

## NORMAL OPERATING PROCEDURES

### PREFACE

FORMAT of this subsection is so arranged as to clearly show the normal division of duties between flight crew members, which has been shown in "Crew Coordination" in our previous manuals, and to set forth normal operating procedures in detail. Where applicable, these procedures coincide with the cockpit check lists, but have been enlarged with explanatory material. For the purposes of standardization and efficiency of operation, specific duties are assigned to each crew member. It is important that these procedures be followed so that maximum crew coordination and efficiency may be maintained regardless of crew pairings. For clarity, the procedures alone appear in chronological sequence on left hand (even numbered) pages in the column provided for the crew member who will normally be expected to accomplish the particular item listed. A reference number, such as "11/", precedes those items about which explanatory material has been provided. The explanations all appear on right hand pages (odd numbered) facing the procedure, properly indexed with the same numbers to provide ready reference. Thus, a quick review of a procedure can be obtained by scanning left hand pages only; an understanding of the various items may be obtained by studying the referenced notes on right hand pages.

THE COCKPIT CHECK LIST must be used as a safety measure to bring to light any important item which may have been inadvertently overlooked. Usually no action is necessary or no control need be positioned when reading the check list if the flight crew has properly carried through their procedures. Check lists will be used in the Challenge-Respond manner; the Flight Engineer reading aloud the challenge, all crewmen checking the item, and that crewman to whom it has been assigned normally making aloud the response. During instrument flight conditions, to permit the pilot handling the controls to concentrate on the problems of flying, the Challenge-Respond items for "Climb", "Cruise", and "Descent-In Range" should be made by the Flight Engineer reading the Challenge, and the Response being made by the Pilot not flying. It is the Captain's responsibility to see that the check list is used properly; however, the Pilot manipulating the controls will be expected to call for it at the proper time.

COORDINATION IN USE OF RADIO is essential to avoid confusion concerning communications and navigation. There must be a clear understanding as to who is guarding what communication channel. The Captain, or the Pilot flying the plane at the Captain's discretion, should determine which navigational facilities shall be tuned on each receiver; thereafter, the pilot not flying should not re-tune a navigational receiver without so advising the pilot manipulating the controls. Pre-planning is necessary to avoid confusion during an instrument approach; the Captain should designate how each receiver will be tuned, who will tune it, and when they will do so.

COMMUNICATIONS AND LOGGING OF CLEARANCES will normally be handled by the pilot not manipulating the flight controls, provided, that if the Captain wishes to delegate this duty entirely to the Pilot, he will provide him with appropriate time, free from handling the controls, to keep the forms and records current with the progress of the flight.

THE CAPTAIN IS RESPONSIBLE for safe operation, passenger comfort, maintenance of schedule, and effecting all economies reasonably possible on each trip to which he is assigned. He is vested with the authority to carry out this responsibility. This means he has authority over all assigned crew members on his flight from the time they report for duty until the termination of such assignment. His orders will receive prompt compliance even though they be at variance with written procedures or other instructions. Crew members should bring to his attention, however, such information or factors of importance which could have a direct bearing on his decision in such instances where safety of the flight is involved.

THE PILOT IS SECOND IN COMMAND and, in event the Captain is incapacitated in flight, will assume his duties and responsibilities and conduct the flight to the point of next intended landing, or to a point where a Captain replacement may be made, or such other point his judgment may dictate.

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CAPTAIN	PILOT	ENGINEER
<b>BEFORE STARTING ENGINES</b>		
<u>1</u> /CIRC. BRKRS. & SWS.....ON		CIRC. BRKRS. & SWS.....ON
	TD CONTROL SWS.....NORMAL	
<u>2</u> /OXYGEN SYSTEM.....ON & 100%	OXYGEN SYSTEM.....ON & 100%	OXYGEN SYSTEM.....ON & 100%
	<u>3</u> /DC HYD. PUMP (TOW SW).....ON	
	<u>4</u> /HYD. COOLING SW.....ON	
	<u>5</u> /ELEC. PANEL...SWS, ON, INV, START	
	<u>6</u> /EXT. POWER VOLTS.....115 & #4	
	<u>7</u> /PRESSURIZATION PANEL.....SET	
	<u>8</u> /CABIN AIR COMPRESSOR PANEL.....CKD.	
<u>9</u> /AIR COND (2 PANELS).CKD & SET		AIR COND (2 PANELS)...CKD & SET
<u>10</u> /AIRFOIL ICE PANEL..CKD & SET		
<u>11</u> /PROP ICE PANEL.....OFF		
<u>12</u> /PITOT HTRS.....CKD & OFF		
SEAT BELT-NO SMOK.....ON		
LANDING LTS....RETRACT & OFF		
<u>13</u> /INDICATING LTS...TEST BRIGHT		INDICATING LTS.....TEST

## NORMAL OPERATING PROCEDURES

### BEFORE STARTING ENGINES - NOTES

- 1/ The Captain, having inspected the circuit breaker panels behind his seat, will respond for them. The Flight Engineer will respond for circuit breakers in the electrical service center and the same panels inspected by the Captain, checked during the preflight inspection, and switches and circuit breakers in the radio panel.
- 2/ Flight Engineer checks the pressure in the oxygen bottles used for crew supply and sees that each bottle is turned ON. Each crew member checks that his full face mask is properly stowed and connected; that his FLOW SUPPLY SWITCH is ON and the OXYGEN SWITCH is set to 100%; that his integral full face mask microphone is plugged in, and the MIC selector switch set to the full face mask position.
- 3/ Windshield wiper should be OFF to prevent pump output from being absorbed by wipers instead of brakes.
- 4/ Hydraulic Cooling Switch is normally ON to assure that scavenge pumps in inboard tanks are running for operation of hydraulic system heat exchangers regardless of position of inboard tank fuel pump switches.
- 5/ All switches forward on Electrical Panel, check output of both rectifiers.
- 6/ The voltage rotary selector switch should be set to EXT POWER, Voltmeter checked to see that 115V are being delivered, then the rotary selector should be reset to GEN 4.
- 7/ Cabin Pressure Controller set for field altitude and desired cabin altitude, Rate Selector set as desired, and rotary switch to CONTROLLED PRESSURE (CCW).
- 8/ All switches DOWN, Safety Valve Control - CLOSED (CW).
- 9/ On Air Conditioning Panel over his head, Captain sets Freon System, Heater and Temperature control switches to AUTO, or as he may desire. Flight Engineer checks indicating lights on Temperature Control Panel and sets Manual Temp. Control switches to AUTO.
- 10/ Captain tests Overheat Warning Lights on Airfoil Ice Panel, checks that Wing, Empennage, and Engine Air Scoop Heaters are off and that Bleed Air Shut-off valves are: Fuselage, OPEN; Wings, NORMAL.
- 11/ To determine that the propeller ice circuits are functioning normally, Captain places Timer Lights switch to BRIGHT, Power Switch to OFF, and the Test Switch to GROUND TEST; ammeters labeled NO. 1 & 4 SPINNERS and NO. 2 & 3 SPINNERS should read about 90 amps; ammeter labeled CUFFS & AFT SPINNERS should read alternately about 67 amps and 78 amps as timer cycles between the Aft Spinner and Cuffs respectively. Timer Sequence Light that is ON indicates which propeller is being de-iced. Power and Ground Test switches should be set to NORMAL after this check.
- 12/ To check that pitot heaters are operating normally, Captain turns them on and inspects the annunciator lights on the Center Instrument Panel. L & R Pitot Heat Out light not being illuminated indicates circuits are normal. Should one of these lights illuminate, it is an indication that the particular pitot heat circuit is not operating. After check, place pitot heat switches OFF.
- 13/ With the teterboard switches on the lower left Lighting Control Panel, the Captain tests lights on the Overhead Panels, Instrument Panels, and the Pedestal, then sets the test switches to BRIGHT. If he has not done so while checking the Airfoil Ice Panel, he also now checks the Overheat Warning Lights on that panel. The Engineer, if he has not previously, now checks the indicating lights on the Temperature Control Panel.

# NORMAL OPERATING PROCEDURES

CAPTAIN	PILOT	ENGINEER
<b>BEFORE STARTING ENGINES - CTD</b>		
<u>14</u> /EMER. EXIT LTS...RESET & ARM POSITION LTS.....AS REQD. BRAKE PRESS (NORM. & EMERG.).....CKD. PARKING BRAKES.....RESET	EMERG. SHUTDN. HNDLS.....IN GEAR LEVER.....DOWN-3-GREEN	
<u>15</u> /RMDI.....SET STATIC SELECTORS.....NORMAL	RMDI.....SET STATIC SELECTORS.....NORMAL OIL QUANTITY.....GALS. HYD. QUANTITY.....CKD.	
<u>16</u> /FUEL QUANTITY.....POUNDS		FUEL QUANTITY.....POUNDS
PROP SYNC. CONTROL.....OFF TEMP. TRIM SW.....CONTROLLED <u>20</u> /TRIM TABS.....SET	MAIN FUEL VALVES.....ON <u>17</u> /CROSS FEEDS.....OFF <u>18</u> /RADAR.....UP & OFF <u>19</u> /AUTO PILOT.....OFF	<u>21</u> /OIL COOLERS.....SET
<u>22</u> /STATIC AUTO FEATHER.....CKD.  <u>23</u> /RPM SWITCHES.....LOW	<u>24</u> /RADIOS & ALTIMS....CKD & SET	

## NORMAL OPERATING PROCEDURES

### BEFORE STARTING ENGINES - NOTES CTD

- 14/ The Captain lifts the guard on the Emergency Evacuation Lights switch, holds the switch in the TEST & RESET position while he visually checks that the Cockpit Overhead Emergency Exit Light illuminates; then releases the switch to the ARMED position. These lights will illuminate if  $1\frac{1}{2}$  G is exerted on an impact switch. They may be turned off by placing the arming switch to TEST & RESET, and releasing it.
- 15/ This equipment has no automatic fast synchronizer, so it is necessary to manually synchronize the RMDI Azimuth Cards. This is done by pushing in the Synch Knob and turning it right or left until the synchronization indicator needle is centered.
- CAUTION: CHECK HEADING INDICATED AS RMDI CAN BE SYNCHRONIZED  $180^{\circ}$  AWAY FROM PROPER AZIMUTH.
- 16/ Engineer should have checked fuel quantity in accordance with instructions contained in 4-2, page 1, Airplane Preflight, and reports it at this point. Captain makes a rough check by reading quantity on Cockpit Fuel Gages; these are accurate in flight but less accurate on the ground than the gages on the underwing Fuel Control Panel.
- 17/ Crossfeed valves are electrically operated. The indicator light labeled VALVE will be illuminated when the valve is in transit, or when valve and switch positions do not coincide. Crossfeeding should seldom be necessary except to balance fuel in all tanks after:  
(1) Starting a flight with a fuel load higher than 29,480 pounds, or, (2) Shutting down an engine in flight.
- 18/ Radar antenna Tilt Control should be positioned to the full UP TILT position to minimize possibility of harmful radiation in event the radar is inadvertently turned ON in close proximity to persons, fuel tenders, etc.
- 19/ The AP ENGAGE switch, on the Autopilot Control Panel, should be OFF. The Emergency Disconnect Handle on the aft face of the pedestal near the floor will always be kept in the ENGAGED position (IN) except when necessary in case of malfunction.
- 20/ Elevator trim set  $10^{\circ}$  nose up, ailerons and rudder to  $0^{\circ}$ .
- 21/ During cold weather the oil cooler doors should be closed to reduce time of oil warm-up after engine starts. On hot days, they should be fully open, and it should be remembered it is necessary to hold the Oil Cooler Door actuating switches to the OPEN position for a short period after the Engine Start Selector has been turned OFF in order to get the inducers operating. Inducer operation can be checked by noting about 30 to 40 degree rise in T.I.T. as the inducers start operation.
- 22/ If examination of the Airplane Log reveals an autofeather check has been made on the current date, it is not necessary to make one. Ordinarily, the Flight Engineer will make the static autofeather check on the pre-flight inspection. If he has not had time to do so and one is required, the Captain will accomplish it and have its accomplishment recorded on page 4 of the Airplane Log. This check is described in detail in Section 6-3, page 4.
- 23/ RPM switches are kept in low for engine starts and ground operation. Should a throttle be moved out of the  $9^{\circ}$ - $30^{\circ}$  range, microswitches will trip the switch for that engine and it will return to NORMAL RPM. The switches are spring-loaded to NORMAL and electrically held in low; if they are set to LOW and power removed from the DC Essential Bus, they will spring back to NORMAL.
- 24/ Check all communication and navigational radios. Set flight group altimeters to airport pressure altitude and lower altimeter on L.H. instrument panel to current sea-level setting as explained in EAL Flight Operations Manual.

# NORMAL OPERATING PROCEDURES

## ENGINE STARTING PROCEDURE

CAPTAIN	PILOT	ENGINEER
<div style="border: 2px solid black; display: inline-block; padding: 5px 20px; margin: 0 auto;">ENGINE STARTING PROCEDURE</div>		
<p>25/</p>		
<p>26/THROTTLES.....START POSITION</p>		
<p>27/FREON &amp; HEAT.....OFF</p>		
<p>28/BLEED AIR VALVES.....OPEN</p>		
<p>29/FUEL &amp; IGNITION SWS.....ON</p>		
<p>ENGINE STARTER SELECTOR.....SET</p>		
<p>When ready to start engine #4, the Captain will advise the ground crew via interphone, "Turn on Air", and will check air pressure gage.</p>		
<p>30/PRIMER BUTTON...DEPRESS-HOLD</p>		
<p>31/STARTER BUTTON.....DEPRESS</p>		
<p>Check the following closely during all engine starts.</p>		
<p>32/T.I.T. AND RPM</p>		<p>32/RECORD AIR PRESSURE, PEAK T.I.T. IN AIRPLANE LOG.</p>

## NORMAL OPERATING PROCEDURES

### ENGINE STARTING PROCEDURE - NOTES

#### 25/ ENGINE STARTING PROCEDURE

Normal sequence - 4, 3, 2, 1 when using aft air and electrical connection.  
Alternate sequence - 4, 1, 2, 3 when using forward air and electrical connection.

The ground crew will normally advise by interphone "Clear to start #4 and #3", or, "Clear to start all engines". Upon receiving signal from the ground, engines will be started as indicated.

**CAUTION:** DO NOT PERFORM A START IF T.I.T. IS ABOVE 200°C.

- 26/ Normally, the throttles will be in the START position as a result of having been so placed for; the NTS check on the previous shut-down, or the auto-feather check before starting engines. If it is suspected the prop blades are not in the minimum torque position for starting, place the throttles in START and hold out the feathering buttons.
- 27/ This item is not accomplished until receiving the signal to start engines; its purpose is to reduce electrical drain on the ground power unit, which is not capable of delivering simultaneously full electrical output and air for engine starts. A protective device on the power unit will trip OFF electrical supply when starting to deliver air if the current draw is more than 75 amps. It will not be necessary to cut off Freon or heat if it is determined that the plane's electrical draw is less than 75 amps just prior to starting. Duct heaters are turned off by turning off the FAN switch.
- 28/ This refers to the engine Bleed Air Valves on the Engine Start Panel. Bleed air shut-off valves on the Airfoil Ice Panel must be OPEN and NORMAL.
- 29/ Arms circuits. The Captain in starting should always keep a finger near the Fuel and Ignition switch of the engine being started so that it may be quickly turned OFF if rate of rise of T.I.T. is excessive, or if starting temperature limits are exceeded, or a hung start is indicated.
- 30/ Make all first start attempts using prime. If the engine does not start, do not use prime on succeeding start attempts. When primer used, hold on, then release as soon as there is any rise in T.I.T., which indicates light-off.
- 31/ This energizes starter, the button will be held in by solenoid action. The button should pop out automatically as the starter declutches from the engine at about 8000 to 9000 RPM, accompanied by a momentary blinking of the Starter Overspeed Warning Light. If it does not pop out at this point, the Captain should pull it out manually. If the Starter Overspeed Warning Light stays ON, it indicates the starter has not declutched, and the engine should be shut down immediately with the Emergency Handle.

If starter button holding coil releases starter button: (a) Before 2200 ERPM, cut Fuel & Ignition switch and let engine coast to a complete stop, then turn Fuel & Ignition ON and manually hold button in till ERPM is above 8250; (b) After light-off, but below 8000 ERPM, monitor engine speed and T.I.T. closely; if acceleration is not satisfactory, cut Fuel & Ignition switch and let engine coast to a complete stop; motor engine with starter, Fuel & Ignition OFF, until T.I.T. is below 200°C., then reject starter and allow engine to stop; restart, holding starter button in until after 8250 ERPM.

**CAUTION:** NEVER ENGAGE STARTER WHEN PROPELLER IS ROTATING.

- 32/ The Captain will start all engines. In doing so, he will closely watch all pertinent instruments. Engine oil pressures should ordinarily rise before the engine has reached 2000 RPM. Light-off will be clearly indicated by a rise in T.I.T., usually between 2600 and 2900 RPM. The Pilot should monitor all pertinent instruments during the start and advise the Captain of any unusual condition which might not have come to his attention. All should be alert for an indication of a stalled start, as described below. The Engineer will monitor T.I.T., record air pressure and peak T.I.T. in the log book, and advise the Captain of an overtemperature if one occurs.

**STALLED START:** A stalled start is indicated if the T.I.T. is between 800 and 877°C with a reluctance of RPM to increase above 5000-7000 range after 5 seconds, and a decreasing fuel flow as trim system attempts to hold maximum T.I.T. If this occurs, Captain should immediately cut Fuel & Ignition switch OFF.

**OVERTEMPS:** He should also cut the Fuel & Ignition switch if T.I.T. remains in 877-965°C range for more than 5 seconds, or exceeds 965°C momentarily. If overtemperature did not exceed 965°C, cool to below 200°C and restart; if temperature again exceeds limit, shut down and call for maintenance. If overtemperature exceeded 965°C, do not attempt a restart, call for maintenance for an overtemperature inspection. Any overtemperature during a start should be noted in the log book.

# NORMAL OPERATING PROCEDURES

CAPTAIN	PILOT	ENGINEER
<b>ENGINE STARTING PROCEDURE - CTD</b>		
Check the following closely during all engine starts.		
<u>33</u> /OIL PRESSURE RISE	<u>33</u> /OIL PRESSURE RISE	
<u>34</u> /FUEL PUMP LIGHTS	<u>34</u> /FUEL PUMP LIGHTS	
<u>35</u> /STARTER: DECLUTCH AND OVERSPEED WARNING LIGHTS.	<u>35</u> /STARTER: DECLUTCH AND OVERSPEED WARNING LIGHTS.	
		<u>36</u> /PRESSURES AND TEMPERATURES.....CHECK
AFTER STARTING ENGINE #4, BEFORE STARTING #3		
	GEN #4.....(115V).....CHECK	
	<u>37</u> /EXTERNAL POWER SW.....OFF	
START ENGINE #3 IN SAME MANNER AS OUTLINED ABOVE		
<u>38</u> /ADVISE GROUND CREW.....DISCONNECT AIR		
<u>39</u> /	START ENGINES #2 AND #1 AS OUTLINED ABOVE	
<u>WARNING</u>		
TO AVOID POSSIBILITY OF HAZARD TO PERSONS USING PASSENGER ENTRANCE STAIRWAY, ENGINES #2 AND #1 WILL NOT BE STARTED UNTIL AFTER STAIRWAY IS RETRACTED.		