

AD 487001

⑥ XC-142A

VTOL TRANSPORT PROGRAM.

~~CONFIDENTIAL~~ ⑬ 33(657)-7868 ✓

⑨ MONTHLY PROGRESS REPORT. no. 53

FOR

MAY 1966.

MTV VOUGHT AERONAUTICS DIVISION 212 445

⑪ May 66, ⑫ 27p

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INTRODUCTION

This report has been prepared in accordance with the requirements of Item 7 of the Contract Number AF33(657)-7868 and is the fifty-third in a series of monthly reports covering activity on the XC-142A VTOL Transport Aircraft Program.

This report is devoted specifically to a summary of progress for the month of May 1966.



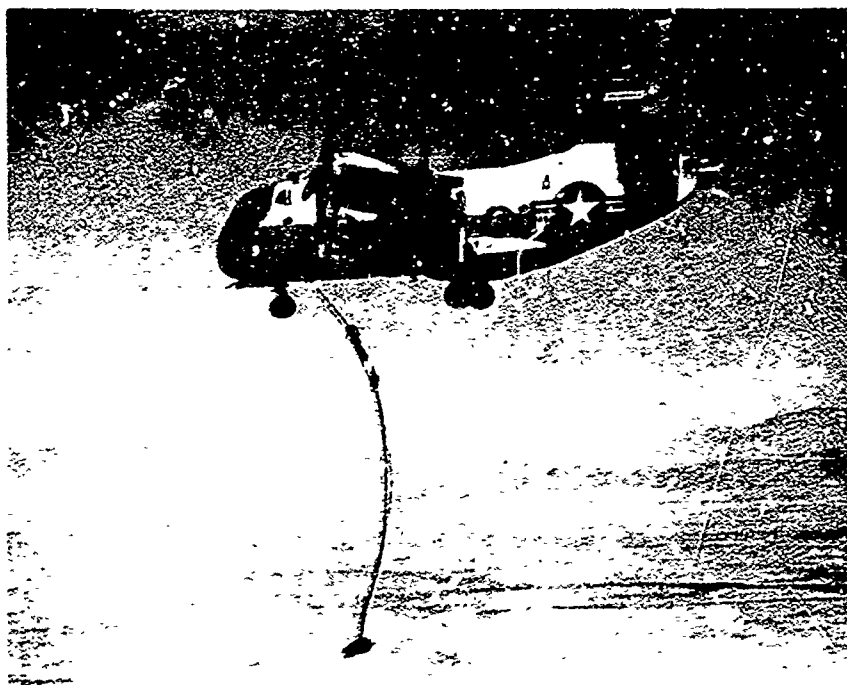
Pilots Lt. R. L. Rich, USN and Major S. B. Barrett, USAF Ready for Delivery of No. 1 Aircraft

SUMMARY

During the month of May, the XC-142A program proceeded essentially on schedule. In the early part of the month flights on the No. 1 aircraft were accomplished to obtain prop stress data and to evaluate flying quantities with the new configuration propellers (2FF). In addition, the aircraft hovered over, landed and took off vertically from a 120 foot diameter helicopter landing pad of polyester resin and fiberglass. On 12 May, the aircraft was officially delivered to the Air Force and flown to Edwards Air Force Base without incident, including a stop at El Paso, Texas. The cumulative flight time from Dallas to EAFB, including a ten minute hover at El Paso was 4 hours 56 minutes.

The No. 2 Aircraft continued to progress satisfactorily through repair work with pre-flight operations expected to start in late June, followed by return to flight status in mid-July and delivery to EAFB by August 1966.

The No. 3 aircraft remained in a dormant status at EAFB throughout the reporting period, pending a repair decision. A completely successful air drop program was conducted at ~~NAF El Centro, California during the month~~ utilizing the No. 4 aircraft. In 8 hours and 29 minutes of flight time, the aircraft accomplished approximately forty drops of various kinds, including loads ranging from 500 to 4000 pounds, 5 and 95 percentile dummies and 10 paratroopers. Methods employed included extraction, gravity and "dump truck" at various altitudes and forward speeds from zero to 125 knots. Upon completion of the air drops on 18 May, with the aircraft on the ground, a fire occurred in the No. 4 nacelle as the result of a cracked hydraulic fitting. At the end of the month, the aircraft was undergoing repairs with return to flight status estimated for late June.



XC-142A No. 4 Aircraft Dropping Dummy Through Lower Escape Hatch at
El Centro

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The No. 5 aircraft returned to flight status at EAFB on 11 May following acceptance inspection subsequent to the delivery of the aircraft to EAFB in April. On 18 May, the aircraft flew from EAFB to the aircraft carrier USS Bennington for flight evaluation under various conditions. Two series of successful operations were conducted, including vertical and short take-offs and landings, conversions and reconversions and hover with wind over the deck from approximately 12 to 37 knots.

At the end of the reporting period, a total of 27 pilots had flown the XC-142A aircraft and a total of 16 passengers had flown in the aircraft at one time. Flight status of the five aircraft at the end of May 1966 was as follows:

Category I Tests	214 Flights	151:40 Flight Time
Category II Tests	54 Flights	63:12 Flight Time
TOTAL	268 Flights	214:52 Flight Time

ITEM 1A DEVELOPMENT OF XC-142A AND FABRICATION OF FIVE PROTOTYPE MODELS

The repair of the No. 2 aircraft continued essentially on schedule during the month with anticipation of pre-flight operations beginning by late June, return to flight status in mid-July and delivery to EAFB by 1 August.

ITEM 1B FABRICATION OF STATIC TEST ARTICLE ((Completed))

ITEM 2 FABRICATION OF MOCKUP ((Completed))

ITEM 3 GROUND TEST PROGRAM

3-1 STRUCTURAL TESTS ((Completed))

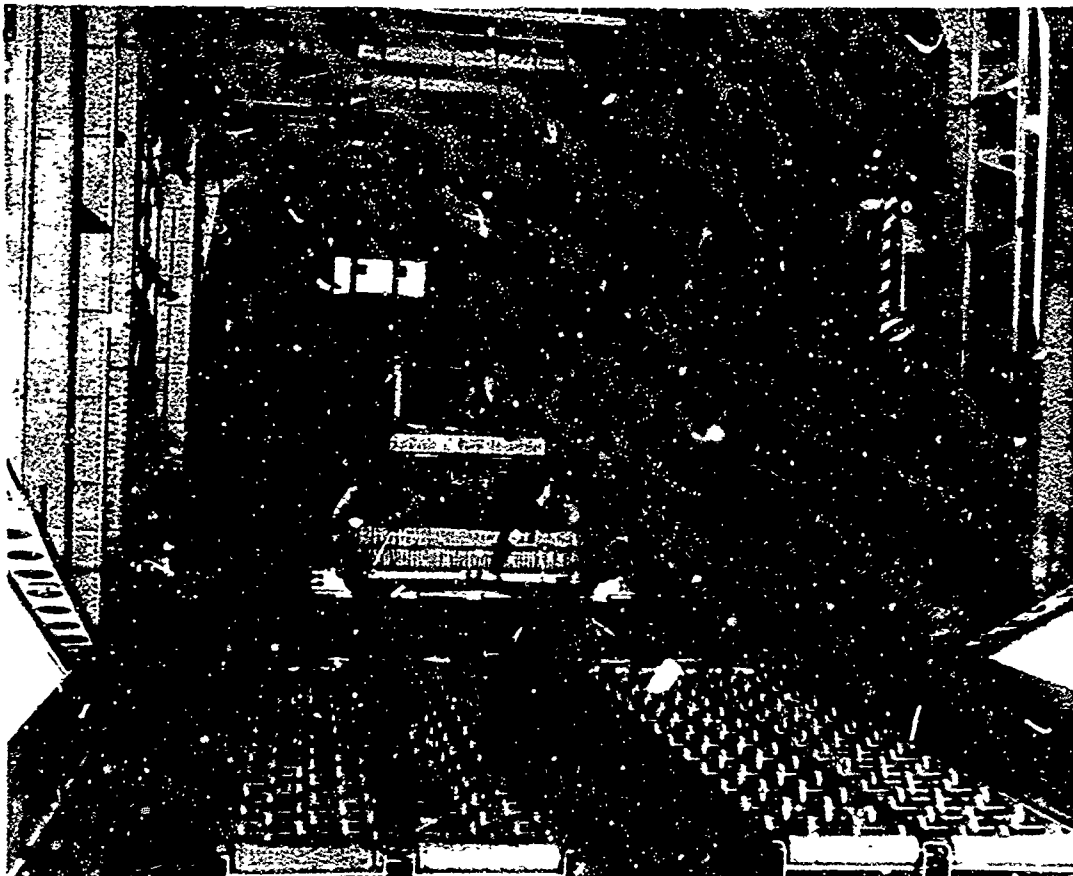
3-2 TRANSMISSION SYSTEM TESTS ((Completed))

3-3 SYSTEM TESTS - All system tests are complete with the exception of the wing incidence screw-jack actuator qualification tests which are still in process and the heat and ventilating and rain removal system tests which require flight testing to confirm satisfactory operation. These flight tests are planned to be conducted utilizing the No. 2 airplane following bailment to the Contractor.

ITEM 4 ENGINEERING DATA

During May the Engineering effort continued to be devoted to support of the flight test program involving airplanes Nos. 1, 4 and 5 and the repair of airplane No. 2.

Several investigations were conducted as a result of discrepancies encountered on airplanes at EAFB. Special attention was devoted to determining the cause of a fire experienced in the No. 4 nacelle of No. 4 airplane at El Centro on 18 May and the action necessary to prevent recurrence. (see Item 6) Cause was a hydraulic leak from a cracked hydraulic line quick-disconnect in the outlet port of the main engine pump. Final corrective action was released under T. O. 631C and consisted of replacing existing aluminum hydraulic



XC-142A No. 4 Configured for Air Drop Program at El Centro

disconnects with steel disconnects. Repair of the damaged nacelle of No. 4 airplane was in progress at the end of the month.

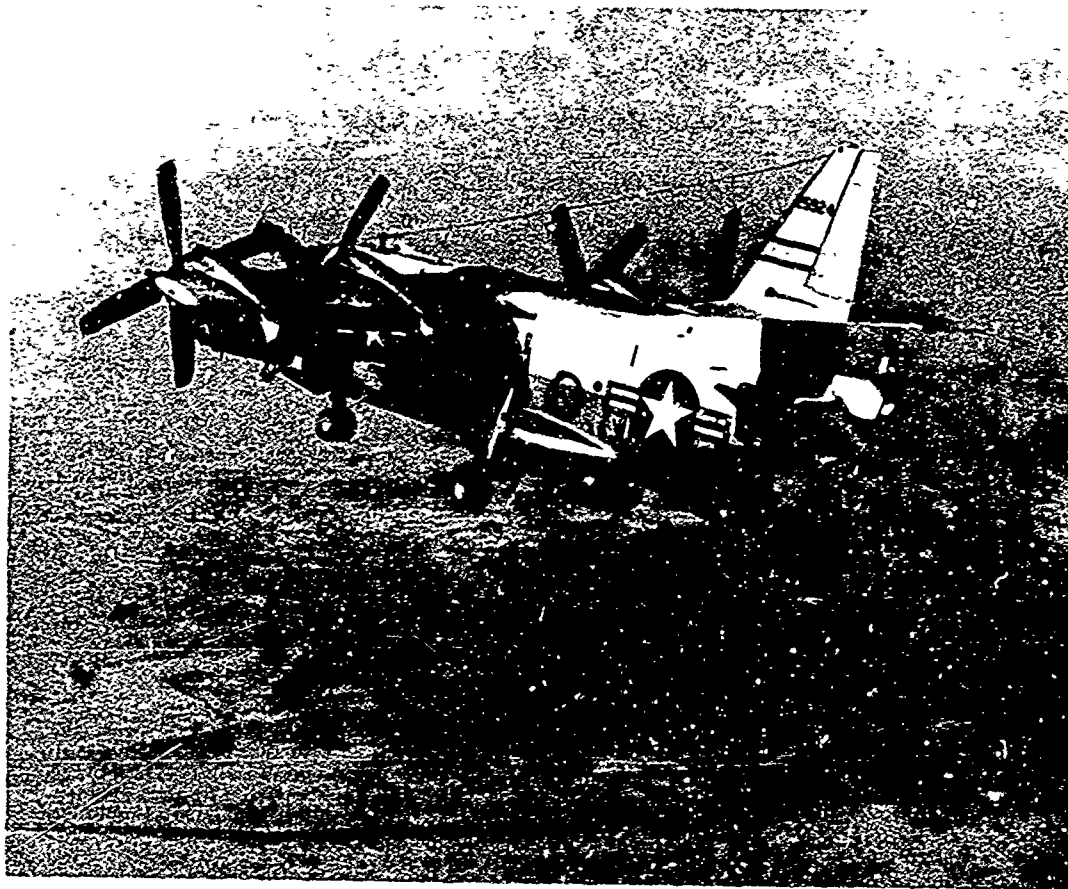
Action was initiated in May to determine cause of failure of the long stroke wing flap actuator on No. 5 airplane and a similar failure experienced later on the wing incidence actuator. Investigation indicated that failures were the result of excessive local deflection in the actual ball nut which results in overloading one or two rows of balls near the center of the nut. A program is being undertaken to replace the existing ball nut with a stiffer ball nut. Pending availability of new parts, actuators are being inspected daily for any signs of distress.

On 16 May a wing shaft flexible coupling failure was experienced inboard of the No. 3 Main IGC on No. 5 airplane. The failure was a diaphragm failure rather than the weld type of failure experienced previously on No. 1 airplane and reported in Monthly Progress Report No. 52. Immediate cause of the failure was an increase in stress level in the outer most diaphragm of the assembly resulting in a short cycle failure. The increase in stress level is considered due to development of excessive clearance in the ball socket joint which changed the stress distribution among the several diaphragms in the assembly. The results of the coupling investigation programs, underway at Bendix, Fairchild/Hiller and LTV, will be forwarded to ASD when firm conclusions have been reached.

ITEM 5 DESIGN DATA

STATUS OF DESIGN DATA

Status of design data at the close of the reporting period was as follows:



XC-142A No. 4 Executing Gravity Drop at Ei Centro

	<u>Design Data</u>	<u>Surveillance</u>	<u>Total</u>
Total Submissions to Date	215	246	461
Total Submissions to Go	4	6	10
Grand Total	219	252	471
Percent Complete	95%	95%	95%

Test reports covering the long stroke flap actuator and the UHT trim actuator were completed during the reporting period and will be submitted to ASD for approval in June.

5.2 SCN STATUS

As of 31 May, a total of 254 specification change notices against contract reports had been submitted. Of these, 232 were approved, 18 were disapproved, and 4 were pending.

ITEM 6 FLIGHT TEST

In the month of May, a total of 23 flights were accomplished on the two Category I flying XC-142A aircraft. Four flights were conducted utilizing the No. 1 aircraft during the month:

<u>Cat. I Flight No.</u>	<u>Date</u>	<u>Time</u>
93	5-4	:17
84	5-6	1:15
85	5-7	1:50
86	5-7	1:03

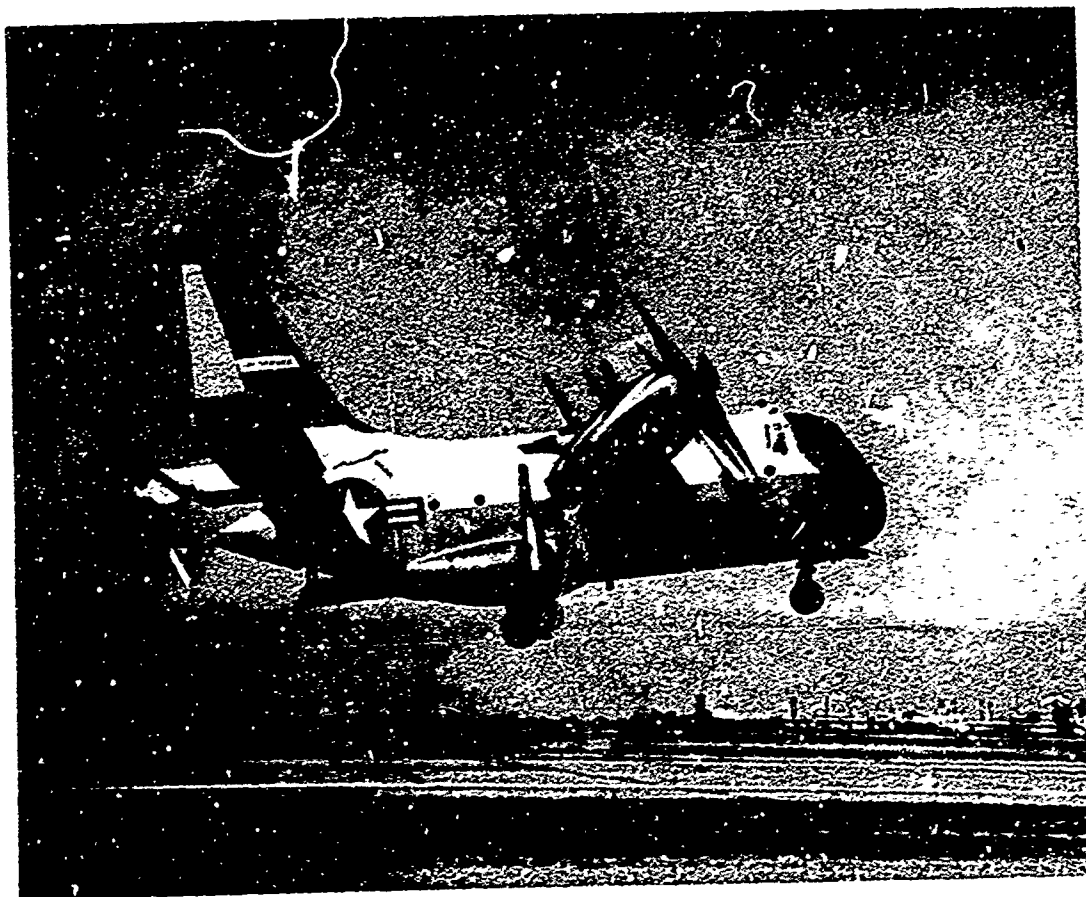
The total flight time of four hours and 25 minutes for these flights brought the cumulative total for No. 1 airplane to 62 hours and 53 minutes. At the completion of flight 86 the airplane was prepared for delivery to Edwards AFB. (see Item 12). The No. 4 aircraft accomplished 19 flights:



XC-142A No. 4 Executing Extraction Method Drop at El Centro

<u>Cat. I Flight No.</u>	<u>Total Cat. I-Cat II Flight No.</u>	<u>Date</u>	<u>Time</u>
15	53	5-4	:48
16	54	5-5	1:05
17	55	5-6	:06
18	56	5-6	1:00
19	57	5-7	:51
20	58	5-10	:09
21	59	5-11	:13
22	60	5-11	:42
23	61	5-12	:48
24	62	5-13	:36
25	63	5-13	:18
26	64	5-14	:18
27	65	5-14	:06
28	66	5-16	:03
29	67	5-16	:07
30	68	5-16	:06
31	69	5-16	:12
32	70	5-17	:07
33	71	5-18	:54

The total flight time of 8 hours and 29 minutes for these flights brings the cumulative total for No. 4 airplane to 67 hours and 29 minutes. During this period a most successful air drop program, one that opened up many new possibilities for slow speed aerial delivery, was conducted. The original Category I Air Drop program was completed on Flight 28. Since funds and calendar time had not been completely expended, USAF asked that the program be extended. Nine of these "add on" drops had been completed when, subsequent



XC-142A No. 4 Executing Dump Truck Method Drop at El Centro

to flight 33, a fire broke out in the No. 4 nacelle while a ground power check was being accomplished. The fire was extinguished and an investigation initiated to determine the cause of the fire and to assess the damage. (see Item 4)

The following significant tests were accomplished during the month of May:

- . Completion of the simulated bump taxi tests
- . Completion of sufficient amount of propeller stress ground and flight test program for the 2FF props to permit transfer of the aircraft to EAFB
- . Completion of enough of the Flying Qualities and Performance evaluation with the 2FF props installed to permit transfer of the aircraft to EAFB
- . A successful landing and take-off on a 120-foot diameter "rapid site" pad
- . Delivery of No. 1 aircraft to Edwards AFB for Category II testing
- . Extraction of 4000# simulated cargo at 5000 ft at 65 kts
- . Dump truck drop of 3000# simulated cargo at 5 ft at 0 and 30 kts
- . Dump truck sequence drop of 4-1000# containers at 5 ft at 30 kts
- . Live free fall jump - 10 jumpers at 12,500 ft at 65 kts
- . Drop of 5% and 95% dummies from lower fwd escape hatch at 1000 ft at 65 kts

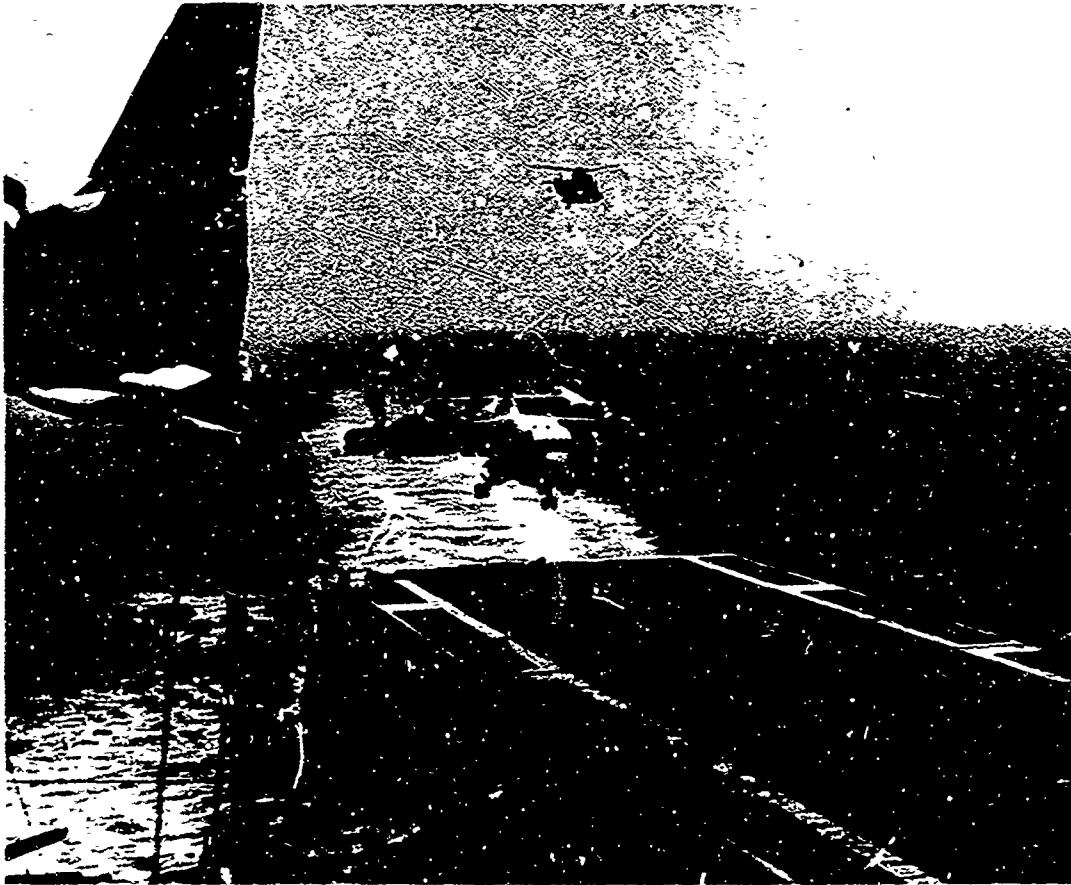
ITEM 7 REPORTS

The Program Progress Report for the month of April, 1966 was submitted on 31 May and the Financial Report for the month of April, was submitted on 25 May.

ITEM 8 SPARE PARTS FOR FIVE PROTOTYPE AIRPLANES

Spare parts status at the end of the reporting period was as follows:

- 1122 Total line items scheduled for shipment to bonded warehouse (increase of 24 since last report).
- 238 Total line items scheduled for direct shipment to vendor for overhaul (increase of 30 since last report).
- 1360 Total line items on order to date



XC-142A No. 4 in STOL Approach to Aircraft Carrier USS Bennington
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ITEM 9 DEVELOPMENT AND FABRICATION OF AGE

The status of AGE development and fabrication at the end of May was as follows:

<u>Through May</u>	<u>Submitted</u>	<u>Approved</u>	<u>Demonstrated</u>
CPE-AGERD	171	120	112
GPE-AGERD	<u>64</u>	<u>59</u>	<u>32</u>
	235	179	144

ITEM 10 SPARE PARTS FOR AGE - No activity in May

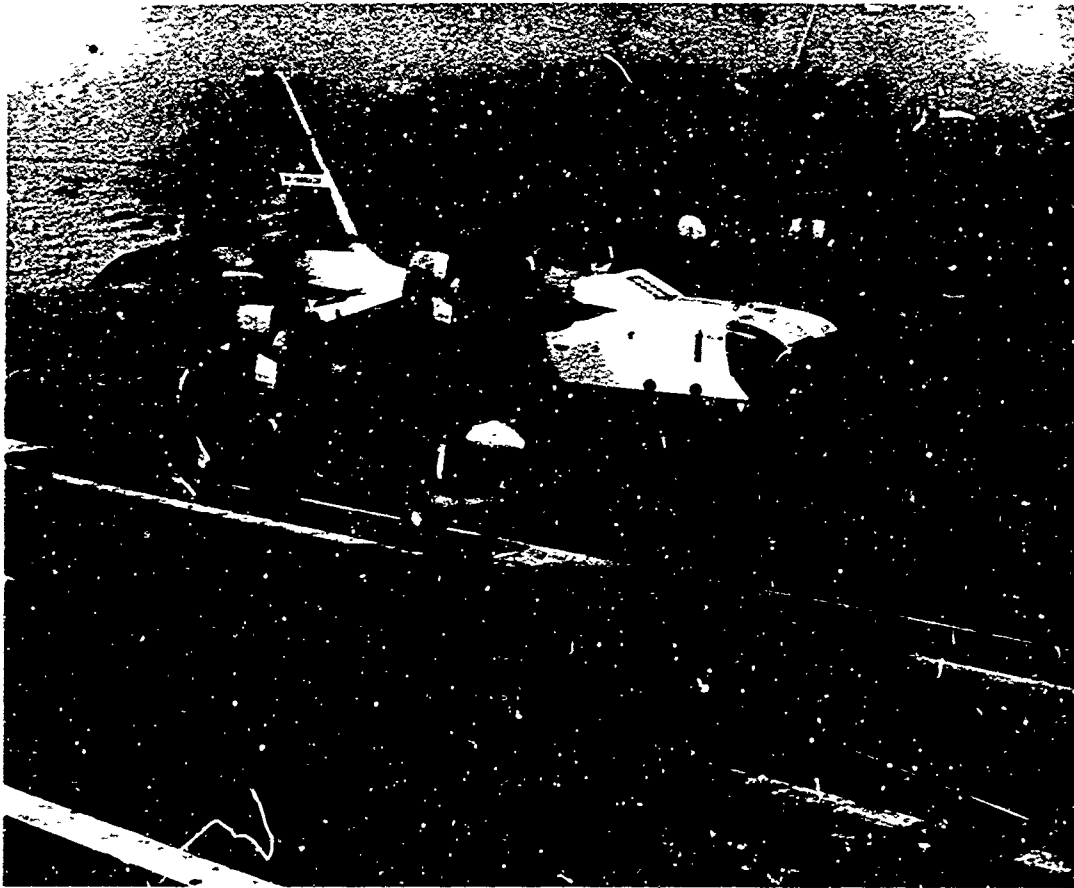
ITEM 11 TRAINING AND TRAINING EQUIPMENT (Completed)

ITEM 12 CONTRACTOR SUPPORT OF FLIGHT TEST PROGRAM

The Contractor continued to support the Category II flight test program at EAFB with approximately 50 people assigned to the off-site office.

On 12 May, the No. 1 aircraft was accepted by the Air Force at the Contractors' facility and flown from Dallas, Texas to Edwards Air Force Base with an intermediate stop at El Paso, Texas. The flight was accomplished without incident and was accomplished in 4 hours 56 minutes of flight time including a ten minute hover at El Paso. The remainder of the month on this aircraft at EAFB was primarily devoted to post-delivery inspection, fuel calibration and removal, inspection and re-installation of wing shaft flex couplings.

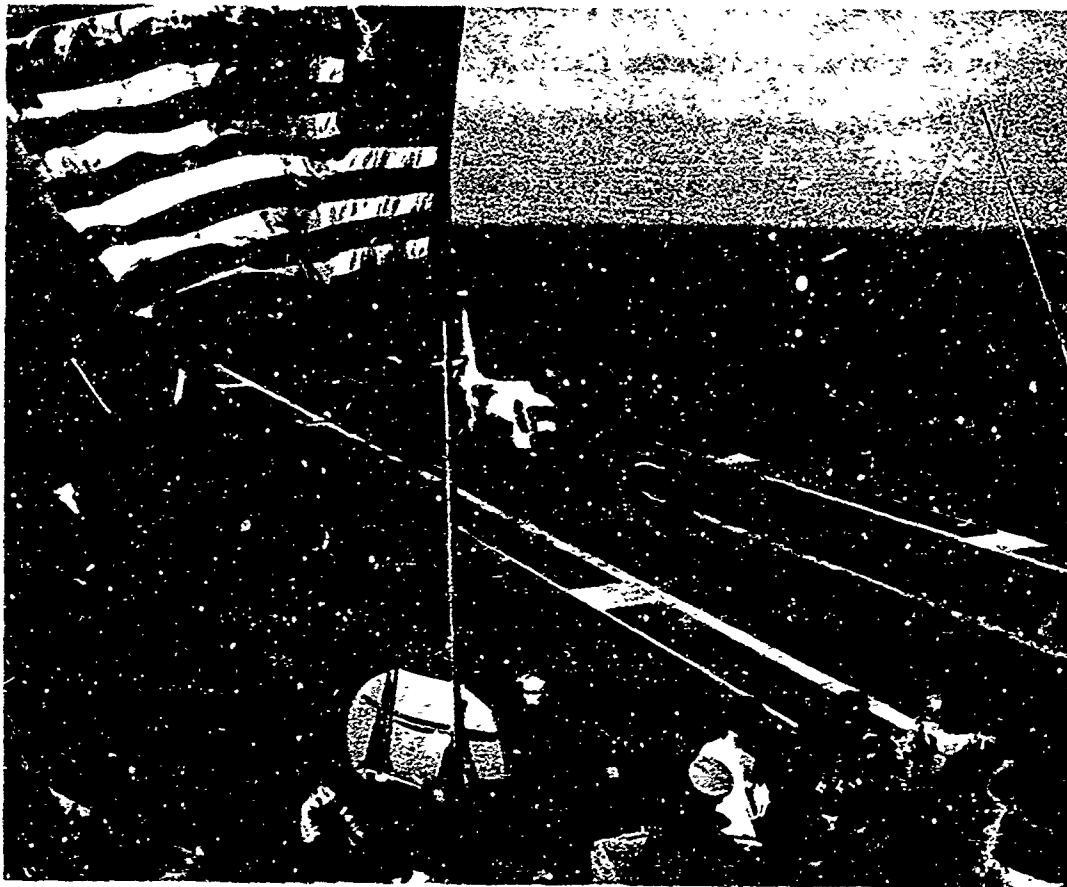
The No. 3 aircraft fuselage remained in dormant status at EAFB during May pending a repair decision. The No. 5 aircraft returned to flight status on 11 May following acceptance inspection subsequent to the delivery of the aircraft to EAFB in April. On 18 May, the aircraft flew from EAFB to the aircraft carrier USS Bennington for flight evaluation under various conditions. Two series of successful operations were conducted from the flight deck, including vertical and short take-offs and landings, conversions and reconversions and hover



XC-142A No. 5 in Hover Over Aircraft Carrier USS Bennington

with wind over the deck varying from approximately 12 to 37 knots. Subsequently, the aircraft was in a layup status primarily due to the requirement for inspection of transmission system flexible couplings and hydraulic line quick-disconnect fittings in the outlet port of the engine pumps. In late May, the aircraft returned to flight status with checkout flights accomplished preparatory to off-runway work at Pt. Mugu.

At the end of May, a total of 54 flights and 63:12 flight time had been accomplished during Category II flight testing.



XC-142A No. 5 Aboard Aircraft Carrier USS Bennington

VISITS TO CONTRACTOR FACILITY DURING MAY

<u>Date</u>	<u>From</u>	<u>Purpose</u>
17-20	Hq. USAF, AFSC, ASD, RTD, WRAMA, TAC, ATC, AFFTC	Status review of C-142 Configuration Evaluation
21	Pensacola, Florida	Program briefing for Naval Aviators
26	Cdr., TAC	Program Briefing

ECP INDEX

<u>ECP No.</u>	<u>Title</u>	<u>Status</u>
1	Fuselage, Installation of Aft Fuselage Escape Doors	Disapproved
2	Electrical, Installation of 35 KVA Generators	Disapproved
3	Electronics, Additional AT-256A/ARC UHF Communications Antenna; Installation of	Disapproved
4	Flight Tests, Category I Inflight Load Survey; Elimination of	Authorized
5	Ground Tests, Escape System Sled Tests; Elimination of	Authorized
6	Fuel System, Ferry Fuel Tank; Elimination of	Authorized
7	Escape System, Douglas Escapac 1-C Ejection Seat in Lieu of LW-1 (Modified) Seat; Installation of	Cancelled
8	Furnishings; Cargo, Troop Accessories for Four Airplanes, Elimination of	Authorized
9	Ground Test, Wing Fatigue Test; Elimination of	Authorized
10	Structural Demonstrator Instrumentation, Addition of	Authorized
11	Ground Test, Structural Failing Load Test, Elimination of	Authorized
12	Navigation Equipment, AN/ARC-21C in Lieu of AN/ARN-52 (V); Provisions for	Disapproved
13	Propulsion System, Integral Gearbox Propeller System Test; Reduction of	*
14	Drawing Quality Requirements; Reduction of	*
15	Weight Control Policy; Revision of	Disapproved
16	Main Propeller IGC Bearing Change	Authorized

<u>ECP No.</u>	<u>Title</u>	<u>Status</u>
17	Aluminum Forging Treatment to Improve Corrosion Resistance	Cancelled
18	Redesign Main Propeller Blade; Full Scale Test at NASA-Ames	Authorized
18-1	Redesign Main Propeller Blade; 0.60 Scale Test at NASA-Ames	Authorized
19	Elimination of Engine Nacelle Anti-Icing	Cancelled
20	Deletion of Category I Flight Tests on No. 4 Aircraft	Authorized
21	Cargo Compartment Trim; Elimination of	Disapproved
22	Revision to Engine Throttle Control Mechanism	Authorized
23	Extension of Category I Flight Test Program	Disapproved
24	Retrofit of Power Takeoff Engine Units	Authorized

* No longer identified as ECP.

CCN INDEX

<u>CCN No.</u>	<u>Title</u>	<u>Date</u>
1	Substitute 35 KVA Generator for 25 KVA Generator	12-19-62
2	Reduction in Data Requirements and Engine Designation Change	4-26-63
3	Substitute 25 KVA Generator for 35 KVA Generator	2-04-63
4	Reduction in IGB Propeller Testing	5-03-63
5	Approval of ECPs 4-9	6-05-63
6	Elimination of Structural Failing Load Tests	7-23-63
7	Approval of ECPs 5, 6, 8, 9, 16	7-23-63
8	Additional Electronic Support Equipment	7-19-63
9	Cancellation of CCNs 5 and 7 and Approval of ECPs 5, 6, 8, 9, 16	8-02-63
10	Partial Cancellation of CCN No. 2 and Reinstatement of Reduction in Data Requirements	8-22-63
11	Partial Cancellation of CCN No. 2 and Reinstatement of Engine Designation Change	8-22-63
12	Approval of ECP 18-1	9-30-63
13	Approval of ECPs 4 and 10	11-13-63
14	Approval of ECP 18	11-19-63
15	Approval of Revision to Contract Data Requirements Document	12-05-63
16	Approval of ECP 20	2-19-64
17	Approval of Inspection of Damaged Engine	3-16-64
18	Incorporation of Revision A to Detail Spec into Item 1 of Basic Contract	6-04-64

CCN INDEX

<u>CCN No.</u>	<u>Title</u>	<u>Date</u>
19	Approval of ECP-24	6-15-64
20	Dynamic Analysis of VPOL Thrust Stand	11-9 -64
21	Maintenance of Flight Control Simulator	12-4 -64
22	Revision of Maintenance Manual for Addition of Repair Data	2-15-65
23	Flight and Maintenance Manuals Revision	4-05-65
24	In-Flight Load Measurement Program	5-10-65
25	Cool Suit Provisions	5-28-65
26	Category II Instrumentation Modifi- cation on Aircraft Numbers 1 and 3	6-22-65
27	Study for Reduction of SPOL Landing Distance	6-15-65
28	Improved Braking System	6-15-65
29	Category II Instrumentation Modifi-(Canceled) cation on Aircraft Numbers 1 and 3 (by CCN #) (44)	6-22-65
30	Conditional Acceptance of No. 4 Aircraft	7-07-65
31	Removal of Parts from Flight Control Simulator	7-26-65
32	Conditional Acceptance of No. 3 Aircraft	7-27-65
33	Addition of Hydraulic Quantity Indicators	1-31-66
34	Unprepared Surface Operations	1-31-66
35	Installation of Improved Brake System	1-31-66
36	Technical Manual Change	1-31-66
37	Cargo Loading and Aerial Delivery	1-31-66

CCN INDEX

<u>CCN No.</u>	<u>Title</u>	<u>Date</u>
38	Open Cargo Doors in Flight	1-31-66
39	Repair of No. 2 Aircraft	2-09-66
40	Unprepared Surface Operations (Cancels CCN 34)	3-07-66
41	Cargo Loading and Aerial Delivery Tests	3-11-66
42	Delivery Configuration of No. 5 Aircraft	4-15-66
43	Maintenance and Data Reduction Services on No. 1 Aircraft	4-25-66
44	Instrumentation of Aircraft Nos. 1 and 3	5- 5-66
45	Repair of Aircraft No. 4	5-24-66

LIST OF ABBREVIATIONS

A/C	Aircraft
AGE	Aerospace Ground Equipment
AGERD	Aerospace Ground Equipment Requirements
AMC	Army Material Command
APU	Auxiliary Power Unit
ASD	Aeronautical Systems Division
ATC	Air Training Command
CCN	Contract Change Notice
CFE	Contractor Furnished Equipment
CSD	Constant Speed Drive
DIET	Design Information Element Test
EAFB	Edwards Air Force Base
ECP	Engineering Change Proposal
GFE	Government Furnished Equipment
IGC	Integral Gear Case
PERT	Program Evaluation and Review Technique
PITS	Propulsion Integrated Test Stand
QEC	Quick Engine Change
SPO	Systems Program Office
TBP	Time Between Overhauls
UHT	Unit Horizontal Tail
WRAMA	Warner Robbins Air Material Area
TCTO	Time Compliance Technical Order