AIRCRAFT ACCIDENT REPORT
OPNAV FORM 3750-1A (Rev. 3-63) Page [redacted]

SPECIAL HANDLING REQUIRED in accord[redacted]
Para. 66, OPNAV INSTRUCTION 3750.6, e[redacted] edition

OPNAV REPORT 3750-1

PART 1 GENERAL

SECTION A. IDENTIFICATION

1. AIRCRAFT ACCIDENT BOARD APPOINTED BY * RECONNAISSANCE ATTACK SQUADRON THREE (RVAH-3)	2. SERIAL NO. * 1-68A	3. DTG (LOCAL) OF MISHAP * 031420 OCT 67	4. MODEL AIRCRAFT * RA5C	5. BUREAU NUMBER * 149315
6. TO: Commander, Naval Aviation Safety Center		9. LOCATION OF MISHAP * 13 miles SOUTH NEW SMYRNA BEACH, FLORIDA		10. DAMAGE * ALFA
7. VIA: * C.O. RECONATRON THREE; CO RECONATWING ONE; CO FAIRJAX; CO NAVAIRLANT	8. *	11. TIME OF DAY * DAY	12. TIME IN FLIGHT * 0+50	13. FLIGHT CODE * 1A1
		14. CLEARED FROM: NAS SANFORD	TO: NAS SANFORD	
		15. TYPE CLEARANCE * LOCAL VFR	16. AIRSPEED E200 KTS	17. A/C WEIGHT E 55,000
18. BRIEF DESCRIPTION OF MISHAP * SPIN OUT OF BARREL ROLL, MISINTERPRETED ENGINE PERFORMANCE, EJECTED			19. ELEVATION AT TIME OF MISHAP * SEA LEVEL TERRAIN SWAMP	

20. LIST MODEL, SUNO, REPORTING CUSTODIAN AND DAMAGE CLASSIFICATION OF ANY OTHER A/C INVOLVED (Complete OPNAV Form 3750-1 for each A/C) *

SECTION B. CONTRIBUTING FACTORS

* ✓	FACTOR	✓	FACTOR	✓	FACTOR
X	1. PILOT ERROR IN TECHNIQUE/JUDGMENT		9. SERVICING PERSONNEL		17. WEATHER
	2. PILOT DEVIATION FROM NATOPS PROCEDURES		10. LANDING SIGNAL OFFICER		18. DESIGN AIRCRAFT
	3. PILOT INCORRECT OPERATION OF A/C SYSTEM		11. OTHER PERSONNEL (Specify)		19. DESIGN CREW EQUIPMENT
	4. PILOT OTHER (Specify)		12. ADMINISTRATIVE		20. DESIGN OTHER (Specify)
	5. CREW		13. FACILITIES-RUNWAY, OVERRUN TAXIWAY, FLIGHT DECK		21. ROLLING/PITCHING DECK ROUGH SEAS
	6. MAINTENANCE PERSONNEL		14. FACILITIES-NAV AIDS, LANDING AIDS (GCA, OCA, ILS, MIRROR)		22. MATERIAL FAILURE/MALFUNCTION
	7. MAINTENANCE SUPERVISORY PERSONNEL		15. FACILITIES-CATAPULT, ARRESTING GEAR (Ship or field)		23. UNDETERMINED
	8. SUPERVISORY OTHER (Specify)		16. FACILITIES OTHER (Specify)		24. OTHER (Specify)

SECTION C. PERSONNEL DATA

* 1. NAME (Last, first, & middle initial)	2. RANK/DATE	3. FULL SERVICE NO.	4. DESIG-NATOR	5. BRANCH OF SERVICE	6. AGE	7. YEARS EXP. FLIGHT	8. SNAFT	9. POSITION	10. FLIGHT CODE
PILOT (at controls at time of mishap) (b) (6) [redacted]	LCDR	(b) (6) [redacted]	1310	USN	33	10	PILOT	PILOT	G
CO-PILOT (identify & submit separate page 1)									

PILOT EXPERIENCE IN HOURS

ITEM			ITEM		
11. ALL MODELS		2756.8	17. CV LANDINGS DAY/NIGHT	ALL	89/21
				IN MODEL	0/0
12. ALL MODELS IN LAST 12 MONTHS		98.1	18. FCLP LANDINGS LAST 6 MONTHS DAY/NIGHT	ALL	0/0
				IN MODEL	0/0
13. ALL MODELS IN LAST 3 MONTHS		13.2	19. INSTRUMENT HOURS LAST 3 MONTHS ACTUAL/SIMULATED	ALL	2.0/7.5
				IN MODEL	0/0.7
14. ALL SERIES THIS MODEL	A/C	2.8	20. NIGHT HOURS LAST 3 MONTHS	ALL	0/
	OFT/CPT	/11.0		IN MODEL	0/
15. ALL SERIES THIS MODEL LAST 12 MONTHS	A/C	2.8	21. TOTAL HOURS IN JETS (if jet mishap) HELOS (if helo mishap)		2406.9
	OFT/CPT	/11.0			
16. ALL SERIES THIS MODEL LAST 3 MONTHS	A/C	2.8	22. LAST PRIOR FLIGHT ALL SERIES THIS MODEL	DATE	9-25-67
	OFT/CPT	/11.0		DURATION	2.0
23. DATE/GRADE LAST NATOPS STANDARDIZATION CHECK		18 SEPT 67/SAT	24. TYPE INSTRUMENT CARD		SPECIAL

OTHER PERS.

* 25. NAME (Last, first, & middle initial)	26. DAS	27. RANK/DATE	28. BRANCH OF SERVICE	29. FULL SERVICE NO.	30. UNIT	31. RUSHY	32. SNAFT	33. POSITION
NONE								

OP-05F

AIRCRAFT ACCIDENT REPORT
OPNAV FORM 3750-1A (Rev. 3-63) Page

SPECIAL HANDLING REQUIRED *in accordance with Para. 66, OPNAV INSTRUCTION 3750.6, [illegible] edition*

OPNAV REPORT 3750-1

PART II MAINTENANCE, MATERIAL, AND FACILITIES DATA

A. A/C HISTORY

1. DATE OF MANUFACTURE	2. FLIGHT HRS. SINCE ACCEPTANCE	3. NO. OF PAR/OVERHAUL	4. MONTHS SINCE LAST PAR/OVERHAUL	5. FLT. HRS. SINCE LAST PAR/OVERHAUL	6. LAST/PAR OVERHAUL ACTIVITY	7. TYPE OF LAST CHECK PERFORMED	8. FLIGHT HOURS SINCE LAST CHECK	9. DAYS SINCE LAST CHECK
22 JUNE 64	1528.7	ONE	18	991.1	NARF JAX	3 rd CALENDAR	237.6	112

B. ENGINE HISTORY

	1. ENGINE MODEL	2. ENGINE SERIAL NUMBER	3. FLIGHT HRS. SINCE ACCEPTANCE	4. NUMBER OF OVERHAULS	5. WAS DIR. REQUESTED?	6. FLT. HRS. SINCE LAST OVERHAUL	7. LAST OVERHAUL ACTIVITY	8. TYPE OF LAST CHECK PERFORMED	9. FLIGHT HOURS SINCE LAST CHECK	10. DAYS SINCE LAST CHECK
(1)	J79 GE-8B	421780	1136.1	0	YES	NA	NA	CALENDAR	237.6	112
(2)	J79 GE-8B	421820	695.6	0	YES	NA	NA	CALENDAR	263.7	174
(3)										
(4)										

C. COMPONENT HISTORY

	1. COMPONENT INVOLVED NOMENCLATURE	2. MANUFACTURERS PART NUMBER	3. TOTAL HRS. ON PART	4. NO. OF OV-HAULS	5. HOURS SINCE LAST OVERHAUL	6. OVERHAUL ACTIVITY	7. WAS DIR. REQUESTED?	8. SER. NO. FUR/AMPEUR
(1)	DROOP MOTOR GEAR BOX ASSYS	279-526201-11 279-526201-21					YES	
(2)	LATERAL MASTER ACTUATOR	247-58707-31					YES	
(3)								
(4)								

D. INCIDENTS & GROUND ACCIDENTS*

1. PARTS REPAIRED		3. DIRECT MANHOURS INVOLVED	2. PARTS REPLACED	
PART NUMBER	NOMENCLATURE		PART NUMBER	NOMENCLATURE

E. ENGINE FAILURES

JET ENGINE FLAMEOUT (Include intentional securing to prevent engine damage)

AT TIME OF FLAMEOUT	1. ALTITUDE	2. IAS	3. RPM	4. EGT	5. MANEUVER AT TIME OF FLAMEOUT	6. FUEL FLOW	7. ATTITUDE

8. G FORCES	9. RELIGHT ☐ ATTEMPTED ☐ ACCOMPLISHED	10. ALTITUDE	11. IAS	12. MAX EGT	13. FUEL CONTROL ☐ PRIMARY ☐ MANUAL	14. NO. RELIGHT ATTEMPTS

INTENTIONAL SECURE	15. ENGINE SYMPTOMS	16. CAUSE OF SYMPTOMS

RECIPROCATING ENGINE FAILURE

17. ALTITUDE	18. IAS	19. ATTITUDE	20. RPM	21. MAP	22. TORQUE/BMEP	23. FUEL FLOW PRESSURE	24. OIL PRESSURE

INTENTIONAL SECURE	25. ENGINE SYMPTOMS	26. CAUSE OF SYMPTOMS

F. OTHER REPORT

IDENTIFY OTHER REPORTS CONCERNING THIS MISHAP

1. AMPFUR SERIAL NUMBER _____
2. DIR MESSAGE REQUEST DATE-TIME-GROUP RVAH-3 091240Z OCT 67 *Info NASC on DIR report. See para. 36 OPNAVINST 3750.6E*
3. OTHER RVAH-3 PRELIMINARY ACCIDENT MSG 032225Z OCT 67
4. RVAH-3 SUPPLEMENTARY ACCIDENT MSG 042225Z OCT 67

OP-03F

AIRCRAFT ACCIDENT REPORT
OPNAV FORM 3750-1A (Rev. 3-63) Pag[redacted]

SPECIAL HANDLING REQUIRED *in accor[redacted] with Para. 66, OPNAV INSTRUCTION 3750.6, [redacted] edition*

OPNAV REPORT 3750-1

G. SHIPS DATA

1. EQUIPMENT INVOLVED ☐ CATAPULT ☐ ARRESTING GEAR	2. PRESSURE SETTING	3. WIND OVER DECK	4. RELATIVE WIND	5. APPROACH/END SPEED
6. MARK NUMBER	7. MODEL NUMBER	8. LOCATION OF SHIP	9. LAUNCHING BRIDLE AND BRIDLE ARRESTER	

10. CATAPULT/ARRESTING GEAR BULLETINS OR NOMOGRAMS USED

11. This portion shall be completed whenever (1) an aircraft accident involves arresting gear barrier and/or barricade equipment, or (2) an aircraft accident involves malfunctioning of arresting gear, barrier and/or barricade equipment. Incidents or routine damage to cables, weldings and other expendable equipment need not be reported herein.

ENGAGED	12. DECK RUNOUT (FEET)	13. RAM TRAVEL (INCHES)	14. CONTROL VALVE SETTINGS: CONSTANT PRESSURE DOME (P.S.I.)	CONSTANT PRESSURE RATIO	CONSTANT RUNOUT (WT. LBS.)	15. ACCUMULATOR PRESSURE (PSI)	16. COMMENTS (for cable failures specify no. landings and months in service)
DECK PENDANT							
DECK PENDANT							
BARRIER/ BARRICADE							

H. DEPLOYMENT

FOR ACCIDENTS ABOARD CARRIERS (complete on pilot)

1. DATE DEPLOYED CONUS	3. DAY HOURS/LANDINGS SINCE DEPLOYMENT	4. DAY HOURS/LANDING LAST 30 DAYS
2. NO. DAYS OPERATING PERIOD		
5. INST. HOURS LOGGED SINCE DEPLOYMENT ACTUAL/SIMULATED	6. NIGHT HOURS/LANDINGS SINCE DEPLOYMENT	7. NIGHT HOURS/LANDINGS LAST 30 DAYS

I. WEATHER

WEATHER AT SCENE OF MISHAP

1. CEILING	2. VISIBILITY	3. RELATIVE WIND DIRECTION AND VELOCITY	4. TEMPERATURE RUNWAY / OUTSIDE AIR	5. DEW POINT	6. ALTIMETER SETTING
30,000 BROKEN	10	080/9 + 15	85F	60F	30.06

7. OTHER WEATHER CONDITIONS *(winds aloft, icing level, sea state, density altitude, as appropriate)*

PART III ADDITIONAL INFORMATION

PART	SECTION	ITEM	1. REMARKS	2. COPY DISTRIBUTION
				200 NAVAVNSAFECN DIRECT (AAR)
				~~100 [illegible] DIRECT (AAR)~~
				1 NAVAIRSYSCOM (AIR-404)
				1 COMNAVAIRLANT
				1 COMNAVAIRPAC
				1 COMFAIRJAX
				1 COMRECONATKWING ONE
				1 NAVPLANTREPO COL
				1 NATC PAX RIVER
				1 NAVAEROSECPAC EL CENTRO

COST DAMAGE TO: 3. GOVERNMENT PROPERTY: NONE — 4. PRIVATE PROPERTY: LESS THAN $100. — 5. DATE SUBMITTED TO CO: 23 OCTOBER 1967

PART IV SIGNATURES OF THE BOARD

(b) (6)

[redacted]

OP-OSF

Part V - THE ACCIDENT

On 3 OCT 1967 at 1335 Drake 203, RA5C Bwno 149315 pilot LCDR (b) (6) (b) (6) launched on scheduled solo familiarization flight number two from NAS Sanford. The aircraft was chased by LCDR (b) (6) as required by squadron doctrine. After twenty minutes of formation flying the acrobatic portion of the flight was commenced. Fuel on board at this time was 14,000#, altitude 14,000 feet. After executing several wing overs and aileron rolls a barrel roll was commenced to the left at 450 KIAS and military power.

The manuver appeared normal up to the inverted 90° position. At this point the pilot felt that the nose was dropping too fast and attempted to increase the rate of roll. The nose continued to drop to an estimated 60° nose down attitude. The pilot experienced uncontrollable nose oscillations and retarded power to idle and extended speed brakes. As the aircraft descended uncontrollably the pilot heard the chase instructor transmitting " pull out, pull out ". At approximately 4500 feet the aircraft appeared to regain controlled flight. Power was advanced to military but the pilot felt no apparent response. Thinking that the engines had flamed out the pilot extended the ram air turbine, checked the throttles at idle and depressed the emergency engine ignitors. At this point the pilot saw that he was dangerously low and elected to eject, using the left alternate firing knob. Ejection sequence was normal from approximately 300' altitude and the pilot landed in the intercoastal waterway approximately 80 yards from a fishing camp. Rescue from 15 foot water depth was accomplished by a boat from the fishing camp within five minutes. All items of survival gear functioned properly and the pilot was uninjured. The aircraft crashed in the intercoastal waterway 13 miles south of New Smyrna Beach, Florida.

Part VI - DAMAGE TO THE AIRCRAFT

Strike damage was sustained by the aircraft. The aircraft impacted right wing low 60° nose down attitude in one foot of water with soft mud bottom. The forward section of the fuselage back to the wing roots was disintegrated. The port wing sheared at the root and was embedded vertically in the mud. The starboard wing separated from the fuselage and was completely submerged. The after section of the fuselage broke just aft of the main landing gear and came to rest in an inverted position. The port engine remained within the wreckage, but the starboard engine was torn loose and not recovered. Fuel ignited upon impact and engulfed the wreckage and surrounding area. All parts of wreckage above water level sustained substantial damage from fire.

The rear canopy landed in the parking lot of the fish camp narrowly missing several parked cars. The forward canopy landed on the fishing pier seven feet from an occupied building crushing a wheelbarrow and one side of the dock. Damage to both canopies was minor.

Part VII - THE INVESTIGATION AND ANALYSIS

A. Personnel Factors

1. Pilot Factors - the pilot was well rested for the flight despite a five hour delay in launch time. There was no evidence of preexisting physical or psychological illness. The specific reasons for the pilot's misinterpretation of aircraft performance following recovery are unknown.

2. Maintenance, servicing, and ground handling personnel factors. The aircraft had recieved proper and thorough servicing and was preflighted and inspected for flight in accordance with current directives.

3. Supervisory Facto :
The pilot had received complete briefing, emergency procedures and aerodynamic lectures covering all characteristics of the RA5C. Aircraft altitude, airspeed, weights and power setting were all in accordance with existing directives at the commencement of the maneuver. Up to the time of the accident the flight had progressed as briefed by the chase instructor.

B. Material Failures or Malfunctions

1. DIR disclosed the recovered engine was operating at or near idle RPM at the time of impact.

2. DIR of port wing droop actuators disclosed the droops to be in the required cruise position.

3. DIR of the lateral master actuator disclosed it to be operating normally.

4. A review of previous yellow sheets reveals only one flight control discrepancy on 29 September 1967. A squadron instructor pilot downed the aircraft for "full opposite lateral stick required to level wings on a right hand final approach, and stick felt hard to move after aircraft was on the deck." Two other squadron instructor pilots moved the control stick prior to engine shutdown and reported normal stick feel, control throw and boundary layer control airflow normal. A complete electrical and hydraulic check of the flight control system revealed no discrepancies. Wing transfer and scavage pumps were checked for possible trapped wing fuel. The pumps all checked normal. The aircraft flew a 2.0 hour test flight during which the flight control gripe could not be duplicated. The aircraft flew three additional flights prior to the accident with no flight control discrepancies.

C. Facilities
Facilities were not considered to be a contributing factor.

D. NATOPS
1. NATOPS procedures had been complied with during spin recovery except that the speed brakes were extended.

2. The pilot was utilizing NATOPS check lists and had received his CPT emergency procedures check on 18 September 1967.

3. The RA5C NATOPS maneual should be changed to reflect more specific unusual attitude recoveries, reference enclosure (11).

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH OPNAVINST 3750.6 SERIES

Part VIII - Conclusions

1. Investigation of the wreckage and analysis of the pilots statement, chase pilots statement, North American Aviation Spin test data (A5A) and NATOPS manual indicate that Drake 203 did enter a fully developed spin from the inverted position while attempting a barrel roll. The spin was probably induced when the pilot attempted to increase his rate of roll thereby increasing the drag on the port wing sufficiently to stall the wing and spin the aircraft. The pilot's statement and DIR of aircraft components indicate no material failure as shown below.

a. The starboard engine was operating at idle RPM at the time of impact as born out by DIR.

b. It is concluded that both engines were operating because of the total lack of warning and caution lights which would have been present in the event of a flameout. Additionally, receipt and transmission of radio communications during the entire sequence of events indicates electrical power was available to illuminate any warning lights.

c. The pilot stated that stick movement was normal, indicating no loss of hydraulic systems. DIR of control actuators show that they were capable of normal operation and that the droops were in the proper position of cruise flight.

2. Had dual engine flameout occured as the pilot suspicioned, extension of the ram air turbine would have immediately illuminated numerous caution lights as well as providing electrical power for engine relight.

3. Pilot interview disclosed that the speed brake switch was held open for approximately three seconds, which would yield not more than one half speed brake extension. It is presumed that speed brakes were retracted during radio transmission or throttle manipulation since investigation showed them to be fully closed at time of impact.

4. Statements by the pilot, the chase instructor and ground observers show that the aircraft regained normal flight at approximately 4500 to 6000 feet, at which point the pilot added military power then reduced throttles to idle thinking he had a flameout and began relight procedures at approximately 3000 feet. Measurements of time and distance show that the most probable aircraft configuration at this time was:

a. Power at idle

b. Speed brakes closed

c. Airspeed a minimum of 200 KIAS

d. Rate of descent 8000' per minute

e. Nose attitude 15° down.

f. Flight path 25° downward

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH OPNAVINST 3750.6 SERIES

Under these conditions, North American Aviation computers readout shows that the aircraft would reduce the rate of descent to zero in about 7 seconds at military, thus successfully recovering.

5. It must be concluded that the pilot induced the spin by increased lateral stick at a crucial point and after recovery from the spin erred in judgement by misinterpreting engine performance at low altitude thereby necessitating ejection.

6. It must be further concluded that the violent gyrations of the aircraft during the spin were a contributing factor in the pilots misinterpretation of engine performance.

Part IX - Recommendations

1. That all Category I RA5C replacement pilots receive familiarization acrobatic flights in VA-45 prior to reporting RVAH-3.

2. That the barrel roll maneuver be delayed until a later phase of flight training.

3. That continued emphasis be placed upon recovery techniques from unusual attitudes.

Part V - THE ACCIDENT, ADDENDUM TO

On 3 Oct 1967 at 1335 Drake 203, RA5C BuNo 149315 pilot LCDR (b) (6) [redacted] launched on scheduled solo familiarization flight number two from NAS Sanford. The aircraft was chased by LCDR (b) (6) [redacted] as required by squadron doctrine. After twenty minutes of formation flying the acrobatic portion of the flight was commenced. Fuel on board at this time was 14,000#, altitude 14,000 feet. After executing several wing overs and aileron rolls a barrel roll was commenced to the left at 450 KIAS and military power.

The maneuver appeared normal up to the inverted 90° position. At this point the pilot felt that the nose was dropping too fast and attempted to increase the rate of roll. The nose continued to drop to an estimated 60° nose down attitude. The pilot experienced uncontrollable nose oscillations, retarded power to idle and extended speed brakes. As the aircraft descended uncontrollably, spinning to the left seven to ten times, the pilot heard the chase instructor transmitting "pull out, pull". At approximately 4500 feet the aircraft appeared to be in controlled flight. Power was advanced to military but the pilot felt no apparent response. Thinking that the engines had flamed out the pilot extended the ram air turbine, checked the throttles at idle and depressed the emergency engine ignitors. At this point the pilot saw that he was dangerously low and elected to eject, using the left alternate firing knob. Ejection sequence was normal from approximately 300' altitude and the pilot landed in the intercoastal waterway approximately 80 yards from a fishing camp. Rescue from 15 foot water depth was accomplished by a boat from the fishing camp within five minutes. All items of survival gear functioned properly and the pilot was uninjured. The aircraft crashed in the intercoastal waterway 13 miles south of New Smyrna Beach, Florida.

Part VII - Investigation and Analysis, Addendum to

A. The pilots statement, chase pilots statement, North American Aviation spin test data (A5A) and NATOPS manual indicate that the crash of Drake 203 resulted after a fully developed spin from the inverted position while attempting a barrel roll. The spin was probably induced at the time the pilot attempted to increase his rate of roll thereby increasing the drag on the port wing sufficiently to stall the wing and spin the aircraft. Statements by the pilot, the chase instructor and ground observers indicate that the aircraft regained normal flight at approximately 4500 to 6000 feet, at which point the pilot added military power, then reduced throttles to idle thinking he had a flameout and began relight procedures at approximately 3000 feet. Measurements of time and distance show that the most probable aircraft configuration at this time was:

1. Power at idle RPM.

2. Speed brakes closed.

3. Airspeed a minimum of 200 KIAS.

4. Rate of descent 8000' per minute.

5. Nose attitude 15° down.

6. Flight path 25° downward.

Under these conditions, North American Aviation computer readout shows that the rate of descent could be reduced to zero in about 7 seconds at military power, thus successfully recovering.

B. Personnel Factors

1. Pilot Factors - A description of the accident appears as part V (page preceeding). The pilot was well rested for the flight despite a five hour delay in launch time. There was no evidence of physiological or psychological illness.

The chase pilots statement, enclosure (2), reading "Drake 203 then came to a heading of northwest and commenced a spin" is credible. By interrogation, the board established that Lieutenant Commander (b) (6) did use the term "spin" accurately and intentionally to describe the maneuver performed by Drake 203. The board examined the spin test data for the A5A and found similar behavior to that exhibited by Drake 203. No other explanation suffices to explain how the aircraft was maneuvered from 14,000 feet at 450 knots to a very low altitude at 200 knots in a time period that cannot be stretched past two minutes. How the pilot came to spin the aircraft will remain a matter for speculation. The pilot's statement is not particularly enlightening in this regard. One point is clear from the pilot's statement. When inverted he "tried to increase

the rate of roll to prevent (the aircraft) from scooping out". At this point (while inverted) the pilot's description of nose position and lateral control response fit the definition of a full stall wherein the center of lift has moved forward radically and the spoiler deflectors are not effective in controlling roll rate but rather increase the severity of the stall. Supposing the aircraft to be stalled at this point, the spin follows logically. The question remains as to how the pilot maneuvered to a stall. From the chase pilot's statement, enclosure (2), it appears that the pilot did complete 90° turn while rolling 180° to the inverted position. There are infinite combinations of g-forces and roll rates that can be used to accomplish this part of the barrel roll maneuver for a given entry speed. There are g-force and roll rate limits above which the aircraft will enter an accelerated stall, supposedly preceeded by buffeting. The pilot did not feel any buffeting. There are limits below which the aircraft will run out of flying speed, and, if this is what happened, stall with little or no warning. Admitting that it is not clearly evident, the board favors the latter circumstance as being the preceeding event to the spin. The pilot adds nothing more informative to his statement in interviews and it is clear that he does not know how he came to spin the aircraft. (b) (5)

(b) (5)

[redacted]

The pilot was experienced, has an excellent reputation as an airman and has subsequent to this accident proven his ability to maneuver the RA5C very satisfactorily.

(b) (5)

[redacted]

There are other points of pilot performance after the spin developed that appear to have been inappropriate but never-the-less natural reactions when due regard is given the pilot's general background and low level of experience in the RA5C.

First, he did not eject immediately as prescribed for this circumstance by NATOPS. The 15,000 foot lower altitude limit for ejection during uncontrolled flight prescribed by NATOPS obviously presupposes that the aircraft is descending rapidly from higher altitude. (b) (5)

(b) (5)

[redacted]

(b) (5)

[redacted]

(b) (5)
(b) (5)

[redacted] Considering that no fleet pilot has experience with spinning jet aircraft, that this pilot was only theoretically familiar with the RA5C systems, and that he could not overnight rid himself of reflexes developed over years of experience, his actions after the initiation of the spin, if not correct in some essentials, are at least understandable and do not constitute intentional violations of NATOPS or indicate that he is physiologically or psychologically abnormal compared to other pilots.

In summary, the available evidence is conclusive as to the event; Drake 203 did spin out of a barrel roll. The following evidence eliminates all reasonable suppositions of cause except pilot error. The underlying cause has been discussed but remains a matter for speculation. (b) (5)

(b) (5) (b) (5)

[redacted]

2. Maintenance, servicing, and ground handling personnel factors. The aircraft had received proper and thorough servicing and was preflighted and inspected for flight in accordance with current directives.

3. Supervisory Factors
The pilot had received complete briefing, emergency procedures and aerodynamic lectures covering all characteristics of the RA5C. Aircraft altitude, airspeed, weights and power setting were all in accordance with existing directives at the commencement of the maneuver. Up to the time of the accident the flight had progressed as briefed by the chase instructor.

B. Material Failures or Malfunctions.

1. DIR disclosed the recovered engine was operating at or near idle RPM at the time of impact. No caution lights were noted by the pilot at any time and he both received and transmitted on the radio. The possibility that engine flameout occurred is remote.

2. DIR of port wing droop actuators disclosed the droops to be in the required cruise position.

3. A review of previous yellow sheets reveals only one flight control discrepancy on 29 September 1967. A squadron instructor pilot downed the aircraft for "full opposite lateral stick required to level wings on a right hand final approach, and stick felt hard to move after aircraft was

on the deck." Two other squadron instructor pilots moved the control stick prior to engine shutdown and reported normal stick feel, control throw and boundary layer control airflow normal. A complete electrical and hydraulic check of the flight control system revealed no discrepancies. Wing transfer and scavage pumps were checked for possible trapped wing fuel. The pumps all checked normal. The aircraft flew a 2.0 hour test flight during which the flight control gripe could not be duplicated. The aircraft flew three additional flights prior to the accident with no flight control discrepancies. DIR of the lateral master actuator disclosed it to be operating normally. The pilot was able to move the stick during and after the spin and spoiler/deflector actuators recovered were normal. There was no evidence of control malfunction or hydraulic failure.

C. Facilities

Facilities were not considered to be a contributing factor.

D. NATOPS

1. NATOPS procedures had been complied with during spin recovery except that the speed brakes were extended.

2. The pilot was utilizing NATOPS check lists and had received his CPT emergency procedures check on 18 September 1967.

3. The RA5C NATOPS manual should be changed to reflect more specific unusual attitude recoveries, reference enclosure (11).

PART VIII CONCLUSIONS, Addendum to

1. It is concluded that the pilot induced a spin by extending spoiler deflectors while operating at or near stall condition and after recovery from the spin erred in judgment by misinterpreting engine performance thereby necessitating ejection. Therefore, pilot error is assigned as the sole cause of this accident.

2. It is concluded that, all circumstances considered, the pilot's actions did not constitute intentional violations of NATOPS or indicate that he is physiologically or psychologically abnormal compared to other pilots.

(b) (5)

[redacted]