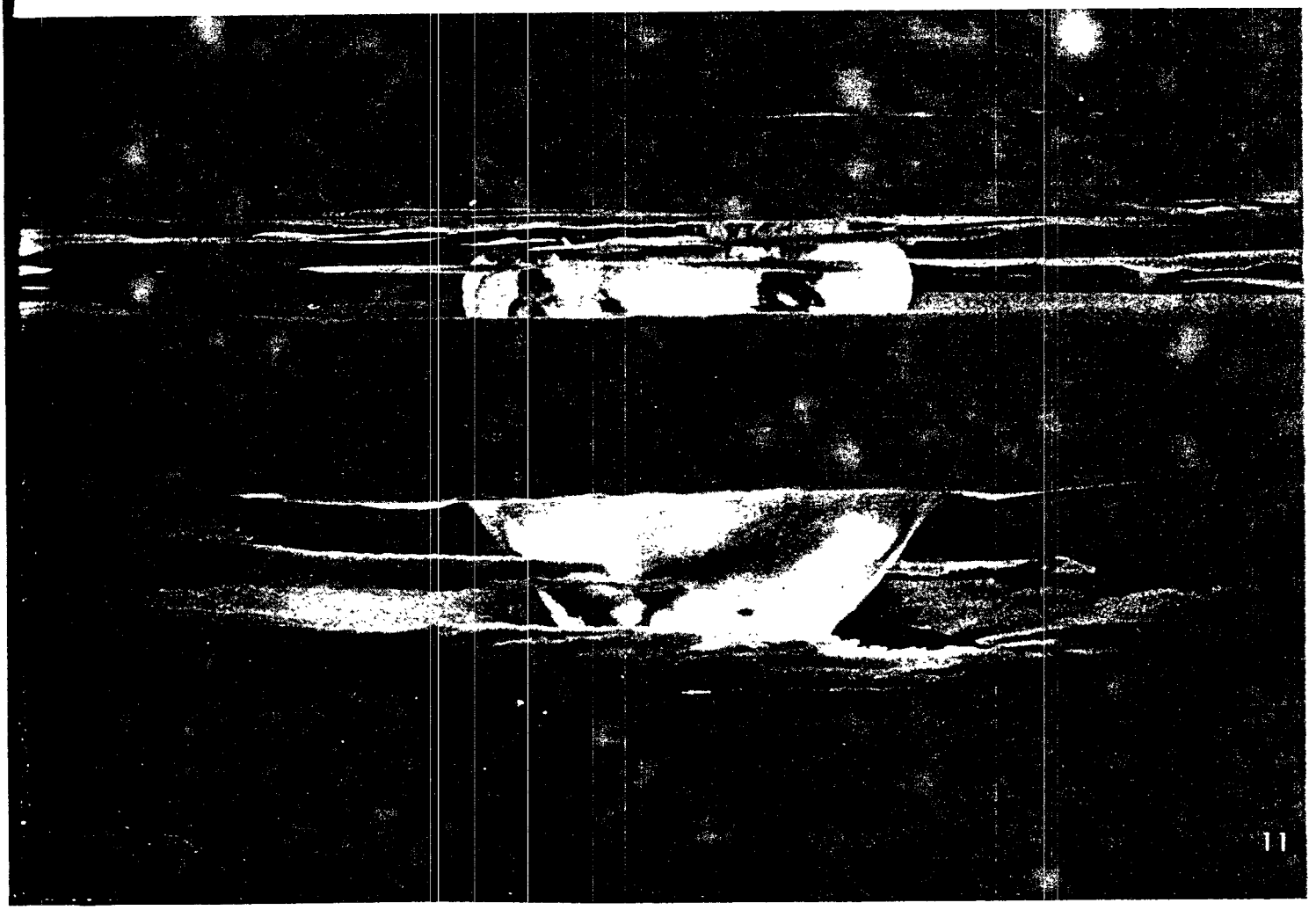
Release Tone Transmitters



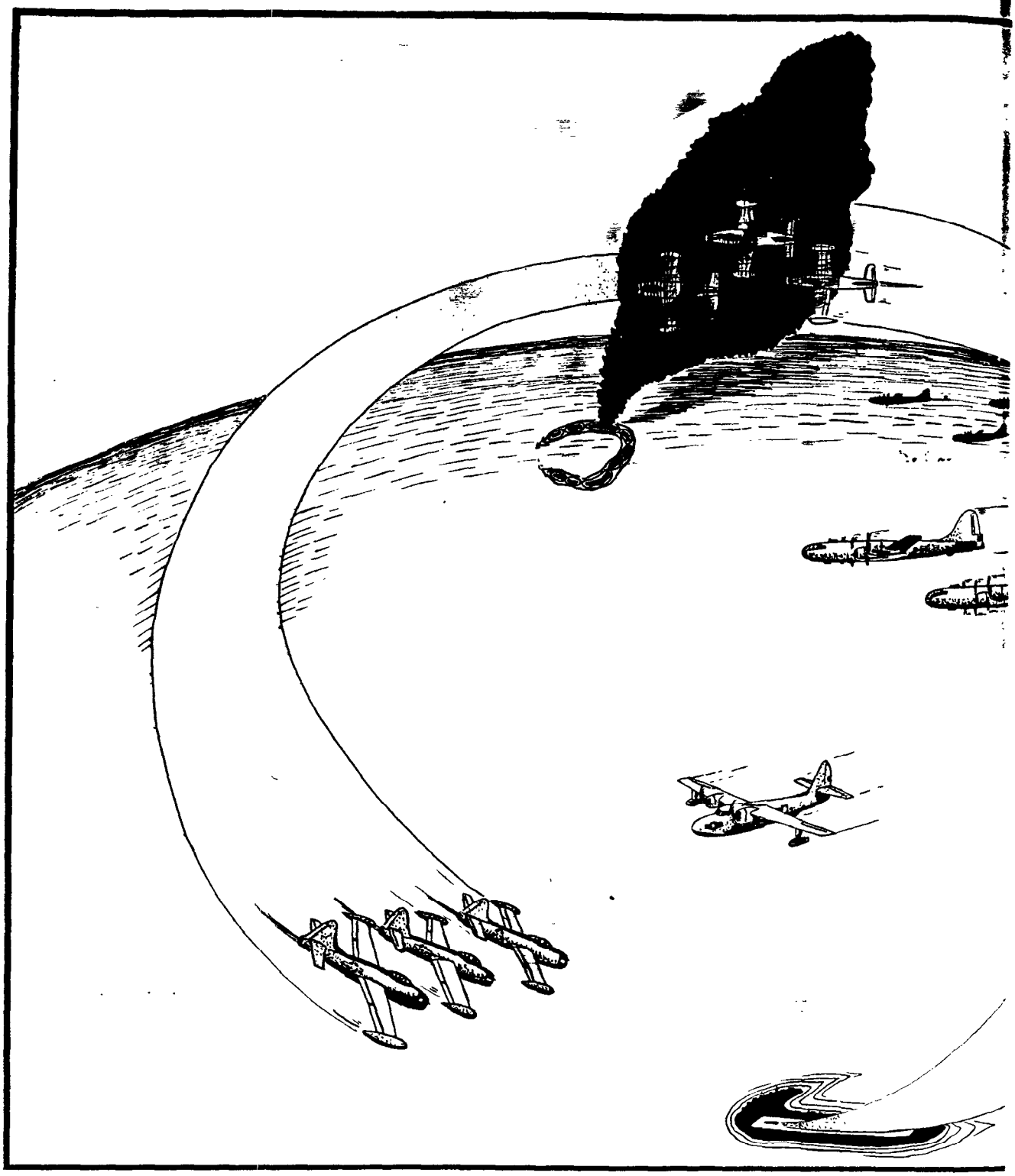
Bomb Monitoring Equipment in B-36

AEWL/MO

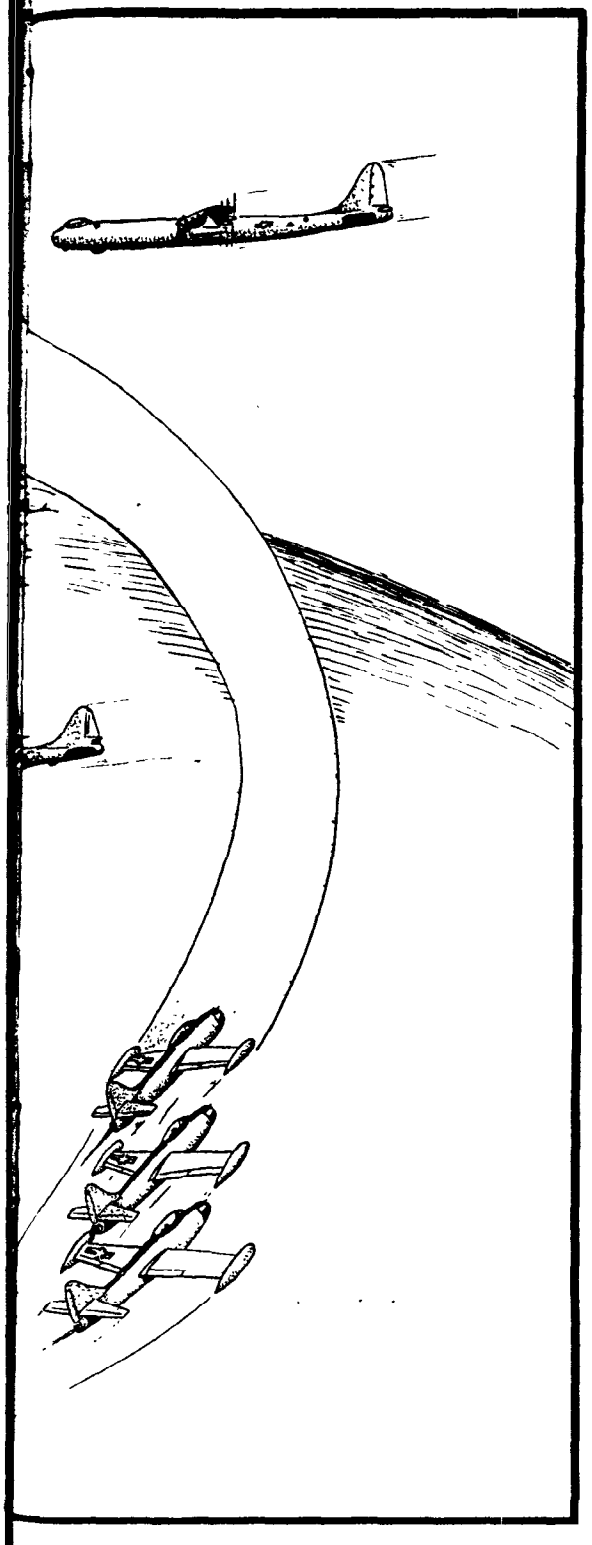
Fireball



Collecting The At



mic Cloud Samples



One of the definitive methods of determining the extent of the nuclear or thermo-nuclear reaction of a detonated bomb or device is the analysis of the radioactive particles and gas that remain in the cloud after the fireball has died away. As a result, the immediate collection of cloud samples and their return to ZI laboratories is of primary importance to the scientific program.

For the IVY test, manned fighter type aircraft were used to collect samples from the atomic cloud.

The Los Alamos Scientific Laboratories (LASL), specified a requirement for the sampling aircraft to be at the highest possible altitude and for efficiency of sampling to have the highest possible speed. Jet fighter type aircraft were indicated and the F-84G was selected by the USAF because of their inflight refueling capabilities. KB-29 tanker aircraft were included to provide this inflight refueling.

The standby B-36 Bomb Drop aircraft was utilized as the observation platform for the scientists selecting the cloud area for sampling. A modified B-29 acted as an airborne operational control center for all aircraft in the sampling area.

The F-84's took off from KWAJALEIN and proceeded to the sampling area where they orbited around the airborne control center until the scientific team called for them to participate. After two (2) or more cloud penetrations, determined by the readings of the radiological instruments, the fighters were refueled and returned to KWAJALEIN.

The fighters departed KWAJALEIN in flights of four (4) spread over a five (5) hour period and returned the same way or in pairs, determined by the duration of each sampling pass. Two (2) refuelings were accomplished in some cases.

Immediately after return to KWAJALEIN the removed samples, stored in special containers, departed for LASL the same day aboard two (2) R6D aircraft. Within thirty (30) hours from collection, the first of the samples was delivered.

AFWL/HO

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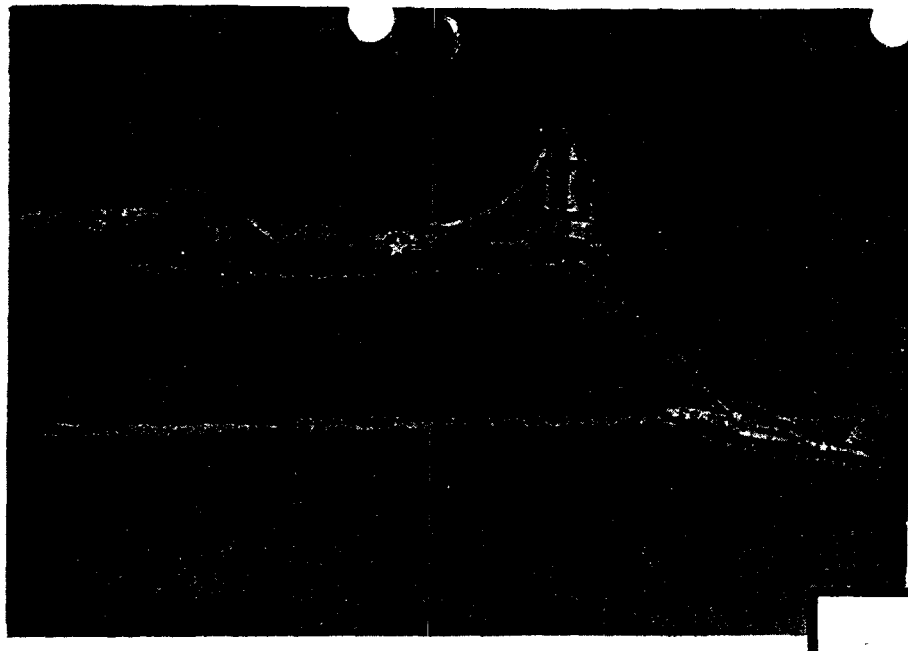
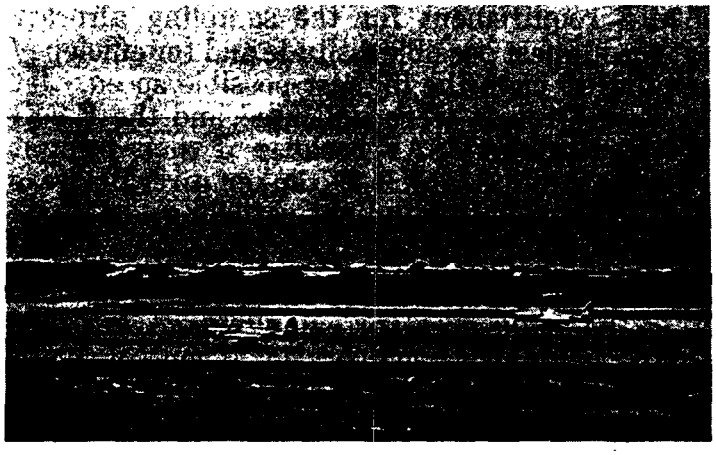


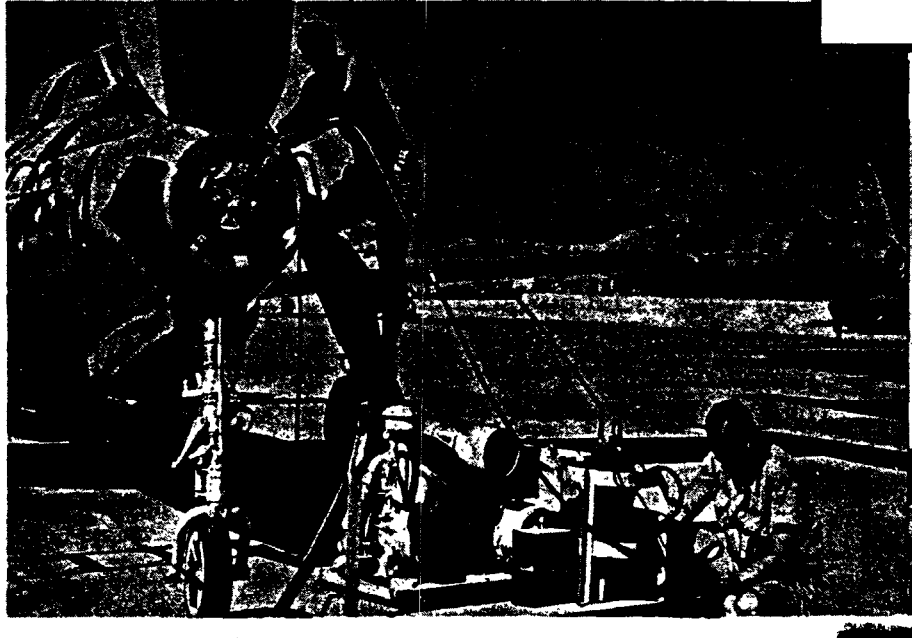
KB-29 Tanker Refuels F-84 in Flight

Removing a Sampling

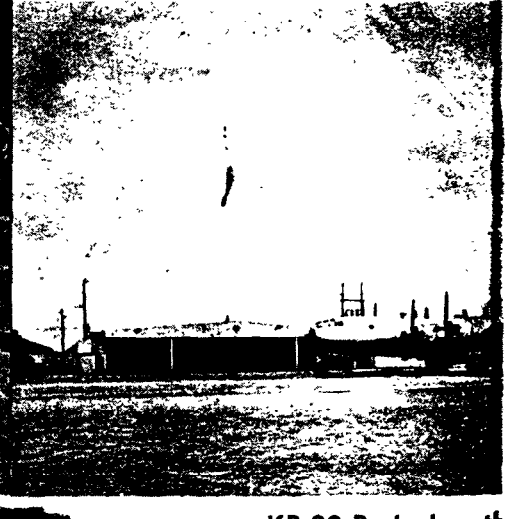


Flight of Sampler Jets Depart KWAJALEIN

A/C TYPE	NO. T.O. SCHED.	NO. T/O COMP	CO
"MIKE"			
F-84G	14	14	
B-36H (CONT.)	1	1	
B-29 (CONT.)	2	2	
KB-29	8	8	
WB-29	2	2	
SA-16	2	2	
SB-29	2	2	
"KING"			
F-84G	14	15	
B-36H (CONT.)	1	1	
B-29 (CONT.)	2	2	
KB-29	10	10	
WB-29	2	2	
SA-16	2	2	
SB-29	2	2	



Removing Gas Samples from the F-84



KB-29 Parked on th

AFWL/HO

te After F-84 Mission

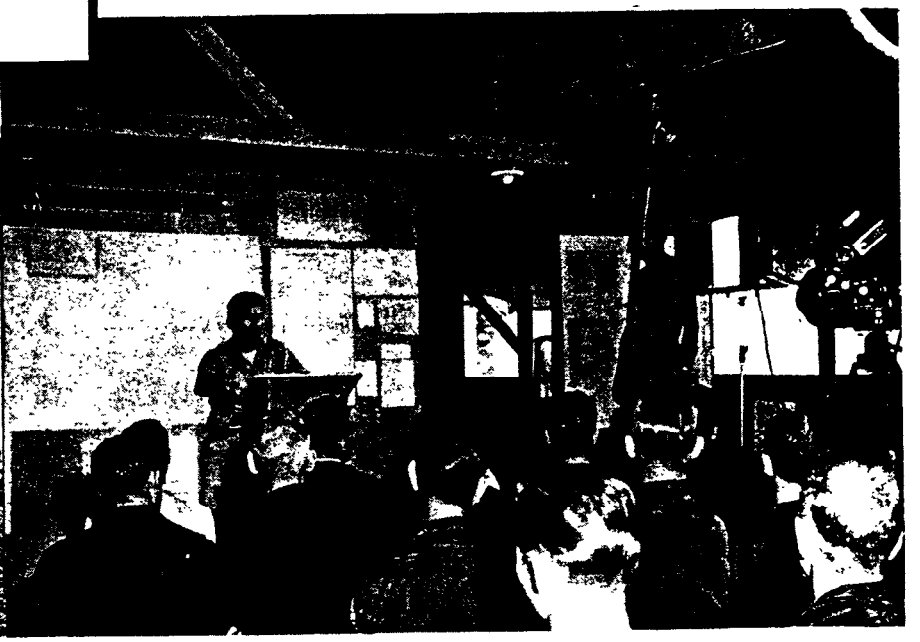
Instrument Panel of an F-84G Sampler

NS TED	SUCCESSFUL SAMPLING	REMARKS
	12	
	—	
	—	
	—	
	2	
	—	
	—	

10	ONE F-84 ABORTED GEAR MAL ONE F-84 ABORTED FUEL MAL SPARE F-84 ABORTED ENGINE MAL
2	SB-29 ABORTED PROP MAL

Pilot Completes Sampling Mission

amp at KWAJALEIN

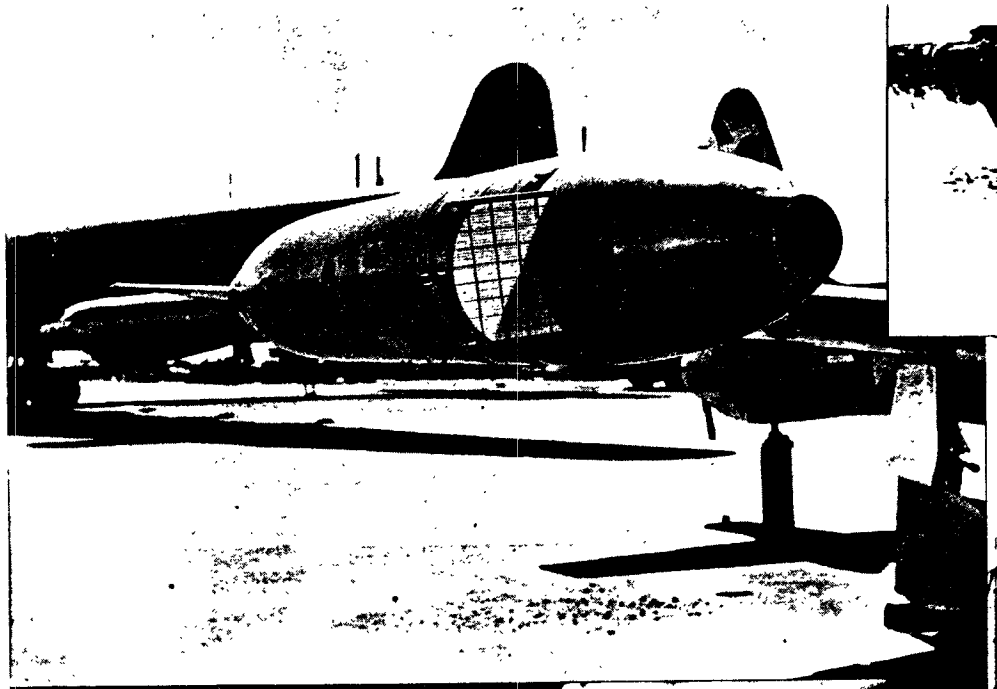


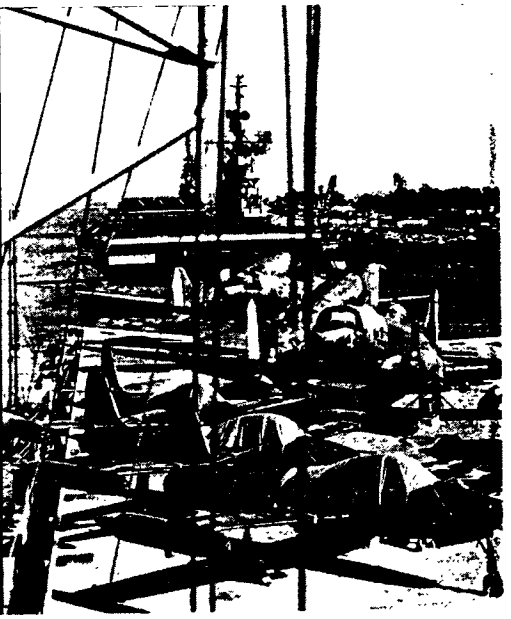
Mission Briefing for Flight Crews

AFWL/IMO

92

Sample Plate in F-84 Tiptank





F-84's Being Loaded on U

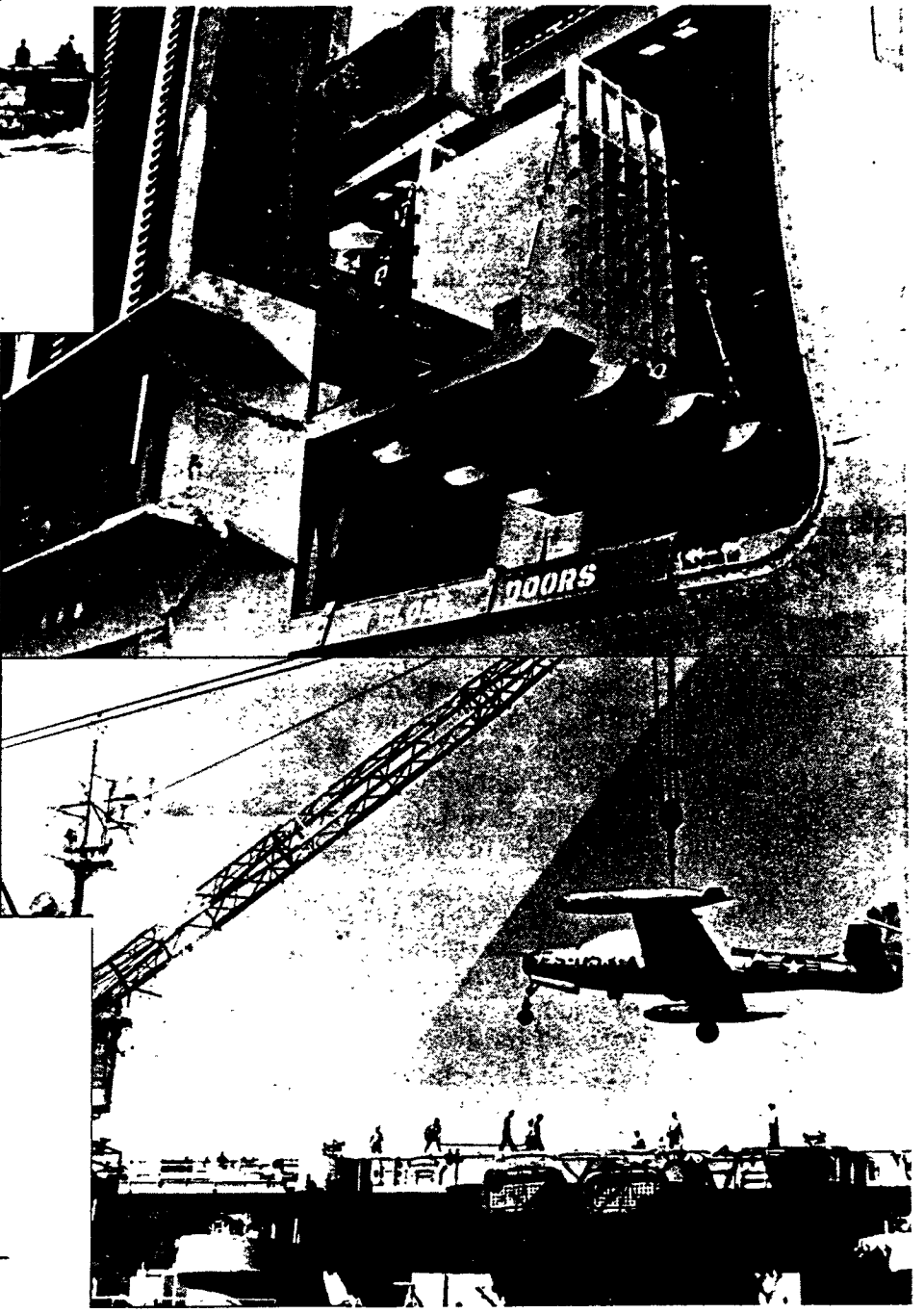
Refueling Boom on KB-29 Tanker

F-84's Awaiting Shipment at SAN DIEGO

Off Loading F-84's at [redacted]JALEIN

Radiological Samples Being Loaded on R6D

RENDOVA at SAN DIEGO



Loading an F-84 Jet Aboard the USS RENDOVA

Measuring Effects Of A Tactical

Inevitably with the creation of larger and larger weapons the question arises of the ability of present day aircraft to deliver these bigger weapons. Therefore, considerable effort has been made in past tests and again on IVY to measure the effect of atomic explosions on the most modern delivery aircraft. Information is needed to confirm or deny the validity of theoretical calculations and to fill missing points on partially constructed curves. From these curves and calculations come answers to the maximum yield bomb that may be carried in presently operational aircraft, which obviously, has an immediate effect on the atomic stockpile and has tremendous influence on structural changes and design modifications to be made in projected aircraft.

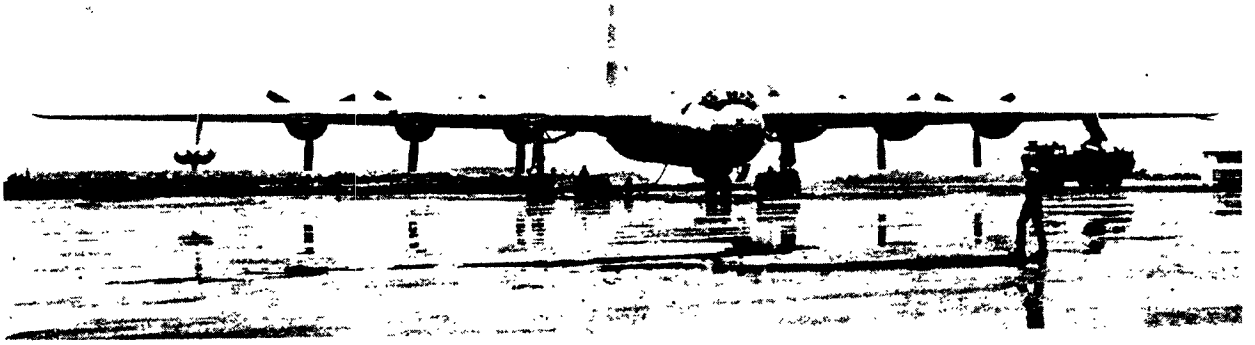
The effects with which these tests were concerned were thermal and blast. It has been previously determined that the radiation hazard from big bombs is not the limiting factor.

The method of conducting these tests was divided into two (2) phases, close-in measurements utilizing parachute supported canisters and measurements of strains, deformations, and temperatures taken at critical points on manned aircraft. The canisters were dropped so as to have the first at low altitude over ground zero and the remainder extending thirty (30) miles down wind in a line increasing in altitude. Each canister automatically radios to a receiver on the ground, altitude, temperature, and two (2) ranges of peak pressures. By correlating the space position of the canisters with the timed readings the thermal and blast waves can be plotted as a function of time and distance. The manned aircraft, in this case a B-36D and a B-47B, had installed thermo-couples, straingauges, and accelerometers of various types with recording meters and oscilloscopes. By positioning these aircraft in space at the very threshold of damage the actual structural distortion and skin temperature rise under realistic conditions may be determined.

The charts on the following pages show theoretical calculations of the results that were expected from the detonations of yields indicated. All aircraft in the shot area were positioned by the same type calculations, thus relative positions with respect to ground zero are shown in the last pair of charts. The aircraft crews were given a five (5) second tolerance to be in position. Any greater error would either endanger the aircraft and crew or tend to make the data less meaningful.

The results of these tests will not be known for at least four (4) months because of the time required for data reduction.

tomic Blast & Heat On Aircraft



Readying B-36D for KING Shot

B-47 Returning from MIKE

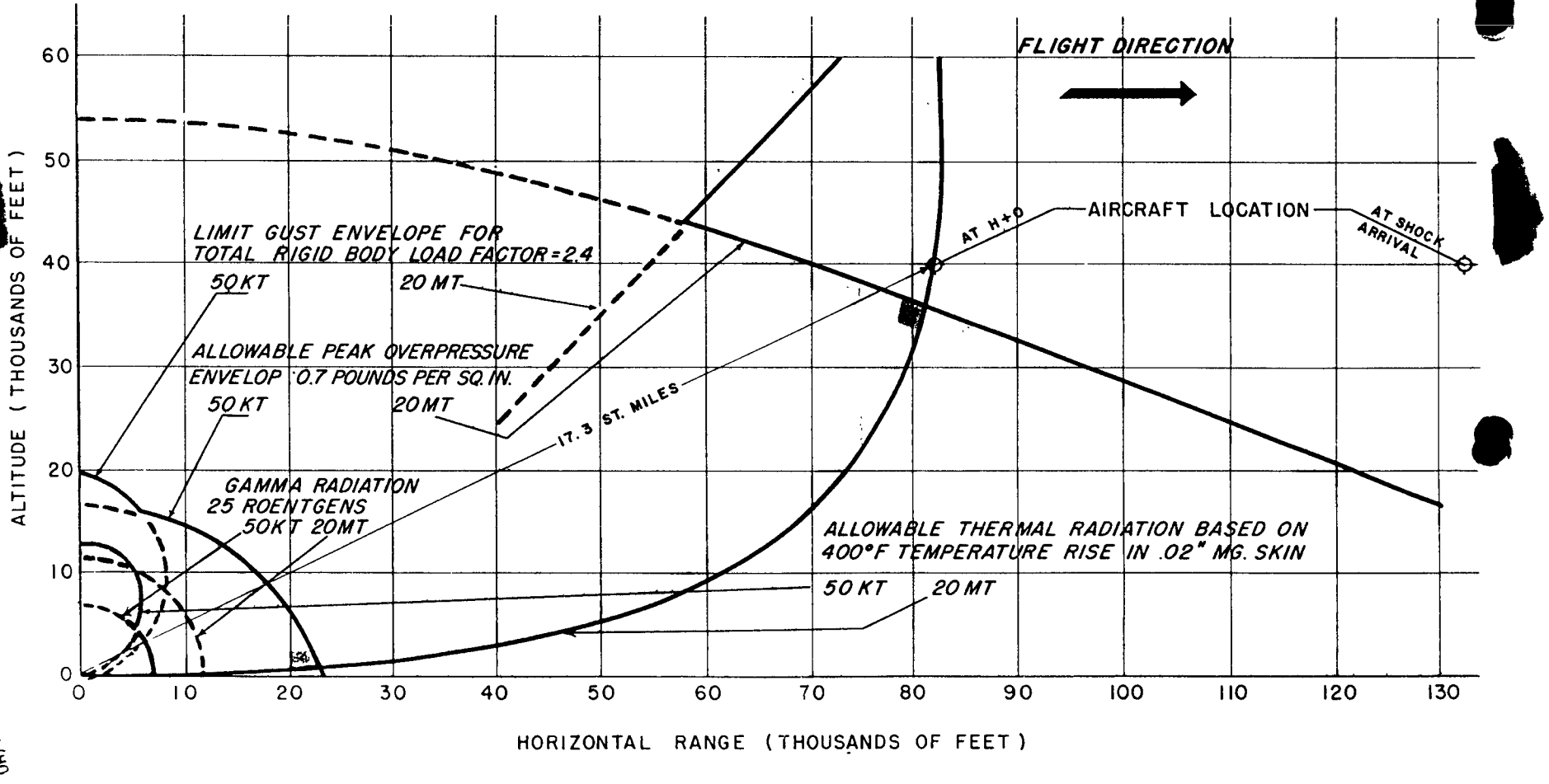
Canister Drop B-29

··MIKE SHOT··

B-36D DANGER REGIONS

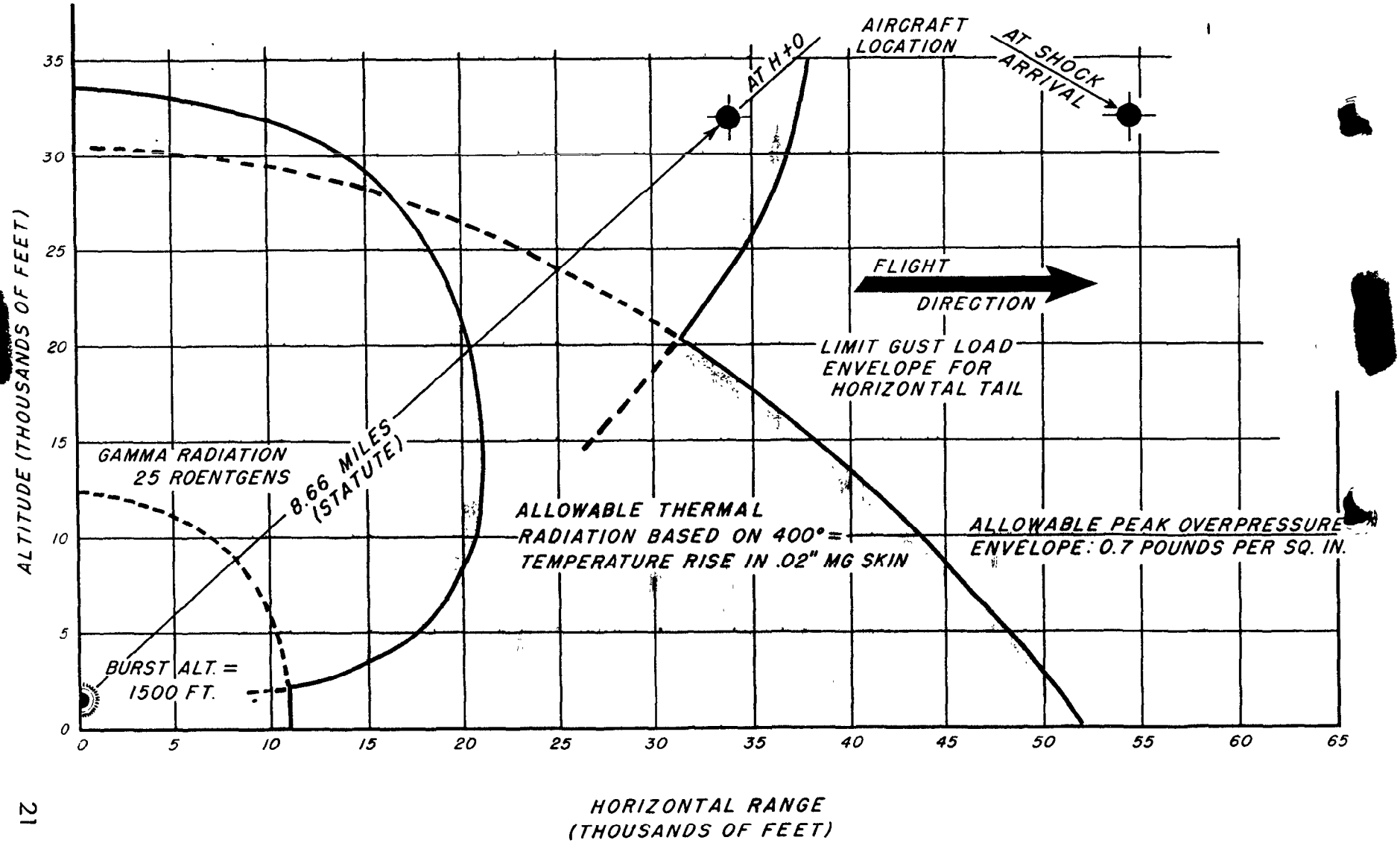
LEVEL FLIGHT CONDITION
BURST ALT = SEA LEVEL

COMPARISON BETWEEN 20MT & 50KT
RED ENVELOPES AT H+0
GREEN ENVELOPES AT SHOCK ARRIVAL



KING SHOT B-36D DANGER REGIONS

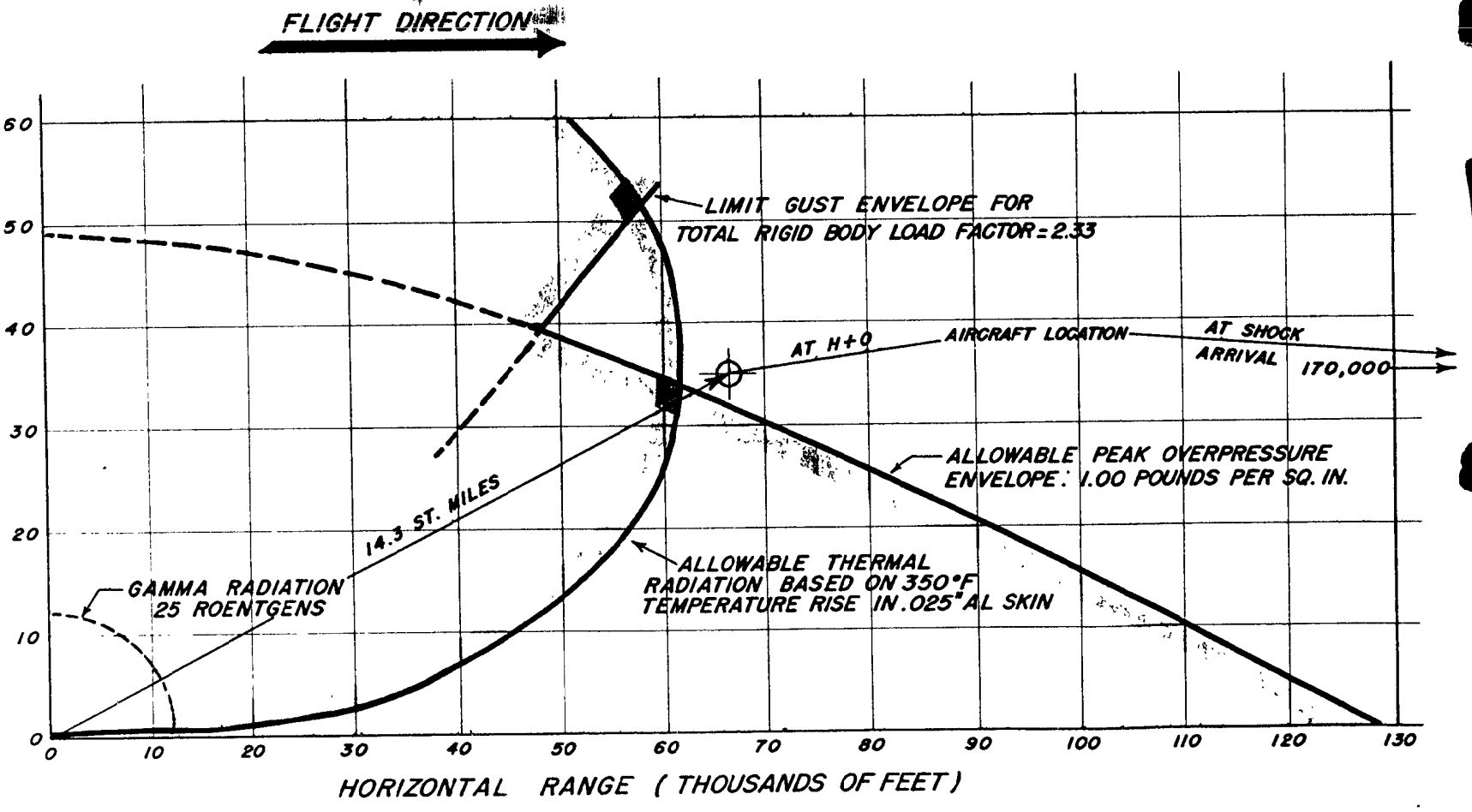
LEVEL FLIGHT CONDITION, YIELD=600 KT
BURST ALT.=1500 FT., I.A.S.=163 MPH



·· MIKE SHOT ··

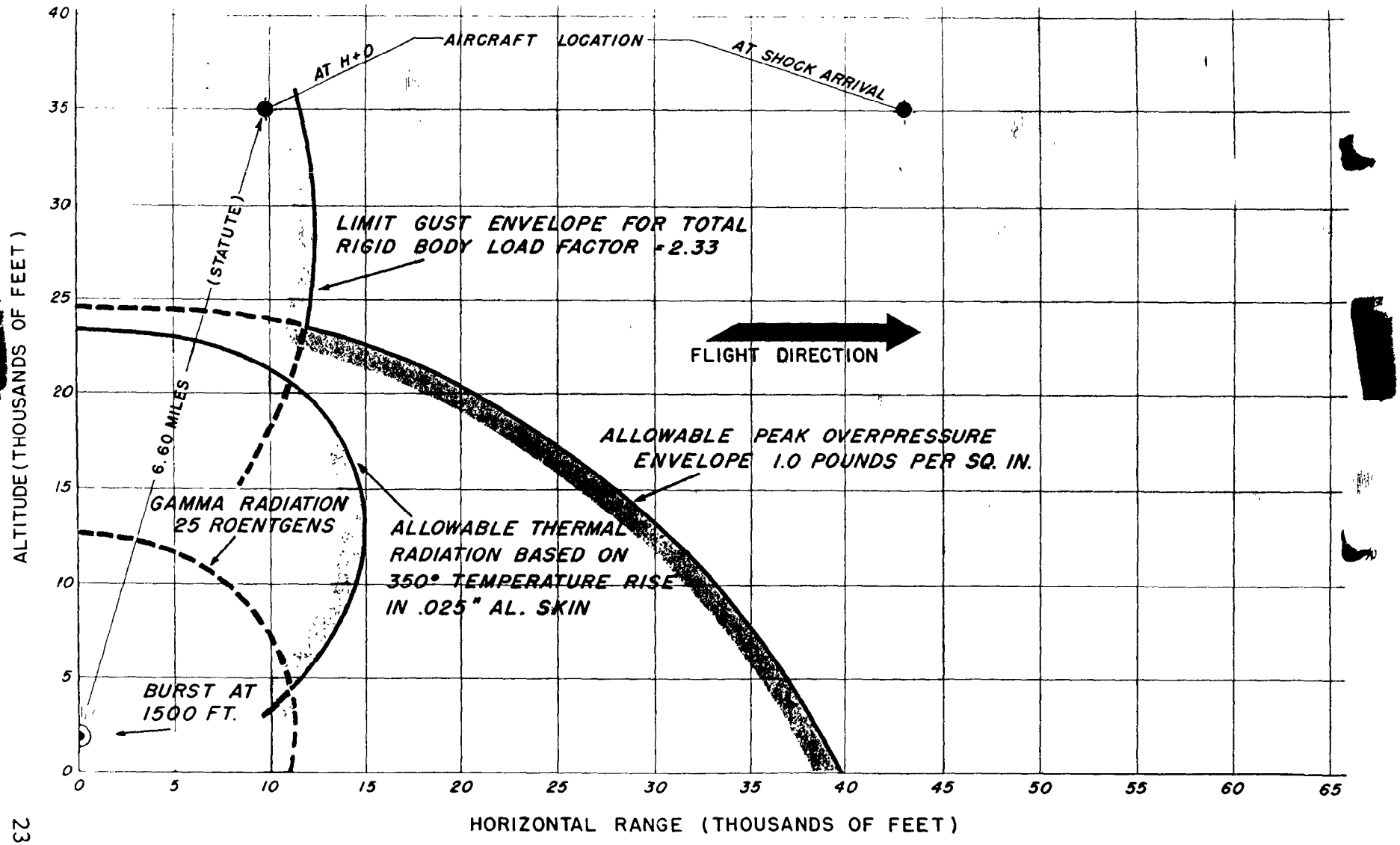
B-47B DANGER REGIONS

LEVEL FLIGHT CONDITION
BURST ALT. = SEA LEVEL
I.A.S = 287 MPH, 20 MT
RED ENVELOPES AT H+0
GREEN ENVELOPES AT SHOCK ARRIVAL



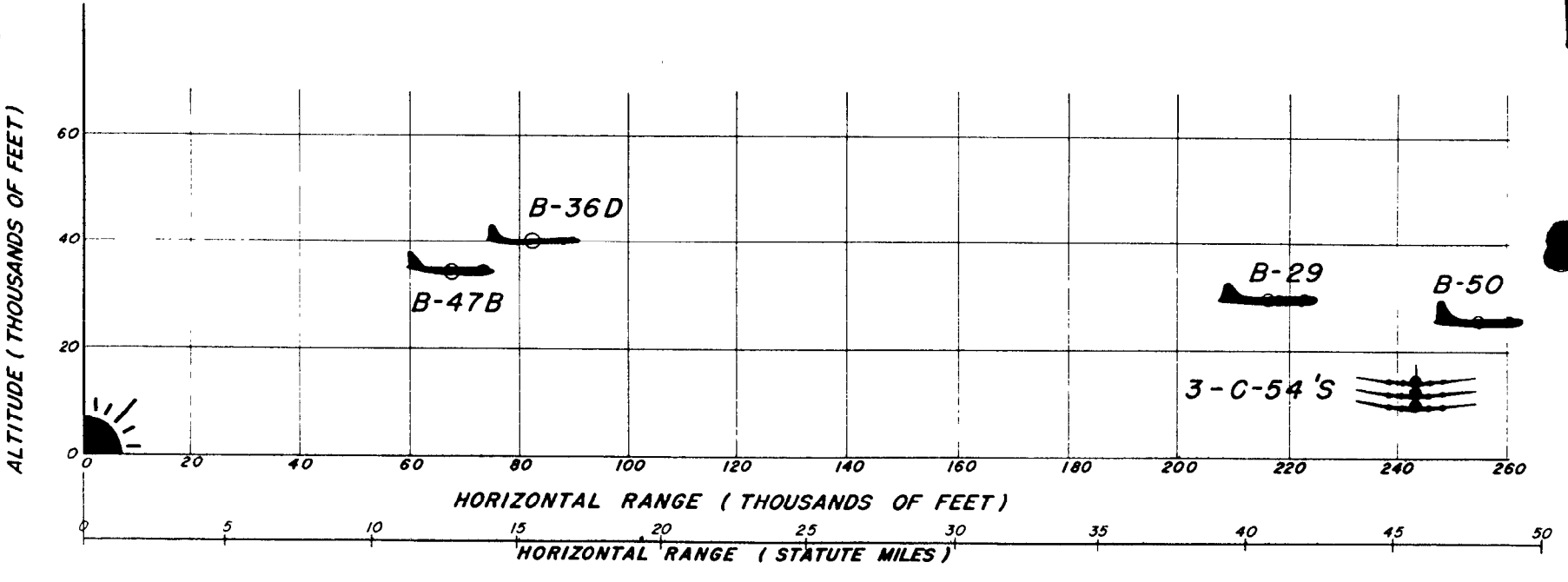
KING SHOT B-47B DANGER REGIONS

LEVEL FLIGHT CONDITION, YIELD = 600 KT
BURST ALT. = 1500 FT, I.A.S. = 288 M.P.H.



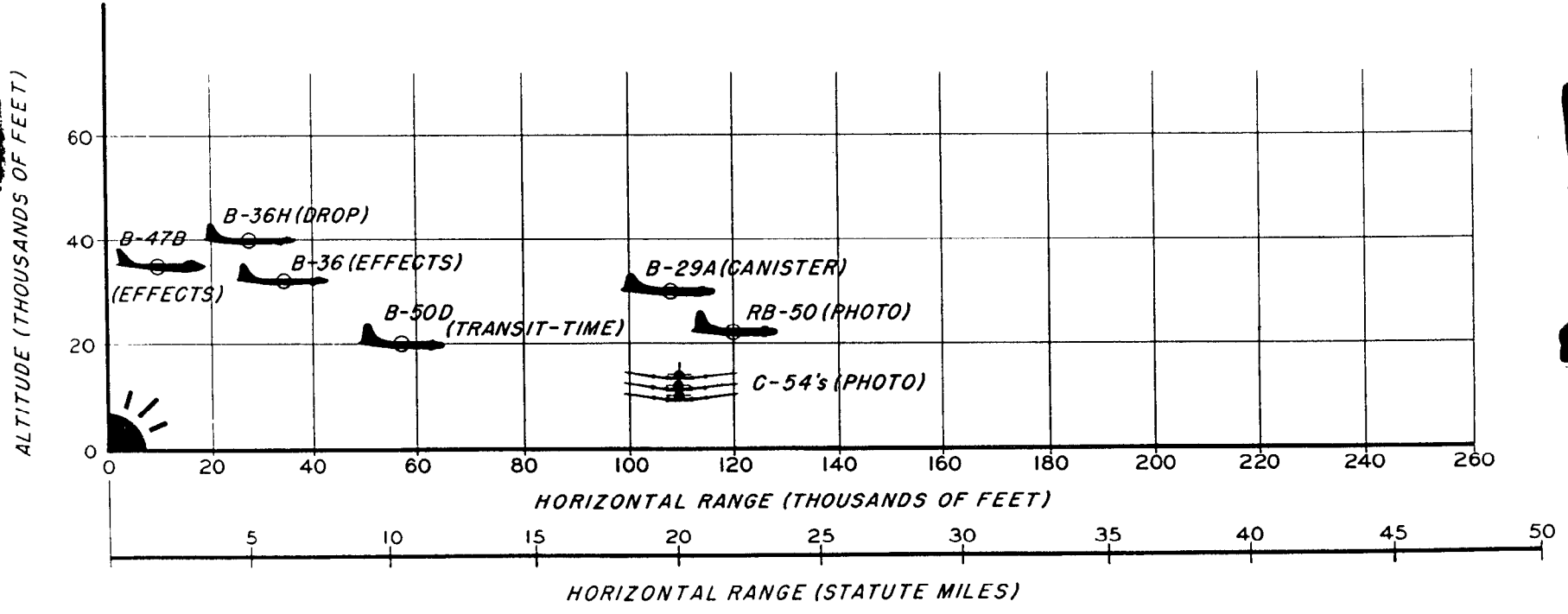
"MIKE SHOT"

AIRPLANE POSITIONS AT H+0



"KING SHOT"

AIRPLANE POSITIONS AT H+0



Aerial Photograph

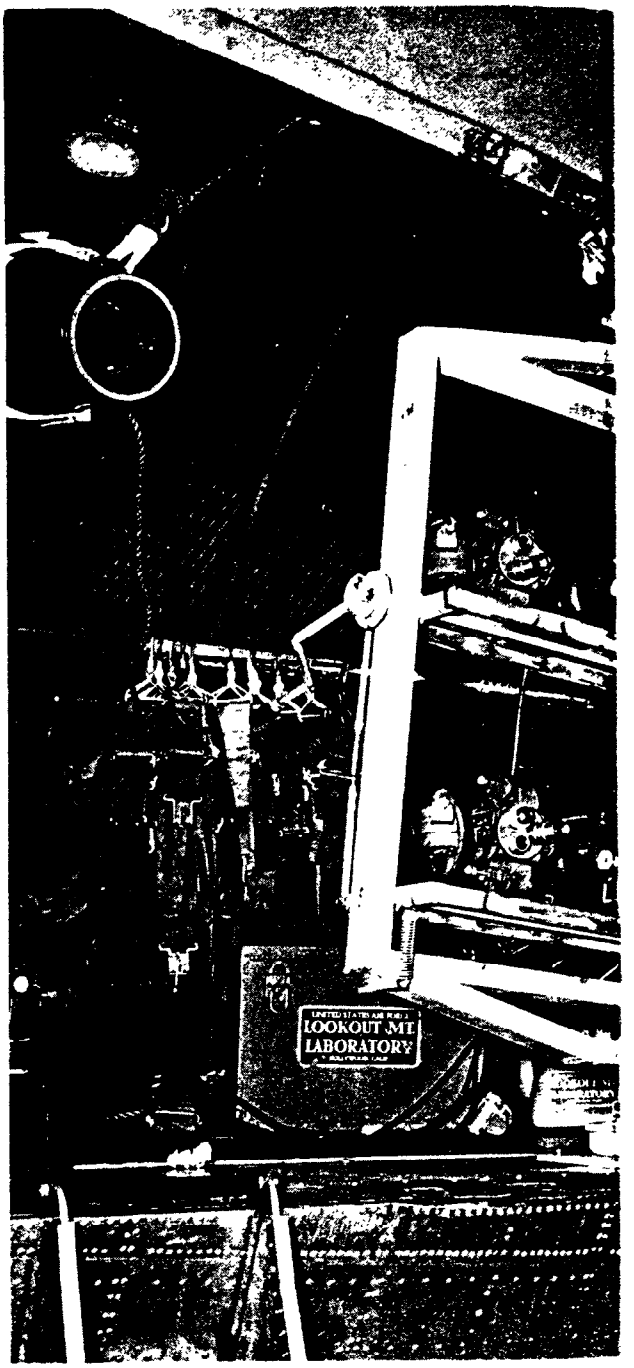
PHOTO DOCUMENTARY UNIT

The Documentary Photographic Element for Operation IVY, consisting of three C-54 type aircraft and one RB-50D, was assigned to obtain complete mapping of Eniwetok and Bikini atolls and to procure complete photo coverage of both MIKE and KING Shots, before, during and after the blasts.

The three C-54's assigned from MATS Pacific Division, were equipped with special camera mounts constructed at Wright Patterson Air Force Base. These mounts, built to accommodate 16 and 35 millimeter movie cameras and several types of aerial cameras for still coverage, were installed in the rear cargo doors of the C-54's.

All aircraft of this unit were in place at Kwajalein by 15 October 1952. Two of the C-54's held a special rehearsal on 14 October and all three of the C-54's participated in the dress rehearsal for MIKE shot on 18 October. The RB-50 made a normal take-off on this rehearsal, but was forced to turn back before reaching its assigned altitude, due to an excessive oil leak in number one engine.

The RB-50 completed low altitude vertical photo coverage of shot island and approximately 50% of the assigned low altitude mosaic of Eniwetok Atoll on 20 October. The remaining low altitude mapping and a complete 1:40,000 scale mosaic of Eniwetok were completed on 23 October by the RB-50; however, all the photography accomplished on that date was lost in a fire which destroyed the RB-50, following an explosion during the landing roll at Eniwetok.



Cameras and

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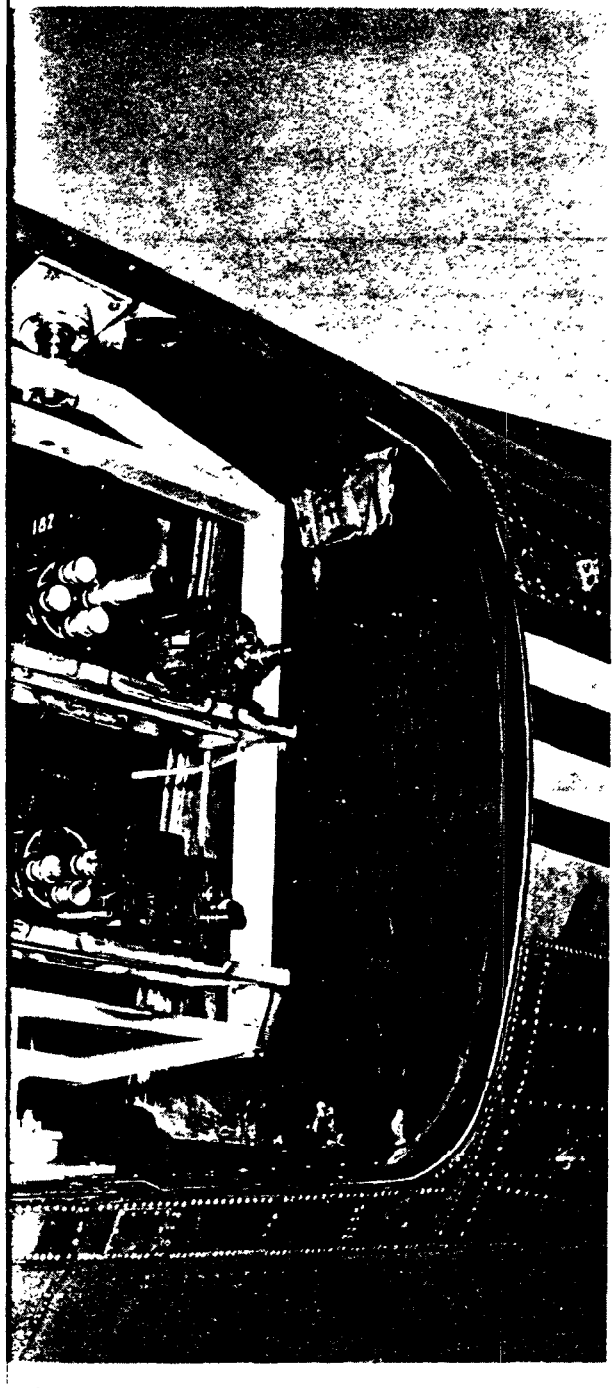
y For The Record



ack in C-54

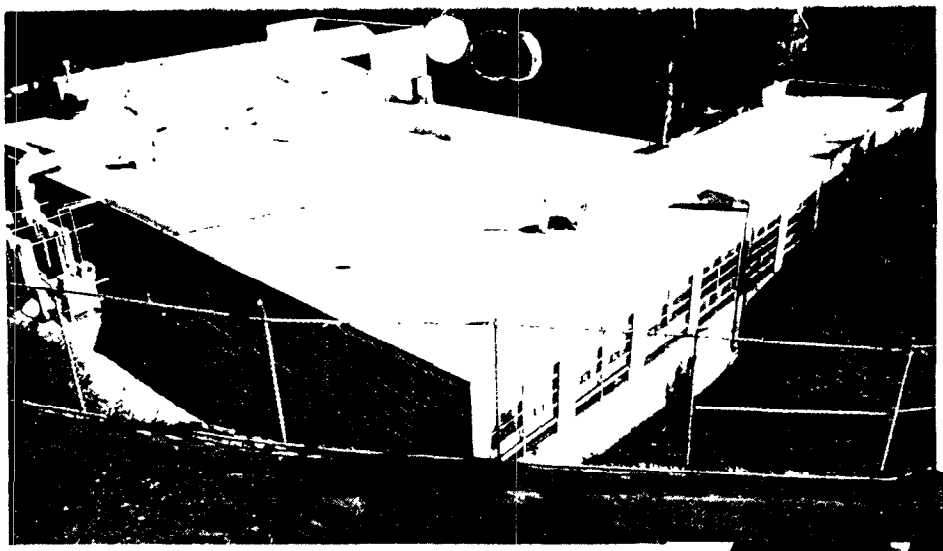
Immediate request was made for replacement of the RB-50, and one of the C-54's was dispatched to Eniwetok to accomplish low obliques of shot island. This documentation had also been accomplished by the RB-50 on 23 October, but was also lost in the subsequent fire.

The replacement RB-50 was delayed by an engine change enroute and did not arrive until after the scheduled take-off time for MIKE Shot. An all-out effort was made to get the RB-50 airborne in time to accomplish crater photo following the blast, but the aircraft did not check out and the flight was cancelled.

The three C-54's participated as briefed on shot day, accomplishing 16 and 35 millimeter movie coverage and obliques of the cloud. One of the C-54's also flew low obliques over shot island approximately an hour and a half after the shot, to obtain crater photography. This aircraft encountered considerable fall-out from the blast and both crew and aircraft were found contaminated with radioactivity upon their return to Kwajalein. As a result, the low oblique photography, which was developed locally, was heavily fogged.

The RB-50 returned to shot island 2 November to accomplish low altitude vertical photography of the blast crater. Several mapping strips were run at both fifteen hundred and twenty-five hundred feet, but the film did not give adequate detail, due to insufficient light, spoiled film or inadequate developing.

On KING Shot all 3 C-54 and the RB-50 participated. Weather was perfect for photography and excellent results were obtained.



Lookout Mountain Laboratories

Ready

Rear of Camera Rack

AIRCRAFT TYPE	SCHEDULED TAKE OFFS	ACTUAL TAKE OFFS	ALLOWABLE POS. ERROR	ACTUAL POS ERROR	- REMARKS -
MIKE					
C-54 P-2	1	1	2NM	1NM	RB-50 ARRIVED FROM ZI TOO LATE TO MAKE TO
C-54 P-3	1	1	2NM	2NM	
C-54 P-4	1	1	2NM	1NM	
RB-50 P-1	1	0	2NM	—	
C-47 SS-1	1	1	5NM	1NM	
C-47 SS-2	1	1	5NM	3NM	
VIP SC	2	2	10NM	2NM	
KING					
C-54 P-2	1	1	2NM	0	
C-54 P-3	1	1	2NM	0	
C-54 P-4	1	1	2NM	0	
RB-50 P-1	1	1	2NM	1.5 NM	
C-47 SS-2	1	1	5NM	1NM	
C-47 SS-3	1	1		NOT APPLICABLE	

[redacted]

Aircraft Co

1. Air Op

USS

2. Air Op

KWA

3. Airborr

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rations Center

ESTES

rations Center

JALEIN

e Control Center

Air Operati

(Combat Inform

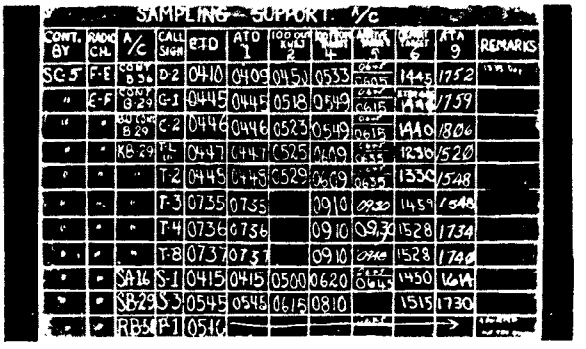
USS E

Overall control of the Joint Task Force air effort was centered in the Air Operations Center on the Command Ship, USS ESTES. From this point, the Air Task Group Commander kept the Joint Task Force Commander advised of the readiness and position of critical Task Force aircraft, provided him with immediate air mission accomplishment results and directed for him the Task Force Search and Rescue Forces.

Control of Naval aircraft was performed by the Navy Task Group Commander aboard the USS RENDOVA, with which the ESTES Combat Information Center had a direct radio link. The actual control of the air sampling operation, including that of the Air Force F-84 samplers and the KB-29 tankers, was delegated to the control B-29 aircraft. Air Force Effects Measurement, Drop, Instrumentation and Photographic aircraft established their own positions in space. The Combat Information Center monitored, through radio and radar, the execution of each of these functions, except those of the Navy Task Group. By so doing, it not only stood continually ready to implement decisions of the Task Force or Task Group Commander affecting any aircraft or combination of aircraft, but it had the radar coverage and the communications means with which to discharge emergency Search and Rescue action as long as the operation stayed within radar range.

In order to perform this mission, five (5) radar scopes and controller positions were installed in the CIC. Information from the ESTES search radar, the AN/SPS-6, was fed into these scopes, enabling the Senior Air Controller to delegate a proportionate share of the control function to each of five (5) scope Controllers. Each Controller was provided a VHF radio telephone to converse with the aircraft under his control. The UPX-1

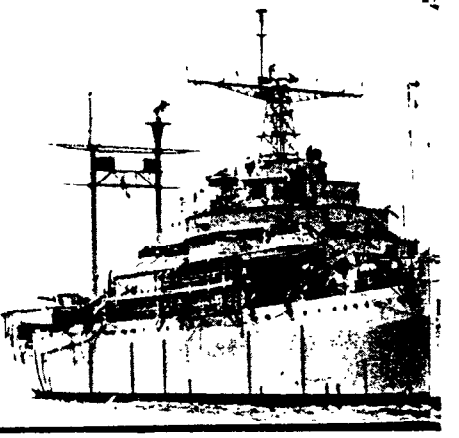
Main Rioting Board



SAMPLING - SUPPORT A/C

CONT. BY	RADIO CH.	A/C	CALL SIGN	ETD	ATO 1	ATO 2	ATO 4	ATO 5	ATO 6	ATA 9	REMARKS
SC 5	F-E	B-29	D-2	0410	0409	0451	0533	0605	1445	1752	
"	E-F	B-29	G-1	0445	0445	0518	0549	0615	1445	1759	
"	"	B-29	G-2	0446	0446	0523	0549	0615	1440	1806	
"	"	KB-29	TL	0447	0447	0525	0549	0635	1230	1520	
"	"	"	T-2	0445	0445	0529	0609	0635	1350	1548	
"	"	"	T-3	0735	0735		0910	0930	1459	1548	
"	"	"	T-4	0736	0736		0910	0930	1528	1734	
"	"	"	T-8	0737	0737		0910	0930	1528	1746	
"	"	SA-16	S-1	0415	0415	0500	0620	0645	1450	1644	
"	"	SB-29	S-3	0545	0545	0615	0810		1515	1730	
"	"	RB-[illegible]	[illegible]-1	0510							

"All Back"



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STES

Repeater Scopes and Operators

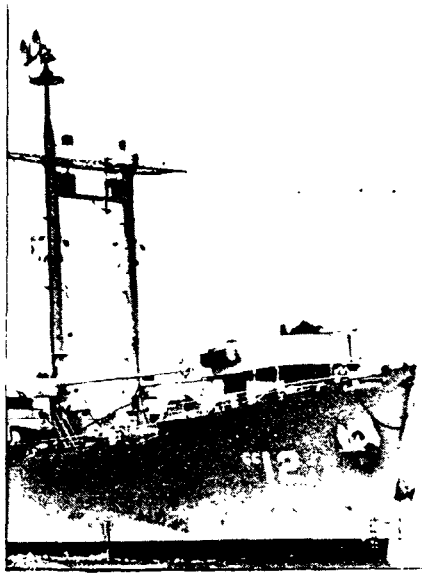
"SS-3, 85 and 73"

component of the Mark 10 IFF system was installed on the AN/SPS-6 radar to increase the radar pickup range on aircraft, to enable constant tracking of aircraft and to assist in identifying aircraft. At peak operation, the dependable pickup range of this equipment on high flying F-84's was 180-210 nautical miles. Radar without this component had a range of only 30-50 nautical miles. The equipment however, although dependable in both control B-29 aircraft, was not dependable on the ESTES and was ineffective throughout the MIKE operation.

The overall air picture was displayed on a vertical plot board. Tracks were told by tellers behind each Scope Controller to plotters who recorded them on this board. The status of each aircraft was maintained on three (3) vertical status boards. Weather information was displayed on another and the position of all ships was maintained on a horizontal chart. Information on the position and readiness of aircraft was received and told to the KWAJALEIN AOC on two (2) HF radio telephones. The Commander of the Air Task Group was provided direct telephone to the Joint Task Force Commander.

These facilities and personnel comprised the primary tools and organization by which the Commander, Task Group 132.4 and his Senior Air Controller executed the Task Force air control function. In addition, they had direct communications with the Task Force Joint Operations Center, Weather Central and Rad-Safe Office.

All CIC personnel, except the Senior Air Controller and his assistant, were from the ESTES' ship complement. They were briefed on their duties by the Senior Air Controller while the ESTES was enroute to the forward area. The ESTES CIC officer then supervised their training, which proved exceptionally effective during actual operations.



USS ESTES

AIR OPERATIONS CENTER

KV

The Air Operations Center was designed to serve as take-off, landing control and tracking monitor of Task Group aircraft and to serve as a source of information to the forward area Air Operations Center aboard the USS ESTES.

The physical layout consisted of a large plotting map, aircraft movement board where scheduled times were recorded, weather information chart, air radex plotting board and an operating table where the controllers were equipped with the necessary communications facilities for accomplishing their mission.

Communications included:

a. Direct land line telephone to Naval (Base) Operations, the control tower, SAR controller, the communications center (AACS), Radiological defense activities, all operations offices of subordinate task units and elements, and one line to the Task Group Commander.

b. Radio Channels: "C" and "E" (VHF), air to ground on 5 and 8 megacycles (HF), and two radio point-to-point voice circuits to the forward area (HF). All communications were terminated on AN/TTQ-1 equipment.

The operating procedures were as follows: Take-off and landing times were telephoned to the AOC by the tower. The information was called to the forward area over radio circuits by the Senior Air Controller and then plotted on the movement board. An airman controller maintained a listening watch on "C" Channel and, when the aircraft reported 100 miles out, the same plotting and telling procedures were followed. The same pattern prevailed when aircraft reported 100 miles out (inbound) and when they landed. In all radio transmission, code words were used for positions and aircraft.

Other pertinent information was immediately passed to the forward area; such as aborts, aircraft substitution, schedule changes, local weather observations and forecasts and instructions from commanders of aircraft units.

The AOC was manned by two (2) officers, two (2) airmen controllers and an airman specialist who maintained and installed the AN/TTQ-1 equipment. During rehearsals and on shot days these permanent personnel were augmented with radiological specialists and representatives of all the units with aircraft involved in the operation.

VAJALEIN

KING DAY

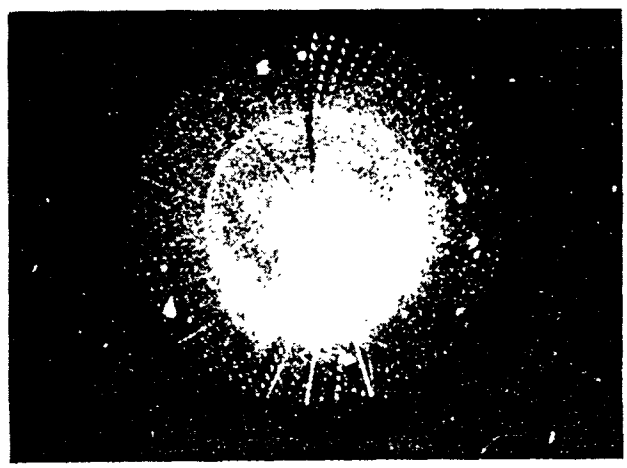
Airborne C

The B-29 Control Aircraft provide an Airborne Operational Control Center for the control of all aircraft in the sampling area. The normal crew was augmented by two additional observers, one additional radio operator, a senior controller, a radar mechanic, and one or more scientific observers.

The B-29 maintained a position within 20 miles of the B-36 Control Aircraft by radar and/or visual means. An additional observer manned the 10 inch radar scopes which presented the beacon returns from the aircraft in the area or inbound to the area. This observer constantly relayed the necessary ranges and bearings of all aircraft to another observer who plotted these aircraft on the plotting board. A list of all aircraft in the area and their IFF equipment setting was maintained on the right side of the plotting board. Another chart was maintained showing the bearings and distances from the B-29 to the intermediate refueling area, home base, nearest surface vessel, nearest land, and nearest emergency airfield. This information was furnished by the navigator on a continuous basis.

Utilizing this flow of information to the plotting board, the B-29 senior controller, who was a rated pilot, vectored the inbound F-84G sampler aircraft to the B-36 Control for sampling operations. The B-29 Control maintained constant surveillance of the sampling operation to insure that the directions given by the B-36 scientific observer

Read



ENIWETOK ATOLL

ntrol Center

To Go

did not exceed the limitations of the aircraft and other equipment involved. When an F-84G element completed their sampling operations the controller vectored them to the tanker aircraft for in-flight refueling operations. When the refueling operation was completed, the controller gave the F-84G element the magnetic heading and distance to fly to reach the intermediate refueling point and/or home station.

The controller had three VHF sets at his position for communication with the various task elements in the sampling area, including the SAR aircraft, and with the ESTES AOC. He was prepared to assist in the direction of SAR aircraft to any aircraft in an emergency.

HF communications to the ESTES AOC and Destiny AOC was handled by the two radio operators. Sample traffic was; position reports, aircraft arrivals in the sampling area, aircraft departures from the sampling area, desired changes in takeoff times of later aircraft, weather reports, and other data necessary for the above AOC's to keep abreast of the sampling operations.

In event the B-29 Control Aircraft lost radar contact with any aircraft, the controller advised that aircraft to home on the B-29 utilizing the medium frequency homer installed as a secondary means of rendezvous. A smoke signaling device provided a means of completing visual rendezvous under conditions of restricted visibility.

Precautionary

1. Flight Safe
2. Search & I
3. Crash & F
4. Standby Ei
5. Evacuation

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Measures . . .

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Rescue

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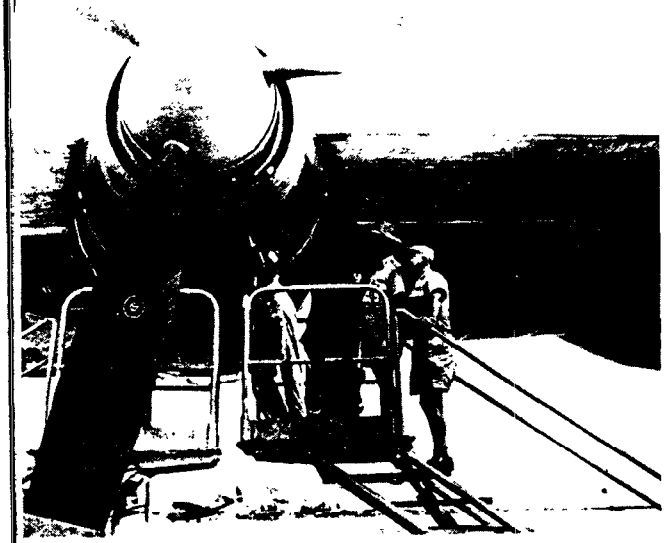
Plan

Flight

"It Pays To Advertise"



Inspection of Maintenance on B-36

"Safety of Flight" was the keynote of all planning, training and operations of Task Group 132.4. The Task Group Commander solicited the recommendations of Flight Safety Research in planning a safe operation. In order to achieve the maximum in aircraft accident prevention a Flight Safety Officer from Strategic Air Command was assigned for duty with the Headquarters of the Air Task Group.

The accident prevention program consisted of the following in brief: review of all operational plans in the interest of safety of flight; flight safety survey of operational areas and corrective action; an intense advertising campaign in the forward area through use of the Task Group Flying Safety Bulletins, posters, other safety publica-

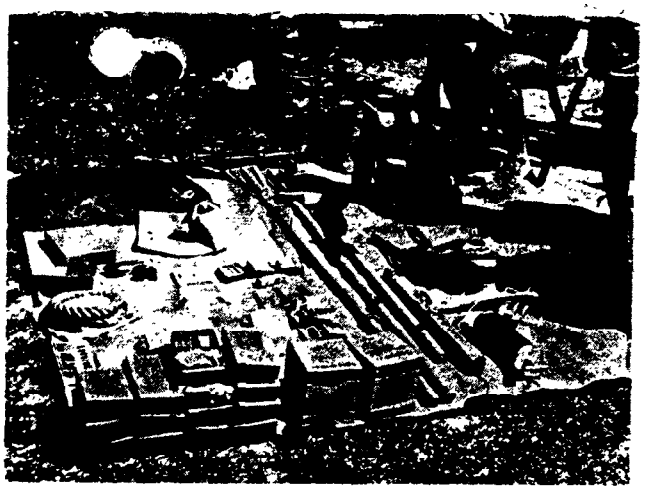
AFWL/HO

Flight Safety Class at Base Swimming Pool

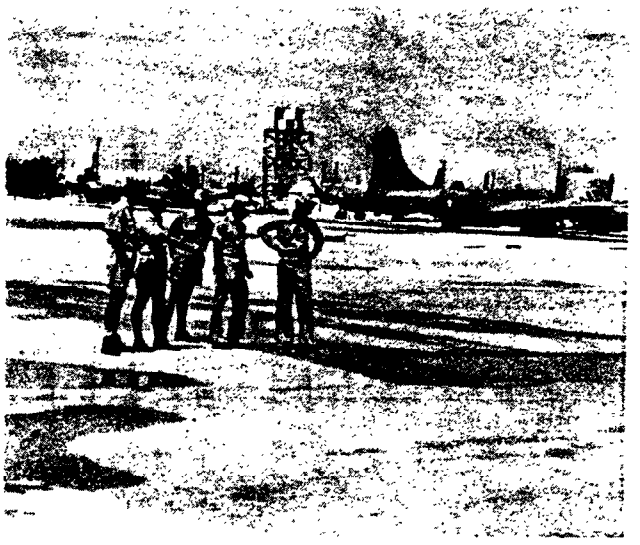
Safety

tions, and flying safety meetings; review of aircraft maintenance; and continued alertness to the daily recurring problems which affected safety in flight.

Looking at the success or failure of the accident prevention program in terms of major aircraft accident rate per 100,000 hours of flying, the Task Group rate during the entire operation was nineteen (19). Comparative rates of other USAF organizations during the year 1951 were as follows: USAF world wide—33, ARDC—50, SAC—19. It should be pointed out that flying during this operation was accomplished in areas and under conditions imposed by the nature of the tests. Present also were inherent hazards not associated with normal flying activity.



Over-Water Flight Emergency Equipment



Surveying Runway at KWAJALEIN

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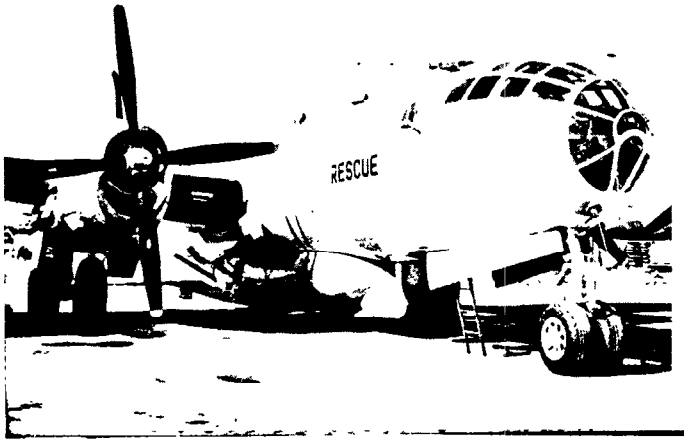
Demonstration in Use of the Liferaft

Search And Rescue

SA-16 Take-off—KWAJALEIN

SAR SB-29 for Operation IVY



Control of rescue operations involving TG 132.4 aircraft on TG 132.4 missions was exercised in the KWAJALEIN area by the TG 132.4 SAR controller, who was the Commanding Officer of the Air Rescue Element 132.4.3.4. During daily operations, in accordance with the terms of the joint agreement with the Naval Station, normal area SAR procedures prevailed. However, on JTF missions, either actual or practice, the TG 132.4 SAR controller at KWAJALEIN was responsible for the overall coordination and control of any rescue effort required.

The Naval Station SAR Center was used as the controlling agency for all missions. This Center, located adjacent to the AOC and base operations, provided a central point at which all information could be gathered and evaluated, and from which instructions to Air Rescue aircraft and naval facilities could be issued. In order to provide maximum cooperation and coordination, the Center was manned by TG 132.4 personnel and personnel of the Naval Station. Thus it was possible to secure unified effort, had the necessity arisen. Under this concept Navy personnel, acting for the Commanding Officer of the Naval Station, were present and capable of directing those facilities peculiarly pertaining to the Navy, while the TG 132.4 controller was directing the efforts of the TG 132.4 SAR aircraft.

Communications facilities used were those permanently employed as part of the Naval Station SAR Center, together with the normally assigned SAR frequencies. By this means it was possible to provide communications with Air Rescue aircraft without additional equipment or personnel.

AFWL/HO

Crash And Fire

Fire-fighting facilities at KWAJALEIN were manned by a force consisting of forty-five (45) Naval personnel augmented by twenty (20) Air Force personnel. Mobile equipment provided to meet all types of fire emergencies included six (6) trucks. To insure that the fire station at KWAJALEIN would maintain an optimum capability to fulfill the special requirements of the Task Group, the intensive training program for fire fighters emphasized techniques which were considered most effective for combating possible fires in each type of aircraft participating in the operation.

Training Under Simulated Conditions

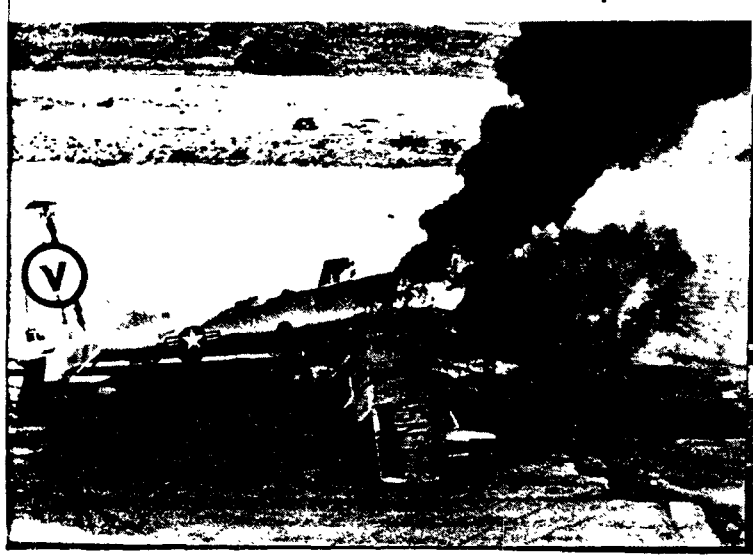
Standby Emergency Aircraft

Because the aircraft used in IVY were specially modified and instrumented for a specific function, the loss of even one (1) would have impaired seriously the capability of the Task Group to carry out its mission. Little could be done to mitigate the hazards imposed by the nature of the mission upon aircraft operations; much, however, could be done to furnish all possible assistance to any aircraft encountering difficulty during rehearsals or actual missions. Under this concept was developed the plan for a standby emergency C-47 aircraft.

The primary mission of this aircraft and its team of specialists was to provide personnel, equipment, facilities and supplies necessary to meet all foreseeable fires, injuries to personnel, crash landings, and damage to aircraft. Fire fighting equipment, medical supplies, and crash tools, together with personnel trained as an integrated emergency team, constituted this unit.

The C-47 was maintained in a ground alert status throughout all missions and rehearsals, fully prepared to depart immediately to the scene of any emergency, in accordance with instructions issued through the KWAJALEIN AOC.

RB-50 Aflame on ENIWETOK Air Strip



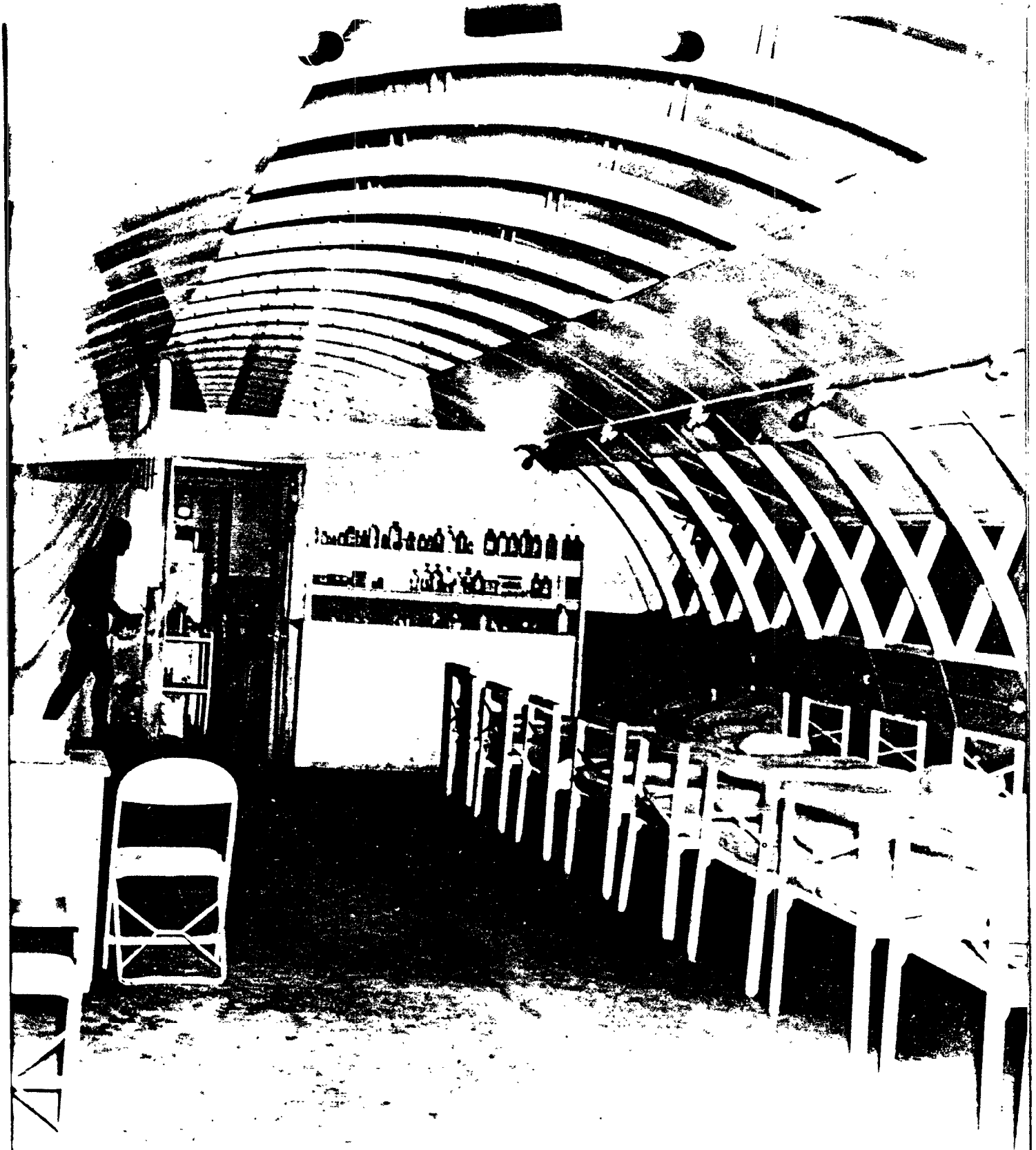
Equipment Aboard Standby Emergency C-47

Evacuation Plan

The purpose of the plan was to accomplish emergency evacuation from KWAJALEIN of all Task Group personnel and aircraft in the event that the radiological cloud should enter this area and create a hazard to the health of the Task Group personnel. This plan provided a possible airlift capability of approximately 3,836 personnel, if all assigned aircraft available under emergency conditions were loaded to maximum emergency capacity, without regard to available emergency equipment for all evacuees. Joint Task Force 132 personnel on KWAJALEIN, at top strength, totalled approximately 2,515 persons, including officers, airmen, and civilians. The excess capacity could have been made available to KWAJALEIN Navy personnel if the Commander of the Naval Station desired to evacuate personnel under his command. Aircraft loads were established as set forth in SAC Regulation 60-10, and by actually determining maximum loading of aircraft at ROSWELL, NEW MEXICO and KWAJALEIN. It was proposed that F-84G and C-47 type aircraft would evacuate to MAJURO and all other aircraft would evacuate to HICKAM AFB, T.H.

Evacuation Capabilities

AIRCRAFT TYPE	NUMBER OF AIRCRAFT	NO. OF PERSONNEL PER AIRCRAFT	TOTAL
C-47	4	49	196
B-29B (Control)	2	147	294
F-84 (Sampler)	16	1	16
KB-29P (Tanker)	10	75	750
WB-29A (Weather)	6	160	960
C-54 (Photo)	3	105	315
RB-50D (Photo)	1	75	75
SB-29 (SAR)	2	46	92
SA-16 (SAR)	2	16	32
B-50 (Inst.)	2	129	258
B-29B (Canister)	2	147	294
B-47 (Effects)	1	4	4
B-36 (Drop & Back Up)	2	200	400
B-36 (Effects)	1	150	150
TOTAL	54	1,304	3,836



Air Force Dispensary on KWAJALEIN

Vital Support

1. Maintenance Co
2. Air Installations
3. Communications
4. Aids To Navigat
5. Weather
6. Radiological Saf
7. Airlift In The F

Activities . . .

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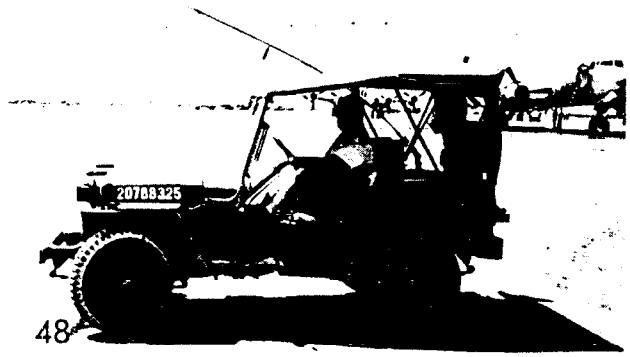
Maintenance Control

Radio Calls for Maintenance Received Here

Maintenance Control Staff Sections

Maintenance Control Officer



The SAC "Maintenance Control" system was adopted on Operation IVY for the first time during the operational phase of an overseas atomic test. The maintenance of sixteen (16) different types of multi-engine aircraft operated by the Navy, MATS and the Task Group, all using one (1) system of maintenance shops, necessitated the establishment of a single control to establish priority. This control was vested in "Maintenance Control" under the executive for maintenance who reported directly to the Task Group Commander. This unit provided a means through which the Commander was constantly apprised of the status of all maintenance and the overall readiness of Task Group aircraft to perform their assigned missions. It acted as the nerve center of all maintenance activities including flight line, periodic, electronics, field maintenance and base flights.

Coordination was maintained with the Director of Operations to assure that all operational requirements would be met. In this center, status boards reflecting the latest maintenance and supply action of all aircraft were kept. Close coordination was maintained with Base Supply to assure the availability of parts and materiel.

A team, comprised of various specialists capable of performing any type of work required on any type of aircraft assigned the Task Group, was dispatched and monitored by the "Maintenance Control" Unit.

TOC's on all assigned aircraft were scheduled and monitored from this unit. Considerable effort also was expended to assure the timely submission of Unsatisfactory Reports as prescribed by AF Regulation 65-26 and T.O. 00-35B-54.

The introduction of the Maintenance Control system on Operation IVY proved extremely effective in molding together the maintenance capabilities of various units representing many major air commands to assure the successful accomplishment of the Air Task Group assigned mission.

Maintenance Control

Radio Calls for Maintenance Received Here

Maintenance Control Staff Sections

Maintenance Control Officer

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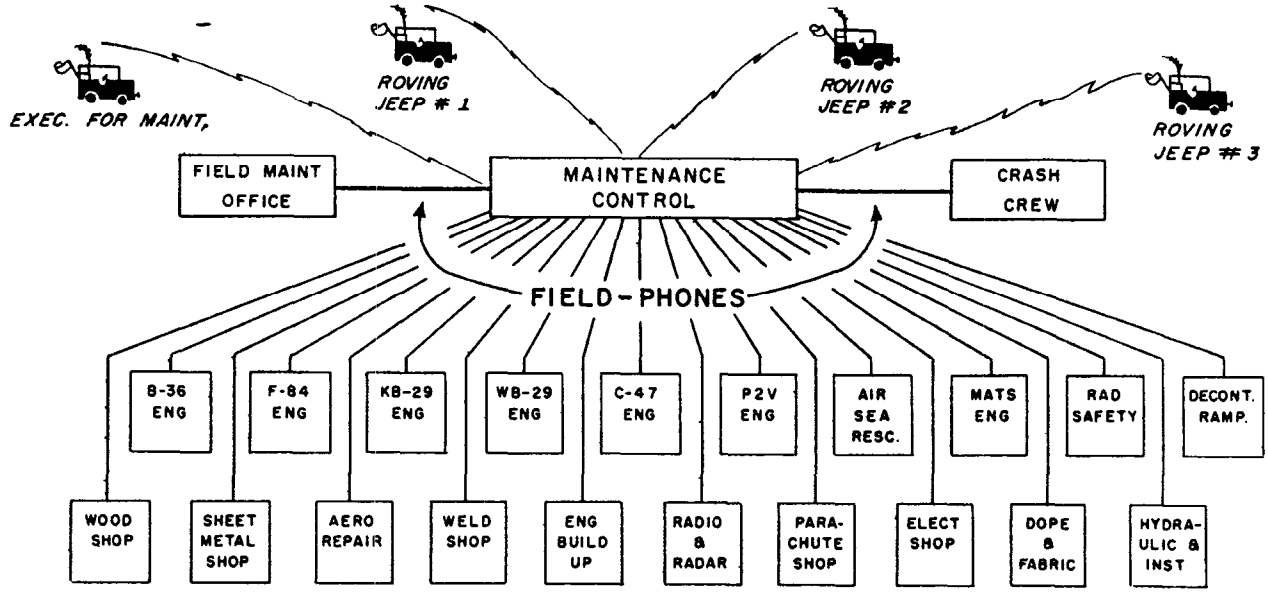
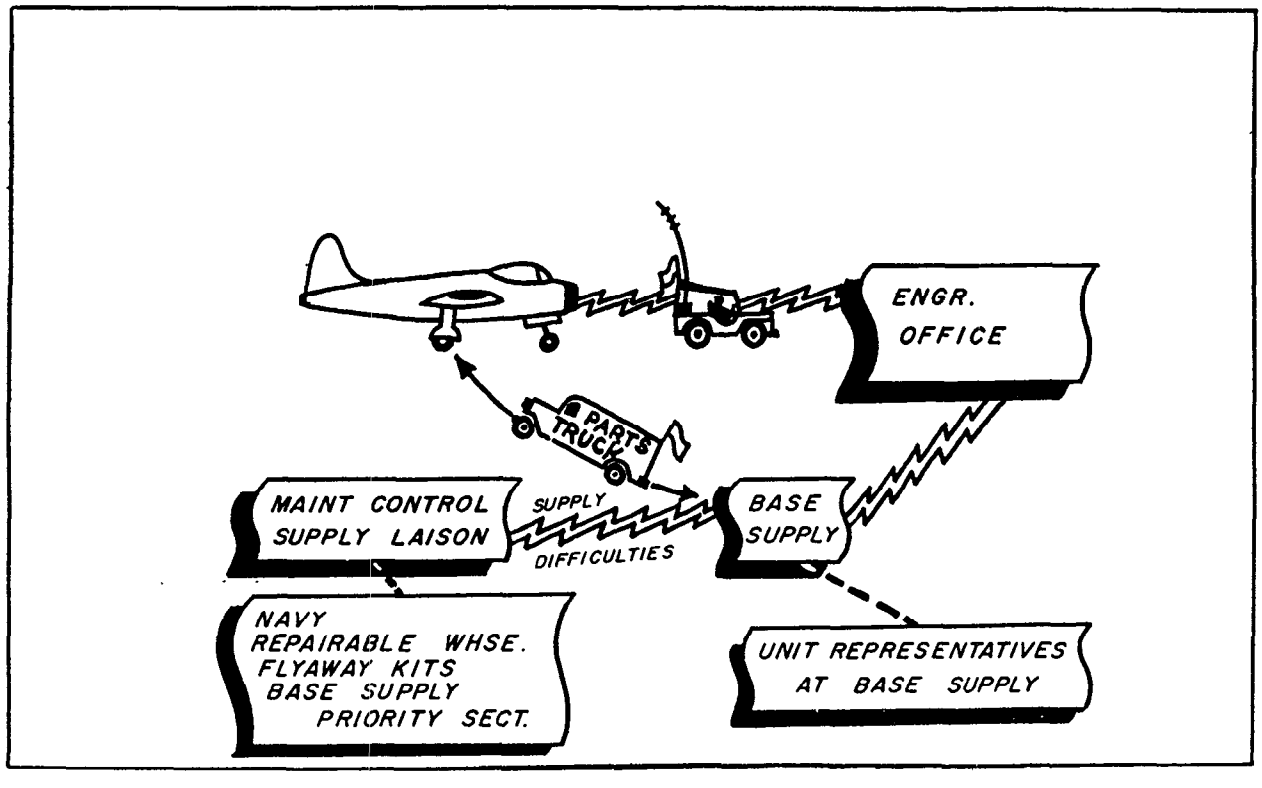
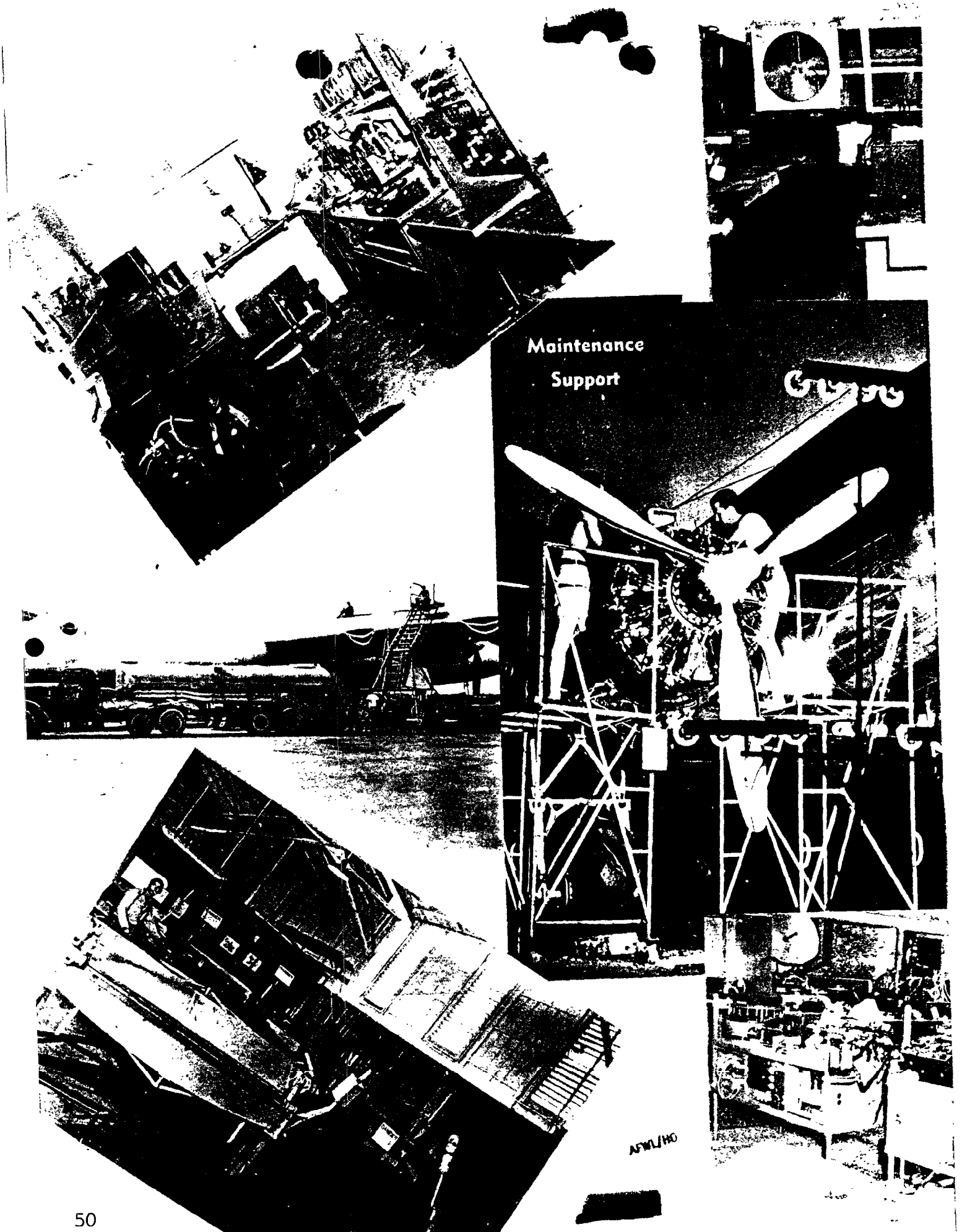
Maintenance Communications

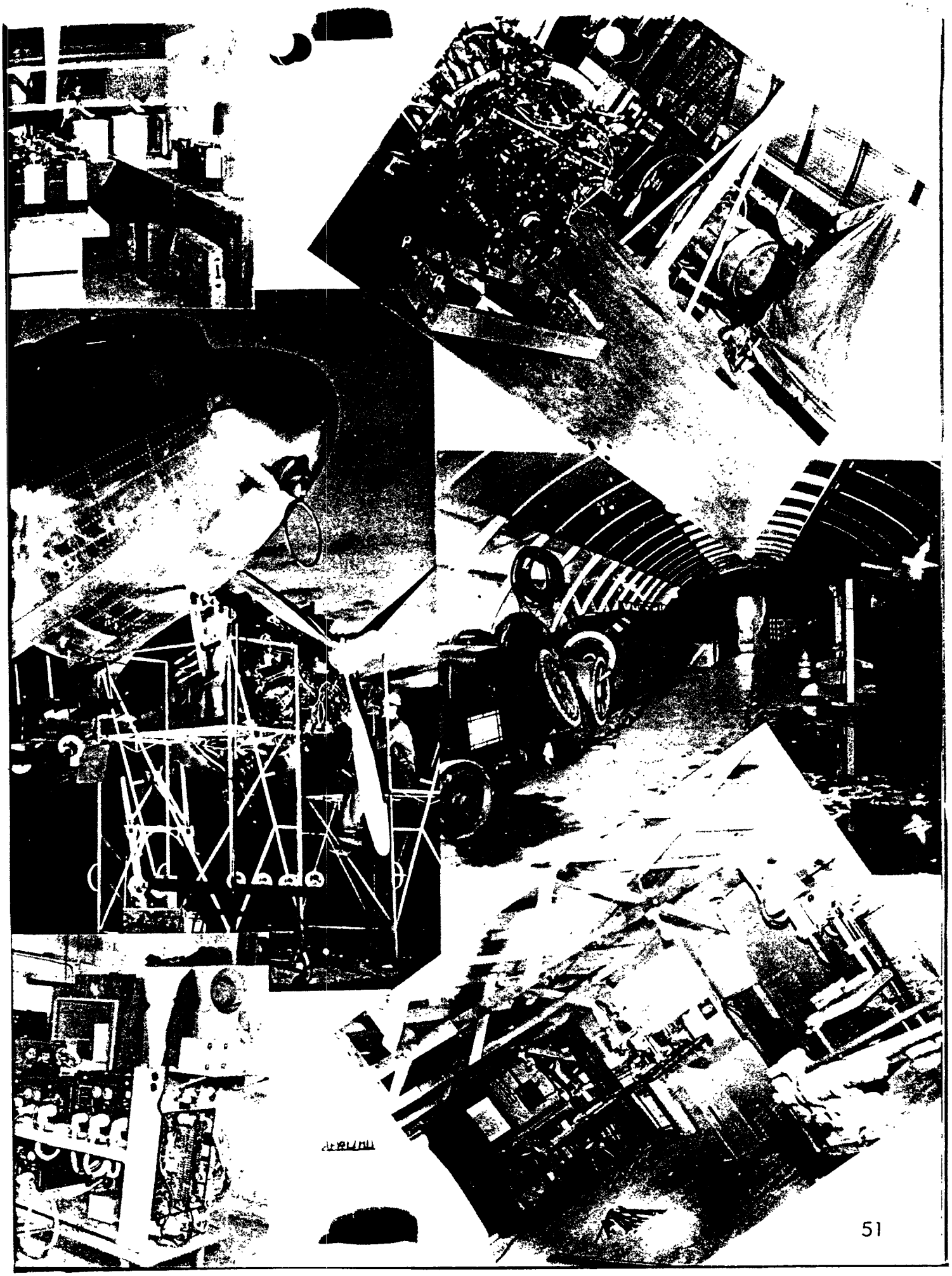


NOTE: ABOVE SYSTEM AUGMENTED BY 5 TRUNK LINE TELEPHONES.

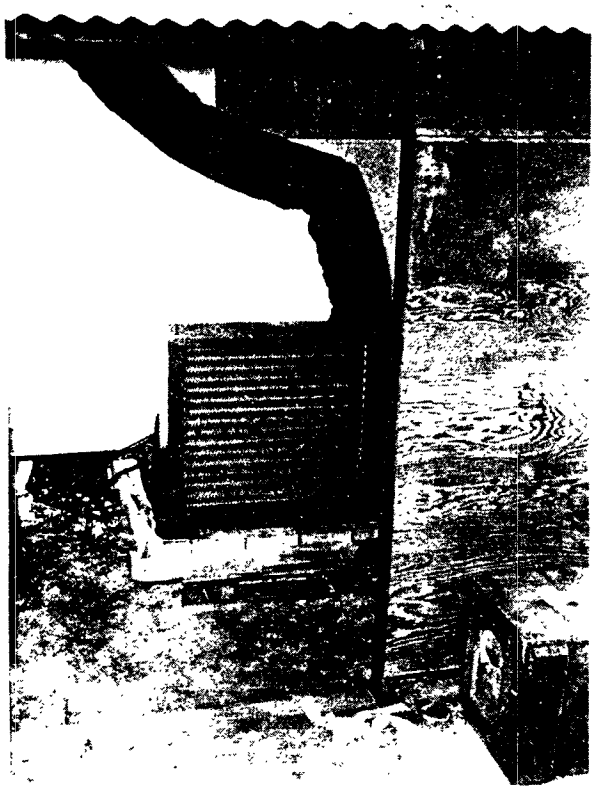
Supply Expediter System



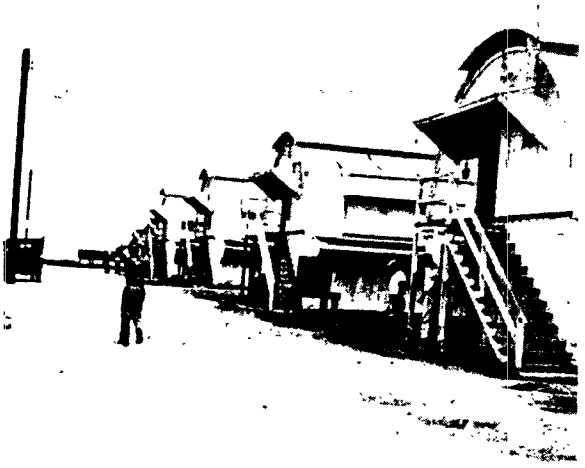

Maintenance
Support
AFWL/HO



Air Installations



Air Conditioning Unit



EM Living Quarters, Support Unit

Considerable effort was expended in planning, locating and developing required facilities in the forward area to assure that all participating elements were provided with the proper administrative, billeting and operating space.

Initial planning began as soon as the particular types and approximate strengths of units to be assigned to perform the missi[redacted] were determined. To ascertain the buildings and areas that could be made available for this operation, surveys were made in the forward area by Air Task Group personnel.

When the overall space allocation of these buildings and areas was obtained, a survey was made of each building to ascertain the area, location, condition, type of structure, power and other facilities. Assignments of buildings and area space were then made according to the individual unit or project requirements. Coordination of these contemplated assignments was then made with all unit and element commanders to insure that the allocated space was sufficient to carry out their assigned mission.

Upon arrival at the forward operating site, liaison was established with the Naval Station for repairs, rehabilitation, construction or alterations to meet the various requirements of participating units. This was accomplished by submission of a letter request, with necessary blueprints and plans, to the Naval Public Works Office. For normal station maintenance during the operation, a work order for the accomplishment of normal station maintenance required by the Task Group was submitted to the Naval Maintenance Compound. The Naval Public Works Officer, on receipt of the letter request, obtained a cost estimate of the work which was returned to the Task Group for funds and approval. If the estimate was acceptable and approved, a priority was assigned the project and the Naval Station was requested to proceed with the necessary work.

Due to the frequent changes of projects assigned, a constant flow of work requests were submitted to the Naval Station for alteration to existing facilities and new construction during the entire operation.

[redacted]

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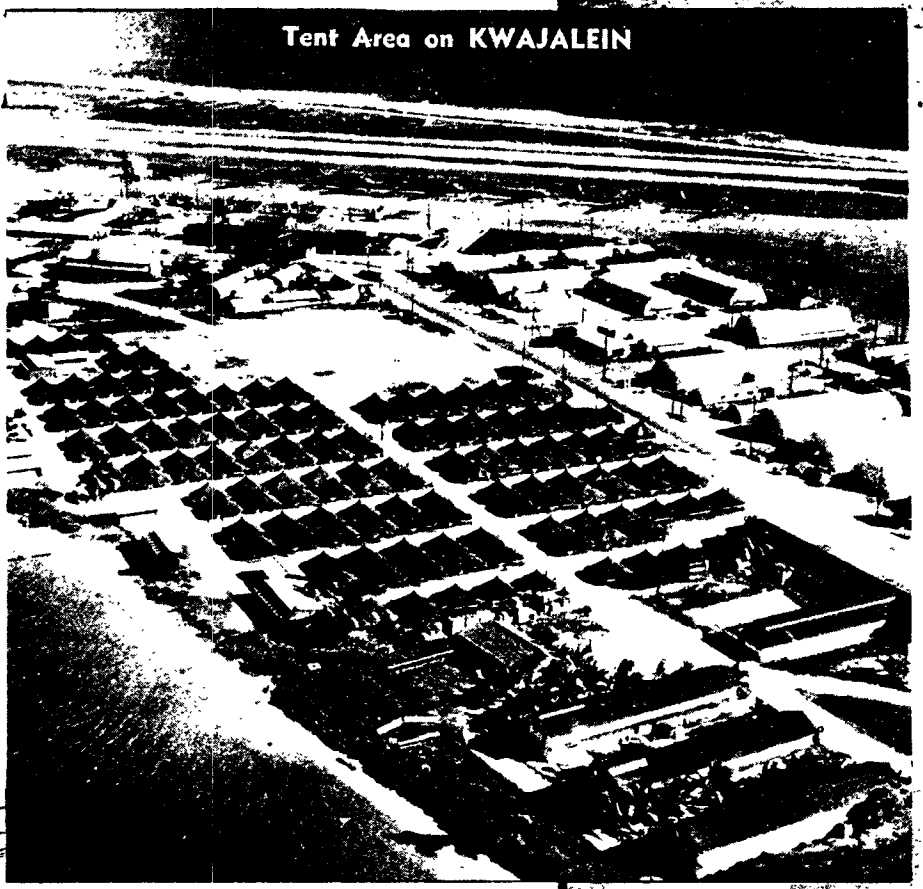
Tent Area on KWAJALEIN

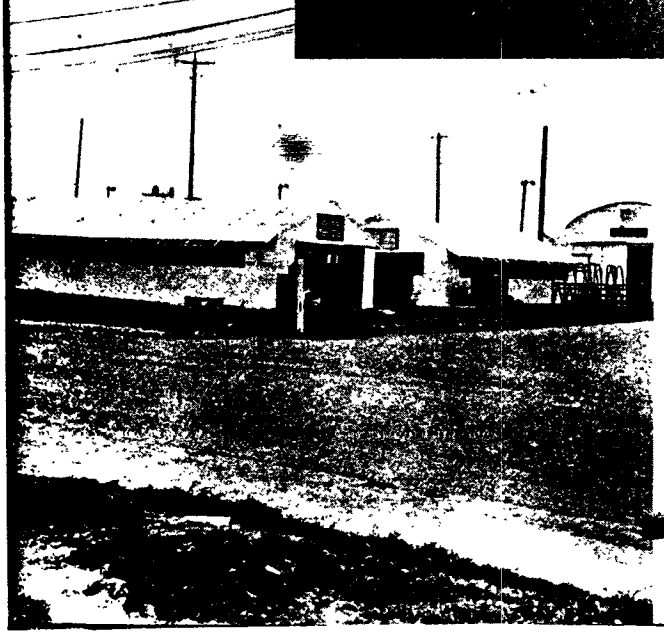


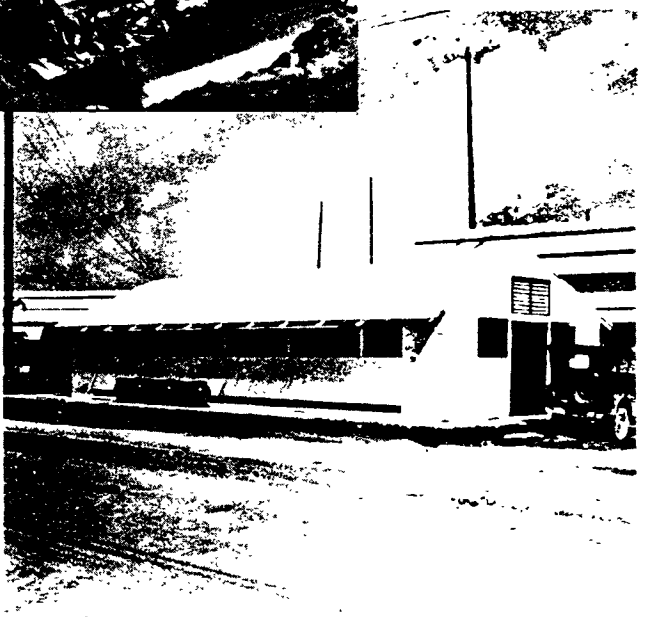
Senior Officers' Quarters

Shops on the Line

Unit Operations

"Prefab" Building





Commur

The mission of Task Group 132.4 called for a myriad of communications networks to support the aircraft directly involved. Many of these communications facilities were in place in the existent Airways and Air Communications Services installations on KWAJALEIN and ENIWETOK. However, even these had to be rehabilitated to a large extent and many new communications means and devices had to be added.

To the established AACS communications facilities was added AN/FGC-5 Multiplex equipment on the KWAJALEIN-HICKAM radio teletype circuit. The same equipment was ordered for the KWAJALEIN-ENIWETOK link, but this did not arrive in time for installation. Navy type facsimile equipment was obtained for the intercept of weather maps. Standard AACS transmitters and receivers were in the main used on all other circuits; SCR-399 radios were placed on the weather islands, and components of this and the SCR-499 were utilized in the Air Operations Center and the Command voice radio.

One of the major tasks accomplished was the installation of a complete telephone central office and cable distribution plant for the Task Group units on KWAJALEIN, using a three (3) position switchboard and over-head lead covered cable. Another installation of some magnitude was the AN/TTQ-1 and associated telephone and radio circuits in the Air Operations Center on KWAJALEIN. Standard HF, VHF, and telephone equipment and techniques were used.

Aircraft control communications are discussed to some length in other parts of this report. It can be noted that here again standard equipment and techniques were utilized.

Difficulties encountered were of course numerous—most of them engendered by the dispatch with which the work had to be accomplished from the planning stage through the equipment procurement stage and the installation phase.

The dearth of communications equipment and parts in the supply channels in the Zone of the Interior caused much grief; personal intervention on the part of personnel of the Task Group Headquarters was in many instances necessary to obtain items from both Air Force and Signal Corps depots. Frequency authorizations were not a great problem as the requests were forwarded to the Joint Communications Electronics Committee at the earliest possible date. Crystals were a minor nuisance, but again, due to various factors, there was no last minute mad scramble for crystals. Frequency interference, especially on the electronically overcrowded island of KWAJALEIN, started out as a major problem, but the excellent technical ability of the local AACS Squadron and the Fifth AACS Installation and Maintenance Team overcame almost all of the interference.

One last communication bugaboo was present and persisted throughout the operation. That was frequency propagation, or rather, the lack of it. On MIKE Day especially, propagation reached a nadir—even VHF was erratic; high frequencies were a good share of the time non-existent. Maybe it was sun spots; maybe it was the atomic cloud. However, once again communications in no instance failed to the extent that the successful accomplishment of the mission was endangered.

AFWL/HO

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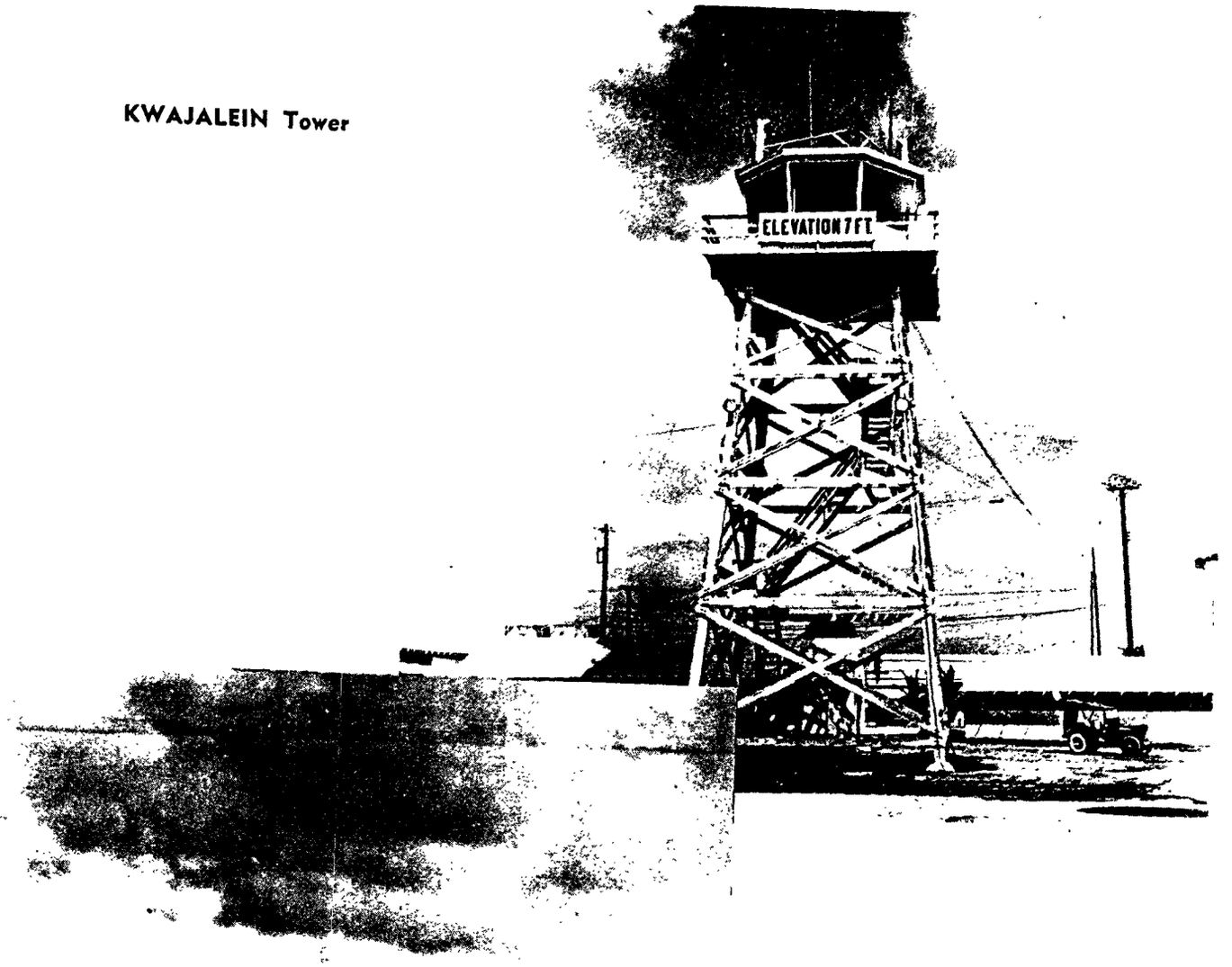
ications

KWAJALEIN Tower



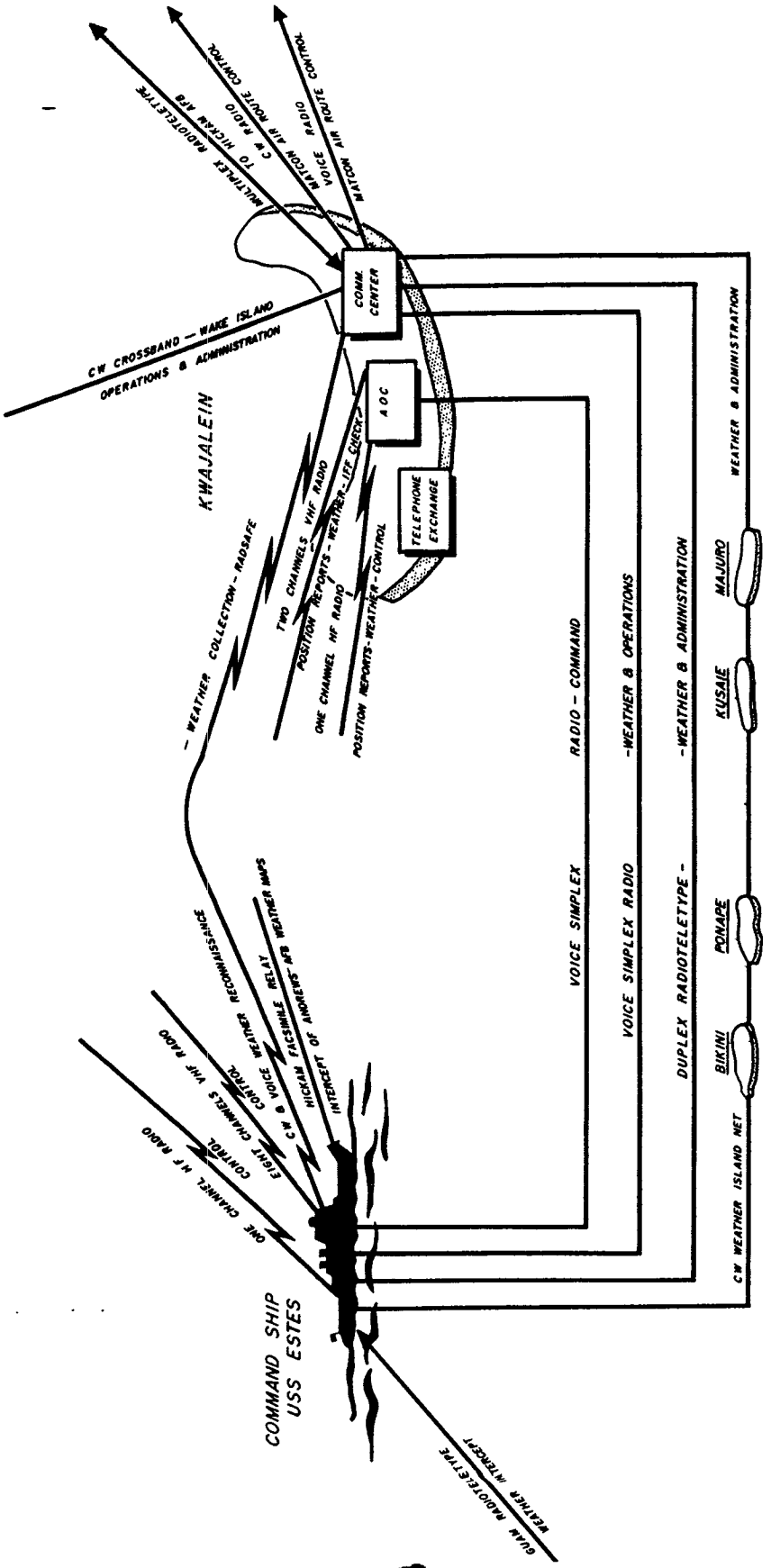
Transmitter Antenna Farm

[redacted]

AEWM/HQ

62

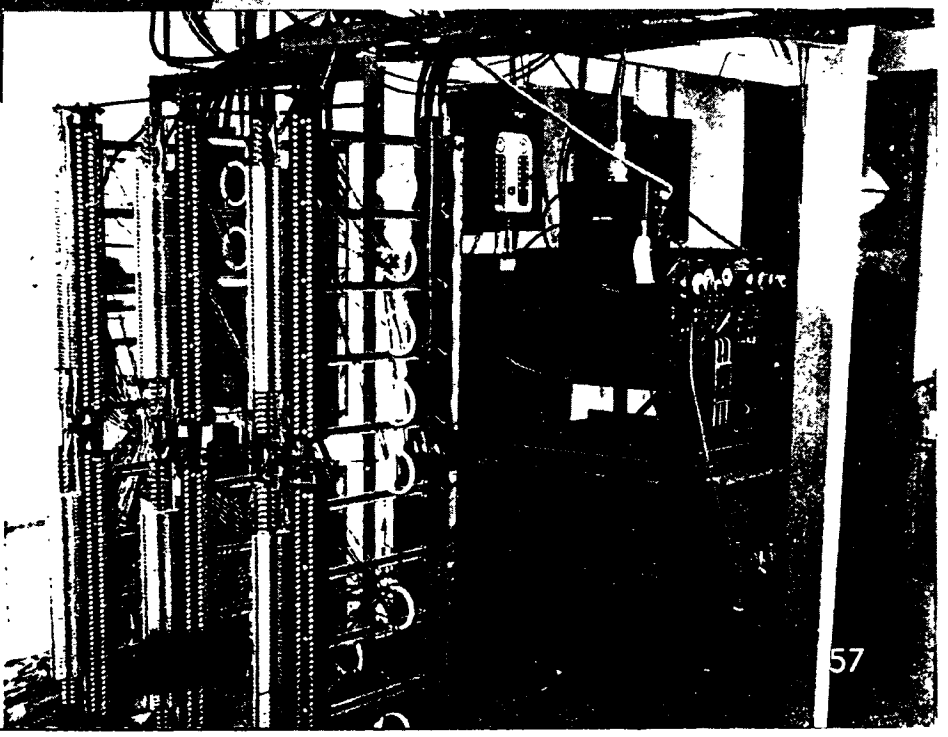
Major Communication Facilities



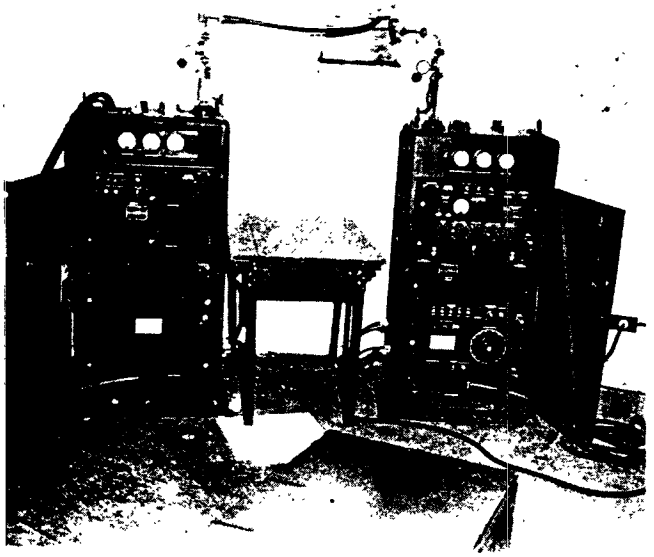
AACS Message Center

Telephone Exchange

Telephone Switchboard, KWAJALEIN

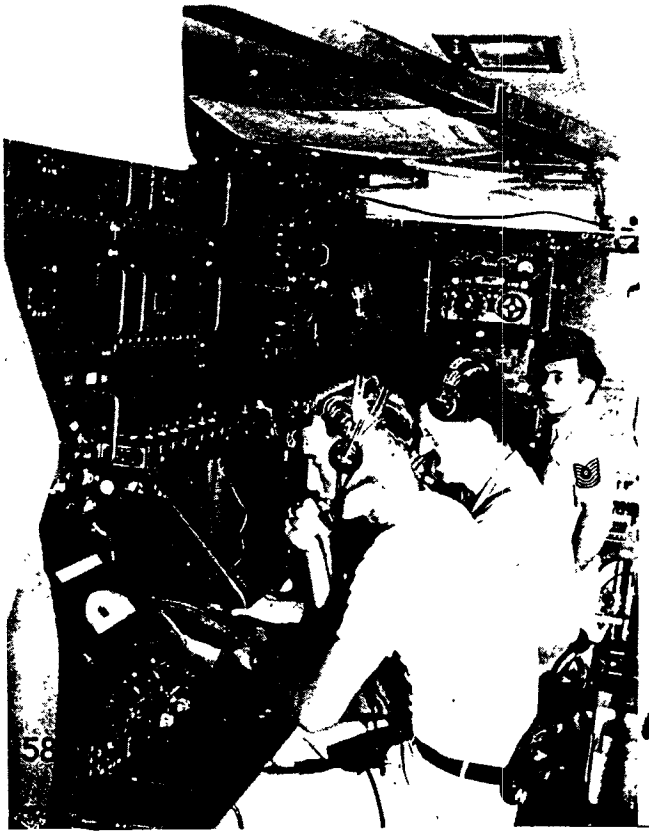


Aids To N



Radar Beacon AN/CPN-6

Final Approach



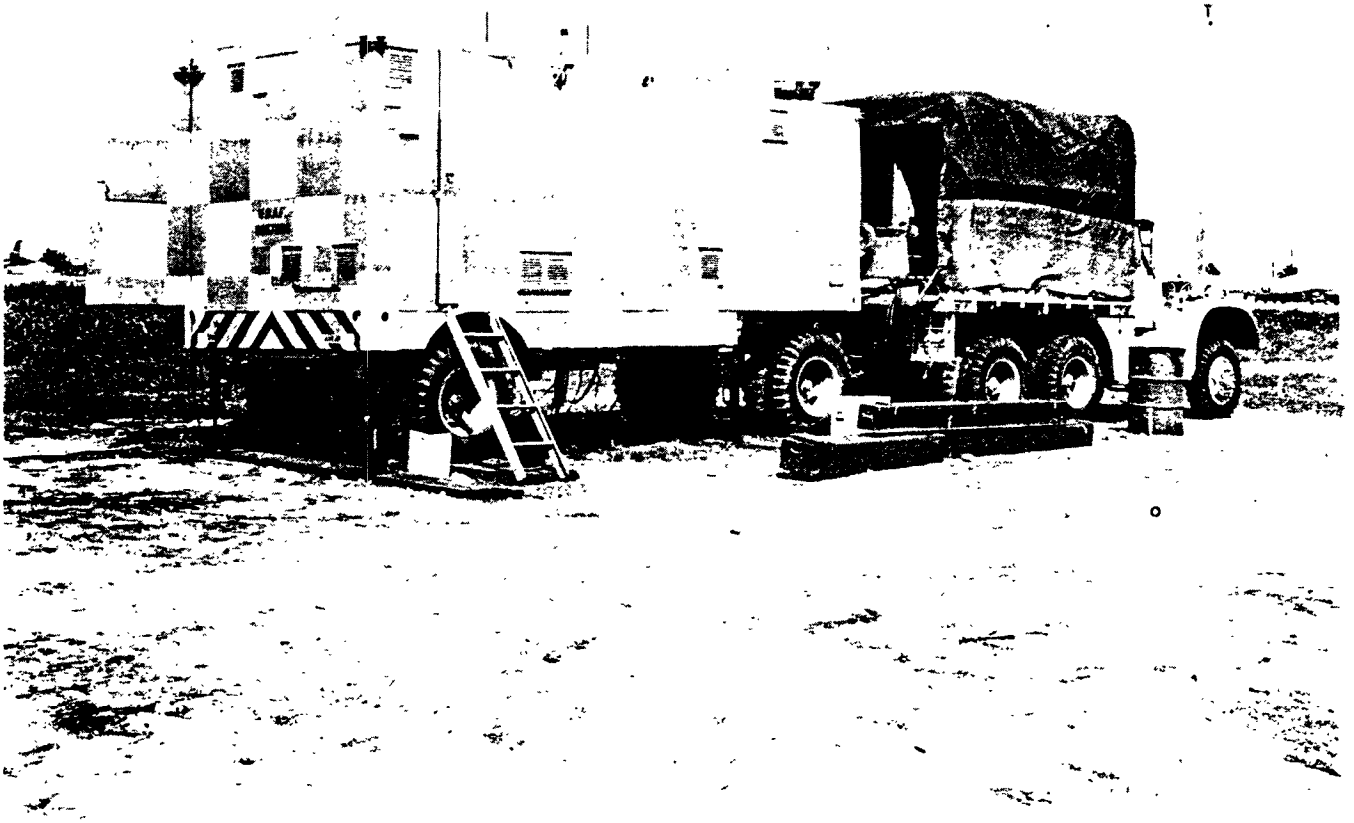
To those navigation aids listed in the Radio Facility Charts-PACIFIC, it was necessary to add several others to satisfy the exacting needs of the Task Group. AN/URD-2 VHF/DF was installed in the control towers at both KWAJALEIN and ENIWETOK. Likewise, radar beacons, AN/CPN-6, were placed on the two islands. The HF/DF at KWAJALEIN was reactivated and a low frequency radio beacon, utilizing a BC-610 transmitter, was put into operation on BIKINI ATOLL.

Forty by forty-foot (40 X 40) canvas panels coated with luminous paint were placed on five atolls as an aid to identification for high flying aircraft. However, these proved unsatisfactory, as the paint lost its luminosity almost immediately after the panels were in place due to the effects of heavy rains and bright sunshine. The hazardous coral reefs surrounding approaches to the more important islands made replacement of the panels impractical.

A Ground Controlled Approach radio, the AN/MPN-1, was placed in operation on KWAJALEIN. The main purpose to be served by this equipment was to aid jet aircraft in landing during Instrument Flight Rules conditions. Here, too, the equipment did not measure up to expectations. During heavy rain storms, the GCA was ineffective as an aid to jet aircraft. However, it did, many times, aid in the landing of multi-engine planes.

AFWL/HO

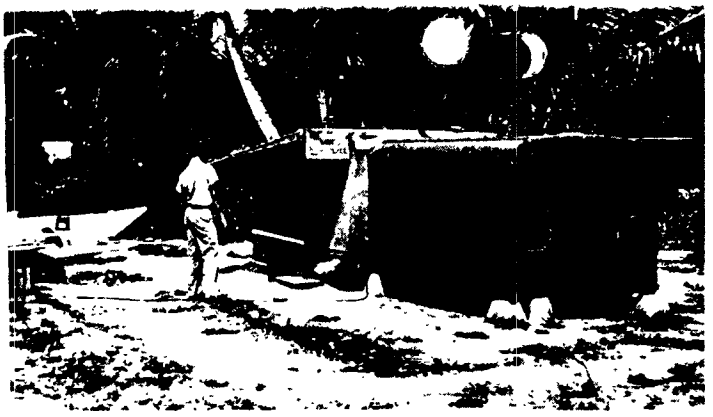
avigation



GCA—KWAJALEIN

66

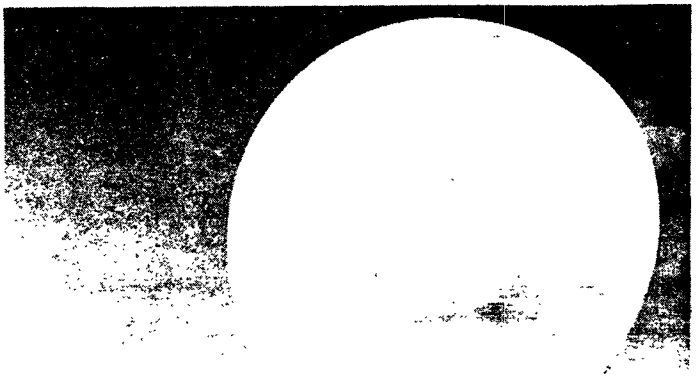
Weather



Weather Office, KWAJALEIN

Reporting Facility on Outlying Weather Island

Launching Balloon for Upper Air Soundings



As in past atomic tests, the accurate reporting and forecasting of weather was important for proper scheduling of operations. The normal permanent weather reporting stations within an eight hundred (800) mile radius were KWAJALEIN, WAKE, ENIWETOK, and TRUK and were not sufficient in number to provide necessary data. The Task Group provided fixed weather stations at PONAPE, KUSAIE, MAJURO, and BIKINI. Ten (10) WB-29 weather reconnaissance aircraft flew an average of two (2) flights per day to supply synoptic coverage. A weather central was maintained for the Commander, JTF 132.

During the operational phase of IVY, weather conditions over the MARSHALL ISLANDS were marginal for the most part. Poor flying weather over either base, route, or target area existed most of the time. The weather was caused by the inter-tropical zone of convergence being near KWAJALEIN and frequent easterly wave passages. Forecasting a date weather conditions would be favorable for all agencies concerned was difficult; for example, full air operations were dispatched on two (2) occasions based on favorable forecasts, the Air Task Group rehearsal and the original K-Day. The weather encountered was much worse than forecast due in the first case to the inter-tropical front moving over KWAJALEIN and in the second to a low associated with an easterly wave. In both cases loss or damage to aircraft nearly resulted.

On shot days and rehearsals, complete weather coverage was provided the AOC on KWAJALEIN. The coverage included hourly weather reports from KWAJALEIN, ENIWETOK, BIKINI, MAJURO, PONAPE, and KUSAIE; three (3) hourly reports from WAKE and TRUK; and the latest upper wind data from these stations. A WB-29 reconnoitered the area within one hundred fifty (150) miles of KWAJALEIN and radioed weather reports direct to the AOC concerning shower activity and the location of the inter-tropical front. Radar weather observations from the APQ-13 in the weather station were also posted. Current KWAJALEIN and intermediate refueling area weather was passed to the AOC on the USS ESTES.

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JTF Weather Central, ENIWETOK

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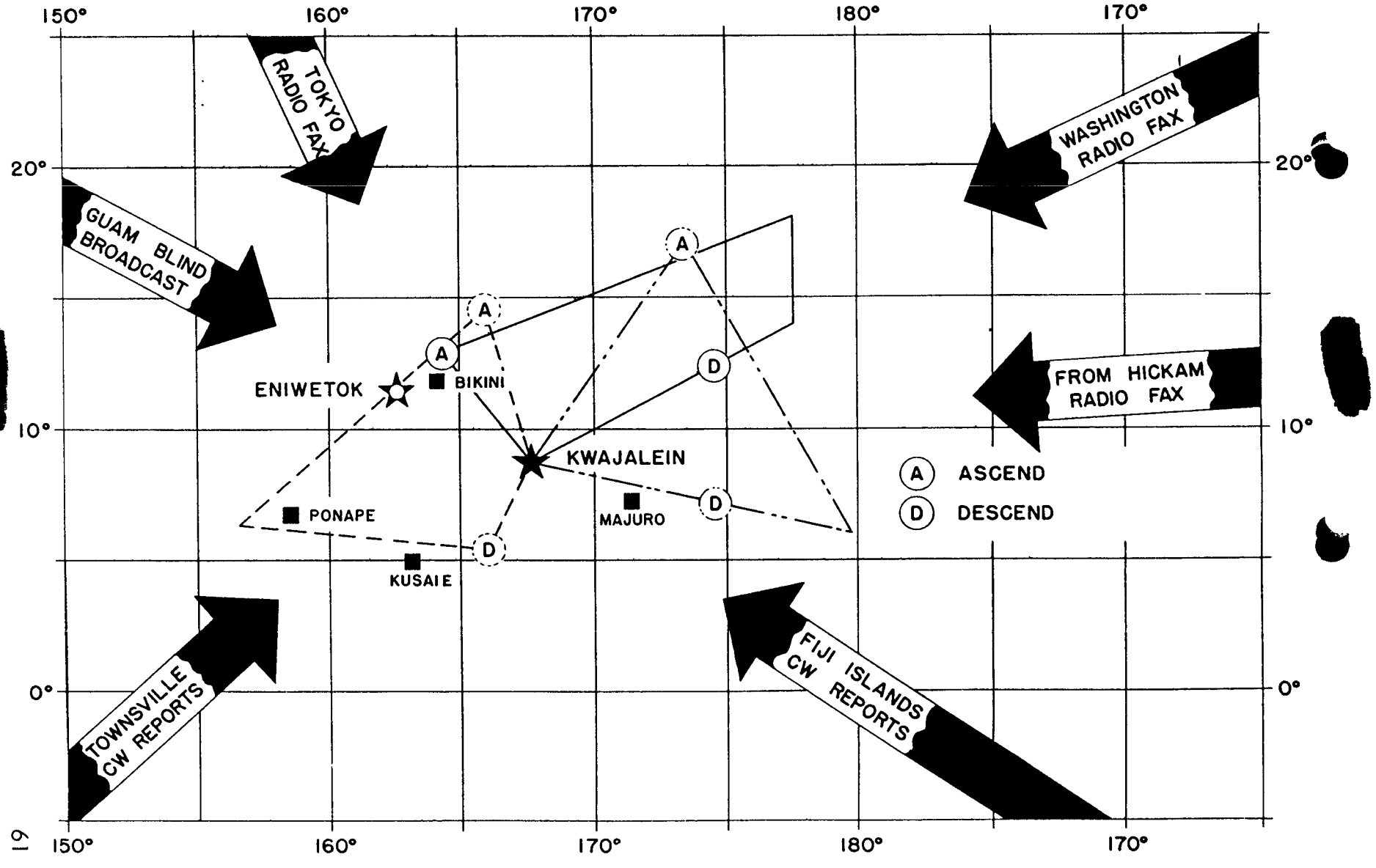
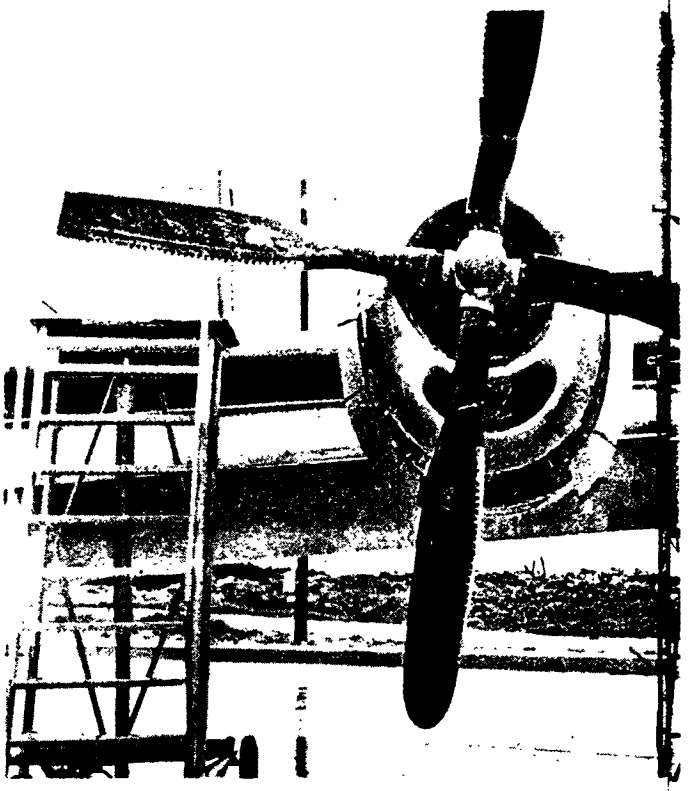
WEATHER REPORTING



Radiologi

In order to properly protect the personnel of the Task Group from radiological hazards arising from nuclear and thermo-nuclear detonations, the radiological safety program was two (2) phased.

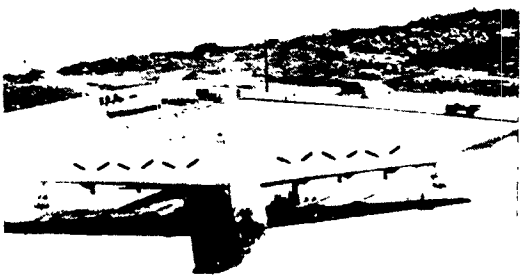
The first phase and most important was to provide monitors and monitoring instruments to show where radioactive danger areas existed. All aircraft participating in the test programs, including observation aircraft, carried such instruments. The F-84G sampling aircraft had installed special detector instruments to show total dosage absorbed by the pilots and to indicate instantaneous intensity of radiation. By the use of these the pilot could accurately determine where he should break off sampling operations. In addition he was provided with a lead cloth suit, lead covered helmet, and lead glass visor. The consensus of the wearers, however, was that the suit made flying



Decontaminating WB-29 Aircraft

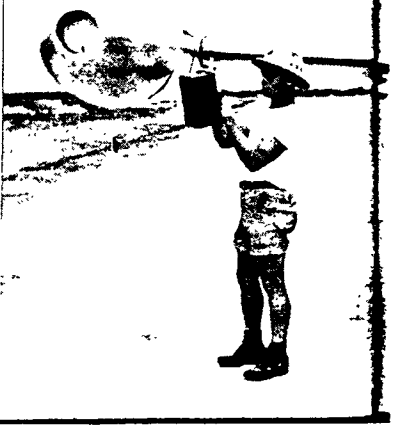
AFWL/HO

Decontamination Area

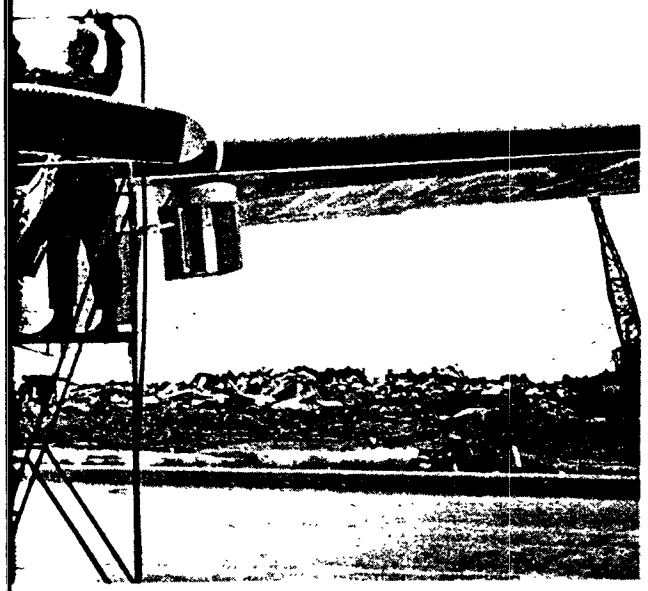


Monitoring Personnel With Geiger Counter

Testing a "Ho



al Safety



fter Cloud Tracking Mission

of the aircraft dangerous due to restricted motion and that it be either discarded or redesigned. The helmet was acceptable but the lead glass visor was too delicate for normal usage.

The other phase of the program was the decontamination of personnel and equipment as rapidly as possible to reduce the unavoidable exposure dosage to a low figure. All personnel so exposed were checked and showered; new clothes were provided. Some individuals were returned to the showers as many as seven (7) times to accomplish the desired cleansing. The aircraft, large and small, were towed to a specially constructed concrete decontamination ramp and thoroughly washed with "gunk" and clear water to "cool" them off quickly in order to allow the maintenance personnel to resume work. The ramp drained to the sea to avoid accidental exposure of casual personnel.

Sampler

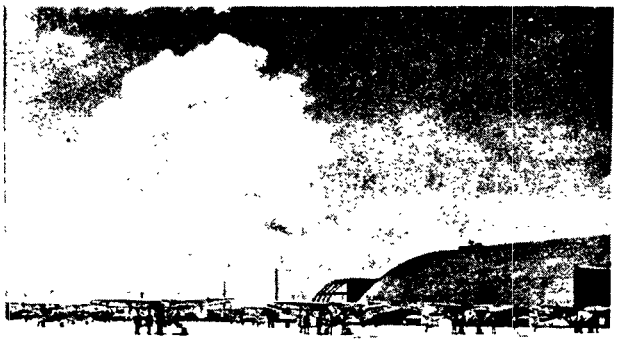
Rad-Safe Crew and Equipment

Post Mission Check of F-84 Pilot

90

Airlift In The

Airlift H-19's at ENIWETOK ATOLL



Parking Area for Intra-Atoll Aircraft

The task of establishing an airlift service in the forward area was undertaken by the Task Group early in the preparatory phase of Operation IVY. The necessity for intra-atoll airlift of the type and in the quantity provided scientific and contractor personnel, was dictated by requirements for speed of movement to meet installation and construction deadlines and obstacles presented by the local geography.

Liaison airlift was conducted as a primary mission of the Task Element based at ENIWETOK. The actual magnitude of this effort is shown by the corollary support functions which included: maintenance of all airbase facilities; security surveillance flights; assistance in search and rescue activities; maintenance of a supply account to support base facilities at ENIWETOK, together with all the outlying weather islands. Air transportation was provided throughout the islands of ENIWETOK ATOLL with liaison type L-13 aircraft. In May 1952, three (3) H-19 helicopters arrived at ENIWETOK to augment the airlift capability. The helicopters transported cargo to and from islands not possessing landing strips.

With the arrival early in October of major elements of the Task Group, airlift between atolls in the forward area was initiated using C-47 aircraft operating from KWAJALEIN. Inter-atoll airlift was conducted primarily to support Task Force activities. A function under this effort was establishment of a daily courier flight between KWAJALEIN and ENIWETOK, with flights to other atolls being scheduled as needed.

	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL
PASSENGER MILES FLOWN	12,603	24,533	19,247	28,184	23,285	24,098	36,435	68,854	103,345	42,384	352,968
NUMBER PASSENGERS CARRIED	472	994	1,103	1,402	1,251	1,270	2,147	3,485	5,402	1,355	18,881
HOURS FLOWN ON AIRLIFT	199:55	320:10	296:15	330:55	260:40	244:15	405:55	748:35	1194:00	281:05	4281:45
NUMBER OF LANDINGS MADE DURING AIRLIFT	748	1,153	1,178	1,716	1,343	1,506	1,927	3,564	5,551	1,472	20,158
CARGO IN POUNDS	0	0	19,304	12,466	9,251	7,543	16,633	27,221	47,343	6,115	145,876

AFWL/HO

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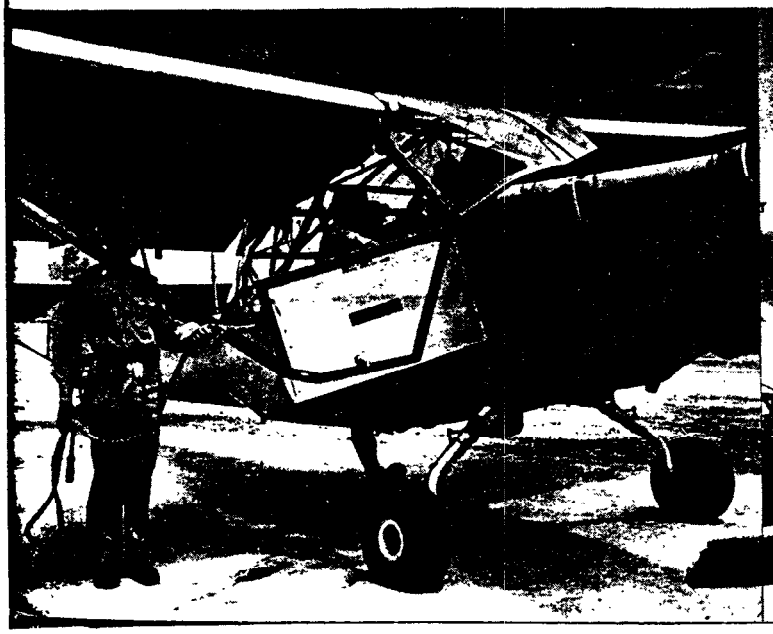
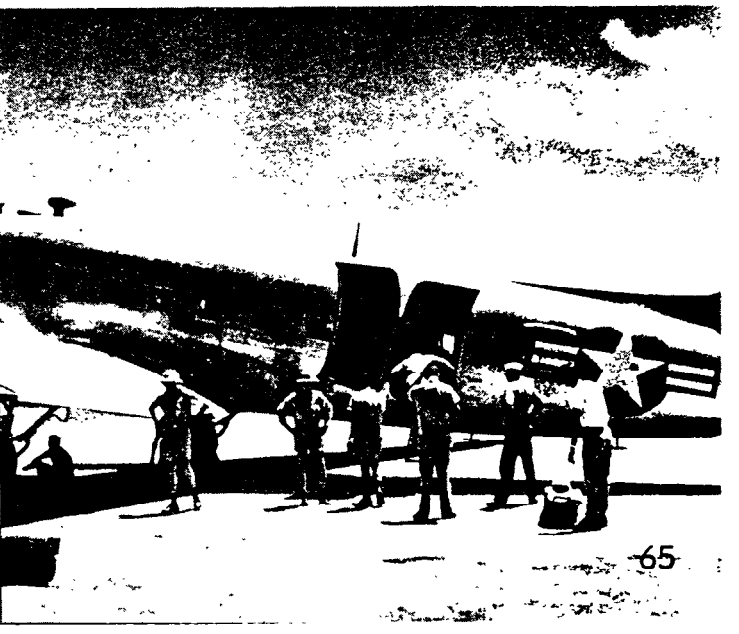
Forward Area

Approaching the Runway at ENIWETOK ISLAND from the Southwest

AFWL Intra-Atoll Passenger Boarding L-13



Boarding a C-47 for Inter-Atoll Flight



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Task Group .

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3. Aircraft
4. Rehearsal

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Modification

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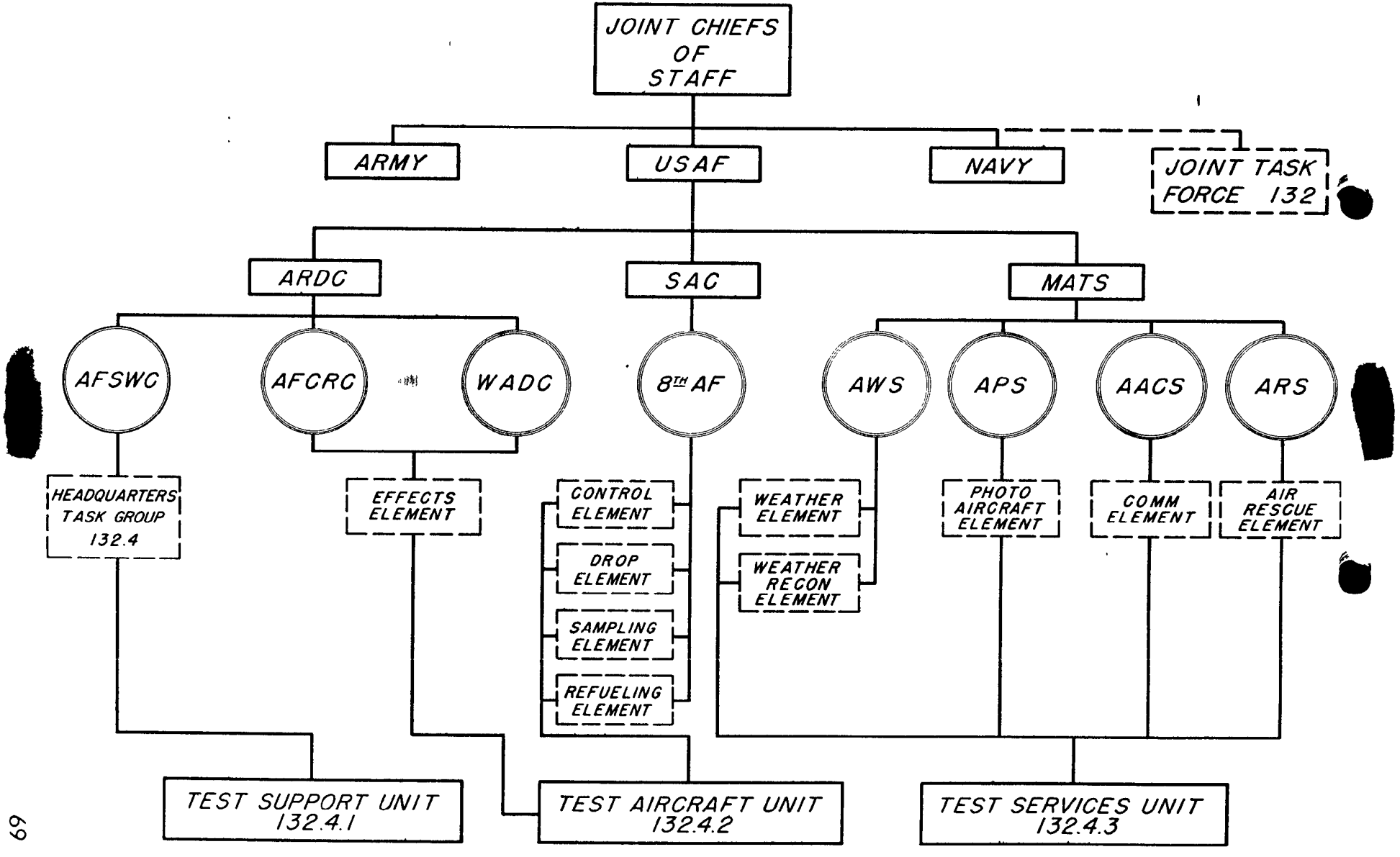
PARENT COMMANDS OF TASK GROUP 132.4



Task Group Or

EXECUTIVE FOR MAINTENANCE
Col. S. Gershon

INSPECTOR GENERAL
Lt. Col. W. R. Hanna

SURGEON
Maj. L. S. Greider

ADJUTANT GENERAL
Capt. A. J Amerson

TASK GROUP 132.4
COMMANDING GENERAL
Brig. Gen. ~~Frederic~~ E. Glantzberg

DEPUTY COMMANDER
Col. J. W. Thomson

CHIEF OF STAFF
Lt. Col K. D Krenth

FLYING SAFETY
Maj F. W. Hall

PROTOCOL
Capt A Pfeifer

AFWL/HO

ganization Chart

DIRECTOR OF PERSONNEL
Maj B. R. Williams

DIRECTOR OF OPERATIONS
Lt. Col. C. A. Ousley

DIRECTOR OF MATERIEL
Lt. Col. M. A. Ciccone

COMPTROLLER
Lt Col A C Fleming

TEST SUPPORT UNIT
Col. A. E. Tokaz

TEST SUPPORT ELEMENT
Lt. Col. T. T. Omohundro

TEST AIRCRAFT UNIT
Col. W. E. Bertram

FLIGHT-A
Col. S. F. Martin

FLIGHT-B
Lt. Col. V. K. Meroney

FLIGHT-C
Lt. Col. M. J. Galer

TEST SERVICES UNIT
Col R. W. Nelson

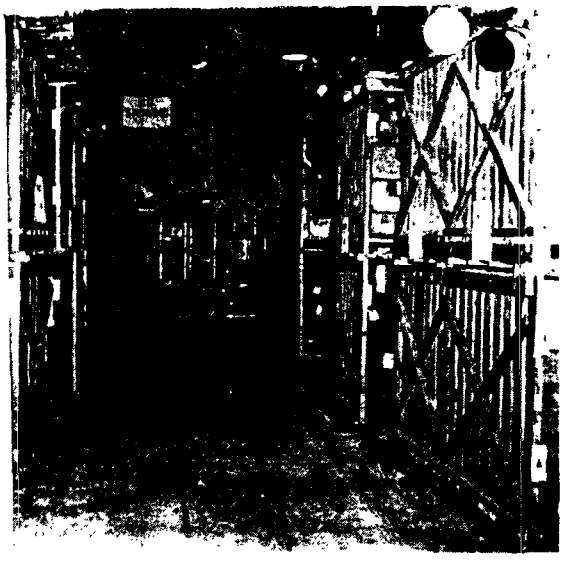
WEATHER RECONNAISSANCE
Lt. Col. F. W. Simpson

WEATHER REPORTING
Lt Col. W. S. Barney

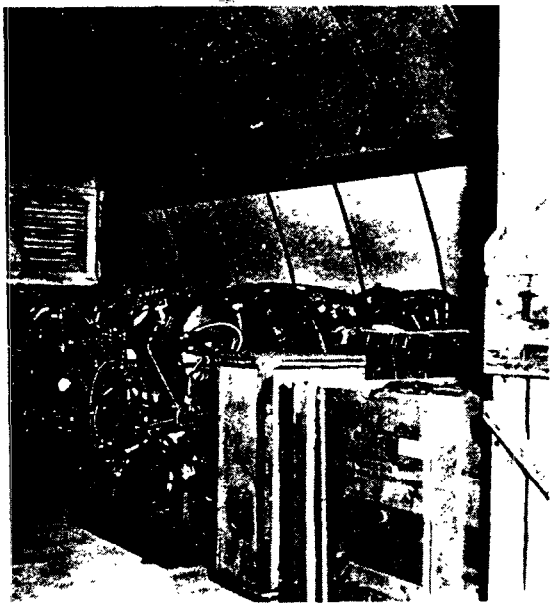
A. A. C. S.
Maj. R. W. Fox

A. R. S.
Lt. Col. O. M. Legg

Supply M



Bulk Storage



Spare Engines

Upon receipt of the basic mission, action was immediately started to assure that all necessary tools and equipment would be in place at the proper time.

In collaboration with Hq, AMC, a "Supply Support Plan" was drawn up during February 1952. This plan outlined in detail the specific procedures to be followed in the submission of requisitions and the ultimate delivery of supplies to the operation site. Briefly, the plan directed that operating elements submit their requirements for equipment, supplies and spares to Task Group Headquarters for necessary screening (in order that duplication could be eliminated) and forwarding to the Sacramento Air Materiel Area for procurement action. The Logistics Liaison Section, under the control and supervision of the Headquarters, Director of Materiel, then took over the job of expediting and accomplishing necessary follow-up to assure the timely delivery of all items to the overseas site.

The responsibility for furnishing logistical support to all participating units during the training phase in the ZI was assumed by the sta-

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Last Stop

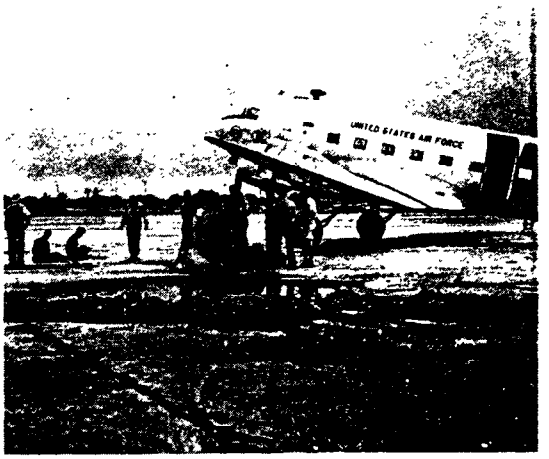
tions at which training was being conducted.

During this planning phase, action also was taken to establish the necessary supply facilities in the forward area to receive, store, issue and account for the supplies being delivered. This action entailed the drawing up of appropriate TD's and the phasing of personnel to the advance site.

Concurrently with the development of a "Supply Support Plan", procedures for transporting both personnel and materiel to the forward area also had to be developed. From a Task Group standpoint, the great bulk of transportation required was obtained simply by submitting forecasts of personnel and cargo shipments to Hq, JTF 132, where, in turn, allocations for both air and water were procured from Military Air Transport Service and Military Sea Transport Service, respectively. Additional water and airlift, provided by naval vessels and aircraft of major air commands, often were necessary to meet operational deadline dates.

With the accomplishment of these basic steps, necessary tools and equipment were delivered to the operational site.

Delivery

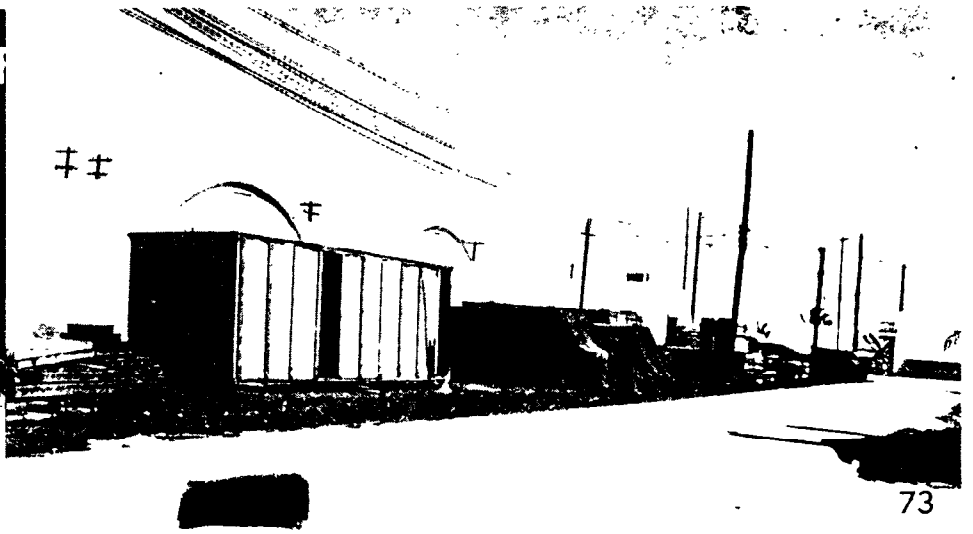


Receiving and Classification

AFWL/HO

iting Shipment

Outside Storage



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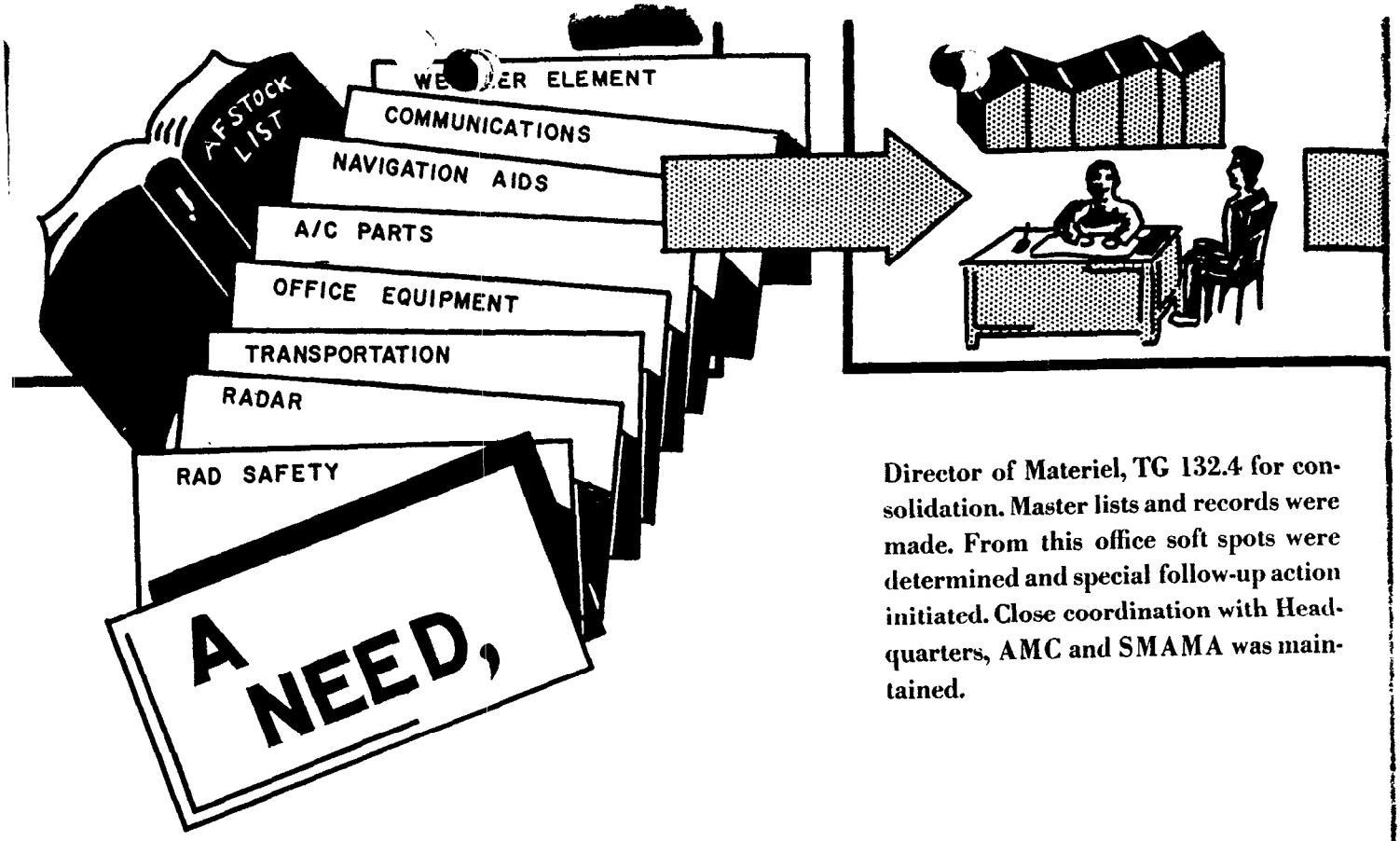


Director of Materiel, TG 132.4 for consolidation. Master lists and records were made. From this office soft spots were determined and special follow-up action initiated. Close coordination with Headquarters, AMC and SMAMA was maintained.

Requisitions were submitted from all supporting units to...

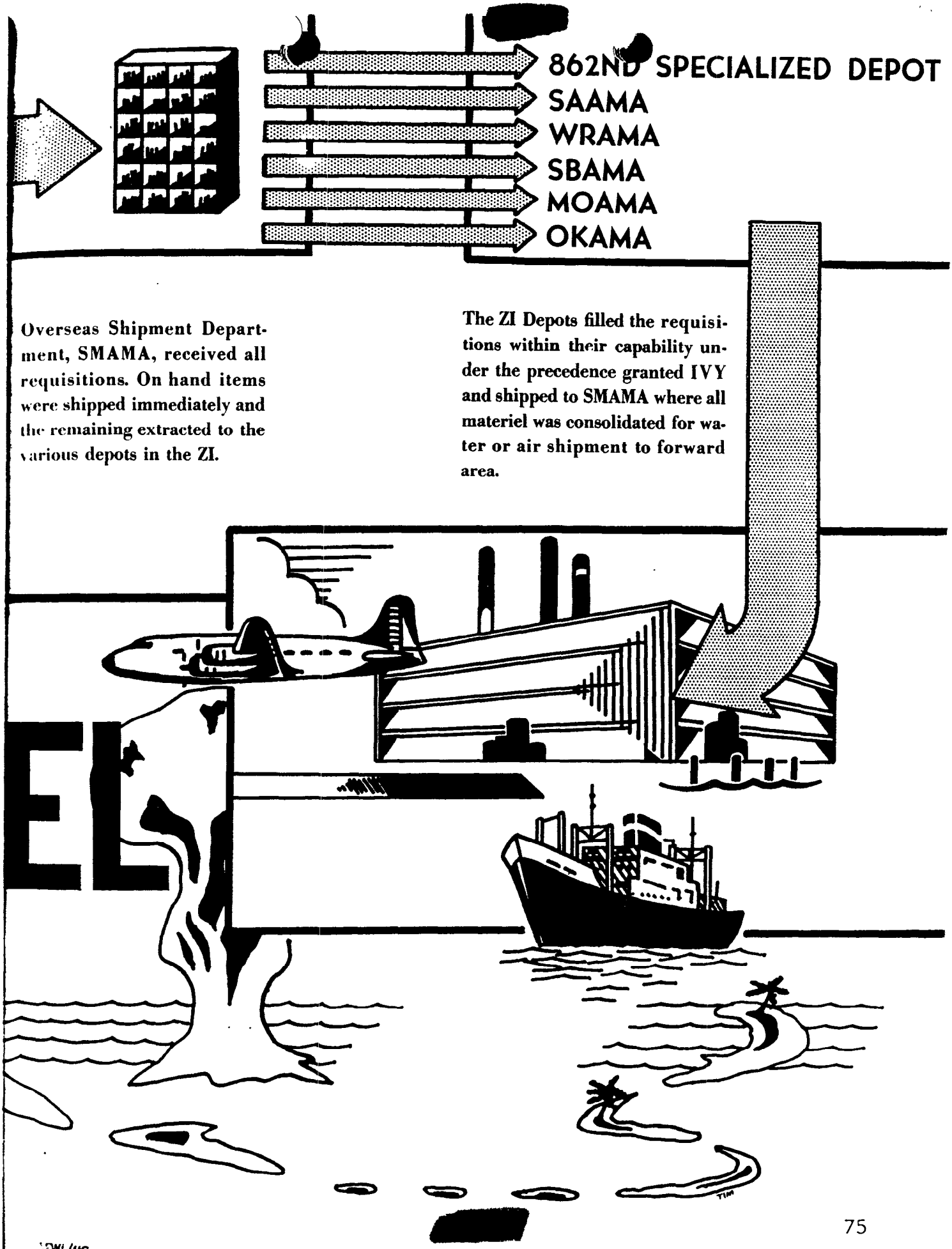
FOR MATERI

At SMAMA was located the TG 132.4 Supply Liaison Officer. Through his office were submitted late requirements and those which arose during the Operation. His efforts replaced the Director of Materiel as expeditor and coordinator after the Headquarters TG 132.4 departed the ZI.

Supplies were shipped in the main, by water from SAN FRANCISCO. Critical items which were not available soon enough for water shipment were airlifted from TRAVIS by MATS. Airlift was transshipped at HICKAM. Water lift was direct.

APWU/HO

61


862ND SPECIALIZED DEPOT
SAAMA
WRAMA
SBAMA
MOAMA
OKAMA
Overseas Shipment Department, SMAMA, received all requisitions. On hand items were shipped immediately and the remaining extracted to the various depots in the ZI.
The ZI Depots filled the requisitions within their capability under the precedence granted IVY and shipped to SMAMA where all materiel was consolidated for water or air shipment to forward area.

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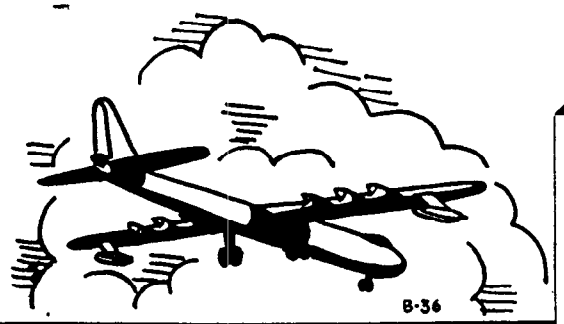
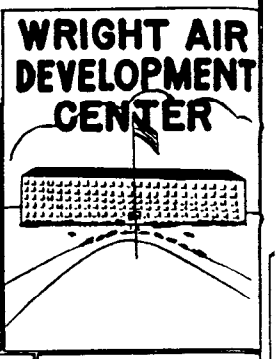
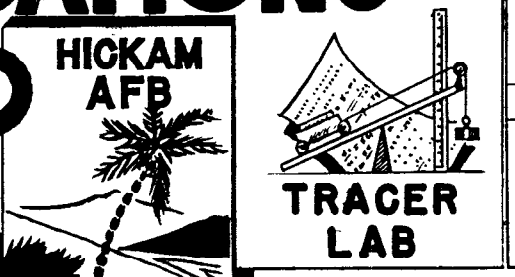
Aircraft Modific

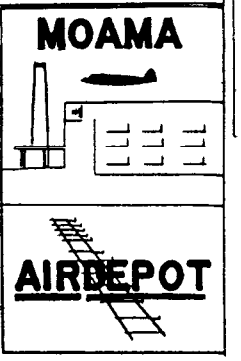


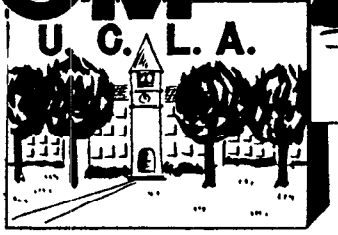
LOS ALAMOS SCIENTIFIC LABORATORY

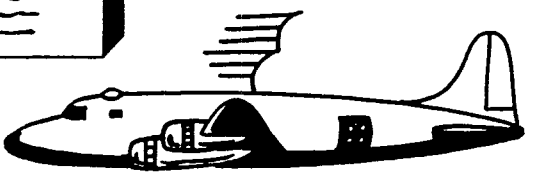


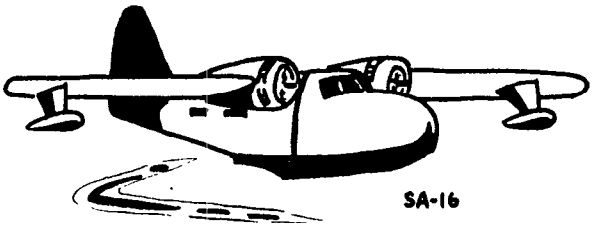
MODIFICATIONS RESULTED FROM...

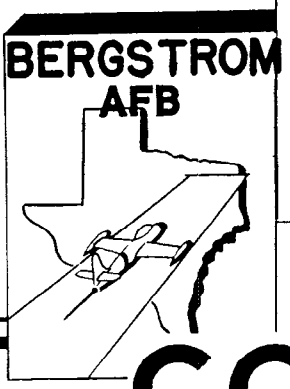


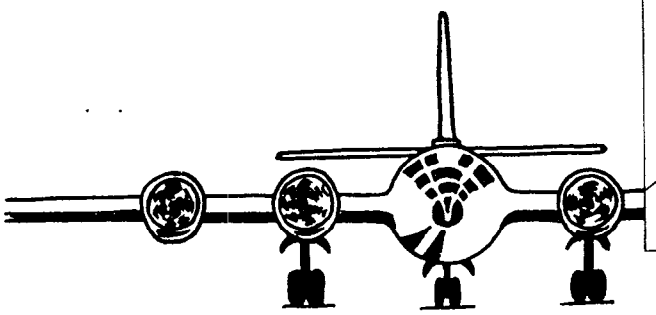








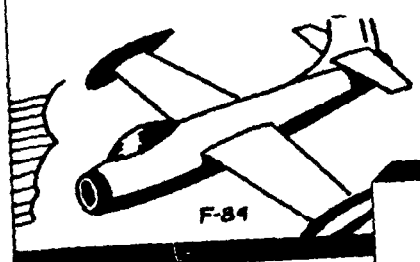


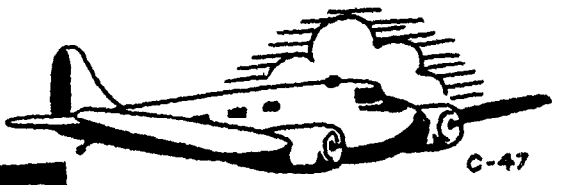


CO-OPE

AFWL/HO

ation Program





DUMONT

FLETCHER AIRCRAFT

NEEDS, IDEAS, WORK,

RESEARCH BELL SYSTEM LABORATORIES

and

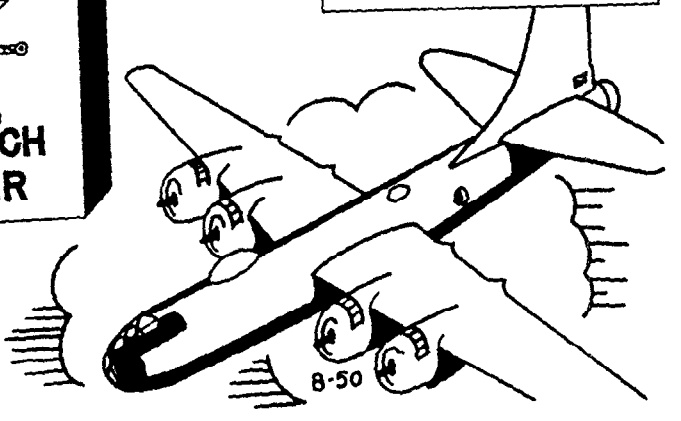
SANDIA CORP

307 TH ARS

AIR FORCE CAMBRIDGE RESEARCH CENTER

ARMY CHEMICAL CENTER

ALLIED RESEARCH INC.



RATION

The modification program for the aircraft for Operation IVY resulted from the requirements for airborne instrumentation laid down by the directors of the various scientific programs. The extent of the modifications was to a large degree a result of the type of aircraft selected for Task Group use by Headquarters, USAF. Operational considerations, influenced greatly by the area selected for the tests, made the creation of an airborne control plane mandatory, and forced the inclusion of considerable navigation, safety and communications equipment into the modification program.

As a consequence of these three considerations the modification program:

a. Modified or instrumented 49 aircraft of 11 different types.

b. Installed radiological and scientific instruments developed solely for this project.

c. Developed, procured and installed new radar and radio air control equipment.

d. Expended approximately 90,000 man hours.

e. Accomplished some 82 weeks of work in 5 months.

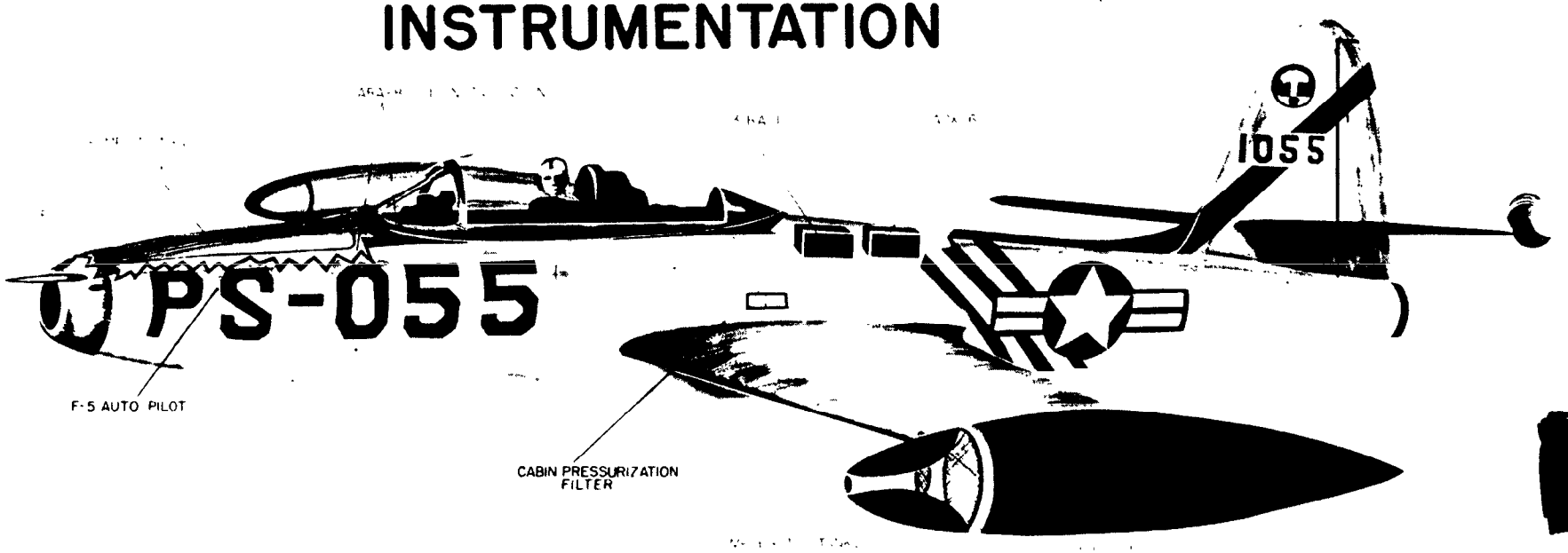
f. Dealt with 36 agencies both military and civilian.

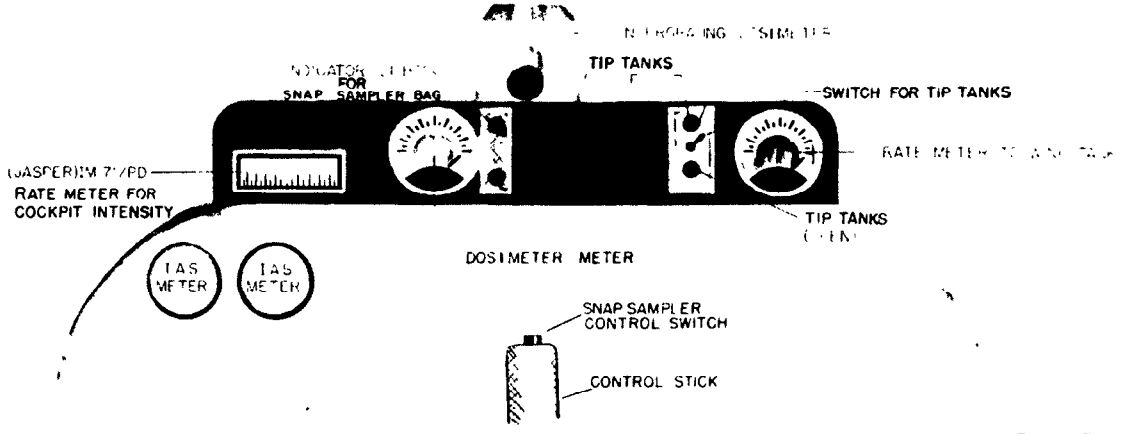
The extent of the modifications ranged from superficial to major changes. The aircraft which had the most work performed upon them are shown in cutaway form on the following pages.

The B-29 Control Aircraft did not exist prior to operation IVY. ADC, SAC, and WADC and the Navy were all consulted concerning equipment and aircraft to use for this purpose but finally the aircraft was designed around a modified AN/APX-6 MK X Airborne IFF beacon. By this the Control B-29 could interrogate all other Task Group aircraft within a 150 mile radius.

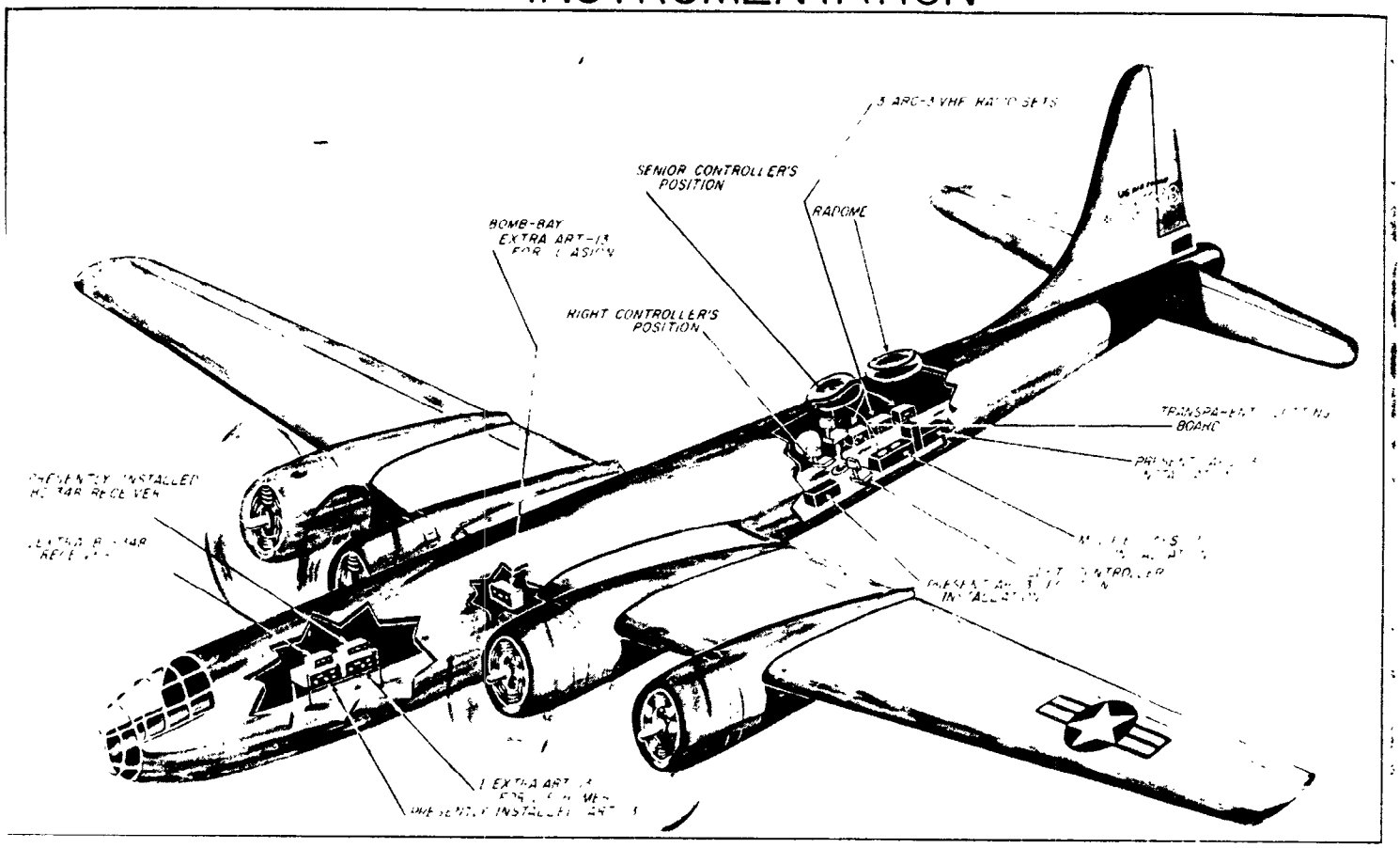
The entire modification program could not have succeeded without the cooperation and hard work of all the agencies involved. The men who actually accomplished the work were faced continually with changes, parts shortages and a lack of engineering data. Nevertheless, the job was accomplished through ingenuity, improvising substitute parts and cutting red tape. All aircraft were completed in time to insure adequate training for all crews.

F-84G SAMPLER AIRCRAFT INSTRUMENTATION

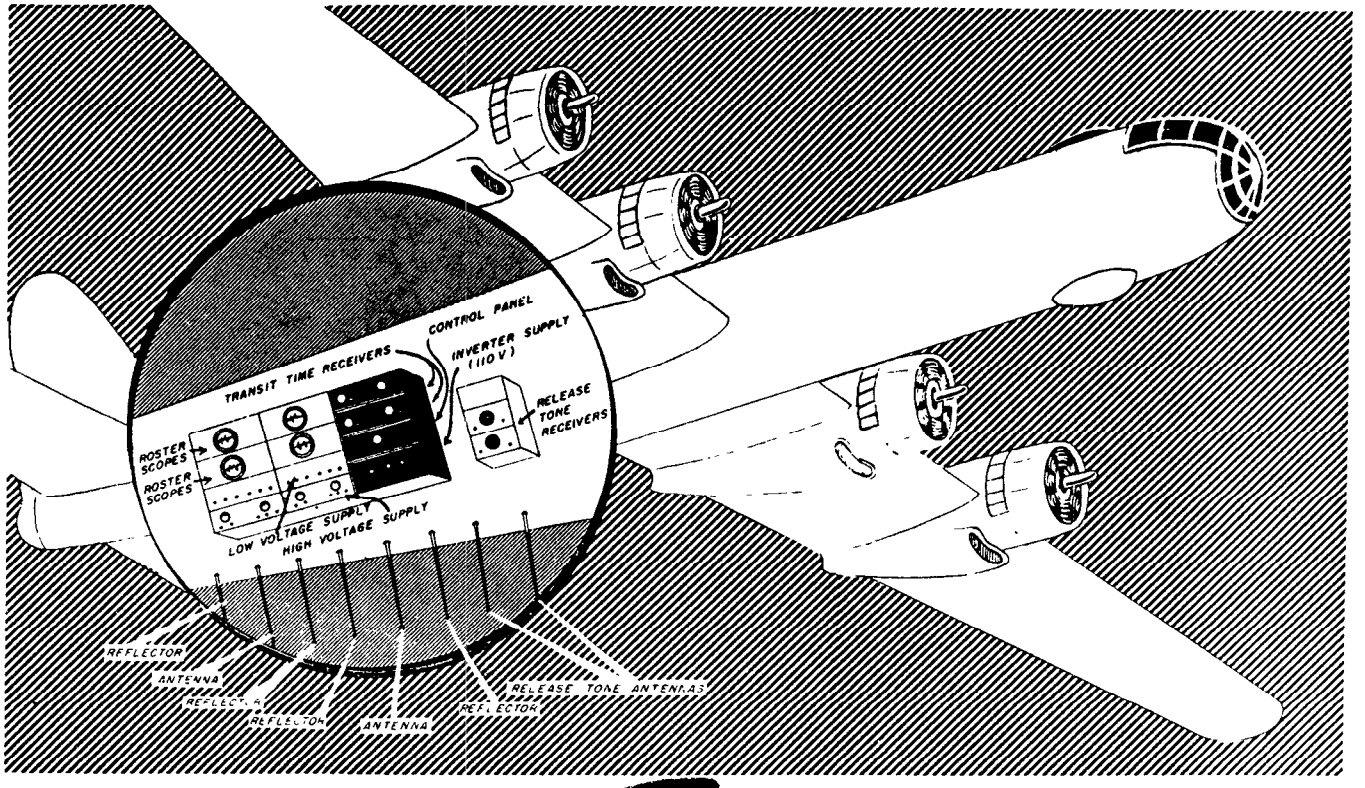




79 INSTRUMENT PANEL F-84G SAMPLER AIRCRAFT

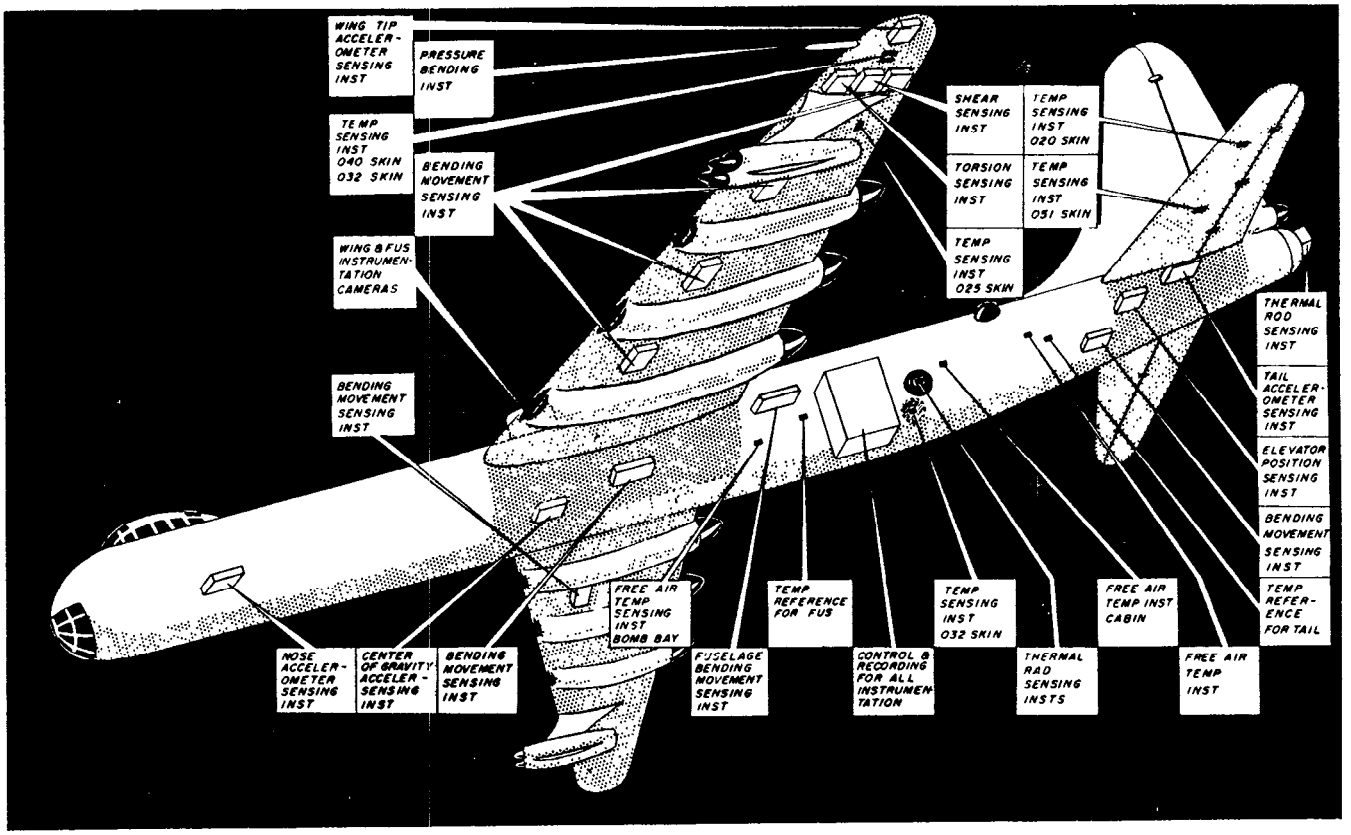


B-50D Drop Instrumentation

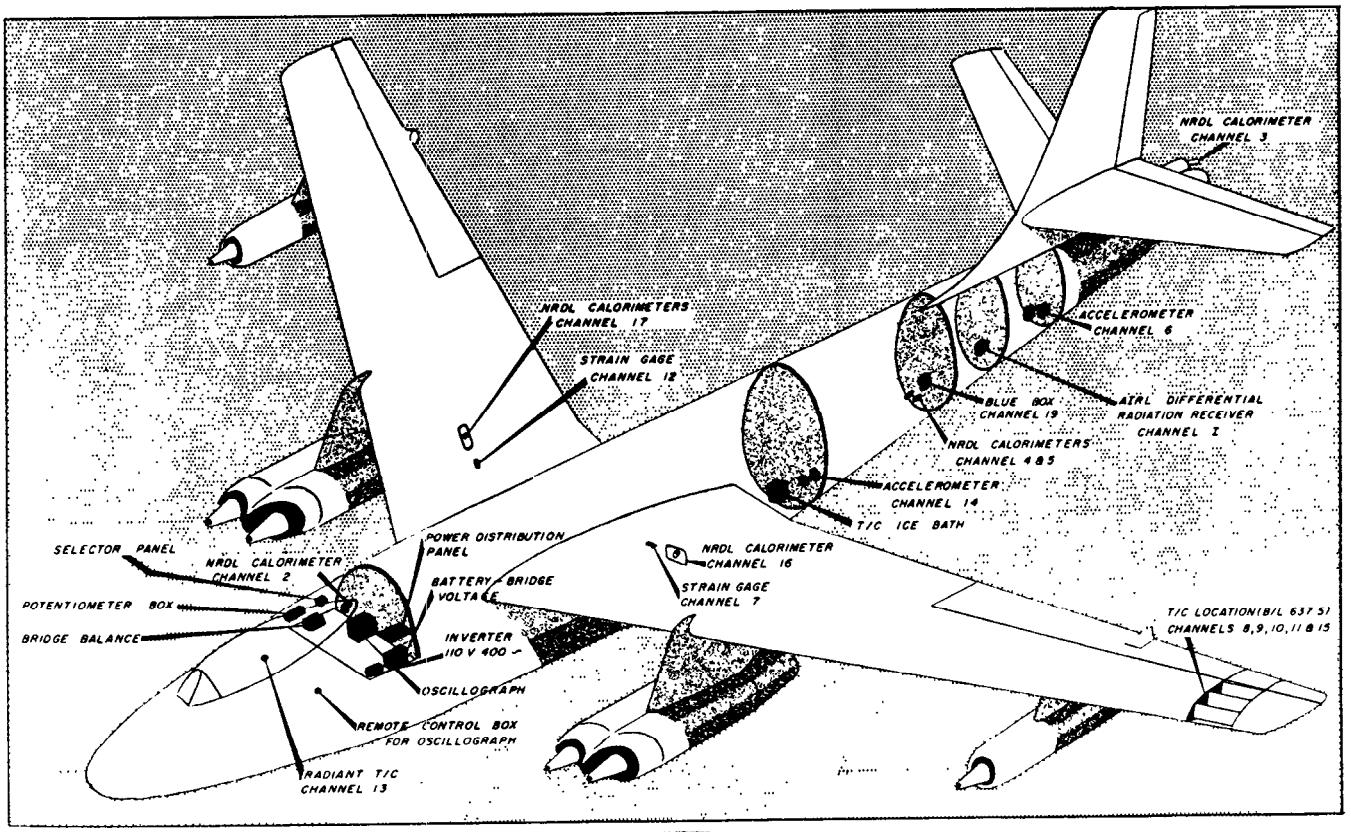


AFWL/MG

B-36D Effects



B-47B Effects



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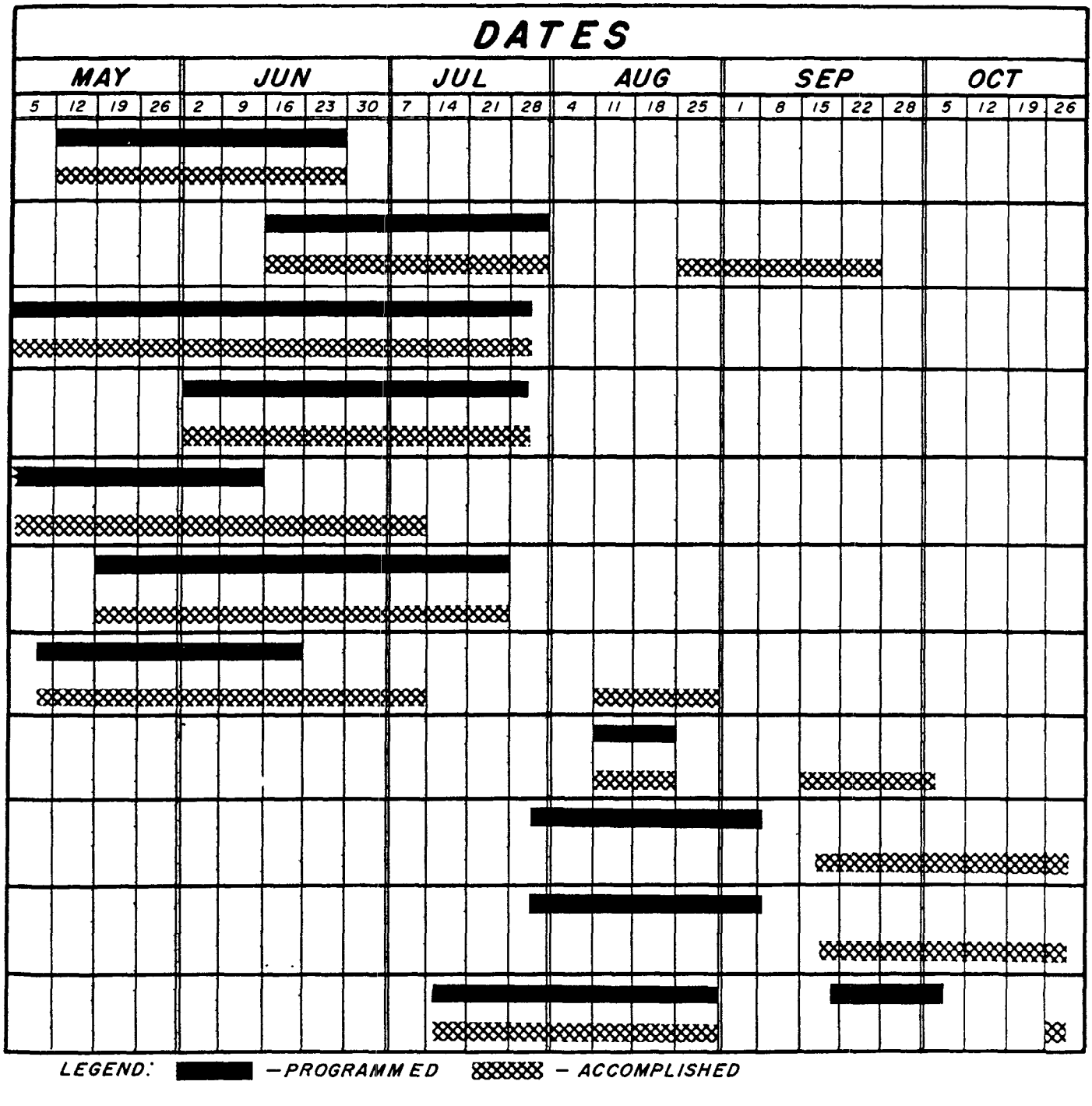
Aircraft Modifi

A/C TYPE	REQUIREMENTS	LOCATION
B-36H 2 ea	1. RELEASE TONE TRANSMITTER. 2. EXTRA AN/ARC-3 RADIO.	CARSWELL AFB SANDIA CORP
B-50 2 ea	1. RELIABLE RADAR. 2. TRANSIT TIME TELEMETERING EQUIP. 3. AIR ATTENUATION EQUIPMENT	SMAMA KIRTLAND AFB WALKER AFB
B-36D 1 ea	1. BLAST & THERMAL INSTR.	W-P AFB
B-47B 1 ea	1. BLAST & THERMAL INSTR.	W-P AFB DETROIT MICH
B-29 2 ea	1. RADAR 2. COMMUNICATIONS 3. CONTROL ROOM	W-P AFB
KB-29 10 ea	1. COMMUNICATIONS 2. RADAR BEACON	WALKER AFB
F-84G 16 ea	1. RADIAC INSTR. 2. FILTER TANKS 3. NOSE GAS SAMPLER 4. COMMUNICATIONS 5. MISC OPER EQUIP.	MOAMA BERGSTROM AFB
C-54 3 ea	1. CAMERA RACKS. 2. OXYGEN OUTLETS	W-P AFB HICKAM AFB
SA-16 4 ea	1. MK X IFF 2. MK X INTERROGATOR	HICKAM AFB
SB-29 4 ea	1. MK X IFF 2. MK X INTERROGATOR	HICKAM AFB
C-47D 4 ea	1. OVERWATER FLYING EQUIPMENT 2. MK X IFF 3. MOISTURE PROOFING. 4. PHOTO EQUIPMENT.	SBAMA HICKAM AFB

AFWL/HC

ation Schedules



Rehearsals

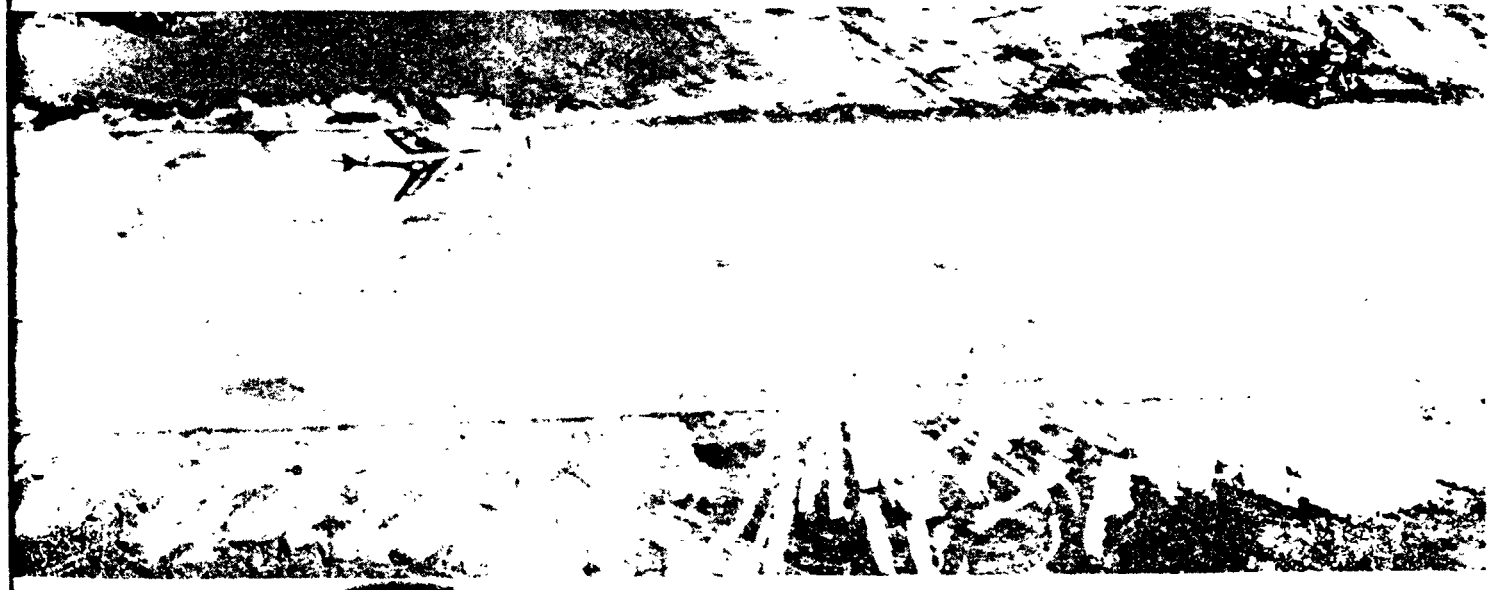
Training preparations for aircraft and crews, in addition to normal unit and element training, included participation in TUMBLER/SNAPPER in Nevada in April 1952, Operation TEXAN conducted from Bergstrom AFB, Texas, on 13 August 1952, and MIKE X-Ray conducted from Kwajalein on 28 October 1952. In conjunction with the ZI Operations TUMBLER/SNAPPER, F-84 pilots of Task Unit 132.4.2 received radiological training at Kirtland AFB, New Mexico and Indian Springs AFB, Nevada including actual sampling flights through an atomic cloud, lectures and instructions in the use of radiological instruments and indoctrination in a knowledge of general radiological hazards and factors pertaining especially to manned aircraft sampling.

Operation TEXAN was the final composite training rehearsal in which nearly all aircraft simulated shot operations as they would be conducted on site. The exceptions were the B-47 Effects Aircraft and the RB-50 Photo Aircraft which were not available for this rehearsal. Aircraft procedures and orbit patterns, including a practice bomb drop, were established and flown as all available data indicated they would be flown in the forward area. This rehearsal proved that the basic concept of operations was sound and that the aircraft and crews could accomplish the tasks assigned.

MIKE X-Ray was the Joint Task Force 132 rehearsal for MIKE Shot on 28 October 1952. All tasks assigned to Task Group 132.4 for this shot were simulated by a reduced number of assigned aircraft. The basic effort required of Task Group 132.4 was proven in the Group rehearsal on the previous Saturday, 18 October 1952. Therefore, the actual MIKE rehearsal was flown only to provide a final check on communications precedures and facilities to insure that all was in readiness for MIKE. One outstanding incident of the Task Group rehearsal on 18 October involved the B-47 aircraft. This aircraft was forced to land at the 4100 foot emergency strip at Roi Island, located at the northern tip of Kwajalein Atoll, because of low fuel and zero visibility conditions prevailing at Kwajalein caused by torrential rain. This forced landing was effected successfully and the aircraft was safely flown to Kwajalein Island on 20 October 1952.

4100 Feet—Jato Assist

Emergency Strip—ROI



ROI After Clearing for Takeoff

Roll-Up

The concept of Roll-Up for Operation IVY entailed two (2) aspects: progressive Roll-Up and general or final Roll-Up. In the progressive stage, personnel were reassigned and materiel was redeployed as they became surplus to the requirements of the mission. Under general or final Roll-Up, which commenced immediately following conclusion of the test phase of Operation IVY, complete disposition was effected for all Task Group personnel and materiel. One additional factor, however, had to be considered. Inasmuch as another joint Department of Defense - Atomic Energy Commission operation is contemplated for 1953, and requirements for the latter test are similar to IVY, the Roll-Up phase of IVY and the preparatory phase of future activity dictated a necessity for concurrent, integrated planning. Planning factors included the establishment of a garrison force at KWAJALEIN and resumption of the garrison status at ENIWETOK; requirements for intra-atoll liaison type airlift at ENIWETOK and at BIKINI and for inter-atoll airlift between these points and KWAJALEIN ATOLL. The ultimate disposition of personnel and materiel were determined largely by these considerations. Personnel not required for duty with the inter-operational garrison force were returned to their parent commands. Their movement schedule and redeployment phasing were consonant with both the primary mission and Roll-Up requirements.

Action was initiated through Headquarters, USAF, to retain for future operations all aircraft which had undergone extensive specialized modification and instrumentation. In this manner, such aircraft as were used for sampling, controlling, drop instrumentation and measuring the effects of test detonations, would be available and operable when needed.

Since the Roll-Up phase of IVY and the build-up preparations for future operations were inseparable, from the planning standpoint, the disposition of Task Group supplies and equipment was carried out with the future in mind. Excess equipment no longer required for IVY or use of the garrison force, or for future test activity, were prepared for immediate disposal. T.O. & E. equipment accompanied the elements scheduled for redeployment. All serviceable items required for future use were shipped for storage and maintenance in serviceable condition to HICKAM, ENIWETOK, and to KWAJALEIN. Repairable items intended for future use were returned to depots on a repair and return basis. Qualified personnel were selected for retention in the interim garrison force to assure proper storage and maintenance of vehicles and other materiel. A comprehensive preventive maintenance program was established with special emphasis on corrosion control.

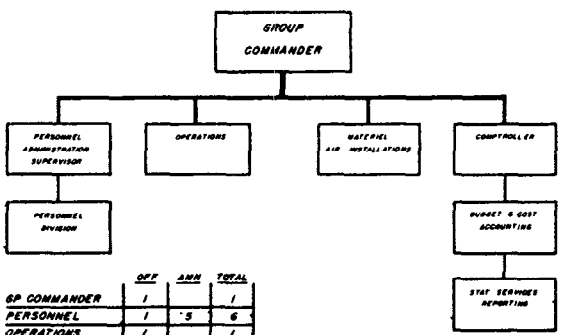
Action was initiated to retain buildings and facilities on KWAJALEIN for operating, administrative, billeting, and storage activities in connection with interim garrison functions and preparations for future operations. The equipment from the outlying islands was crated, marked for return at the appropriate time, and avacuated to HICKAM for rehabilitation, maintenance and storage. Thus, what under ordinary circumstances constitutes a normal military phasing-out procedure, under Operation IVY, became the initial planning phase of a subsequent operational task.

AEWL/HO

DISPOSITION OF IVY AIRCRAFT

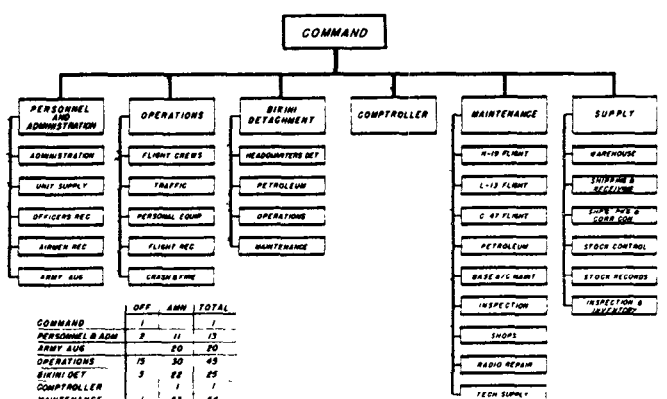
TYPES	NO	DISPOSITION
B-36H	2	RETURN TO SAC-CARSWELL AFB
B-36D	1	RETURN TO ARDC-WADC
B-50D	2	RETURN TO SAC - WALKER AFB
B-47	1	RETURN TO ARDC-WADC
B-29 (CONTROL)	2	RETURN TO SAC - WALKER AFB
B-29 (CANISTER)	2	RETURN TO ARDC CRC
RB-50	1	RETURN TO SAC -RAMEY AFB
KB-29	10	RETURN TO SAC - WALKER AFB
WB-29	10	RETURN TO MATS - HICKAM AFB
C-54	3	RETURN TO MATS - HICKAM AFB
C-47	4	RETAINED AT ENIWETOK
F-84G	15	RETURN TO SAC BERGSTROM AFB
SA-16	2	RETURN TO MATS - HICKAM AFB
SB-29	2	RETURN TO MATS - HICKAM AFB
H-19	3	RETAINED AT ENIWETOK
H-13	3	RETAINED AT ENIWETOK
L-13	15	RETAINED AT ENIWETOK
B-17	1	RETURN TO HQ CMD-BOLLING AFB

"4930 TEST SUPPORT GROUP (KWAJ) GARRISON FORCE"



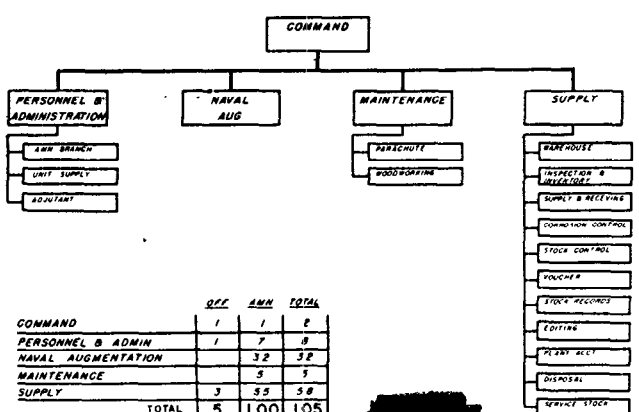
	OFF	AMN	TOTAL
GP COMMANDER	1		1
PERSONNEL	1	5	6
OPERATIONS	1		1
MATERIEL	1	1	2
COMPTROLLER	2	5	7
TOTAL	6	11	17

"4931ST TEST SUPPORT SQDN. (ENI.) GARRISON FORCE"



	OFF	AMN	TOTAL
COMMAND	1		1
PERSONNEL & ADM	2	11	13
ARMY AUG		20	20
OPERATIONS	15	30	45
BIKINI DET	3	22	25
COMPTROLLER		1	1
MAINTENANCE	1	53	54
SUPPLY	3	39	42
TOTAL	25	176	201

"4932ND TEST SUPPORT SQDN (KWAJ) GARRISON FORCE"



	OFF	AMN	TOTAL
COMMAND	1	1	2
PERSONNEL & ADMIN	1	7	8
NAVAL AUGMENTATION		32	32
MAINTENANCE		5	5
SUPPLY	3	55	58
TOTAL	5	100	105

CONCLUSIONS AND

The basic concepts used in the organization and operation of Task Group 132.4 as set forth in the directives from the Joint Chiefs of Staff, JTF 132, and Headquarters, USAF were sound. However, experience gained in Operation IVY indicates the desirability of making some changes in organization and execution for future operations. These changes are embodied in the following recommendations:

1. **Serious consideration should be given in future operations to making ENIWETOK the main base of Air Force operations.** The major problems experienced during Operation IVY resulted from operating two (2) far separated bases. This handicap should not be accepted during future operations unless again made mandatory by scientific requirements.

2. **Provision should be made to insure that the commander of the Air Task Group has the authority to deal directly with all supporting commands.** This authority was granted by the Commanding General, Special Weapons Center for Operation IVY and contributed greatly to the early resolution of planning and build-up problems.

3. **Consideration should be given to changing the organizational structure of MATS support elements participating in future atomic operations overseas, providing KWAJALEIN is used again as a main base for Air Force operations.** During operations in the forward area on project IVY the Test Services Unit was composed of five (5) elements: Weather Reconnaissance, Weather Reporting, Communications, Search and Rescue, and Documentary Photographic. The parent units of four (4) of these elements are normally under PACDIV MATS's jurisdiction, i.e., the 57th Weather Reconnaissance Squadron based at HICKAM; the 1960th AACS Squadron and the 78th Air Rescue Squadron based at KWAJALEIN; and the 1500th Air Transport Group, which furnished the three (3) C-54 photo aircraft and crews, based at HICKAM. In addition to these units, PACDIV also has the 1502nd Support Squadron at KWAJALEIN.

Therefore, it is recommended that MATS direct PACDIV to support future atomic operations in the forward area and utilize the 1502nd Support Squadron as the Headquarters of the Test Services Unit. The Test Services Unit would be under the operational control of the commander of the Air Task Group in the forward area as it was in Operation IVY. This proposal eliminates one (1) Headquarters at KWAJALEIN and places the responsibility for MATS participation on an established organization in the forward area.

4. **The Scientific Task Group should maintain an administrative staff in the same area as the Air Task Group Headquarters.** This staff would coordinate the activities of the scientific program directors who work with the Task Group units and would speak for the scientific Task Group Commander. Communications and test changes could then funnel through a single channel instead of the sometimes devious means which were, of necessity, used on IVY.

5. **The technical operations staff of the Task Group should be augmented by a civilian or military expert on the effects of large scale detonations on aircraft.** It was only through the cooperation of the scientific personnel of the Effects program that all the aircraft of the Task Group were safely posi-

RECOMMENDATIONS

tioned. With very high yield weapons coming in future tests the increasing importance of having the capability to calculate safe flight plans for all Task Group aircraft cannot be over emphasized.

6. **The Weather Central and the Weather Reconnaissance Element should be on the same base and a readiness date should be set rather than a specific shot date.** Air Force operations during project IVY were conducted, in general, under adverse weather conditions. During the operating phase in the forward area, KWAJALEIN, the primary Air Force installation, was under the influence of the inter tropical zone of convergence and easterly wave activity, with associated vortices, the greater part of the time. Even by establishing weather stations on four (4) selected outlying islands and by optimum utilization of weather reconnaissance, forecasting the movement and wave development on the Inter Tropical Front was difficult. Maximum coordination between the Weather Central on ENIWETOK and the Weather Reconnaissance Element on KWAJALEIN was not possible. Although the Central received all of the reconnaissance reports, the forecasters and aerial observers could not get together to discuss the weather situation. It is believed that this physical separation resulted in a loss of efficiency in the weather service provided the Task Force. The forecasting problem was further complicated by considerable psychological pressure on the forecasters because specific shot dates were established and announced. This pressure could be eliminated in large part in future operations by announcing a readiness date and firing on the first day, then or thereafter, the predicted weather is favorable to all agencies concerned.

7. **Future operations should be assigned a higher supply precedence in the build-up stage.** In IVY the supply precedence was not sufficiently high to guarantee delivery of critical items of supply at the forward area by orderly and economical means. Only by jumping channels, using personal contacts, and employing emergency requisitions and expensive airlift were the required critical items delivered in time for the actual missions. No more or less supplies were procured by the assignment of a low priority. Its only result was confusion and waste.

8. **It is strongly recommended that the sampler aircraft, the control aircraft, the instrumented B-50 aircraft, and the effects measuring B-36 and B-47 be retained in their present configuration.** The savings in money, time, and equipment are obvious.

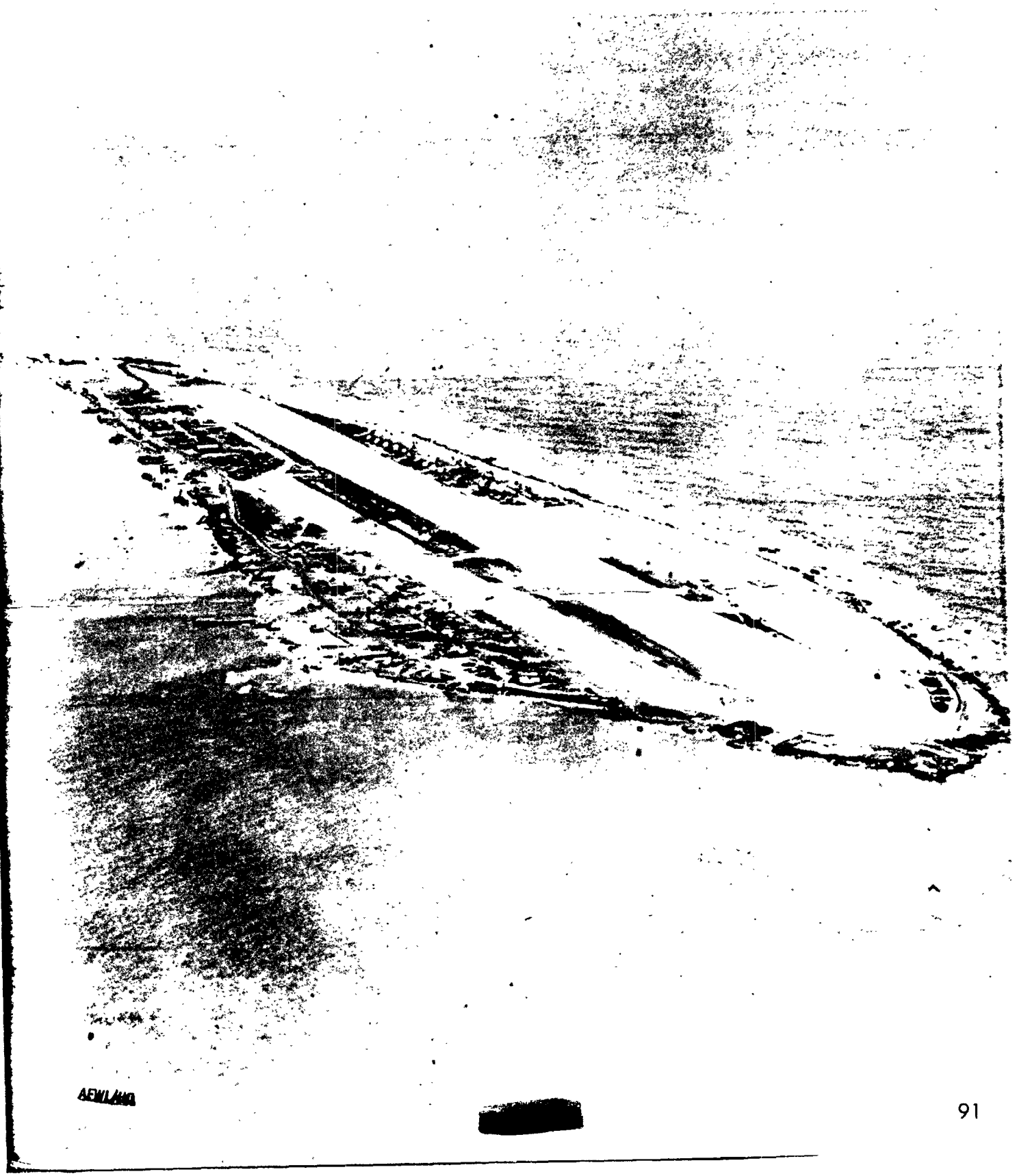
9. **The GCA unit installed for IVY should be replaced by a modern AN/-CPN-4 with the capability of working jet type aircraft through rain and cloud interferance.** The necessity of diverting the B-47 to a four thousand one hundred (4,100) foot emergency strip because of heavy rain could have been avoided if the more modern unit had been in place.

10. **A communication net adequate to fulfill the needs of the entire Joint Task Force should be installed and maintained on a permanent basis.** The expense of augmenting the permanent facilities for each operation is not justified and the service is not of first quality because of installation difficulties and circuit interference which cannot be foreseen in advance. Also, the low priority given IVY resulted in not having some of the planned facilities for lack of parts.

STATISTICAL SUMMARY

The statistical summary will be published at a later date when all pertinent data has been compiled. The material will be comprehensive and detailed and will cover the operational, administrative and logistical activities of Task Group 132.4.

ENIWETOK



AEWL/ANO

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