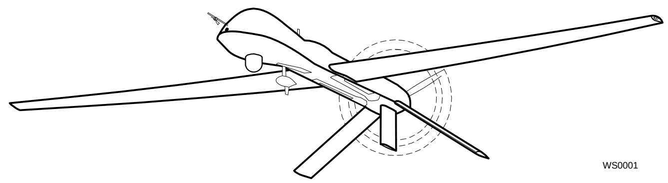
EMERGENCY PROCEDURES



SECTION III

TABLE OF CONTENTS

3.1. INTRODUCTION

Procedures in this section provide the best possible guidance under most circumstances. Adherence to these procedures will ensure maximum safety for personnel and the aircraft.

The situations covered are representative of the most probable malfunctions; however, multiple emergencies, weather, or other factors may require modification of the recommended procedures.

NOTE

Weapons and munitions related emergencies are covered in TO 1Q-1(M)B-34-1-1 and associated checklists.

3.1.1. GENERAL RULES

To assist the pilot in an emergency situation, three rules are established that apply to most emergencies occurring while airborne:

1. Maintain aircraft control.
2. Analyze the situation.
3. Take proper action.

During an emergency, contact the controlling agency for assistance as soon as practical. Do not hesitate to declare an emergency. Take whatever action is necessary to safely recover the aircraft.

3.1.2. CRITICAL ACTION PROCEDURES

Critical action procedures are printed in boldface capital letters. These steps must be performed immediately without reference to a written checklist. Any other steps are considered non-critical and are printed in normal typeface.

3.1.3. CREW POSITIONS

When necessary, steps in procedures will be followed in parenthesis by the crew position responsible to perform the step, for example: (P) for pilot. If multiple responsibilities exist, each person responsible to perform the step will be identified, for example: (P, SO) for pilot and sensor operator.

Crew position abbreviations used are:

(P) – Pilot
(SO) – Sensor Operator
Paragraph Deleted
(CC) – Crew Chief
(COMM) – Communications

3.1.4. DEFINITIONS

3.1.4.1. LAND AS SOON AS POSSIBLE

An emergency will be declared. A landing should be accomplished at the nearest suitable airfield considering the severity of the emergency, availability of alternate GCS/CDCS, weather conditions, field facilities, ambient lighting, aircraft gross weight, and command guidance.

3.1.4.2. LAND AS SOON AS PRACTICAL

Emergency conditions are less urgent, and although the mission should be terminated, the degree of the emergency is such that an immediate landing at the nearest adequate facility is not necessary.

3.2. GENERAL EMERGENCIES

3.2.1. GCS/CDCS LOSS OF LINE POWER

IF ALTERNATE GCS/CDCS POWER IS IMMEDIATELY AVAILABLE (G1 G10 G20 FF WITHIN 15 MINUTES, CC01 CC05 WITHIN 10 MINUTES), PERFORM THE FOLLOWING STEPS:

1. ALTERNATE GCS POWER – Connect (CC).

   If power is successfully reestablished, continue the mission.

NOTE

> The left PSO workstation will automatically transfer to UPS 2 if UPS 1 power fails; however, for Block 01 and earlier configurations, the GDT will not.
>
> CC01 CC05 Left PSO workstation will not automatically transfer to UPS 2 if UPS 1 power fails; center rack is powered by UPS 2 only.

See SS-47

2. LOST LINK MISSION – Verify and resend (P).

Warning Deleted

IF AIRCRAFT IS IN THE AIRPORT TRAFFIC AREA AND IN A POSITION TO LAND (G1 G10 G20 FF WITHIN 15 MINUTES, CC01 CC05 WITHIN 10 MINUTES):

NOTE

> G1 G10 G20 FF The UPS and batteries will power the PSO racks for approximately 18 minutes without line power.
>
> CC01 CC05 UPS and batteries will power the CDCS for approximately 10 minutes without line power.

3. RTB COURSE – Establish (P).
4. AIRCRAFT – Land as soon as possible.

IF LOW VOLTAGE ALARM ON PSO 1:

5. G20 FF CC01 CC05 ALL POWER DISTRIBUTION CIRCUIT BREAKERS – Off (P or SO).

   Turning all circuit breakers off will send aircraft lost link and shut down both PSO workstations.

6. G1 G10 GDT POWER CABLE – Connect to GDT 2 outlet (SO, CC).

   If the low voltage alarm sounds, UPS 1 power will fail shortly. Transfer GDT to UPS 2 power as follows:

   a. Turn off GDT No. 1 and 2 power circuit breakers on the center rack power distribution panel (SO).
   b. Disconnect GDT power cable from J4 on the GCS main I/O panel, and connect it to J9. Refer to Figure 1-17.
   c. Turn on GDT No. 2 power circuit breaker on the center rack power distribution panel (SO).

IF POWER NOT RE-ESTABLISHED AND MORE THAN G1 G10 G20 FF 15 MINUTES OUT, CC01 CC05 10 MINUTES OUT:

7. ALL POWER DISTRIBUTION CIRCUIT BREAKERS – Off (P or SO).

   Turning all circuit breakers off will send aircraft lost link and shut down both PSO workstations.

8. G1 G10 DEMPC UPS – As required (SO).
9. G20 FF CC05 MFW POWER – As required (SO).

NOTE

> MFW UPSs are interchangeable and will not effect PSO 1and 2 UPS power.

10. ETA – Determine (P).

WHEN AIRCRAFT ETA IS LESS THAN G1 G10 G20 FF 15 MINUTES, CC01 CC05 10 MINUTES, REFER TO GAINING HANDOVER CHECKLIST IN NORMAL PROCEDURES.

NOTE

If UPS low voltage alarm sounds before recovery is complete, go to step 7.

G1 G10 UPS 3, 4 and 5 in the DEMPC racks are interchangeable with UPS 1 and 2 in the mission monitor rack, and could be used as replacements to provide additional PSO workstation operating time.

G20 PSO UPSs are all interchangeable.

3.2.2. SMOKE, FUMES OR FIRE IN THE GCS/CDCS

NOTE

G1 G10 G20 Locations of fire extinguishers and first aid kit are shown in Figure 3-1.

1. NON-ESSENTIAL PERSONNEL – Evacuate (P).

2. POWER DISTRIBUTION PANEL CIRCUIT BREAKERS – Off (P).

   Turning all circuit breakers removes GDT/PGDT power, which will send the aircraft lost link.

   G1 G10 G20 FF Turning all circuit breakers off also shuts down both PSO workstations.

IF TIME AND CONDITIONS PERMIT:

3. UPS OUTPUT – Off (P or SO).

   G20 FF has three UPSs, CC01 CC05 have two UPSs, G1 has five UPSs and G10 has six UPSs.

4. G1 G10 G20 EMERGENCY POWER OFF (EPO) BUTTON – Press (P or SO).

AS SOON AS POSSIBLE:

5. GCS/CDCS SHELTER – Evacuate (P).

6. G1 G10 G20 CC01 CC05 GCS/CDCS EXTERNAL POWER SOURCE – Off (P).

   The best way to eliminate power from the outside is to shut off the generators powering the GCS. The UPS batteries will still be providing power if they were not turned off prior to evacuation.

7. FF FACILITY POWER – Off, as required (P).

8. FIRE DEPARTMENT – Notify (P).

9. CONTROLLING AGENCY – Notify (P).

10. If alternate GCS or CDCS is available, perform Gaining Handover checklist (paragraph 2.3.5).

EMERGENCY EQUIPMENT LOCATION (TYPICAL)

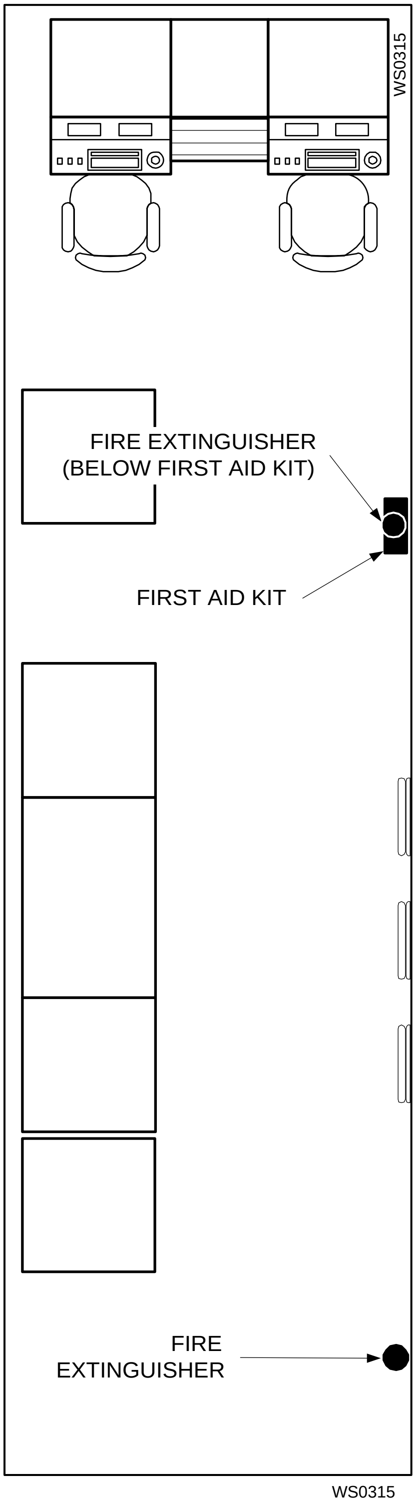


Figure 3-1

3.2.3. PILOT MONITOR FAILURE

Monitor failure is indicated by a dark screen and complete loss of video and telemetry. Perform the following steps in the event that the pilot's HUD or tracker display monitor fails during flight:

1. SENSOR OPERATOR DISPLAY – Use (P).

   The pilot can use the HUD or tracker on the sensor operator workstation and continue flight.

2. FLIGHT GRAPHICS – Select (SO).

   Select flight graphics and turn off AN/AAS-52 graphics (if applicable) so only flight graphics are displayed.

3. HUD ALTITUDE DISPLAY – As required (SO).

4. **G20** **FF** **CC01** **CC05** MONITOR RESET – Cycle Off/On (P).

5. RACK SWITCH – Perform, if necessary (P).

NOTE

The rack switch defines the action of transferring the master rack position from one PSO workstation to the other. Crewmembers should not confuse the act of transferring master rack position with a PSO workstation condition requiring emergency actions.

3.2.4. PILOT VIDEO SOURCE FAILURE

Video failure is indicated by a complete loss of HUD video with continued presence of telemetry (telemetry only on the screen).

1. SENSOR OPERATOR VIDEO – Check (P).

   Verify a good EO/IR sensor image is provided on the SO HUD.

NOTE

If this condition occurs low to the ground, ensure ground clearance and continue checklist at safe altitude and airspeed.

If this condition occurs during takeoff roll and sufficient runway is available, consider aborting the takeoff.

2. FLIGHT GRAPHICS – Select (SO).

   Select flight graphics and turn off AN/AAS-52 graphics (if applicable) so only flight graphics are displayed.

3. HUD ALTITUDE DISPLAY – As required (SO).

IF TIME AND CONDITIONS PERMIT:

4. PILOT HUD VIDEO SOURCE – Change, as required (P).

   If the SO video and telemetry checks good, choose the same HUD video source as the SO.

5. AIRCRAFT VIDEO MUX – Change, as required (P, SO).

3.2.5. PSO-2 RACK LOCK-UP

There are multiple conditions that could cause PSO-2 to malfunction: loading large map files, loading a second map while loading a large map file, typing with mouse cursor on tracker display, manipulating the HDD menus with the mouse in tracker display, leaving a route in the edit mode on the tracker display, and trying to do too many commands at once. If the rack is perceived to be slowing down, stop making new inputs to the rack and let the processor catch up.

If the lock-up is caused by CCSM failure it is indicated by any of the seven HDD warning messages that begin with "CCSM…" (Figure 3-17). If the Sensor Operator CCSM fails, new control commands (joystick, throttle, etc.) may not be transmitted to the aircraft.

If PSO-2 Locks up while being used as the sensor operator workstation, perform the following procedure:

WARNING

If PSO-2 rack lock-up occurs while the laser is firing, the laser will continue to fire as last commanded by PSO-2. Due to the time involved in rebooting PSO-2 and the safety hazard caused by an uncontrolled and armed laser, the pilot should send the aircraft lost link. The initial arming sequence of the lost link mission execution will command the laser to stop firing. Reference autopilot procedures to reestablish link (Figure 1-67).

NOTE

Check PSO-1 for PSO-2 off line warning.

IF FIRING LASER PERFORM STEP 1. IF LASER IS NOT FIRING, SKIP TO STEP 3.

1. UPLINKS – Off (P).

MONITER DOWNLINK / RETURN LINK UNTIL SYTEM AMP DROP INDICATES LASER OFF.

2. UPLINKS – On (P).

3. G1 G10 G20 FF PSO-2 J-2 CABLE – Disconnect from Bitsync PWA (P or SO).

   On PSO-2 computer bitsync, disconnect J-2 connector as shown in Figure 3-2.

CAUTION

Ensure the J-2 cable remains unplugged until PSO-2 is rebooted and back online. Failure to do so may result in unexpected lost link or unexpected commands being sent to the aircraft during PSO-2 rack reboot.

The PSO-2 J-2 cable is attached with two small screws. Ensure both screws are loose before attempting to remove the cable.

4. CC01 CC05 GDT/PGDT SERIAL CABLE – Disconnect from back of HUD monitor (SO).

5. PROCESSOR ASSEMBLY POWER SWITCH 2 – Off (P or SO).

NOTE

Wait to power cycle Processor Assembly Power Switch 2 until all 4 rack monitors are black.

6. PROCESSOR ASSEMBLY POWER SWITCH 2 – On (P or SO).

   “Enter…” warnings will clear when rack is booted, but before J-2 plug is connected.

IF CCSM WARNINGS ARE STILL DISPLAYED:

NOTE

Cycling the PSO-2 console switch (Figure 3-3) will reset the CCSM. The power cycle may restore functionality to PSO-2 workstation.

7. PSO-2 CONSOLE SWITCH – Off (P or SO).

8. PSO-2 CONSOLE SWITCH – On (P or SO).

IF FUNCTIONALITY IS RESTORED TO PSO-2 WORKSTATION:

9. G1 G10 G20 FF PSO-2 J-2 CABLE – Connect (P or SO).

10. CC01 CC05 GDT/PGDT SERIAL CABLE – Reconnect (SO).

11. DATA LOGGER – On (P or SO).

NOTE

Multiple reboots required in a short period of time may indicate an equipment malfunction. Consideration should be given to landing as soon as possible.

IF FUNCTIONALITY IS NOT RESTORED TO PSO-2 WORKSTATION:

NOTE

Confirm PSO-1 is Pilot Station and Master Rack.

12. PROCESSOR ASSEMBLY POWER SWITCH 2 – Off (P or SO).

13. AIRCRAFT – Land as soon as practical (P).

G1 G10 G20 *BITSYNC J2 CONNECTOR*

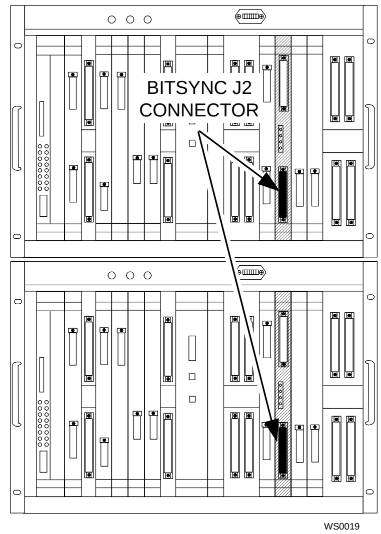


Figure 3-2

FF *BITSYNC J2 CONNECTOR*

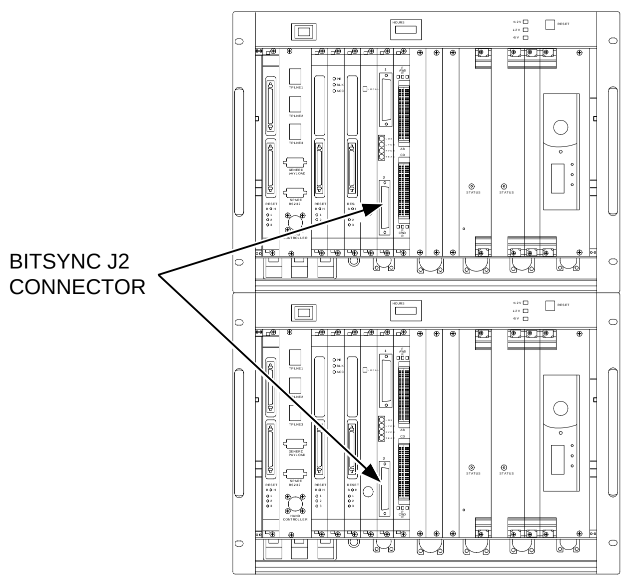


Figure 3-2.1

3.2.6. PSO-1 RACK LOCK-UP

There are multiple conditions that could cause PSO-1 to malfunction: loading large map files, loading a second map while loading a large map file, typing with mouse cursor on tracker display, manipulating the HDD menus with the mouse in tracker display, leaving a route in the edit mode on the tracker display, and trying to do too many commands at once. If the rack is perceived to be slowing down, and the aircraft is in a safe position, stop making new inputs to the rack and let the processor catch up.

If the lock-up is caused by CCSM failure it is indicated by any of the seven HDD warning messages that begin with "CCSM…" (Figure 3-17). If the pilot CCSM fails, new control commands (joystick, throttle, etc.) may not be transmitted to the aircraft.

The pilot has the option to send the aircraft lost link prior to executing this checklist. Ensure both Ku Command Link and LOS uplink are off in order to send aircraft lost link.

If the Ku-band datalink is on, the quickest way to turn off the Command Link is to disable the Ku CL Control via the pull down menu. This option may not be available if the rack is locked up. Options to disable the Command Link are:

- Mute Command Link at PPSL.
- Disable command through the pull down menus.
- Shut off LMA.
- Pull cables outside GCS.

NOTE

When operating with an encrypted Ku-band command link, the pilot should send the aircraft lost link only by muting the command link at the PPSL. Attempting to do so by another means may result in the inability of the aircraft to properly execute its lost link mission and may prevent the pilot from reestablishing a Ku datalink with the aircraft. However, if the Ku datalink is operating with only the return link encrypted, the pilot may send the aircraft lost link by disabling the KU CL Control or by the other methods listed above. Refer to 3.5.21.7. Lost Ku/DLOS Link Recovery–Encrypted procedures.

If the C-band uplink is on, the quickest way to turn off the uplink is by turning off the GDT/PGDT power switch. The aircraft will immediately execute lost link procedures with the GDT/PGDT power switch off unless the aircraft also has a KU Command Link.

NOTE

Check PSO-2 for PSO-1 off line warning.

IF UNABLE TO CONTROL AIRCRAFT:

1. SENSOR OPERATOR HUD – Flight graphics (SO).
2. HUD ALTITUDE DISPLAY – As Required (SO).
3. GEAR SWITCH – Match (P, SO).

NOTE

All preset values as well as system states such as Hold Modes, Cruise Mode, Stall Protect, SAS and Ignition should transfer and be resident in PSO-2 prior to the rack switch.

PSO-1 and PSO-2 console commands, such as gear switch and throttle position are independent of each other and will act according to whether the rack is a pilot station or a payload station. Prior to rack switch, the gear switch should be matched to avoid HUD warning "ready to raise/lower gear" after rack switch button is pressed. If the throttle is matched prior to switching racks, the payload will zoom change.

PSO-2 will not be able to perform pilot commands until the rack switch button has been pressed and the master rack is transferred. When PSO-2 is the payload station, PSO-2 will not be able to turn the SAS On and the GCS Ignition to Hot.

4. EMERGENCY MISSION – Verify and match (P, SO).

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft.

Warning Deleted

5. EMERGENCY MISSION START POINT – Confirm (P, SO).

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft.

NOTE

If no emergency mission is loaded on PSO-2, then as soon as the rack switch button is pressed, the emergency mission start point will immediately change to waypoint 1 regardless of what PSO-1 tracker display shows.

FFGCS equipped with the fiber-optic interface assembly start-stop switch (mounted above the center rack power distribution panel), pressing the stop switch interrupts the data flow from the GCS to the LOS GDT, terminating the LOS link. This will cause the warning message "GDT serial interface failure" to be displayed. Turning off the GDT power circuit breaker will not interrupt the LOS datalink, because the GDT is receiving power from a remote source. If the Ku link is being routed through the fiber-optic interface (not the case with remote split ops), pushing the stop button will also interrupt the Ku link. Any time the aircraft is required to be forced into lost link (LOS), press the stop button. Then have Comm shut off GDT power and mute the PPSL, as required. To reestablish the datalink, press the start button, and have Comm turn on GDT power and unmute the PPSL, as required.

6. RACK SWITCH BUTTON – Press (P).

NOTE

Confirm PSO-2 is Pilot Station and Master Rack.

IF GDT/PGDT IN USE PERFORM STEPS 7 AND 8, OTHERWISE PROCEED TO STEP 9:

7. G1 G10 G20 FF PSO-1 J-2 CABLE – Disconnect (P or SO).

On PSO-1 computer bitsync, disconnect J-2 connector as shown in Figure 3-2.

CAUTION

When GDT is in use, always pull the J-2 cable immediately after switching racks if PSO-1 is locked up because some PSO failures may interfere with or prevent the Master Rack function from transferring to the opposite rack. Ensure the J-2 cable remains unplugged until PSO-1 is rebooted and back online. Failure to do so may result in unexpected lost link or unexpected commands being sent to the aircraft during PSO-1 rack reboot.

8. CC01 CC05 GDT/PGDT SERIAL CABLE – Disconnect from back of HUD monitor (SO).

9. PSO-2 CONTROL – Verify (P).

10. EMERGENCY MISSION – Verified and resent, as required (P).

See SS-47

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft.

Warning Deleted

11. CHART RECORDER CONFIGURATION – Chart 1 (P).

12. DATA LOGGER – On (P).

13. AIRCRAFT ARC-210 – Set as required (P).

REBOOT PSO-1:

14. PROCESSOR ASSEMBLY POWER SWITCH 1 – Off (P or SO).

NOTE

All four rack monitors must be black before power cycling Processor Assembly Power Switch 1.

15. PROCESSOR ASSEMBLY POWER SWITCH 1 – On (P or SO).

G20 FF Verify “Enter…” message is clear.

G10 “Enter…” messages will not clear until the J-2 cable is connected.

NOTE

If PSO-1 power was recycled to reset the CCSM and the reset was successful, CCSM HDD warnings will not be displayed. CCSM has a separate power source. CCSM failure is most likely diagnosed by functional keyboard/mouse but non-functional control levers.

IF CCSM WARNINGS ARE STILL DISPLAYED:

NOTE

Cycling the PSO-1 console switch (Figure 3-3) will reset the CCSM. The power cycle may restore functionality to PSO-1 workstation.

16. PSO-1 CONSOLE SWITCH – Off (P).

17. PSO-1 CONSOLE SWITCH – On (P).

IF FUNCTIONALITY IS RESTORED TO PSO-1 WORKSTATION:

18. TRACKER DISPLAY – Set (P).

19. EMERGENCY MISSION – Verified and matched (P, SO).

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft.

Warning Deleted

20. EMERGENCY MISSION START POINT – Confirmed (P, SO).

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft.

21. M10 M15 BATTERY – Manual (P).

22. M10 M15 BATTERY #1 AND #2 – Ensure Idle (P).

CAUTION

M10 M15 If battery charging is in automatic mode, a charge cycle will begin at engine start. This unneeded charge cycle can overheat the batteries, and shorten the service life of the batteries.

NOTE

M10 M15 Leave battery charging in manual for the duration of the flight. If battery charging in flight is desired, do so manually while monitoring battery temperatures. Turn off battery charging if battery temperature reaches 50 °C.

IF GDT IN USE:

23. G1 G10 G20 FF PSO-1 J-2 CABLE – Connect if removed (P or SO).

24. CC01 CC05 GDT/PGDT SERIAL CABLE – Connect to back of HUD monitor (SO).

25. RACK SWITCH BUTTON – Press (P).

NOTE

Confirm PSO-1 is pilot station and master rack.

26. KU CONFIGURATION – Match settings, as required (P).

NOTE

Under some circumstances, KU CL control and other KU configuration settings might not match prior to rack switch. Sensor Operator cannot match settings until the PSO-1 is the master rack. If the settings do match cancel the changes and match the settings after the PSO-1 is the master rack.

27. PSO-1 CONTROL – Verified (P).

28. EMERGENCY MISSION – Verified and resent (P).

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft

Warning Deleted

29. CHART RECORDER CONFIGURATION – Chart 1 (P).

30. DATA LOGGER – On (P).

31. IFF TRANSPONDER – Set and On as required (P).

32. AIRCRAFT ARC-210 – Set as required (P, SO).

33. CLOCKS – Displayed as required (P).

34. HUD ALTITUDE DISPLAY – As required (P).

IF FUNCTIONALITY IS NOT RESTORED TO PSO-1 WORKSTATION:

NOTE

Confirm PSO-2 is pilot station and master rack.

35. PROCESSOR ASSEMBLY POWER SWITCH 1 – Off (P).

36. PSO 2 HUD VIDEO SOURCE – As required (P).

37. AIRBORNE VIDEO MUX – Nose, as required (P).

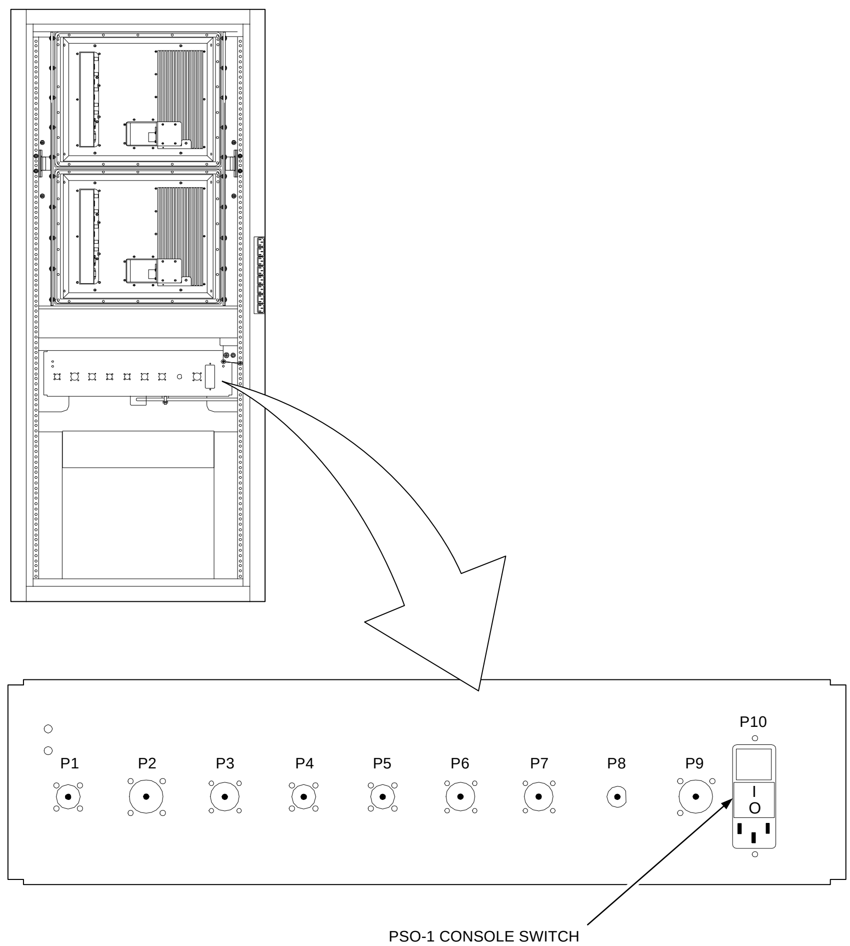
NOTE

Without a payload station, the sensor operator cannot adjust the payload. It is likely that the payload will not be set up for landing. If this is the case, land with nose camera or hand off to another GCS.

38. AIRCRAFT – Land or hand off as soon as practical (P).

PSO-1 CONSOLE SWITCH

See SS-45



REAR OF RACK

Figure 3-3

3.3. GROUND OPERATION EMERGENCIES

3.3.1. ENGINE FIRE ON THE GROUND

Engine fire may be indicated by the engine instruments on the pilot's HUD and HDD or by notification from the ground crew.

1. **GCS IGNITION – COLD (P).**

2. ENGINE KILL SWITCH – Cold, if conditions permit (CC).

3. AIRCRAFT POWER – Off, if able (CC).

4. NOTIFY TOWER (P, SO).

WARNING

If weapons are installed, a 4000 ft withdrawal should be adhered to (see TO 1Q-1(M)B-34-1-1). Stay upwind of burning aircraft, smoke and fumes are toxic.

3.3.2. NOSEWHEEL STEERING MALFUNCTION

Nosewheel steering malfunctions can be caused by problems with the steering servo in the aircraft, or by rudder pedal linkage failure. Partial steering control may be available in some cases.

1. AIRCRAFT – Stop (P).

   Use differential braking as needed to bring the aircraft to a stop.

2. YAW TRIM – Center (P).

3. STEERING SERVO – Monitor (P).

   The nosewheel steering servo can be monitored for amperage (VIT 2) and temperature (VIT 2). If steering becomes jammed at full lock, apply steering into the direction of turn. This decreases the amperage of the servo trying to center from its stuck condition, thereby reducing servo temperature.

CAUTION

Do not taxi or takeoff with a known or suspected nosewheel steering failure

IF SERVO TEMPERATURE CONTINUES TO INCREASE:

4. AIRCRAFT – Shut down (P).

   After shutdown, tow aircraft as required.

3.4. TAKEOFF EMERGENCIES

3.4.1. ABORT

Takeoff must be aborted if engine or other serious failure makes the aircraft unsafe for flight. During an abort, the pilot should use maximum braking to ensure the aircraft will stop on the available runway. It is critical to identify an abort point. An abort past the abort point may result in a cable engagement or a runway departure.

1. THROTTLE – IDLE (P).

2. BRAKES – APPLY (P).

IF STOPPING DISTANCE IS CRITICAL:

3. GCS IGNITION – Cold (P).

   Shutting down the engine will increase drag and allow for faster deceleration and prevent damage to the propeller or engine.

NOTE

Do not attempt to raise landing gear as a last resort to stop the aircraft.

3.4.2. TIRE FAILURE DURING TAKEOFF ROLL

Tire failure on takeoff roll may be indicated by yaw or by pilot or SO HUD video vibration during takeoff roll. Severe vibrations of the pilot HUD video during takeoff roll usually indicates a failure of the nose gear tire or a takeoff with the parking brakes engaged.

IF DECISION TO STOP IS MADE:

1. ABORT (P).

If nose gear tire is flat, minimize use of brakes as much as possible. If main gear tire is flat, use differential braking and nosewheel steering to maintain control. Accomplish a normal engine shutdown and have the aircraft towed to parking.

2. LANDING GEAR – Do not retract (P).

3. Refer to Landing With a Flat Tire checklist, paragraph 3.6.6.

IF DECISION TO CONTINUE TAKEOFF IS MADE:

3.4.3. ENGINE FIRE OR OVERHEAT DURING TAKEOFF ROLL

An engine fire or overheat on takeoff roll is indicated on the VITs in the pilot/SO HDDs. An overheating condition associated with other engine malfunctions may be an indication of impending failure. If takeoff is continued, maintain full power to a safe altitude and then reduce power to the minimum necessary for flight. Avoid unnecessary throttle movements that could result in engine failure. Aircraft should be landed as soon as possible.

IF DECISION TO STOP IS MADE:

1. ABORT – (P).

IF DECISION TO CONTINUE TAKEOFF IS MADE:

2. CLIMB – To safe altitude (P).

3. THROTTLE – As required to attain/maintain safe altitude. (P).

   Minimize unnecessary throttle movement.

4. Refer to Engine Overheat (paragraph 3.5.15) or Engine Fire Checklists (paragraph 3.5.16), as required.

5. AIRCRAFT – Land as soon as possible (P).

   Review Forced Landing Procedure (paragraph 3.6.10) as required.

3.4.4. LANDING GEAR WILL NOT RETRACT

Failure of the landing gear to retract may be indicated in the pilot/SO HDDs or by a visual gear check performed by the SO. In any case, the exact position of the gear must be determined by a visual inspection to correctly identify the malfunction.

1. GEAR POSITION – Verify (SO).

   Use sensor camera to verify landing gear did not retract.

   NOTE

   A failed landing gear switch or rapid activation of the joystick trigger could cause this malfunction. Check the Aircraft Status Area for a landing gear failed message. If after 1 minute, it still reads down, it is likely that the landing gear switch or the joystick trigger failed. It is important that the pilot confirm the presence of the "Ready to raise landing gear" HUD feedback message before commanding the gear to raise with the joystick trigger. If the joystick trigger has failed, the "Ready to raise landing gear" feedback message will remain displayed after the pilot pulls the trigger. A second, slower trigger pull may raise the gear and the mission may continue. If it does not, the joystick trigger has failed.

   If the pilot slides the landing gear switch aft and does not get a "Ready to lower landing gear" HUD feedback message, the landing gear switch failed. In either case, the aircraft gear command displayed in the aircraft status area should remain down.

2. GEAR – Do not attempt to raise gear (P).

   There may be a gear problem; however, if the gear is currently in the landing configuration, do not attempt to recycle. Recycling the gear may cause this situation to deteriorate.

IF LANDING GEAR FAILED OR IS NOT FULLY EXTENDED:

3. Refer to Landing Emergencies (paragraph 3.6).

3.5. IN-FLIGHT EMERGENCIES

3.5.1. LOSS OF CONTROL PREVENT

A loss of control situation is any un-commanded motion that cannot be arrested promptly by simple application of pilot control. The early stages leading to a loss of control may be indicated by un-commanded roll, pitch, or yaw (as indicated by the horizon line), impending stall conditions or actual stall that may result in loss of the datalink or aircraft. This may be caused by an Airspeed or Pitot/Static Failure, AOA Failure, Autopilot Sensor Failure, Airframe Icing or Structural Failure. Perform the following steps if loss of control is encountered:

1. LANDING CONFIGURATION – COMMAND (P).

2. PAYLOAD – POSITION MODE (SO).

IF AIRCRAFT CONTROL IS REGAINED:

3. Refer to the AOA Sensor Failure (paragraph 3.5.8), Airspeed or Pitot/Static Failure (paragraph 3.5.9), Autopilot Sensor Failure (paragraph 3.5.10), Airframe Icing (paragraph 3.5.6), or Structural Failure (paragraph 3.5.4) checklists – As required (P).

   Analysis of the situation is necessary. To accomplish this:

   - Compare AOA with what would be expected for normal flight.
   - Compare primary and secondary airspeed.
   - Compare AP1 and AP2.
   - Use the payload to determine possible causes, such as icing or structural failure.

   After determining the cause, the appropriate checklist listed in step 3 should be accomplished to isolate/mitigate the failure.

IF AIRCRAFT CONTROL IS NOT REGAINED, PERFORM THE FOLLOWING STEPS UNTIL CONTROL IS REGAINED:

4. AP SENSOR – Switch manually (P).
5. SAS – Off (P).

WARNING

Aircraft control is completely different with the SAS off. Any pitch or roll input will cause the aircraft to continue to change attitude in the direction of the input.

The aircraft should be returned to straight and level attitude (+/- 5º roll and +/- 5º pitch) using corrective control inputs, before turning SAS back on.

When the SAS is turned ON the GCS immediately changes the stick commands to match current aircraft pitch and roll angles. Due to datalink validation logic, the SAS command is not immediately accepted by the aircraft, but is delayed by at least .5 seconds. The GCS stick commands are momentarily interpreted as control surface deflection commands instead of aircraft pitch and roll commands. If the aircraft is not returned to straight and level flight, these momentary control surface deflections may contribute to loss of aircraft control.

The SAS software has several features which keep the aircraft stable when SAS is on, including gain reductions when airspeed increases, pitch and roll trimmers, and pitch transition filters. If an unusual attitude is entered with SAS off, these features will limit the SAS authority and ability to recover the aircraft to straight and level flight when the SAS is turned back on.

6. GEAR – Down (P).
7. GCS IGNITION – Cold (P).

3.5.2. STALL RECOVERY

A stall condition may be indicated by warnings on the pilot HUD, excessively high AOA, or unexpected loss of altitude. Perform the following steps if the aircraft stalls:

Deleted Note

1. LANDING CONFIGURATION – Command (P).
2. NOSE – Lower (decrease AOA) (P).

   A significant forward stick movement may be necessary to break the stall.

3. THROTTLE – As required (P).

   If altitude is not critical, reduce power to idle. At traffic pattern altitudes, full power may be necessary to recover the aircraft.

CAUTION

Maximum power during a stall condition may increase the probability of a spin, due to p-factor, gyroscopic precession, and torque.

4. AILERONS – Neutral (P).
5. RUDDER – Opposite roll (P).

WHEN AOA IS –2.5° WITH AIRSPEED INCREASING:

6. NOSE – Raise (P).

   Stabilize the AOA to at least –2.5° with airspeed increasing before raising the nose.

7. AOA AND AIRSPEED – Check (P, SO).

   Crosscheck VIT 2 to confirm airspeed is functioning properly.

8. PITOT HEAT – On (P).
9. TRIM AND THROTTLE – As required (P).

   For most weights, recover at 70 knots.

3.5.3. SPIN RECOVERY

A spin will be indicated by unexpected aircraft yaw, loss of altitude, and AOA in excess of 18 degrees. Perform the following steps to regain control.

CAUTION

This procedure has not been flight tested.

1. LANDING CONFIGURATION – Command (P).
2. SAS – Off (P).

   Turn off the Pitch and Roll SAS using the SAS button on the joystick.

WARNING

Aircraft control is completely different with the SAS off. Any pitch or roll input will cause the aircraft to continue to change attitude in the direction of the input.
The aircraft should be returned to straight and level attitude (+/- 5º roll and +/- 5º pitch) using corrective control inputs, before turning SAS back on.

When the SAS is turned ON the GCS immediately changes the stick commands to match current aircraft pitch and roll angles. Due to datalink validation logic, the SAS command is not immediately accepted by the aircraft, but is delayed by at least .5 seconds. The GCS stick commands are momentarily interpreted as control surface deflection commands instead of aircraft pitch and roll commands. If the aircraft is not returned to straight and level flight, these momentary control surface deflections may contribute to loss of aircraft control.

The SAS software has several features which keep the aircraft stable when SAS is on, including gain reductions when airspeed increases, pitch and roll trimmers, and pitch transition filters. If an unusual attitude is entered with SAS off, these features will limit the SAS authority and ability to recover the aircraft to straight and level flight when the SAS is turned back on.

3. THROTTLE – Idle (P).
4. AILERONS – Neutral (P).
5. RUDDER – Opposite rotation (P).
6. ELEVATOR – Through neutral (P).

CAUTION

The stick must be moved through neutral in the correct direction. Position the stick forward for a normal spin and aft for an inverted spin. Full elevator deflection may reduce rudder effectiveness.

IF ROTATION CANNOT BE STOPPED:

7. GEAR – Down (P).
8. CONTROLS – Neutral (P).
9. SPIN RECOVERY – Reapply (P).

NOTE

If the aircraft continues to spin, reapply Spin Recovery with full aileron in direction of spin.

WHEN AOA IS –2.5°:

10. NOSE – Raise (P).

    Stabilize the AOA to at least –2.5° with airspeed increasing before raising the nose.

11. AOA AND AIRSPEED – Check (P, SO).

    Confirm AOA and airspeed are functioning properly.

12. PITOT HEAT – On (P).

13. TRIM AND THROTTLE – As required (P).

    For most weights, recover at 70 knots.

AFTER RECOVERY:

14. VERTICAL GYRO OPERATION – Check (P).

    Proper vertical gyro operation is indicated by stable artificial horizon and absence of vertical gyro warning.

15. SAS – As required (P).

WARNING

The aircraft should be returned to straight and level attitude (+/- 5° roll and +/- 5° pitch) using corrective control inputs, before turning SAS back on.

When the SAS is turned ON the GCS immediately changes the stick commands to match current aircraft pitch and roll angles. Due to datalink validation logic, the SAS command is not immediately accepted by the aircraft, but is delayed by at least .5 seconds. The GCS stick commands are momentarily interpreted as control surface deflection commands instead of aircraft pitch and roll commands. If the aircraft is not returned to straight and level flight, these momentary control surface deflections may contribute to loss of aircraft control.

The SAS software has several features which keep the aircraft stable when SAS is on, including gain reductions when airspeed increases, pitch and roll trimmers, and pitch transition filters. If an unusual attitude is entered with SAS off, these features will limit the SAS authority and ability to recover the aircraft to straight and level flight when the SAS is turned back on.

16. AIRCRAFT – Visually check (SO).

17. CONTROLLABILITY CHECK – Perform (P).

    Refer to Paragraph 3.5.5.

3.5.4. STRUCTURAL FAILURE

Structural failure may be indicated by erratic or unstable aircraft performance, or may be suspected due to events such as bird strike, hostile gunfire, etc. Use the sensor to inspect visible portions of the aircraft for damage. Perform Controllability Check as required.

3.5.5. CONTROLLABILITY CHECK

This should be accomplished by the landing aircrew in LOS. During any in-flight or landing emergency when structural damage or any other failure that may adversely affect aircraft handling characteristics is known or suspected, a controllability check should be performed. The following items should be accomplished:

1. SAFE ALTITUDE – Attain (P).

2. OPTIMUM CONFIGURATION AND WEIGHT FOR LANDING – Determine (P).

CAUTION

Do not slow aircraft below computed minimum touchdown speed.

Establish landing configuration and note handling characteristics while simulating approach to landing. Refer to charted approach speeds in Appendix A.

NOTE

If the aircraft is not controllable down to a reasonable landing speed, slow only to the AOA/airspeed that allows acceptable handling qualities.

When a landable configuration has been achieved, do not change unless aircraft cannot otherwise be recovered.

3.5.6. AIRFRAME ICING

This checklist should be executed prior to entering any potential icing conditions or when icing is encountered.

WARNING

If "Airspeed or pitot/static failure" and/or "AOA sensor failure" conditions are evident, immediately execute the required checklists prior to continuation of this checklist.

1. PITOT HEAT – On and verified (P, SO).

   Operation may be verified with IR sensor.

2. (Deleted)

3. FUNCTIONAL AIR SPEED SOURCE – Select (P).

WARNING

If primary and secondary airspeeds exceed a 5 KIAS differential, ensure that the Airspeed or Pilot/Static Failure checklist is executed prior to switching airspeed source. Failure to perform this step may result in an extreme and rapid change in aircraft pitch and could result in departure from controlled flight.

4. AIRSPEED – Maintain greater than stall speed +10 knots (P).

   Increase power and airspeed to compensate for decreased lift, increased drag, and increased weight.

NOTE

Decreasing electrical load (i.e., disable SAR) will provide additional power.

5. ALPHA PROBE – Verify functional (P).

   In smooth air and icing conditions the AOA vane may freeze in position. Continuously evaluate the functionality of the AOA vane.

CAUTION

If alpha probe becomes inoperable, refer to AOA Sensor Failure Checklist.

6. STALL PROTECT – As required (P).
7. NOSE LENS HEAT – As required (P).
8. M15 NOSE IR LENS HEATER – As required (P).
9. ICING CONDITIONS – Exit, as soon as possible (P).

CAUTION

Allow sufficient time for airframe icing to dissipate prior to landing.

10. SENSOR – Aft (SO).

    Select stow or point sensor ball aft to minimize sensor lens icing.

11. AIRCRAFT – Visually check (SO).

    Use the sensor to evaluate ice accumulation/dissipation and confirm airframe structural integrity.

3.5.7. DE-ICING SYSTEM FAILURE IN ICING CONDITIONS

An unexpected increase in AOA during level flight may indicate an icing condition. Perform the following steps if a de-icing system failure is detected.

1. GLYCOL REMAINING – Check (P).
2. PUMP ON AND HIGH – Verify (P).

   Verify Pump On/Off is On and Pump Speed set to High.

3. DE-ICING FLUID FLOW – Verify (SO).

   Use the sensor to verify de-icing fluid flow on the wings and tails.

   If no fluid flow, exit and remain clear of icing conditions. Climb, descend, or reroute to remain clear of the icing conditions.

3.5.8. AOA SENSOR FAILURE

An unexpected increase in AOA during level flight may indicate an icing condition. Indications of AOA sensor failure may be moderate to severe pitch oscillations with stall protect engaged. Perform the following steps in the event that the AOA sensor fails:

1. STALL PROTECT – Off (P).
2. CRUISE MODE – On, as required (P).

NOTE

Cruise Mode On deactivates aileron tip stall override.

To override aileron tip stall protection, activate Cruise Mode by turning on any autopilot Hold Mode (or by airspeed above 95 KIAS).

3. AUTOPILOT HOLD MODES – As required (P).
4. AIRSPEED – Stall speed +10 minimum (P).
5. CONTROLLABILITY CHECK – Perform (P).

   Refer to paragraph 3.5.5.

6. AIRCRAFT – Land as soon as practical (P).

CAUTION

When cruise mode is off, aileron tip stall protection becomes active and will deploy ailerons if AOA fails above 7 degrees. Autopilot deflects ailerons proportionally if AOA is between +7 degrees and +11 degrees.

3.5.9. AIRSPEED OR PITOT/STATIC FAILURE

Pitot static failure most often occurs during icing conditions and can be extremely deceptive in clear air icing.

CAUTION

Pitot heat does not guarantee absence of ice from the pitot-static system. Moisture can freeze in the unheated areas of the system. This malfunction may be indicated by "Airspeeds differ by > 5 kts" warning message, abnormal attitude, abnormal airspeed indications or a combination of any of these. These conditions may result in aircraft pitch down/oscillation, loss of datalink, and loss of aircraft control. Exercise vigilance when using the autopilot while flying above the freezing level due to the potential for this pitot icing problem. Be prepared to disengage the autopilot immediately upon noticing any abnormal/uncommanded aircraft movement, especially after flying in the vicinity of visible moisture.

Perform the following steps in the event the airspeed sensor fails:

1. PREPROGRAM – Off (P).

2. AIRSPEED HOLD – Off (P).

Deleted Caution

3. PITOT HEAT – On (P).

4. AIRSPEED SOURCE – As required (P).

NOTE

Before switching airspeed sources, compare airspeeds on (VIT 2). Confirm which airspeed is within normal operating limits. Refer to Figure 3-4.

5. SECONDARY ALTITUDE – As required (P).

CAUTION

Secondary Altitude uses the GPS altitude output of the currently selected navigation sensor. GPS altitude may vary significantly from barometric altimeter altitude.

Consider selecting GPS Altitude as primary altitude reference from the Overrides Backup Sensor menu.

IF BOTH AIRSPEED SOURCES ARE INOPERATIVE:

6. AOA – Use as primary speed reference (P).

   Maintain an alpha (AOA) of 2° maximum. Refer to Figure 3-4 for AOA airspeed guidance.

7. CONTROLLABILITY CHECK – Perform (P).

   Refer to paragraph 3.5.5.

   Use the EO or IR sensors to check for structural damage and for ice detection.

NOTE

Once a landable configuration is determined, do not change configuration.

8. AIRCRAFT – Land as soon as practical (P).

3.5.10. AUTOPILOT SENSOR FAILURE

Autopilot sensor failure may be indicated by any of the following warnings on the HDD:

- Vertical gyro power failure.
- Autopilot sensor 1 failed.
- Autopilot sensor 2 failed.
- Autopilot sensors do not match.

Autopilot sensor failure may also be indicated by unresponsive flight controls, unusual movement of artificial horizon, or uncommanded pitch, roll or yaw.

Perform the following steps in the event that the autopilot sensor fails:

1. AP SENSOR – Switch manually (P).

   If AP sensor selection is set to automatic, the system should switch AP sensors automatically upon failure. If automatic switching does not occur, or if AP sensor selection is not set to automatic, switch sensors manually. If manual selection fixes the problem, perform controllability check and land as soon as practical.

CAUTION

Using AP1 (LN100G) in flight may result in aircraft tail oscillations. If AP 2 fails and the aircraft switches to AP1, or AP 1 must be selected for other reasons, cage the sensor by setting it to position mode.

NOTE

In the automatic mode, the system may not switch to LN100G unless there is a gross failure in the flight sensor unit.

Note Deleted.

IF BOTH AUTOPILOT SENSORS HAVE FAILED:

2. SAS – Off (P).

   Turn off the Pitch and Roll SAS using the red SAS button on the joystick. Trim roll first, then pitch. If directional problems persist, turn Off the Yaw SAS. If the exact cause of the failure is determined, the individual and unaffected SAS (pitch, roll, or yaw) controls may be engaged. Always perform a controllability check when the final landing configuration is determined.

WARNING

Aircraft control is completely different with the SAS off. Any pitch or roll input will cause the aircraft to continue to change attitude in the direction of the input.

The aircraft should be returned to straight and level attitude (+/- 5º roll and +/- 5º pitch) using corrective control inputs, before turning SAS back on.

When the SAS is turned ON the GCS immediately changes the stick commands to match current aircraft pitch and roll angles. Due to datalink validation logic, the SAS command is not immediately accepted by the aircraft, but is delayed by at least 0.5 seconds. The GCS stick commands are momentarily interpreted as control surface deflection commands instead of aircraft pitch and roll commands. If the aircraft is not returned to straight and level flight, these momentary control surface deflections may contribute to loss of aircraft control.

The SAS software has several features which keep the aircraft stable when SAS is on, including gain reductions when airspeed increases, pitch and roll trimmers, and pitch transition filters. If an unusual attitude is entered with SAS off, these features will limit the SAS authority and ability to recover the aircraft to straight and level flight when the SAS is turned back on.

3. CONTROLLABILITY CHECK – Perform (P).

   Refer to paragraph 3.5.5.

NOTE

Once a landable configuration is determined, do not change configuration.

4. AIRCRAFT – Land as soon as possible (P).

IF UNABLE TO MAINTAIN AIRCRAFT CONTROL:

5. GEAR – Down (P).

IF UNABLE TO REGAIN AIRCRAFT CONTROL:

6. GCS IGNITION – Cold (P).

3.5.11. FLIGHT CONTROL SERVO OVERHEAT

Flight control servo overheat is indicated by warning(s) in the HDDs. The crew should refer to (VIT 6) in the HDD to determine a suspected overheat condition.

1. AUTOPILOT HOLD MODES – As required (P).

   Turn off applicable hold mode to alleviate a servo overheat.

2. SERVO AMP DRAW – Monitor (P).

   Vary airspeed, flap, rudder trim (full left or right), or gear position as needed to alleviate the overheat condition.

CAUTION

Asymmetric flight controls or landing gear may cause servo overheat.

If an aileron or tail servo exceeds 165 °C, (329 °F) land as soon as possible. Servo has a high probability of failure after 10 minutes at 200 °C (392 °F).

NOTE

If tail servo is overheating, when airspeed gets below 40 KIAS, tails will disable and drag. Stop straight ahead and do not taxi.

3. CONTROLLABILITY CHECK – Perform as required (P). See paragraph 3.5.5.

NOTE

Once a landable configuration is determined, do not change configuration.

3.5.12. ENGINE FAILURE

Engine-out landings may be accomplished if the pilot factors in glide performance, datalink management, and battery life. Forced landings at other than the home field require Ku band datalink. If the engine fails after liftoff the aircraft will begin a descent. The pilot must immediately determine whether the aircraft can be turned or landed straight ahead. Every effort must be made to avoid injury to personnel or damage to equipment on the ground. For engine failure immediately after takeoff, there may not be sufficient time to call for this entire checklist while airborne, and there may be sufficient runway available to land and stop the aircraft. Refer to Forced Landing, paragraph 3.6.10, for a complete discussion of forced landing procedures. Perform the following steps if the aircraft engine fails:

1. GLIDE – ESTABLISH (P).

Maintain an airspeed that optimizes aircraft range for the landing runway. Generally, an alpha (AOA) of 2° will suffice.

NOTE

SO should start stop watch or record time at the time of engine failure to aid estimation of battery life.

Refer to Figure 3-5 thru 3-9 engine-out glide range.

2. LANDING SITE – SELECT (P).

WARNING

When landing off the airfield, prioritize actions to minimize collateral damage, injury, and/or loss of life. If possible, land on a runway, suitable overrun, or suitable surface. When attempting a landing immediately after takeoff and committed beyond the departure runway/overrun, attempt to land on parallel runway(s), cross runway(s), or opposite direction, if possible.

For Ku only, select a long straight landing surface to help maintain link and compensate for control and video delays.

For Ku-band datalink operation, rapid heading changes and abrupt roll and pitch reversals exceeding the limits below will probably cause the aircraft to lose the datalink. Use smooth control inputs while maneuvering to land to prevent a lost link condition.

The Ku-band air data transmitter aircraft attitude limits are as follows:

- Heading change ±1° per second.
- Roll rate ±15° per second.
- Roll angle ±20°.
- Pitch rate ±2° per second.
- Pitch angle ±10°.

CAUTION

If descending through moisture with a cold soaked aircraft, ensure nose lens heat is sufficient to prevent frost from forming on the nose lens.

It is possible for the actual nose camera lens inside the fuselage to fog during descent. Fogging of the actual nose camera lens cannot be prevented with the use of nose lens heat. The EO or IR sensors may be required for landing; however, a rapid descent from cold air to warm moist air may also fog the interior of the EO/IR sensor ball windows.

3. THROTTLE – 25% (P).

In the event of engine rollback, retarding the throttle to approximately 25% minimizes the chance of engine overspeed. As the engine RPM drops the prop servo will drive to a flatter pitch. Should the RPM decrease below 1000, propeller control reverts to VPP mode and the prop pitch will drive to the setting of the pitch lever on the control console. In such cases set the prop pitch lever to approximately (straight up). As the fuel cools, normal fuel delivery will be restored after about 1-2 minutes and the engine may return to operation. Should the throttle be set above and/or the prop pitch is near fine, the engine will overspeed.

4. ALTITUDE HOLD – Off (P)

5. GCS IGNITION – Hot (P).

Ensure GCS ignition is HOT, providing opportunity for windmill action to restart engine.

5A. MAP 1 and MAP 2 – Check (P)

Verify that MAP 1 and MAP 2 sensors are within normal operating limits. Erratic engine performance may indicate a faulty MAP sensor. If the MAP sensor is determined to be faulty, switch to backup MAP sensor.

NOTE

There is more than one type of MAP sensor failure. Not all map sensor failures trigger an HDD warning. Erratic MAP sensor readings may be an indication of a failed MAP sensor within the normal range. If both MAP indications are erratic, the non-selected MAP may be reacting to engine performance issues caused by the selected MAP. Selecting the backup MAP is appropriate. Because MAP 1 and 2 sensor data is updated in the downlink at different rates (20 Hz for the selected MAP sensor, and 1 Hz for the non-selected sensor), transient differences may be observed if throttle command is changing. The limit for differences between MAP sensor readings (2.5 in Hg) applies to steady throttle conditions, averaged over 30 seconds. It may be necessary to set altitude hold off to obtain steady throttle conditions. This transient difference between MAP sensor readings does not affect engine performance. If engine performance is erratic or insufficient, reference turbocharger failure checklist (para 3.5.19).

6. M10 M15 BACKUP MAP SENSOR – On (P).

NOTE

Erratic engine performance may indicate a faulty MAP sensor.

M10 M15 IF SELECTED MAP READING AND ENGINE PERFORMANCE STABILIZE, PERFORM STEP 7. OTHERWISE PROCEED TO STEP 8.

7. AIRCRAFT – Land as soon as practical (P).

8. ELECTRICAL LOAD – Reduce (P).

Refer to Battery Duration Chart (Figure 3-12). Gear should be extended before battery voltage drops below 22 volts.

CAUTION

Several aircraft components may cause severe drain on the battery life. See Figure 3-13 for estimated electrical load of switchable aircraft components.

a. SAR – Off (P)

b. If LOS, SPMA POWER – Off (P).

NOTE

Turning off SPMA will disable digital LOS datalink and VHF/UHF radio system.

c. PAYLOAD – As required (SO).

During descents through moisture, the nose camera may be unusable and the EO or IR sensor may be required for the landing.

The EO/IR cryogenic unit may be turned off if the IR sensor will not be used.

Paragraph Deleted

d. PITOT HEAT – As required (P).

e. NAVIGATION AND STROBE LIGHTS – Off (P).

f. IFF TRANSPONDER – As required (P).

g. ARC-210 – Off, if not required (P).

h. ENGINE COOLING FAN – Auto (P).

CAUTION

If the alternator is unable to provide power at windmilling RPM, depletion of aircraft batteries and complete loss of power will occur as shown in Figure 3-12. See Figure 3-13 for estimated electrical load of each switchable aircraft component.

When battery voltage drops below 22 volts, all electrical power may be lost. Gear must be extended before system drops below 22 volts. Attempting to lower the gear below 22 volts may be unsuccessful and may cause a complete loss of power.

NOTE

With fully charged batteries, sufficient electrical power should be available to power the aircraft through landing. If battery status is in doubt, consider increasing airspeed to 85 knots or greater, in VPP Mode, with propeller control full forward, to allow the alternator to power the aircraft electrical system. Increased airspeed will significantly reduce glide performance.

9. BATTERY APPLICATION TIME – Monitor (P, SO).

Monitor total time battery power has been applied.

10. BATTERY VOLTAGE – Monitor (P, SO).

11. AUTO FUEL TRANSFER – Off (P).

12. FUEL TANKS – Switch (P).

Switch fuel tanks in the unlikely event the flameout was caused by an empty tank.

NOTE

Although an Engine Start button is provided in the M-key menu, it is unlikely to be effective for in-air restart.

If the engine is windmilling above 1000 RPM, the Engine Start command will have no effect.

If the engine is not windmilling above 1000 RPM, it may be frozen or jammed. In this condition, setting Engine Start – On will cause an electrical current draw for 2 to 15 seconds. The level of current is unpredictable, but could be as high as 80 amperes for 2 seconds, or a lower level for up to 15 seconds.

13. GCS IGNITION – Cold (P).

Selecting ignition cold will conserve electrical power by shutting off the fuel pumps.

14. PROPELLER – Full aft, or as required (P).

With VPP Mode selected, set the propeller control lever fully aft to minimize propeller drag. Setting the control full aft may slow engine RPM sufficiently to drop the alternator off-line and put the electrical system on battery power.

15. KU VIDEO CONFIGURATION – Optimize for landing as required (P, SO).

    a. RL RATE SELECT – Shared 3.2 (P).

    b. ENERDYNE/VCR SOURCE – Nose or IR (SO).

    c. PILOT HUD VIDEO SOURCE – Enerdyne video (P).

    d. SENSOR OPERATOR VIDEO SOURCE – Ku/VQ Video (SO).

    e. GCS VCR SOURCE – As required (P, SO).

16. GEAR – Down, as required (P).

    Lower landing gear when in position to land on runway, suitable overrun, or suitable surface. With engine out and landing gear down, VSI is approximately 600 ft/min. High gross weights and headwinds significantly reduce glideback capability. The aircraft landing gear can absorb some of the shock of a forced landing and may provide some protection for the sensor ball.

CAUTION

Gear extension time is up to 35 seconds from initiation to full extension.

REVIEW FORCED LANDING PROCEDURES (PARAGRAPH 3.6.10) AS REQUIRED.

3.5.13. M5 ALTERNATOR FAILURE / M10 M15 DUAL ALTERNATOR FAILURE

Alternator failure shall be dealt with in the same manner as an engine failure when planning a forced landing. Battery life is limited forcing the pilot to land as soon as possible before battery failure causes the complete loss of aircraft control. See Figure 3-12 for approximate battery life. Refer to Forced Landing, paragraph 3.6.10, for a complete discussion of forced landing procedures.

NOTE

SO should start stop watch or record time at the time of alternator failure to aid estimation of battery life.

1. LANDING SITE – Select (P).

WARNING

When landing off the airfield, prioritize actions to minimize collateral damage, injury, and/or loss of life.

For Ku only, select a long straight landing surface to help maintain link and compensate for control and video delays.

For Ku-band datalink operation, rapid heading changes and abrupt roll and pitch reversals exceeding the limits below will probably cause the aircraft to lose the datalink. Use smooth control inputs while maneuvering to land to prevent a lost link condition. The Ku-band air data transmitter aircraft attitude limits are as follows:

- Heading change ±1° per second.
- Roll rate ±15° per second.
- Roll angle ±20°.
- Pitch rate ±2° per second.
- Pitch angle ±10°.

CAUTION

If descending through moisture with a cold soaked aircraft, ensure nose lens heat is sufficient to prevent frost from forming on the nose lens.

It is possible for the actual nose camera lens inside the fuselage to fog during descent. Fogging of the actual nose camera lens cannot be prevented with the use of nose lens heat. The EO or IR sensors may be required for landing; however, a rapid descent from cold air to warm moist air may also fog the interior of the EO/IR sensor ball windows.

2. ELECTRICAL LOAD – Reduce (P).

NOTE

Refer to Battery Duration Chart (Figure 3-12). Gear should be extended before battery voltage drops below 22 volts.

    a. SAR – Off (P).

CAUTION

The SAR causes a severe drain on the battery life. See Figure 3-13 for estimated electrical load of switchable aircraft components.

b. If LOS, SPMA POWER – Off (P).

NOTE

See SS-47

Turning off SPMA will disable digital LOS datalink and VHF/UHF radio system. Use standard LOS mode.

c. PAYLOAD – As required (SO).

During descents through moisture, the nose camera may be unusable and the EO or IR sensor may be required for the landing.

The EO/IR cryogenic unit may be turned off if the IR sensor will not be used.

Paragraph Deleted

d. NAVIGATION AND STROBE LIGHTS – Off (P).

e. IFF TRANSPONDER – Off (P).

f. ARC-210 – Off, if not required (P).

g. PITOT HEAT – As required (P).

h. ENGINE COOLING FAN – Auto (P).

CAUTION

If the alternator has completely failed, depletion of aircraft batteries and complete loss of power will occur as shown in Figure 3-12. See Figure 3-13 for estimated electrical load of each switchable aircraft component.

When battery voltage drops below 22 volts, all electrical power may be lost. Gear must be extended before system drops below 22 volts. Attempting to lower the gear below 22 volts may be unsuccessful and may cause a complete loss of power.

Land as soon as possible with unknown or limited battery life to ensure positive aircraft control for landing.

3. ALTERNATOR – Verify enabled (P).

4. BATTERY APPLICATION TIME – Monitor (P, SO).

Start timing as soon as alternator fails and battery power is applied.

5. BATTERY VOLTAGE – Monitor (P, SO).

6. KU VIDEO RATE – Optimize for landing if required (P, SO).

   a. RL RATE SELECT – Shared 3.2 (P).

   b. ENERDYNE/VCR SOURCE – Nose or IR (SO).

   c. PILOT HUD VIDEO SOURCE – Enerdyne Video (P).

   d. SENSOR OPERATOR VIDEO SOURCE – Ku/VQ Video (SO).

   e. GCS VCR SOURCE – As required (P, SO).

REVIEW FORCED LANDING PROCEDURES (PARAGRAPH 3.6.10) AS REQUIRED.

3.5.14. M10 M15 SINGLE ALTERNATOR FAILURE

1. ELECTRICAL LOAD – Reduce (P).

   a. SAR – Off (P).

   b. If LOS, SPMA POWER – Off (P).

See SS-47

   c. PAYLOAD – As required (SO).

   d. NAVIGATION AND STROBE LIGHTS – Off (P).

2. AIRCRAFT – Land as soon as practical (P).

3.5.15. ENGINE OVERHEAT

Engine overheat may be indicated by a warning in the HDDs.

NOTE

Do not assume a bad indicator. Land as soon as practical when experiencing engine overheat indications.

Engine overheat can occur in various forms such as high Water Temp, high Oil Temp, high EGT, etc. A loss of coolant may result in high CHT, high Oil Temp, and erroneous engine Water Temp indications.

A loss of coolant could be indicated by a large difference (greater than 50 degrees) between CHT and water temperature.

1. THROTTLE – As required to attain/maintain safe altitude (P).

IF ENGINE TEMPS OTHER THAN EGT OR MCT ARE HIGH:

2. ENGINE COOLING FAN – Manual and On (P).

NOTE

Turning on the engine cooling fan may help decrease water temperature, oil temperature and CHT. It WILL NOT decrease high EGT or MCT.

Ensure the fan is turned Off as required, to avoid overcooling the engine at higher altitudes.

IF OVERHEAT PERSISTS:

3. ELECTRICAL LOAD – Reduce (P, SO).
4. AIRCRAFT – Land as soon as possible (P).

3.5.16. ENGINE FIRE

An engine fire may be detected with sensor or by the ground observer.

1. GCS IGNITION – As required (P).

   It may be necessary to shut down the engine; this turns off the fuel pumps that could be feeding the fire. However, if the aircraft is out of glide-back range, shutting down the engine could result in loss of the aircraft.

CAUTION

An engine fire may cause erroneous and intermittent readings of engine parameters. If the decision is made to turn the GCS ignition cold, the crew must confirm the status of the ignition in the HDD and not rely on engine parameters such as RPM, EGT, etc. which may not be accurate due to sensor failures caused by the fire.

2. AIRCRAFT – Land as soon as possible (P).

   If engine is shut down, refer to Engine Failure checklist, paragraph 3.5.12.

3.5.17. PROPELLER SERVO OVERHEAT/ SERVO FAILURE

Impending propeller servo failure is indicated by erratic Prop P Amps and increasing Prop Servo Temp into the red, 165 degrees, in (VIT 6). Another type of failure is frozen/intermittent propeller servo failure and is indicated by Prop P Amps staying at 0.0 Amps and Prop Svo Temp staying at 75 °C over an extended period of time during commanded power adjustments.

CAUTION

Using Power Mode to include altitude hold or preprogram could cause the propeller to freeze at a very coarse setting when the servo fails. This condition could leave the aircraft under powered and unable to maintain level flight.

With hold modes On, the propeller pitch is automatically adjusted by the system to maintain altitude. When maintaining a constant altitude and airspeed in calm air, Prop P Amps and Prop Svo Temp may not change for extended periods of time. To verify frozen/intermittent propeller servo failure, increase airspeed by 5 KIAS and monitor the Prop P Amps and Prop Svo Temp. Any adjustment must be great enough to cause a more than 50 RPM change before the prop will be commanded to move. If Prop P Amps and Prop Svo Temp remain the same after the airspeed adjustment the servo has potentially failed.

Frozen/intermittent propeller servo failure indicates an open circuit propeller pitch servo, a condition in which the propeller pitch cannot be changed. Prop Svo Temp is an algorithm of Prop P Amps over time, not an actual temperature reading. Prop Svo Temp provides trend data on the propeller amps. The Prop Svo Temp will never read below 75 °C (baseline); a reading of 75 °C is indicative of having 0.0 Amps for a period of time.

This condition may be intermittent or permanent. The servo may receive sporadic electrical power which is able to drive the propeller pitch. Depending on throttle position during these sporadic inputs, the pitch may change and freeze in an unfavorable pitch (i.e., 27°, full coarse position), leading to uncontrolled descents. In this condition the propeller pitch servo should be considered unreliable. Changes in airspeed and altitude are not recommended until the propeller pitch servo is isolated (aircraft in VPP Mode).

1. PREPROGRAM – Off (P).
2. THROTTLE – Midrange (P).
3. ALTITUDE HOLD – Off (P).

NOTE

Propeller manual controls are locked out when in preprogram or altitude hold mode.

4. PROP LEVER – Set midrange (P).
5. POWER MODE – Off (P).

   This sets propeller control to VPP mode and wastegate to 50%.

CAUTION

With Power Mode Off, pilot has to exercise extreme care to prevent engine overspeed or overboost during nose-down pitch or airspeed changes. Changing to VPP Mode at high airspeeds or nose down attitudes can result in overspeed if the propeller control lever is not set below the current propeller command.

6. PROPELLER – Set for zero amps to correct overheat, otherwise set midrange (P).

   If the propeller pitch is frozen, the servo may be driving constantly. Verify Prop P Amps on (VIT 1) reads zero. Prop P Cmd can be verified on, (VIT 1). See Figure 3-14 for VPP command versus feedback correlation.

7. THROTTLE – As required (P).

CAUTION

The propeller may fail with a negative (beta) pitch. The resulting throttle control will be inversely effective and provide beta thrust. This failure is evident with a correlation between increased descent rates with higher power settings. Consideration should be given to setting GCS Ignition – Cold, in this case to minimize drag and perform VPP Rack Bridge Bearing Failure Checklist Procedures (paragraph 3.5.17A).

See SS-47

8. EMERGENCY MISSION – Set waypoints for current altitude and airspeed, if practical (P).

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft

See S-42

Warning Deleted

   If the aircraft goes lost link, it will revert to power mode. Setting waypoints to current altitude and airspeed should minimize power setting changes, which may prevent propeller freezing in an adverse position.

9. INITIAL LOST LINK ALTITUDE – Set to current altitude, if practical (P).

WARNING

When aircraft enters emergency mission phase of lost link (After 1 sec if aircraft is within 200 feet of initial lost link altitude or higher), all hold modes are engaged, and airspeed is given priority. If current airspeed is slower than programmed emergency mission airspeed, aircraft may initially pitch down to gain airspeed. Aircraft may impact ground if at low altitude. Care must given to select initial lost link and emergency mission altitudes that account for a possible aircraft pitch down and maneuvering.

IF UNABLE TO MAINTAIN ALTITUDE:

10. WASTEGATE – Manual (P).

11. WASTEGATE MANUAL CONTROL – As required (P).

    When wastegate is set to manual, setting goes to zero%. Zero% is fully open (minimum boost), 100% is fully closed (maximum boost).

CAUTION

The pilot has to exercise extreme care to prevent engine overboost when operating with manual wastegate settings and power mode off. Any change in airspeed, altitude or power will have an immediate effect on manifold pressure and engine RPM. The pilot must monitor RPM and MAP indications closely when making airspeed, altitude or power changes to prevent engine overspeed or overboost.

NOTE

The wastegate default setting of zero may not provide adequate engine power. It may be necessary to quickly increase the wastegate setting to prevent loss of altitude.

IF VARIABLE PITCH PROPELLER FAILS TO A FIXED NEGATIVE PITCH POSITION:

12. GCS IGNITION – Cold (P).

WARNING

If the propeller moves to a negative pitch, there will be a loss of thrust, and the engine will pull the aircraft instead of pushing it. The resulting drag will manifest itself in excessive decent rates. Setting GCS Ignition to Cold will minimize drag and prolong glide capability.

NOTE

If the control shaft fails between the VPP servo and the sector gear, the propeller position data on the VITs may continue to display a positive value although the propeller may be in a negative pitch position. If engine instruments (MAP, EGT, etc.) indicate normal performance but excessive descent rates are present, the propeller may have failed to a fixed negative pitch.

3.5.17A VPP RACK BRIDGE BEARING FAILURE

A VPP rack bridge bearing failure will most likely result in an uncommanded reverse propeller pitch. If increasing the throttle directly relates to increasing descent rate and if changing the propeller pitch command while in VPP mode has no effect on engine RPM it is probable the VPP rack bridge bearing has failed. Perform the following steps if the VPP rack bridge bearing fails:

1. GCS IGNITION – Cold (P).

WARNING

If the VPP Rack Bridge Bearing fails, the propeller may move to a negative pitch and result in reverse thrust. Increase in power settings will increase the descent rates. Setting GCS Ignition to Cold will minimize drag and prolong glide capability.

NOTE

If the control shaft fails between the VPP servo and the sector gear, the propeller position data on the VITs may continue to display a positive value although the propeller may be in a negative pitch position. When the VPP fails to a fixed negative pitch position, shutting the engine off can minimize decent rates and give the pilot a more normalized decent angle. This course of action is only recommended if the propeller has failed to a negative pitch position. If the propeller failed to a positive pitch position it will still produce thrust, but probably insufficient thrust to maintain altitude.

2. GLIDE – Establish (P).

3. ALTERNATOR FAILURE / DUAL ALTERNATOR FAILURE CHECKLIST – Perform (P).

Refer to paragraph 3.5.13.

3.5.18. THROTTLE SERVO FAILURE

Throttle servo failure is indicated by a lack of response to throttle lever movement, inadequate or excessive engine power, or warning messages on the HDD.

3.5.18.1. INADEQUATE POWER

If throttle failure occurs and engine power level is inadequate for continued flight, go to Engine Failure checklist.

3.5.18.2. ADEQUATE POWER

If engine power level is adequate for continued flight, land as soon as possible.

3.5.18.3. EXCESSIVE POWER

IF ENGINE POWER LEVEL IS TOO HIGH:

1. WASTEGATE – Manual (P).

   Adjust wastegate setting for desired power.

   When wastegate is set to manual, setting goes to zero%. Zero% is fully open (minimum boost), 100% is fully closed (maximum boost).

IF ENGINE POWER IS STILL TOO HIGH:

2. PROP LEVER – Full Aft (P).

3. POWER MODE – Off (P).

This sets propeller control to VPP mode and wastegate to 50%.

CAUTION

The pilot has to exercise extreme care to prevent engine overboost when operating with manual wastegate settings and power mode off. Any change in airspeed, altitude or power will have an immediate effect on manifold pressure and engine RPM. The pilot must monitor RPM and MAP indications closely when making airspeed, altitude or power changes to prevent engine overspeed or overboost.

4. PROP LEVER – Adjust pitch as required (P).

CAUTION

Any change in airspeed, altitude or power will have an immediate effect on manifold pressure and engine RPM. The pilot must monitor RPM and MAP indications closely when making propeller pitch adjustments, airspeed or altitude changes to prevent engine overspeed or overboost.

5. AIRCRAFT – Land as soon as practical. (P).

3.5.19. TURBOCHARGER FAILURE

Turbocharger failure is indicated by excessive or inadequate MAP, or warning messages on the HDD. Refer to VIT 61 for MAP sensor readings.

1. MAP SENSORS – Verify functioning (P).

NOTE

Not all MAP sensor failures trigger an HDD warning. Erratic MAP sensor readings may be an indication of a failed MAP sensor within the normal range. If both MAP indications are erratic, the non-selected MAP may be reacting to engine performance issues caused by the selected MAP.

In no cases, including MAP1 and MAP2 failure, does software use MAP3 as a source. MAP3 data is unreliable.

IF MAP INDICATIONS ARE ERRATIC:

2. BACKUP MAP SENSOR – Select On (P).

IF SELECTED MAP READING AND ENGINE PERFORMANCE STABILIZE:

3. AIRCRAFT – Land as soon as practical (P).

IF ENGINE PERFORMANCE DOES NOT IMPROVE, CONTINUE WITH STEP 2:

4. THROTTLE – As required (P).

5. WASTEGATE – Manual, if required (P).

If additional power is required, set Wastegate Manual Control to a value above 50%, as required.

When wastegate is set to manual, setting goes to 0%. 0% is fully open (minimum boost), 100% is fully closed (maximum boost).

CAUTION

The pilot must exercise extreme care to prevent engine overboost when operating with manual wastegate settings. Any change in airspeed, altitude or power will have an immediate effect on manifold pressure. The pilot must monitor MAP indications closely when making airspeed, altitude or power changes to prevent engine overboost.

6. AIRCRAFT – Land as soon as possible (P).

If power is not adequate for RTB, prepare for Forced Landing (see paragraph 3.6.10).

NOTE

If boost is lost, engine power should improve as aircraft descends. Effects of turbocharging are greatest at high altitude.

3.5.20. FUEL SYSTEM FAILURES

3.5.20.1. FUEL TANK SELECT OVERRIDE

If a "Fuel tank – selection override" message occurs clear the warning using the follow procedures. If the message reoccurs, clear the warning and land as soon as practical. If the message reoccurs during RTB, do not attempt to clear the message.

NOTE

Verify both fuel pumps are working by checking F Pump Amps on (VIT 6). Current should be M5 0.8 to 2.6 amperes M10 M15 1.0 to 5.0 amperes.

1. AUTO FUEL TRANSFER – Off (P).

2. FUEL TANK SELECT – Match to tank in use (P).

3. WARNING – Clear (P).

4. AUTO FUEL TRANSFER – On (P).

IF A FUEL IMBALANCE HAS DEVELOPED:

5. LANDING GEAR – Down, if required for aft CG (P).

   If forward tank is selected, use chart in Figure 3-15 to determine critical forward fuel weight. If at any time the forward fuel weight falls below the critical level, the gear must be lowered and remain lowered for the remainder of the flight.

6. CONTROLLABILITY CHECK – Perform (P).

   See paragraph 3.5.5.

NOTE

This condition may cause difficulty with directional control on rollout. Use differential braking for centerline control.

3.5.20.2. AUTO FUEL TRANSFER FAILURE

Auto fuel transfer failure may be indicated by an increasing fuel level in one tank and decreasing fuel level in the other tank. The pilot must correctly identify the problem because there are two courses of action.

Open Return Solenoid

IF THE SELECTED TANK IS GOING DOWN AND THE NON-SELECTED TANK IS GOING UP:

1. AUTO FUEL TRANSFER – Off (P).

2. FUEL TANK – Manually select (P).

   Manually select tanks in accordance with fuel calibration chart as required to balance fuel. For example, if the aft tank return solenoid failed in the open position, initially select the aft tank to get back to equilibrium, and leave it selected for some time until a nose-heavy balance is achieved. Then select the forward tank for a short time to rebalance. If the forward tank return solenoid failed to open, the sequence would be reversed.

3. LANDING GEAR – Down, if required for aft CG (P).

   If forward tank is selected, use chart in Figure 3-15 to determine critical forward fuel weight. If at any time the forward fuel weight falls below the critical level, the gear must be lowered and remain lowered for the remainder of the flight.

4. CONTROLLABILITY CHECK – Perform (P).

   See paragraph 3.5.5.

   Verify controllability in landing configuration at safe altitude prior to landing.

NOTE

This condition may cause difficulty with directional control on rollout. Use differential braking for centerline control.

5. AIRCRAFT – Land as soon as possible (P).

Open Feed Solenoid

An open feed solenoid condition is indicated if the selected tank is going up and the non-selected is going down. If this condition exists:

1. AUTO FUEL TRANSFER – Off (P)

2. DECREASING TANK – Select (P).

   Select the fuel tank that has the decreasing level to slow the rate of decrease.

CAUTION

With a failed-open feed solenoid, selecting the tank that is not decreasing would create a greater fuel imbalance by drawing fuel from the decreasing tank and returning it to the other tank. Selecting the decreasing tank slows the rate of decrease. There is no way to rebalance the fuel tanks with this type of failure. Fuel in the other tank is trapped and unusable.

3. LANDING GEAR – Down if required for aft CG (P).

If forward tank is selected, use chart in Figure 3-15 to determine critical forward fuel weight. If at any time the forward fuel weight falls below the critical level, the gear must be lowered and remain lowered for the remainder of the flight.

4. CONTROLLABILITY CHECK – Perform (P).

See paragraph 3.5.5.

NOTE

This condition may cause difficulty with directional control on rollout. Use differential braking for centerline control.

5. AIRCRAFT – Land as soon as possible (P).

3.5.20A OIL SYSTEM FAILURES

Oil system malfunctions can occur in many forms. Indications include HUD "E" and associated HDD warnings, VIT values, and possible visual indications. The oil system can be monitored on VITs 1 and 61. Care should be taken to monitor the oil system closely when beyond glide back range to a landing location.

3.5.20A.1 LOW OIL TEMPERATURE

WHEN OIL TEMPERATURE DROPS BELOW 140 DEGREES:

1. THROTTLE – Increase if practical (P).

IF OIL TEMPERATURE DOES NOT RETURN TO NORMAL OR CONTINUES TO DECREASE:

2. ALTITUDE – Decrease, as required (P).

IF OIL TEMPERATURE CONTINUES TO DECREASE:

3. AIRCRAFT – Minimize maneuvering, land as soon as possible and plan for possible engine failure (P).

3.5.20A.2 HIGH OIL TEMPERATURE

IF OIL TEMPERATURE EXCEEDS 260 DEGREES:

1. THROTTLE – Decrease, as required to attain/maintain safe altitude (P).

2. AIRCRAFT – Minimize maneuvering, land as soon as possible and plan for possible engine failure (P).

IF OIL TEMPERATURE REMAINS IN THE YELLOW FOR MORE THAN 1 MINUTE:

3. ENGINE COOLING FAN – On (P).

IF OIL TEMPERATURE EXCEEDS 275 DEGREES:

4. ENGINE OVERHEAT CHECKLIST – Perform (P).

3.5.20A.3 LOW OIL LEVEL

Decreasing oil level may be an indication of oil leak (external or internal), oil consumption, or oil foaming.

WARNING

Minimize maneuvering with a low oil level condition.

Fluctuating oil pressure combined with fluctuating oil level may be an indication of a clogged oil vent line.

Oil pressure above 90 psi can cause failure of oil seals, leading to catastrophic loss of the aircraft.

Oil leaking inside the engine compartment can ignite and burn out of control resulting in the loss of the aircraft.

IF OIL LEVEL DROPS BELOW M5 70% M10 M15 60%:

1. AIRCRAFT – Attain level flight if possible (P).

IF OIL LEVEL REMAINS BELOW M5 70% M10 M15 60%:

2. AIRCRAFT – Scan for external leak (SO).

3. OIL system – Monitor (P or SO).

4. AIRCRAFT – Land as soon as practical (P).

IF OIL LEVEL DROPS BELOW M5 60% M10 M15 50% OR THERE ARE VISUAL INDICATIONS OF AN OIL LEAK:

5. AIRCRAFT – Land as soon as possible (P).

3.5.20A.4 HIGH OIL PRESSURE

WARNING

Minimize maneuvering with a high oil pressure condition.

Displayed readings as high as 100 psi for up to 1 minute are considered normal during cold weather engine starts, full power runs in cold weather and when applying power after prolonged descents. If condition does not clear after 1 minute, land as soon as practical. Oil pressure above 90 psi for extended periods of time can cause failure of oil seals, leading to catastrophic loss of the aircraft.

Oil leaking inside the engine compartment can ignite and burn out of control resulting in the loss of the aircraft.

1. AIRCRAFT – Minimize maneuvering, land as soon as possible and plan for possible engine failure (P).

3.5.20A.5 LOW OIL PRESSURE

IF OIL PRESSURE DROPS BELOW (914) 30 PSI, (914i) 28 PSI:

	Minimum	Normal	Maximum
914 engine	30 psi	40-90 psi	98 psi
914i engine	28 psi	32-90 psi	98 psi

1. POWER – Reduce if practical (P).

2. ALTITUDE – Descend if practical (P).

CAUTION

If within glide distance of a landing site, do not descend below an altitude that provides safe glide back range.

3. AIRCRAFT – Minimize maneuvering, land as soon as possible and plan for possible engine failure (P).

3.5.20A.6 OIL LEAK

Leaking oil may or may not be visible on the external skin of the aircraft. If an oil leak is suspected land as soon as possible.

WARNING

Oil leaking inside the engine compartment can ignite and burn out of control resulting in the loss of the aircraft.

1. AIRCRAFT – Minimize maneuvering, land as soon as possible and plan for possible engine failure (P).

3.5.21. DATALINK EMERGENCY PROCEDURES

3.5.21.1. TOTAL DOWNLINK FAILURE BELOW 2000 FEET AGL

Loss of downlink is indicated by frozen video and telemetry on the HUDs and associated warnings on the HDDs. However, crews should be aware that a gradual loss of downlink will cause the video to become degraded before freezing. Severe degradation may make it extremely difficult for the crew to realize that the video is frozen. In this case, it is imperative that the crew recognize the frozen telemetry and HDD warnings. Aircraft position will not update on the tracker display, and should be considered unreliable.

WARNING

Loss of downlink in the pattern or at low altitude is the most critical datalink emergency because of the hazard to personnel or equipment on the ground.

1. UPLINKS – OFF (P).

a. GDT/PGDT POWER SWITCH – Off (P).

This is the quickest way to sever the C-band uplink and is the preferred method at low altitude. The aircraft will immediately execute lost link procedures with the GDT/PGDT power switch off unless the aircraft also has a Ku uplink.

b. KU CL CONTROL – Disable (P).

If the Ku-band datalink is on, the quickest way to turn off the uplink is to disable the Ku command link via the pull down menu. This action will immediately execute lost link procedures once the uplink is terminated. Options to disable uplink are:

- Perform rack switch.
- Disable command through the pull down menus.
- Shut off LMA.
- Pull cables outside GCS.

NOTE

On FFGCS equipped with the fiber-optic interface assembly start-stop switch (mounted above the center rack power distribution panel), pressing the stop switch interrupts the data flow from the GCS to the LOS GDT, terminating the LOS link. This will cause the warning message "GDT serial interface failure" to be displayed. Turning off the GDT power circuit breaker will not interrupt the LOS datalink because the GDT is receiving power from a remote source. If the Ku link is being routed through the fiber-optic interface (not the case with remote split ops), pushing the stop button will also interrupt the Ku link. Any time the aircraft is required to be forced into lost link (LOS), press the stop button, then have Comm shut off GDT power and mute the PPSL, as required. To reestablish the datalink, press the start button and have Comm turn on GDT power and unmute the PPSL, as required.

ONCE THE AIRCRAFT IS ESTABLISHED IN THE LOST LINK PROFILE:

2. GDT UPLINK TX – Off (P).

3. GDT/PGDT POWER SWITCH – On (P).

   Turning the GDT/PGDT power switch on with the transmitters off will allow the aircraft to continue executing the lost link profile yet allow reception of downlink video and telemetry.

NOTE

On FFGCS equipped with the fiber-optic interface assembly start-stop switch (mounted above the center rack power distribution panel), pressing the stop switch interrupts the data flow from the GCS to the LOS GDT, terminating the LOS link. This will cause the warning message "GDT serial interface failure" to be displayed. Turning off the GDT power circuit breaker will not interrupt the LOS datalink because the GDT is receiving power from a remote source. If the Ku link is being routed through the fiber-optic interface (not the case with remote split ops), pushing the stop button will also interrupt the Ku link. Any time the aircraft is required to be forced into lost link (LOS), press the stop button, then have Comm shut off GDT power and mute the PPSL, as required. To reestablish the datalink, press the start button and have Comm turn on GDT power and unmute the PPSL, as required.

IF DOWNLINK RETURNS AND AIRCRAFT AT SAFE ALTITUDE:

4. GDT UPLINK TX – On (P).

IF DOWNLINK DOES NOT RETURN AND AIRCRAFT IS LIKELY TO HAVE REACHED A SAFE ALTITUDE:

5. Refer to Loss of C-Band Downlink (Above 2000 Feet AGL) checklist.

3.5.21.2. LOSS OF C-BAND DOWNLINK (ABOVE 2000 FEET AGL)

Loss of downlink is indicated by frozen video and telemetry on the HUDs and associated warnings on the HDDs. However, crews should be aware that a gradual loss of downlink will cause the video to become degraded before freezing. Severe degradation may make it extremely difficult for the crew to realize that the video is frozen. In this case, it is imperative that the crew recognize the frozen telemetry and HDD warnings. Aircraft position will not update on the tracker display, and should be considered unreliable. The steps that follow are designed to troubleshoot and regain C-band downlinks. Depending on aircraft location and conditions, it may be necessary to force aircraft into lost link profile by turning off uplink transmitters prior to beginning this checklist.

1. UPLINK – As required (P).

   a. GDT UPLINK TX– Off, as required (P).

   b. KU CL CONTROL – Disable (P).

VERIFY OR SET THE FOLLOWING COMMANDS:

2. AV TX POWER – High (P).

3. AV TX 1 AND AV TX 2 – On (P).

4. AV ANTENNA – As required (P).

5. GDT ANTENNA – As required (P).

6. GDT TRACKING – Check (P).

NOTE

If the GDT is not pointing at the aircraft, refer to the GDT Will Not Track checklist, paragraph 3.5.21.4.

IF AV TX 1 OR GDT RX 1 IS INOPERATIVE:

7. GDT RX – Select Rx 2 (P).

8. HUD VIDEO SOURCE – Transmitter 2 (P or SO).

9. AIRBORNE VIDEO MUX – Select a suitable camera (P).

IF AV TX 2 OR GDT RX 2 IS INOPERATIVE:

10. GDT RX – Select Rx 1 (P).

11. HUD VIDEO SOURCE – Transmitter 1 (P and SO).

12. AIRBORNE VIDEO MUX – Select a suitable camera (SO).

NOTE

If it is determined that the GDT/PGDT is inoperative and a second GDT or PGDT is available, have maintenance replace the inoperative GDT/PGDT with the good GDT/PGDT and recover the aircraft. If there is another operational GCS/CDCS available, consider recapturing the aircraft with the good GCS/CDCS using the gaining handover procedures. Further troubleshooting for partial downlink can be accomplished by manipulating the downlink frequencies to check for receiver failure. It is possible to check if a downlink problem may be an inoperative receiver by changing the inoperative downlink to the operative downlink frequency. If an identical picture is received on the inoperative link, the receiver is working and the lost downlink is probably due to an inoperative AV transmitter.

13. Deleted.

14. STALL PROTECT – On (P).

15. AIRSPEED HOLD – On (P).

CAUTION

During autopilot controlled level offs (with airspeed and altitude hold on), airspeed hold will not operate properly if the warning “Stall protect override” is displayed on the HUD. Pushing forward on the stick to increase the commanded airspeed will alleviate this condition. To prevent this problem during operational and emergency missions, plan the mission at least 5 knots higher than endurance speed (VIT 5). Stall protect will still function normally if AOA exceeds 4°.

16. HEADING HOLD – On (P).

17. HEADING COMMAND – Set desired heading (P).

18. ALTITUDE HOLD – As required (P).

19. EMERGENCY MISSION START POINT – Update, as required (P).

WARNING

Setting an inactive mission (magenta when deselected) as the primary Operational or Emergency mission by clicking the "Set Emergency Mission" or "Set Operational Mission" button will immediately update the entry waypoint, for that mission type, in the aircraft. This situation could potentially cause the aircraft to fly to an unintended entry waypoint should lost link occur. Editing inactive missions should be accomplished through the Waypoint Editor until the mission is sent to the aircraft.

20. GDT UPLINK TX – On (P).

IF JAMMING IS SUSPECTED:

See SS-47

21. DOWNLINK FREQUENCIES – Change (P).

CAUTION

LOS transmitters are forced on when the aircraft passes the next to last waypoint in the lost link pattern. The pilot should wait until this event occurs before attempting to link to the aircraft without a downlink.

Change the downlink frequencies and check for jamming. If being jammed, change aircraft heading.

IF UNABLE TO RESTORE LOS DOWNLINK AND KU-BAND IS AVAILABLE:

22. Refer to Ku In-flight Power-Up Checklist.

The LOS uplink must be operative in order to power up the Ku-band datalink.

IF UNABLE TO RESTORE LOS DOWNLINK AND KU-BAND IS NOT AVAILABLE:

23. GDT UPLINK TX – Off (P).

The aircraft will then perform its lost link profile and eventually glide to the ground. Notify appropriate agencies for crash recovery.

3.5.21.3. LOST C-BAND UPLINK

Complete loss of the C-band uplink is indicated by a warning in the HDDs and/or loss of signal strength. With the downlinks still operating, aircraft position may be monitored on the tracker display. Aircraft will perform lost link profile if C-band uplink is lost and there is no Ku-band datalink.

WARNING

Cycling High and Low uplink signal strengths on AV RX 1 and AV RX 2 may be an indication of an invalid C-band LOS uplink.

Even though aircraft can be controlled through Ku datalink, complete this checklist prior to attempting to land aircraft with lost C-band uplink. If C-band uplink is not regained, refer to Ku Band Landings (paragraph 3.6.10.4). C-band downlinks provide near real-time video, but the uplink commands will have the Ku-band delay and may create directional control difficulties during approach, landing, and rollout.

NOTE

Loss of video and telemetry indicates loss of downlink.

1. UPLINK SIGNAL STRENGTH – Check (P).
2. GDT TX POWER CTRL – High (P).
3. GDT UPLINK TX 1 – On (P).
4. GDT ANTENNA – As required (P).

   Check the other antenna modes (omni, wide, and narrow) to see if signal strengths improve. If aircraft is within 5 miles of the GDT, select Omni. Wide on the directional antenna has been effective out to 20 nautical miles; however, the narrow antenna is recommended beyond 10 nautical miles.

5. GDT TRACKING – Check (P).

NOTE

If the GDT is not pointing at the aircraft, use the GDT Will Not Track checklist, (paragraph 3.5.21.4).

6. GDT UPLINK TX 2 – On (P).

   If transmitter one has failed, link should be regained by switching to transmitter 2.

7. RACK SWITCH – As required (P).

NOTE

If time permits refer to PSO-1 Rack Lock-up checklist (paragraph 3.2.6).

3.5.21.4. C-BAND GDT/PGDT WILL NOT TRACK

Perform the following steps if the C-band GDT/PGDT will not track the aircraft:

1. GDT ANTENNA – As required (P).

   Select options omni, wide or narrow to receive a signal. If aircraft is within 5 nautical miles of the GDT, select Omni. Wide on the directional antenna has been effective out to 20 nautical miles, but the narrow antenna is recommended beyond 10 nautical miles.

2. GDT TRACKING MODE – Azimuth (P).

   Slew GDT to point at the aircraft by maximizing signal strengths. If GDT does not turn manually, refer to step 7 of this checklist.

IF FAILURE OCCURRED WITH GPS TRACK SELECTED:

3. GDT TRACKING SELECT – In-flight (P).

   Verify GDT antenna tracks the aircraft.

4. GDT AZIMUTH OFFSET – Verify (P).

   Adjust offset to maximize signal strength. If in-flight track is tracking the aircraft, remain in in-flight track and land as soon as practical.

IF FAILURE OCCURRED WITH IN-FLIGHT TRACK SELECTED:

5. GDT TRACKING SELECT – GPS (P).

   Verify GDT antenna tracks the aircraft.

6. GDT AZIMUTH OFFSET – Verify (P).

   Adjust offset to maximize signal strength. If GPS track is tracking the aircraft, remain in GPS track and land as soon as practical.

7. GDT DISH TENSION – Check (CC).

   If no tension on the dish, the GDT has lost power.

IF FAILURE OCCURRED IN GDT/PGDT ELEVATION:

8. GDT ELEVATION OFFSET – Off (P).

9. MANUAL ELEVATION – Set (P).

IF GDT/PGDT POWER SUPPLY HAS FAILED:

10. STARTER CART – Connected to GDT pedestal interface (CC).

    Check plugs at interface panel.

IF GDT/PGDT STILL DOES NOT TRACK:

NOTE

> If aircraft link is still maintained but the GDT/PGDT does not track, attempt to fly the aircraft straight home in the beam of the antenna if possible. Once the aircraft is within omni range, switch the GDT antenna to omni and recover the aircraft. (PGDT has only one antenna element; no switching is required.)
>
> If it is determined that the GDT/PGDT is inoperative and a second GDT/PGDT is available, have maintenance replace the inoperative GDT/PGDT with the good GDT/PGDT and recover the aircraft. If there is another operational GCS or CDCS available, consider recapturing the aircraft with the good GCS/CDCS using the GCS Handover Checklist.

11. GDT ANTENNA – Omni (P).

    If datalink is lost, select the omni antenna. Selecting the omni antenna will permit re-establishing the datalink when the aircraft returns to base while executing the emergency mission.

12. RACKS – Switch (P).

    If the GDT/PGDT is powered, but will not track, the PSO workstation may be malfunctioning. If time and conditions permit, as a last resort try different tracking types. PSO-1 Rack Lock-up checklist (paragraph 3.2.6).

3.5.21.5. LOST KU-BAND COMMAND/RETURN LINK (WITHOUT LOS LINK) – NON ENCRYPTED

(S50) **NOTE**

> Allow a minimum of 30 seconds for link to be re-established on its own. Depending on situational awareness, weather, aircraft location, and other conditions, it may be possible to wait longer, to allow time for the link to return. If return link is not re-established, refer to Lost Ku-Band Return Link Broadcast Mode Workaround – Non Encrypted/ Encrypted.

When experiencing any Ku-band datalink anomalies, contact the Ku Technician.

Lost Ku-band datalink is indicated by warnings in the HDDs. Aircraft position may be monitored on the tracker display if the return link is operable.

Lost Ku-band return link is a serious situation because the crew is unable to monitor the aircraft position. The aircraft may violate international border, fly into threat areas, or hazardous weather.

IF KU RETURN LINK IS LOST:

1. KU CL CONTROL – Disable (P).

2. COMMAND LINK – Mute (Comm).

IF Ku COMMAND LINK IS LOST:

3. RETURN LINK – Monitor (P).

FOR EITHER CONDITION:

4. CONTACT KU TECHNICIAN – (P or SO).

5. SWITCHES AND SETUP – Check (P).

   Refer to Ku In-Flight Power-Up procedure in Section II, paragraph 2.3.2.

IF LINK IS NOT REGAINED, AIRCRAFT WILL EXECUTE THE EMERGENCY MISSION. PROCEED AS FOLLOWS:

6. GDT UPLINK TX – Off (P).

7. RETURN OVERHEAD TIME – Compute (P).

8. C-BAND DOWNLINK – MONITOR (P).

   Refer to normal recovery procedure in Section II.

3.5.21.6. LOST DLOS LINK – NON ENCRYPTED

If the aircraft experiences a lost link condition while operating with DLOS datalink, it will automatically shut off the DLOS link, return to normal C-band LOS datalink operation, and execute the lost link program.

1. LINK TYPE – LOS (P).

2. Perform applicable Lost C-band Uplink checklist (paragraph 3.5.21.3).

3.5.21.7. LOST KU/DLOS LINK RECOVERY – ENCRYPTED

(S50) **NOTE**

Allow a minimum of 30 seconds for link to be re-established on its own. Depending on situational awareness, weather, aircraft location, and other conditions, it may be possible to wait longer, to allow time for the link to return. If return link is not re-established, refer to Lost Ku-Band Return Link Broadcast Mode Workaround – Non Encrypted/ Encrypted.

The use of encryption with a KU or DLOS link differs significantly than an unencrypted KU or DLOS link primarily due to synchronization. Any time the encrypted link is lost and equipment failure is not suspected, the best course of action is to allow the link to re-establish itself. This requires the least amount of action by the crew and greatly decreases the likelihood of misapplication of correction procedures. However, if the link is not regained after one complete SPMA reset cycle, the following procedure should be attempted.

CAUTION

In no case should the KU CL Control be disabled when operating with an encrypted Ku command link. Failure to mute an encrypted command link at the PPSL may result in the inability of the aircraft to properly execute its lost link mission and may prevent the pilot from reestablishing a Ku datalink with the aircraft. However, if the Ku datalink is operating with only its return link encrypted, the pilot may send the aircraft lost link by disabling the KU CL Control.

NOTE

Regaining an encrypted link should always be attempted in the encrypted mode. It is not possible to regain link in a clear Ku or DLOS link mode with an aircraft that lost link while in encrypted mode.

IF KU COMMAND LINK IS LOST:

1. RETURN LINK – Monitor through one SPMA reset (P).

IF KU RETURN LINK IS LOST:

2. COMMAND LINK – Mute (Comm).

AFTER 1 COMPLETE SPMA RESET AND KU RETURN NOT ESTABLISHED:

3. LMA – Off (SO or Comm).

NOTE

Ensure that power remain Off for at least 10 seconds to facilitate the reset. There are memory banks within the LMA that must completely reset to ensure proper synchronization of the encryption upon reset.

WAIT 10 SECONDS MINIMUM:

4. LMA – On (SO or Comm).

5. LMA ENCRYPTION KEYS – Load (SO or Comm).

NOTE

It is not possible to regain link unless the identical set of keys in use at time of lost link are reloaded.

WHEN THE LMA OFFLINE WARNING CLEARS:

6. KEY SELECT – Apply (P).

WAIT 10 SECONDS MINIMUM:

7. RL RATE SELECT – Apply (P).

NOTE

The identical set of keys in use prior to lost link condition should not be changed until a command link is regained.

WHEN A KU LOST RETURN LINK WARNING CLEARS:

8. COMMAND LINK – Unmute (Comm).

(S50) 3.5.21.7A. (v103.8.14) LOST KU-BAND RETURN LINK BROADCAST MODE WORKAROUND – NON ENCRYPTED/ ENCRYPTED

Software version 103.8.14 contains an anomaly that may cause inadvertent entry into broadcast mode. There are no warning messages or displays to alert the crew that the aircraft has entered broadcast mode. However, if the aircraft is operating in broadcast mode, the return link will be lost. To exit this mode, a valid Ku command link must be received by the aircraft or the RF must be re-applied in the “Ku RF Configuration” window while in C-band datalink. The following procedures will re-establish return link to an aircraft if it is in braoadcast mode, by attempting to send valid Ku commands to the aircraft. Once the aircraft receives a valid Ku command, it will exit broadcast mode, and return link will be re-established.

When experiencing any Ku-band datalink anomalies, contact the Ku technician.

Lost Ku-band return link is a serious situation because the crew is unable to monitor the aircraft, and without return link, the crew will initially be uncertain as to whether command link has been maintained. It is critical for the crew to evaluate aircraft location and conditions when deciding whether or not to terminate command link. Factors to consider include but are not limited to autopilot protection features engaged at time of loss of return link, weather, terrain, other aircraft, and airspace restrictions. Use all tools available to assess aircraft status. If able, wait a minimum of 30 seconds to see if Ku return link is re-established prior to accomplishing this checklist.

If aircraft status is uncertain or if conditions do not permit maintaining command link without a return link, then the crew should immediately mute or disable the command link. When terminating command link, two options are generally available to the crew: disabling command link on the tracker display or muting the command link at the Ku SATCOM terminal. If operating in encrypted command link mode, do not disable command link. When operating with an encrypted command link, the aircrew should only use muting of the Ku SATCOM terminal to terminate command link.

NOTE

Broadcast mode does not impact C-band operations.

If at any time during this procedure, uncertainty arises as to the aircraft status or the safety of maintaining a command link without a return link, then immediately mute or disable the command link to force the aircraft to execute the emergency mission profile.

IF RETURN LINK IS RE-ESTABLISHED AT ANY POINT DURING THIS PROCEDURE, CHECKLIST COMPLETE.

IF KU RETURN LINK IS LOST:

1. KU CL CONTROL – Set (P, Comm).

    a. NON ENCRYPTED – Disable (P).

    b. ENCRYPTED – Mute (Comm).

2. TIME-HACK – As required (P or SO).

    Hack a clock when command link is terminated to time SPMA reset and to provide a means to estimate aircraft location throughout the emergency mission profile.

3. SWITCHES AND SETUP – Check (P).

REFER TO KU INFLIGHT POWER-UP PROCEDURE IN SECTION 2.

4. PREPROGRAM MODE – Off, as required (P).

NOTE:

If preprogram mode is on when command link is re-established, the aircraft will return to preprogram mission.

5. AIRSPEED HOLD – Set to safe airspeed (P).

6. ALTITUDE HOLD – Set to safe altitude (P).

7. HEADING HOLD – As required (P).

AFTER SPMA RESET:

NOTE

About three and a half minutes after the aircraft enters the lost link profile, the SPMA will reset. The SPMA can take up to three minutes to reset.

8. KU CL CONTROL – Set (P, Comm).

    a. NON ENCRYPTED – Enable (P).

b. ENCRYPTED – Unmute (Comm).

WARNING

Maintaining command link without a return link is a serious situation. Ensure sufficient situational awareness and continuously monitor aircraft performance through all means available. If aircraft position or continued safety of commanding the aircraft without return link is in doubt, immediately mute or disable command link as required. If at any time during troubleshooting, uncertainty arises as to the aircraft status or the safety of maintaining a command link without a return link, then immediately mute or disable the command link to force the aircraft to execute the emergency mission profile.

9. TIME HACK – Start (P or SO).

NOTE

Allow a minimum of 30 seconds for return link to be re-established. Depending on situational awareness, weather, aircraft location, and other conditions, it may be possible to wait longer to allow time for the link to return.

IF KU RETURN LINK IS RE-ESTABLISHED:

10. ENERDYNE ENCODER – Reset, as required (SO).

IF KU RETURN LINK IS NOT RE-ESTABLISHED, AND AIRCRAFT IS WITHIN LOS RANGE

11. DATALINK TYPE – LOS (P).

12. KU CL CONTROL – Set (P, Comm).

    a. NON ENCRYPTED – Enable (P).

    b. ENCRYPTED – Unmute (Comm).

13. RF – Apply (P).

NOTE

Once RF is re-applied while in datalink type LOS, the aircraft should exit broadcast mode, and return link should be re-established.

IF KU RETURN LINK IS NOT RE-ESTABLISHED AND AIRCRAFT IS NOT WITHIN LOS RANGE:

14. REFER TO THE LOST KU-BAND COMMAND/RETURN LINK (WITHOUT LOS LINK) – NON ENCRYPTED OR LOST KU/DLOS LINK RECOVERY – ENCRYPTED CHECKLIST – as required (P).

3.5.21.8. ROVER LOST LINK

1. Perform normal ROVER Power-down checklist.

   Refer to paragraph 2.5.9.

CAUTION

It is not possible to establish a C-band downlink, if Tx 1 Digital Downlink and/or Tx 2 Digital Downlink are On in the recovering GCS/CDCS.

(S47) 3.5.21.9 (v103.8.12) LOSS OF POSITIVE KU CONTROL WITH NORMAL KU CONTROL INDICATIONS

During Ku operations, if the aircraft becomes unresponsive to the Ku command link and has not executed lost link profile following an AN/AAS-52 reset or change in video mux settings, check for the following indications:

- AV TX1 PWR and TX2 PWR greater than 50% (VIT 52).
- Signal strength present on uplink SIG 1 and/or UPLINK SIG 2.
- AV RX1 FREQ and AV RX2 FREQ not toggling every 10 seconds (VIT 52).
- DN SAWTOOTH not incrementing (VIT 58).

1. LRE – Recover aircraft (P).
   Immediately direct LRE to attempt LOS recovery.
2. KU-BAND SATCOM DATALINK – Maintain (P).
3. AIRBORNE VIDEO MUX TX1 AND TX2 – A Nose Camera (P, SO).

PERFORM MCE TO LRE HANDOVER PROCEDURES.

3.6. LANDING EMERGENCIES

3.6.1. GEAR WILL NOT EXTEND

The exact position and condition of the gear must be determined by the crew using the sensors before any troubleshooting on the gear is attempted.

Perform the following steps after verifying the landing gear have failed to extend:

1. GEAR – Command down (P).

   Reset the landing gear switch on the throttle and command gear down.

2. LANDING GEAR COMMAND – Verify down (P).

CAUTION

If step 1 does not extend gear, verify the landing gear are commanded down. Use the information in the aircraft status area to determine which gear command is in the aircraft. The status area will show failed if activation of the landing gear system has violated software safety features. This failure indication may take up to 1 minute to appear.

3. CRITICAL SWITCHES MENU – Select gear down, as required (P).

   Attempt to lower the gear using the button in the Critical Switches Menu.

4. GEAR – Bump down (P).

   If previous steps have not lowered the gear, use bump menu to bump down all three landing gear.

CAUTION

Bumping each main gear at least once will activate each brake. Bumping the nose gear once will activate nosewheel steering.

IF UNABLE TO LOWER THE GEAR:

5. AIRCRAFT – Land as soon as practical (P).

6. Refer to the Landing With All Gear Retracted, Landing With Nose Gear Retracted, Landing With One Main Gear Retracted, or Landing With Both Main Gear Retracted procedures (paragraphs 3.6.2 through 3.6.5), as applicable.

3.6.2. LANDING WITH ALL GEAR RETRACTED

Perform the following steps to land the aircraft if all landing gear fails to extend:

1. SENSOR – Hold 90° from aircraft heading to minimize damage (SO).

2. AIRCRAFT – Land normally (P).

   Aircraft should touchdown on the tails first, then gradually lower the nose to the runway. Land with a minimum amount of fuel to reduce possibility of a fire.

3. GCS IGNITION – Cold (P).

3.6.3. LANDING WITH NOSE GEAR RETRACTED

Perform the following steps to land the aircraft if the nose landing gear fails to extend:

1. SENSOR – Hold 90° from aircraft heading to minimize damage (SO).
2. AIRCRAFT – Land normally (P).

ON ROLL OUT:

3. NOSE – Hold off, as long as practical (P).

   As airspeed decreases through 30 knots, fly the nose to the runway to minimize EO/IR sensor damage. Maintain back pressure to minimize weight on the nose of the aircraft as the aircraft comes to a complete stop.

4. BRAKES – Minimize use (P).

   Use brakes only as necessary to maintain aircraft heading.

5. GCS IGNITION – Cold (P).

3.6.4. LANDING WITH ONE MAIN GEAR RETRACTED

Plan to land the aircraft on the side of the runway that coincides with the extended main gear. If practical, land with any crosswind on the side of the aircraft with the extended landing gear. The aircraft will tend to pull in the direction of the side of the aircraft with the retracted main gear as the aircraft settles on its side.

NOTE

Consider increasing brake preset up to maximum on operational brake.

ON ROLL OUT:

1. GCS IGNITION – Cold (P).

   Shut down the engine on touchdown to minimize damage to engine components.

2. AILERON – Hold wing tip off ground (P).

   Use the aileron to hold the wingtip off the ground as long as possible.

3. BRAKES – Apply for directional control (P).

   Use a combination of flight controls, nosewheel steering (if available), and braking to maintain runway alignment.

3.6.5. LANDING WITH BOTH MAIN GEAR RETRACTED

1. NOSE GEAR – Extend (P).

   Land with the nose gear extended to protect the sensor.

2. LAND – Tails first (P).

CAUTION

Avoid landing on the nose gear first. Landing on the nose gear may result in "porpoising" the aircraft, loss of control, and severe aircraft damage.

IMMEDIATELY FOLLOWING TOUCHDOWN:

3. GCS IGNITION – Cold (P).

   Shutdown the engine immediately on touchdown to minimize internal damage upon impact. After touchdown, attempt to maintain runway alignment using nosewheel steering and the flight controls.

3.6.6. LANDING WITH A FLAT TIRE

IF NOSE GEAR TIRE IS FLAT:

Land in the center of the runway and hold the nosewheel off the ground as long as possible. Allow the aircraft to come to a complete stop. Using brakes only as necessary to maintain aircraft control and stop on the remaining runway. Accomplish a normal engine shutdown and have the aircraft towed to parking.

IF A MAIN GEAR TIRE IS FLAT:

Land on the side of the runway corresponding to the good main tire. If practical, land with any crosswind on the side of the aircraft with the good main tire. The aircraft will tend to pull in the direction of the side of the aircraft with the flat tire as the main gear touchdown. Maintain directional control with differential braking and nosewheel steering. Stop the aircraft, accomplish a normal engine shutdown, and have the aircraft towed to parking.

NOTE

Consider increasing brake preset up to maximum on operational brake.

3.6.7. LANDING WITH INOPERATIVE NOSEWHEEL STEERING

Prior to landing, the pilot should verify nosewheel steering is inoperative by moving the rudder pedals left and right while the sensor views the nosewheel.

Land normal. Differential braking should be adequate to maintain runway alignment; however, expect slower reaction to control inputs. Stop the aircraft straight ahead on the runway, accomplish a normal engine shutdown, and have the aircraft towed to parking.

3.6.8. LANDING WITH BRAKE FAILURE

While airborne, brake failures can be confirmed on VIT 53 by comparing the left and right brake feedback and brake amperes.

IF INOPERATIVE BRAKES (BOTH) ARE SUSPECTED:

Consider removing all runway cables and ensure the entire runway is usable. Reduce power to idle at touchdown. Shutdown the engine and use nosewheel steering to avoid any obstacles as the aircraft rolls to a complete stop. Have the aircraft towed to parking.

IF ONE INOPERATIVE BRAKE IS SUSPECTED:

Consider removing all runway cables and ensure the entire runway is usable. Reduce throttle to idle at touchdown. Use a combination of nosewheel steering and the good brake to maintain directional control. When stopped, shutdown the engine and have the aircraft towed to parking.

3.6.9. RUDDER PEDAL LINKAGE FAILURE

IF THE FAILURE IS KNOWN PRIOR TO LANDING:

Refer to the PSO 1 Rack Lock-up, paragraph 3.2.6, and land from the operating rack position.

IF THE FAILURE OCCURS ON ROLL OUT:

The amount of brake and/or rudder authority available after a failure will depend on the nature and location of the break. The most common effect of a rudder linkage failure is that the pedals will move forward several inches and rudder/brake authority will be limited. Adequate nosewheel steering and braking authority should be available to maintain runway alignment.

IF THE FAILURE OCCURS DURING TAXI:

1. GCS IGNITION – Cold (P).
2. PARKING BRAKE – On (P).

3.6.10. FORCED LANDING

The decision to force land at an airfield or unpopulated area rests with the pilot. Refer to Engine Failure or Alternator Failure procedures, paragraph 3.5.12 and 3.5.13. Considerations for attempting a forced landing include:

- Nature of the emergency.
- Weather conditions.
- Lighting conditions (day or night).
- Battery life.
- Proximity of a suitable landing runway.
- Type of datalink in use – Ku-band or line of sight.

WARNING

When landing off the airfield, prioritize actions to minimize collateral damage, injury, and/or loss of life.

3.6.10.1. GENERAL CONSIDERATIONS

To perform a forced landing, establish the best glide (maximum range) airspeed, and turn immediately toward the desired runway (landing area). If range to the desired runway or battery life is critical, the decision to continue rests with the pilot. The maximum glide range of the aircraft is shown in Figure 3-5 thru 3-9. Flying into a headwind significantly decreases glide range.

Battery life management is key to a successful forced landing. Closely monitor battery life to ensure sufficient power is available to operate the landing gear, transmitters, and flight controls for landing. It may be necessary to increase airspeed (which could shorten glide range) to reduce the time required to complete a forced landing. Turning the nose lens heat to 30% should be considered before entering clouds or icing, to ensure continuous nose camera visibility. **M15** The IR nose camera defrost fan should also be turned on.

CAUTION

It is possible for the actual nose camera lens inside the fuselage to fog during descent. Fogging of the actual nose camera lens cannot be prevented with the use of nose lens heat. The sensors may be required for landing; however, a rapid descent from cold air to warm moist air may also fog the interior of the sensor ball windows.

3.6.10.2. BATTERY DURATION

In case of engine failure and air starts are unsuccessful, or alternator failure, aircraft control is dependent on available battery power. Battery duration varies with the current load and the internal temperature of the batteries. Figure 3-12 provides estimated battery duration at various temperatures and current loads. To use the chart, read Bat 1 Temp and Bat 2 Temp from VIT 6 on the head-down display, and System Amp from VIT 1. Enter the vertical axis from the left at the appropriate System Amp level, and proceed to the right to intersect the appropriate temperature curve. Then proceed downward to read battery duration.

Figure 3-13 provides electrical current usage of various aircraft components that can be controlled by the flight crew. This information can be used to determine the expected effect of shutting off each component if it is necessary to reduce electrical load.

NOTE

If the alternator is functional, windmilling RPM above 1600 will provide electrical power to the system.

3.6.10.3. UNPREPARED SURFACES

When a forced landing must be made on an unprepared surface, select a suitable area as soon as possible to allow maximum time to plan and execute the procedure. The Data Exploitation operator should be tasked to locate a potential landing area, provide the pilot heading, and distance to the landing area. A suitable landing site is one that is unpopulated and would limit aircraft and collateral damage. Select an area that is free from structures and towers. If landing in a cultivated field, attempt to land parallel to the furrows, unless the wind precludes this option. In wooded areas, it may be necessary to use the sensors to scan for a clearing, (this could reduce battery life). Select possible emergency landing sites during mission planning for the target areas to be flown. The pilot should maneuver the aircraft into the wind and plan for a touchdown in the first third of the landing area.

3.6.10.4. KU-BAND LANDINGS

Forced landings outside of LOS datalink coverage will require use of the Ku-band datalink. Using Pilot video compression mode will decrease the video refresh time and provide the pilot higher quality video feedback. In-flight planning for a Ku-band landing is critical for success. Battery life, aircraft control, and flight performance feedback will be degraded. A final approach of at least one nautical mile will help with aircraft line-up and landing. Lag from joystick input to feedback may adversely affect the pilot's ability to satisfactorily complete a Ku-band forced landing. Pilot should attempt to minimize flight control inputs to avoid pilot-induced oscillations. Primary concern in a Ku-band forced landing is to select a landing site and a flight path to the site that avoids populated areas and allows completion of the procedure through landing without endangering personnel or property.

CAUTION

In Ku-band datalink operation, rapid heading changes and abrupt roll and pitch reversals exceeding the limits below will probably cause the aircraft to lose the datalink. Use smooth control inputs while maneuvering to land to prevent a lost link condition. The Ku-band air data transmitter aircraft attitude limits (VIT 63) are as follows:

- Heading change ±1° per second
- Roll rate ±15° per second
- Roll angle ±20°.
- Pitch rate ±2° per second
- Pitch angle ±10°.

TO OPTIMIZE KU VIDEO FOR LANDING:

a. RL RATE SELECT – Shared (P).

b. ENERDYNE/VCR SOURCE – Nose or IR (SO).

c. PILOT HUD VIDEO SOURCE – Enerdyne video (P).

d. SENSOR OPERATOR VIDEO SOURCE – Ku/VQ video (SO).

NOTE

Best glide speed is approximately 2° AOA with flaps neutral.

3.6.10.5. FORCED LANDING PATTERNS

There are two basic types of forced landing patterns: The overhead approach (Figure 3-10) and the straight-in approach (Figure 3-11). The overhead approach is preferred as it affords the most opportunities to properly manage available energy, while providing the best position for pattern corrections. The aircraft may enter the overhead approach at any pattern position, provided the aircraft achieves the proper altitude for the point in the pattern. The main concern is to reach high key, low key, or base key as close to the recommended altitudes as possible. A straight-in approach is an alternative when the aircraft cannot achieve overhead approach parameters. The straight-in approach gives the pilot better visibility of the landing runway, but can put the aircraft in a position where it cannot reach the runway with the prevailing conditions. If landing in Ku, a straight-in approach requires less maneuvering and allows the pilot to better assess control response. For both approaches, the initial aim point should be one-third of the way down the landing surface. Once landing is assured, shift the aim point to the approach end of the landing area and closely monitor descent rate and airspeed. Misjudgment of the final approach and actual touchdown beyond the one-third point may not ensure sufficient landing area for a safe landing rollout.

CAUTION

Lowering landing gear too early may prevent a satisfactory flight path to the point of intended landing.

Once the landing gear is lowered, battery life may preclude another full landing gear cycle prior to a successful touchdown.

EO/IR sensors can help with orientation during a forced landing but will significantly reduce battery life.

If the sensor ball or IR cryogenic cooler is off and turned on prior to landing, allow sufficient time for the IR sensor to cool prior to use.

NOTE

Approach airspeed is gross weight dependent.

Maximum range airspeed (landing gear up or down) is gross weight dependent.

Optimum bank angles are 12 to 20 degrees.

3.6.10.6. OVERHEAD APPROACH (TYPICAL)

Plan to arrive over the landing area (High Key) at 1800 to 2000 feet AGL (Figure 3-10). The aircraft may approach the high key position from any direction. The recommended key altitudes are based on flying a 360-degree descending turn from the high key with landing gear down. Pattern altitudes vary with gross weight and additional drag created by a windmilling propeller. Recommended high key altitudes are 1800 to 2000 feet, plus 200 feet if the propeller is windmilling. Recommended low key altitude is 1000 to 1200 feet, plus 150 feet if propeller is windmilling. Base key altitudes are 600 to 800 feet, plus 100 feet if propeller is windmilling. Maintaining proper landing area orientation is essential to a successful forced landing. Using 12 to 20 degrees of bank is desired for pattern alignment. If the aircraft will arrive at high key with significantly higher altitude than desired, accomplish shallow S-turns or 360-degree descending turns to achieve the appropriate entry altitude.

3.6.10.7. STRAIGHT-IN APPROACH (TYPICAL)

If the aircraft cannot achieve the overhead approach key positions, fly a straight-in approach (Figure 3-11). Maintain a clean aircraft configuration glide at maximum range airspeed until reaching a point 1 nautical miles and 600 feet AGL, then lower the landing gear. A good reference is a no wind glide of 600 feet per nautical mile (propeller stopped), or 800 feet per nautical mile (propeller windmilling) to the reference aim point of 1/3 down the landing surface. Once the landing surface is assured, shift the aim point to the approach end and closely monitor descent rate and airspeed.

3.6.10.8. USE OF CRITICAL FORWARD FUEL WEIGHT CHART

The chart in Figure 3-15 is used to determine if a critical CG condition exists. Correct use of the chart depends on the condition when aircraft was CG'd for flight. The aircraft is normally CG'd in only two conditions: no glycol or ½-tank glycol.

- If the aircraft is not flying a de-ice mission, it will be CG'd with the glycol tank empty.
- If the aircraft is being prepared for a mission into suspected icing conditions, it will be CG'd with the glycol tank ½ full. When the tank is filled prior to the mission, it will create a slightly tail heavy condition until the glycol is expended. As glycol is expended, the CG moves forward through a neutral condition when ½ the glycol is used, then to a slightly nose heavy condition when the glycol tank is empty.

Use the chart as follows:

1. Enter chart at baseline with current aircraft weight.
2. Follow slope lines diagonally up and to the left until intersecting horizontal line at current glycol weight. If no glycol was in the aircraft when it was CG'd for flight, use 34-pound glycol weight line.
3. Proceed vertically into upper chart to appropriate rear fuel take quantity diagonal line.
4. Proceed horizontally to left edge and read critical forward fuel weight.
5. If actual forward fuel weight is greater than the calculated critical forward fuel weight, no CG problem exists.
6. If actual forward fuel weight is less than the calculated critical forward fuel weight, a CG problem exists.

   a. GEAR – Down

      Lowering gear moves CG forward to compensate for critical tail-heavy condition. Gear must remain down as long as forward fuel weight is below critical.

   b. If imbalance was caused by manual selection of forward fuel tank, manually select aft fuel tank to correct imbalance.

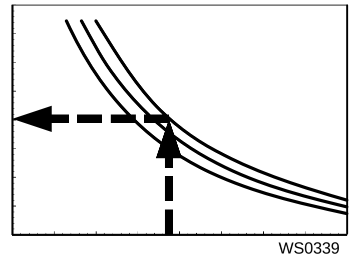
   c. Perform Fuel Tank Selection Override or Auto Fuel Transfer Failure checklist, as applicable.

   d. Land as soon as practical.

MODEL: MQ-1B
914 ENGINE

DATE: SEPTEMBER 1998
DATA BASIS: FLIGHT TEST

M5 ANGLE OF ATTACK AIRSPEED



CONDITIONS:

Standard Day
Flaps Neutral (0°)
Dual Airspeed Failure

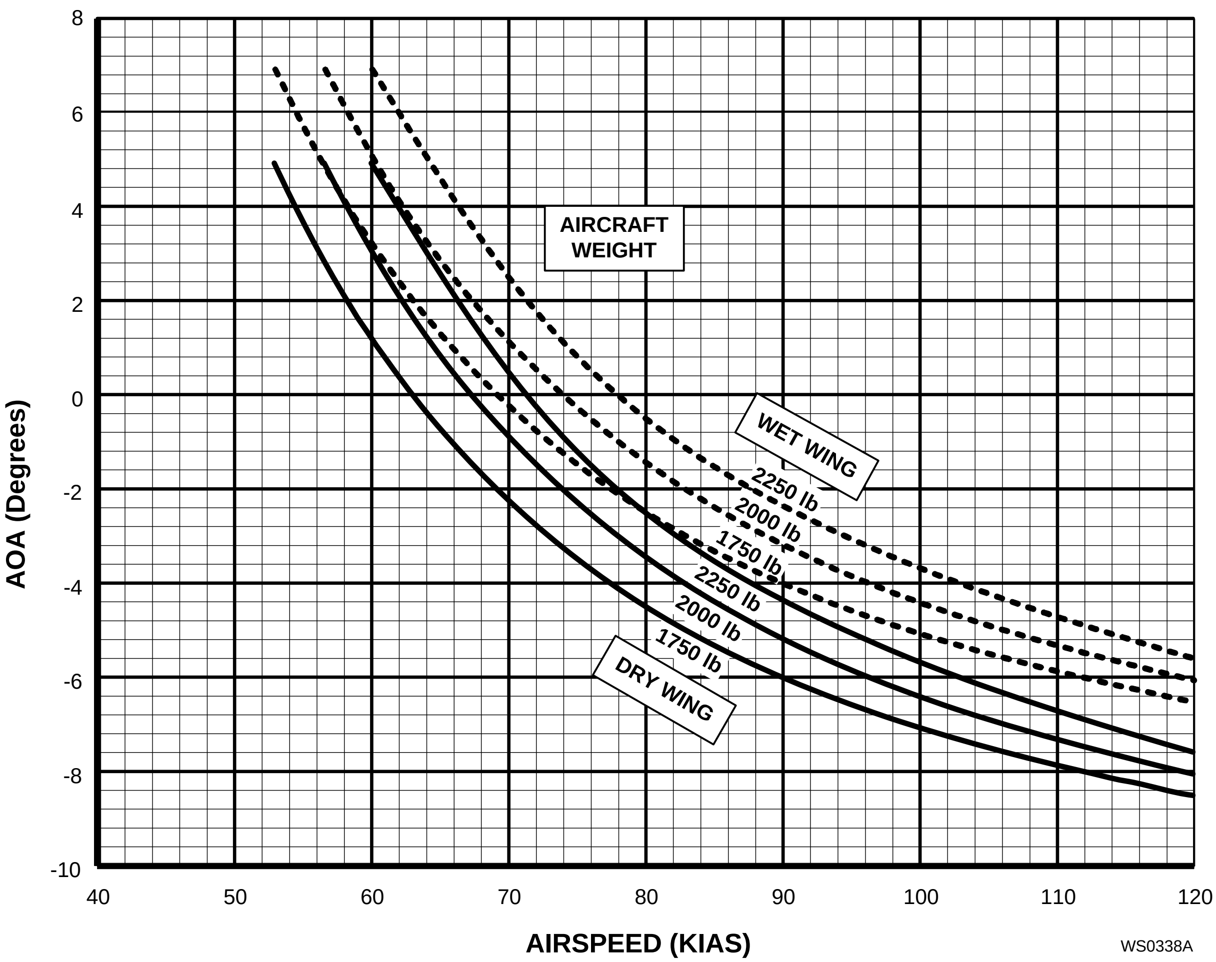


Figure 3-4

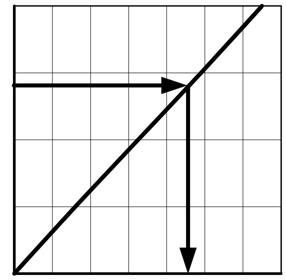
USE OF CHART:

1. Verify dual airspeed failure condition.
2. Determine appropriate airspeed for applicable phase of flight from charts in Appendix A.
3. Enter the chart with the desired airspeed.
4. Proceed up to the appropriate weight line.
5. Proceed across to read the AOA.

MODEL: MQ-1B
914 ENGINE

DATE: OCTOBER 2003
DATA BASIS: FLIGHT TEST

M5 ENGINE OUT GLIDE RANGE – DRY WING WITHOUT PYLONS



STANDARD DAY CONDITIONS.
BEST GLIDE AIRSPEED.
NO WIND.
ENGINE STOPPED.

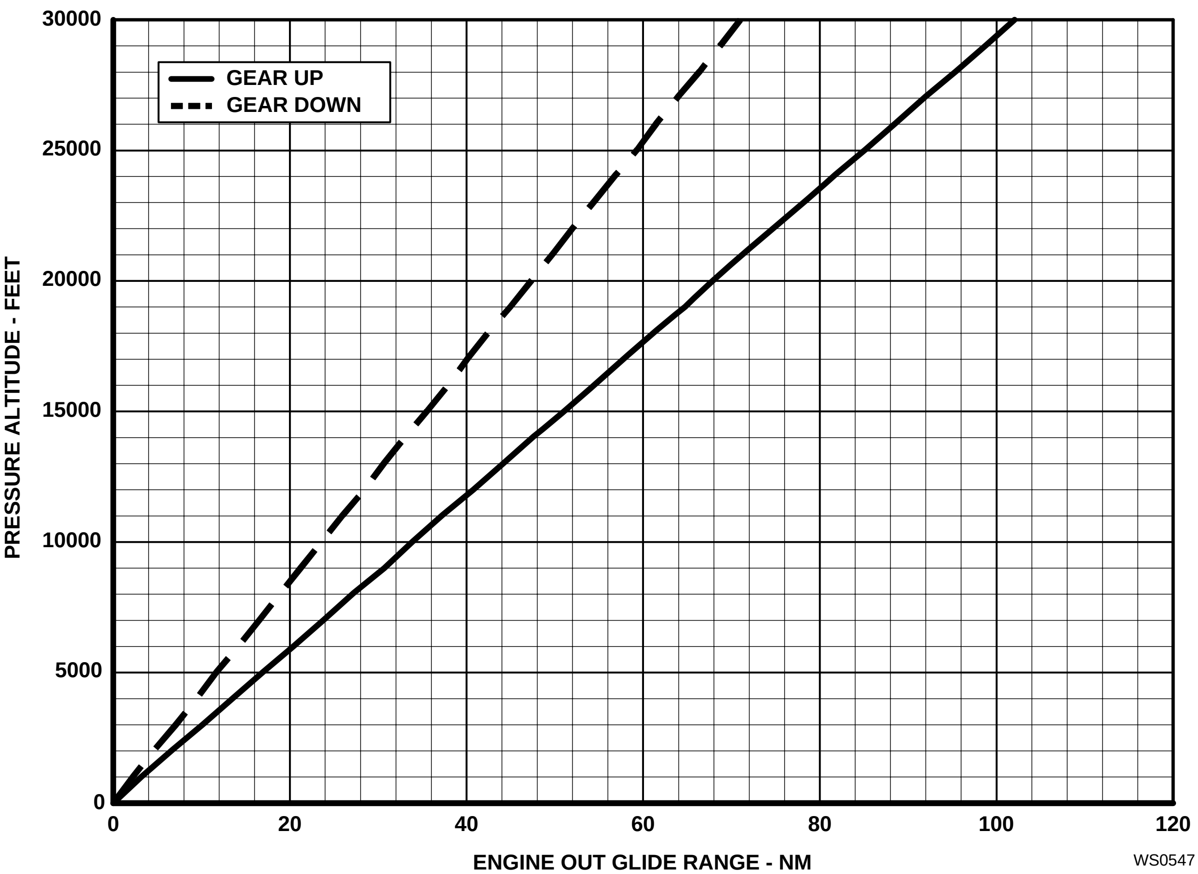
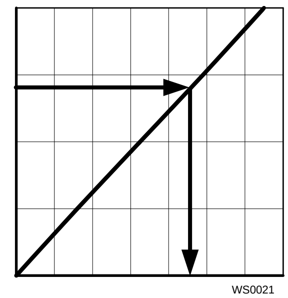


Figure 3-5

MODEL: MQ-1B
914 ENGINE

DATE: OCTOBER 2003
DATA BASIS: FLIGHT TEST

M5 ENGINE OUT GLIDE RANGE – WET WING



STANDARD DAY CONDITIONS.
BEST GLIDE AIRSPEED.
NO WIND.
ENGINE STOPPED.

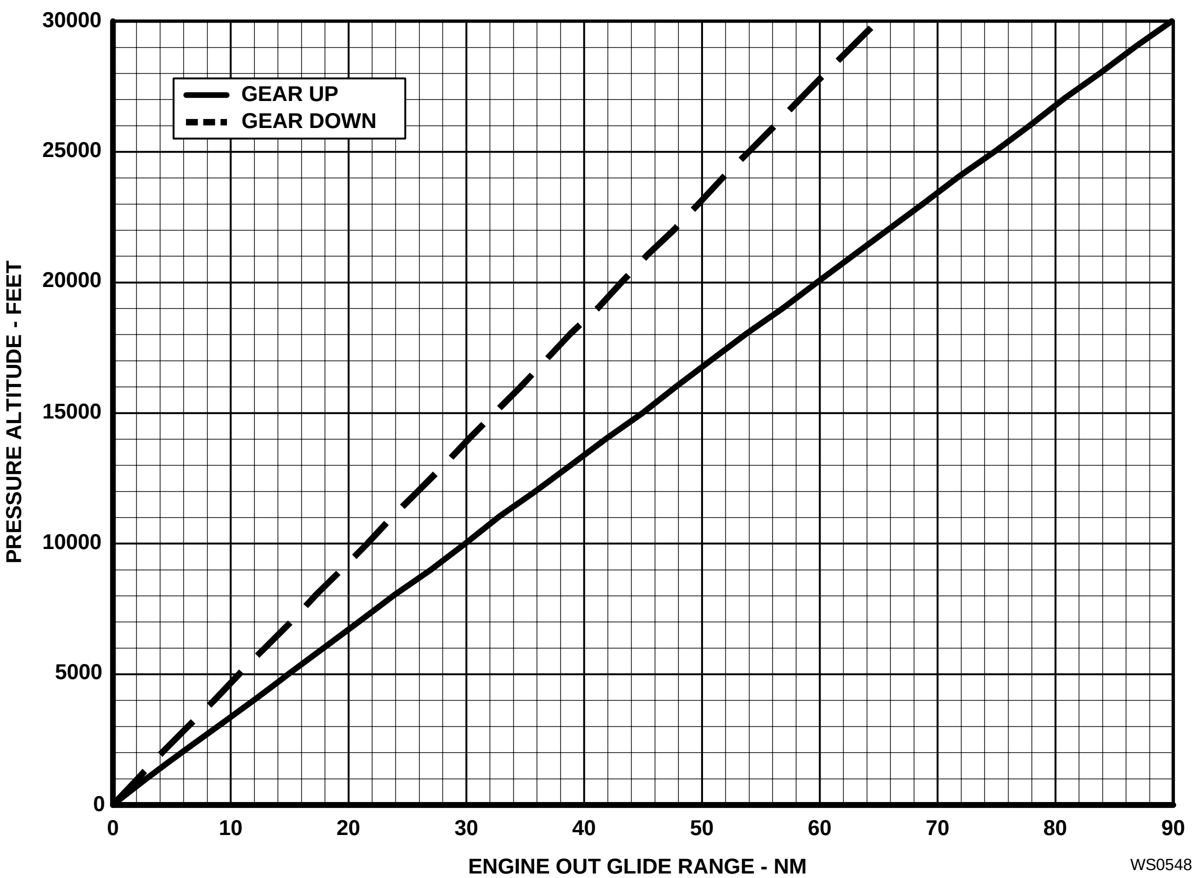
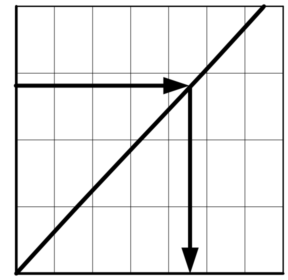


Figure 3-6

MODEL: MQ-1B
914 ENGINE

DATE: OCTOBER 2003
DATA BASIS: FLIGHT TEST

M5 ENGINE OUT GLIDE RANGE – WITH WEAPONS / PYLONS



STANDARD DAY CONDITIONS.
BEST GLIDE AIRSPEED.
NO WIND.
ENGINE STOPPED.
WINGS WITH WEAPON PYLONS.
WITH OR WITHOUT WEAPONS.

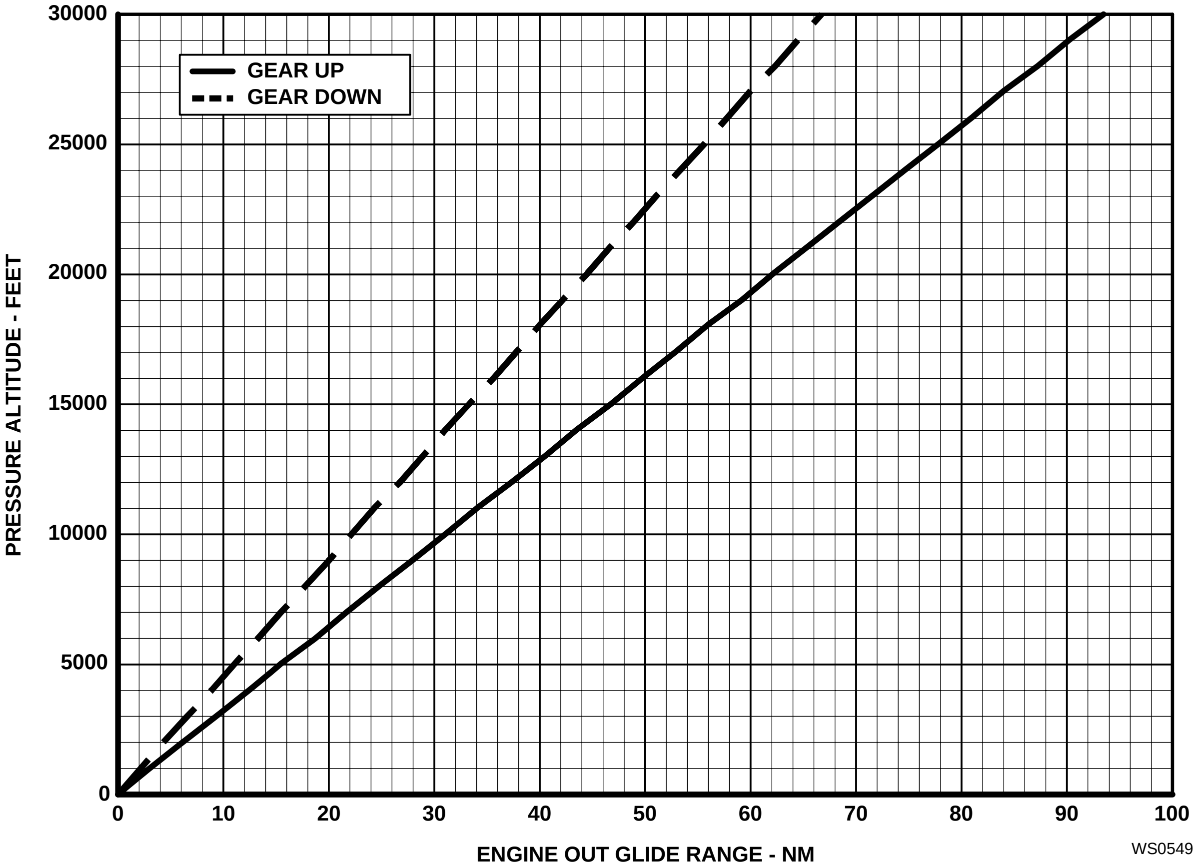
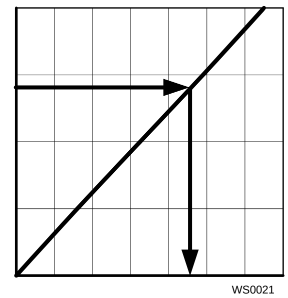


Figure 3-7

MODEL: MQ-1B
914i ENGINE

DATE: OCTOBER 2003
DATA BASIS: FLIGHT TEST

M10 M15 ENGINE OUT GLIDE RANGE – DRY WING WITH WEAPONS PYLONS



STANDARD DAY CONDITIONS.
BEST GLIDE AIRSPEED.
NO WIND.
ENGINE STOPPED.

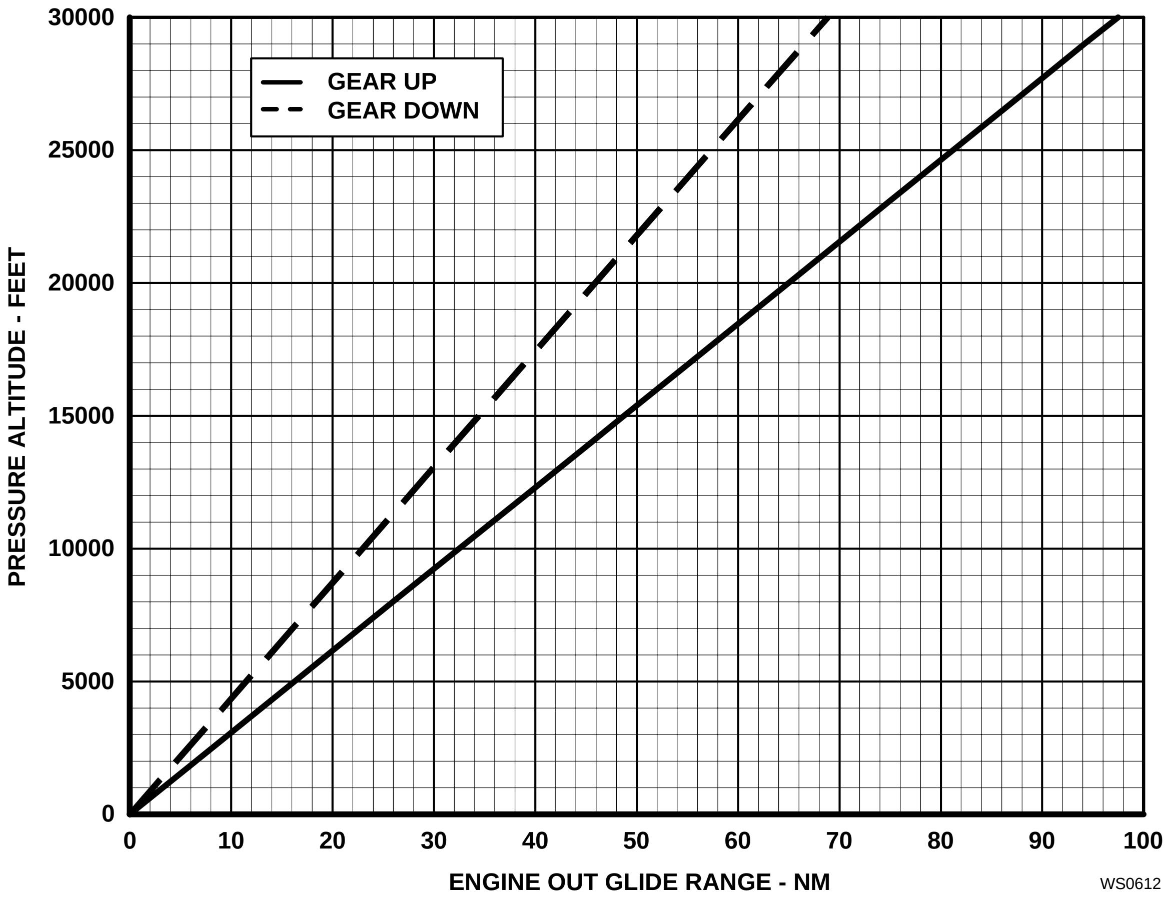
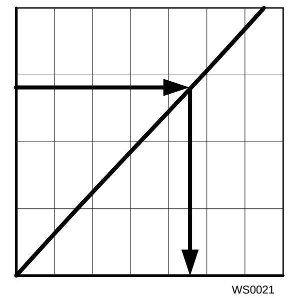


Figure 3-8

MODEL: MQ-1B
914i ENGINE

DATE: OCTOBER 2003
DATA BASIS: FLIGHT TEST

M10 M15 ENGINE OUT GLIDE RANGE – WET WING



STANDARD DAY CONDITIONS.
BEST GLIDE AIRSPEED.
NO WIND.
ENGINE STOPPED.

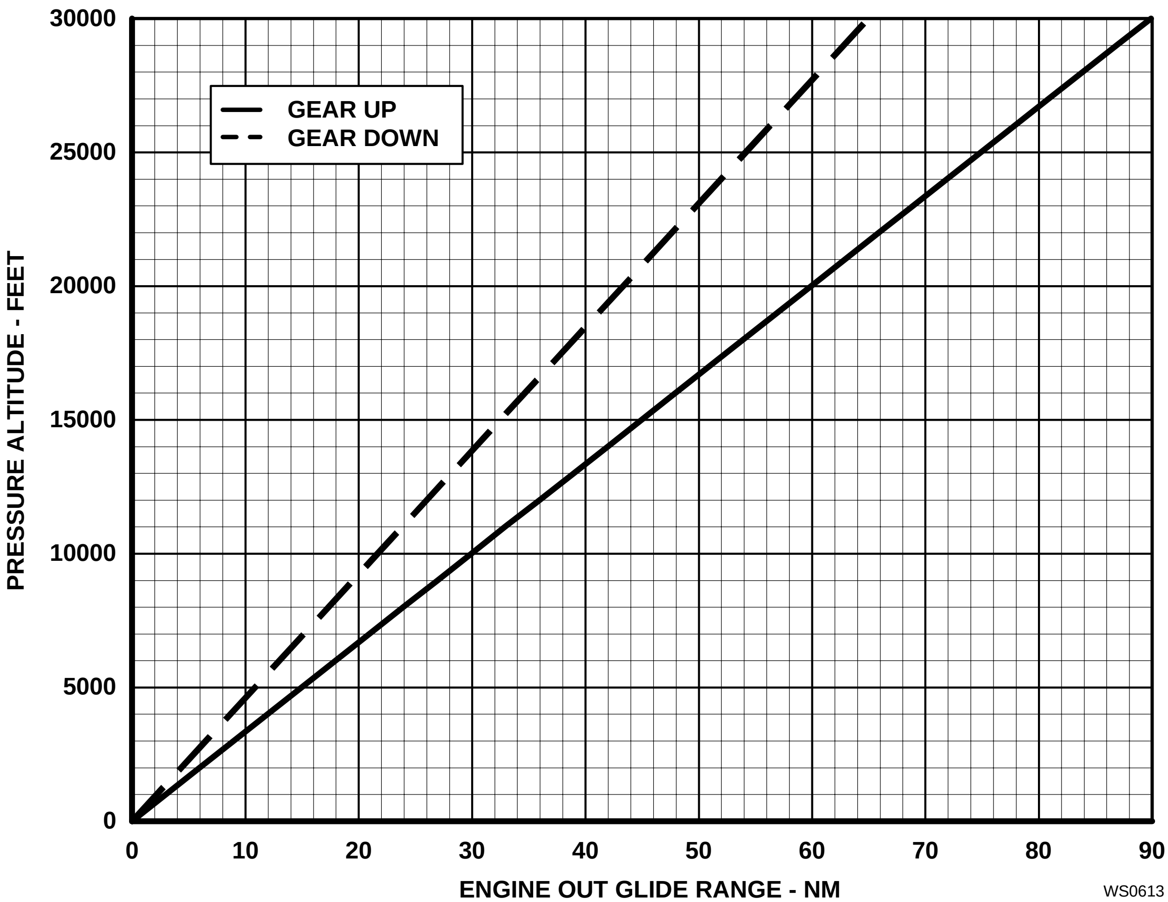


Figure 3-9

ENGINE OUT OVERHEAD APPROACH PATTERN (NO WIND)

WARNING

Cruise mode automatically engages when the airspeed >95 KIAS (goes off when airspeed drops below 90 KIAS). Cruise mode limits rudder authority.

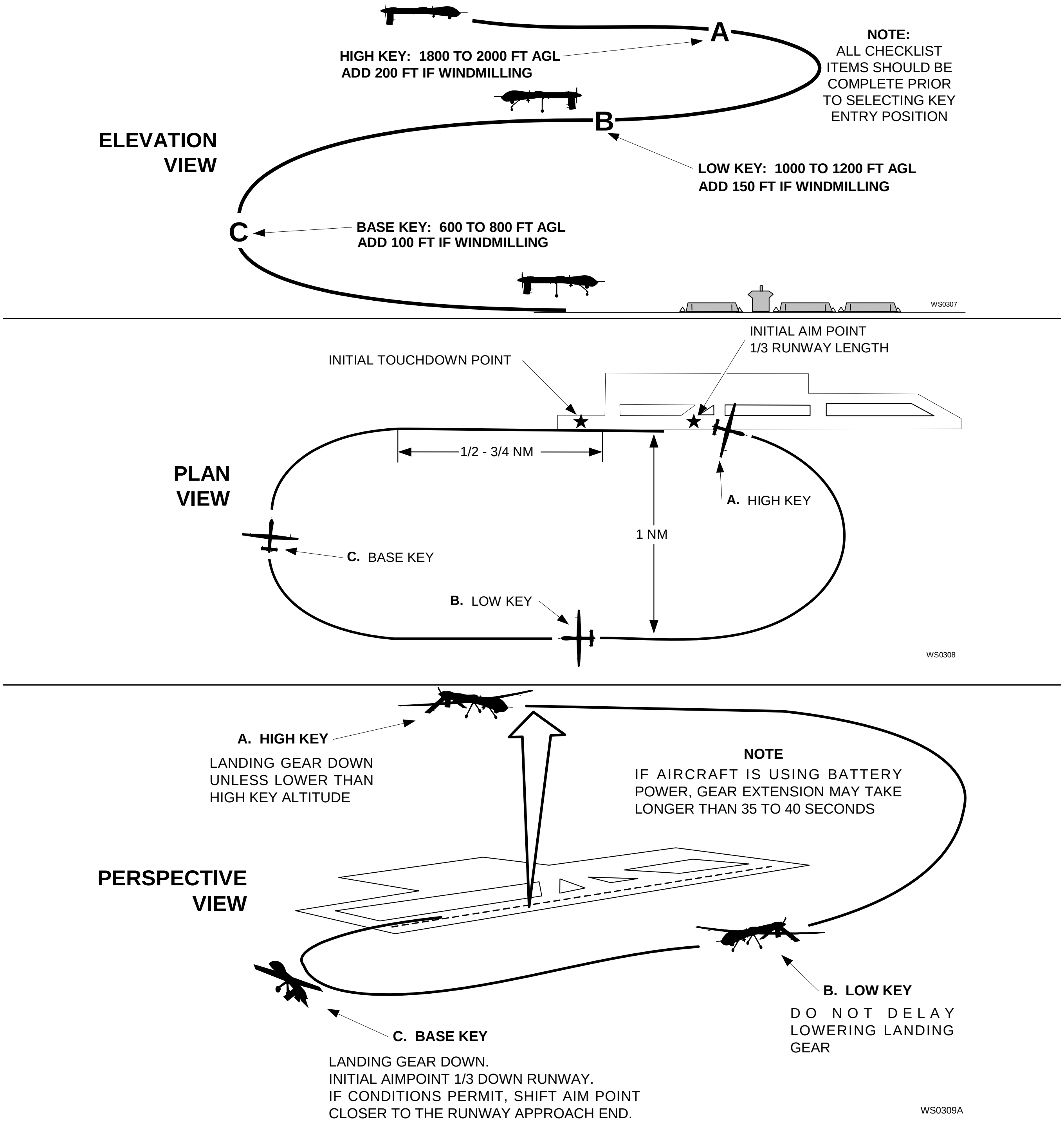


Figure 3-10

STRAIGHT-IN APPROACH

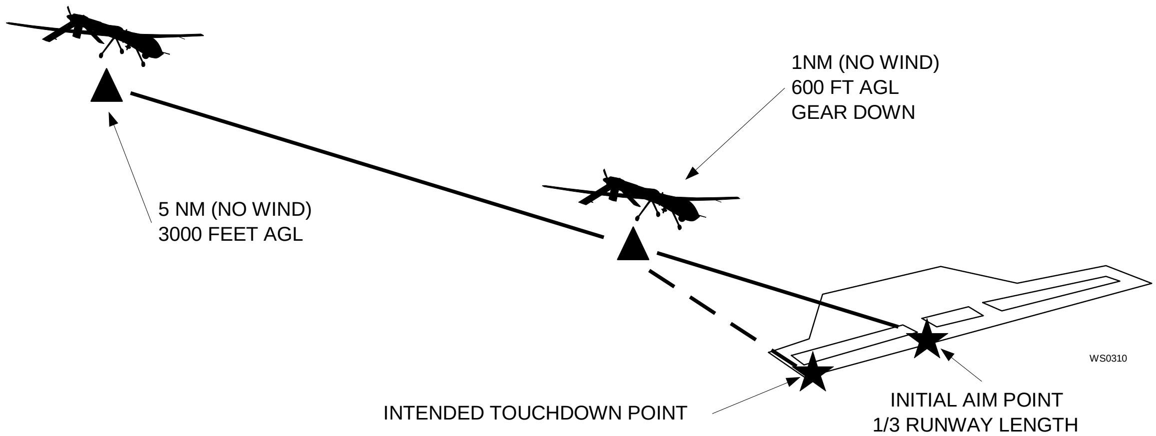
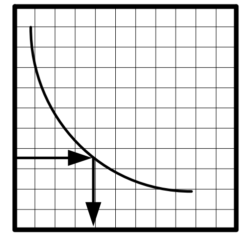


Figure 3-11

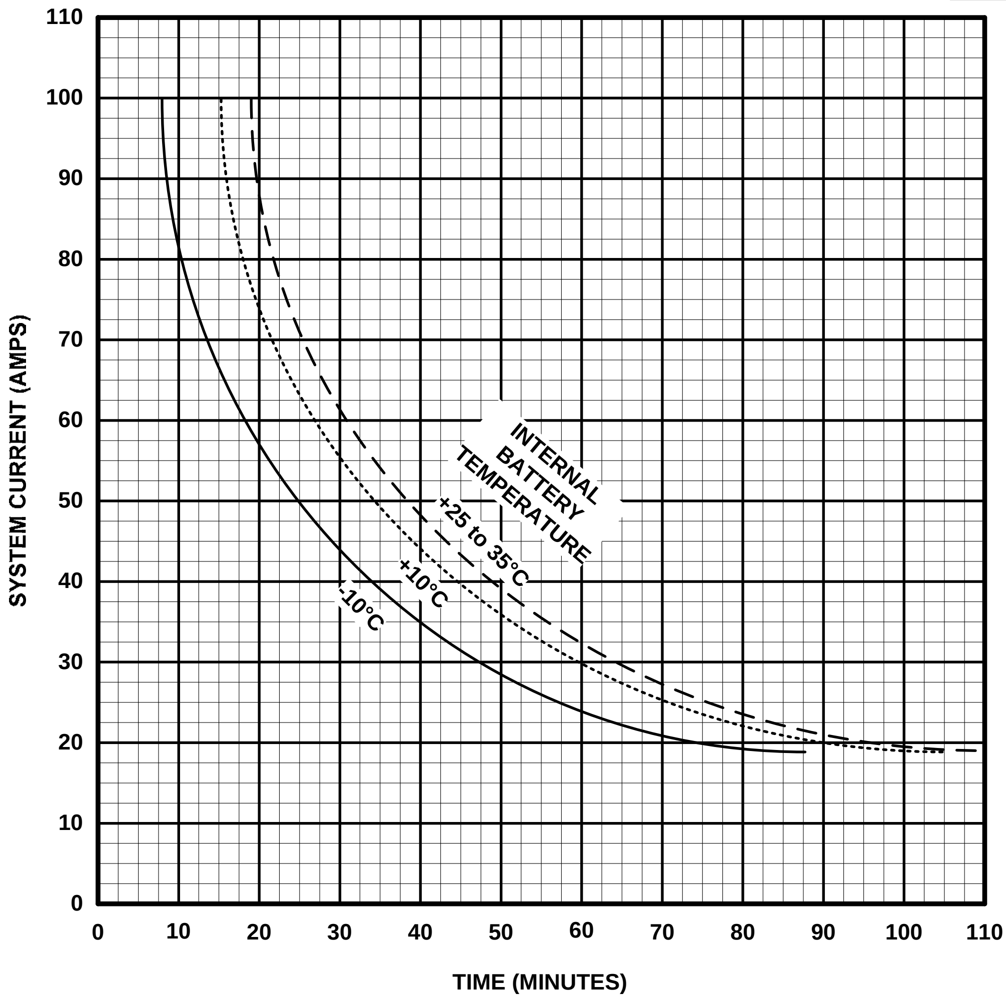
MODEL: MQ-1B
914 and 914i ENGINE

BATTERY DURATION



DATE: MAY 1999
DATA BASIS: ENGINEERING ANALYSIS

FULLY CHARGED BATTERIES
ENGINE STOPPED



NOTES: Battery capacity varies from unit to unit. Values shown in the chart are nominal for batteries in servicable condition. Times shown assume batteries are depleted when they have an output of 21 volts.

Temperature curves are based on internal temperature of the batteries, which may be different than ambient temperature. Observe Bat 1 Temp and Bat 2 Temp on VIT 56.

Battery capacity decreases at temperatures above 35°C and can be seriously degraded at temperatures of 50°C and above.

When off charge, batteries typically lose 6% of their charge in 48 hours. WS0023A

Figure 3-12

AIRCRAFT COMPONENT CURRENT REQUIREMENTS

Aircraft Component	Condition	Nominal Current Use (Amps)
AN/AAS-52	Maximum	70
	Average	12 to 55
LRD	On	15
Heater	On	15
SAR	Average	42.9
Pitot Heat (with anti-ice system – includes second heated pitot and heated nose blanket)	Maximum	33.2
	Average	16.6
Engine Cooling Fan	Maximum	33.0
	Average	10 to 31
Ku-Band Datalink	Average	28.6
Pitot Heat (without anti-ice system)	Maximum	21.2
	Average	10.6
EO/IR Sensor	Average	7 to 12
	With Cryo Unit Off	3
VHF/UHF Radio (ARC-210A)	Transmit	5.0
	On/Receive	1.0
Navigation and Strobe Lights	Average	3.9
C-Band Transmitters (2)	Average	2.5 (each)
Fuel Pumps and Solenoids (controlled by engine ignition)	Both pumps on	2.5
	One pump on	1.5
PCM Cooling Fans	Maximum	2.0
	Average	1.0
De-icing Pump	High Speed	1.7
	Low Speed	1.0
Nose Lens Heat	Maximum	1.5
M15 Nose IR Lens Heater	Average	5.4
IFF Transponder (APX-100)	Average	1.0
Ice Detector	Average	0.5
VCR	Average	0.1

Figure 3-13

CAUTION

Figure 3-13 shows typical continuous amperage for each device. However, momentary in-rush current can be up to 2 or 3 times as much when a unit is first turned on. When the aircraft is operating on partially depleted batteries, a momentary current surge could reduce voltage below system requirements, resulting in loss of the aircraft.

MODEL: MQ-1B
914 ENGINE

VPP COMMAND VS FEEDBACK

DATE: JANUARY 2000
DATA BASIS:
ENGINEERING ANALYSIS

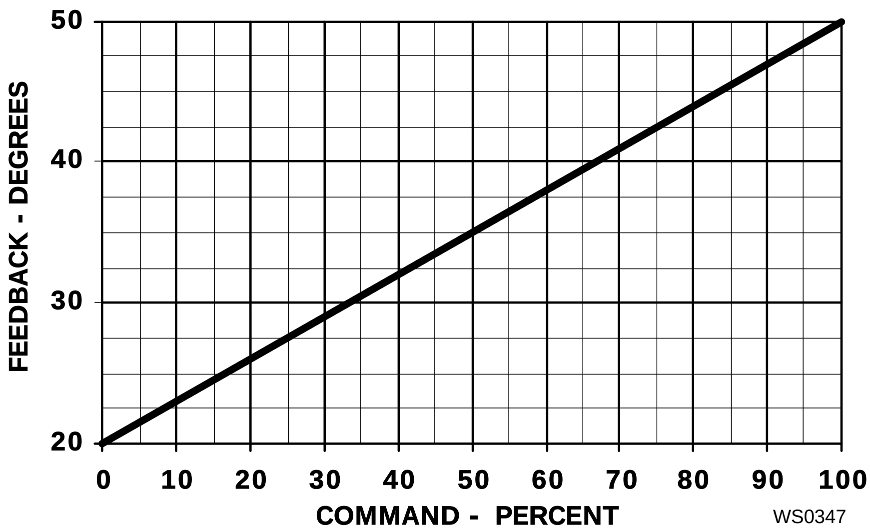


Figure 3-14

MODEL: MQ-1B
914 ENGINE

DATE: MARCH 2000
DATA BASIS:
ENGINEERING ANALYSIS

CRITICAL FORWARD FUEL WEIGHT

NOTE

See instructions in paragraph 3.6.10.8.

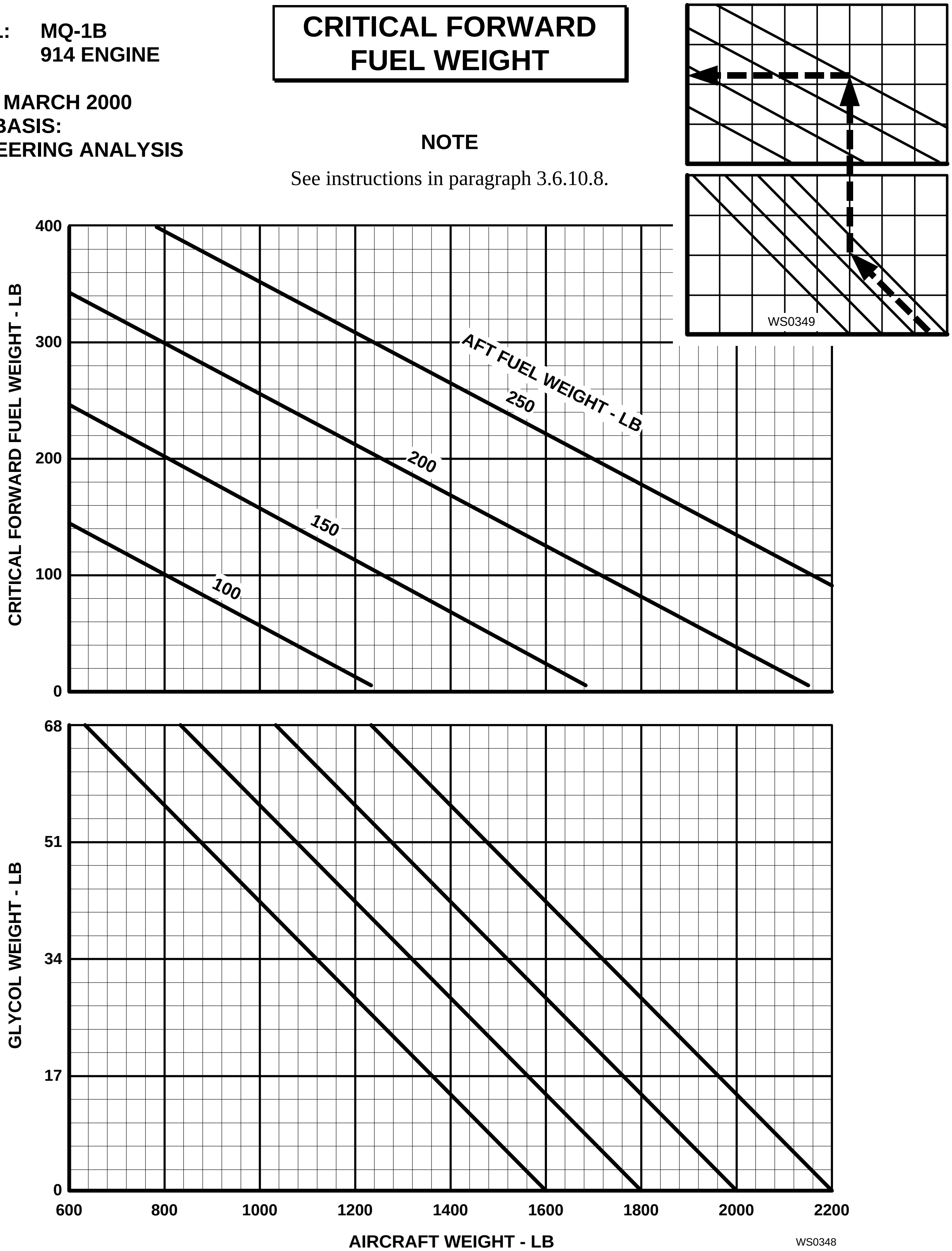


Figure 3-15

3.7. WARNING MESSAGES

Faults detected during system operation are reported in the blue area of the left head-down display. All possible warning messages are listed for reference in the following table. When a message displays, it may be accompanied by an audible alarm, which can be reset using the period key on the PSO workstation keyboards. Information in the table is as follows:

MESSAGE The text of each warning message. Messages are listed in alphanumeric order.

CAUSE The most likely cause of the warning message.

ACTION The recommended actions to be performed in response to the warning message. These actions are not all inclusive procedures. Refer to the appropriate emergency procedures for more detailed direction.

COLOR/TYPE COLOR: RED indicate the most serious warning conditions, and YEL (yellow) indicates less serious cautionary conditions.

TYPE: "A" indicates an avionics problem, "D" indicates a datalink problem, and "E" indicates an engine problem.

RELATED VIT ELEMENT If the red or yellow threshold for a VIT data element triggers display of the warning message, the name of the data element will be listed. See Section I for a description of VIT data elements.

In some cases, the related VIT data element could help in determining the seriousness of a problem. For example, the message: "Very high water temperature" indicates engine coolant temperature is above 209°F. The related VIT data element, "Water Temp," would indicate the exact temperature, and allow the pilot to observe if the temperature is continuing to increase, has stabilized, etc.

Figure 3-16 DELETED