DEFINITIONS:

A “flow” is a memorized series of items following a logical pattern around or across the instrument panel.

1. Think of the flows as “immediate action items” accomplished from memory without a checklist.
2. In this handbook, all flows are shown as sets of numbered items.
3. In training, you must demonstrate that you can execute all company flows exactly as shown in this handbook.

A “Checklist” is a paper backup for the flows. Checklists do not always follow the same sequence as the flows, nor do they necessarily contain all of the same items.

1. Normal and emergency checklists are model-specific and equipment-specific.
2. They are printed on laminated cards which remain with each airplane.
3. The normal and emergency checklists for a normally aspirated L model 210 with a standby vacuum system are included at the end of this handbook (pages 45 and 46) for study and reference.

- All flows must be executed in the correct sequence, from memory, exactly as published in this handbook, unless there is a specific and valid reason to make a change in a particular situation. (For example, you might choose not close the cowl flaps during the cruise flow if the CHT gauge were reading abnormally high at that moment.) When in doubt, ask your instructor if it’s okay to do something differently. Do not take it upon yourself to make procedural changes based on your own habits and preferences, however. The FAA wants to see absolute PROCEDURAL STANDARDIZATION in our training program and that is what we give them.

- Checklists will be utilized at the appropriate times, as called for by this handbook.

- All flow and checklist items will be vocalized – meaning that you must say everything out loud.

- If an item appears in quotation marks, that means you must use the exact words shown. For other items however, it does not matter what words you use as long as you do vocalize each task or check in some manner as you accomplish it.

- If an item has already been accomplished as part of a flow, it is not necessary to do it again when running a checklist. (It is still required, however, that the item be vocalized.)

In other words, perform the flow, accomplishing and vocalizing all checks and tasks, and then pull out the checklist (if required by this handbook) to confirm that you did not miss anything. Read through the checklist out loud, pausing only to accomplish those items which were not accomplished during the flow, either because they were not included in that particular flow or because they were skipped, deferred or forgotten during the flow.
NOTICE

The frequent or consistent failure to learn and utilize the company flows, checklists and procedures published in this handbook, including configurations, speeds, power settings and other published limitations and guidelines, constitutes unsatisfactory performance.

If a pilot candidate resists the company training program or shows blatant impatience, lack of interest, exasperation, an argumentative or confrontational demeanor or any other type of behavior (such as grumbling and mumbling through a checklist instead of reading it carefully and mindfully) that suggests he is only “humoring” the instructor or “playing along” with the curriculum, we will be forced to assume that the pilot candidate has no intention of following the handbook when flying the line. This may result in the discontinuation of that pilot candidate’s training if the pilot candidate does not respond favorably to corrective counseling.

Likewise, if the pilot candidate exhibits a discourteous, undisciplined, disorganized, unprepared, inattentive or otherwise unprofessional attitude we will be forced to assume that such inappropriate conduct would manifest itself on line. Accordingly, this may also result in the discontinuation of that pilot candidate’s training if the pilot candidate does not respond favorably to corrective counseling.

Remember that each pilot candidate is being evaluated not only on aviation knowledge and skill, but also on those personality characteristics which are directly related to the job of air courier. This is because even if a person is a great pilot, that person will be nothing but a liability on the line if he or she is always refusing assignments, neglecting to turn in paperwork, forgetting to check his or her voice mail, being rude to ground couriers, mechanics, air traffic controllers and dispatchers, abusing airplanes, breaking FARs or otherwise being a whiner, a troublemaker or a prima donna. Thus, if a pilot candidate leaves a strong and persistent negative impression with a company trainer, a check airman, the Chief Pilot or the Director of Operations that pilot candidate may receive corrective counseling. If the pilot candidate does not show improvement after that, he or she may be terminated. **Just as with any commercial air carrier, attitude is important!**

Expect relevant and reasonable procedural and regulatory questions from your instructor, along with realistic distractions, while you are flying. The questions and distractions will be similar to those encountered during a normal (Part 61) instrument/commercial checkride. For example, during an approach the instructor might ask “what is the missed approach procedure?” or “what is the minimum visibility required to land?”

**The instructor wants to see that:**
1. Your head is in the game – you basically know what you are doing.
2. You can divide your attention effectively. (Single-pilot cross-country IFR requires multi-tasking. You have to be able to read charts while hand-flying and talking on the radio all at the same time, for instance.)
3. You can fly smoothly and consistently within the FAA’s published instrument and commercial practical test standards (PTS) in a complex, high-performance, single-engine piston airplane with no cockpit automation.
4. You can satisfactorily demonstrate any and all kinds of approaches which we are authorized to use. (This includes ILS, VOR, localizer, localizer back course and NDB, with or without DME, circling or straight in.)
The standards and expectations for the initial Part 135 IFR-PIC checkride are IDENTICAL in all respects to the standards and expectations for all subsequent recurrent Part 135 IFR-PIC checkrides.
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Part I. Before Takeoff

Before Starting the Engine

Run the preflight action and before starting checklists.

(There is nothing to memorize here. Read each item out loud, verifying it carefully before proceeding to the next item on the checklist. Do not rush and do not assume.)

Starting the Engine [FLOW]

1. master switch – ON
2. throttle – FORWARD (open)
3. propeller – FORWARD (high RPM)
4. mixture – FORWARD (rich)
5. electric aux. fuel pump – ON (both sides of the split rocker switch)
6. fuel flow meter – observe needle rise and then peak/stabilize
7. electric aux. fuel pump – OFF (both sides of the split rocker switch positively “clicked” to the off position)
8. throttle – retard to idle stop, then crack open about ½"

1. ignition key – IN
2. starter switch – ENGAGE until engine starts
   (See limitations in the POH, sec. 4, p.7)
3. set RPM – no more than 1,000
4. oil pressure – green arc within 10 seconds
5. vacuum gauge – active
6. ammeter – indicating a charge rate
7. voltage warning light – OUT
8. low vacuum warning light – OUT
9. starter – confirm DISENGAGED*
10. Run the after starting checklist.

* If there is no starter annunciator light, simply listen for the grinding sound of a hung starter.
1. pitot-static instrument check
   (This part may be accomplished at any time before or during taxi, whether the airplane is in motion or not.)

   A. airspeed indicator –
      i. on zero
      ii. Note which scale (outside or inside) reads in knots.
   B. altimeter –
      i. Confirm that the altimeter is correctly set to the current ASOS, AWOS, ATIS etc.
      ii. Then confirm that the altimeter reads within 75 feet of the field elevation. (Vocally verify the field elevation.)
   C. vertical speed indicator – on zero  (If not, note the level reference.)

2. gyroscopic / magnetic instrument check
   (This part may only be accomplished while making a taxi turn.)

   A. attitude indicator – erect, with no more than 5 degrees of lean during a level taxi turn
   B. heading indicator – numbers increase on right turn / decrease on left turn
   C. magnetic compass –
      i. full of fluid
      ii. erect
      iii. numbers increase on right turn / decrease on left
   D. turn coordinator / inclinometer –
      i. Miniature airplane leans in direction of turn.
      ii. Ball moves to the outside of the turn.

Take this taxi instrument check very seriously! Execute it carefully and methodically. If any of your primary flight instruments does not appear to be fully functional and reliable, return to the ramp. This is especially true when preparing to fly in actual instrument conditions, particularly at night and/or in turbulence.
The Cessna 210L has a “steering lag” while taxiing; only steady, smooth pedal inputs will result in a controlled turn. Thus, it takes patience and anticipation to taxi a 210 correctly. Pedal inputs must be applied early and held for a relatively long time to cause a change in direction while rolling on the ground. Small, rapid pedal inputs will not result in any movement of the nosewheel. This is because when the rudder pedal is depressed, a spring-loaded steering bungee will turn the nose wheel through an arc of approximately 14.5° each side of center. That bungee absorbs any small, quick, jerky inputs, effectively negating them. In other words, it does not transmit such inputs to the nosewheel at all.

This is unlike the much quicker response associated with the pushrod systems encountered on many smaller, lighter aircraft (such as Cessna 152s and 172s) and also unlike the much more effortless response associated with the hydraulically boosted steering found on many larger, heavier ones.

Finally, note that the airplane must be rolling for the nosewheel to turn. The nosewheel cannot be forced to turn with aggressive pedal inputs while the airplane is at a standstill. Although a 152 pilot might be able to coerce his airplane into a turn with assertive use of the throttle and brakes when it is barely moving forward, this technique will not work with the 210! Let the airplane roll forward first and then initiate the turn.

Here are four brake-saving taxi tips:

- Use patience and anticipation while taxiing; apply pedal pressure early and then hold it steadily and firmly until the turn occurs.
- Try to avoid riding the brakes; use throttle alone to control speed.
- When it is time to come to a complete stop, reduce power all the way to idle first, before applying the brakes.
- Try to use nosewheel steering rather than brakes for normal taxi turns, except for extremely sharp turns at very low speeds.
Engine Runup

Run the before takeoff and engine runup checklists.
(There is nothing to memorize here. Read each item out loud, verifying it carefully before proceeding to the next item on the checklist. Do not rush and do not assume. Refer to the amplification below for more detail.)

- While performing the magneto check, vocalize which mag you have selected and how much of an RPM drop you observe on each mag. Allow about two seconds for the engine speed to stabilize so that you can obtain an accurate reading.

- Cycle the propeller governor three times prior to the first flight of the day, especially in cold weather, but only once prior to each flight after that. Bring the prop control knob back slowly and smoothly and then smoothly but promptly bring it all the way back forward again as soon as an RPM drop begins to occur. Try not to allow the RPM to decay more than 300, as this places stress on the engine. Look for a modest increase in manifold pressure and a slight momentary fluctuation in oil pressure. Check the windscreen for ejected oil.

- Do not cycle the alternator switch off and on unless the engine is at idle. Some alternators may be damaged by this practice.

- Likewise, the standby vacuum system (SVS) must also be checked with the engine at idle to prevent vacuum pump damage. The SVS should never be operated when the engine is running fast because this could damage or even destroy the vacuum pump. With the engine at low idle, the needle of the suction gauge will be reading well below the green arc and the LOW VAC WARN light will probably be illuminated. When the SVS knob is pulled, the RPM should increase, the suction gauge should jump up and indicate in the green arc and the LOW VAC WARN light should extinguish. When the SVS knob is pushed back in, these signs should immediately reverse.
Part II. Traffic Pattern & En Route Operations

At Flight Express, we use a normal traffic pattern as a training exercise, the purpose of which is to reinforce the company flows and checklists in your mind by providing an opportunity to practice them while flying visually. You should rehearse the traffic pattern flows and checklists extensively prior to your first flight. Your objective should be to be able to execute the flows and checklists smoothly, easily and rapidly, without hesitation or confusion. You should be able to execute the flows and checklists with minimal mental effort, almost automatically, like counting or reciting the alphabet, so that you can devote the greater percentage of your attention to communication, navigation and the physical tasks of flying. This does not mean that you should do them mindlessly, however, so we require (as always) that you carefully vocalize each and every flow and checklist item. On each traffic pattern training exercise we will simulate a complete cross-country flight from airport A to airport B, including all the flows and checklists – the “lights, camera, action” flow, the climb flow, the cruise flow, the cruise checklist, the in-range flow, the in-range checklist, the TBGUMPS flow and finally the “lights, camera, action/action” flow and checklist. We do this because we feel that it is important to realistically experience the full acceleration to cruise mode followed by the full deceleration to the final approach environment. This emphasizes the value of the flows and checklists in preventing you from missing or forgetting something important in a high-workload situation.

When Cleared Onto the Runway  [FLOW]
(Do not perform this flow until actually cleared onto the runway to save electrical power, conserve bulbs and avoid bothering other pilots with your lights.)

1. “Lights:” taxi, landing and strobe lights – ON
2. “Camera:” transponder – squawk code set and ALT selected
3. “Action:” flaps – 10 degrees for all takeoffs

Normal Takeoff  [PROCEDURE]
1. Smoothly apply full power.
2. check manifold pressure – maximum available
3. check tachometer – 2850 RPM
4. check engine instruments (CHT, oil temperature and oil pressure) – GREEN
5. airspeed indicator – active  (If any of the above items appears questionable, abort the takeoff.)
6. \( V_{\text{w}} \) (75 KIAS) – rotate
7. Smoothly pitch for a \( V_{\text{Y}} \) (97 KIAS) climb.*

* It is not necessary to actually reach 97 knots right away; all that is required is to establish the correct pitch attitude for a \( V_{\text{Y}} \) climb. The speed will build as the climbout continues and the airplane is “cleaned up.”

Raising the Landing Gear  [FLOW]
(The items enclosed in quotation marks below MUST be vocalized using the EXACT WORDS SHOWN.)

1. Verify / vocalize: “Postitive rate of climb on two instruments.”
2. Verify / vocalize: “Clear of all obstacles.”
4. Lightly apply the brakes to stop the wheels from spinning. “Tap brakes.”
5. Select gear handle – UP and vocalize: “Gear in transit.” (Use those precise three words.)
8. Verify / vocalize: “Gear up and locked.”
9. flaps – ZERO

* If there is no gear pump annunciator light, simply listen and feel for the noise and vibration of the hydraulic power pack to stop. The HPP should shut off almost immediately after the gear locks up in the gear wells.
Climb [FLOW]
1. taxi, landing and strobe lights – ON
2. amber light – ON
3. hydraulic power pack – OFF
4. throttle – retard to 25” MP
5. prop – reduce to 2,550 RPM
6. mixture – RICH
7. flaps – retracted
8. CHT – normal (Always check the CHT gauge before reaching for the cowl flap lever.)
9. cowl flaps – OPEN

Note 1: The climb flow is configuration check. You are only actually manipulating two controls (the throttle and prop). The rest of these items are only being verified. This is where you would catch it if you had forgotten something earlier – such as raising the flaps, turning on the landing and taxi lights etc.

Note 2: Do not perform the climb flow until you have reached an altitude of at least 700-900 feet AGL, because the first time you bring the power down from a maximum setting is one of the most frequent power-failure scenarios. Therefore you want to have the ability to turn around and glide back to the airport before you pull the throttle back.

Note 3: Any time you intend to climb more than 500 feet, go ahead and perform the full climb flow. For climbs of 500 feet or less, there is no need to perform the climb flow.

Note 4: As you climb, it will be necessary to increase throttle (usually at a rate of about 1”/1,000’) to maintain 25” MP. Above about 4,000’ (depending on the humidity, temperature and barometric pressure) it is frequently no longer possible to maintain 25”, and at that point full throttle should be applied.

Any speed between $V_Y$ and normal level cruise may be used as a cruise climb speed. 120 knots is typical.

Cruise [FLOW]
1. taxi and landing lights – OFF
2. strobe lights – ON
3. amber light – ON
4. hydraulic power pack – OFF
5. throttle – 24” MP
6. prop – 2400 RPM
7. mixture – TO DO
8. CHT – normal (Always check the CHT gauge before reaching for the cowl flap lever.)
9. cowl flaps – CLOSED
10. Run the cruise checklist.
Imagine putting an engine on a stand and aiming the propane burner from a hot-air balloon at it. After blasting it with a searing plume of flame for a couple of minutes, now imagine spraying it with ice-cold water from a fire hose. Then repeat the process . . . over and over again. How long do you think it will be before parts of that engine begin to melt, crack, deform or break?

Poor mixture management leads to repetitive thermal stress, which leads to the expensive replacement of mufflers, cylinders, crank cases, pistons, piston rings, valves and exhaust manifolds. It also reduces engine performance and longevity. In extreme cases, it can even lead to sudden and total power failure!

Like many fleet operators, we have discovered over the years that a conservative, rich-of-peak operating standard translates into longer service life for their engines and less non-scheduled maintenance.

Here are the official Flight Express rules on that subject.

1. Do not lean the mixture at all below 3,000 feet. Just leave it full rich all the time. (There is no measurable advantage to leaning below this altitude.)
2. Above 3,000 feet, wait at least 2 minutes after you level off in cruise before you even touch the mixture control knob. Give the engine’s internal temperatures a chance to even out and stabilize at its new speed and operating temperature.*
3. After you do begin leaning, lean very slowly. Observe a gradual rise in EGT and a gradual drop in fuel flow. Turn the knob at a very, very slow rate. How slow? Here is a guideline: if at any time you stop turning the knob, the EGT gauge needle should instantly freeze. It should not continue to move. If it continues to move after you have stopped turning the knob, then you were turning the knob too fast – I.E., leaning the mixture too fast and therefore causing the engine to heat up too fast.
4. Continuing to work very slowly, identify peak EGT, or the leanest mixture on which the engine will run smoothly. Do not continue to lean until the engine gets rough. That’s too much.
5. Once you have identified peak EGT, enrich the mixture slowly until you are operating at 100 degrees cooler than peak EGT. (The large calibration lines on the EGT gauge represent 100-degree increments and the small calibration lines represent 25-degree increments.)

Remember that you are causing temperature changes inside the engine of 200° F or more. Doing it rapidly – enriching or leaning too much or too fast – is incredibly brutal to the equipment. At the very least, it leads to expensive and avoidable extra maintenance. And at the worst, it can lead to a sudden and total power failure at a critical phase of flight.

On an average day with an average load in an average airplane, after leaning as described just now you can expect to be indicating a fuel burn of about 100 pounds per hour, which is about 17 gallons per hour. Obviously, this will vary tremendously from airplane to airplane and from day to day, depending upon the circumstances. When in doubt, always try to err on the rich side. Remember: “Fuel is cheap compared to the price of engine components and very cheap compared to the price of an airplane!”

*Avoid leaning in a climb unless the engine begins to run rough. Then lean gradually and cautiously as required to maintain smooth engine operation.
DESCENT PLANNING [PROCEDURE]

You will not always be able to choose the airspeed, rate or commencement point for your final descent to the airport – it will often be assigned by ATC. In many cases, however, you will be able to choose (besides, it never hurts to ask), and at such times there are certain methods which will 1.) improve your average groundspeed and therefore your time enroute and 2.) help to reduce the repetitive thermal stress on the airplane’s engine to ensure continued performance and reliability.

When it comes to descent planning, many less experienced pilots often tend to start their descents too late and then descend at very high airspeeds and relatively low power settings – essentially diving at the airport. This is very hard on engines because it leads to rapid and uneven cooling of their internal components.

It is also detrimental to your overall average groundspeed for the leg to do this because although you are going very fast, you are not going very fast for a very long period of time. Plus, much of your speed is vertical rather than horizontal. A much better way to plan a descent is to start it earlier and then “milk” the descent for a good long time, maintaining a slightly higher airspeed for a prolonged period. Mathematically, this increases your average groundspeed much more than a short, fast dive. It is therefore good for your time enroute. Also, this kind of descent is much gentler on the engine, because you can maintain a cruise power setting and a moderate airspeed. This mitigates or even virtually eliminates the rapid cooling effects.

This is the official Flight Express recommended policy for descent planning in any situation where the descent will be up to your discretion. You will find that this rule of thumb is highly effective.

Take your altitude and cut it in half. Knock off the last two zeros. That is the approximate number of miles out that you want to start your descent.

*Example:* You are at 8,000 feet. Cut that number in half and you get 4,000. Knock off the last two zeros and you get 40 . . . So plan to start your descent about 40 miles out.

At a cruise descent groundspeed of 160 knots it will take you about 13 minutes and 8 seconds to fly 35 miles. At 500 feet per minute you will descend 6,562.5 feet during that time. Five miles out you will be passing through 1,437 feet. If you execute your in-range flow at this time and slow down to 120 knots you will have about 2 and a half minutes to gently lose the remaining 437 feet and then gracefully enter the traffic pattern 1,000 feet above the ground (15:38 total).

Compare this to the experience of a pilot who flies the first 30 miles at his normal cruising speed of 140 knots and then dives steeply to the airport at 180 knots for the last 10 miles. It will take him about 12 minutes and 51 seconds to go the first 30 miles and then about 3 minutes and 20 seconds to cover the last 10 miles (16:11 total). A.) This kind of high-speed / low-power descent was very abusive to the engine and may dramatically shorten its life. B.) It actually took him slightly longer to get there. C.) He is now right over the airport doing 180 knots across the ground – it will be difficult to make a smooth transition into the pattern. He may have to do S-turns or even a couple of 360s just to get slowed down enough to lower his gear and flaps . . . not a safe practice nor an efficient use of company time.
As far as the actual descent procedure, leave the power at the cruise setting – 2,400 RPM and 24” MP – and then slowly, smoothly, gently and slightly lower the nose to ease into a 160-knot descent. This will eventually yield a stabilized descent rate of about 500 feet per minute. Adjust as needed. (If you dump the nose over aggressively, it will be much harder to maintain a steady, stabilized descent at a constant airspeed and a constant rate; the plane will tend to “stair-step” instead, alternately diving and then leveling off as airspeed builds.)

As you descend, you must do two things. First, steadily but gradually enrich the mixture to compensate for increasing atmospheric density. (If you fail to do this, the mixture will get leaner and leaner, which means that the engine will get hotter and hotter, which can lead to pre-ignition, detonation and engine stoppage.) A rate of about ½ turn to ¼ turn seems to work in most cases; plan it so that you are operating at nearly fully rich by the time you reach about 3,000 feet. And second, steadily and smoothly reduce throttle to maintain 24” MP. (If you fail to do this, the MP will climb and climb until it is unacceptably high, well outside of the normal operating range.)

DO NOT neglect to enrich the mixture as you descend, but also DO NOT slam the mixture control knob all the way forward all at once! This internally shock-cools the engine.

DO NOT start the engine and immediately apply high power settings. Give the engine time to warm up and the oil time to fully circulate. Keep the throttle set to 1,000 RPM for at least a minute or two after start.

DO NOT shut down immediately after running at high power settings. Allow the engine time to cool at idle. Taxiing at a reduced throttle setting is an acceptable way to accomplish this.

Descent Planning for Engine Protection and Time Management

START – airplane at 10,000 feet

* Waited too long.
* Steep, high-speed, low-power descent.
* Much of the speed is vertical. ↑
* Not descending for very long. ↓
* Very hard on the engine.

START – airplane at 10,000 feet

* Started descent earlier.
* Normal power setting.
* Slightly higher airspeed for a long time.
* Most of the speed is horizontal across the ground.
Fuel Management [PROCEDURE]

In most of the airplanes in our fleet, there are three positions for the fuel selector valve: LEFT, RIGHT and OFF. *You must switch tanks in flight.* When and how often you switch is left up to your discretion.

It is highly recommended that you write down the time you take off and then write down the time again whenever you switch from one fuel tank to another. This is the only reliable way to keep track of fuel consumption. *DO NOT* put your trust exclusively in the fuel gauges, which may not be accurate.

Manufacturer/FAA Requirement: *You must take off and land on the FULLER fuel tank.*

CAUTION: If you run a fuel tank dry in flight, simply switching to the other tank may not cause the engine to restart. It may be necessary to run the electric auxiliary fuel boost pump for several seconds to restore power. See the engine failure procedure on page 32 for more.

CAUTION: If the engine-driven fuel pump fails, the engine may stop developing power. Gravity cannot provide an adequate flow rate to keep the engine supplied with fuel, especially at higher power settings. Use of the electric auxiliary fuel boost pump may be necessary. Use the left / red / high side for higher power settings and the right / yellow / low side for lower power settings. The left / red / high side of the split rocker switch is spring-loaded to the OFF position in most of our 210s; it will automatically default to OFF when you release it. The right / yellow / low side will remain ON until you turn it off.
In-Range [FLOW]

1. taxi, landing and strobe lights – ON
2. landing gear – TO DO
3. throttle – 17” MP (This is an initial power setting only. See note 3 below.)
4. prop – TO DO
5. mixture – RICH
6. flaps –
   A. Verify / vocalize: “Airspeed below 140.”
   B. extend to 10 degrees (first detent)
7. CHT – normal (Always check the CHT gauge before reaching for the cowl flap lever.)
8. cowl flaps – CLOSED
9. Run the in-range checklist.

Note 1: The primary purpose to the in-range flow is to start slowing the airplane down – to make a smooth transition from the cruise mode to the approach mode.

Note 2: The in-range flow is normally accomplished about 5-10 miles from the destination airport. It may be done earlier or later, at the pilot's discretion, depending upon the situation. For example, if ATC asks a pilot to maintain a high airspeed for sequencing with faster traffic the pilot might elect to defer the in-range flow until closer to the airport. On the other hand, if the pilot knows that he or she will be number ten following numerous slower airplanes, it might make sense to do the in-range flow farther out. In any case, the airplane should be in the in-range configuration prior to commencing the actual approach. Doing it too soon may cause you to run behind schedule; doing it too late may leave you overloaded and behind the airplane.

Note 3: The power should be retarded to 17” MP only until the airplane slows to approach speed (120 knots). Once established at 120, the airplane should be stabilized there. Accordingly, the pilot needs to add some power as necessary (usually about 2-4” MP) to hold 120. This helps make the transition to a precision or non-precision approach descent smoother and easier.
**TBGUMPS [FLOW]**

1. T – time *(Start time at the final approach fix, if needed.)*
2. B – brakes, tap *(Check for equal resistance, pump them up.)*
3. G – gas, on fuller tank *(If not already on the fuller tank, switch.)*
4. U – undercarriage:
   - A. Vocalize: *“Airspeed below 140.”*
   - B. Select gear handle – DOWN and vocalize: *“Gear in transit.” (Use those precise three words. Don’t say “gear down.”)*
   - C. Verify / vocalize: *“Green light – ON.”*
   - D. Verify / vocalize: *“Hydraulic power pack – OFF.”*
   - E. Verify / vocalize: *“One in the window.”*
5. M – mixture, RICH
6. P – prop, FORWARD *(Dial it in slowly and smoothly; do not jam it.)*
7. $S_1$ – seat belt and shoulder harness, SECURE
   - $S_2$ – switches (for the exterior lights), ON as needed

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*Note 1:* TBGUMPS will be performed at the final approach fix or final approach point during an instrument approach.
*Note 2:* During a visual approach, TBGUMPS can be performed at the pilot’s discretion.
*Note 3:* Although TBGUMPS does appear as a checklist as well as a flow, it is not necessary to run the checklist if the flow was completed successfully. *(We would rather have your attention on flying the final approach.)* If the flow was not completed correctly or if the pilot isn’t sure, however, then the checklist should be utilized as a backup.

**Avoidable gear-up accidents ruin careers, wreak havoc with equipment and cost this company incredible, staggering amounts of money. Pilot candidates who do not take the flow above very seriously and execute it carefully and with religious consistency will be subject to discontinuation.**
Normal Visual Final Approach  [PROCEDURE]
⇒ below 105 KIAS, flaps – DOWN to 20 or 30 degrees, as desired
⇒ final approach / best glide speed – 85 KIAS
⇒ Touch down smoothly on the main wheels only first, in a nose-high attitude, without bouncing or ballooning, at the approximate stalling speed, on the runway centerline.

DO NOT CLEAN UP THE AIRPLANE UNTIL YOU COME TO A COMPLETE STOP CLEAR OF THE RUNWAY.

Cleaning Up the Airplane After a Full-Stop Landing  [FLOW]
1. “Lights:” taxi, landing and strobe lights – OFF  (unless the taxi light is still required)
2. “Camera:” transponder – STANDBY
3. “Action I:” flaps – ZERO
4. “Action II:” cowl flaps – OPEN
5. Run the after landing checklist.

Landing Hint 1: Unless you are very tall, if you can see the runway clearly over the top of the instrument panel during the landing flare then you have probably not raised the nose enough yet.

Landing Hint 2: There should be a brief but distinct pause between the moment the mains touch the runway and the moment the nose wheel touches the runway.

Landing Hint 3: The brakes on a Cessna 210 Centurion are EXTREMELY effective, so much so that Flight Express frequently has problems with pilots ruining brand-new (or nearly new) tires because they applied the brakes too soon during the landing rollout – often in an attempt to clear the runway before the airplane had adequately slowed down. This is very expensive to the company!

Pilots are always amazed at how easy it is to burn a flat spot (or even a hole) in a 210 tire. All it takes – literally – is a slight “tap” on the brakes when the airplane is rolling at a fairly high speed. This can lead to a disabled airplane. Worse, it can lead to an airplane spinning out of control and winding up in a ditch or upside-down. Very experienced pilots have found themselves in this position simply because they underestimated the grabbing power of a 210’s brakes.

Here is a tip which, if you follow it, will prevent you from ever having this embarrassing situation happen to you:

Do not use the brakes AT ALL – keep your heels on the deck and your toes on the bases of the rudder pedals – until you can pull the yoke to the full-aft position and it actually hits the back stop.

At this point the full weight of the airplane in on the main landing gear and it is safe to apply the brakes. (Smoothly applying “up” elevator during the landing rollout has the additional advantage of providing maximum aerodynamic deceleration prior to using the brakes.) If you don’t feel like you can get the yoke all the way to the full-aft position without causing the airplane to “pop” into the air, then the wings are still producing significant lift and brake use would likely lead to tire damage.
FINAL GLIDE

Although there is no specific FAA or company requirement that you be able to glide to a landing while in the pattern or on final approach, it is widely regarded as a good idea from a common sense standpoint. After all, it’s a shame not to be able to reach the runway when your engine stops running and you are only a mile or two from the airport!

Because the 210 has an extremely steep glide angle (especially in the landing configuration – full flaps, gear down, prop forward), if you want to be able to reach the runway without power you will need to come in much higher and closer on final than you otherwise would.

When transitioning into the 210, pilots almost always tend to come in too shallowly at first, starting their descents too early and pulling the power back too much. This puts them in a bad position: low and slow and too far from the runway, having to add quite a lot of power just to reach the threshold. A loss of available thrust at such a moment could lead to an off-field landing or perhaps even a crash. In any case, it will certainly not lead to a stabilized approach. In order to avoid this, wait to start your descent until you are relatively close to the runway – defining “close” here as more or less within a reasonable gliding range. You might be surprised by how steeply the 210 glides at 85 knots! (On a 1-mile final, if a 172 Skyhawk were at 1,000 feet it could glide power-off right past the whole airport – but a 210 will glide – maybe “plummet” would be a better word – straight to the numbers from the same place.) This does not mean you should go crazy and come in ridiculously high on every approach. It just means that you shouldn’t pull the power to idle abeam the numbers downwind and expect to make the runway without adding a lot of power.

SAVING THE BRAKES AND TIRES ON LANDING

In addition to our suggestion for waiting until full “up” elevator is applied before using the brakes during the landing rollout, we also strongly recommend landing with full (30°) flaps whenever practical in order to touch down with the lowest possible groundspeed. Many of our brake meltdowns, tire blowouts and other related problems have occurred when the pilot simply flew the final approach too fast. Good landings result from good approaches. Manage your final approach speed well and a normal landing is more likely to be the outcome. Obviously, if the wind is very strong or gusty or blowing directly across the runway then landing at a higher-than-normal airspeed with a reduced flap setting is preferable.
Short-Field Takeoff [PROCEDURE]
1. Taxi to the very beginning of the available runway and hold the brakes.
2. Smoothly apply full power; hold elevator for a slightly nose high / tail low position – just aft of neutral
3. check manifold pressure – maximum available
4. check tachometer – 2850 RPM
5. check engine instruments (CHT, oil temperature and oil pressure) – GREEN
6. (If any of the above items appears questionable, abort the takeoff)
7. Release the brakes for maximum acceleration and confirm airspeed indicator – active.
8. $V_r$ (71 KIAS) – rotate
9. Pitch up smoothly but aggressively for a $V_x$ (75 KIAS) climb.
10. Wait until all obstacles are cleared. (Your instructor will let you know.)
11. Smoothly relax back pressure on yoke, allow the nose to smoothly fall to a $V_y$ (97 KIAS) climb attitude.

Raising the Landing Gear After the Short-Field Takeoff [FLOW]
(The items enclosed in quotation marks below MUST be vocalized using the EXACT WORDS SHOWN.)
1. Verify / vocalize: “Positive rate of climb on two instruments.”
2. Verify / vocalize: “Clear of all obstacles.”
4. Lightly apply the brakes to stop the wheels from spinning. “Tap brakes.”
5. Select gear handle – UP and vocalize: “Gear in transit.” (Use those precise three words.)
8. Verify / vocalize: “Gear up and locked.”

(Flaps may be retracted as soon as your airspeed reaches 80 knots. This may occur midway through the gear retraction.)
Short-Field Approach and Landing [PROCEDURE]

⇒ Perform the TBGUMPS flow earlier than usual to give the airplane extra time to slow down.
⇒ below 105 KIAS / inside the white arc: flaps – DOWN to 30 degrees
⇒ short field final approach speed – 71 KIAS (tolerance +5 / -0)
⇒ Aim for a visual touchdown point about 50-100 feet short of the runway threshold.
⇒ Touch down smoothly on the main wheels only first, in a nose-high attitude, without bouncing or ballooning, at the approximate stalling speed, on the runway centerline.
⇒ Smoothly pull the yoke back, using “up” elevator for maximum aerodynamic braking.
⇒ DO NOT apply the brakes until you can get the yoke all the way to the full-aft position and it hits the stop. There is a tendency to stomp on the brakes too soon during short-field landings, and this often leads to flat spots or blowouts.
⇒ Bring the airplane smoothly to a complete stop, remaining on the runway centerline until ready to exit the runway.

Note 1: The Cessna 210 does not “like” to fly at 71 knots, and may feel a bit mushy, unstable or “squirrelly” at this speed. Accordingly, if you err you should tend to err on the high side.
Note 2: If it looks like you are going to land on the numbers based on a “laser beam” line-of-sight from your eyeballs down your descent path, then you are going too long. Your visual aiming point should lie short of the threshold. See figure 4 on page 18.

The short-field approach and landing procedure MUST be used any time a land and hold short clearance has been accepted, regardless of the amount of available runway.
In figure 1, the pilot maintains level flight until clear of the obstacle and then pulls back sharply on the power to swoop down to the runway. This is a dangerous practice that puts the airplane in a vulnerable position. It may also cause extremely hard landings.

In figure 2, the pilot aims for the numbers with an excessively shallow approach angle and strikes the obstacle. This type of accident is very common at night in poorly lit areas, especially when shooting non-precision approaches in low-visibility conditions. Moreover, an excessively shallow approach can lead to this kind of CFIT incident even when the runway is not especially short.

In figure 3, the pilot overcompensates for the presence of the obstacle by coming in high above it. On a short runway, this could mean a choice between a go-around and an overrun.
In figure 4, the pilot uses the correct short-field approach and landing procedure from page 21 of this handbook. Aiming for a visual touchdown point (represented by the X) just slightly short of the runway threshold allows for the longitudinal displacement which will inevitably occur during the roundout prior to the flare. The final glide, while slow, is steep enough that the airplane is continuously in a position to reach the runway even if the power fails. The final approach speed is steady at about 71 KIAS (+5 / -0) and the descent rate is stable. (Although the vertical scale is exaggerated here for emphasis, the final approach will be quite steep.)

Again, the key element here is a STABILIZED final approach at a CONSTANT airspeed, a CONSTANT glide path and a CONSTANT descent rate.
No-Flap Final Approach  [PROCEDURE]

⇒ Adjust pitch and trim to maintain a final approach speed of 90 knots. (This will require an unusually nose-high pitch attitude; be ready for an unfamiliar sight picture.)
⇒ Adjust throttle to control your descent rate to the runway.
⇒ Touch down smoothly on the main wheels only first, in a nose-high attitude, without bouncing or ballooning, at the approximate stalling speed, on the runway centerline. Be prepared for a longer, faster rollout and consciously refrain from using the brakes too early or too aggressively.

Note 1: The final approach “sight picture” will look a bit different during a no-flap approach because of the abnormally nose-high pitch attitude required to maintain 90 knots. The tendency is for a pilot to want to lower the nose to get a better view of the runway ahead. If the pilot succumbs to this temptation, however, the airplane will build up a very high speed very quickly and a normal landing may be difficult.

Note 2: Try to discipline yourself to use small, slow, smooth throttle changes to regulate your descent rate to the runway while holding 90 knots using pitch.

Note 3: If this technique is used and the airplane enters ground effect at about 90 knots, there will be no noticeable difference in the landing characteristics.

Note 4: Under normal circumstances there is no reason to land without flaps. This method should therefore only be used in the event of a flap failure. When landing in extremely gusty conditions, a much higher approach speed is advisable.

Touch and Go  [FLOW]

1. cowl flaps – OPEN
2. wing flap switch – to the zero detent, then to the ten-degree detent.*
3. mixture – RICH
4. prop – FORWARD
5. throttle – FULL

* The purpose of this is to ensure that the flaps are properly set at ten degrees before power is applied.
Part III. Air Work

All airspeeds shown are indicated airspeeds. In all air work maneuvers, smoothness, accuracy and precision are much more important than speed. Take your time and proceed carefully.

Steep Turns [CONFIGURATION FLOW]

1. taxi, landing and strobe lights – ON
2. gear – up and locked ("amber light – ON, hydraulic power pack – OFF")
3. throttle – retard to about 17” MP
4. prop – 2400 RPM
5. mixture – RICH
6. flaps – UP
7. CHT – normal (Always check the CHT gauge before reaching for the cowl flap lever.)
8. cowl flaps – OPEN
9. Ask the instructor about clearing turns. (He will then give you headings.)
10. Perform the maneuver as directed by your instructor.

Note 1: Ensure that your airspeed is stabilized prior to commencing the first steep turn.
Note 2: Announce what airspeed you intend to use as your reference airspeed.
Note 3: It will require an additional 1-2” MP of power to maintain your airspeed during this maneuver.
Note 4: Do not exceed $V_A$ during this maneuver.

STANDARDS FOR SATISFACTORY PERFORMANCE: You must maintain a 45-degree angle of bank +/- 5 degrees, hold your altitude +/- 100 feet, hold your reference airspeed +/- 10 knots and roll out on your entry heading +/- 10 degrees while keeping the ball centered at all times.
(Be aware that the instructor may direct you to enter slow flight clean or slow flight dirty from normal cruising flight. He may also direct you to make the transition directly from slow flight clean into slow flight dirty. All three flows are presented on the following two pages.)

**Slow Flight Clean  [CONFIGURATION FLOW]**
1. taxi, landing and strobe lights – ON
2. gear – up and locked (“amber light – ON, hydraulic power pack – OFF”)
3. throttle – retard to about 17” MP
4. Dial the prop control all the way forward slowly and smoothly.
5. mixture – RICH
6. flaps – UP
7. CHT – normal (Always check the CHT gauge before reaching for the cowl flap lever.)
8. cowl flaps – OPEN
9. Ask the instructor about clearing turns. (He will then give you headings.)

*Note 1: When told to enter slow flight clean, first complete the configuration flow and then gradually retard the throttle until you reach 70 knots.*
*Note 2: Turn slowly and smoothly to headings as directed by the instructor.*
*Note 3: It will require maximum nose-up trim to comfortably perform this maneuver. Don’t be shy with the trim wheel.*

**STANDARDS FOR SATISFACTORY PERFORMANCE:** You must maintain your 70-knot airspeed +/- 5 knots, hold your altitude +/- 100 feet and hold your assigned heading +/- 10 degrees while keeping the ball centered at all times.
Transition From Slow Flight Clean to Slow Flight Dirty  [CONFIGURATION FLOW]

1. flaps – 10 degrees
2. gear –
   A. Vocalize: “Airspeed below 140.”
   B. Select gear handle – DOWN and vocalize: “Gear in transit.” (Use those precise three words.)
   C. Verify / vocalize: “Green light – ON.”
   D. Verify / vocalize: “Hydraulic power pack – OFF.”
   E. Verify / vocalize: “One in the window.”
3. flaps –
   A. Verify / vocalize: “Airspeed below 105.”
   B. extend first to 20 and then all the way to 30 degrees

Allow the airplane to smoothly slow down to 60 knots.

STANDARDS FOR SATISFACTORY PERFORMANCE: You must maintain your 60-knot airspeed +/- 5 knots, hold your altitude +/- 100 feet and hold your assigned heading +/- 10 degrees while keeping the ball centered at all times.

Entry to Slow Flight Dirty from Cruise  [CONFIGURATION FLOW]

1. taxi, landing and strobe lights – ON
2. gear –
   A. Vocalize: “Airspeed below 140.”
   B. Select gear handle – DOWN and vocalize: “Gear in transit.” (Use those precise three words.)
   C. Verify / vocalize: “Green light – ON.”
   D. Verify / vocalize: “Hydraulic power pack – OFF.”
   E. Verify / vocalize: “One in the window.”
3. throttle – retard to about 17” MP
9. Dial the prop control all the way forward slowly and smoothly.
10. mixture – RICH
11. flaps –
   A. Verify / vocalize: “Airspeed below 140.”
   B. extend to 10 degrees (first detent)
   C. Verify / vocalize: “Airspeed below 105.”
   D. extend first to 20 and then all the way to 30 degrees
12. CHT – normal  (Always check the CHT gauge before reaching for the cowl flap lever.)
13. cowl flaps – OPEN
14. Ask the instructor about clearing turns.  (He will then give you headings.)

Note 1: When told to enter slow flight dirty after completing the configuration flow, gradually retard the throttle until you reach 60 knots.

Note 2: Turn slowly and smoothly to headings as directed by the instructor.

STANDARDS FOR SATISFACTORY PERFORMANCE: You must maintain your 60-knot airspeed +/- 5 knots, hold your altitude +/- 100 feet and hold your assigned heading +/- 10 degrees while keeping the ball centered at all times.
Power-Off (Approach to Landing) Stall  [CONFIGURATION FLOW]

1. taxi, landing and strobe lights – ON
2. gear –
   A. Vocalize: “Airspeed below 140.”
   B. Select gear handle – DOWN and vocalize: “Gear in transit.” (Use those three words.)
   C. Verify / vocalize: “Green light – ON.”
   D. Verify / vocalize: “Hydraulic power pack – OFF.”
   E. Verify / vocalize: “One in the window.”
3. throttle – retard to about 17” MP
4. Dial the prop control all the way forward slowly and smoothly.
5. mixture – RICH
6. flaps –
   A. Verify / vocalize: “Airspeed below 140.”
   B. extend to 10 degrees (first detent)
   C. Verify / vocalize: “Airspeed below 105.”
   D. extend first to 20 and then all the way to 30 degrees
7. CHT – normal  (Always check the CHT gauge before reaching for the cowl flap lever.)
8. cowl flaps – OPEN
9. Ask the instructor about clearing turns.  (He will then give you headings.)

Stabilize the airplane in an 85-knot power-off descent.  When directed by the instructor, smoothly raise the nose to bleed off airspeed and induce a stall. Smoothly recover once the stall occurs or at the first warning sign, as directed by the instructor. Watch out for strong torque and P-factor when advancing the throttle at a low airspeed; be ready to apply heavy right pedal pressure.

Power-Off Stall Recovery / Power-On Stall Recovery / Go Around  [EMERGENCY FLOW]

1. Pitch for a level flight attitude. (The nose should initially be on the horizon, not above it or below it.)
2. Smoothly apply full power. (1 and 2 happen simultaneously!)
3. Immediately retract the flaps to the takeoff (ten-degree) position if they aren’t already there.
4. WAIT for a positive rate of climb to register on two instruments.
5. Select gear handle – UP and vocalize: “Gear in transit.” (Use those precise three words.)
8. Verify / vocalize: “Gear up and locked.”
9. flaps – ZERO
10. Pitch for a V_Y (97 KIAS) climb.
11. Pause for a moment, then perform the climb flow.

Note 1: In the Cessna 210 Centurion, it is very important to get the flaps immediately to the takeoff (ten-degree) position to minimize drag and maximize lift when making the emergency transition from a descent to a climb. Do not “milk” the flaps slowly from 30 to 20 to 10 degrees.
Note 2: The procedure for a go-around is essentially identical to the procedure for a power-on or power-off stall recovery.
Note 3: One of the quirks of the Cessna 210 is that it will not climb AND accelerate while in the fully “dirty” configuration, even at full power. It may do one or the other, but it cannot do both right away. And in some situations, such as a hot, humid day when operating at close to maximum gross weight, it may not be able to do either.
Note 4: It is highly recommended that you practice this procedure until it is second nature, because many fatal accidents have occurred in the Cessna 210 when the pilot attempted a go-around by merely adding full power and pitching up without cleaning up the airplane. In such a scenario, the airplane will either slow down until it stalls or else simply “mush” into the ground or obstacles.
**Power-On (Takeoff and Climb) Stall**  
[CONFIGURATION FLOW]

1. taxi, landing and strobe lights – ON
2. gear –
   A. Vocalize: **“Airspeed below 140.”**
   B. Select gear handle – DOWN and vocalize: **“Gear in transit.” (Use those three words.)**
   C. Verify / vocalize: **“Green light – ON.”**
   D. Verify / vocalize: **“Hydraulic power pack – OFF.”**
   E. Verify / vocalize: **“One in the window.”**
3. throttle – 17” MP
4. Dial the prop control all the way forward slowly and smoothly.
5. mixture – RICH
6. flaps –
   A. Verify / vocalize: **“Airspeed below 140.”**
   B. extend to 10 degrees (first detent)
7. CHT - normal (Always check the CHT gauge before reaching for the cowl flap lever.)
8. cowl flaps - OPEN
9. Ask the instructor about clearing turns. (He will then give you headings.)

Ask the instructor about clearing turns. (He will then give you headings.)

When the airplane reaches 80 KIAS (the published entry speed for this maneuver), **smoothly** apply full power and **gently** pitch up for an unsustainable climb attitude. Try to stall the airplane before you climb more than 1,000 feet if you can, but **DO NOT** whip-stall the airplane! Moreover, keep the ball centered at all times! (This prevents a spin, for which 210s are **not** approved.) Maintain your heading +/- 10 degrees throughout the climb, the stall and the recovery.

See the previous page for the recovery procedure.

**NOTE:** A commonly asked question regarding go-arounds or recoveries from stalls is “how soon and how much can I raise the nose after applying power?” If you raise the nose too much or too fast you can place the airplane dangerously close to a primary or secondary stall. If you raise the nose too little or too slowly, however, you will not quickly establish a positive, healthy climb. So here is the answer, which applies almost universally to almost all airplanes.

*From the moment you initiate the go-around or stall recovery until you are established in a V, climb, the airspeed should steadily increase and further altitude loss should be avoided.*

If the airspeed stays the same or even begins to decrease prior to that point, you are raising the nose too fast.

If your altitude stays the same or even begins to decrease after commencing the maneuver, you are not raising the nose fast enough.
Part IV. Emergencies

Electrical Charging System Failure

Run the electrical charging system failure checklist.

(There is nothing to memorize here. Read each item out loud, verifying it carefully before proceeding to the next item on the checklist. Do not rush and do not assume. Refer to the amplification below for more detail.)

- Only simulate cycling the master switch. (The purpose of doing this in real life would be to reset the overvoltage sensor, in case it had sensed a power surge and tripped the alternator off-line.)

- Assuming that the instructor tells you that the ammeter continues to indicate a battery discharge and the voltage warning light continues to glow after you have checked the alternator circuit breaker and cycled the master switch, briefly discuss what electrical appliances may be turned off under various circumstances. For example, if you are five minutes away from your destination on a VFR day, you might not turn anything off. If you are an hour away from the nearest suitable airport on an IFR night, however, you might consider turning almost everything off. Remember that in an emergency you can violate the regulations to the extent necessary to meet the emergency. You may even choose to temporarily turn off both comm. radios and your transponder if you felt such a decision was justified.

- When the checklist calls for you to pull the hydraulic power pack circuit breaker, go ahead and actually do it.

- The electrical charging system failure checklist will, in training, always lead straight into the manual gear extension checklist.

- Thus, for training purposes, you will go ahead and extend the gear manually at this time.

- Follow the manual gear extension checklist verbatim, carefully vocalizing all items.

- It may be necessary to reduce power to get below 140 KIAS prior to beginning the extension. (As soon as the landing gear is out of the wells, however, you may restore the power to 24/24. It is impossible for the 210L to exceed 140 KIAS in level flight once the gear is partially out.)

- While pumping, remember that there is no need to hurry. The whole point of extending the gear manually now instead of shortly before landing is to avoid having to rush while in an already potentially distracting and stressful situation.

- Once the gear is down and locked and you have stowed the manual extension lever, vocally confirm that you have completed the checklist.

- You must maintain your altitude +/- 100 feet and your heading +/- 10 degrees throughout this demonstration. (The judicious use of throttle and trim will help greatly here.)
Vacuum Pump Failure

Run the vacuum pump failure checklist.

(There is nothing to memorize here. Read each item out loud, verifying it carefully before proceeding to the next item on the checklist. Do not rush and do not assume. Refer to the amplification below for more detail.)

- Assume, for training purposes, that you are in IMC (even when flying visually).

- Consult the Standby Vacuum System chart and show the instructor how you would determine what maximum power setting you could maintain and still be able to achieve the 3.5” Hg of suction needed to spin the gyroscope rotors at an adequate speed to make them usable for IFR.

- Explain how you would then make a decision as to whether to use the SVS or fly partial panel based on this information.

- Do not actually activate the SVS. (Doing this in flight would damage the vacuum pump. It should never be done except in a real emergency.)

- Configure the airplane for partial panel flying when the checklist prompts you to do so. (This includes a power setting of 20” MP, a flap setting of 10 degrees and the gear down.)

- Perform timed or magnetic compass turns as directed by the instructor. You must be able to consistently turn to a heading +/- 10 degrees while maintaining an altitude +/- 100 feet.
Engine Failure  [EMERGENCY FLOW]

1. Immediately slow to 85 KIAS and trim for it.  (See note 1 below.)
2. Turn towards the nearest suitable landing field.  (If under the hood, maintain your heading.)
3. fuel gauges – CHECK
4. engine instruments – CHECK
5. fuel selector valve – SWITCH TANKS  (You will actually do this.)
6. mixture – RICH
7. prop – FORWARD
8. throttle – HALFWAY IN  (Simulate this.)
9. mags – BOTH
10. electric aux. fuel pump – RUN and COUNT for seven seconds:  “One one thousand, two one thousand” etc.  (Simulate this.)
11. master switch – verify ON
12. Run the engine failure checklist.

If your instructor tells you that the engine does not restart after you have completed the engine failure flow and the engine failure checklist, then immediately proceed with the engine secure flow as follows:

Engine Secure  [EMERGENCY FLOW]

1. fuel selector valve – OFF  (Simulate this.)
2. mixture – OUT  (Simulate this.)
3. prop – OUT  (Simulate this.)
4. mags – OFF  (Simulate this.)
5. electric aux. fuel pump – OFF
6. master switch – TO DO
7. Run the forced landing checklist.

Note 1:  You do not need to allow the airplane to begin losing altitude until you have reached your best glide speed.  Maximize your time aloft as well as your options!
Note 2:  For training standardization purposes, as soon as the forced landing checklist prompts you to do so, actually lower the gear and actually lower the flaps all the way to 30 degrees.  In reality, obviously, you might defer these items or even decide not to do them – if you were going to land on a swampy surface, for example, you might elect to leave the gear up.  And if you were trying to maximize your glide performance, you might not lower the flaps until close to the ground.  But again, for the sake of training standardization and uniformity of evaluation, you will lower the gear and lower the flaps all the way to 30 degrees as soon as the forced landing checklist prompts you to do so.
Note 3:  Simulate turning off the master switch and unlatching the doors.
Note 4:  You must complete both flows and both checklists prior to reaching 1,000 feet AGL for a satisfactory demonstration.  Your instructor will not allow this practice maneuver to go below that altitude.  Execute a go-around when directed.  (See page 23 for the go-around procedure.)
Note 5:  The purpose of placing the throttle in the halfway position is to provide correct fuel metering when running the electric auxiliary fuel boost pump for the sake of obtaining a restart.
**Engine Fire [EMERGENCY FLOW]**

1. mixture – IDLE CUTOFF  (*Simulate this. Your instructor will then pull the throttle to idle.*)
2. gear – DROP
3. flaps – 10 degrees
4. dive – MINIMUM 120 / MAXIMUM 140 (Target about 130.)
5. Run the *engine fire in flight* checklist.

Note 1: *Lower the nose smoothly to obtain a dive speed of at least 120 knots but no more than 140 knots – aim for a target speed of about 130 knots. Although this will require a very steep descent, if you smoothly lower the nose as soon as the power drops to idle it will not require a hard pushover.*

Note 2: *As soon as you have correctly completed the engine fire in flight checklist and you are maintaining a dive speed of at least 120 KIAS but not more than 140 KIAS, your instructor will tell you that the fire is out.*

Once the fire is out, **recover from the dive by slowing to a trimmed 85-knot glide** and then:

**Engine Secure [EMERGENCY FLOW]**

1. fuel selector valve – OFF  (*Simulate this.*)
2. mixture – OUT  (*Simulate this.*)
3. prop – OUT  (*Simulate this.*)
4. mags – OFF  (*Simulate this.*)
5. electric aux. fuel pump – OFF
6. master switch – TO DO
7. Run the *forced landing* checklist.

You must complete both the flows and the checklists prior to reaching 1,000 feet AGL for a satisfactory demonstration. Execute a go-around when directed by your instructor.
UNUSUAL ATTITUDES

As a practical matter, there are really only two unusual attitudes: nose-high and nose-low. If you should suddenly look up from what you are doing (reviewing an approach plate, perhaps, or reaching for something in your flight bag) to discover that you are in an unusual attitude, the first place your eyes should go to is the airspeed indicator.

1. If your airspeed is increasing you are in a nose-low unusual attitude.

2. If your airspeed is decreasing you are in a nose-high unusual attitude.

Nose-low Unusual Attitude Recovery [EMERGENCY FLOW]
   1. Smoothly reduce power to idle.
   2. Smoothly level the wings.
   3. Smoothly raise the nose to the level flight attitude.

WARNING – 1 and 2 happen simultaneously. 3 does not happen until after 2, however. Do not pull back on the elevator while the airplane is still in a diving turn! This could overstress the structure and result in a catastrophic failure . . . meaning that you could literally pull the wings off the fuselage!

Load factor increases dramatically with bank angle as shown below.

<table>
<thead>
<tr>
<th>Bank angle:</th>
<th>20°</th>
<th>40°</th>
<th>60°</th>
<th>80°</th>
<th>approaching 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load factor:</td>
<td>1.06 Gs</td>
<td>1.31 Gs</td>
<td>2 Gs</td>
<td>5.76 Gs</td>
<td>greater than 9 Gs</td>
</tr>
</tbody>
</table>

Turbulence increases the load factor even more.

The Cessna 210 Centurion is certificated in the normal category. In other words, it is neither intended nor approved for aerobatic maneuvers. The maximum allowable load factor limits are 3.8 positive Gs and 1.52 negative Gs. (The design load factors are 150% of those values.)

Nose-high Unusual Attitude Recovery [EMERGENCY FLOW]
   1. Smoothly increase power to full.
   2. Smoothly level the wings.
   3. Smoothly lower the nose to the level flight attitude.

These three things can happen more or less at once.
Part V. Instrument Procedures

**ILS approach [INSTRUMENT PROCEDURE]**

- Obtain ASOS, AWOS or ATIS as soon as practical – even if you are 20 miles away or more.

- Correctly tune and identify all navaids required for the approach. Failure to do so constitutes unsatisfactory performance (in accordance with the FAA’s instrument practical test standards).

- Perform the *in-range* flow and then run the *in-range* checklist early enough to be stabilized in the proper approach configuration prior to intercepting the localizer. (This will require good situational and positional awareness, so plan ahead and think carefully.)

- Vocalize “**localizer alive,” “localizer captured,” “glideslope alive”** and “**glideslope captured**” at the appropriate times.

- At *glideslope intercept* (as the needle hits the top of the “donut”), lower the gear to draw the airplane into a stabilized descent. *Then* perform the TBGUMPS flow while descending on the glideslope.

- Initially maintain a power setting of *approximately 19” MP*, adjusting as necessary to maintain a **120-knot** indicated airspeed. (This will yield a stabilized descent at **600 FPM**, which will put you on a 3-degree glideslope in a no-wind condition.) Make small, smooth pitch adjustments to remain on the glideslope.

- The ILS will be flown all the way down to the decision height. Do not go visual unless directed to do so by your instructor.

- Starting at 500 feet above the DA, begin altitude callouts every 100 feet. Use the following format: “leaving [altitude] for [DA]”

  **EXAMPLE:**
  - “Leaving 800 for 310.” – or – “500 to go”
  - “Leaving 700 for 310.” “400 to go”
  - “Leaving 600 for 310.” etc. “300 to go” etc.

  Note: *The first method above is strongly recommended because in the excitement and distraction of an actual instrument approach it is very easy to do the mental math wrong with respect to the airport elevation and the resulting difference between MSL and AGL. Many pilots have been embarrassed to find themselves saying “300 to go, 200 to go, 100 to go – no, wait a minute, I mean 400 to go . . .”*

- Just like on a real approach, be prepared to go visual and land or to execute a missed approach, as directed.

- If ATC instructs you to maintain a higher or lower airspeed on final, that’s fine – do it. Coming into Orlando Executive or Miami Opa-Locka we are often asked to slow it down to 90 to fit in with local training traffic. Coming into Atlanta Hartsfield or Nashville International, however, we are almost always asked to maintain 160 knots as long as practical. In the absence of special instructions, however, use 120 as a standard final approach speed.
1. Exhibits adequate knowledge of the elements of an ILS instrument approach procedure. _____

2. Selects and complies with the appropriate ILS instrument approach procedure to be performed. _____

3. Establishes two-way radio communications with ATC, as appropriate to the phase of flight or approach segment, and uses proper radio communications phraseology and technique. _____

4. Selects, tunes, identifies and confirms the operational status of ground and aircraft navigation equipment to be used for the approach procedure. _____

5. Complies with all clearances issued by ATC or the examiner. _____

6. Advises ATC or examiner any time the aircraft is unable to comply with a clearance. _____

7. Establishes the appropriate aircraft configuration and airspeed, considering turbulence and wind shear, and completes the aircraft checklist items appropriate to the phase of flight. _____ [Note: in our case, this means accomplishing the IN-RANGE flow and then backing it up with the IN-RANGE checklist prior to intercepting the localizer and then executing the TBGUMPS flow shortly after glideslope intercept.]

8. Maintains, prior to beginning the final approach segment, specified altitude within 100 feet, heading or course within 10° and airspeed within 10 knots. _____

9. Applies the necessary adjustments to the published DH and visibility criteria for the aircraft approach category when required. _____

10. Establishes an initial rate of descent at the point where the electronic glideslope is intercepted, which approximates that required for the aircraft to follow the glideslope to DH. _____ [Note: in our case, this means about 120 knots / 600 feet per minute for a standard 3° glideslope, adjusting as necessary for headwinds or tailwinds, UNLESS otherwise instructed by ATC.]

11. Allows, while on the final approach segment, no more than three-quarter-scale deflection of either the localizer or glideslope indications and maintains the specified airspeed within 10 knots. _____

12. Avoids descent below the DH before initiating a missed approach procedure or transitioning to a normal landing approach.

13. Initiates immediately the missed approach procedure when, at the DH, the required visual references for the intended landing runway are not distinctly visible and identifiable. _____

14. Transitions to a normal landing approach when the aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers. _____
If your instructor directs you to go visual from an ILS approach, use the following procedure to land.

**Landing From an ILS  [INSTRUMENT PROCEDURE]**

- Begin *slowly and smoothly* retarding the throttle to IDLE.  (*Do not* yank it back suddenly.)

- **WAIT** until the airspeed has dropped below 105 KIAS – inside the white arc – and then lower the flaps all the way to 30 degrees.

- **Remain on the glideslope** all the way to touchdown.

- Enter ground effect at about 85 knots and then land normally.

**Note 1:** Since you are at a decision height of about 200 feet and moving across the ground at about 120 knots, you have a lot of speed to lose. You want to lose it gradually, however, as part of a seamless transition from the electronic glideslope to the visual glidepath.

**Note 2:** An easy way to remain on the glideslope all the way to touchdown is to aim visually for the touchdown zone markings and/or the glideslope antenna itself.

**Note 3:** If you follow this procedure correctly, you will enter ground effect at about 85 knots and your roundout, flare and touchdown will be just like any other landing.

**Note 4:** Landing from an ILS is considered by the FAA to be a separate task from the ILS approach.
Non-Precision Approach  [INSTRUMENT PROCEDURE]

⇒ Obtain ASOS, AWOS or ATIS as soon as practical – even if you are 20 miles away or more.

⇒ Correctly tune and identify all navaids required for the approach. Failure to do so constitutes unsatisfactory performance (in accordance with the FAA’s instrument practical test standards).

⇒ Perform the in-range flow and then run the in-range checklist early enough to be stabilized in the proper approach configuration prior to intercepting the final approach course. (This will require good situational and positional awareness, so plan ahead and think carefully.)

⇒ Perform the TBGUMPS flow and simultaneously commence your descent to MDA immediately as you cross the final approach fix or reach the final approach point.

⇒ For a non-precision descent, initially set the power to approximately 15” MP and pitch to maintain 120 KIAS. (This will yield a stabilized 750 FPM rate of descent.)

⇒ To level off at or slightly above MDA, raise the nose to a level flight attitude while smoothly and simultaneously increasing power to about 21” or 22” MP. This will enable you to maintain your altitude as well as your 120-knot airspeed.

⇒ Do not go visual unless directed to do so. Be prepared to land or to proceed to the MAP and then execute a missed approach.
15. Exhibits adequate knowledge of the elements related to an instrument approach procedure. _____

16. Selects and complies with the appropriate instrument approach procedure to be performed. _____

17. Establishes two-way radio communications with ATC, as appropriate to the phase of flight or approach segment, and uses proper radio communications phraseology and technique. _____

18. Selects, tunes, identifies and confirms the operational status of navigation equipment to be used for the approach procedure. _____

19. Complies with all clearances issued by ATC or the examiner. _____

20. Recognizes if heading indicator and/or attitude indicator is inaccurate or inoperative, advises controller, and proceeds with approach. _____ [Note: in our case, this means running the VACUUM PUMP FAILURE emergency checklist and then configuring the airplane for partial-panel flying prior to beginning the approach.]

21. Advises ATC or examiner any time the aircraft is unable to comply with a clearance. _____

22. Establishes the appropriate aircraft configuration and airspeed, considering turbulence and wind shear, and completes the aircraft checklist items appropriate to the phase of flight. _____ [Note: in our case, this means accomplishing the IN-RANGE flow and then backing it up with the IN-RANGE checklist prior to intercepting the final approach course and then executing the TBGUMPS flow at the final approach fix or appropriate final descent point if no FAF is published.]

23. Maintains, prior to beginning the final approach segment, altitude within 100 feet, heading within 10° and allows less than a full-scale deflection of the CDI and maintains airspeed within 10 knots. _____

24. Applies the necessary adjustments to the published MDA and visibility criteria for the aircraft approach category when required. _____

25. Establishes a rate of descent and track that will ensure arrival at the MDA prior to reaching the MAP with the aircraft continuously in a position from which descent to a landing on the intended runway can be made at a normal rate using normal maneuvers.

26. Allows, while on the final approach segment, no more than three-quarter-scale deflection of the CDI and maintains airspeed within 10 knots. _____

27. Maintains the MDA, when reached, within +100 / -0 feet to the MAP. _____

28. Executes the missed approach procedure when the required visual references for the intended landing runway are not distinctly visible and identifiable at the MAP. _____

29. Executes a normal landing from a straight-in or circling approach when instructed by the examiner. _____
BUSTING MDA

Busting MDA is the cardinal sin of IFR flying, and is always an automatic “unsat.” Going more than 100 feet high or even 1 foot low constitutes a violation of the PTS. In the simulated scenario of a practice instrument approach down to minimums, the imaginary ceiling is 100 feet above MDA.

Thus, going more than 100 feet high means that you are back in the clouds and have lost visual contact with the ground. Going even 1 foot low means that you have lost your obstacle clearance and are in imminent danger of colliding with something. Imagine that you are flying inside a cave with a ceiling 100 feet high and a lake of boiling lava below. MDA is not a suggestion or a recommendation; it is an absolute rock-hard deck.

When using the simulator, we set an audible alarm to go off if the plane descends even 1 foot below MDA and we adjust the ceiling to lie 100 feet above MDA so that visual contact with the airport will be lost if the airplane climbs. Unfortunately, we cannot make training in the actual airplane that realistic. Pretend that you are skimming just beneath the base of an overcast layer and that a warning horn is armed to blare at you if you bust MDA, however, and you will have the right idea.

Busting minimums trying to “squeak it in” KILLS PILOTS.
Circling Approach  [INSTRUMENT PROCEDURE]

⇒ DO NOT descend below circling MDA until within about 30 degrees of the extended runway centerline and landing is assured, meaning that a normal final glide to the runway is possible. Most pilots tend to start their descent much too early and way too far out! Wait until you are close to the runway and almost aligned with it.

⇒ When circling at our normal instrument approach speed of 120 knots, use the category B minima and be sure to remain within a 1.5 nautical mile radius of all runway thresholds.

(See AIM 5-4-18, fig. 5-4-19 for more on this.)

⇒ In other words, when circling in actual conditions, keep your pattern high and tight.

⇒ WARNING! Circling approaches are very dangerous, especially at night; the NTSB statistics make this quite clear. Use extreme caution and do it by the book.
Missed Approach  [INSTRUMENT PROCEDURE]

⇒ *Immedieatly* execute a go-around (pages 28 and 29) and initiate your climbout as published or as instructed without delay.

⇒ DO NOT hesitate to establish your initial climb and turn to the appropriate heading (based on the situation) as soon as the decision to go missed has been made. These things must be done right away. A missed approach should be treated as an urgent situation, because it is. Being too slow to execute a missed approach procedure due to confusion or uncertainty can lead to flying into a mountain or a radio antenna tower.

⇒ If visual reference is lost while circling to land, you must begin a climbing turn toward the landing runway and continue the turn until established on the missed approach course. Since circling may be accomplished in different directions using different turns, various patterns may be required to do this. Be ready to follow this procedure if necessary; NTSB statistics clearly show that missed approaches from circling approaches are particularly hazardous.

(See AIM 5-4-19, para. c. for more on this.)
Holding  [INSTRUMENT PROCEDURE]

☞ If holding over or in the vicinity of an airport, obtain ASOS, AWOS or ATIS as soon as practical.

☞ Correctly tune and identify all navaids required for the holding procedure. Failure to do so constitutes unsatisfactory performance (in accordance with the FAA’s instrument practical test standards).

☞ Perform the in-range flow and then back it up with the in-range checklist prior to reaching the holding fix. Again, WE HOLD IN THE IN-RANGE CONFIGURATION. This helps to do two things: 1) slow the airplane and 2) get ready for a possible approach to follow.

☞ Remember that you never want to “hurry to a hold.” If you slow down before you get to the holding fix . . . maybe you won’t have to hold when you get there! Or maybe you’ll only have to make 1 or 2 orbits instead of 6 or 7. In any case, there is no advantage to flying a hold fast.

☞ Select and use a recommended entry procedure (direct, parallel or teardrop) that makes sense and which keeps you within the protected holding pattern airspace. Any entry method is fine as long as it does not take you onto the “wrong side,” into the unprotected airspace.

Remember that the FAA instrument PTS apply to all holds. A hold that is not flown within the FAA PTS is considered unsatisfactory and will have to be repeated.

ALTITUDE: ± 100 feet at all times  
AIRSPEED: ± 10 knots at all times  
ANGULAR DEVIATION: within 10 degrees of the inbound holding course
Part VI. Normal and Emergency checklists (L model)

The normal and emergency checklists for the Cessna 210L Centurion are reprinted on the following two pages. Refer to them when practicing in preparation for the flight training. Normal and emergency checklists are model-specific (each airplane has its own set) and are printed on laminated cards which remain with each airplane. Different checklists exist for the TKS-equipped 210s, turbo 210s etc.

For training standardization purposes, all ground and flight training, as well as all initial and recurrent Part 135 IFR-PIC checkrides, will focus on the normally aspirated L model with a standby vacuum system.

The reason for this is that the V-speeds and maximum structural capacities for an L model may safely be used as “default” procedures in an M or N model. The opposite is not true, however; using N model V-speeds or maximum structural capacities in an L model would be neither safe nor legal. We do not expect you to memorize multiple sets of procedures for variously equipped multiple versions of three different models. Always use the correct model-specific and equipment-specific checklist for the airplane that you are in and you should be fine.

Remember:

- All flow and checklist items will be vocalized. (You must say everything out loud.)
- If an item has already been accomplished as part of a flow, it is not necessary to do it again when running a checklist. (It is still required, however, that the item be vocalized.)

In other words, perform the flow, accomplishing and vocalizing all items, and then pull out the checklist to confirm that you did not miss anything. Read through the checklist out loud, pausing only to accomplish any items which were not accomplished during the flow.

The best way to get ready for flight training is to sit in the airplane (or in front of a cockpit poster) and actually run these flows and checklists over and over, vocalizing all items and reaching for or pointing to the appropriate knobs, levers, dials and switches at the correct times. These exercises will get the flows and checklists into your muscle memory as well as your auditory memory. Learn these procedures thoroughly. They should become instinctive, reflexive and automatic, like counting or reciting the alphabet. Once flight training begins, the flows, checklists and other procedures will become “background noise” while you devote 75% of your mental resources to the physical act of flying the plane, communicating with air traffic control and navigating.

Nothing you ever do, however, should be mindless – this is why you are required to vocalize all items during training and encouraged to vocalize all items even when flying solo. Talking to yourself constantly keeps you focused and on-task, which in turn helps to prevent mistakes and oversights. It also lets the instructor know what your thought process is – i.e., whether you are firmly, confidently and calmly in control or getting overloaded and behind the airplane.
Flight Express
Cessna 210L NORMAL PROCEDURES Training Checklist

**PREFLIGHT ACTION**
- Prop lock – Removed and placed by seat
- Fuel – Visually checked
- Inspection – Complete (green card)
- Paperwork / ATIS / clearance – Complete

**BEFORE STARTING**
- Aft baggage door – Closed
- Straps and belts – None outside
- Doors – Closed and latched
- Seats – Adjusted and locked
- Seat belts and S.H. – Fastened
- Overhead cabin light – Off
- Under-wing courtesy lights – Off
- Eyebrow map light – Off
- Avionics master switch – Off
- Rheostats – Off / on at night
- Pilot heat – Off
- Nav lights – Off / on at night
- Flashing beacon – Off
- Strobe lights – Off
- Taxi and landing lights – Off
- Gear lever – Down
- Autopilot – Off
- Alternate static source knob – In
- Standby vacuum sys. knob -- In
- Propeller control – In
- Cowl flaps – Open
- Fuel selector – Fuller tank
- Hydraulic pump handle – Stowed
- Brakes – Check
- Propeller area – Clear
- Master switch – On
- Low vac. warning light – On
- Fuel gauges – Check
- Landing gear ind. lights – Check both
- Landing gear warn. horn – Check
- Circuit breakers – In
- Hydraulic power pack CB – Locate
- Alternator CB – Locate

**STARTING**
- Prop chain – Confirm off
- Brakes – Hold firmly
- Engine start flow (p.6) – Execute

**AFTER ENGINE START**
- Set RPM – No more than 1,000
- Oil pressure – Green arc within 10 seconds
- Vacuum gauge – Active
- Ammeter – Indicating a charge rate
- Voltage warning light – Out
- Low vacuum warning light – Out
- Starter – Confirm disengaged
- Avionics master switch – On
- #2 comm. radio – Company frequency

**BEFORE TAKEOFF**
- Taxi instrument check – Complete
- Prop blast area – Clear
- Brakes – Hold firmly
- Flight controls – Free and correct
- Horizon – Set
- Allimeter – Set
- Heading indicator – Set
- Trim – Set for takeoff
- Transponder – 1200 or as assigned

**ENGINE RUNUP**
- RPM – 1700
  - Mags – Check
  - Prop – Cycle
  - Elec. sys. – Check (p. 9)
  - Engine instruments – OK
  - Vacuum gauge – Check
  - Low vac. warn. light – Out
- RPM – Idle
  - Standby vac. sys. – Check (p. 9)
- RPM – 1000
  - Windows – Closed and latched
  - Parking brake – Off

**CRUISE**
- Taxi and landing lights – Off
- Strobe lights – On
- Landing gear amber light – On
- Hydraulic power pack – Off
- Power – 24”MP / 2400 RPM
- Flaps – Verify retracted
- CHT – Check
- Cowl flaps – Closed (or as needed)
- Engine instruments – Check
- Ammeter – Check
- Vacuum gauge – Check
- Fuel – Manage
- Mixture – If above 3000' lean SLOWLY only after at least 2 minutes and only to 100° F rich of peak EGT

**IN-RANGE**
- Seat belts – Check
- Shoulder harnesses – Check
- Altimeter – Check and set
- Allimeter – Check and set
- Ammeter – Check
- Vacuum gauge – Check
- Fuel selector valve – Fuller tank
- Approach – Review and set up

**BEFORE LANDING**
- Time – Started at the FAF
- Prop chain – Confirm off
- Brakes – Pumped and checked
- Gas – Fuller tank
- Undercarriage – Flow complete (p. 17)
- Mixture – Rich
- Prop – Dialed forward, slowly and smoothly
- Straps and switches – Checked

(Fully secure the airplane in accordance with all the postflight procedures listed on the green card.)

**ENGINE SHUTDOWN**
- Avionics – Off
- Throttle – Closed
- Mags – Perform a grounding check
- Mixture – Pull to idle cutoff
- Mags – Off
- Beacon – On
- Other lights – Off
- Keys – Out of ignition switch and left in plain sight

**AFTER LANDING**
- “Lights” – Taxi, landing and strobe lights off
- “Camera” – Transponder on standby
- “Action” – Wing flaps UP / cowl flaps OPEN
**ENGINE FAILURE**
Airspeed – Trim for 85 knots; conserve alt.
VFR – Turn towards nearest suitable field
IFR – Maintain heading
Fuel gauges – Check
Engine instruments – Check
Mixture – Rich
Prop control – Forward
Throttle – Halfway
Mags – Both
Elec. aux. fuel boost pump – On for 7 sec.
Elec. aux. fuel boost pump – Off
Master – On
If engine restarts – Advance throttle slowly

**FORCED LANDING**
Airspeed – 85 knots
Fuel selector valve – Off
Mixture – Idle cutoff
Prop control – Out
Mags – Off
Elec. aux. fuel boost pump – Off
Master switch – To do
Landing gear – Down now for training
Flaps – Down to 30° now for training
Doors – Unlatched
Upper body – Prepare to use coats or cushions for protection

**ENGINE FIRE IN FLIGHT**
Mixture – Idle cutoff
Fuel selector valve – Off
Master switch – Off
Overhead vents – On
Airspeed – 120 knots OR HIGHER until fire is extinguished
Execute forced landing.

**ELECTRICAL FIRE IN FLIGHT**
Master switch – Off
Mags – On both
All other switches – Off
Cabin heat and air vents – Off
Land as soon as possible.

**CABIN FIRE IN FLIGHT**
Master switch – Off
Mags – On both
All other switches – Off
Cabin heat and air vents – Off
Land as soon as possible.

**WING FIRE IN FLIGHT**
Nav lights – Off
Pitot heat – Off
Strobe lights – Off
Sideslip to keep flames away; land as soon as possible.

**LANDING GEAR MALFUNCTION**
Hyd. power pack circuit breaker – Check in
Try again to extend gear.

**IF LANDING GEAR FAILS TO EXTEND**
Airspeed – Reduce to 140 or below
Hyd. power pack circuit breaker – Verify out
Landing gear handle – Down
Emergency gear extension lever – Pull out forward and then pump vertically until gear is down and locked
Gear down green light – Check on
Emergency gear extension lever – stow

**IF LANDING GEAR STILL FAILS TO EXTEND**
Airspeed – Reduce to 140 or below
Hyd. power pack circuit breaker – Verify out
Landing gear handle – Down
Emergency gear extension lever – Pull out forward and then pump vertically until gear is down and locked
Gear down green light – Check on
Emergency gear extension lever – stow

**GEAR-UP LANDING**
Gear handle – Up
Hyd. power pack circuit breaker – Verify in
Runway – Use longest HARD surface available / avoid dirt or turf if possible
Flaps – 30°
When landing is assured:
Fuel selector valve – Off
Mixture – Idle cutoff
Prop control – Out
Mags – Off
Elec. aux. fuel boost pump – Off
Master switch – Off
Doors – Unlatched
After landing:
Cabin – Evacuate

**ELECTRICAL CHARGING SYSTEM FAILURE**
Alternator circuit breaker – Check in
Master switch – Off, then on
Ammeter – Check

**IF STILL NOT CHARGING**
Electrical load – reduce as situation permits
Wing flaps and landing lights – Avoid use until airport has been visually acquired
If IFR – Advise ATC
Landing gear circuit breaker – Pull out
Landing gear – Manually extend to save battery power using the following procedure:
Airspeed – Reduce to 140 or below
Hyd. power pack circuit breaker – Verify out
Landing gear handle – Down
Emergency gear extension lever – Pull out forward and then pump vertically until gear is down and locked
Gear down green light – Check on
Emergency gear extension lever – stow

**VACUUM SYSTEM FAILURE**
If IFR – Advise ATC
Refer to cockpit table and decide whether to use the SVS or fly partial-panel.

**IF THE SVS IS USED**
Adjust throttle as necessary to maintain adequate vacuum and altitude. Consider diverting.

**NO SVS IN VFR**
Remain in VFR.
Land where repairs can be made.

**NO SVS IN IFR**
Above all else, maintain aircraft control.
Fly towards VFR conditions if possible.
Affected instruments – Cover
Power – Reduce to 20” MP
Landings gear – Lower
Flaps – 10°
Bank – Control using turn coordinator
Pitch – Control using altimeter
Heading – Control using mag. compass
Consider declaring an emergency.
Approach – request, in order of preference:
Visual approach
Radar approach
ILS approach
LOC approach
VOR approach
Avoid NDB, LOC BC and circling approaches!