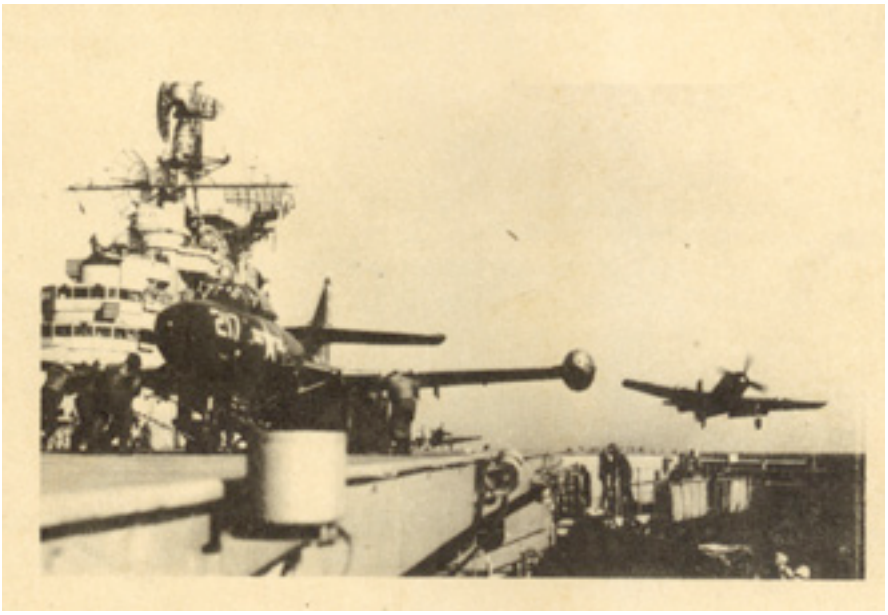
EVALUATION
OF THE
CANTED FLIGHT DECK
INSTALLED IN
U. S. S. ANTIETAM - CVA-36 -



FINAL REPORT
ON PROJECTS FL-E25-S11 AND FL-AI2-S11
PREPARED AND SUBMITTED BY
COMMANDING OFFICER, U.S.S. ANTIETAM - CVA-36 -

U.S.S. ANTIETAM (CVA-36)

25 June 1953

From: Commanding Officer, U.S.S. ANTIETAM (CVA-36)
To: Commander Air Force, U. S. Atlantic Fleet

Subj: Final Report on Project FL/E25/S11 - "Evaluate the Canted Flight Deck Installed in USS ANTIETAM"; and Project FL/A12/S11- “Assist the Bureau of Aeronautics and the Bureau of Ships in Tests of the Canted Flight Deck Installed in USS ANTIETAM"; submission of

1. The subject report is submitted herewith.

2. Project responsibility for Project FL/E25/S11 was assigned to the Commanding Officers USS ANTIETAM (CVA-36). This is considered the basic project. Project responsibility to assist the Bureau of Aeronautics and the Bureau of Ships with Project FL/A12/S11, to be conducted concurrently with the basic project, was also assigned.

3. This report covers the period 8 September 1952, when construction began on converting USS ANTIETAM (CVA-36) into the first canted deck carrier, until completion of Phase IV on 21 May 1953.

4. In addition to Progress Reports, the following scheduled reports were submitted during the evaluation period:

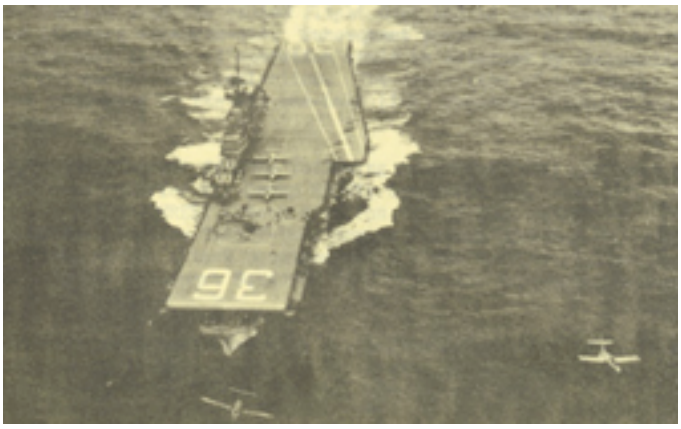
a. Canted Deck Preliminary Evaluation (CVA-36/15/S1-4 ser 79 of 19 January 1953).
b. Monthly Report of Canted Deck Evaluation Number 1 (CVA-36/15/Sl-4 ser 181 of 5 February 1953).
c. Interim Report of Canted Deck Evaluation (CVA-36/15/S1-4 ser 288 of 21 February 1953).
d. Monthly Report of Canted Deck Evaluation Number 2 (CVA-36/20/WTH:wjp/S1-4 ser 402 of 12 March 1953).

In addition to these reports, final reports on BUAER TED PTR SI-427 “Development and Evaluation Tests of Canted Deck for Aircraft Carriers” (Project FL/A12/S11) are being prepared by Commander, Naval Air Test Center, Patuxent River, Maryland, the Bureau of Aeronautics, and the Bureau of Ships. These reports are not currently available to the Commanding Officer, USS ANTIETAM (CVA-36); therefore, they are not included as enclosures to this report.

5. Upon distribution of the aforementioned additional reports, unless otherwise directed, it will be considered that Projects FL/E25/S11 - "Evaluate the Canted Flight Deck Installed In USS ANTIETAM (CVA-36)" and Project FL/Al2/S11 - "Assist the Bureau of Aeronautics and the Bureau of Ships in Tests of the Canted Flight Deck installed in USS ANTIETAM (CVA-36)" have terminated, at which time cancellation of these projects is requested,

S. G. MITCHELL (signed)

ABSTRACT



1. The purpose of Project FL/E25/S11 was to permit early evaluation of the canted flight deck concept in order to determine suitability for future carrier design and/or carrier conversion. The purpose of Project FL/A2/S11 was to assist the Bureau of Aeronautics and the Bureau of Ships in conducting tests towards obtaining canted deck design and operational data in order to obtain information for possible future conversion of CVA-9, CVA-41, CVAX, and CVE/ASW Class carriers.

2. U.S.S. ANTIETAM (CVA-36) is a CVA-9 Class carrier on which an improvised canted flight deck has been installed. The axial flight deck is eight hundred and seventy-six (876) feet in length, whereas the canted deck is five hundred and twenty-five (525) feet in length. The angle of cant of the deck is eight (8) degrees nine (9) minutes to the centerline of the ship. The deck edge elevator was immobilized and extended thirty-four (34) feet outboard of the original installation and the fair lead sheaves of the arresting gear were relocated so that the arresting gear pendants would be perpendicular to the centerline of the canted deck. No barriers or barricades were installed, although provisions were made for rigging two (2) barriers and a barricade. If an emergency developed requiring their use, these could be rigged in approximately three (3) minutes. Deck lighting was modified to conform with the canted flight deck and is considered superior to previous lighting arrangements. Subsequent operations and evaluation indicated additional safety of operation could be obtained by increasing the angle of the canted deck centerline, The centerline of the canted deck was therefore increased to ten and one-half (10 1/2) degrees by repainting the centerline.

3. Pilots and aircraft from the following activities were assigned for participation: Carrier Air Group EIGHT; Composite Squadrons FOUR, SEVEN, TWELVE, and THIRTY-THREE; Attack Squadron ONE HUNDRED SEVENTY-FIVE; Air Anti-Submarine Squadron TWENTY-TWO; Marine Fighter Squadron TWO HUNDRED TWENTY-THREE; Marine Attack Squadron TWO HUNDRED ELEVEN; Fighter Squadron THIRTY-FOUR; Air Transport Squadron TWENTY-TWO and Helicopter Squadron TWO.

4. Operations were conducted with the following aircraft types in conjunction with the projects: AD-4N, AD-5N, AF-2S, AF-2W, AJ-1, F2H-2, F4U-5, F9F-4, F9F-5, F9F-6, HUP-l, HUP-2, SNJ-5C, 7BM-3R, and XFJ-2.

5. Simultaneous land/launch air operations were conducted. Two thousand three hundred and sixty-nine (2,369) touch-and-go and one thousand seven hundred and thirty-eight (1,738) arrested landings were made. Both day and night air operations were conducted during the tests.

6. The following flag officers observed canted deck operations during the evaluation period:

Admiral L. D. McCORMICK, U. S. Navy
Vice Admiral F. B. STUMP, U. S. Navy
Vice Admiral J. J. BALLENTINE, U. S, Navy
Vice Admiral M. B. GARDNER, U. S. Navy
Vice Admiral R. A. OFSTIE, U. S. Navy
Vice Admiral F. M. TRAPNELL, U. S. Navy (Retired)
Vice Admiral C. C. HUGHES-HALLET, Royal Navy
Rear Admiral R. T. COWDRY, U. S. Navy
Rear Admiral T. S. COMBS, U. S, Navy
Rear Admiral A. K. DOYLE, U. S. Navy
Rear Admiral H. P. BAYER, U. S. Navy
Rear Admiral W. L. REES, U. S. Navy
Rear Admiral S. B. SPANGLER, U. S. Navy
Rear Admiral L. HARRISON, U. S. Navy
Rear Admiral F. N. KIVETTE, U. S. Navy
Rear Admiral I. C. HOBBS, U. S. Navy
Rear Admiral E. R. MCLEAN, U. S. Navy
Major General W. 0. BRICE, U. S. Marine Corps
Brigadier General A. H. BUTLER, U. S. Marine Corps
Brigadier General T. A. WORNHAM, U. S. Marine Corps
Brigadier General N. H. NELSON, U. S. Marine Corps
Brigadier General L. J. GREELY, U. S. Army

7. As a result of the tests conducted it was determined that the canted deck is feasible, suitable and superior to the axial deck as the primary means of operating carrier aircraft. To further the efficiency of flight deck operations from canted deck carriers, the optimum canted flight deck was determined to be ten and one-half (10 1/2) degrees to the axial centerline of the ship. For ESSEX (CVA-9) Class carriers, operating with current fleet type aircraft, a minimum landing area five hundred and twenty-five (525) feet in length, seventy (70) feet in width, at the landing ramp, and thirty-five (35) feet at the take-off ramp, is required, A runway laid out to these dimensions presents a funneling effect rather than the usual rectangular effect. This funneling effect of the canted deck runway assists the pilot in aligning the aircraft with the canted deck centerline. For CVE/ASW type carriers a similar runway, three hundred and fifty (350) feet in length and eighty (80) feet in width at the landing ramp is satisfactory. Optimum arrangements and characteristics of equipment associated with canted deck installations, such as arresting pendants, emergency barricades, deck lighting and markings were determined. Operational techniques, training procedures and requirements were established in general, including approach pattern, power-on and touch-and-go landings, and optimum wind direction and velocity for land/launch operations. No abnormal effects on ship handling, sea keeping qualities or general operating characteristics were noted. Winds of gale forces were not encountered during the period of tests, however, it is not believed such winds will seriously effect operations or shiphanding. No important changes are required in current operating and/or tactical doctrine to compensate for the canted deck installation.

8. Evaluation of data collected during the tests indicate that the canted deck design should be incorporated in all new construction, existing carriers and conversions. This is recommended.
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CONCLUSIONS

As a result of the tests conducted, it is concluded that:

1. As the primary means of operating carrier aircraft, the canted flight deck is suitable, feasible, and superior to the axial flight deck because:

   a. It provides for greater safety of operations.

      (1) Handling of aircraft, refueling and rearming can be conducted more safely on aircraft spotted forward during recoveries.
      (2) Compound accidents resulting from barrier crashes will be eliminated.
      (3) The pilot is given greater confidence and ease of mind by removal of the barriers and barricades with resultant improvement in landings.
      (4) The lay-out of the runway provides for safer landings and easier approach alignment, due to the funneling effect of the converging side lines and wide centerline combination.
      (5) The night lighting arrangement is superior, with subsequent ease of mind and resultant good landings.
      (6) Longer arrested runouts are possible without crashing the barriers.
      (7) The power-on landing technique permits pilots to make soft, easy landings with increased safety without imposing undue shock to aircraft landing gear assemblies.
      (8) The touch-and-go landings give new pilots an opportunity to get the feel of a carrier landing without fear of a barricade.

   b. It provides for greater flexibility of operations and deck handling because:

      (1) Simultaneous free deck and catapult launches are feasible and practical.
      (2) Higher aircraft landing speeds are possible.
      (3) Ready aircraft can be launched without respotting the deck.
      (4) A ready deck can be maintained more expeditiously and easily.
      (5) Fewer respots are required, thereby improving the overall efficiency of the Carrier Task Force.
      (6) Deck markings provide for improved efficiency of operations and flexibility, due to safe parking area forward.
      (7) The lighting arrangement does not destroy the night vision of the pilots and plane handlers.
      (8) Aircraft can taxi out of the arresting gear, turn downwind into the safe parking area and taxi onto a starboard deck edge elevator aft of the island resulting in shorter landing intervals.
      (9) Landing intervals between twelve (12) and twenty (20) seconds can be attained with adequate elevator services.

   c. Fewer cross deck pendants and arresting gear engines are required with resultant decrease in topside weight.

      (1) Only six (6) pendants are required and four (4) arresting gear engines; three (3) for pendants and one (1) for barriers.

d. More leeway is possible on the ship's course and speed to obtain satisfactory wind across the deck for recovery of aircraft.

(1) Direction of wind over the deck can vary in relation to the normal centerline from zero (0) to twenty (20) degrees to port for safety.
(2) To further the efficiency of operations the optimum canted deck layout for Essex (CVA-9) Class carrier requires:
  (a) A minimum length of five hundred twenty-five (525) feet and a minimum width of seventy (70) feet for the landing area and an angle of cant of ten and one-half (10 ½) degrees.
  (b) Three elevators:
    1. A starboard deck edge elevator located at about Frame one hundred and twenty-two (122).
    2. A port deck edge elevator (amidships) or a starboard deck edge elevator located forward of the island.
    3. A forward axial deck centerline elevator.
  (c) A safe aircraft parking area, located fifty (50) feet to the starboard of the canted deck centerline and parallel to that line.
  (d) A Landing Signals Officer's Platform parallel to the canted deck centerline at about its present position.
  (e) A catapult located forward on the canted deck.

3. The optimum arrangements and characteristics of equipment associated with the canted deck installation includes:

a. Six (6) arresting pendants (No. 1 pendant located eighty (80) feet forward of the landing ramp) spaced twenty-eight (28) feet apart perpendicular to the canted deck centerline.

b. With the present type barricade attached to Mark 5 (Mk. 5) arresting gear engine the barricade should be located one hundred and fifty (150) feet forward of the number six (6) pendant.

c. Deck lighting arrangement which includes:

(1) Landing ramp guide lights perpendicular to the centerline.
(2) Forward ramp guide lights perpendicular to the centerline, to indicate take-off end of runway.
(3) High intensity white deck surface lights.
(4) White centerline guide lights.
(5) Red deck edge lights to outline contour of canted deck.
(6) Red runway lights.
(7) Arrangement and location as shown in Fig. 3.

d. Deck Markings of the following characteristics:

(1) Yellow canted deck centerline five (5) feet in width at an angle of ten and one-half (10 ½) degrees to the axial centerline.
(2) Yellow side lines eighteen (18) inches in width, thirty-six (36) feet seven (7) inches to port of the canted deck centerline and thirty-three (33) feet five (5) inches to the starboard of the centerline. A total width of approximately seventy (70) feet converging to a total width of approximately thirty-five (35) feet at the take-off and of the runway.

(3) A broken red safe parking line two (2) inches in width, parallel to the canted deck centerline at a distance of fifty (50) feet.
(4) Axial centerline indicated by white broken lines.
(5) Other markings as required.

3. Optimum operational techniques and training procedures include:

a. For recovery, a relative wind of about eight (8) to twelve (12) degrees to the port of the axial centerline at a velocity of thirty-six (36) knots for jets and thirty-one (31) knots for propeller aircraft. For free deck and catapult launches, direction and force of wind about the same as for axial deck carriers.
b. Landing and break-up patterns essentially the same for axial deck carriers, except a longer cross wind leg on the approach so as to place the aircraft in a direct line with the canted deck centerline.
c. Average approace speeds about one hundred fifteen (115) knots for jets and remaining the same for propeller aircraft as for an axial deck carrier approach.
d. Normal landing with power-on for landing jet aircraft.
e. Touch-and-gos without the necessity of a clear deck forward is one of the greatest innovations of the canted deck carrier.
f. For carrier qualifications two (2) or three (3) touch-and-go and six (6) arrested landings are sufficient.
g. Landing intervals of about twenty (20) seconds or less.

5. The canted deck design has no abnormal effect on shiphandling, seakeeping qualities or general operating characteristics of U.S.S. ANTIETAM (CVA-36) under normal operating conditions.

6. Although some smoke is encountered at times, smoke nuisance or interference during landing operations is practically nil.

7. It is feasible, desirable, and necessary to use starboard deck edge elevator for striking aircraft below the hangar deck by taxiing aircraft out of the gear, turning aft, taxiing downwind to the elevator and striking below.

8. The port deck edge elevator could not safely be used during recovery operations.

9. The present barricade can be rigged in two and one-half (2 ½) minutes and derigged in one (1) minute. The two (2) barriers can be rigged in two and one-half (2 ½) minutes and derigged in two (2) minutes.

10. The maximum recorded run out of the arresting gear was one hundred sixty-five (165) feet.

11. Additional deck guide lights are required at the take-off end of the runway.

12. A symmetrical arrangement of port and starboard deck surface lights and runway outline lights would be only moderately helpful in ensuring safety of night operations.

13. Engagement lights, warning signals or visual markings to indicate passing of all arresting pendants are not required.

14. Jet and prop blast on landing aircraft being taxied enroute to parking position on bow or turning up on the catapults is negligible.

15. There is a definite burble effect in the area directly astern of the ship caused by the flight deck island and stack gases which is aggravated in winds above forty (40) knots or when directly down the centerline of the axial deck, causing pilots to line up to the left of the canted deck centerline instead of on the centerline to avoid turbulence. This is acceptable since compensations can be made if pilots are briefed to expect this condition.

16. There is minor turbulence at the take-off end of the runway, however, this is not adverse. Compensations can be made if pilots are briefed in advance of this condition.

17. There is a possibility of aircraft going over the side or swerving into aircraft forward if tail hook breaks upon engagement. This is considered an acceptable "calculated risk".

18. With improved power on landing technique the strength of landing gear of future aircraft may be reduced, thereby reducing weight of aircraft.

19. There is no difficulty involved in operating canted deck carrier(s) in company with axial deck carrier(s). However, it is desirable to have the canted deck carrier on the starboard side of the formation to permit slight variation in course when necessary and/or desirable.

a. Ship courses for launches are the same.
b. Ship courses for recoveries vary only by several degrees.
c. Winds from Zero (0) to twenty (20) degrees to port of axial centerline can be used for recoveries by canted deck carriers.

20. Canted deck carriers heel more in a starboard turn than turn to port, using the same rudder angle. Less rudder angle is used in a turn to starboard for this reason.

21. Some pitching and rolling were encountered. There were no adverse effects noted.
a. A rolling and pitching canted deck has about the same effect on safety of flight operations as an axial deck under the same conditions.

22. The canted deck for CVE/ASW type carriers is feasible and operationally suitable.

23. Overall efficiency of Carrier Task Force is increased due to canted deck capabilities.
a. The canted deck carriers will be able to handle as many aircraft as axial deck carriers more smoothly and in a more flexible manner with resulting increase in efficiency.

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RECOMMENDATIONS

It is recommended that:

1. **The canted deck design be incorporated in all new construction, existing carriers and conversions.**
2. **The angle of cant of the flight deck be ten and one-half (10 ½) degrees to the port of the axial flight deck centerline and that this be standardized for all carriers.**

3. The canted deck lay-out of deck markings, lighting arrangements and specifications be adopted as standard. These deck markings, lighting arrangements, and specifications of each, provide for maximum safety, improved efficiency of operations and flexibility. In addition, the funneling effect eliminates the requirement for extremely large overhanging structure which would be the case if a rectangular runway was provided. This effect also provides for additional safe parking and handling of aircraft.
4. The Landing Signal Officer's platform be parallel to the canted deck centerline and retained in its present position.
5. That there be only six (6) arresting gear pendants, and three (3) arresting gear engines. The number one (1) arresting pendant be eighty (80) feet forward of the landing ramp and successive five (5) pendants spaced at twenty-eight (28) foot intervals, these pendants to be perpendicular to the canted deck centerline. This arrangement provides for maximum safety for arrested landings with resultant reduction in topside weights. It is more practical than spacing pendants at closer intervals and adding two (2) additional pendants, since the end result would be about the same.
6. That the deck runway specifications of five hundred twenty-five (525) feet in length, seventy (70) feet in width (at landing ramp) and thirty-five (35) feet at take-off ramp be considered as standard for CVA-9 Class carriers. These specifications can be used as a guide to determine lengths and widths of runways for other class carriers and taking into consideration types of aircraft which will be operating from future canted deck carriers.
7. That three (3) elevators be provided, a starboard deck edge elevator at frame one hundred and twenty-two (122), a port or starboard deck edge elevator amidships and a forward centerline elevator. Such an arrangement of elevators will provide maximum safety, efficiency, and flexibility of operations and deck handling.
8. That barricades and/or barriers, if provided at all, be automatic types, preferably recessed into the deck and finished in such a way that when in the down position, landing aircraft will not make an unintentional arrestation, causing damage to the tail hook assembly, and that they be installed one hundred fifty (150) feet forward of the number six (6) arresting gear pendant.
9. That a catapult be installed at the forward end of the canted deck to provide for faster launches and to take advantage of the flexibility of the canted deck for launching aircraft in a "ready" status without the necessity of a re-spot.
10. That power-on landings for jets be included in FCLP and that this be adopted as standard landing procedure for carrier landings upon assignment of canted deck carriers to the active fleet.
11. That carrier qualifications be grouped to provide for two (2) or three (3) touch-and-go's and six (6) arrested landings. Too many touch-and-go's are not desired since pilots begin to adopt procedures of their own, contributing little to their training.
12. That relative winds of eight (8) to twelve (12) degrees to port of axial deck centerline be considered as standard for recovering aircraft on canted deck carriers, and when operating canted deck carriers in company with axial deck carriers, the latter should be to the left of the axis to provide for diverging courses.
13. That relative winds be kept below forty (40) knots in order to minimize stack wash and burble at the landing ramp.
14. Consideration be given towards reduction of future aircraft landing gear weights upon introduction of canted deck carriers into the active fleet.

S. G. MITCHELL (signed)

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PURPOSE OF TESTS

l. The purpose of the tests was to permit early evaluation of the canted flight deck concept in order to determine suitability for future carrier design and/or carrier conversion including:

a. Operational suitability of the canted flight deck as the primary means of operating carrier aircraft.

b. Optimum canted deck layout to further efficiency of operations:

(1) Minimum required length and width of canted deck landing area take-off ramp configuration and location required.

(2) Recommended locations of deck edge elevators relative to canted deck landing area.

(3) Locations of safe airplane parking areas in relation to canted deck landing area.

(4) Location of ISO platform.

c. Optimum arrangements and characteristics of equipment associated with canted deck installations to further efficiency of operations:

(1) Minimum number and optimum location of arresting pendants.

(2) Optimum location of emergency barricade.

(3) Deck lighting arrangement, location, color and types of deck landing lights.

(4) Deck markings, arrangement, location, size and color for landing.

(5) Special devices, lights or markings required to indicate take-off position of aircraft that have not engaged an arresting pendant or making touch and go landings and take-offs.

d. Operational techniques and training procedures to further development and acceptance of canted deck carriers from the standpoints of embarked air units, ship's personnel and forces in company:

(1) Limits of relative wind (force and direction) to port and starboard of canted deck axis.

(2) Optimum aircraft landing approach patterns, techniques and procedures under various wind conditions particularly when the surface wind is such that the relative wind is not down the centerline of the canted deck,

(3) Power on landing (touch-and-go) procedures.

(4) Optimum landing intervals.

(5) Aircraft deck handling, spotting, and servicing techniques for canted deck.

a. Effect of canted deck installation on ship handling, general operating characteristics, and sea keeping qualities.

2. In addition to the above, the Bureau of Aeronautics was interested in criteria for design of aircraft for canted deck operations including:

a. Sinking speed.
b. Approach speed.
c. Engaging speed.
d. Special engine throttle controls for power-on landing.
e. Aborted landing take-off engine acceleration requirements.

3. The Bureau of Ships was interested in obtaining, in addition to the evaluation of flight deck markings, lightings and general arrangement of the flight deck, information on:

a. Seaworthiness of the sponson, including maximum pitch and roll, weather status and remarks as to the ship's behavior, local damage or the like when steaming at various courses and speeds in a sea state of gale force or more.

b. Smoke nuisance or interference during recoveries on the canted deck,

4. The following specific comments and recommendations were desired in amplification towards determining suitability of the canted flight deck:

a. Minimum recommended length of the canted deck landing area.

b. Feasibility of using starboard deck edge elevator(s) during landing operations to strike airplanes below to the hangar deck by taxiing aircraft out of the gear, turning aft, taxiing downwind to the elevator and striking below by use of other elevators was desired.

c. Whether landing operations could be conducted safely with the port elevator in the down position.

d. Relative advantages and disadvantages of canted flight dock vs. axial flight deck in aircraft handling, spotting, respottings, refueling, rearming, etc.

e. Optimum location of the number one (1) arresting pendant (distance from ramp) considering aircraft landing requirements vs. allowance of space forward of pendants for installation of catapult or elevator.

f. Number of arresting pendants and area covered.

g. Maximum useable arresting gear runouts assuming new designs.

h. Time required to rig emergency barrier/barricade with a trained crew.

i. Whether deck surface lights were desirable and how far forward they should be located.

j. Whether location of the starboard deck surface lights at the deck edge rather than on starboard runway edge would provide adequate runway illumination for night landing operations.

k. Whether a symmetrical arrangement of port and starboard deck surface lights and runway outline lights (red) considered mandatory, desirable or helpful in insuring safety of night landing operations.

1. Whether lighting used in the test was satisfactory as to effectiveness of intensity and angular visibility.

m. Whether special lights and deck markings to indicate take-off position of aircraft that have not engaged a pendant considered mandatory, desirable, or helpful for normal operation with trained pilots of average ability (FCLP and carrier touch-and-go landings). If mandatory, whether cockpit audio or light warning devices were considered necessary or desirable.

n. Adverse effects, if any, of oblique impingement of jet and prop blast on landing aircraft from aircraft taxiing enroute to parking position on bow or aircraft turning up on catapults.

o. Adverse effects, if any, of air turbulence due to stack, island and/or ramp on the landing of aircraft.

p. Adverse effects, if any, of turbulent airflow conditions at the forward end of the canted deck area on take-off of aircraft which have not engaged an arresting pendant.

q. Recommended sinking speed, approach speed and arresting gear engaging speed.

r. Requirements, if any, for engine acceleration and aircraft control for take-off conditions when the aircraft had not engaged an arresting pendant.

s. Increase in engaging speed for power-on landings on canted deck compared with power-off landings on axial deck.

PREVIOUSLY KNOWN DATA

1. In July 1952, the Naval Air Test Center, Patuxent River, Maryland, at the direction of the Bureau of Aeronautics, conducted preliminary canted deck tests aboard the USS MIDWAY (CVA-41). In these

tests, a line approximately seven (7) degrees to the left of the normal centerline of the ship was painted on the flight deck. The first six (6) cross deck pendants were used for arrested landings. Power-on type approaches and landings were made and sufficient data was collected to indicate that the canted deck carrier was desirable. It was further indicated that the canted deck afforded increased safety of personnel and aircraft, eliminating barrier crashes, damages and casualties from hung ordnance and/or loaded guns. The test further indicated that the flexibility of flight deck and air operation was improved,

2. No previous information on handling, sea keeping qualities or general operating characteristics of canted deck carriers was available to the Commanding Officer, USS ANTIETAM (CVA-36). There was no available information on operating and tactical doctrines or operating procedures for canted deck carriers.

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STATISTICAL SUMMARY

1. **LANDING STATISTICS**

TYPE AIRCRAFT	TOUCH AND GO	ARRESTED	TOTAL LANDINGS BY TYPE, A/C
SNJ-50	7	14	21
XFJ-2	79	25	104
F9F-6	*105*	*30*	135
F2H-3	86	58	144
F2H-2	97	62	159
F4U-5	46	*15*	63.
AD-4 * 4N	437	361	838
F9F-5	1,452	1,126	2,578
TBM	0	28	28
AJ-1	2	3	*5*
F3D	*58*	16	74
TOTAL	2,369	1,738	4,107

2. **CROSS DECK PENDANT ENGAGEMEMT DATA**

TYPE AIRCRAFT	PENDANT NUMBER						TOTAL
	1	2	3	4	5	6	
SNJ-5C	3	6	3	2	0	0	14
ILFJ-2	5	6	3	0	8	3	25

F9F-6	3	7	10	2	6	2	30
F2H-3	13	21	10	12	1	1	58
F4U-5N	5	6	1	1	2	0	15
AD-4 * 4N	118	102	77	41	15	8	361
F9F-5	121	222	278	222	171	112	1,126
TBM	18	2	6	1	1	0	28
F2H-2	19	16	11	7	4	*5*	62
AJ-1	0	2	1	0	0	0	3
F3D	4	5	2	4	0	1	16
TOTAL	309	395	402	292	208	232	1,738

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OPERATING SCHEDULE FOR USS ANTIETAM

PHASE I

Period 20 December 1952 to 16 January 1953

20 Dec - 4 Jan (a) Complete readying ship for sea.

(b) Supply activities complete loading including shipboard aviation handling equipment and operating allowances.

(c) Bring ships complement up to strength.

(d) Conduct on-the-job and “board-ship" training as practicable.

(e) Embark BuShips participants as directed by BuShips for ISE period enroute Norfolk.

5 Jan - 8 Jan (a) Enroute Norfolk. Commence Evaluation.

(b) If heavy seas encountered, assist BuShips personnel in conducting heavy weather evaluation.

(c) Conduct such ship-handling drills and training exercises as time permits

9 Jan - 13 Jan (a) Load NATC aircraft and personnel, Buaer personnel and test equipment CVG-8 participants and aircraft and ships spare parts as required at Pier - NorVa.

12 Jan - 16 Jan (a) Underway for operating area as designated by ComAirLant.

(b) Conduct BuAer test in accordance with reference (a) and (b) as requested by Commander Naval Air Test Center, Patuxent River.

OPERATING SCHEDULE FOR USS ANTIETAM

Phase II
Period 17 January 1953 to 6 March 1953

17 Jan -18 Jan (or upon completion of Phase I)	(a) At Norfolk. (b) Embark CAG aircraft and personnel as designated. (c) Complete loading aircraft spares and supplies for GTMO shakedown period. (d) Commence preparation for first Monthly report. (e) Embark BuAer and BuShips personnel as directed.
19 - 22 Jan	(a) Enroute GTMO. (b) Conduct BuShips heavy weather trials if required. (c) Conduct ship training exercises enroute, concentrate on flight deck crews, rigging and unrigging barrier/ barricades and engineering casualties. (d) Submit monthly report No. I by 5 February.
23 Jan - 6 Mar	(a) Commence GTMO modified refresher training schedule. (b) Conduct maximum number of carrier landings progressing to night operations. (c) Evaluate canted deck to obtain operating statistics and information in accordance with enclosures (5), (6) and (7). (d) Together with BuShips representatives and ComAirLant prepare yard work list to incorporate changes and modifications as dictated as the result of operations. (e) Bring crew to high state of operating efficiency. (f) Submit monthly Evaluation Report No. 2 by 5 March.

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OPERATING SCHEDULE FOR USS ANTIETAM

Phase III
Period 7 March 1953 -12 April 1953

7 - 11 Mar (About 9 Mar)	(a) Enroute NavShipd, New York. (b) Fly off Air Group Eight aircraft, proceed NorVa disembark Air Group Eight personnel and dud aircraft and equipment.
11 Mar	(a) Arrive NavShipYd, New York.
12 - 26 mar	(a) Commence Post Shakedown availability. (b) Continue to maintain high state of training.
27 Mar	(a) Underway for NorVa.
28 - 29 mar	(a) Load NATC and Air Group Eight aircraft as designated. (b) Load BuAer, BuShips participating personnel as designated.

30 Mar - 12 Apr promulgated. (a) Conduct NATC and BuAer flight test as outlined in BuAer instructions to be

(b) Submit Monthly Evaluation Report No. 3 upon completion of BuAer Tests and Quarterly Evaluation Report summarizing operations conducted period 5 January through 12 April.

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OPERATING SCHEDULE FOR USS ANTIETAM

PHASE IV

Period 13 April 1953 to 1 July 1953

13 Apr - 1Jul
(a) Embark Air units as designated.
(b) Conduct flight operations in furtherance of evaluation in accordance with instructions to be issued by Commander Air Force, U.S. Atlantic Fleet.
(c) Be prepared to conduct demonstrations (day and night) for observers.
(d) Continue compiling statistical information in preparation of final report.
(e) Submit Monthly Evaluation Report No. 4 by 15 May.
(f) Submit Final Evaluation Report by 10 July.