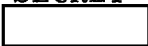


*Black Shield Meetings*  
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OXC-9207-65  
Copy 2 of 3

9 SEP 1965

MEMORANDUM FOR THE RECORD

SUBJECT : BLACK SHIELD Technical Meeting  
2 September 1965.



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This report constitutes:

- Part I - General Aircraft Items
- Part II - Propulsion Items
- Attachment I - Agenda
- Attachment II - Decisions and Actions
- Attachment III - Significant Charts

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Part I - General Aircraft Items:

1. Copies of Lockheed charts used for the presentation are available in D/TECH.

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2. All effort continues to be concentrated on the three primary BLACK SHIELD aircraft, 126, 127 and 128. Numerous pilot "squawks" were reported after the post-mod flights of aircraft 126 and 127 thus preventing these aircraft from being turned over to the Detachment. Aircraft 128 is still in functional checkout after modification and appeared to have wiring problems. The modification schedule for the follow-on BLACK SHIELD aircraft has slipped compared to the original BLACK SHIELD plan. A copy of the modified schedule is presented in Attachment III.

3. The BLACK SHIELD schedule has slipped three weeks; one week due to delays in the de-bug mod program and two weeks due to the new tank sealant soaking procedure requiring two hours at Mach 2.8 and one hour at Mach 3.0 prior to flying at Mach 3.1.



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GROUP 1  
Excluded from automatic  
downgrading and  
declassification

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4. Evidence of past performance indicates that the tank sealant, when cured gradually in accordance with the procedure noted above, will withstand the sustained high temperatures. The tank sealant of the SR-71 which went directly to Mach 3.0 - 3.2 experienced considerable bubbling.

5. LAC presented the range factor results from the recent Continental flight. The question was raised concerning the reason for the large variation in power lever angles and for the non-optimum variation of gross weight vs. altitude exhibited on this flight. LAC's response was that these variations were necessary to establish the optimum power setting and flight profile. It should be noted that D/TECH and P&W both took exception to the LAC response and noted that their previous independent calculations based on past vehicle performance resulted in power settings and a profile very close to that resulting from the Continental data.

6. The proposed Super Continental flight with aircraft 129 using JJ engines is intended to demonstrate the best possible performance in the event that future plans may include JJ engines. Admittedly this flight will have no direct bearing on BLACK SHIELD. P&W made the observation that, based on uninstalled engine performance, there should be no appreciable difference in range between the YJ and the JJ engines. However, the LAC compilation of aircraft installed flight data for both configurations clearly indicated that the JJ engine configured flights were superior in cruise for some unexplained reasons. D/TECH cautioned that any comparisons made between the performance with YJ engines and JJ engines, if valid, must be made for comparable power settings, speed, altitudes, gross weights, drag, inlet performance i.e., the engine must be the only variable.

7. The Detachment air refueling procedure to be used will depend on the gross weight. The new technique, i.e., one engine in minimum afterburner and adjusting thrust with the other engine below military power, will be used where practical. However, at light gross weight, there is too much thrust even with one engine in minimum afterburner and the other engine at idle thrust. Consequently, the refueling

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will initially use military thrust on both engines in accordance with the old technique. When the gross weight is high enough, the aircraft will break away, one engine will be put in afterburner and another hook-up made to complete the refueling.

8. The Honeywell family tests require one more INS mission and four more auto-pilot missions on aircraft 132. Honeywell, Minneapolis, has performed very limited tests with an integrator card designed to alleviate the steering needle and asymmetric bank problem. Three more integrator cards are being made in advance of complete tests. These will be available for the BLACK SHIELD aircraft if the test results are satisfactory. Honeywell will also fabricate and test an auto-trimmer card which represents a different approach to the same problem. This will also be tested in aircraft 132.

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9. The [REDACTED] packages are performing very well in aircraft 122. As noted in Attachment II, details of the tests will be presented at the next BLACK SHIELD meeting.

10. Status reports for Type I and Type IIC payloads are available in D/TECH. Both systems are in a ready status and neither are confronted with any major problems. Three Type IV systems are at the Area and two have been flown. The systems are being updated to be compatible with the SIP. The Type IV system has been flown ten times and has operated at Mach 3.05 and 83,000 feet.

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Part II - Propulsion Items:

1. Continued investigation of number 3 bearing compartment distress has revealed two problems with their respective fixes. The first is an interference between stationary and rotating parts induced by excessive vehicle descent rate from hot High Mach to cold environment. This thermally induced interference condition is being corrected by increasing critical clearances by an additional .090 inches. The second problem is one of excessive oil leakage around number 3 compartment seals induced by abnormal breather to gas path pressure differentials experienced during prolonged periods of "off design" windmilling. The breather pressurizing valve is being modified with an orifice to prevent this pressure differential upset. Test parts representing these fixes are installed in engine 216 for immediate flight confirmation in aircraft 122. A minimum of two flights for the interference fix and five flights for the oil leakage fix is required prior to lifting the current windmill (single engine performance program) restrictions on those engines incorporating the fixes. Parts are being expedited at the factory for field retrofit expected to require four to six days per engine. At this time a delivery schedule has not been defined.

2. Concerning the current nine hour Mach 3 life of YJ burner cans, the first set of J burners approaching 10 hours Mach 3 have been inspected with favorable results. They look better than the YJ burners and because of this (still rather meager evidence) will be expedited for all YJ engine incorporation. Delivery information shown on Attachment III "Urgent Changes". In addition, a flight test program has been coordinated between P&W and LAC to investigate, define, and improve inlet inducing factors involving pressure distortion at the engine face (never before measured) which upsets the velocity profile entering the burners resulting in eccentric burning and flame front impingement on the burner wall. A definition of this program for aircraft 129 is shown on Attachment III, "Propulsion Test Program".

3. Engine flight test program priorities coordinated between LAC and P&W were reviewed and defined on Attachment III "Propulsion Test Program".

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4. BLACK SHIELD engine assignments and status were presented and are shown on Attachment III. Other propulsion charts including such items as "desired changes" for engine improvement are not attached but are available in D/TECH.

5. Data from the Continental Silver Javelin (aircraft 129, flight 138) reflecting EGT, rotor speed, and fuel flows indicated YJ engine performance to be where it should be as specified.

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AGENDA 2 September 1965

BLACK SHIELD Meeting

0900 - 1230 Hours

1. Lockheed:

- a. Debug Mod Program status, actions, problems, flight results, and future Mod scheduling.
- b. SCOTCH MIST all weather mods results summary.
- c. Current flight test program priorities and future planning - to include engine requirements per ref. B (Anchor 3164) SILVER JAVELIN flights, and why J engines for next SILVER JAVELIN.

2. Pratt and Whitney:

- a. Summary definition and corrective action of problems surfaced by continued Florida investigation of number 3 bearing compartment with confirmation required to left windmilling restriction.
- b. Status of continued investigation of YJ burner can distress problem including recent J burner inspection findings and proposed steps to further define inducing factors and corrective actions.
- c. Review engine flight test program priorities cited reference message(Anchor 3164). Include impact on BLACK SHIELD configuration status.

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3.

- a. Steps taken toward "one engine afterburning other engine modulating" refueling technique.
- b. Any underlying reasons for a/c 132 better flight success during SCOTCH MIST WARPATH deployment relative to prior and subsequent  flight performance.

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c.

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- d. Summary - a/c 132 MH family program progress since SCOTCH MIST.

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### LIMITED TECHNICAL MEETING

2 September 1965 1300 - 1530 Hours

1. Lockheed:

- a. Continental SILVER JAVELIN aircraft 129 flight 138 results significance including inlet recoveries and distortions vs. mach number to include upper outboard quadrant, and reasons for non-optimum cruise profiles particularly altitude-weight variations and power setting variations.
- b. Future planning for inlet vortex generator and spike eccentricity flight test programs.

2. Pratt and Whitney:

- a. Continental SILVER JAVELIN (aircraft 129 flight 138) engine performance results as flown and corrected to standard day and relative to specification.

3. Camera Contractors:

- a. PE, EK, Hycon Technical Briefings

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Attachment II to  
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DECISIONS AND ACTIONS

A. Modification done to aircraft 135 will be done on a non-interference basis with the BLACK SHIELD aircraft.

B. Due to unavailability of LAC instrumentation, aircraft 121 will continue with 34K engine testing until 15 September at which time the aircraft will be instrumented for compressor blade stress testing to begin about 1 October.

C. Aircraft 122 flight test will be extended indefinitely beyond its scheduled September date for modification. First in priority of several propulsion items will be confirmation of number 3 bearing compartment fixes.

D. Aircraft 129 flight test will be extended indefinitely beyond its scheduled modification to a BLACK SHIELD operational configuration. After the next Silver Javelin, it will concentrate on inlet investigations particularly in the area of engine face distortion. Specially instrumented engine inlet cases for measuring distortion will be flown and investigations conducted on Vortex generators and spike concentricity.

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F. No additional [ ] channels beyond the 20 channels now in use will be added to the BLACK SHIELD aircraft.

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G. There will be no further changes to the three primary BLACK SHIELD aircraft without a coordinated message signed off by Col. Kelly, LAC, P&W and Headquarters.

H. LAC will submit to Headquarters a compilation of A-12 sonic boom data.

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(Decisions and Actions Con't.)

I. The 390 INS system will be installed in aircraft 121 to be used in lieu of the 330 system. No specific tests are to be conducted for the 390 system.

J. P&W and LAC will submit a status report on the auto-trimmer at the next BLACK SHIELD meeting.

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[REDACTED]

L. Wet weather braking tests without drag chute will be conducted sometime in future at Edwards Air Force Base due to narrow [REDACTED] runway.

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# PROPULSION TEST PROGRAM

	AIRPLANE AVAIL	INSTR. AVAIL.	TEST PERIOD
<b>AIRPLANE 121</b> 1. BLADE STRESSES 2. HEAT REJECTION 3. 34 K ENGINE TESTS (PRIOR TO ITEM 1)	SEPT. 15 NOW SEPT. 1-SEPT. 15	? (P&W) NOW	OCT. 15 - OCT. 3 NOW SEPT. 1-SEPT. 15 (THEN PUT ENG. IN '35)
<b>AIRPLANE 122</b> COMPARTMENT 1. *3 BEARING <del>COMPRESSOR</del> CHANGES 2. FUEL CONTROLS - BENDIX HAM. STD. 3. RELITE ENVELOPE 4. OIL DILUTION & CONSUMPTION 5. FOD SCREENS 6. SLOW TRIMMERS	NOW NOW NOW NOW NOW NOW	NOW NOW	NOW SEPT. 1- ON
<b>AIRPLANE 129</b> 1. VORTEX GENERATORS 2. CENTERING OF SPIKE 3. ENGINE CASE INLET TESTS 4. SPECIAL RAKES FOR BOUNDARY LAYER SURVEYS CLOSE TO ENG. FACE 5. PRESSURES ON TAIL FLAPS 6. ACCELEROMETER ON INLET CONTROL	SEPT. 13  NOW	NOW  NOW	SEPT. 16-SEPT. 20  SEPT. 1-SEPT. 8

Urgent Changes

DATE AUG 31 1965

PROBLEM	CORRECTIVE ACTION	ENGINE SERIAL NUMBERS																																																									COMPLETION SCHEDULE
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	
ZND COMPRESSOR DISK GROWTH	STRENGTHENED DISK E/C 153998	[Gantt chart showing completion for all engines]																																																									ALL PARTS AVAILABLE
1ST STAGE COMPRESSOR BLADE ROOT CRACKS	A. SHIMMED T1 BLADES E/C 160189 B. WASPALOY BLADES E/C 160821 Serv. Bul. 33	[Gantt chart showing completion for all engines]																																																									A. COMPLETE B. 30 SETS ON ORDER 2 AUG 3 SEPT 4-5 MO/THEREAFTER
TT <sub>5</sub> FALL-OFF	FROSTY CONTROL E/C 160337 Pilot Lot 651A	[Gantt chart showing completion for all engines]																																																									2 SPARES NOT ASSIGNED 6 PER MO
MAIN GEAR ON IDLER BEARING FAILURE	A. 1.07E CHECK OR B. REVISED ASSEMBLY PROCEDURES AND INCREASED CLEARANCE BEARINGS E/C 172319C E/C 172419 Serv. Bul. 220	[Gantt chart showing completion for all engines]																																																									ALL OVERHAUL WILL COMPLY PLUS FIELD RETROFIT AS GEAR BOXES AVAILABLE
BURNER CAN DISTRESS	J BURNER CANS AND NOZZLES E/C 158166 Serv. Bul. 234	[Gantt chart showing completion for all engines]																																																									2 SETS AVAILABLE 2 SETS PER WK
A/B ACTUATOR MANIFOLD CRACKING	REDESIGNED LINE E/C 160641 Serv. Bul. 194	[Gantt chart showing completion for all engines]																																																									COMPLETE
2ND TURBINE BLADE NOTCH WEAR	HARDFACE E/C 155600	[Gantt chart showing completion for all engines]																																																									OVERHAUL REOP
TURBINE VANE BOWING	INCREASED COOLING E/C 159841 Serv. Bul. 165	[Gantt chart showing completion for all engines]																																																									COMPLETE
CAVITATION EROSION OF HYDRAULIC RETURN LINE	INCREASED PIPE DIAMETER E/C 160758 Serv. Bul. 204	[Gantt chart showing completion for all engines]																																																									COMPLETE
TRANSONIC THRUST MARGIN	J A/B E/C 159250	[Gantt chart showing completion for all engines]																																																									1 SET/WK
STICKING A/B RESET VALVE	ROTARY RESET E/C 154695	[Gantt chart showing completion for all engines]																																																									ALL PARTS AVAIL
2ND STAGE IN-100 TURBINE BLADE DEFECTS	REINSPECT WITH SUPER SENSITIVE X-RAY Serv. Bul. 207	[Gantt chart showing completion for all engines]																																																									AS ENGINES AVAIL

IN PROCESS  
 COMPLIED WITH OR NOT APPLICABLE  
 INCORPORATED  
 TRANSFERABLE FROM ENGINE TO ENGINE  
 NOT APPLICABLE

Prepared by Service Engineering Records, FRDC

Pratt & Whitney Aircraft  
FLORIDA RESEARCH AND DEVELOPMENT CENTER

U  
A\*

653008  
CS 0859



# BLACKSHIELD ENGINE ASSIGNMENTS

ARTICLE

ASSIGNED ENGINE

126

LEFT  
RIGHT

213  
224

127

LEFT  
RIGHT

209  
238

128

LEFT  
RIGHT

248  
214

SPARES

247  
227  
211  
210

# BLACKSHIELD ENGINE STATUS

ENGINE NO.	ASSIGNMENT	PRESENT LOCATION	FLAT 2 <sup>ND</sup> COMP. DISC	SHIMMED 1 <sup>ST</sup> COMP. BLADES	FROSTY <sup>™</sup> HSD MAIN FUEL CONTROL	MAIN GEARBOX VIBRATION CHECK	"J" BURNER CANS	REDESIGNED A/B ACTUATOR MANIFOLD	HARDFACED 2 <sup>ND</sup> TURB. BLADES	INCREASED COOLING 1 <sup>ST</sup> TURB. VANES	REVISED HYD. RETURN TUBE	"J" A/B	ROTARY RESET A/B FUEL CONTROL	RE-XRAY 2 <sup>ND</sup> TURB. BLADES	FUEL DERICHMENT KIT	REVISED NO. 3 COMP. & VENTED BREATHER
213	126L	READY SPARE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	
224	126R	READY SPARE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	
209	127L	127 L	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	
238	127R	READY SPARE	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓	✓	NA	✓	
248	128L	128 L	✓	✓	BX	✓	Δ	✓	✓	✓	✓	✓	✓	NA	✓	
214	128R	SHOP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
247	SPARE	126 L	✓	✓	Δ	✓	Δ	✓	✓	✓	✓	✓	✓	NA	Δ	
227	SPARE	127 R	✓	W	✓	✓	Δ	✓	✓	✓	✓	✓	✓	✓	✓	
211	SPARE	128 R	✓	✓	✓	✓	Δ	✓	✓	✓	✓	✓	✓	✓	✓	
210	SPARE	READY SPARE	✓	✓	✓	✓	9-96S	✓	✓	✓	✓	✓	✓	✓	✓	

NA - NOT APPLICABLE W - WASPALOY BLADES BX - BENDIX MAIN FUEL CONTROL  
 Δ - 5 DAY AFTER ENGINE MADE AVAILABLE OR REPLACEMENT WITH ALL FEATURES PROVIDED

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