

Flow Checks for Improved Cockpit Management

By Richard Bertoli and Cirrus Design

Cirrus Design has been publishing a monthly Pilot Proficiency Program for almost two years and July, 2007's issue is so compelling that I felt it was something I needed to share with all of you. What you'll find here are guidelines on how to efficiently manage the aircraft using flow checks and how to appropriately use the electronic checklists on the MFD. I sincerely believe this will enhance the safety and pleasure of flying your Cirrus aircraft.



Checklists may be completed as either do-lists or flow patterns. Do-lists are items that must be done in a critical set-by-step process. An example is the engine start procedure. If the steps to start the engine are not accomplished in the specified procedure, the engine will not start. Flow patterns are designed to be used

during periods of high workload when order is not critical to safely accomplishing the desired task(s). An example of flow pattern usage would be the climb checklist. These tasks are non-critical tasks and a flow pattern can allow you to expeditiously complete the checks and then return your attention to flying the aircraft and looking for traffic. It is important to remember that flow patterns do not alleviate the pilot from using the checklist. However, they allow the pilot the ability to complete the desired tasks, and then reference the checklist during a low workload period to confirm all required tasks are completed correctly.

Pre-Departure

The Pre-Departure phase of flight includes many components including:

- pre-flight
- engine start
- taxi
- before takeoff checks.

Pre-Flight

While the pre-flight may be conducted in a flow, you should ensure that you reference the checklist either during or afterwards to make sure no tasks were inadvertently skipped. Catching an error on the ground is the best means of preventing an emergency in the air. The pre-flight is also a good time to make sure that a recent VOR check has been completed (for flights on IFR flight plans).

Engine Start

The engine start checklist is normally completed as a do-list. Since the MFD and avionics are not turned on until after the engine start, you should use a paper checklist to accomplish these tasks as a do-list.

Before Taxi and Taxi Out

Taxi checks should be completed as a do-list using the checklists on the MFD. As the avionics are warming up after the engine start, you should take the time to check the validation dates of your avionics including: GPS databases, CMax (if installed), NavData, and Obstacles. When taxiing out, make sure that the AHRS system has aligned correctly, turns to headings are correct, and the skid/slip indicator slides to the outside of your turn. Finally be sure to use proper braking techniques to prevent overheating the brakes. The best procedure is to tap the brakes, as opposed to riding them, and keeping power around 1,000 RPM for the taxi.

[Before Taxi Flow](#)

[Taxi Flow](#)

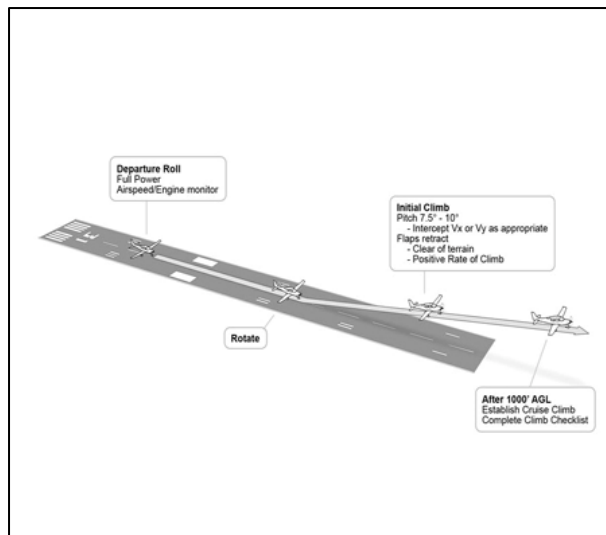
Before Takeoff

The Before Takeoff checklist is completed as a do-list. This checklist should be completed at the end of the runway or the appropriate run-up area prior to departure. Before running up the engine, make sure the oil temperature has exceeded 100°F. As part of the Before Takeoff checklist, a number of avionic and technological components will also be checked. During this checklist, the autopilot will be checked to ensure proper operation and response, navigation radios / GPS will be programmed for the flight, XM weather should begin communicating (if installed), and the E-TAWS system self-test may also be performed.

Takeoff

Takeoff / initial climb and approach / landing are known as the two critical phases of flight. Both phases have briefings that should be completed prior to attempting to complete the desired task. The idea behind these briefings is to review critical items prior to takeoff / climb or approach / landing. An example of a takeoff briefing is shown below:

This will be a _____ (normal, short, soft) takeoff from RWY _____ with a takeoff distance of _____ feet and _____ feet of runway available. Rotation speed is _____ KIAS. Initial heading after takeoff is _____ degrees to an altitude of _____ feet. Abort the takeoff for any engine failures/abnormalities prior to rotation. If the engine fails after rotation I will _____.



Climb

The desired time to complete the climb flow is shortly after passing 1,000 above ground level (AGL), time permitting. After workload decreases, the MFD climb checklist should be referenced to ensure all tasks have been completed. Aside from completing checklist items, you will be busy watching for other traffic in the airport area, getting on course, and climbing to the desired altitude.

Should you desire, the autopilot may be engaged once passing 400 feet AGL. Make sure the proper command bugs have been set to avoid being thrown off course by engaging the autopilot with it set incorrectly. The MFD may also be set to the Map page to help you maintain situational awareness.

[Climb Flow](#)

Cruise

The cruise check can be completed as a flow when time and workload permit. The Engine page can provide valuable information regarding leaning the aircraft for the most powerful or most economical power setting for your flight. Remember, for engine break in periods, cruise at a minimum of 75% power until the engine has operated for at least 25 hours or until oil consumption stabilizes. It is also recommended that you remain below 8,000 MSL for the break in period.

[Cruise Flow](#)

Descent

When planning your descent, consider the ground speed of the aircraft, altitude to lose, distance, and time to your destination. When possible, it is recommended to use the vertical navigation function on the Garmin GPS to assist with descent planning. Proper planning during the descent phase will work to allow you to seamlessly transition into the approach to landing phase of flight. To best assist your efforts, the descent checklist should be completed as a flow pattern at the top of descent or 20 minutes prior to arriving at your destination. Verify all tasks have been completed by reviewing the Descent checklist on the MFD when time and workload permit.

[Descent Flow](#)

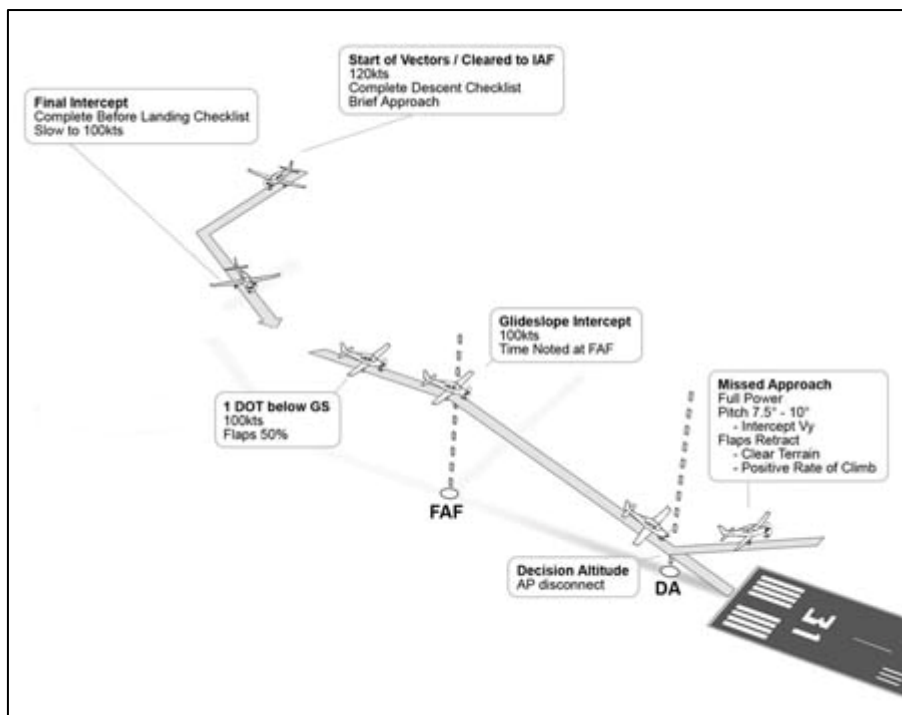
Before Landing / Traffic Pattern

The Before Landing checklist should be completed as a flow pattern prior to entering the traffic pattern. Slowing the aircraft early will allow for a smooth transition into the traffic pattern. The following profile will also assist in helping

[Before Landing Flow](#)

Instrument Approaches

When conducting an instrument approach, it is important to complete necessary tasks at certain times to prevent getting behind the aircraft, and ensuring that the aircraft is ready to begin the descent towards the runway. While there are a number of various types of instrument approaches, we will focus on vectors for a straight-in approach in this example. If you think you've studied the image enough, visit this month's exercise to "fly" the approach for yourself.



Landing

Normal landings in Cirrus aircraft should be made with 100% flaps. Final approach speeds should be 80 knots and 75 knots for the SR22 and SR20, respectively. Final approach speeds should be adjusted for wind gusts exceeding 10 knots by adding half of the gust factor. Pilots should apply short and soft field techniques as needed for field length and condition. Remember Cirrus advises landing on no runway less than 2,500 feet or double the required landing distance.

After Landing

After landing, pilots should maintain control of the aircraft using rudder and braking as needed. After exiting the runway and clearing the hold short line, pilots should complete the after landing flow pattern, contact ground control (if needed), and taxi into the ramp.

[After Landing Flow](#)

Shutdown

The shutdown checklist may be performed as a flow pattern. It has been determined that the MFD can remain powered on for shutdown to be used as a reference to ensure that the shutdown flow turned off all necessary equipment. The pilot is also responsible for parking and securing the aircraft once it is shutdown.

[Shutdown Flow](#)

Conclusions

Whether this was your first introduction to Standardized Operating Procedures or simply a refresher, these tips and techniques can help you efficiently manage your aircraft.

If you feel the need to refresh these techniques some more, a AirShares Elite Cirrus Standardized Instructor can provide more guidance as to the proper usage of the Cirrus SOPs. Also keep on the watch for Cirrus' soon to be released Flight Operations Manual!



Recommended reading:

“Habits, Not Checklists” by F. Bowlin, IFR Magazine Vol. 23 No. 7, July 2007

“Pelican’s Perch #1: Throw Away That Stupid Checklist!” by J. Deakin, AvWeb.com, March 1998

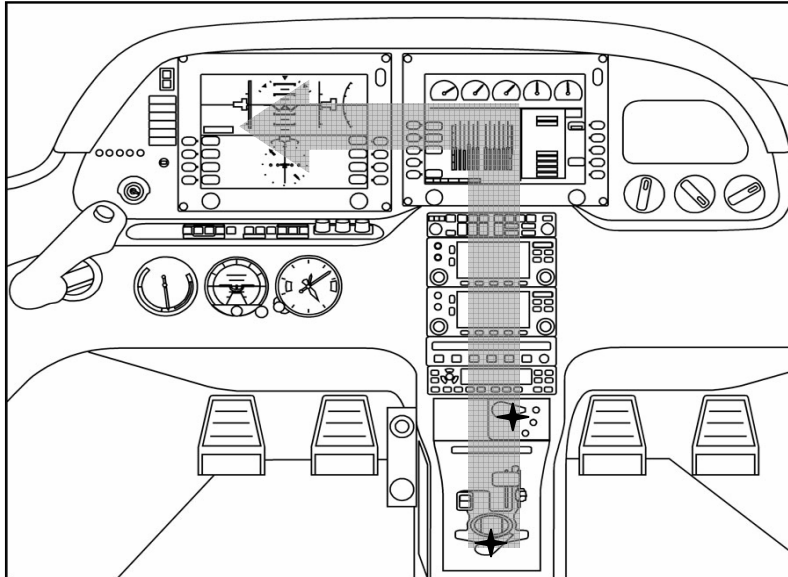
Before Taxiing Flow

Complete the Before Taxiing Flow prior to taxi. Reference the checklist to verify that all items have been completed once the flow has been completed.

1. Flaps – UP (0%)
2. Fuel Selector – SWITCH TANK

Avionics Configuration

1. Transponder – Verify transponder is in STBY mode. Set code if assigned
2. Autopilot – Verify the autopilot is in A/P RDY mode.
3. GPS Units/Audio Panel – Confirm each GPS database is current. Construct flight plans and configure communications as required.
4. MFD – Confirm database are current, set initial fuel and verify oil temperature and pressure are acceptable.
5. PFD – Verify PFD is initialized and ready for taxi.



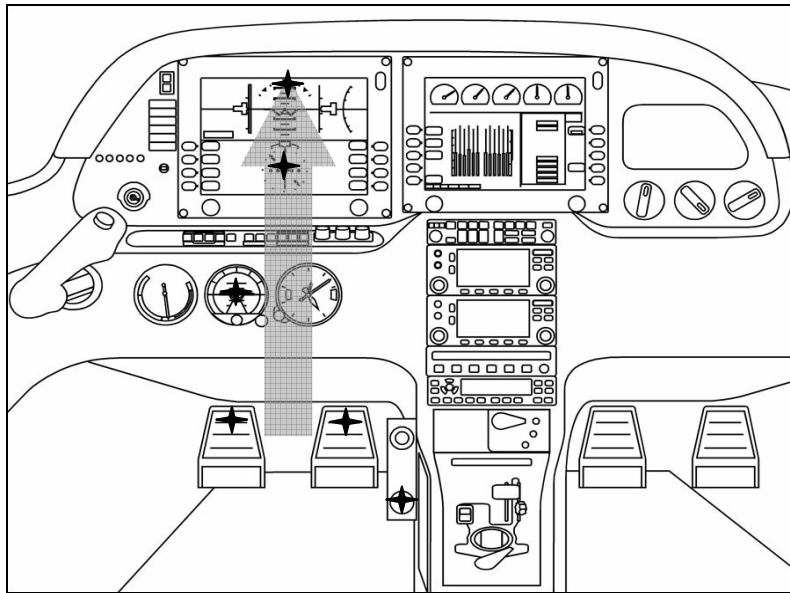
Taxi Flow

Complete the Taxi Flow when time and workload permit.
Reference the checklist to verify all items are complete once the flow has been completed and the aircraft is not moving.

1. Parking Brake – DISENGAGE
2. Brakes – CHECK
3. Attitude Gyro – CHECK
4. HSI Orientation – CHECK
5. Turn Coordinator – CHECK

Avionics Configuration

There are no avionics configurations required for this phase of flight.



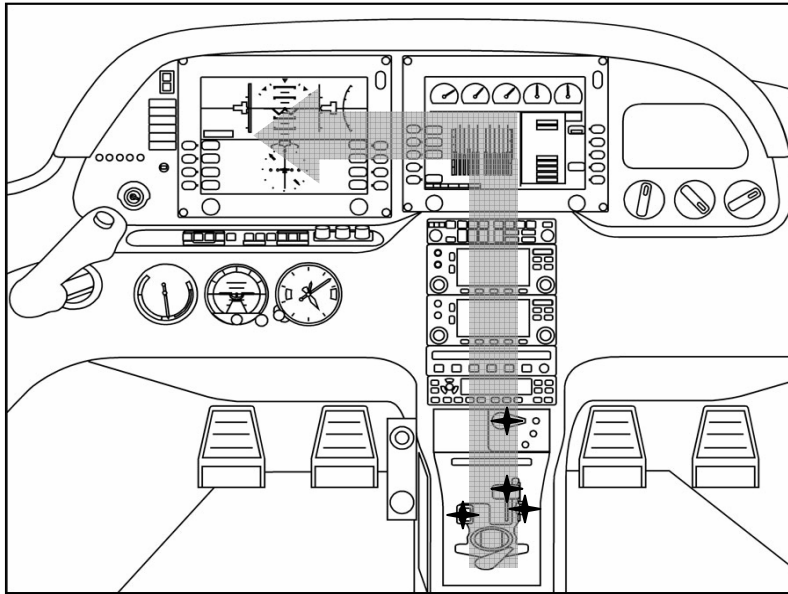
Climb Flow

Complete the Climb Flow after 1000' AGL when time and workload permit. Reference the checklist to verify all items are complete once the flow has been completed.

1. Fuel Pump - OFF
2. Mixture – LEAN as required
3. Climb Power - SET
4. Flaps – Verify UP
5. Configure avionics

Avionics Configuration

- Autopilot – Set modes as desired past 400 AGL
- MFD – Complete Checklist, monitor Map for situational awareness.
- PFD – Monitor aircraft flight parameters and system status.



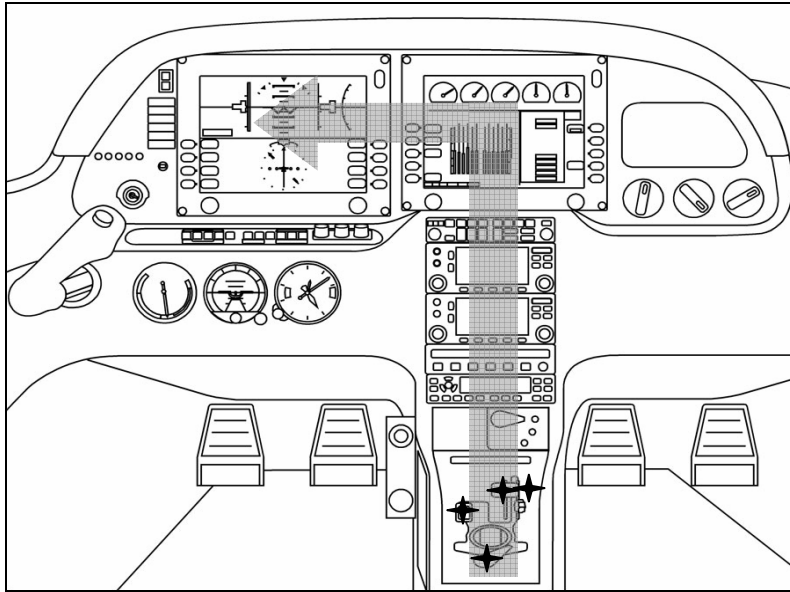
Cruise Flow

Complete the Cruise Flow when time and workload permit and cruise has been achieved. Reference the checklist to verify all items are complete once the flow has been completed.

1. Fuel Flow and Balance – Monitor
2. Fuel Pump – OFF
3. Cruise Power - SET
4. Mixture – LEAN as required

Avionics Configuration

- Autopilot – Ensure correct modes are engaged.
- GPS 2 – Monitor for traffic. GPS 1 – Verify correct navigation information is set.
- MFD – Use Lean Assist to lean the mixture
- PFD – Monitor aircraft flight parameters and system status



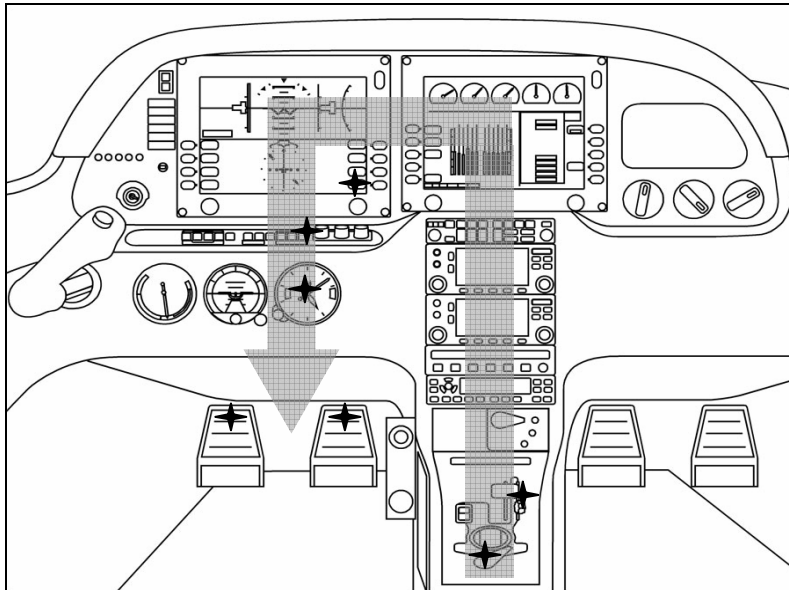
Descent Flow

Complete the Descent Flow when time and workload permit upon initiating descent to land. Reference the checklist to verify all items are complete once the flow has been completed.

1. Fuel System – CHECK
2. Mixture – AS REQUIRED
3. Altimeter – SET Twice
4. Landing Light – ON
5. Brake Pressure - CHECK

Avionics Configuration

- Autopilot – Set desired modes on autopilot for descent
- GPS 1 – Verify correct navigation information is set.
- MFD – Complete Checklist, monitor Map for situational awareness.
- PFD – Set Altitude and VSI bugs for the descent. Monitor aircraft flight parameters and system status.



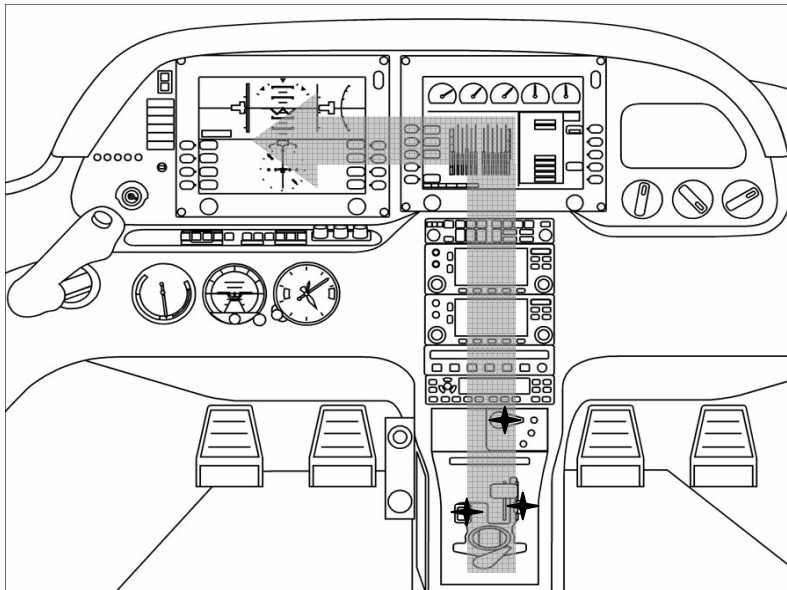
Before Landing Flow

Complete the Before Landing Flow when time and workload permit. Reference the checklist to verify all items are complete once the flow has been completed.

1. Seat Belt and Shoulder Harness – SECURE
2. Fuel Pump – BOOST
3. Mixture – AS REQUIRED
4. Flaps – AS REQUIRED

Avionics Configuration

- Autopilot – Disengage the autopilot prior to entering the traffic pattern.
- MFD – Complete Checklist, monitor Map for situational awareness.
- PFD – Check autopilot annunciators to verify autopilot is disengaged.



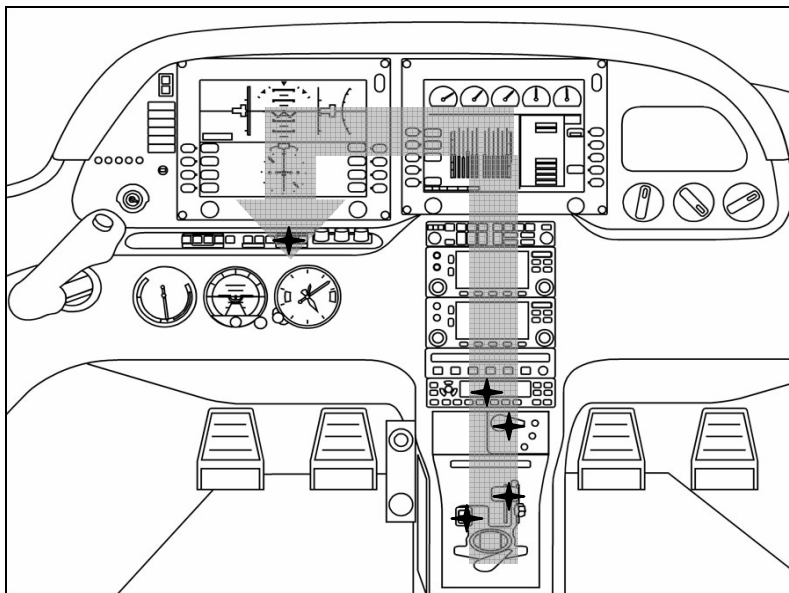
After Landing Flow

Complete the After Landing Flow when time and workload permit after clearing the active runway. Reference the checklist to verify all items are complete once the flow has been completed.

1. Fuel Pump – OFF
2. Power Lever – 1000 RPM
3. Flaps – UP
4. Transponder – STBY
5. Lights – AS REQUIRED
6. Pitot Heat – OFF

Avionics Configuration

There are no avionics configurations required for this phase of flight.



Shutdown

Complete the shutdown checklist as a flow pattern. Verify with checklist to ensure all items have been accomplished when completed with the flow.

1. Fuel Pump (if used) – OFF
2. Throttle – IDLE
3. Ignition Switch – CYCLE
4. Mixture – CUTOFF
5. All Switches – OFF
Magnetos – OFF
6. ELT – TRANSMIT LIGHT OUT

Avionics Configuration

- There is no specific avionics flow for this phase of flight.

