ATR TRAINING NOTES

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Prepared by Steve Foster and Darin Carroll.

REVISION #8

The newest version is always available at www.fosterweb.com/atr

Revision 8 removes references to stall procedures, which changed since the last revision, and adds notes regarding prohibition against pulling / resetting circuit breakers. Also updates icing procedures and makes many clarifications and corrections of minor errors. Change bars are now provided to show the major updates since the last revision.

Note: the first section was created by Steve Foster

Note: These notes were created when I went through initial groundschool as a student years ago. Enjoy, but don't sue me if you find a mistake!

Aircraft General (1.01)

Aircraft limitations – know the limitations from the FCOM, except for powerplant limitations. For those, refer to the SOP.

Abbreviations:

AAS	Anti icing Advisory System
ACW	Alternating Current Wild Frequency
ADU	Advisory Display Unit
AHRS	Attitude and Heading Reference System
ASCB	Avionics Standard Communication Bus
ATPCS	Automatic Take off Power Control System
BITE	Built in test Equipment
BPCU	Bus Power Control Unit
BPU	Battery Protection Unit
BTC	Bus Tie Contactor
BTR	Bus Tie Relay
BXR	Battery Transfer Relay
CAC	Crew Alerting Computer
CAP	Crew Alerting Panel
CCAS	Central Crew Alerting System
CL	Condition Lever
CLA	Condition Lever Angle
CRC	Continuous Repetitive Chime
DADC	Digital Air Data Computer
DADS	Digital Air Data System
ECU	Electronic Control Unit
ISOL	Isolation
KVA	Kilovolt Amps (1000 amps)
PL	Power Lever
PLA	Power Lever Angle
PB	Push Button
PSEU	Proximity Switch Electronic Unit
RCAU	Remote Control Audio Unit
SC	Single Chime or Starter Contactor
SGU	Symbol Generating Unit
VA	(Electrical system) Volt Amps (for AC power)
VMCL	Minimum Control Speed during landing approach
WOW	Weight on Wheels
ZA	Aircraft Altitude
ZCTH	Theoretical Cabin Altitude
ZP	Pressure Altitude
ZRA	Radio Altimeter Altitude

When doing the walk around, be sure to have the checklist in hand! It's a read and do checklist, and is required to be used. The gear doors are extremely expensive. Do not step on them. They are made from a composite material.

Four emergency exits. Two type III exits in forward cabin, two type I exits in the rear, including the main cabin door. The emergency escape hatch in the cockpit doesn't count as an emergency exit – blocked by locked door for the baggage compartment. All exits can be opened from outside or inside the aircraft. Observer seat can be rocked back out of the way in an emergency. Suggestion: show ACM how to stow the seat before he rides. Keep hands off the striped area of the cabin door when opening or closing to avoid pinching your fingers. Cargo door should be fully open or fully closed for normal baggage loading operations. Prop the door open with the strut unless it's deferred.

If the cabin door, cargo door operating panel hatch or fueling panel is open (or if someone is in the cockpit pressing the aux hydraulic pump pushbutton) and there is no GPU connected and no engine running, the red light will be on at the cargo door operating panel. This shows that the main battery is being discharged through the ground handling bus. Visible with hatch open or closed. Cargo door can be manually opened, but it takes many turns and a great deal of manual labor. Caution: Consult the MEL for a maintenance item regarding pulling the circuit breaker to deactivate the door motor.

Forward avionics bay hatch has a warning light. It is a plug type door, though, so if it comes unlatched, it won't fall out. Accessible through the nose landing gear well. Only the main cabin door, service door, cargo door, cockpit emergency hatch, and forward avionics access hatch have warning lights. No warning if a fuel door, ground air conditioning access door, emergency exit, etc. is open. Must check refueling panel door before flight if it was not closed during preflight or if it was opened after the preflight was completed.

The cabin and cargo unlocked aural alert are inhibited when the engine 1 CL is at feather or fuel cutoff. The service and forward compartment (avionics bay or maintenance access) hatch aural warnings are inhibited when engine 2 is at feather or cutoff. Only the single chime is inhibited, the other elements of the warning still come on. Don't confuse forward compartment light with forward cargo bin.

The OK lights on the overhead panel are associated with the test switch just below them. If the cabin or service door is open on the ground, you can test the microswitches that make the "UNLK" lights come on by pressing the test button and observing the green light for the associated door. That just tests the microswitches, not any other part of the system. Door must be open to do the test. If the green light for a door comes on with the door showing closed, it isn't really closed – the door warning is inop.

Landing lights, taxi lights, instrument panel normal & emergency lighting, reading lights in the cabin all require AC Wild electrical power: One prop must be at least 70% Np before they will work. Minimum cabin lighting only works when on battery power only. Otherwise, the switch has no effect. (If the GPU is plugged in but has not been brought on line by the crew, the F/A lighting panel, which will be operable in this condition through the service bus, will override the min cabin light position.) The min cabin light switch causes every other overhead light (not reading light) to come on if the battery is the only source of power.

The two minute light for exiting the aircraft works even with all power removed from the aircraft. Powered by the ground handling bus. Two switches for the 2 minute light: one in cockpit near observer's oxygen mask, one near rear door. That switch turns on one bulb in the forward emergency exit light, one bulb in the aft emergency exit light and a light in the cockpit next to the observer's oxygen mask for two minutes. Switches are not marked. Another switch near the observer's oxygen mask turns the forward cargo light on or off. Switch on the cargo door operating panel (outside) does the same thing. Light is normally left on so the flight attendant can see the door handles on the cockpit door when coming to the cockpit in flight.

The only lights for the instruments when only the DC emergency bus is powered are the RH dome light (if switched on), 3 lights located below the Captain's glareshield, the light in the wet compass if switched on, and a light in the overhead circuit breaker panel to shine on the center console.

Emergency exit lights are armed by first officer prior to engine start. Turned off by the captain after shutdown. They are required by FARs to be on prior to taxi. When armed, if the GPU is not powering the aircraft, the emergency exit lights and emergency escape path lighting (same switch) come on when you have battery power only, or when DC emergency bus voltage drops below 18V. The emergency bus, if available, powers the lights. If the emergency bus is not available (power below 18V), 6 little batteries in the exit light system will power the system for 10 minutes. Those 6 little batteries are the ones that are exempt from the hazmat rules.

Take your keys with you when leaving the cockpit in flight to use the restroom!

Toilet recycles dirty water through a filter and back into the bowl. Yuck. Supposed to be serviced each morning on first flight into STL. Light in lav is opposite of the light in your refrigerator. Comes on when door is locked closed. Lav motor is driven by AC wild, so when parked at the gate you can't flush. It takes half a minute or so for the reservoir in the filter unit to recharge with fluid, so if flush repeatedly and no fluid comes out, be patient and try again in a little while.

One chime in the cabin is heard when no smoking or seat belt sign is turned on or off.

When checking your oxygen mask, look at the pressure gauge. If the needle drops quite a bit when you test the mask, someone has the oxygen bottle valve almost completely closed. If it's left that way and you don't catch it, this is a death trap! If you need oxygen due to smoke in the cockpit and that valve is closed most of the way, you'll suffocate and the aircraft will be lost. There's no way you're going to have the presence of mind to figure out a way to get into the panel to open that valve in an emergency, so make sure it's open when you check the mask, using the above procedure!

CCAS (1.02)

Basic philosophy: Lights out = normal operation.
Alert levels: Level 0 = information. Level 1 = advisories. Level 2 = cautions. Level 3 = warnings.
Warnings, TCAS, etc. are only on the speakers – not on the headsets, and are unaffected by the volume controls.

2 parts of the CCAS: digital and hardwired. Both process level 3. Level 2 only processed by digital part of the Crew Alerting Computer (CAC). If digital part is lost, you still have local alerts, no master caution / single chime or level 2 lights on the CAP. Still have master warning / CRC and local alerts. This fault is shown by the CCAS light on the CAP. No way to tell if the hardwired part fails.

In the 72, the MFCs replace the CACs and each has a digital section – part B. If both B channels are lost, symptoms are somewhat similar to loss of the digital part of the CAC but with some odd differences – see FCOM.

CLR will clear level 2 lights only.

Before each landing, push the "recall" button to see what alarms were canceled during that flight. (If a fault went away on its own, the system won't remember that it failed – you're only recalling those items that are still either faulted or turned off.) Also a good idea just before takeoff if holding on the runway for an extended period of time, in case you had the inhibit function armed for a couple of minutes and something failed between that point and takeoff. The takeoff inhibit inhibits all smoke warnings, plus all the level 2 caution lights, except for the EFIS comp warning. In the 72, the ENG light on the CAP is not inhibited for an ADC switch fault alert, and FLT CTRL is not inhibited for a TLU or FLAP ASYM alert. However, the local alerts will still function – both aircraft.

Emergency audio cancel will cancel nuisance warnings. If the failed alert is one of the following, the warning will be rearmed immediately after the triggering condition disappears: Landing gear, Vmo, Vfe, Vle, stall warning, pitch trim whooler. All other alerts will remain inactive for the duration of the flight and will not be reactivated until the next aircraft startup. Should be a breakaway wire on the guard, not safety wire.

TO Config. warning sounds if one of these is not in takeoff position: Parking brake, pitch trim, flaps, power management selector. In the 72, it also verifies that the rudder TLU is in the low speed position. TO Config test PB simulates power levers going forward, to see if everything is set for takeoff – except the parking brake.

On the 42, landing gear warnings only sound if system 2 (overhead panel) shows unsafe gear. (In the 72, the MFCs control the warnings and displays for both systems.)

Angle of attack for stick shaker for icing and non-icing: (42)
Non - icing: Shaker: 12.5 degrees. Pusher: 15 degrees.
Icing: Shaker: 7.5 degrees. Pusher: 15 degrees.
Icing / non-icing determined by whether horn anti-icing has been selected on, as it would be in Level 2.
Icing immediately after takeoff (until flap retraction or 5 min. whichever happens first): Shaker 8.5 degrees. Note that the pusher stays the same – only the shaker threshold changes. (In the 72, each flap setting and icing condition has its own unique threshold numbers – too many to remember. Know that the shaker and pusher thresholds change in the 72, but only the shaker threshold changes for the 42.)

Electrical System (1.06)

Two ni-cad batteries of different sizes. Main = 43 amp hrs (Ah). Emergency = only 15 Ah. Main battery supplies hot main battery bus at all times. Hard wired into battery. Emergency battery always supplies hot emergency battery bus in same way.

2 DC Starter – Generators. Starter cuts out at 45% Nh on engine start. Becomes a generator at 61.5% Nh.

A bus tie contactor (BTC) is open unless the GPU or only 1 generator is on line. This allows current to flow from one side to the other in case a generator fails. Batteries can't supply DC bus 1 and / or 2.

Utility bus 1 supplies recirc. fan 1, utility bus 2 supplies recirc fan 2. The shed light in the Service / Utility bus PB only shows a fault of a utility bus. No cockpit indication for loss of the service bus. To see which utility bus was lost, see which recirc. fan failed.

The DC service bus is able to get power directly from the GPU so the flight attendant can have some power with the battery switch off to provide cabin lighting, etc. before the flight crew shows up at the airplane. The flight attendant's service bus PB is the "master" switch for the service bus if the GPU is plugged in but has not been brought on line using the EXT PWR switch in the cockpit. This way, once the GPU is plugged in, the flight attendant has limited power. Once the GPU has been put on line (DC bus 1 powered) the switch in the cockpit is the master.

In the "normal" mode (at least one generator on line – DC busses powered) the DC emergency bus and the DC standby bus are supplied from the hot emergency battery bus. The DC essential bus is supplied from the hot main battery bus. Inverter 1 is powered by DC bus 1, and inverter 2 is powered by DC bus 2. See FCOM 1.06.20 p.7 and 13. On battery power only, AC bus 1 and 2 are shed (not to be confused with ACW busses!) to save battery power. Since in basic mode inverter 1 is only powering the AC standby busses, you could say that in basic mode the DC and AC standby busses always get power from the same place. The source of power for the standby busses is as follows:

- When you turn the battery switch on: Main battery.
- When the GPU provides power, DC Stby bus is powered by emergency battery, AC busses supplied by DC bus 1.
- If conducting a battery start (no GPU) stby bus is powered by emerg. batt. during start, then stays there when a generator comes on line.

In the "basic" mode (which means that the batteries are the only power supply and the battery switch is in the on position), the DC emergency bus is still powered by the hot emergency battery bus, but the DC essential bus and the DC standby bus are powered by the hot main battery bus. Inverter 1 is then powered from the hot main battery bus, and inverter 2 is not powered. See FCOM 1.06.20 p.8 and 13.

A unit called the BPCU (Bus Power Control Unit) goes looking for a power source for the essential bus, the emergency bus, and the standby busses. For example, flying along in the normal mode (at least 1 generator operating) if the emergency battery charge contactor opens due to an overheated battery, the BPCU will transfer those to DC Bus 1. If that bus is not available, it will transfer to DC Bus 2. If DC Bus 2 is then lost, the emergency bus will go back to the emergency battery until it's depleted, and the standby & essential bus will be powered by the main battery.

Do not confuse the BPCU, which controls the power to the busses, with the BPU – battery protection unit – which opens the battery charge contactor if a battery becomes overheated. The 72 doesn't have a BPU – the MFCs take care of that function.

Normally the inverters are powered by their respective DC busses: DC bus 1 supplies inverter 1, and DC bus 2 supplies inverter 2. In the event of a failure of DC bus 1, inverter #1 is lost, but inverter #2 takes over, and the BTR closes, allowing both AC busses to be powered by either inverter. If both DC bus 1 and DC bus 2 fail, the batteries will supply the power, through the DC Standby bus to inverter 1 only and AC bus 1 and 2 are shed. If both DC busses are lost and inverter #1 is inoperative, you are just out of luck. Inverter 2 can only be powered by DC Bus 2.

If you had a dual generator failure, you are supposed to have 41 minutes before you die. If there weren't something to prevent it, the BPCU (or MFC) would see higher voltage on whichever battery was the strongest at any given moment and would switch to that source. It would keep switching back and forth between the hot main battery bus and the hot emergency battery bus, and you would end up with two very weak batteries at once when it finished. This may also cause the power to the avionics to surge as the bus switching occurs.

To prevent that there is an override position on the battery switch. When you move that switch to OVRD the system locks the standby bus and inverter 1 (and thus the AC standby bus) onto the DC essential bus, which is powered by the hot main battery bus. There is no difference in the power supply or indications. The override position just overrides the logic of the BPCU.

In order for the inverters to work they need at least 18 volts. When the BPCU determines that the main battery is down to 19.5 volts the undervoltage PB light comes on. Push the override pushbutton (different from the switch mentioned in the previous paragraph) and the standby busses are switched from main battery to the emergency battery. At this point you need to be real close to landing – especially in IMC!

Inverter 2 can take power only from DC bus 2. Either inverter can drive the AC standby bus. Normally, the AC standby bus is driven by inverter #1. With battery power only, AC bus 1 and 2 are never supplied.

External power always has priority over aircraft generators. DC generators are not deferrable.

Know the maximum generator load limits for the DC generator. The generator maximum loads on FCOM 2.01.05 p.1 are automatically kept within limits by the BPCU. The BPCU will shed enough load to keep that within limits.

There are no inverter switches. The inverters are always on if power to them is available.

When reading through the FCOM and checklists, don't confuse a bus fault with a generator fault. Look for the root of the problem if you see numerous fault lights all at once. One DC generator failing will not cause the loss of any equipment, but a bus fault will result in the loss of many items, including the generator on that side. Again, go to the checklist that represents the root of the problem.

High power draw items are generally powered by AC Wild power – AC generators are on the reduction gear box, which means the prop must be turning at a minimum of 70% Np before they will work. On the ground with the ECU operative the Np should be 70.8% when not in the feather position.

The AC Wild service bus is automatically shed if you lose an AC Wild generator. There is no cockpit indication of a loss of the ACW Service bus (nor for that matter for a loss of the DC Service bus). The shed light is on the flight attendant's panel. The F/A will call up and tell you that the AC Wild service bus shed light is on. That means they should reset that button. If that doesn't work (and it won't) cycle the AC external power switch on and off, even if in flight. That will make things will work again. Remember, if one engine is not running (single engine taxi) the AC Wild shed light is supposed to be on.

AC Wild generators are deferrable, but there is a large performance penalty.

You cannot conduct the receiving checklist without a generator or a GPU. You can start the right engine and use generator power to do the receiving check if single engine turns are permitted at the airport. This is an example of what the "Before Engine 2 Start" checklist is for.

Suggestion: Keep one engine running at normal Np (not feathered) when you have an extensive taxi delay. It's annoying to hear the aux. hydraulic pump running continuously, and the passengers will have no reading lights, hot coffee, etc. without AC wild power.

Items on the ground handling bus: "CARE"
Cargo door control
Aux. hydraulic pump
Refueling Panel
Entrance Light

Fuel system (1.11)

Fuel tanks hold 4960# each for a total of 9920#. Of that, the feeder compartment holds 352# per side. If the feeder tank is all you have left, the fuel low level light for that side comes on, as well as the fuel pump for that side.

A jet pump, using motive flow from an electric pump, is working whenever the battery is on. They will start keeping the feeder tanks full at that time. In the training syllabus, when they talk about the jet pump, that's not the one they mean. They generally mean the engine feed jet pump, which provides a higher pressure to feed fuel into the engine-driven fuel pump inlet. The LP valves (which means low pressure) are activated only by the fire handles. Their indicators look like push buttons but are not. The fuel shutoff function of the condition lever goes to the HMU, where fuel is cut off.

If you open the crossfeed, both electric pumps start running. When you crossfeed, you have to turn off the fuel pump on the side that you're crossfeeding into. The pumps will also start running if low fuel pressure is sensed downstream of the jet pump. The pumps run from the DC essential busses.

If you turn off an electric fuel pump, the motive flow valve on that side will close, causing the jet pump to quit. The engine might keep running, since the HMU can suck the fuel out of the tanks by gravity and suction. However, ATR makes no guarantee that if you turn a fuel pump off you will not have a flameout.

If you get a single chime with nothing else wrong, see if a (green) pump “run” light is on. If it is, the jet pump failed on that side, causing a momentary low fuel pressure that was immediately corrected by the electric pump. If the feed low pressure light stays on along with a fuel pump run light, either you have a bad electric pump that isn’t putting out enough pressure to extinguish the light or a fuel leak. The checklist will have you monitor indications for signs of a leak in this case. The only other indication of a jet pump failure is on the maintenance panel on the first officer’s side console, way back toward the rear. We are supposed to ignore those, but you might see a yellow dot in one of those indicators in case of a jet pump failure.

Fuel flow gauge: The needle is flow, the digital readout is fuel used since it was last reset. The fuel gauge test button will make the numbers on the fuel used and on the fuel gauges read all "8" and will activate the electric fuel pumps. (Of course, on the ground with the engines shut down, the fuel pumps will be running anyway.)

In summary, 4 things will make an electric pump run: Jet pump low pressure, crossfeeding, low fuel quantity light on, and the low fuel quantity test pb.

Review FCOM 2 and the abnormal checklists for procedures to follow in case of problems in the fuel system.

Powerplant (1.17)

The PW 120 is a free turbine engine. The high pressure spool is not directly connected to the low pressure spool, and neither spool is directly connected to the power turbine that drives the prop. Air blowing across the turbines is what makes everything move. In other words, the engine is just flying in tight formation with itself.

Reserve takeoff = rated power of 2000 SHP for the 42. Normal takeoff uses only 1800 SHP (92% torque). Normal takeoff torque is also known as "objective torque." There are 14 fuel nozzles. Minimum fuel temp for takeoff: Green arc. There are no numbers on that gauge. Np: 100% = 1200 RPM.

DC starter / generators, HP fuel pump and the oil pumps are located on the accessory gear box. The AC Wild generators, PCU, feather pump (HP), aux. feather pump and overspeed governor are on the reduction gear box at the front of the engine. The aux. feather pump is electrically driven.

Prop is moved by oil from the HP feathering pump on the RGB. No springs or counterweights in the prop hub– all moved by oil. (Of course, there are springs and counterweights in the PCU that control the prop speed by changing blade angle commands – but those are not in the prop hub.) "Metered pressure" moves the prop blades toward flat pitch ("decreased pitch") and "supply pressure" moves the props toward feather ("increased pitch"). When feathering the prop with the CL, you're moving a rod that opens a valve to dump metered pressure, allowing supply pressure to feather the prop. When the fire handle or ATPCS feathers a prop, a valve is electrically opened (feather solenoid valve) to dump metered pressure.

The supply pressure is provided by the HP oil pump on the RGB. This is not the same as engine oil pressure, but the oil does come from the engine. Since the RGB will still be turning as the prop on a failed engine windmills, there will be supply pressure available to start moving the prop toward feather when you place the CL in FTR position. However, as the prop speed (thus RGB speed) decreases, the HP pump will no longer spin fast enough to provide supply pressure. That's why the electric feathering pump comes on for a few seconds any time the prop is feathered by any means – to boost the supply pressure as the prop slows down. The electric feathering pump has an internal reservoir built into the case of the RGB – like a standpipe, oil is available for feathering even if all the rest of the oil in the engine is gone.

The prop shouldn't overspeed in case of a loss of PCU oil pressure. The pitch lock gap keeps the blade angle to within 1 degree of the failure. 3 ways to feather a prop: 1. The condition lever. 2. The fire handle. 3. ATPCS activation. The fire handle and ATPCS activate the electric feather pump and electric feathering solenoid to achieve feathering.

The prop limits are –10 degrees (reverse) to 86.5 degrees (feather). Know that the low pitch lights indicate that the blade angle has been selected to something below flight idle - the value isn't important to know.

There is no bypass light for the oil filters, and no chip detector lights in the cockpit. Oil capacity is 10 quarts. Maintenance checks the oil – we can't reach it.

There's no time limit on the use of continuous ignition. On the aircraft that have two ignition systems, use A&B together if doing a battery start or on very cold days. Then, use A on odd flight numbers, B on even flight numbers. The ignition only works if the associated condition lever is above fuel shutoff.

On engine start, the ECU (42) comes on at 25% Nh. At 45%, the start contactor opens. At 61.5%, the generator comes on line. 3 start attempts are permitted, for a total starter running time of 90 seconds.

Then, you wait for 4 minutes and try again. You can repeat that sequence all day. Know these numbers for the first day in the simulator and for the oral. Also know all the start faults from FCOM section 2.

In the 42, the ECU fault lights will be on prior to engine start until the engine reaches 25% Nh. In the 72, the EEC fault lights will not be on unless there is a fault.

The prop sync works above 70% Np except when the power management is set to takeoff.

ATPCS: The autofeather won't work except on takeoff and go around. Learn the conditions for ATPCS arming in flight and on the ground, and what triggers it. FCOM 1.17.40 p. 1-2. Once the APTCS is triggered the prop will feather after 2.15 seconds. The 2.15 seconds is designed to give you time to initiate a rejected takeoff without the prop feathering. In that case, you are disarming the system by moving the power levers aft of their threshold for ATPCS activation, and by reducing the torque below its arming threshold. Thus, the prop won't feather while in reverse as you're aborting the takeoff if you act quickly. A torque gauge fluctuation, if caused by the SCU, could cause a perfectly good engine to autofeather. When looking to see if autofeather occurred, I look at both the torque and the Np. In the sim, the Np will show about zero for a feathered prop on a failed engine but this may be as high as about 10% in the actual airplane, I'm told.

ATPCS disarming conditions: When Power Mgt. is set to other than TO, the ATPCS PB is off, at least one PL is retarded below 56 degrees, both torques below 53%, autofeather signal triggered on one engine. Any of these will disarm the system. Note the last one – once autofeather occurs, the system disarms itself so that the other prop can't accidentally feather itself, too.

The ECU adds fuel using a torque motor that works in conjunction with the HMU valve position. Thus, an ECU failure will cause a partial loss of power that's recoverable by moving the PL forward. However, on takeoff, an ECU failure will not result in a power loss. The power is kept where it belongs in case of a failure on takeoff by the "fail – fix" device (HMU enrichment solenoid). Other than on takeoff, loss of the ECU will require PL movement that's much further forward than normal, and spool up time may lag. The ECU also provides the uptrim for the ATPCS. In the 72, EECs replace the ECUs. They usually subtract fuel, but they add fuel when necessary to keep the prop speed at 70.8% minimum.

Primary benefits of the ECU:

- Engine responds more quickly when adding power (better throttle response)
- Constant power output for a given power lever angle
- Maintains minimum 70.8% Np
- Provides ATPCS uptrim

The ECU works by adding fuel above what is scheduled manually. The EECs in the 72 usually subtract fuel from what is scheduled (they add fuel at low power settings, such as during taxi operations.)

An EEC fault in the 72 will result in the power being "frozen" and the EEC fault light blinking until the power lever is retarded into the green area on the power lever quadrant. Only then will the EEC light stop blinking – then it's safe to turn off the EEC. Turning off a blinking EEC can result in over boosting the engine, so **never deselect or reset a blinking EEC!**

On all go-arounds, set power to the FDAU bugs, which will be 100% on a cool day. That's because the ATPCS won't uptrim the good engine on a go around, only on takeoff. Bug 100% (or charted lower go-around torque value) on the in range flow. On the 72, this setting is the "ramp" in the power lever quadrant.

On a cross generator start, only the battery is working below 10%. After 10%, the generator on the other side kicks in. Beware when making multiple cross generator starts, because the battery will become depleted, making starting impossible until the "off / start abort" position is selected for a while, so the battery can charge back up a little bit. Engine #1 is normally started using cross generator starting on the ground. In flight the generator on the good engine will not be available to help start the other one. Only battery starts in flight are allowed by the circuitry.

ATR 42 only: If the ITT rises more than normal during start, turning off the ECU may allow the start to continue within limits. In the 72, sit on one hand during the start so you won't de-select the EEC out of habit. This could cause an overtemp to worsen and go over the limits.

ATPCS arming conditions: in-flight or on the ground:

Power management selector to TO
ATPCS push button on
Both power levers above 56°
Both torques above 53% (49% in the 72)

Whether the aircraft is in flight or on the ground, these conditions are the same. However, when armed on the ground, you have uptrim and autofeather functions. When armed in flight, you only have the autofeather function. Triggering: One torque below 21%, autofeather will activate in 2.15 sec. Uptrim occurs immediately.

Start sequence for starting engine #1 after engine #2 is already running:

0%:	Start "ON" light illuminated
10%	Fuel & ignition introduced using condition lever
	#2 generator comes on line to help provide power – on the ground only.
25%	ECU comes on, ECU fault light extinguishes
45%	Starter cutout - Start light extinguishes
61.5%	Generator comes on line

Check the ECU if a generator won't come on line after engine start. Normally that's the problem. Pushing the condition lever forward out of feather too early is the usual cause of an ECU fault. The ECU fault lights will be illuminated before start. (The 72 has EECs instead of ECUs. The EECs are not faulted before start.)

The ITT indicator has a flush mounted test button on the indicator. When you push it, the counter and pointer will go to 1150 C. You'd have to stick a paper clip or something in there to test it, but don't bother testing it anyway. (Don't test it with the engine running, or the DFDR will show a huge overtemp and you'll be doing the carpet dance in the office.) There is a blue dot on the indicator dial at 1150 C.

Fuel temp is measured in two places. In the left tank (this gauge has numbers on it) and at each engine. The ones for the engines may be pegged out at the upper redline in warm weather, but as fuel flows through after engine start they should cool down into the green. If they don't, it could be a malfunction of the fuel / oil heat exchanger, resulting in very hot fuel being delivered to the engine.

Hamilton Standard Props are composite. They have an aluminum center spar with a hard shell. Between the center spar and the hard outer shell they are filled with foam. A nickel leading edge provides abrasion resistance and lightning protection.

Fire detection and extinguishing (1.08)

If the fire bottle for the wastebasket in the lav discharges to extinguish a fire, which will happen automatically without crew intervention, there will be no notice in the cockpit that the fire bottle for the lav has been used. Maintenance would find it during an inspection. If there's an aft smoke warning you don't know if it's coming from the lav or the aft cargo. You have to ask the flight attendant. They have a panel on some aircraft (423 and up) that tells whether the fire is in the lav or the cargo bin. Otherwise, they will just have to go check.

If you get smoke in the cockpit from any source, it will trigger the electric compartment smoke detector when the smoke cycles through there. So, if the smoke is noticed first, then you get the light, it's not from the electrical panel. If you get the light first, then notice the smoke, it's from the electrical panel.

On the ground, there's a right nacelle overheat light that might come illuminate when taxiing with a tailwind. It was installed as an alert for operating in hotel mode, in case a tailwind caused the nacelle to get hot enough to cause possible damage. See checklist for procedure to follow if it comes on. Inhibited in flight.

Smoke warnings can't be canceled, but they are inhibited for takeoff. (I don't understand why. It would seem to me that if you were on the takeoff roll, before V1, and the airplane's lav or cargo bin caught on fire, it might be a good idea to abort the takeoff. But nooooo, that's inhibited for takeoff.) There are two fans for lav / aft cargo smoke detection. One operates on one leg, the other operates the next time the aircraft power is turned on, so that they alternate. You never know which one is being used, but if one faults off, push a button to select the other one. One is deferrable.

Fire handles activate: (FAA DEP – like in Dept.)

Fuel – closes LP valve
Air – closes bleed valve and HP valve
Arms the squibs
De-ice / isolation valves are closed
Electrical – DC and ACW generators off
Prop - feather

Pneumatic, air conditioning, and pressurization systems (1.16, 1.03)

There are two ports on the engines that provide bleed air for air conditioning, pressurization, and deicing. The high pressure (HP) port always provides the air for the deicing and engine anti icing systems. Low pressure (LP) port air cannot be used for anti icing and deicing. The air for the anti icing and deicing systems is not affected by the position of the bleed air switches on the overhead panel. Those are only for the bleed air that goes to the packs. The two ports are located at different compressor stages in the engine. The LP port draws air from the low pressure compressor section of the engine. The HP port gets it's air from the high pressure compressor.

The packs will draw air from either the LP or the HP ports. In flight, with normal cruise power, the LP ports are supplying the packs. When you pull the power back to idle, the HP valves will automatically open, because there isn't enough air coming in from the LP ports to keep the aircraft pressurized. At that point, a check valve closes so that the LP valve is cut off from the rest of the system, so that air doesn't run backward through the LP valve, back into the engine. You can hear this transition take place in the winter, when it's putting out heat. You'll hear the hissing of the air increase markedly as you bring the power levers almost to flight idle. If the HP valve doesn't receive electricity or air, it closes.

Bleed overheat light is triggered at 274 degrees C (inside the duct). Bleed leak light is triggered at 124 degrees C (around the outside of the duct). The bleed valves can't open during engine start.

In the 42, the crossbleed will not operate – it was operable only in hotel mode when that was available. In the 72, the crossbleed is routed through the MFCs, which will open the crossbleed if you're on the ground with one or no engines running. The valve should never open in flight. If the crossfeed light illuminates in flight, consult the checklist.

The 42 has a ground cooling fan for each pack. Whenever the pack is on, and the aircraft is on the ground or in flight with an airspeed of less than 125 knots, the ground cooling fan will run. In the 72, there's a similar system, with a couple of differences: The fan is driven by a turbine (powered by bleed air) instead of electricity, and the airspeed is 130 knots instead of 125. Also, it's called a turbo fan instead of a ground cooling fan in the 72. On either aircraft, when the fan is running, the ram air inlet closes, and air is sucked in through a ground air inlet. In flight, when the appropriate speed is achieved, the fan shuts off and the ram air valve opens.

The leading edges of the wings between the nacelles and the fuselage have air vented through them in flight to cool the bleed air lines. There's an air scoop on top of the nacelles. No fans or anything – just ram air. The 72 FCOM does not mention this feature.

The automatic mode of the temperature control system takes the following factors into account:

- duct temperature
- zone temperature demand selector (pilot controlled)
- associated compartment selector
- aircraft skin temperature

The right pack waits 6 seconds to come on or go off after selection, to avoid pressure bumps.

There's a flow push button for the packs. (Don't confuse this with the HP valve in the bleed air system!) It controls how much bleed air is allowed into the packs by regulating how far the pack valves open.. Here are the two modes of the "flow" push button:

Norm (pb released): Maximum pack pressure is 17 psi. (22 in ATR 72)
High (pb depressed): Maximum pack pressure is 30 psi.

There are similar sounding warnings, which are easily confused:
Duct leak detection: This is from the **bleeds.** It causes the "LEAK" light to come on at 124c. Leak detection is provided for the wing leading edge, wing to fuselage fairing, upper and lower fuselage floor, and pack areas. It automatically shuts down the affected pack valve, HP valve, and BLEED valve (and ground crossbleed if the left side is affected). Remember, that's something that you can't try to reset if it faults.
Bleed overheat causes the associated **bleed** to fault off at 274c. It also closes crossbleed if that was open.
Pack Fault: Faults off if the air downstream of the **pack compressor** is above 204c or if there is a disagreement between the selected position and the valve position (usually in case of a bleed fault). In case of a bleed fault, the corresponding pack will fault (except on the ground in the 72 because of the crossfeed system for the bleed air). However, if **you turn off** a bleed air, the corresponding pack valve still closes but the fault light for the pack is inhibited in this case.
Duct overheat: When the duct temperature downstream of the mixing chamber increases above 88c, the limiter tries to close the temperature control valve progressively to reduce hot airflow. If that doesn't work, the OVHT light comes on when the duct temperature reaches 92c. At that time, pilot action is required.

To summarize – if a bleed overheats, the bleed valve automatically closes. If the pack overheats internally (>204 degrees downstream of the pack compressor) the pack valve will automatically close. If the duct to the cabin overheats, pilot action is required – automatic systems have failed to reduce the temperature. Memory aid: If you buy a duck instead of a turkey for Thanksgiving, and the only recipe you have is for a turkey, you are liable to overcook the smaller duck. If the duck starts flaming in your oven, will the oven automatically shut off? No – you must turn off the oven (and perhaps extinguish the flaming duck.) So, a duck overheat will not fix itself. Neither will a duct overheat.

Ventilation system

There are two switches, one toggle and one push button, which can affect the OVBD valve. The push button is the EXHAUST MODE OVBD VALVE. The toggle switch, which has three positions, is the OVBD VALVE CONTROL SWITCH. Much confusion is the result of the fact that these two are next to each other and they have similar sounding names.

Two ways to vent the air from the cockpit, electronic & electric equipment compartments, and forward cargo bin: Recirculate it in the cabin, in-flight, or dump it overboard, on the ground. In flight, a fan circulates that air around inside the cabin, through the *underfloor valve* (U/F valve). On the ground, the air is either vented through the OVBD valve (if the left engine is shut down) or through the UF valve (if the left engine is running). If the OVBD valve is open, the UF valve will be closed, and vice - versa. Either way, the fan runs, unless the exhaust mode OVBD push button is released. (Normally it's in.) If the fan fails in flight, you can vent the air overboard by using the exhaust mode OVBD push button. In that case, the fan is shut off, and the port on the outside of the aircraft is opened just slightly.

If you release the exhaust mode OVBD push button on the ground, (with GPU power or a generator on line) the maintenance call horn on the outside of the airplane honks continuously to alert you to go turn off the power to the aircraft, so that the avionics don't overheat. The fault light in the exhaust mode OVBD push button signals that either the fan has failed or overheated (after a 10 sec. delay).

Upon engine start, the fan shuts off for 120 sec. to avoid pressure shocks. The fault light in the exhaust mode OVBD pb will illuminate during engine starts, but the horn doesn't honk. Another fault light in the center of the ventilation panel light indicates a disagreement between the overboard valve position and the position called for by system logic. Don't confuse the fault light on the center of this panel (disagreement light) and the one on the exhaust mode pb (fan failure or overheat). The disagreement light will come on while switching toggle switch to full open or full closed, until the overboard valve reaches the commanded position. If it illuminates while the toggle switch is in auto, the disagreement is between the overboard valve and the position called for by the system's logic.

The OVBD VALVE CONTROL switch (the toggle switch) has three positions: Auto, full open, or full closed. *Don't try to use full open in flight with the aircraft pressurized!* Doing so will make the cabin "dump" pressure through that duct. The duct will collapse and be damaged. However, the "full closed" position can be used on the ground in the winter, to keep the warmer air circulating in the back for the flight attendant and passengers. A 1991 memo prohibits turning off the exhaust mode pb in flight unless it faults. Some pilots were pressing the exhaust mode pb inflight to help cool the cabin. Don't do that.

Icing
FCOM section 13

Engine / Wing Ice Protection

The ATR FCOM - 1.13.20 p.4 is incorrect in some manuals. The "Alert" section refers to the "associated Fault light on associated Air Bleed pb (Air Bleed panel)." This should read "Airframe Air Bleed pb" instead.

The airframe airbleed fault system detects leaks and overheats in the bleed air used for the pneumatic boots on the engines, wings and tail. It is important to remember that with the airframe air bleed pushbutton selected on, which is normally the case even in summer, *bleed air is always provided up to the distribution valves for the engines, wings and tail*. When turning on anti-ice or de-ice, the controllers are commanding the opening and closing of the *distribution valves* according to a schedule determined by the mode selector pb.

The best way to explain how this system works is to run through two example scenarios. Follow along in the schematic and in the abnormal checklist.

First scenario:
Engine #1 is providing bleed air that is hot enough to damage the system: Temperature exceeds 230° C, measured upstream of the left de-ice valve. We are using engine and airframe ice protection (level 3) at the time of the fault. The airframe air bleed fault light illuminates. Per the checklist, the airframe airbleed pb is released. Three things happen when the pb is released:

1. Both isolation valves close.
2. Both de-ice valves would close if the engine anti-ice was off, but since they are on, both de-ice valves remain open.
3. If an overheat is detected by the 230° sensor located upstream of one of the de-ice valves, the engine anti-ice on that side will fault after 6 seconds. The engine anti-ice will not fault for an overtemp condition unless the airframe air bleed pb is off (released).

In this scenario, engine #1 faults 6 seconds after the airframe air bleed pb is released, indicating an overtemp upstream of the de-ice valve. Per the checklist, we now turn off engine #1 anti-ice. This action causes the left de-ice valve to close. At this point both isolation valves and the de-ice valve on the left side are all closed. Now the checklist tells us to turn the airframe air bleed back on. This re-opens both isolation valves. It would appear at this point that we have restored the whole system. This is not the case. FCOM 1.13.20 p.6 tells us that if the engine anti-ice push button is turned off *following an airframe air bleed fault and an engine fault* (which is the case here) the de-ice valve on that side will close.

In our scenario, we have now restored all the ice protection except for engine #1. We're using engine #2 bleed air to provide ice protection for engine #2 and for the wings and tail through the common manifold.

Second scenario:
A leak is occurring in the system. (Pressure < 14 psi. is detected in the common manifold.)

Per the checklist, we turn off the airframe air bleed pushbutton. Since the engine anti-ice is on, the de-ice valves remain open and the isolation valves both close. Neither engine anti-ice faults after 6 seconds, which indicates that the problem is not an overtemp. Thus it must be a leak in the common manifold. There is nothing that can be done to restore the wing and tail ice protection, so the checklist directs an increase in icing speeds and landing distances. The anti-ice for both engines will still operate normally.

Turning on the side window heat to defog the window is not recommended unless the temperature is down in the icing range, to avoid cracking the windows. I think the windows can be easily scratched if the side window icing is turned on and the windows is cleaned while it's on. The heat might soften the Plexiglas, since the side windows are heated when you have DC busses powered on the ground or in flight.

Atmospheric icing conditions:

On ground, and for takeoff: OAT at or below 5 dig. C, visible moisture below 1500' AGL
In flight: TAT at or below 7 deg C, visible moisture
Ground icing conditions:
OAT at or below 5 deg C when operating on contaminated surfaces without atmospheric icing.
Definition of visible moisture:
Clouds, rain, snow, sleet, ice crystals: any visibility. Fog: 1 mile visibility or less.

In flight (only), to determine the SAT (static air temperature) for determining which mode to run the props and airframe icing protection in, the push button must be depressed on the TAT - SAT gauge. On the ground, (when the plane is not moving) SAT and TAT are the same.

Prop modes:
Normal mode: props run on a 70 second cycle with each blade heated for 10 seconds.
On mode: 80 second cycle with each blade heated for 20 seconds.

Engine / Airframe modes:
42 -Normal mode: 5 seconds each, for a total of 30 sec., then waits for 30 sec. (60 sec. cycle).
42 -On mode: 5 sec. each for a total of 30 sec., then 210 sec. off (240 sec. total cycle).
72 is different because of the addition of inboard wing boots that must be cycled on and off.

In the 42, controllers cycle the props and engine / airframe ice protection. In the 72, this function is provided by the MFCs with one backup controller that is used in an override mode in case of MFC failure.

Static ports: Heated when pitot heat is on, but there is no monitoring for the static system in flight. If you had no abnormal indications in flight, but the pitot heat light came on after landing, (42) or the STAT light came on after landing (72) that's the indication that the static system anti-icing failed in flight. There are 6 static ports: 2 for Captain's ADC, 2 for first officer's ADC, 2 for standby instruments.

The CCAS resets the stall warning for icing conditions:
In the 42, the stick pusher is always set for activation at 15 deg. AOA, but it's inhibited for takeoff until 10 seconds after lift off. In the 72, both the stick pusher and stick shaker reset for icing conditions. That's the main thing you have to know. The exact numbers for the different angles of attack are available in the FCOM for each airplane.

The horn anti ice is inhibited on the ground, but the green light for them will still illuminate if it's turned on while on the ground. There are 2 controllers for the engine / airframe anti-ice / de-ice in the 42.

It's normal for the ice detector fault light to be on prior to engine start. The system uses AC Wild power, and isn't smart enough to inhibit the warning on the ground prior to startup.

Use the icing levels from the SOP. The ones in the FCOM have a difference in when the ignition is activated.

Icing level summary

Level 1: always on.

Probes
Windshields (fwd)

Level 1 1/2: For takeoff in ground icing conditions, but flight in non-icing conditions:

Probes
Windshields (fwd)
Props (Mode "on" below -10 SAT. Otherwise, mode normal)
Continuous relight

Level 2: For operating in icing conditions or takeoff when visible moisture exists below 1500' and OAT on the ground is 5º c or less:

Probes
Windshields (fwd)
Props (Mode "on" below -10c SAT. Otherwise, mode "Normal.")
Horns (Green ICING AOA illuminates. Call "Bug minimum icing speeds")
Side windows
Engines (Engine / airframe mode selector: Mode "on" below –18c (42) or –20c (72) SAT)
Continuous relight

Level 3: For operating with ice accretion:

Probes
Windshields (fwd)
Props
Horns
Side windows
Engines
Airframe deicing
Engine / airframe mode selector: Mode "on" below –18c (42) or –20c (72) SAT
Continuous relight

If the ice detector picks up ice:

In level 1: Single chime, CAS caution lt., ICING amber lt. flashing.
In level 2: Single chime, CAS caution lt., ICING amber lt. flashing. (new mod in 1999)
In level 3: No chimes, no CAS caution lt., ICING amber lt. steady, DE ICING blue lt. steady.

If the ice detector is *not* detecting ice for 5 min.:

In level 3: No chimes, no CAS warning lt., DE ICING blue lt. blinking

Move from level 3 to level 2 after the airplane is clear of icing conditions.
(This is a change that went into effect in 2001.)
Depress the green ICING AOA light after the aircraft is completely clear of ice. This resets the stall warning AOA. Then bug normal minimum speeds if on an approach.

During flight in icing conditions, monitor the forward side windows for signs of globular ice formations, large water droplets, ice runback on the spinners, etc. Exit the severe icing conditions, then see the severe icing checklist for what to do! Answer that way on the oral if asked! Remember, there are restrictions on flap and autopilot usage in severe icing conditions that are different than in normal icing conditions.

Caution: Leaving the pneumatic de-ice / anti-ice system in the wrong mode can ruin your day! Operating with the mode "on" ("cold" in 72) results in a much longer wait time between activation of the boots. This could cause a real problem descending into an area of, say, freezing drizzle from colder altitudes!

Hydraulics (Sec. 12)

For oral, know what conditions will cause the blue hydraulic pump to start running:
Aux. pump runs when at least 1 engine is running, the gear handle is down, and the main blue pump pressure drops below 1500 psi. Aux pump is on the blue side. Aux pump button below the parking brake runs for 30 seconds per shot. Runs from the ground handling bus, so it only works on the ground. The aux pump only supplies the blue side. Don't crossfeed on the aux. pump.

If the aircraft is not powered at all on the ground (battery switch off) you can still use the aux. hyd. pump by pressing the pb on the pedestal.

The gauges in the cockpit for the green and blue systems show **system** pressure. The ones outside the aircraft show the **greater of system pressure or accumulator pressure**. They will normally show the accumulator pressure of 1500 psi. unless you check them while ACW power is available or while the blue aux. pump is running. The gauges in the cockpit (except parking brake accumulator) will drift down to zero pretty quickly. The LO PR lights show **pump output** low pressure.

When the blue pump comes on because of a loss of blue main pump pressure, it will stay on unless main pump pressure is restored. It won't cycle on and off. Low main pump output pressure is what activates the aux. pump, and that won't increase when you use the aux. pump.

The accumulators in the system (with the exception of the emergency / parking brake accumulator) are just for absorbing shock. They don't store energy. The brake accumulator is good for 6 parking brake applications.

There are two hydraulic systems: blue and green. Remember that green is on the right; the first officer is "green". One reservoir with two compartments for the fluid. Blue and green are not fluid colors – the fluid is kind of a pinkish color.

Landing gear (Sec. 14)

Pulling the emergency gear extension handle on the ground won't hurt anything. You are only releasing the uplock hooks, not any down locking mechanism. In fact, this is the procedure to use if a red "unlock" light on the panel is on while on the ground, indicating that an uplock box (hook) is not open (system 1 only).

The red light in the gear handle is telling you that you forgot to put the gear down prior to landing – it will not come on while the gear is in transit or whenever a red unlock light illuminates. See the FCOM for exact parameters.

Steering range is +/- 60 degrees with steering on, +/- 91 degrees with steering off. Fusible plugs in the wheels protect the tires from exploding if temperature in the wheel exceeds 177 degrees.

With brake handle in the center notch, you have 500 psi gradually applied for emergency braking. You can go aft about another ½ inch for additional braking if you really have to below 60 knots. Beyond that, you'll get 3000 psi suddenly applied – not recommended while moving. Be sure to use the parking brake position for parking – not the emergency notch. To use emergency braking, just put the lever in the middle notch and leave it there – don't try to modulate it. If you use the emergency brake above 20 knots, the FCOM requires visual inspection of the tires before another takeoff, since one may have overheated and have no air remaining due to the fusible plug melting.

Flight Controls (Sec. 9)

The ATR has ailerons, rudder, elevator, and spoilers for primary flight control. The spoilers are for roll control only, and work hydraulically in concert with the ailerons. If you lose both DC generators, the spoilers will still work. The spoilers' hydraulic actuators are operated mechanically after the ailerons move 2.5 degrees. The spoilers are only used for roll control; there is no way to activate them together for glide path control.

The gust lock will only lock the ailerons and elevator. When the gust lock is engaged, the power lever movement is restricted to about flight idle. If ATC wants you to expedite crossing a runway, most first officers will release the gust lock to allow more power to be applied. The rudder doesn't have a gust lock, but it has a rudder damper. That's not the same thing as the yaw damper. The rudder damper just keeps the rudder from slamming around in the wind when you're on the ground. It's not powered by anything. It's like the thing that keeps the hatchback open on your Toyota. The spoilers are also not locked by the control lock.

There are servos on each aileron for tabs, but only the left one has the aileron trim. The aileron trim indicator is confusing; it can lead a person to think that there is one on each wing. (Aileron trim in the 72 is ½ half the speed of the trim in the 42.)

Electricity is required to send a signal to actuate the flaps. On the flap indicator, the blue "EXT" flag will come on whenever a flap actuator is trying to drive the flaps *down.* It doesn't come on after the extension stops, or when they are coming up. If that flag is visible after the flaps come down, you have a leak in the system and you might consider retracting the flaps before you lose all your fluid.

There is a red flap unlock light on the CAP that indicates that one or more flaps have retracted more than 3 degrees when flaps are selected to 15 degrees or more. This would indicate that the flaps are moving up, but it's not an asymmetry alert. There is no asymmetry alert in the 42 (there is in the 72). If you have an asymmetry in the 42, you will just notice the rolling tendency, and the flaps won't go up or down no matter what you do. Asymmetry is detected only between the two inboard flaps. The flaps will shut off when the asymmetry reaches about 9 degrees.

The Releasable Centering Unit (RCU) on the rudder is activated the rudder trim is used. The RCU has a ratchet assembly that helps stabilize the rudder in turbulence, etc. The RCU position changes with trim setting and allows a new neutral "feel" point. As soon as the rudder trim control is moved, the RCU is disengaged to allow you to set the trim. When you release the trim switch, it will be re-engaged at the new position. If you are on the ground, and you have the rudder all the way to the right, and you bump the rudder trim switches, the RCU will release and re-engage. Then you'll have to overcome the pressure of the spring in the RCU in order to use any left rudder.

Many people misunderstand the function of the RCU. It's there to keep the tail from wiggling back and forth in turbulence excessively if the yaw damper is off or deferred – although it works continuously whether the yaw damper is on or not.

The RCU simulates you holding pressure on both pedals with your feet. If you pretend that there are two springs – one connected to the back of each rudder pedal, trying to pull them both forward to hold pressure on them – you can visualize the purpose and basic function of the RCU. (This is **not** where it's really located – but bear with me to conceptualize the function.) If you had, say, an engine failure, one spring would be extended, pulling back toward neutral on it's pedal. That's why when you re-trim, it adjusts the RCU. It's re-establishing equal tension pulling on each pedal, even though one pedal is further forward than the other. Again, all it's trying to do is simulate holding your feet on the rudder. It is **not** trimming the rudder – it's trying to help hold the pedals in the position where you want them.

The rudder *spring tab* is a big tab that moves opposite to the rudder in flight. If there is little or no airload, the spring tab stays straight with the rudder. With an airload, the pressure of the rudder pedal first has to overcome a spring / clutch type assembly. This spring clutch makes the rudder not move according to your direct input. Instead, the spring tab moves opposite to the way you want the rudder to go, which lets the relative wind move the rudder for you.

The autopilot / yaw damper doesn't trim the rudder. Using aileron trim with the autopilot on is allowed as long as you stay within one dot of aileron trim on the indicator. It's impossible to use aileron trim in the opposite direction than what's indicated on the ADU with autopilot on, but take care not to trim too much in the correct direction. Placards in the aircraft limit aileron trim deflection to 1 unit from zero with autopilot on. The rudder trim can and should be used with autopilot on without restriction.

Pitch trim runaway "can't happen" according to ATR, so they won't tell TSA what procedure to use if it does happen. However, when it happened to one of our crews many years ago, it was because the guard for the standby pitch trim switch was bent. If that happens, you might be able to slow down the rate of travel of the trim by trimming with the normal trim switches in the opposite direction. That's not a normal procedure that you would want to try, though, since that ruins the motor.

If both pilots try to trim in opposite directions, using the trim switches on the control wheels they cancel each other out. That's checked on the receiving aircraft flow.

If you need to disconnect the elevators from each other, both pilots push or pull in the direction that you want the airplane to go. When a force of 52 daN (deca-Newtons)* is reached, the elevators will disconnect and the red "pitch disconnect" light will illuminate on the CAP. This can inadvertently happen if you land and one pilot is using reverse thrust while the other is holding the control wheel, and the flopping around of the elevator gets strong enough. Wait until all three gear are on the ground before going below flight idle, and that will help keep this from happening. Also, if you try to overpower the pusher, they can disengage. Sometimes a pitch disconnect will occur while taxiing due to jet blast coming from behind, with the control lock not engaged. Using the control lock (including the elevator notch in the lock) prevents this. A 6 hour maintenance procedure is required to re-engage the pitch disconnect system.

Don't confuse the pitch disconnect with the pitch trim asymmetry. Pitch trim asymmetry is indicated by a light that might be called "Pitch Trim Fail" or "Pitch Trim Asym." depending on the aircraft. The pitch trim fail / asym. light will come on at 2.5 degrees disagreement between the two pitch trim tabs.

*If you ever hear of deca-Newtons being asked on a test at TSA, notify the Manager of Standards, who will correct the appropriate test or check airman. As a side note, some people wonder what a deca-Newton is. I've actually heard some people say that it's the weight of 10 (deca) fig cookies (Newtons). Obviously, this is incorrect. You must *burn* the fig Newtons and measure the caloric output to come up with the energy required to push the rudder with a force of 52 daN.

Flight instruments (Sec. 10)

The info for the airspeed, altimeter, and VSI comes from the ADCs (air data computers). Information comes and goes digitally on the Avionics Standard Communication Bus (ASCB). Know a little bit about what's on this bus. In the 42, losing both DC generators will result in a loss of both ADCs, so you'll have to use the standby altimeter and airspeed indicator. In the 72, ADC 1 would still work in this scenario.

If you get the AHRS "A ERECT FAIL" light, the checklist says to transfer to the other AHRS and use that. Meanwhile, you will need to periodically press the A ERECT FAIL pb on the one with the problem for 15 seconds while in level unaccellerated flight. This keeps the one with the problem available as a backup. The light will not go back out when you push the pb, since the light is just telling you that you have lost the TAS input from the ADCs. The light has nothing to do with Bob Dole.

Run the marker beacons in high all the time, even though the AIM says not to. Low is just too weak to work in the ATR.

In the 42 simulator, for 160 knots, level flight, use 3 deg pitch. Watch out for a tendency to put the airplane symbol on the horizon if you look away for a minute then look back. Remember where it's supposed to be - there is no adjustment for the zero pitch point. For steep turns to the left, you need 5 to 6 deg nose up; for right steep turns you need 3 to 4 deg. Don't forget that there is a 45 degree bank reference mark on the EADI. The pointer needs to point to that for the steep turns.

The flux valves for the compass slaving are near the wingtips. They both input to the Compensator, then the signal goes from there to the AHRU. When a fuel truck is parked under your right wing, expect comparator warnings. These warnings must go away before takeoff.

When you transfer the AHRS, if both pilots try to transfer, the Captain's side has priority.

On the ground, both AHRS systems will work with the battery on, but not in flight. They wired it so that both would be powered on the ground, prior to engine start, so that when you get ready to taxi out on #2, you don't have to wait 3 minutes for the AHRS to initialize. (Never move the plane until initialization occurs.)

AHRS failure: Blue sphere with "ATT FAIL" on the EADI and compass rose with HDG FAIL on the EHSI. Consult the checklist, which will tell you to select the other pilot's ATT / HDG. Afterwards, use your own nav radio and your own course selector knob.

SGU failure: There are 3 parts to the SGU, part A, part B, and part C. If A and / or B fails, there will be a big red X on both tubes. If they are *both* blank, you have a failure of the whole SGU. It doesn't matter which, in either case you consult the checklist and select the other side with the "EFIS SG" button. Afterwards, you won't be able to use the course selector knob on the failed side – you're just taking the whole picture from the working side. The nav radio on the failed side can be used in VOR mode on the RMIs.

Tube failure: If one tube is blank but the other one on the same side works, you have a failure of the tube. The checklist will have you turn the brightness down on the dead one all the way to off, which puts the remaining display into composite mode. In this case, when you're down to nothing but the nav indicator at the bottom of the composite mode, that CDI will work like an old fashioned VOR head unless the flight director is working. With the flight director working, pressing BC for a back course approach is necessary for correct sensing. If you're in composite mode with a failure of the flight director, (example – dual DC generator loss) you'll have no BC mode and you'll have to fly reverse sensing. You won't have to fly reverse sensing if the flight director is inop but you're using both tubes, because the CDI needle on the EHSI will always indicate properly if it's available. In the arc mode of the EHSI, the tail of the needles will *never* appear.

With the flight instruments in the composite mode (or "composting" as I like to call it), and the working tube is the bottom one, you may not see any colors on the screen for the horizon. If that happens, turn up the radar brightness and you'll get it back (inner knob on EHSI brightness control). A magenta TX display means the brightness for the radar is turned all the way off or that you're flying over Texas.

Remember: No matter what mode you're in, or what has failed, ALWAYS set the FRONT course in on the CDI when shooting an ILS or a back course approach!

I've been asked on orals what works in flight with batteries only. Here's a list of some of the most important items:

AHRS 1, capt's top EFIS tube, capt's clock, standby horizon, standby altimeter, standby ASI, wet compass (with light), fuel quantity, top 4 sets of engine gauges, level 1 advisories and level 3 warnings on the CCAS, CVR, Com 1, Nav 1, 3 lights under capt's panel, first officer's dome light, pedestal light, electric fuel pumps, engine fire protection, minimum cabin lights. You'll have to use the erect pushbutton every once in a while for the remaining AHRS, and you'll need to compare the EFIS attitude with the peanut gyro –The A Erect Fail light will stay on continuously, so cross check the standby instruments and re-erect as needed. Note: In the 72 on battery power, you won't lose ADC 1.

Failure of ADC 1 would be evidenced by the loss of the captain's airspeed, altimeter and VSI. The TAT / SAT indicator would also be lost in the 42, or in the 72 if ADC #1 was selected. Other items would also be lost, but the red flags right in front of your face would probably be very noticeable.

Instead of memorizing what's on every bus, know the basics. Have a general idea what's powered by DC v/s ACW. Know what instruments you'll have left after a dual DC generator failure and what lights are available to see them with.

Communications (Sec. 5)

Be sure to wear your headset. It needs to be on prior to beginning the before start checklist and remains on until shutdown unless you're at or above 18,000 feet.

Watch out for being "hot" on the interphone. The Flight Attendant can hear everything you say in the cockpit, after they ring you and you answer. You'll be making rude comments about the flight attendant's hairdo or something, and they will have the technology (if they're bored enough) to keep listening to what you're saying. Of course, none of our pilots would ever make such comments.

If an audio control panel fails, and you push the button to bypass the audio panel, the pilot on that side only has "his" radio, and no intercom. Must use speaker.

If you don't have a GPU available when you arrive at your destination, Com #2 will be lost when you shut down the engines. You can talk to ops on Com #1 using the captain's speaker – so turn the volume up on that side if you're in this situation.

Flight Control has the technology to transmit selcal signals on 129.87 as well as over ARINC and the dial access stations.

Navigation, AFCS

GPWS: For approach it gets it's info from ILS 2. GPWS switch is in a weird location, and when you need to find it, you're going to be in a hurry. Figure out where it is before you get into the simulator.

AFCS: If you turn off the yaw damper, the autopilot will also disconnect. "Approach" means ILS. If you want to fly a back course, you must select BC mode!

Suggestion: use HDG mode for VOR approaches that take you over the VOR before reaching the MAP. If you want to change VOR course over the station while in VOR mode, do so while the * is showing and the FD will smoothly recapture the new course.

Max. autopilot pitch - any mode: +/- 15 deg.
Max autopilot bank - any mode: 35 deg. Less than 6 deg in basic mode will level the wings when you let go of the TCS pb. If you use TCS and release it while in a bank of 6 degrees or more, it will hold that bank angle. If you release the TCS when in a bank of greater than 35 degrees, it will reduce to 35 and hold that once you release the button.

Use the TCS on an approach to get to an exact altitude for the approach if it's not a cardinal altitude (example 920' – set 1000' then TCS to just a little over 920. Maybe add 20 or 30 feet to MDA for that to allow for the FD to hunt slightly for the right altitude.)

When the FD captures, there will be a star on the ADU and a box on the EADI for 5 sec.

In winter, the ADU and the AFCS control box might not work initially if the aircraft is cold soaked.

Select new headings when you get LOC * or VOR *. But don't select a new altitude until the ALT mode is active, meaning the star has gone away! Otherwise, you'll lose your vertical guidance on the FD.

In VMC you don't have to go around for a hard GPWS warning. Use caution at night, though. Personally, I will execute the escape maneuver if I get a hard GPWS warning at night in VMC unless I'm over a well lighted area and a well lighted area is continuously ahead of me (as in over the middle of a city or over the approach lights on short final) or unless I'm at or near cruise altitude. In IMC, unless you are up around 10,000' or so, use the GPWS escape maneuver if a hard warning sounds, except for "don't sink." Know the hard and soft warnings. The soft warnings are a shorter list to learn. See the GOM.

System integration training

Study the decelerated approach. Remember to add field elevation, because deceleration altitude is height above field elevation.

Don't move the aircraft if there is nil braking action - even to reposition the aircraft or fly part 91. Just leave it where it is!

Icing, single engine after takeoff: Climb with flaps at 15 at VmLB0 after 400' instead of retracting the flaps. Retract flaps once you are up at cruise and the airspeed has built up, unless you were in severe icing – then leave them at 15 and consult the checklist.

After takeoff on two engines, don't level off at 400', just lower the pitch and allow the speed to build as you climb. On 1 engine, you must not overshoot the 400 feet by more than 100 feet or it's a bust.

Use the arm rests - especially in the simulator.

Watch power reductions: Only about 1/2 inch of movement is necessary to go from 92% to 80%. Flying pilot will reduce power before calling for "climb sequence." That's easy to forget, especially after flying the 72, in which you don't move the power levers for the climb sequence.

Know the climb sequence, in the right order. You only accomplish the climb sequence if both engines are operating. On one engine you just select ALT, then select IAS when the airspeed reaches the third bug. Same for go-arounds – on two engines, do the climb sequence at acceleration height, on one engine select ALT.

When you have an engine failure on takeoff, call "gear up, confirm feathering." NFP looks for around 10% Np on failed engine to confirm, calls "autofeathering confirmed." If it doesn't feather: See procedures in SOP for what to do, and memorize that as if it were a memory item!

Airwork (stalls and steep turns, etc.) will be done in the first simulator session. Also abnormal starts. Icing procedures will come on day 3 or 4. Watch for that amber icing light to come on, and call for level 3 when it does. It will come on as other emergencies are distracting you.

Start all maneuvers at 160 knots (170 in the 72). That's 40% torque, 3 deg pitch up for level flight. In a 30 deg bank turn, you need to increase pitch to about 5 deg.

Emergency Descent: Capt. takes over if NFP. Capt. does the memory items on the checklist. Remember the hand movements for the maneuver: Power levers, engine start rotary selector, and seat belt signs - 1,2,3. Then go to the checklist – don't try to do the whole emergency descent procedure from memory.

Asking for "Flaps 15, gear down" is one call if you're at or below 160 knots. Asking for "Flaps 30, condition levers max" is one call. Then, AFTER you verify that the gear and flaps are set, you call for the before landing checklist. On a *non-precision, straight in* approach, this *must* be done *before* you get to the FAF! Even on one engine! For an ILS, you just need to be stabilized prior to 1000' AGL.

Review the speeds for the TOLD card before your simulator session! Remember to "add 1/3 of the wind or all of the gusts, not less than 10 or more than 15" to Vref to get Vapp.

Tip: I had trouble on the single engine precision approaches, because I was used to the aircraft decelerating to 120 when you put the flaps to 30 and CL max. It's timed about right, except that on one engine the CL is already at max, so you don't get that deceleration; just the ballooning effect of the extra flaps. On one engine you'll need to reduce the power on the good engine when you are intercepting in order to get the speed down to 120.

Learn the callouts required by the SOP and the GOM. All the altitude callouts except the 100' above DH / MDA call are made by the non flying pilot. The 100' above DH / MDA call is made by the flying pilot. Then the non flying pilot calls DH / MDA and the rest of the callouts. This is a little hard to remember. There is also a 100' AGL call, and a 20' AGL call (use radar altitude for these). At 20', you reduce the power to flight idle. You should start decelerating in time to cross the threshold at or near ref.

Go to the cockpit mockup in the Training Department with your simulator partner, and learn all the callouts and actions for the following scenarios: Normal takeoff, rejected takeoff, takeoff with engine failure at V1, with and without feathering, with and without icing. Precision and non precision approaches with and without icing, with and without landing. The non flying pilot (PNF) duties are as important to know as the flying pilot's (PF) actions and you will be graded on both.

On a go around, the NFP puts the gear up, then pushes *3 buttons* Heading, Low Bank, and IAS. That's the order in which these need to be pushed on the AFCS. Say "Acceleration Height" when reaching 400'. Do the climb sequence if on 2 engines.

If you're going around on one engine, the flying pilot calls "select IAS" when reaching VmLB0 (instead of "climb sequence"). Then, if you're in icing, you say "leave flaps 15, after takeoff checklist." You can use either the after takeoff checklist or the go-around checklist. It is suggested that you use the go-around checklist if you're going to try the same approach again, or the after takeoff checklist if you're planning a different approach. If you're not in icing, you say, "select IAS, flaps zero, after takeoff checklist" at VmLB0. Either way, you climb at VmLB0, not VmLB0 icing. But VmLB0 is the same as VmLB15ice. So, you always say "select IAS" when you reach VmLB0 if you are on one engine.

Don't automatically do everything that's on the after takeoff checklist when you have an engine failure or other major problem. For example, on one engine, leave the bleeds off and the power management at TO for 5 minutes. Again, on 2 engines, you just say "climb sequence" at acceleration height. Be sure to reduce the power levers a little more than usual (ATR-42 only) before calling for the climb sequence on the 2 engine go around because you are at 100% torque, whereas on a takeoff you're at 92%.

Memorize (put on flash card for starters) everything you need to look for when you get into the cockpit, such as: compass correction card, wt. & balance information, AFM, FCOMs, Airport analysis charts, MEL, normal checklist, emergency checklist, maintenance can, GOM for each pilot, etc. Check the computer for currency of the MEL, performance charts, Jepp charts, etc. etc.

Checklist priority: (a) emergency checklist, (b) normal checklist, (c) abnormal checklist.
For example, for an engine fire on takeoff, you first do the memory items on the In Flight Engine Fire checklist, (after reaching 400'), then complete that checklist. After calling for flaps 0, you do the After Takeoff checklist (but don't do the climb sequence on one engine) then do the Single Engine Operations checklist that is referenced in the fire checklist.

For an engine failure on takeoff, you first do the normal After Takeoff checklist (using common sense for each item called for, as explained earlier), then call for the engine flameout checklist. An engine failure isn't considered an emergency for the purposes of the checklist priority.

Bring some TOLD cards and weight and balance forms. The instructor wants to see those in the flight kit when you get to the simulator session. You'll need at least 5 or 6 of each, plus another 5 or 6 for the guys that forgot to bring any. They use that funky ATR headset in the simulator, and if you don't have an adapter, you have to use that one instead of your own headset. Have everything required for a normal flight or they'll have to send you home.

Note: Darin Carroll created the following section of the notes, edited by Steve Foster

ATR 42 Limitations

Power Settings	Time Limits	Torque %	ITT	NH%	NP%	Oil Pressure	Oil Temperature
Reserve Takeoff	**5 Minutes**	**100**	**816**	**100**	**101**	**55 to 65**	**0 to 115**
Normal Takeoff	**5 Minutes**	**92**	**785**	**Varies**	**101**	**55 to 65**	**0 to 115**
Max Continuous	**None**	**85**	**785**	**100**	**101**	**55 to 65**	**0 to 115**
Ground Idle	-	-	-	**62**	-	**40 Minimum**	**-40 to 115**
Starting	**None**	-	**816**	-	-		**-40 Minimum**
	20 Sec		**850**				
	5 Sec		**950**				

Do not set power above **50%** torque in feather per FCOM. At TSA power is never above FI in feather.
Flight with an engine running and the propeller feathered is not permitted.

Max Altitude	**25,000'**
Max crosswind for cargo door	**45 Knots**
Max taxi weight	**36,870 lbs.**
Max takeoff weight	**36,825 lbs.**
Max landing weight	**36,160 lbs.**
Max zero fuel weight	**33,510 lbs.**
Max forward cargo	**1,693 lbs.**
Max left forward cargo	**1,059 lbs.**
Max right forward cargo	**634 lbs.**
Max aft cargo	**1,691 lbs.**
Max aft cargo (small 421&422)	**845 lbs.**

Vmca Varies - use FCOM

Max Tailwind (TSA)		**10 Knots**
Max demonstrated Crosswind dry runway:		
Takeoff		**45 Knots**
Landing	30 Degrees Flaps	**38 Knots**
Landing	45 Degrees Flaps	**20 Knots**

Engine run-up max crosswind angle	**+/- 45 Degrees**
ECU out, Wind> 15 Knots, Avoid NP% of except for engine start/stop.	**41-65%**

NP below **86%** Prohibited in flight (TSA)
Three start limit, **One minute and 30** second total combined running time, **4 minute** rest.

Max fuel load **9,920 lbs. & 1516 gallons** total & **4,960 lbs.** & **758 gallons** in each tank. Feeder tanks hold **352 lbs**. Per side.

Vmo	**250 Knots**

Va		**160 Knots**
Vfe	15 degrees	**170 Knots**
	30 degrees	**150 Knots**
	45 degrees	**130 Knots**
Vlo	Lowering & retracting	**160 Knots**
Vle	Extended	**170 Knots**
Vra		**180 Knots**
Vwo		**160 Knots**
Max tire speed		**165 Knots**
Vmcl	15 degrees flaps	**89 Knots**

Max fuel imbalance	**1,212 lbs.**
Jet A min. fuel temp to start	**-34 degrees C**
to operate	**-38 degrees C**
Max Cabin differential	**6.35 psi**
Max negative cabin differential	**-.5 psi**
Max differential for landing	**.35 psi**
Max Differential for OVBD valve full open	**1 psi**
Max Bleed off operation	**20,000'**
Vmcl 30 degrees flaps	**87 Knots**

DC Generator Limits 0-400 Amps- **None** 400-600 Amps- **2 Minutes** 600-800 Amps- **8 Seconds**

Minimum height for autopilot on takeoff **500**' (TSA)
Minimum height for autopilot (other than takeoff or approach) **1000'**
VOR approach mode is authorized when co-located DME is available and DME hold is not used.
AP/FD use below DA/MDA on approach prohibited, no lower than 320' on non-precision approach.
Holding with flaps 15 degrees is prohibited in icing conditions (except single engine operations)
Wing ice lights and icing evidence probe light must be operative for **Night flight into icing conditions**
Ice detector **must be operative** for flight into **icing conditions**

ATR 72 Limitations (Differences)

Power Settings	Time Limits	Torque %	ITT	NH%	NL%	NP%	Oil Pressure	Oil Temperature
Reserve Takeoff	**5 Minutes**	**100**	**800**	**102.7**	**104**	**101**	**55 to 65**	**0 to 115**
Normal Takeoff	**5 Minutes**	**90**	**Varies***	**101**	**101.7**	**101**	**55 to 65**	**0 to 115**
Max Continuous	**None**	**100**	**800**	**102.7**	**104**	**101**	**55 to 65**	**0 to 115**
Ground Idle	-	-	-	**66 Min.**	-	-	**40 Min.**	**-40 to 115**
Starting	**None**	-	**800**	-	-	-	-	**-54 Minimum**
	20 Sec		**840**					
	5 Sec		**950**					

Do not set power above **47%** torque in feather per FCOM. At TSA power is never above FI in feather.

***Takeoff ITT Limitations :** 765 - 776 depending on outside air temperature (higher with warmer temperatures)

Low Speed light out by	**185 Knots****
Low Speed light on by	**180 Knots****
Total Fuel	**11,020 lbs.**
	1,680 gallons
Total Forward Cargo	**2,047 lbs.**
LH Forward Cargo	**988 lbs.**
RH Forward Cargo	**1,059 lbs.**
Aft Cargo	**1,691 lbs.**
VA	**175 Knots**
Climb Speed	**170 Knots****
Approach Speed	**130 Knots****
Emergency Descent	**180 Knots****
Pattern Speed	**170 Knots****
Vmcl 15° Flaps	**94 Knots**

Fuel Per Tank	**5,510 lbs.**
	840 gallons
Max Fuel Imbalance	**1,609 lbs.**
Max Taxi Weight	**47,465 lbs.**
Max Takeoff Weight	**47,400 lbs.**
Max Landing Weight	**47,068 lbs.**
Zero Fuel Weight	**43,430 lbs.**
VFE 15	**185 Knots**
VFE 30	**150 Knots**
VLE	**185 Knots**
VLO Retract	**160 Knots**
VLO Extend	**170 Knots**
Max Crosswind	**35 Knots**
Hold Speed (Flaps 0)	**175 Knots**
Initial Approach Speed	**170 Knots****
Vmcl 30° Flaps	**90 Knots**

Note: Max crosswind is 35 kts. for both takeoff and landing.

**Not a limitation, but required knowledge

Engine Starting

Start Fault

1. ENGINE START ROTARY SELECTOR……………………………………..OFF / START ABORT
2. IF ABOVE 45% AND START LIGHT OFF……………………………….. CONTINUE START AS NORMAL

No NH During Start

1. WAIT 10 SECONDS WITH START PUSH BUTTON SELECTED……… ON
2. IF OIL PRESSURE INCREASE…………………………………………… CONTINUE START (NH GAUGE INOP)
3. IF NO OIL PRESSURE INCREASE……………………………………….. ENG START ROTARY SEL OFF / START ABORT

No ITT During Start

1. CONDITION LEVER……………………………………………………….. FUEL SHUT-OFF
2. ENGINE START ROTARY SELECTOR………………………………... OFF / START ABORT
3. WAIT 30 SECONDS……………………………………………………... ALLOW FUEL TO DRAIN
4. ENGINE START ROTARY SELECTOR………………………………... CRANK
5. START PUSH BUTTON…………………………………………………… ON FOR 15 SECONDS
6. ENGINE START ROTARY SELECTOR……………………………….. OFF / START ABORT

Excessive ITT During Engine Start

1. IF ITT EXCEEDS 900 DEGREES C° CONDITION LEVER…………….. FUEL SHUT-OFF
2. ENGINE START ROTARY SELECTOR………………………………... OFF / START ABORT
3. WHEN NH BELOW 30 % ENGINE START ROTARY SELECTOR…….. CRANK
4. START PUSH BUTTON…………………………………………………… ON FOR 30 SECONDS
5. ENGINE START ROTARY SELECTOR……………………………….. OFF / START ABORT

Systems Quiz

Assume ATR 42 unless specified.

AIRCRAFT GENERAL:

How many type III exits are there and how can they be operated?
- Two; they can be operated from inside and outside.

How many hand-held fire extinguishers are on the ATR 42?
- 3.

On the cargo door operating panel, what does the red light mean?
- When illuminated, indicates Ground Handling Bus is directly powered by the HOT MAIN BATTERY BUS.

On the cargo door operating panel, what does the blue light mean?
- When illuminated all door hooks and latch locks are engaged.

When are the CABIN and CARGO door unlocked aural alerts inhibited?
- When the #1 condition lever is in feather or fuel shut-off.

When are the SERVICE and FWD COMPT unlocked aural alerts inhibited?
- When the #2 condition lever is in feather or fuel shut-off.

What does the door OK lights mean when illuminated?
- When the test button depressed, indicates cabin and service doors are opened and associated micro-switches are in the opened position.

With no power available to the aircraft, how can we obtain some lighting in the cabin?
- A switch located by the entrance door provides for 2 minutes of cockpit lighting and emergency EXIT lighting.

Note: Main cabin door must be open.

How many power sources are available for emergency evacuation lighting?
- TWO; DC EMER BUS via a voltage divider or a 6 volt batteries which are charged from the DC EMER BUS.

Note: They have a 10 minute capacity.

With DC EMER BUS only, what cockpit lighting is available?
- RH DOME light.
- LH 3 lights located below the glareshield.
- Overhead panel light illuminating the pedestal.
- Light in the wet compass

What does the MIN CABIN LIGHTING switch do?
- Enables us to control the MIN CABIN LIGHTS powered by the MAIN BATTERY. On the RH side of the cabin, every other light is illuminated. Switch doesn't do anything unless you're on battery power only.

When would the emergency exit lights illuminate?
- On: Emergency exit lights illuminate.
- Arm: Lights illuminate if DC EMER BUS voltage drops below 18 Volts or if both generators are lost.

Lights extinguish if DC EMER BUS voltage is over 20 Volts and at least one generator is operating.
- DISARM: Exit light system is deactivated

Note: F/A's EMER LIGHT switch will override the ARM and DISARM positions.

MFC:

How many MFC's are on the ATR 72?
• Two; MFC 1 and MFC 2; Each computer consists of 2 independent modules (A&B). Modules 1A and 2A have hard wired logic that is independent of the computation unit.

(42) What two ways is a crew notified of a system failure?
- Directly through a local alert.
- A central alert through the CCAS.

(42) When on batteries only, what information will still be processed in the CCAS?
- Warnings only, that portion of the CAC is powered by the DC ESS BUS.

How many alert levels are there, give an example of each, and which are processed in the CAC?
- Four levels (3=Warnings, 2=Cautions, 1=Advisories, 0=Information).
- 3=Engine Fire, Stall Warning.
- 2=Bleed Fault, Pack Fault.
- 1=A/Erect Fail (No Chime).
- 0=Airframe De-ice mode selected.
- Only level 3 & 2 are processed in the CAC.

What lights on the CAP can be inhibited in the 42?
- All smoke lights, level 2 amber lights except EFIS COMP.

How long are the warnings inhibited after takeoff?
- Until the gear starts to retract.

What lights on the CAP can be cleared?
- All amber except; PARK BRAKE, GPWS FAULT, CCAS, and MAINT PANEL.

(42) What items does the T/O configuration test check?
- Flaps 15°.
- Trim in the green.
- Power management in T/O.

(Note: It also performs an auto recall.)

Re: previous question - what additional item would cause a CONFIG warning on takeoff?
- Parking brake not released

Angle of attack info is directly processed by the CCAS; What are the alert and shaker limits and the pusher limits (42)?
- ALERT and STICK SHAKER ACTIVATION 12.5°*.
- STICK PUSHER ACTIVATION 15°*.
- Stall alarm and shaker are inhibited on the ground.
- Pusher in inhibited on the ground and 10 seconds after takeoff.

Horns Anti-Icing On (42):
- ALERT and STICK SHAKER ACTIVATION 7.5°*.
- STICK PUSHER ACTIVATION 15°*.

Note: During T/O the icing AOA stall alert threshold is initially 8.5°*, and changes over in 5 minutes after take-off, or when flaps are selected to 0° which ever comes first.
- Stall alarm and shaker are inhibited on the ground.
- Pusher is inhibited on the ground and 10 seconds after takeoff.

Difference between 42 and 72:

- On the 72 shaker **AND** pusher thresholds change with horns selected ON.
- On the 72, the pusher is also inhibited when the aircraft descends below 500 feet. However, if the radar altimeter gives an erroneous 500ft. signal while IAS > 185 knots for more than 120 seconds, the **STICK PUSHER FAULT** amber light will illuminate, notifying the crew that the stick pusher is inhibited.

AIR CONDITIONING AND PRESSURIZATION:

Air for the packs is bled from where?

- Normally from the low compressor stage (LP). However, at low engine speed when pressure from LP stage is insufficient the air is automatically switched to the high compressor stage (HP).

What is the function of the pack valve?

- Pack shut off.
- Pressure control; Normal or High are available (17 or 30). High flow increases the pack entrance pressure.

What does the pack need to open?

- Air pressure and electrical supply. When one is missing the pack valve is spring-loaded closed.

(42) When does the ground cooling fan run?

- On the ground and in flight when speed is < 125 knots.

What happens to the air sucked in by the ground cooling fan?

- It passes over the primary and secondary heat exchangers and is exhausted overboard.

(42) What would be a likely indication of a ground cooling fan failure?

- On the ground or in flight below 125 knots when the respective pack faults.

What is indicated by a pack fault?

- Valve position disagreement.
- A temperature > 204° C*. downstream of pack compressor. The pack valve will close automatically.

What is the function of the temperature control valve?

- It controls the amount of hot air entering the mixing chamber, while the pack adds cold air.

Note: If one pack is inoperative, the other pack supplies both compartments through the mixing chamber.

What controls the position of the temperature control valve?

- Pack outlet temperature (duct temperature).
- Demand selector position.
- Compartment temperature.
- Skin temperature.
- In MANUAL it is controlled directly by the demand selector position.

In AUTO mode duct temperature is limited to what temperature?

- 88° C*. (This value was previously 82°)

In MANUAL mode the controller directly controls the temperature control valve, the duct temperature is limited to?

- 88° C*. We get an OVHT at 92°* C.

Why would a RECIRC FAN fault?

- Low fan RPM.
- Fan over temperature.

How do the outflow valves operate in AUTO mode?

- The auto digital controller uses:
  - Landing Elevation.
  - Takeoff elevation as memorized.
  - Cabin Pressure
  - Static pressure from ADC1 and Captains altimeter or, ADC2 and 29.92 if ADC1 fails. The controller adjusts the electro-pneumatic outflow valve, which has the pneumatic outflow valve slaved to it. If the digital controller loses electrical power both outflow valves go to full close.

What does the DITCH pb do?

- Two electric motors drive both outflow valves closed. This is only in aircraft with the outflow valves in the belly.

On the ground, with the OVBD valve pb selected to AUTO, the OBVD valve is closed if?

- #1 engine is running (oil pressure above 40 psi).

In flight, if the exhaust mode pb is released, what will happen?

- The OVBD valve will open slightly, the under floor valve will close, and the fan will shut off.

What items will cause the bleed air valves to close?

- Bleed overheat (274° C*. inside the duct).
- Bleed leak (124° C*. around the duct).
- Actuation of the fire handle.
- Absence of air pressure (engine not running).
- Loss of respective DC bus.

What is the cabin pressure at FL250 (maximum theoretical cabin altitude – Max. ZCTH)?

- 6740 feet.*

What are the maximum cabin rates in MANUAL mode?

- +2,500 fpm to -1500 fpm.

What are the maximum cabin rates in AUTO mode?

- up to 20,000 ft. not more than 550 fpm.*
- 20,000 ft. not more than 620 fpm.*
- Descent rate, normal = -400 fpm.
- Descent rate, fast = 500 fpm.

If operating in manual pressurization mode, remember to ensure that:

- The cabin is depressurized before landing – especially before reaching the gate!

In flight, with the exhaust push button on OVBD what happens to the what happens to the extract fan, ovbd valve, and under-floor valve?

- The extract fan stops, the under-floor valve is closed and the ovbd valve is partially open. This allows for differential pressure to vent the avionics area instead of the extract fan.

AUTOFLIGHT CONTROL SYSTEM (AFCS):

What are the main components of the AFCS?
- One computer.
- One control panel.
- One advisory display panel (ADU).
- Three servo actuators; one for each axis.

The ADU has 4 lines of text. What is the meaning and color of each line?
- Line 1: Advisory message in white letters.
- Line 2: Caution message in amber letters.
- Line 3: Armed modes in white letters.
- Line 4: Active modes in green letters.

Where does the computer receive its data?
- Two Air Data Computers (ADC).
- Two Attitude and Heading Reference System (AHRS).
- Two Symbol Generation Units (SGU).
- Radio Altimeter.

What is the difference between low & high bank?
- Hi = 27°
- Lo = 15°

The BANK pb only affects bank angle when in the ______ mode
- Heading

What is the function of the TCS button?
- Temporarily allows the pilot to control the aircraft with the auto pilot engaged.
- In BASIC mode, the TCS button will cause the AP to change pitch and roll references. If the pitch is > 15° when the button is released the pitch will return to 15°. If the TCS button is released at a bank angles < 6° the system will level the wings. If the TCS button is released with a bank angle between 6° and 35° it will maintain that angle. At bank angles of >35° the system will return to 35°.

  Note: Action on the TCS with Alt Hold, VS Hold, Or IAS HOLD modes selected, will re-synchronize those modes.

How can the auto pilot be disengaged manually?
- Quick disconnect on the control wheel.
- Action on the pitch trim (normal or standby).
- Auto pilot pb on the AFCS control panel.
- Yaw damp pb on the AFCS control panel.
- Go around pb on the power lever.
- 30 daN* force on the rudder pedals (66 pounds)*.

How can the auto pilot be disengaged automatically?
- One of the engagement conditions of the auto pilot or yaw damper is no longer met.
- Stall warning indicator threshold is achieved.
- There is a disagreement between two AHRS or two ADC's.
- There is a mismatch between the two pitch trims.

What data is used for guidance computations?
- The AFCS computer uses data from the coupled ADC and SGU and displays the same commands on both sides.

COMMUNICATIONS:

What does an AUDIO SELECT FAULT mean?
- RCAU processing board failure or power loss.

After the oxygen mask has been pulled out how can you use the boom microphone again without re-stowing the oxygen mask?
- It can be accomplished by closing the left oxygen mask door and pressing the TEST pb.

Where is the ELT transmitter located?
- In the ceiling of the cabin between the passenger entry door and the lavatory door.

Where is the ELT antenna located?
- In fairing ahead of the stabilizer fin.

When does ELT transmission occur?
- When deceleration exceeds 5 G's*.

ELECTRICAL:

Name the 11 DC buses.
- Hot Main Battery Bus.
- Hot Emergency Battery Bus.
- DC Service Bus.
- DC Standby Bus.
- DC ESS Bus.
- DC Bus 1.
- DC Bus 2.
- Utility Bus 1.
- Utility Bus 2.
- DC Ground Handling Bus.
- DC Emergency Bus.

What is the function of the 43 AH (Main) battery?
- It is for engine starting and emergency power supply which includes propeller feathering.

What is the function of the 15 AH (Emergency) battery?
- To provide power to the emergency network if the main battery becomes depleted. It's secondary role is to avoid power transients on critical equipment during engine starts.

(42) What is the role of the two battery protection units (BPU)?
- Each connects the battery for charging.
- Analyzes the charge current and or associated DC bus voltage so as to prevent thermal runaway.

What is the role of the Bus Power Control Unit (BPCU)?
- It provides for the control of bus tie contactor.
- Battery start contactor.
- Load shedding.
- External power function.
- DC Service bus contactors.

How many volts are required for the inverters to work?
- 18 volts.

What is the role of the Generator Control Unit (GCU)?
- Controls the generator contactor and the start contactor.

List the sequence of events while starting Engine #1 (assume #2 is already running).

(ECU fault lights will initially be on in 42. EEC fault lights will be off in the 72)

- Engine Start Rotary Selector to Start
- Press Start pb for Engine #2
- 10% Nh: Move CL to FTR which introduces fuel and ignition
- 10% Nh: Generator #2 begins providing power to the start circuit in addition to the battery
- 25% Nh: ECU fault light extinguishes (42 only)
- 45% Nh: Start ON light extinguishes – starter / generator is resting
- 61.5% Nh: Starter / Generator acts as a generator
- 66% Nh – 42 / about 62% Nh - 72: Move CL to Max RPM

In order of priority, in what ways can the DC Emergency Bus be supplied?

- Hot Emergency Battery Bus.
- DC Bus 1.
- DC Bus 2.

In order of priority, in what ways can DC ESS Bus be supplied?

- Hot Main Battery Bus.
- DC Bus 1.
- DC Bus 2.

What does DC Bus 1 normally supply?

- Hot Emergency Battery Bus.
- DC Emergency Bus.
- DC Standby Bus.
- Utility Bus 1.
- Inverter 1.
- DC Service Bus.

What does DC Bus 2 normally supply?

- Hot Main Battery Bus.
- DC ESS Bus.
- Utility Bus 2.
- Inverter 2.

In the normal mode, the DC emergency bus & DC standby bus are powered by?

- Hot emergency battery bus.

In basic mode what powers the busses?

- DC emergency bus: Hot Emergency Battery bus
- DC essential bus, DC and AC STBY busses: Hot main battery bus until override pb depressed
- After Override pb is depressed the DC and AC STBY supply will change to the Hot Emergency Battery bus

What lights on the electrical panel will be on with battery power only?

- DC generator 1 & 2 fault.
- DC bus 1 & 2 fault.
- DC utility bus shed.
- Both battery charge contactor Fault lights
- Both battery arrows
- AC Bus 1 & 2
- Inverter 2
- AC wild bus 1 & 2 off.
- AC wild generator 1 & 2 fault.

What lights on the electrical panel will be on with GPU power?
- DC generator 1 & 2 fault.
- AC wild generator 1 & 2 fault.
- AC wild bus 1 & 2 off.

What lights on the CAP will be on with GPU power?
- Hyd.
- Anti-icing.
- Fuel.
- Elect.
- Air.
- Prkg. Brk.
- ENG – 42 only

How is the Ground Handling Bus supplied?
- By the main battery or by external power.

What does the red light on the cargo door panel mean?
- The ground handling bus is being supplied by the hot main battery bus.

Note: The red light indicates that the main battery is emptying, even if the battery switch is in the off position.

What happens to the ground handling bus in flight?
- It is de-energized.

How can we activate the GND HDLG BUS without turning the battery on?
- Open an entrance door.
- Open the fueling panel.
- Open the cargo door operating panel cover.
- Activate the DC AUX PUMP.

How is the DC SVCE Bus powered, and why is it important to know?
- It can be powered by external power or DC BUS 1.
- If it is being powered by external power the flight attendant has control, and if it is being powered by DC Bus 1 then the pilots have control.

Note: At no time do the pilots have an indication of the status of the Service bus. Just control via the SVCE/UTIL pb.

What does a DC SVCE / ULIT Bus shed light mean?
- At least one UTIL BUS is disconnected from its associated main DC Bus.

Note: To determine which one, check the recirculation fans.

Each Battery Charge Contactor is closed in normal operation. When do they open?
- Thermal runaway of associated battery.
- Undervoltage of DC MAIN Bus (< 25 volts).
- Start sequence initiated (both are opened until Engine Start Rotary Sel. is OFF – but no fault light illuminates).
- Battery switch selected to OVRD.

What does a battery charge fault mean?
- An overheat is detected by the BPU and the contactor is opened.
- A failure of the charge contactor.

What major items are affected by a loss of the DC emergency bus?*

- Master cautions and aural warnings still work if other busses are powered.
- Torque gauges inop.
- VHF 1 radio inop.
- Standby horizon inop.
- Both bleeds and packs will be lost.
- AC wild powered blue hydraulic pump is lost. Use the hyd. Crossfeed.
- Captain and standby probes heating is lost.
- Captain and standby altimeters should be compared to the first officers side.
- Normal pitch trim is lost, but the standby pitch trim will work if the other busses are powered.

What items are on the DC ground handling bus?

- Red light on forward cargo door.
- Fueling control and indicators.
- DC aux. pump power supply and indication when on the ground.
- Cargo door power supply.
- 2 minute lights.

What are the major items on the 26 volt AC standby bus?*

- Flap indicator.
- Course / heading select panel 1.
- First officers RMI.
- Some EFIS comparator warnings.

What does the ACW system run?

- Hydraulic pumps.
- Anti-ice Heat.
- Landing, Taxi, and Strobe lights
- LAV flush.
- Hot Jugs.

EMERGENCY EQUIPMENT:

What is the pressure of the oxygen system?

- Pressure of 1850 psi is reduced to 78 psi.

How long can the oxygen system provide 100% oxygen to the crew?

- at least15 minutes.

Minimum oxygen quantity for dispatch – both aircraft

- 1400 psi.

FIRE PROTECTION:

What must happen for the RED ENG FIRE to illuminate?

- A fire signal must be detected by both loops A & B unless one is de-selected. Then the other will work alone.

What happens when the fire handle is pulled?

- Fuel LP valve is closed.
- Air: Bleed and HP valves are closed.
- Arms the Squibs and light is illuminated.
- De-ice and isolation valves are closed.
- Electrical: ACW and DC generators are deactivated.
- Prop is feathered.

FLIGHT CONTROLS:

How is aileron trim performed?

- By offsetting the LH aileron tab from the neutral position.

When do the spoiler start to deploy?

- At 2.5° aileron deflection.

What do the spoiler lights indicate?

- The associated spoiler is not in the retracted position.

How many elevators are there?

- 2; each control column controls the associated elevator; and through the pitch coupling mechanism; the other elevator and opposite column.

How is pitch trimming performed?

- By offsetting both tabs from the neutral position.

What happens when the pitch tabs become desynchronized?

- An alert on the CCAS.
- Normal and standby trims are inoperative.
- The AP disconnects.

What is the rudder damper?

- It limits excessive movement of the rudder due to wind gusts.

What is the rudder spring tab?

- Similar to a balance tab, it operates in the opposite direction of desired rudder travel in flight. Relative wind then assists in moving the rudder. The amount of deflection of the tab in relation to the rudder is proportional to air load on the rudder.

What does the rudder trim do?
- Changes "neutral" spring tab position

How do the flaps operate?
- The lever electrically controls the flap valve which hydraulically actuates the 4 flap actuators.

What happens when flap asymmetry occurs – both aircraft?
- The flaps stay in their present position and the control lever no longer works (ATR 42 / 72).
- The flap asym light illuminates plus the above (72 only)

What is FLAP UNLK?
- Spurious retraction from flaps 15° and more; the alert is triggered if retraction is more than 3°* (42). 4°* (72)

After the flaps are extended to there selected position there is still a EXT flag; what might this mean?
- There is a leak in the system.

FLIGHT INSTRUMENTS:

What are the inputs to each ADC?
- Static air pressure from static port.
- Total air pressure from pitot tube.
- Total air temperature from TAT probe.

What does the ADC compute?
- Pressure altitude.
- Vertical speed.
- Computed airspeed (IAS).
- True airspeed.
- Total air temperature.
- Static air temperature.

What happens with an ADC failure and can we recover the lost items?
- The associated airspeed, altimeter and VSI are lost and unrecoverable.
- With ADC 1 failure we lose the TAT and SAT indicator (42) and the pressurization system now uses ADC 2.

How many TAS inputs are there to each AHRS?
- 3; 1 analog from respective ADC directly, 1 digital from each ADC through the ASCB.

Is the TAT probe heated on the ground?
- No.

What makes up the AHRS?
- 2 Attitude - heading reference units.
- 2 Flux valves.
- 1 Dual remote compensator.

What is a flux valve?
- A device that senses magnetic north, much like a magnetic compass.

What does AHRS 1 supply?
- SGU 1.
- F/O RMI.
- FDAU.
- Radar stabilization.
- ASCB.

What does AHRS 2 supply?

- SGU 2.
- CPT's RMI.
- ASCB.

What indication do we have of an RMI failure (The RMI itself or AHRS failure)?

- A red OFF flag appears. The ADF needle displays relative bearing only; while the VOR needle displays magnetic bearing to the station.

When does the EFIS COMP light illuminate?

- If the SGUs note a 6° heading difference between the 2 AHRS with the bank less the 6° (if the aircraft bank is greater than 6° the threshold is 12°); there will also be an amber HDG in the upper right corner of the EADI.
- If the 2 SGUs disagree more than 6° on the pitch we see a PIT.
- If the 2 SGUs disagree more than 6° on the roll we see a ROL.
- If the 2 SGUs disagree more than 6° on the pitch and roll we see ATT.
- ILS parameters: .6° - LOC, .2° - GS, both out of limits: ILS

What indication do we have of a SGU failure?

- If part A and / or B fails we see two red X's on both the EADI and the EHSI.
- If part C fails or if the whole SGU fails we see 2 blank screens.

What are the 3 parts of the SGU?

- C = Symbol generation; this part generates the symbols going to the CRT's.
- B = ASCB Input output; this part sends and receives data from the ASCB enabling exchange of data from the other pilots data.
- A= Data input; this part receives data from AHRS and NAV systems.
- Memory aid: A – Acquires data. B – Both can share. C – Creates the picture.

You see one blank CRT. What type of failure is this?

- CRT failure

You see two blank CRTs. What type of failure is this?

- SGU failure

You see a large red X on both CRTs. What type of failure is this?

- SGU failure but part C still works

You see a "blue ball" on the EADI with ATT fail and an empty compass rose on the EHSI with HDG fail. What failed?

- AHRS

You see a small red X on some information. What type of failure is this?

- Source failure. For example, if the red X covers the glideslope, no suitable glideslope signal is being received.

After a source failure of Nav 1, the captain selects VOR/ILS Switching. Which course knob should the captain use?

- The course knob on the captain's side.

After a failure of AHRS #1, which nav source and course knob should the captain use?

- Nav 1 and the course knob on the captain's side.

After a failure of SGU #1, which nav source and course knob should the captain use?

- Nav 2 and the F/O's course knob.

Following the failure of the top CRT, you go to composite mode by doing what?

- Turning the EADI brightness all the way down until it clicks off.

Following the failure of the top CRT, you have gone to composite mode but the colors are missing. How do you fix this?
- Increase the radar display brightness (inner knob for EHSI).

FUEL SYSTEM:

How is the engine feed jet pump activated?
- From HP fuel from the HMU.

Where are the engine feed jet pump and electric pump located?
- In the feeder compartment.

Where are the LP valves located and how do we operate them?
- They are located at the fuel outlet of each fuel tank and the can only be operated by pulling their respective fire handle which electrically closes the valve.

What happens when a fuel pump pb is deselected?
- The electric pump is deactivated and the motive flow valve is closed on that side.

What indication will there be if a jet pump fails in flight?
- Pump RUN light on (green). Possibly a very brief FEED LO PR light.

When do the electric pumps automatically run?
- When Fuel low level light illuminates (less than 352 pounds or test PB pressed).
- When the fuel x-feed valve is open.
- When jet pump pressure drops below 5 psi.

If the left fuel gauge in the cockpit is inoperative, how will the refueling system be affected?
- The left fuel gauge on the fuel panel will be inoperative, making the automatic function of the pressure refueling system unusable.

What could be the cause of a engine 1 feed low pressure light and engine 1 fuel pumps run light?
- A fuel leak or jet pump failure and weak electric pump.

Where is the fuel tank temperature indicator located?
- In the left feeder tank.

HYDRAULIC:

What is the total hydraulic fluid volume?
- 2.54 gallons.*

When does the LO LVL hydraulic alert illuminate?
- .67 gallons.*

What occurs with a LO LVL hydraulic alert?
- The hydraulic x-feed automatically closes.

What is the delivery pressure of each hydraulic pump?
- 3000 psi.

How do the hydraulic gauges in the cockpit differ from the gauges in the hydraulic bay?
- The blue and green cockpit gauges indicate system pressure, while the exterior gauges indicate the greater of accumulator pressure or system pressure.
- The parking brake accumulator pressure on the cockpit gauge is showing the fluid side and can drop to zero after repeated use of the parking brake with no blue system pressure, but the exterior gauges show accumulator pressure on the gas side and should never drop below 1500 psi.

During a walk-around what should the exterior hydraulic gauges indicate (no engines running)?
- Green = 1500 psi.
- Blue = 1500 psi.
- Emer/Park 3000 psi.

When does the DC AUX pump automatically run?
- ACW Blue pump pressure less than 1500 psi.
- Gear handle down.
- At least one engine running.

If the blue pump LO PR light illuminates on final approach (gear down) will the AUX pump cycle on and off?
- No. The pressure provided by the AUX pump cannot extinguish the blue main pump LO PR light due to a check valve.

Will the aux. hydraulic pump automatically come on in flight if the blue ACW pump output drops below 1500 psi.
- Not unless the gear handle is in the down position.

What is required for the standby hydraulic pump pb to work?
- Ground handling bus must be powered (aircraft must be on the ground).
- Automatic aux. pump logic is not met.

With a total loss of hydraulic pressure, if you have a full accumulator charge, how many applications are available of the emergency brake?
- 6

What does the blue system operate?
- Flap extension and retraction.
- Spoilers.
- Nose wheel steering.
- Emer./park brake.

What does the green system operate?
- Landing gear extension and retraction.
- Normal braking.

What do the pump LO PR lights indicate?
- The associated pump pressure is less than 1500 psi.

ICE AND RAIN PROTECTION:

What areas are pneumatically ice protected?
- Outer and center wing leading edges (inner wings also on 72).
- Horizontal tail.
- Engine air intakes.
- Separation chambers.

What areas are electrically ice protected?

- Prop. Blades.
- Windshields.
- Probes.
- Horns.

What is the meaning of the amber Icing light on the center panel?

- Flashing: Ice detected with level 1 or 2 ice protection on (modified in 1999).
- Steady: Ice detected with level 3 ice protection on.

What is the meaning of the ICING AOA green light on the center panel?

- Horns selected on. Must use icing speeds.

What is the meaning of the blue DE-ICING light on the memo panel?

- Steady: Airframe de-icing is selected on.
- Flashing: No ice detected for 5 minutes, but airframe de-icing is still on.

What is level 1 and when is it used?

- Probes and fwd. windshield heating.
- Always used.

What is level 1 ½ and when is it used?

- Level 1 plus:
- Props.
- Continuous relight.
- For takeoff in ground icing conditions, but flight in non-icing conditions.

What level 2 and when is it used?

- Level 1 plus:
- Props.
- Horns.
- Side windows.
- Engines.
- Continuous relight.
- For operating in icing conditions or taking off with visible moisture below 1500' and OAT at or below 5°. Note: Do not try to project what the temperature will be at cloud level. The breaking point is simply 5°.

What is level 3 and when is it used?

- Level 1 plus
- Level 2 plus
- Airframe de-icing.
- For operating with ice accretion.

If an engine failure occurs, what ice protection is lost?

- Associated engine protection is lost.

What do we lose if controller 1 fails (42)?

- Engine 1 boots A & B.
- Airframe A.

What do we lose if controller 2 fails (42)?

- Engine 2 boots A & B.
- Airframe B.

If the AIRFRAME / AIRBLEED pb is deselected what valves are operated?
- 2 Deice valves unless engine anti-icing is selected on.
- 2 Isolation valves.

What does AIRFRAME / AIRBLEED fault mean?
- Low pressure downstream of the deice valve of 14 psi* for more than 6 seconds.
- Over temperature upstream of the deice valve of 230°C*.

If there is low pressure downstream of the deice valve what is lost?
- All airframe deicing; engine deicing is still available.

Describe the inflation sequence for the engine / airframe de-ice in normal mode (42):
- 5 seconds each, for a total of 30 seconds. 30 second rest. Total 60 second cycle.

What changes when the wing / engine deicing mode SEL is selected on (42)?
- The rest period changes to 210 seconds.

What changes when the prop heat mode SEL is selected on?
- The cycle is changed from 10 seconds / pair with 30 seconds off, to 20 seconds / pair and no rest period.

Are the horns heated on the ground?
- No.

When is prop anti-ice inhibited?
- Below 63% NP.

How are the side windows heated?
- DC BUS 1 & 2.

While at the gate with GPU power only which probe heating fault lights will be illuminated?
- The captains pitot and alpha.
- The first officer pitot and alpha.

LANDING GEAR:

How is the gear held in the up position?
- Mechanically by uplocks.

How are the uplocks released?
- Hydraulically or mechanically.

How is the downlock assembly unlocked to allow gear retraction?
- Hydraulically.

What is the meaning of the red light in the gear handle?
- You forgot to put the gear down for landing (as sensed by system 2), below 500’ or with flaps 45 degrees.

What does the number 2 gear indicating system do?
- Gear position on overhead.
- Signal to the CAC for gear warning including red light in gear handle, etc. (42)

Which gear warnings can not be silenced?
- Any gear not seen down by detection system 2 (42) or MFC (72). with flaps 45°
- Any gear not seen down with flaps 30° and radio altimeter < 500 ft.

Which gear warnings can be silenced?
- Any gear not seen down with one power lever at flight idle and radio altimeter < 500 ft.

How does the emergency extension operate?
- The push / pull handle mechanically releases the uplocks and the gear extends do to gravity and aerodynamic forces: the main gear is assisted by a gas actuator.
Note: When the gear retracts it charges the actuator.

What is the maximum nose steering angle?
- + / - 60° with steering on
- + / - 91° while being towed (steering off).

What happens when the gear is selected up?
- The main gear wheels are braked automatically.

When do the fusible plugs release internal pressure?
- 177° C*.

When is the anti-skid deactivated?
- Below 10 knots.

What is locked wheel protection?
- For speeds above 23 knots, if the inboards sense a greater than 50% differential the brakes release. This is the same for the outboards.

What is touchdown protection?
- At touchdown the brakes are inhibited until wheel speed is greater than 35 knots or 5 seconds.

What brake pressure is being applied with the emergency brake?
- 500 psi gradually applied

How many brake applications do we have with the brake accumulator?
- 6.

Why should caution be used when using the emer / park brake?
- Anti skid protection is not available.
- Going past the first notch is prohibited until below 60 knots.
- Going approx. 1 cm beyond the notch is permitted as a last resort if below 60 knots.
- Using the emergency brake at speeds above 20 knots requires visual inspection of tires before next takeoff.
- Leaving the brake in the "emergency" notch for parking is unsafe.

What does the brake temp hot light mean?
- At least one brake exceeds 200° C*.

What does an F on the anti skid panel indicate?
- The associated anti skid is lost.

When is the anti skid test inhibited?
- When the wheel speed exceeds 17 knots.

NAVIGATION:

What is the range of the radio altimeter?
- - 20 feet to 2500 feet.

What is the flap override switch?
- In case of a reduced flap landing, to allows us to remove just the "TOO LOW FLAPS" alert.

PNEUMATICS:

Where is air for air conditioning generally bled?
- LP compressor, but at low engine speeds from the HP compressor.

Where is air for wing and engine bled?
- From the HP compressor.

When does the bleed valve close?
- Bleed overheat is greater than 274° C* inside the duct.
- Bleed leak greater than 124° C* around the duct.
- Fire handle pulled.
- Loss of air pressure or electricity (DC bus 1 or 2 in 42)

Where is the leak detection located?
- Wing leading edge to fuselage fairing.
- Upper and lower fuselage floor
- Air conditioning area.

What happens once a leak is detected?
- Leak light.
- Bleed fault
- Pack fault
- HP and bleed valves are latched shut.

What is the difference in philosophy between a leak and an overheat?
- A overheat may be reset after a cooling period but a leak may not.

A bleed fault light illuminates in flight. Will the associated pack fault light illuminate?
- Yes.

You turn off a bleed pb. Will the associated pack fault light illuminate?
- No – the fault light is inhibited in this case, but the pack valve will still close.

POWERPLANT:

Describe the PW 120 and PW 124:
- It is a 2 spool gas generator driving a four blade prop via a free turbine / reduction gear box assembly.

What is the horsepower rating for the ATR-42?
- 2000 for reserve takeoff and go-around (100% torque)
- 1800 for normal takeoff (92% torque)

What is the horsepower rating for the ATR-72?
- 2400 for reserve takeoff and go-around (100% torque)
- 2150 for normal takeoff (90% torque)

What is located on the accessory gear box?
- DC starter / generator.
- HP fuel pump.
- Oil pumps.

What is installed on the reduction gear box?
- ACW generator.
- Prop control unit (PCU).
- Feather pump and overspeed governor.
- Aux. Feather pump (installed there but driven electrically)

What is the function of the Hydro Mechanical Unit (HMU)?
- Meter the flow of fuel to the engine, with the excess being returned to the HP pump inlet.
- Provide the HP motive flow required by the feeder compartment jet pump and engine feed jet pump
- Provides fuel shutoff via the condition lever.

For the 72s, which have start A / B; what is the difference between A & B?
- There are 2 exciters (A & B) each with their own igniter.

What does the PCU do?
- It meters oil to the increase or decrease side of the piston to change the blade angle.
- Locks the blade angle by means of an acme screw, which prevents the blade angle from decreasing more than 1° in case of loss of oil pressure in the PCU.
- Allows prop feathering by dumping metered pressure back into the oil tank.

If the PCU oil pump failed, what would happen to the prop?
- It would act like a fixed pitch prop, increasing and decreasing speed with PL movement.
- The pilots could still feather the prop because the electrical feathering pump would pump oil from a cavity in the case (like a stand pipe). This is activated when the CL is placed in the feather position.

What is the function of the Electronic Control Unit (ECU)?
- Allows for constant power lever angle for a given engine power setting.
- Delivers uptrim to valid engine in case of engine failure on takeoff.
- Provides faster engine acceleration and slower deceleration.
- Underspeed governor on the ground; maintains 70.8% NP.

What is fuel governing mode?
- The normal mode for ground operations; The PL sets the blade angle through the PCU; the ECU adjusts fuel flow in order to maintain 70.8% NP. Only works with ECU operative.

What is blade angle governing mode?
- The normal mode for flight; the PL adjusts the NH via the ECU and the HMU; the CL sets the MAX NP via the PCU.

What is transition mode?
- The period where the NP is between 70.8% (fuel governing) and the maximum set by the CL (blade angle governing); this normally occurs as the power is being added at takeoff and then again on approach to landing.

What is the main system element to the ATPCS (Automatic Takeoff Power Control System)?
- The Signal Conditioning Unit (SCU) in the 42 or the Auto Feathering Unit (AFU) in the 72; it sends the torque signal from the free turbine to the torque gauge in the cockpit; it also includes the autofeathering / uptrim logic; it delivers the signal to the feather solenoid, the feather pump, and opposite ECU which performs the uptrim.

What are the arming conditions for the ATPCS?

- Power Management to Takeoff.
- ATPCS pb ON.
- Both PL above 56° PLA (49º - ATR-72).
- Both torques above 53%.
- A/C on ground when arm light illuminates for uptrim to be available. If armed in flight there will be no uptrim.

Why is there a 2.15 second delay on the autofeather?

- If an engine fails on takeoff, the 2.15 second delay allows the pilot to retard the PL and disarm the autofeather, in order to receive some reverse on the failed engine.

What initiates the ATPCS sequence?

- 21% torque on the failed engine.

What computes the maximum torque and the displays it on the torque gauge bugs?

- The FDAU.

With the power management selected to takeoff; what torque is computed by the FDAU?

- Reserve takeoff torque (same as go-around torque)

When does the amber light on the ITT gauge illuminate?

- ITT > 816° C (42)
- ITT > 800° C (72)

When does the red light in the oil temperature / pressure gauge illuminate?

- Less than 40 psi; a separate 40 psi switch activates the CCAS.

What is the difference between a x-generator start on the ground and an engine start in flight?

- On the ground the Main battery cranks the starter to 10% and then the opposite generator assists until 45%; but in flight the main battery is responsible for the entire start.

What is the minimum voltage for a battery start?

- 22 volts.

What does a fault light mean in the start pb?

- The starter remains engaged after 45%.
- The GCU fails during starting.

Engine compressor stalls are recognized by?

- Varying degrees of abnormal noise.
- Fluctuating engine parameters.
- Abnormal PL response.
- Rapid ITT increase.

Action to take in case of a compressor stall:

- Consult Engine Stall Checklist – no memory items.

* means not required knowledge – these numbers are provided to assist you in learning the systems.

OVERHEAD PANEL – ATR 42:

FIRE PANEL:

SQUIB TEST: •Squib lights illuminate when the button is depressed.

ENGINE FIRE HANDLE: •Illuminates red when fire warning is activated or during Engine fire test. Normal position is mechanically locked in. Pulling the fire handle causes:
- Squib lights illuminate
- Agent discharge Pb arms
- Propeller Feathers
- Fuel LP valve closes
- De-ice & Isolation valves close
- ACW & DC generator deactivates
- Bleed & HP valves close

LOOPS:

ON: •Aural & Visual alerts are armed.

OFF: •Aural & Visual alerts inhibited. CAP LOOP light illuminates.

FAULT: •Loop A & B and CCAS illuminated. Both loops must sense fire to activate the warning unless one of the loops is in the "OFF" position. No fire warnings available until faulted loop is selected off.

AGENTS:

DISCH: •Illuminates amber after discharge meaning bottle is empty.

SQUIB: •Illuminates during Test & When fire handle is pulled.

TEST TOGGLE SWITCH:

FAULT: •Loop A & B Fault light and LOOP CCAS illuminate.

FIRE:
- Light in the "T" handle illuminates.
- Light in the Condition Lever (if not in fuel shutoff) illuminates.
- CCAS ENG FIRE + MW illuminates.

AFT COMPT/ LAV SMK DET:

ON: •Fans alternate

FAULT: •Normal fan out of service.

ALTN: •Selects alternate fan by depressing Pb.

OXYGEN:

LO PR: •Below 50 PSI. 78 PSI normal delivery in the supply line to the masks.

AVIONICS VENT:

EXHAUST MODE:

NORMAL:
- On ground, engine #1 not running, OVDB valve open, Under floor valve closes.
- In flight or on the ground, engine one running, OVBD valve closes (Oil pressure switch) , Under floor valve opens.
- Above conditions are true providing the OVBD Valve Toggle Switch is on AUTO mode.
- Exhaust fan should run at all times except 120s after engine start.

OVBD:
- On the ground, Pb released: Fan shuts off, Mechanic call horn sounds, OVBD valve opens. Under Floor valve closes.
- In flight, PB released: Fan shuts off, OVBD valve partially opens, Under Floor valve closes. No mechanic horn until touchdown.
- Exhaust fan has two speeds on the ground. Low = Normal: High = Duct temp > 52° C.

FAULT:
- Extract fan Failed or Over Temperature. CCAS AIR is activated.
- Fan stops running for 120 seconds when engine start sequence begins.

OVBD VALVE SW: • Allows manual control of OVBD valve, in flight or on the ground.

FULL OPEN: • OVBD valve fully opens. Do not select it if the differential pressure is > 1.

AUTO: • OVBD valve is in function of EXHAUST MODE Pb in flight or on ground.

FULL CLOSED: • OVBD valve fully closed.

FAULT – big light: • (Big Light) OVBD valve position disagrees – either with the selected position if in "full open" or "full closed" position, or with the logic of the system if in "auto" CCAS AIR is activated.

COMPT TEMP:

RECIR FAN: • Utility Bus 1 & 2.

ON: • Pb depressed. Fan runs recirculating cabin air, supplementing conditioned air.

OFF: • Pb released. No recirculating air available. Just pack air.

FAULT: • Low fan RPM or OVHT. CCAS AIR is activated.

TEMP SEL:

AUTO: • Controls temperature control valve & pack outlet temperature. Uses knob position, pack outlet temperature, and skin temperature.

MANUAL: • Knob controls the position of the temperature control valve.

OVERHEAT: • 92° C. Duct temperature downstream of the mixing chamber triggers OVHT light, but pack valve does NOT close. CCAS AIR is activated. Duct temperature is limited to 88° C in AUTO and MANUAL mode. (FCOM revision – previously 82 in auto)

FLOW:

NORMAL: • Pack pressure 17 PSI.

HIGH: • Pack pressure 30 PSI.

PACK VALVE:

ON: • Valve opens with electrical power and air pressure available.

OFF: • Valve closed.

FAULT: • Valve position disagreement.

• Overheat T > 204° C downstream of pack compressor. Pack valve will automatically close. CCAS AIR is activated.

ENGINE BLEED:

ON: • Pb depressed. Energizes HP and Bleed valve solenoids. Valves will open with pressure. If no air pressure, the BLEED valve is spring loaded closed regardless of electrical power supply. Opening of bleed valves is inhibited during engine start.

OFF: • HP and bleed valves will close.

FAULT: • Bleed valve position disagreement.

• Duct Overheat T > 274° C. Two independent sensors downstream of the bleed valve. Bleed valve will close.

• Leak T > 124° C. Single loop sensor downstream of the bleed valve to the pack valve. HP and bleed valve will close after 1 second delay.

• CCAS AIR is activated.

FO WIPER: • DC bus 2. Max operating speed 160 knots.

FAST: • 130 cycles per minute.

SLOW: • 80 cycles per minute.

OFF: • Park position.

EMER LOC XMTR: • Transmitter located on ceiling near passenger entry door. This transmitter includes its own battery.

AUTO: • Transmits on 121.5 or 243 MHz when 5 G's are exceeded.

MANUAL: • Turns system on.

<u>HYD PWR</u>:

BLUE PUMP:	• Nose wheel steering, flaps, spoilers, emergency and parking brake. Normal pressure 3000 PSI.
GREEN PUMP:	• Landing gear, normal braking. Normal pressure 3000 PSI.
ON:	• Pb depressed. ACW motor driven pump is energized.
OFF:	• Pb released. Pump is deactivated.
LO PR:	• Pump pressure drops below 1500 PSI. CCAS HYD is activated.
OVHT:	• T > 121 ° C at pump case drain line.
X FEED:	• The x feed valve is automatically closed in case of LO LEVEL alert.
ON:	• X feed valve opened. Both hydraulic circuits are connected.
OFF:	• X feed valve closed.

<u>MAIN ELECTRICAL POWER</u>:

AC CONSTANT FREQ:	• Produced by inverters: 500VA, 115V, 400Hz single Phase.
BUS OFF:	• AC BUS is de-energized. CCAS ELEC is activated.
INV FAULT:	• Under / Over voltage at inverter output. CCAS ELEC is activated. • Normal output voltage 18 - 31 volts.
OVRD Pb:	• Allows switching of DC STBY BUS & INV 1 from HOT MAIN BATTERY BUS to HOT EMERGENCY BATTERY BUS.
NORMAL:	• Pb depressed. DC STBY BUS, INV 1, & AC STBY BUS supplied from same source as DC ESS BUS when in basic mode. (HOT MAIN BATTERY BUS).
OVRD:	• Pb released. DC STBY BUS, INV 1, & AC STBY BUS supplied from same source as DC EMER BUS when in basic mode. (HOT EMER BUS).
UNDV:	• Light is illuminated when DC STBY BUS voltage is < 19.5V.

BAT TOGGLE SWITCH:

ON:
- With generator & external power off:
  - DC ESS BUS, DC STBY BUS, INV 1, & AC STBY BUS powered from HOT MAIN BATTERY BUS.
  - DC EMER BUS powered by HOT EMER BATTERY BUS.
- With generator of external power on:
  - ESS BUS powered by HOT MAIN BATTERY BUS.
  - DC EMER BUS, DC STBY BUS powered by HOT EMER BATERY BUS.
  - INV 1 & AC STBY BUS powered by DC BUS 1

OFF:
- DC ESS BUS, INV 1, & AC STBY BUS isolated from HOT MAIN BATTERY BUS.
- DC EMER BUS & DC STBY BUS isolated form HOT EMER BATTERY BUS.

OVRD:
- Position protected by toggle guard. Busses are supplied by their respective battery locking out the BPCU.

EMER SUPPLY IND:
- Amber right arrow when DC ESS BUS is fed by MAIN BATTERY.
- Amber left arrow when DC EMER BUS is fed by EMERGENCY BATTERY.
- It is an indication that the batteries are being depleted.

BAT CHG:
- Controls the Battery Charge Conctactors.

ON:
- Pb depressed. BAT CHARGE CONTACTOR is closed. Normal. It will open if:
  - Thermal runaway. Battery temperature > 65.5° C.
  - Undervoltage of DC BUS 1 or 2. < 25V.
  - Start sequence initiated. Both BCC open but with no light. They will close when the Start Rotary Selector is moved from the START or CRANK position.
  - Battery switch on OVRD.

OFF:
- Pb released. BAT CHG CONTACTOR is open.

FAULT:
- Overheat detected by the BPU.
- Failure of the BCC. CCAS is activated.

DC AMP INDICATOR:
- Shows current charge or discharge of selected battery.

BAT AMP INDICATOR:
- Allows MAIN / EMERGENCY battery charge readings.

DC BUS OFF:
- Will illuminate amber when the bus is not powered.
- If DC BUS 1 is off, CCAS is not activated. Amber light will be on CAP.
- If DC BUS 2 is off, CCAS ELEC will be activated.

BTC:
- DC BUS TIE CONTACTOR. If closed connects both DC BUSSES.

NORMAL:
- Pb depressed. The BPCU automatically controls the:
  - Bus Tie Contactor (BTC). With both generators operating normally, BTC is open, allowing separated operation of both generator circuits.
  - During single generator operation or external power, the BTC is automatically closed. The FLOW BAR is illuminated.
  - Bus Tie Relays in the AC Constant Frequency system.

ISOL:
- Pb released. BTC is opened. ISOL light illuminates white.

DC SERVICE BUS:

NORMAL:
- Pb depressed. DC SERVICE BUS and UTILITY BUS are available.

OFF:
- Pb released. DC SERVICE BUS & UTILITY BUS are disconnected.

SHED:
- BPCU has disconnected at least one UTLY BUS from main DC BUS. Amber SHED light illuminates and CCAS is activated.

DC GEN Pb: • Controls energization of generator and resetting of system protection after failure.
ON: • Pb depressed. Generator energized. GC (Generator Conctactor) closes if GCU checks OK.
OFF: • Pb released. Generator de-energized. GC opens. OFF light illuminates.
FAULT: • Protection trip initiated by GCU. Underspeed self-auto resets. Others need manual reset.
• Caution: Do not reset in flight except in accordance with checklist.
• GC opened. (Except when generator Pb selected OFF).
• On either Fault trip, BTC closes. Affected DC BUS is fed from the other generator.
• CCAS ELEC is activated.

<u>AC WILD ELEC PWR</u>:
ACW BUS OFF: • Amber light comes ON and CCAS ELEC is activated when bus is de-energized.

BTC: • Controls ACW BTC 1 & 2.
NORMAL: • Pb released. BPCU (Bus Protection Control Unit) controls BTC 1 and BTC 2.
• With both ACW generators running BTC 1 & 2 are opened.
• With external ACW power or single ACW generator operation, BTC's are closed. Flow bar illuminates.
• When one ACW generator is off line the ACW SVCE BUS is automatically shed.
ISOL: • Pb depressed. BTC 1 & 2 are opened. ISOL illuminates white.

ACW GEN: • Two prop driven, 3 phase, 20 KVA, 115V, 341-488 Hz (70 - 100% NP).
ON: • Pb depressed. Generator is activated. Generator connector closes if GCU checks OK.
OFF: • Pb released. Generator deactivated. Generator connector opens. OFF white light illuminates

FAULT: • Protection tripped by GCU. Underspeed will automatically reset. Others need a manual reset.
• Generator connector opened, except when generator Pb selected OFF. In both cases BTC's close. Affected ACW BUS is automatically fed by other generator
• Alert light & fault circuits resets when failed ACW generator Pb is selected OFF.
• When one ACW generator is OFF line the ACW SVCE BUS is automatically shed.

EXT PRW:
AVAIL: • Green light illuminates when ACW power is connected.
ON: • Blue light. ACW external is checked OK by the BPCU and is energizing related busses.
• ACW external power has priority over ACW generators.

<u>ANTI-ICING PROBES HTG</u>:
PITOT: • Amber light OFF, normal for operations in flight or on ground. Amber light ON, Pitot not heated in flight or on ground. CCAS ANTI ICE is activated. PITOT light also monitors the LH & RH STATIC PORTS: <u>ONLY</u> on the ground. In flight the STATIC PORTS are <u>NOT</u> monitored.
ALPHA / TAT: • Amber light on probe not heated. CCAS ANTI ICE is activated.
• TAT probe not heated on the ground.
• ALPHA: Angle of attack probe.

CPT / STBY / FO:

ON: • Pb depressed. Probe is energized.

OFF: • Pb released. Probe is de-energized. Off illuminates white. PROBE HEAT illuminates Amber.

WINDSHIELD HTG: • Front windshield electrically (200V ACW) heated for ice protection and defogging through a film between the panes. Outer windshield temperature 2° C. Inner windshield temperature 21° C. Side windshield electrically (28V DC) heated for defogging only through embedded wiring between the panes. Inner temperature 21° C.

ON: • Pb depressed.

OFF: • Pb released.

FAULT: • Power loss. CCAS ANTI ICE is activated.

ANTI ICING:

PROPELLER: • 115 ACW. Prop anti icing is inhibited when NP < 63%.

ON: • Pb depressed.

OFF: • Pb released.

FAULT: • Power loss on blade. CCAS ANTI ICE is activated.

MODE SEL: • Controls the prop deicing cycle.

NORMAL: • Pb released. SAT > -10° C. 70 second cycle. 10 seconds each blade pair for a total of 40 seconds with 30 seconds off.

ON: • Pb depressed. SAT < -10 ° C. 80 second cycle. 20 seconds each blade pair. No rest.

HORNS ANTI ICING: • ACW powered.

ON: • Pb depressed. Left Pb controls the rudder and left elevator. Right Pb controls the ailerons and right elevator.
• Activation of one of the Horns reduces the stall threshold.
• AOA green light comes ON.
• Horns heating is inhibited on the ground.

FAULT: • Electrical power loss. CCAS ANTI ICE is activated.

ENGINE ANTI ICING: • Pneumatic annular boots.

ON: • Pb depressed. De-ice valve opened. Boots cycle according to mode selected.
• De-ice valve opens even if AIRFRAME AIR BLEED Pb is selected OFF.

OFF: • Pb released. Boots deflate. Distribution Controllers close.

FAULT: • Distribution Controller open and no downstream pressure detected. CCAS ANTI ICING is activated.
• Distribution Controller closed and downstream pressure detected. CCAS ANTI ICING is activated.
• AIRFRAME AIR BLEED Pb selected off and air temperature upstream of the De-ice valve > 230° C for more than 6 seconds. CCAS AIR is activated. This overheat leads to automatic De-ice valve closure.

DEICING:

AIRFRAME AIR BLEED: • Controls both the De-ice and Isolation valves.

ON: • Pb depressed. Normal operation. Both De-ice & Isolation valves open.

OFF: • Pb released. De-ice and Isolation valves are closed. Engine anti-ice may be used. Engine anti ice ON Pb will open the De-ice valve, but airframe De-icing will not be available.

FAULT:
- ANTI ICING CCAS alert and AIRFRAME AIR BLEED FAULT on overhead.
- Pressure downstream of the De-ice valve < 14 PSI for more than 6 seconds.
- Air temperature upstream of the De-ice valve > 230° C. CCAS AIR alert is activated.

AIRFRAME: • Controls outputs A & B for wing and stabilizer valves.

ON: • Pb depressed. Controller outputs open. Cycle depends on mode selected.

OFF: • Pb released. Normal position. Controller outputs closed. Boots deflate.

FAULT:
- Distribution Controller opened and no downstream pressure detected.
- Distribution Controller closed and downstream pressure detected.

CCAS ANTI ICING activated.

MODE SEL: • Controls AIRFRAME and ENGINE De-icing cycles.

NORMAL: • Pb released. SAT > -18° C. 60 second cycle, a 5 second cycle for each distribution valve A & B, beginning with engine boots, then wings and tail for a total of 30 seconds ON and 30 seconds OFF.

ON: • Pb depressed. SAT < 18° C. 240 second cycle. 30 seconds on and 210 off.

SIGNS:

EMER EXIT: • Supplied with a 6V DC self-contained battery. (10 minute). Normally charged and operated through the DC EMER BUS.

ON: • Emergency exit lights and evacuation path illuminates.

ARM:
- Normal switch position. Emergency exit lights and evacuation lights illuminate if:
- DC EMER BUS voltage < 18V or both DC generators are lost.
- Lights extinguish when DC EMER BUS voltage > 20V and one engine running.

DISARM: • Emergency light system is deactivated. Flight attendant EMER EXIT light switch to ON position overrides cockpit ARM & DISARM modes.

ENG START ROTARY SELECTOR:

OFF START ABORT: • Ignition circuit is de-energized.

CONT RELIGHT: • The exciter and igniters for both engines are continuously energized.

CRANK: • Enables engine cranking. Ignition is inhibited.

START:
- Arms start sequence. Ignition is accomplished when fuel shutoff valve is opened by selecting the condition lever (CL) to the feather position.
- Starter and ignition is deactivated when NH reaches 45% NH.

X START FAIL: • Amber light illuminates if X-start not normal. Generator is not assisting the battery for engine start. Normally the generator kicks in at 10% NH.

START Pb:

ON: • Pb depressed. Initiates starting or cranking of engine as long as ENG START ROT SEL is on CRANK or START mode. Starting sequence terminates when NH reaches 45% NH.

FAULT:
- Starter remains engaged after 45% NH.
- GCU fails during starting.
- CCAS ENG is activated.

COCKPIT VOICE RECORDER:
• Records last 30 minutes of all crew communications from RCAU and from a microphone below overhead panel + headsets. DC ESS BUS.
• Recorder is ON automatically after aircraft is on its own electrical power with one engine running.
• Recorder is OFF automatically 10 minutes after engine shutoff.

MONITOR IND: • For test only. Movement of pointer to green means all channels working.
TEST: • Activates test circuit.
• If a headset is plugged in a tone will be heard.
ERASE: • If depressed for 2 seconds. It erases tape providing:
- Aircraft on ground.
- Parking brake set.

SPOILER: • Blue hydraulic system. When illuminated, blue light indicates spoiler not in retracted position. Spoiler deploys after aileron deflection > 2.5°.

LANDING GEAR: • Displays landing gear position as sensed by system 2.
GEAR DOWN & LOCKED: • 3 green triangles illuminate (3 on main panel also).
GEAR UP & LOCKED: • No lights illuminate.
GEAR IN TRANSIT: • Red UNLK lights illuminate.

UNLK: • Red light illuminates when gear is not locked according to selected lever position.
• On the ground; UNLK illuminates if UPLOCK box is not in the opened position.
• CCAS LDG NOT DN + MW + RED light in gear lever is activated if:
- Gear not sensed down, flaps 30° or 45° selected, and Radio altitude < 500 ft.
- Gear not sensed down, at least one Power Lever at flight idle, and Radio Altitude < 500 ft.

DOOR LIGHTS:
OK: • Illuminates when depressing the test button only if the Cabin & Service doors & Micro switches are opened.
TEST: • Tests the micro switch system for Cabin & Service doors if doors are open.
UNLK: • Alert lights for Cabin, Cargo, Fwd Compt, Emer Hatch, and Svc doors.
• CCAS DOOR is activated.

FUEL: • 2 tanks. Maximum fuel 9920 LBS. Maximum fuel unbalance 1212 LBS.
LP VALVE IND: • Displays position of the LP valve, which should always be opened. It can not be controlled by hand. It will close if the FIRE HANDLE is pulled.
IN LINE: • Valve opened. Flow bar is flushed and illuminated green.
CROSS LINE: • Valve closed. Flow bar crosses system flow line & green light illuminated.
• When valve in transit, flow bars extinguish.
FEED LO PR: • Fuel delivery pressure < 5 PSI. Indicates pump failure or fuel starvation or leak.
• CCAS FUEL is activated.

X FEED:

IN LINE:
- Pb depressed. Valve opens. Flow bar is flushed. Green light illuminates and both electric pumps run unless the button was selected OFF.

CROSS LINE:
- Pb released. Valve closes (Normal operation) Flow bar is crossed & green light illuminated.
- When valve in transit flow bars extinguish.

PUMP Pb:
- Controls the electric Pump & jet pump motive flow valve.

ARMED:
- Pb depressed. (Normal Operation) Motive flow valve will open fuel pressure is available.
- Electric pump will automatically run if one of the following:
    - Jet pump delivery pressure < 5 PSI. (Engine not running, or jet pump pressure low) No CCAS is activated. RUN green light illuminates on overhead.
    - X feed valve is selected open.
- Electric pump will automatically turn off when 8.5 PSI fuel pressure is sensed downstream of the jet pump.

RUN:
- Electric pump is ON. Green light illuminates.

OFF:
- Pb released. Electric pump deactivated. Motive flow valve closes.

MANEUVERS:

Engine Failure After V1:

NFP "V1" "ROTATE"
NFP "V2" "POSITIVE CLIMB"
FP "GEAR UP" **FP** "CONFIRM FEATHERING"
NFP "AUTO FEATHER CONFIRMED" if Np is around 10% or so.
NFP "ACCELERATION HEIGHT"; SELECT ALT on AFCS
FP Level AC to accelerate to VmLB0; "SELECT IAS"; "FLAPS 0"; "AFTER T/O CHECKLIST"; "ENGINE FLAME OUT CHECKLIST"

If Failed engine has not feathered:

FP Retard the Failed Engine Power Lever to 40° PLA, Guard the Good Condition Lever, and Command "Failed Engine Condition Lever Feather Then Fuel Shutoff"

Notes: 1. Five Minutes after beginning Takeoff Roll: Select PWR MGT to MCT. Stay within Engine Limitations.
2. If in Icing Conditions; Keep Flaps 15° and climb at VmLB15 Ice For third climb segment.

STEEP TURNS:

45° Bank and at least 180° turn but not more than 360° turn.
Va; Aprox. 40% Torque
As bank angle is increased past 30°; torque should increase about 5% to maintain airspeed.
Recovery 15° prior to heading desired.

STALLS:

Setup for all stalls:

1. **FP** "Continuous Re-Light on".
2. **FP** "Power MGT TO MCT".
3. **FP** "Conditions Levers TO MAX RPM".
4. SET BUGS for weight, takeoff or landing.

See the most current SOP for stall descriptions.

POWER SETTINGS:

160	CLEAN	1 Engine	75% Torque
160	CLEAN	2 Engine	40% Torque
160	STEEP TURN		50% Torque
120	LDG	2 EngineILS	28% Torque
120	LDG	1 EngineILS	45% Torque
120	LDG	2 Engine-1000fpm	20% Torque
120	LDG	1 Engine-1000fpm	40% Torque
120	LDG	2 EngineLevel	45% Torque
120	LDG	1 EngineLevel	88% Torque

To determine **Vapp** take **1/3** of the reported wind velocity or **all** of the gust factor. **Min. Vref +10** – add nothing for tailwind components. Example: Ldg. rwy. 36, wind 260 at 15 kts – Vref =Vapp

Rejected Landing:

1. **FP** "Go around, set max power, flaps 15°". **NFP** Retract flaps to 15°.
2. **FP** Actuate the go around push button.
3. **FP** Advance power levers to the white band. **NFP** adjust power levers to Go around torque.
4. **FP** Rotate to go around attitude.
5. **NFP "**Power set." "Positive climb".
6. **FP** "Gear Up". **NFP** will select the gear up, then select heading, bank low, and IAS on AFCS.
7. **NFP** "Acceleration Height".
8. **FP** "Climb sequence".
9. At Vmlb0 or Vmlb0 icing, **FP** "Flaps 0, After takeoff checklist or Go around checklist".

Holding:

1. 160 ATR 42; 175 ATR 72 unless fuel is critical, then consult holding charts in FCOM.

Stabilized Approach Heights:

1. 500 ft. above the airport elevation during visual approaches or straight in instrument approaches during VMC.
2. MDA or 500 ft. above airport elevation, whichever is lower, if a circling approach is being conducted.
3. 1000 ft. above the airport or touchdown zone for straight in instrument approach in IMC.
4. 1000 ft. above the airport during a contact approach.
5. 1000 ft. per minute descent inside the final approach fix.

ILS Approaches:

1. IN RANGE CHECKLIST
2. 160 knots clean for procedure turn.
3. On LOC and glideslope 1 dot fly up, **FP** "Flaps 15, Gear down".
4. At glideslope intercept, **FP** "Flaps 30, Condition levers Max, Before landing checklist".

Decelerated Approach:

1. Indicated airspeed x 10
2. Add 500 ft.
3. Gives you AGL Height.
4. Add to Airport elevation to get MSL.

Non Precision Approach:

1. Start to configure 3-5 miles from final approach fix.
2. Complete before landing checklist prior passing the FAF.

NOTE: VOR approaches using the autopilot or flight director are authorized if:

1. A co-located DME is available.
2. DME hold is not selected.

Circling Approach

1. Same configuration as straight-in approach
2. Watch out for faster speeds due to icing, etc. – may put you into higher minimums.
3. Autopilot can now be used and it's use is encouraged when circling, until ready to leave MDA.
4. If single-engine circle cannot be avoided, consider circling with flaps 15º until almost ready to leave MDA.

END