B737-300
Oral
Questions

FOR TRAINING ONLY!

ORAL QUESTIONS

These oral questions are based on an old copy of a Boeing 737-300 training document (circa 1987?) that has been floating around the 737 pilot group for many years. I scanned the list into the computer, cleaned it up, and offer it to new hires as a study aid.

There is a possibility that errors exist. I have not gone through this document. Always cross reference your oral study with the Flight Manual (which is always the final authority).

Good luck on your school daily exams, on your initial oral, and future PC orals!

There are differences for the B737-4-5-6-7-800.

Captain Bruce Sprague CO737

Thanks Bruce
Readers:
When you do find something that needs to be changed, advise me (please send complete OLD Q/A, referencing system and question number, with your re-write).

Bill Bulfer
bbulfer@firstnethou.com

Appendix / Oral Questions
Table of Contents:

Aircraft General

1 What is the maximum gross takeoff weight of the 737?
Ans: 135,000 lbs.
2 What is the approximate OEW of the 737?
Ans: 72,000 lbs.
3 What is the approximate fuel load capacity of the 737?
Ans: 35,800 lbs.
38,500 lbs. with the aux tank
4 What is the maximum gross landing weight of the 737?
Ans: 114,000 lbs.
5 What is the maximum ZFW of the 737?
Ans: 106,500 lbs.
6 What is the approximate range of the 737?
Ans: 2,300 nm.
2,460 nm.with the aux tank
7 What is the seating configuration of the 737-300?
Ans: 10/118 (typical)
8 How many emergency exits are there on a 737?
Ans: 8. 2 aft, 2 overwing, 2 forward, 2 cockpit windows.
9 What is unique about the cockpit door?
Ans: it has two sets of panels which are hinged. The lower "Blow-out" panels will pop into the cockpit in the event of a rapid decompression. The upper panels have a handle and can be pulled inward from the cockpit side as a means of escape.
10 What is the minimum crew oxygen pressure?
Ans: 15°C/59°F
2 crew - 470 psi
3 crew - 655 psi
11 What is unique about the passenger oxygen units?
Ans: they are individually supplied with the oxidizing supply units. If one mask is activated, the unit is activated and will supply oxygen for 12 minutes.
12 How many masks are in each unit?
Ans: 4 for each 3 seats
13 What other positions have oxygen masks?
Ans: two masks at:
1. Each f/a station.
2. Each lavatory.
14 What will make the PSUs available?
Ans: 1. Automatic activation at 14,000 cabin altitude.
2. Manual activation using the overhead cockpit switch
15 Are all the slides automatic?
Ans: yes.
16 How can the emergency lights be activated?
Ans: automatically - loss of normal AC power (which causes loss of #1 DC bus) with the system armed OR Manually - from the cockpit or aft F/A station.
17 Which switch overpowers all others?
Ans: the aft F/A station.
18 How long will the emergency lights stay illuminated?
Ans: 20 minutes.
19 What is unique about the overwing exits?
Ans: if they are opened, their individual lights illuminate.
20 How many overwing exterior lights are there?
Ans: Two. One illuminates the immediate exit area, the other illuminates the trailing edge of the wing.
21 What other emergency lights are there?
Ans: the slides have lights installed at the base of the slides.
22 What flotation devices are on the 737? (typical)
Ans: seat cushions and a life vest under each passenger seat for the passengers. There are life vests installed in the flight attendant seat-backs and in the cockpit.
23 How many personal oxygen bottles are on board?
Ans: 5 plus the cockpit walk-around; the bottle in the center-aft closet is a smaller unit than the rest (need one per flight attendant; need one FA for every 50 seats or portion of)
24 What type POB is in the cockpit?
Ans: full face type with a demand type regulator.
25 How many halon fire extinguishers are there on board?
Ans: 3.
26 Where are they located? (typically)
Ans: one in the cockpit, one in the forward galley, one in the aft closet.
27 How many water type extinguishers are there on board?
Ans: one in the aft closet
28 How many first aid kits are there on the 737?
Ans: two, plus the emergency medical kit in the cockpit.
29 Where are the first aid kits located? (typically)
Ans: in the fore & aft overhead compartments along with a megaphone at both of the same stations.
30 How many flashlights are installed on the aircraft?
Ans: four (two at each f/a seating station)
31 Which cockpit lights come on automatically with loss of normal Power?
Ans: the fluorescent lights, at a prefixed lower intensity, the dome light, and standby compass light.
32 What is the power source for the cockpit dome lights?
Ans: the battery bus.
33 Can the cockpit emergency exit light be used as a portable light?
Ans: no

34 How many exterior emergency lights are there on the 737?
Ans: 8

35 Where is the potable water quantity gauge located?
Ans: in the right aft galley.

36 How is this gauge operated?
Ans: pushing the test button lights up the level. If the 1/4 LED and 1/2 LED illuminate, the tank is 1/2 full. All LEDs illuminated indicates a full tank.

37 Where is the water service panel and shutoff valve located?
Ans: below the left aft galley door, nearly on the belly of the aircraft.

38 What will cause the wheel well lights to remain illuminated?
Ans: 1. leave the switch in the main WW at the "on position" will keep the main WW lights on, and leaving the nose WW light on, at the Ext. Power panel, will leave the nose WW lights on (you can't turn these off from the cockpit).
2. cockpit WW light switch on

39 What type engines are on the 737?
Ans: CFM-56-3.

40 What is the power rating of the 737 engines?
Ans: 20,000 lbs. thrust.

41 What is the primary thrust source for these engines?
Ans: the fan provides 80% of the engine power.

42 What will cause the intermittent takeoff warning to sound?
Ans: 1. Stab trim not in the green band.
2. Flaps not in the takeoff range (1 - 15 degrees).
3. LEDs not in proper position with respect to flap setting
4. Speed brake not in the down detent position
5. Parking brake set (-500 only)

43 What will cause the steady landing warning to sound?
Ans: any landing gear not down and locked and:
a. Flaps between 1 and 10 degrees and low throttle angle,
b. Flaps at 15 degrees and:
1. One throttle at 30 degrees or greater with the other at less than 10 degrees, or:
2. Both throttles less than 30 degrees,
c. Flaps greater than 15 degrees with the gear up.

44 Which of these conditions can be silenced?
Ans: "A" and "B-1" only.

45 How are the annunciator warnings organized?
Ans: They are general and specific. If a problem exists, the "master caution" lights illuminate along with a general annunciation on the forward panel. These general annunciation's indicate to the pilots which area to specifically check the specific warning lights, located adjacent to their associated control, are then checked for the problem.

Pneumatics

1 What stages of bleed air do the engines use?
Ans: Fan, 5th, & 9th
2 What is the fan air used for?
Ans: precooler and CSD cooling.
3 Is the fan air regulated?
Ans: yes, there is a thermostatic regulator on the precooler heat exchanger.
4 How does this regulator operate?
Ans: if the bleed air temperature leaving the precooler increases, the regulator modulates the fan valve open.
5 What is the relationship between 5th stage air and 9th stage air?
Ans: 5th stage air is the primary source of bleed air with 9th stage air supplementing whenever the pressure falls below 29 psi.
6 How does this relationship operate?
Ans: 5th stage air will normally maintain a duct pressure of 30 - 40 psi, if the pressure falls below 29 psi, the 9th stage valve will open to maintain a minimum pressure of 29 psi.
7 How is the 5th stage air regulated?
Ans: only by the engine bleed valve; it does not have a separate shutoff valve, only the 9th stage air has a modulation/shutoff valve.
8 Where are the engine bleed valves located in the system?
Ans: they are downstream of the 5th stage air and the 9th stage modulation / shutoff valve.
9 How are the bleed valves operated?
Ans: they are DC activated, pneumatically operated.
10 What is the function of the engine bleed valves?
Ans: they act as. 1. Shutoff valves. 2. Check valves (reverse flow). 3. Pressure regulators.
11 What pressure does the engine bleed valve normally limit?
Ans: it limits pressure to a maximum of 45 psi.
12 Does the engine bleed valve regulate a minimum value?
Ans: no, at less than 45 psi, they are full open.
13 Is there an exception to this?
Ans: yes, if the temperature downstream of the precooler is excessive, the bleed valve reduces the bleed flow.
14 Can the engines be started with the engine bleed valve switches in the "off" position?
Ans: yes, the engines may still be started using APU or ground air with the engine bleed valves closed.
15 What causes a bleed trip?
Ans: a bleed supply temperature in excess of 255° C, **or** excessive bleed pressure.
16 Where would this temperature be indicated?
Ans: only on the bleed trip off light.
17 Where is the supply duct temperature read from?
Ans: downstream from the mix manifold.

18 What is the highest temperature you would normally expect to see?
Ans: 140 degrees, if the topping circuit is working properly.
19 What does the duct overheat light indicate?
Ans: a duct temperature in excess of 190 degrees F.
20 What would you do about this condition?
Ans: select a cooler temperature.
21 When does a duct overheat cause a pack trip?
Ans: above 250 degrees F.
22 How would you reset this condition?
Ans: push the reset button when the temperature reduces.
23 Is it necessary to first turn off the pack?
Ans: no
24 How does the isolation valve operate?
Ans: the isolation valve separates the left & right halves of the pneumatic system, with the valve in the open position, the two halves are connected. The valve may be manually opened, or will automatically open, with the switch in the AUTO position, if either of the bleed or pack switches is turned off ("switch
24 When is the ISOL valve open?
Ans: 1. Whenever any of the bleed or pack switches is off.
2. Whenever it is manually selected open.
25 What is the power source of the ISOLATION valve?
Ans: transfer bus #1,
26 When does the DUAL BLEED light illuminate?
Ans: whenever there is a potential for back-pressuring the APU. It will normally illuminate during engine start.
27 What happens to the engine bleed valves upon engine shutdown?
Ans: they automatically close (pneumatically)
28 Is this true of the APU bleed valve also?
Ans: yes, the APU bleed valve also shuts off with APU shutdown.
29 What does the **left** WING-BODY OVERHEAT light indicate?
Ans: a bleed leak:
1. In the leading edge area.
2. In the engine strut.
3. In the left pack bay.
4. In the keel beam area.
5. In the APU bleed duct.

30 What does the **right** WING-BODY OVERHEAT light indicate?

Ans: a bleed leak:

1. In the leading edge area.
2. In the engine strut.
3. In the right pack bay.

31 What would cause a faulty indication?

Ans: direct sunlight on a hot day for an extended period of time.

32 How would you verify that this was a faulty indication?

Ans: turn off all bleed sources.

33 What does the overheat test function do?

Ans: it checks circuit continuity

Air Conditioning

1 Where do the air conditioning packs get their air supply?
Ans: 1. from the individual engine bleeds
2. from the opposite bleed if the ISOL valve is open
3. from the APU
4. from ground air

2 Where does ground preconditioned air enter the system, when used?
Ans: it is pumped directly into the mix manifold

3 Why is this information important to the pilots?
Ans: because the cockpit will not receive much of this air.

4 Is ground air (unconditioned) biased to either pack?
Ans: yes, it enters the system on the right side

5 Can it be used for the left side?
Ans: yes, provided that the isolation valve is open

6 Where does the APU air enter the system?
Ans: On the left side

7 When does the HIGH function of the A/C packs operate?
Ans: 1. during single pack operation in the air if the flaps are retracted
2. if manually selected to HIGH

8 What is the function of the air conditioning turbo fan?
Ans: it supplies additional cooling air to the packs

9 What is the power source for the turbo fan?
Ans: it is powered by bleed air

10 When does the turbo fan operate?
Ans: whenever the packs are operating on the ground, **or** in the air with the flaps extended

11 Where is the cockpit air supply taken from?
Ans: from the left pack, upstream of the mix manifold

12 What is the power source for the pack valves?
Ans: the battery bus

13 How are the pack valves operated?
Ans: they are electrically controlled, pneumatically operated

14 What malfunctions does the reset button affect?
Ans: 1. bleed trip
2. pack trip
3. duct overheat/pack trip (does **not** reset a wing body overheat)

15 If a pack trip occurs during wing anti-ice usage, would you lose wing anti-ice to that side?
Ans: no

16 Where is the cabin temperature read from?
Ans: from the forward passenger cabin, row 3.

17 What is the function of the recirculating fan?
Ans: it reduces bleed demand by the packs by increasing the volume of air into the mix manifold. Reduces air conditioning pack load (FM 7-12).

18 What is the source of air for the recirculating fan?
Ans: air directly from the passenger cabin and the E & E compartment via a shroud above the forward cargo compartment.

19 When does it operate?
Ans: at all times **except** when **both** packs are operating **and** one or both of the packs is in the HI mode, **or** when fan is manually turned off.

20 Why should we maintain an awareness of this fan?
Ans: because it is the most likely candidate for electrical smoke or fumes in the passenger compartment or cockpit (only if left pack is off, FM 7-13). The source of such smoke or fumes could be either from the fan itself, or overheating equipment in the E & E compartment.

21 What powers the recirculating fan?
Ans: gen bus #2.

22 Why is this bus important to this fan?
Ans: it will be downloaded during a power transfer if #2 gen bus is lost.

23 If power is lost to the recirculating fan, what action takes place automatically?
Ans: the forward outflow valve remains open to maintain the warming airflow.

24 Is there a condition when the forward valve would still close?
Ans: yes, if the cabin pressure was insufficient, the valve would still close in conjunction with that problem.

25 When is the forward outflow valve open?
Ans: whenever the main outflow valve is open by more than 3 degrees or when the recirculating fan is off.

26 When is the forward outflow closed?
Ans: when the main outflow valve is within 1/2 degree of being closed or whenever the recirculating fan is operating,

27 When does the equip cooling fan operate?
Ans: at all times.

28 When would the equip cooling off light illuminate?
Ans: whenever the **airflow** was insufficient to cool the airflow sensor.

29 How does this sensor operate?
Ans: it is a heat source/detector circuit. If there is insufficient **airflow**, the heat source activates the sensor on the opposite side of the duct and the off light \ illuminates.

30 What should your action be if the equip cooling off light illuminates?
Ans: switch to the alternate fan.

31 What is the source of this airflow?
Ans: air from around the cockpit circuit breaker panels and air from the lower
E & E compartment racks.

32 Where is the equipment cooling air exhausted?
Ans: On the ground or in flight, the air is normally exhausted through a belly port, unless the pressure is greater than 2.5 psid. Otherwise it goes through the forward outflow valve, unless the recirc fan is on, then it goes out the aft outflow valve.
1. on ground or if in air (if psid is less than 2.5), through the flow control valve (belly port).
2. if psid greater than 2.5, than flow control valve closes, air circulates around forward cargo, and vents out the forward outflow valve if it is open.
3. if recirculation fan is on, then forward outflow is closed and the equipment cooling air, after circulating around the forward cargo, is drawn by the recirculating fan into the mix manifold, and out the aft main outflow valve.

33 Would you expect the pressure to exceed 2.5 psid on the ground?
Ans: No, that exceeds limitations (the limitation is only for TO and LDG)

34 How is the exhaust air routed before it exhausts overboard?
Ans: at a pressure differential less than 2.5 psid, it is exhausted through the belly port. At pressures greater than 2.5 psid, it is circulated around the forward cargo compartment, then overboard through the forward outflow valve, or aft outflow valve if recirc fan is on.

35 What mechanism directs the equipment cooling air, and how does it operate?
Ans: the flow control valve controls the airflow. It aerodynamically positions itself
according to how much air is flowing through it.

36 When does the air conditioning ram air deflector door open?
Ans: when the aircraft is on the ground.

Pressurization

1 Where does the auto function receive its BARO reference?
Ans: from the Captain's altimeter.
2 Where does the STBY function get its BARO reference?
Ans: from the First Officer's altimeter
3 When does the forward outflow valve close?
Ans: whenever the recirculating fan is operating or whenever the main outflow valve
4 is within 1/2 degree of being closed.
What would cause the AUTO FAIL light?
Ans: 1. Loss of AC for 15 seconds.
2. Excessive cabin altitude (13,875')
3. Excessive cabin rate (±1800 fpm)
5 Which outflow valve motor does the AUTO function use?
Ans: the AC motor.
6 Which outflow valve motor does the standby mode use?
Ans: the DC motor.
7 In the AUTO mode, where does the controller derive its altitude information?
Ans: from the static ports.
8 In the standby mode, where is the altitude information derived from?
Ans: from the air data computer.
9 When the FLT/GND switch is placed in the FLT position, what does the system do?
Ans: it sets the pressure at .1 psid or 200' below field elevation.
10 What is the pressurization schedule?
Ans:
On the ground:.125 psid max (1 psid normal)
Less than 18,500': Sea level
Above 18,500'; below FL280:
7.45 psid ±.1 (constant rate)
Above FL280
7.80 psid ±.1 (constant rate)
Maximum 8.65 psid
11 When will the OFF SCHED DESCENT function disarm?
Ans: 1. Within 1,000' of the selected cruise altitude.
2. When a lower-than-existing altitude is selected.
3. When STBY is selected.
12 What are the system limits in the event of an off schedule climb?
Ans: max rate of climb of 500 fpm, up to 7.9 psid
13 Assuming a scheduled cruise altitude above 28,000, what differential pressure does the AUTO controller schedule?
Ans: 7.8 ±.1 psid
14 If the aircraft does not attain the scheduled cruise altitude, where is the landing pressure scheduled?
Ans: departure elevation minus 300'
15 Upon touchdown, what does the auto-controller do?
Ans: it selects field elevation minus 200'.
16 If the AUTO mode is inoperative, how should you operate the standby mode?
Ans: For takeoff: set the CAB ALT to 200' below field elevation.
During climb: set CAB ALT according to the placard.
During descent: CAB ALT to 200' below destination field elevation.
17 If the automatic mode did not detect the aircraft leaving the ground, what climb schedule would it maintain?
Ans: it would maintain departure field elevation minus 200' until reaching 7.45 psid, then it would then maintain 500 fpm climb. Above 7.9 psid, the cabin would climb with the aircraft.

Fuel System

1 How much usable fuel does each tank hold?
Ans: 1 and 2 - 10,118 lbs.;
Center - 15,613 lbs. Aux - 2,632 lbs.
2 Where is the aux tank located, when installed?
Ans: in the forward end of the aft cargo hold.
3 Where are the main fuel shutoff valves located?
Ans: at each engine mount on the wing
4 What powers these valves?
5 Ans: the hot battery bus.
6 What powers the crossfeed valve?
Ans: the battery bus
7 What ensures that the center tank fuel will be used before the wing tank fuel when all boost pumps are operating?
Ans: center tank check valves open at a lower differential pressure than the check valves in the #1 and #2 tanks.
8 What ensures that the aux tank fuel will be used before the wing tank fuel when all boost pumps are operating?
Ans: aux fuel pumps have a higher output pressure.
9 In an aircraft with the aux tank installed, how is the fuel normally used?
Ans: the aux tank will automatically supply the left engine until it is depleted, with the center tank supplying the right engine until the aux tank is depleted; then the system will operate as though there was no aux tank on board,
10 With regard to refueling operations, do the cockpit fuel switches enter the refueling picture in the case of an aircraft with an aux tank?
Ans: yes, all fuel pump switches must be off
11 How is the center tank system different from the wing tanks?
Ans: there is no suction feed on the center tank, and there are no drip sticks installed
12 Does the aux tank have suction feed?
Ans: no
13 What is different about the center tank low pressure lights?
Ans: they will not illuminate with the power switches in the "off" position
14 Is this statement also true with regard to the aux tank?
Ans: yes
15 When will the forward panel fuel annunciator illuminate?
Ans: wing tank: when both low pressure lights in the same tank illuminate,
center tank: one light and one pump off
16 Where is the fuel temperature probe located?
Ans: in #1 tank.
17 Is this a self-powered probe?
Ans: no, it uses AC power.
18 What prevents tank surge pressure damage?
Ans: a system of surge tanks and vents.
19 Where is the fueling station located?
Ans: in the leading edge area of the right wing, outboard of the engine.
20 Where is the manual defueling valve located?
Ans: between the fueling station and #2 engine.
21 In simple terms, what does this valve do?
Ans: it connects the engine feed system with the refueling station.
22 What functions does this valve serve?
Ans: 1. System defueling
2. Ground fuel transfer between tanks
3. Pressure fueling of the aux tank.
23 What is the maximum imbalance between tanks 1 and 2?
Ans: 1000#
24 What is a precaution regarding refueling operations?
Ans: the wing tanks must be loaded symmetrically.
25 What is the normal order of refueling?
Ans: tanks 1 and 2. Then the center tank, then the aux tank if installed.

Auxiliary Power Unit (APU)

1 What does the LOW QUANTITY light indicate?
Ans: the APU oil quantity is down to the 1 1/2 quart level. This equates to 10 hours of operation left. You may operate the APU, but you better have maintenance check (you may have a leak)! This is an advisory light only.

2 What are the altitude limits of the APU?
Ans: 1. air AND electrical - 10,000'
2. air OR electrical - 17,000'
3. electrical - 35,000'

3 What will cause the APU to shut down automatically?
Ans: 1. overspeed
2. low oil pressure
3. high oil temperature
4. fire warning input

4 Will the APU fire detection system automatically discharge the fire bottle?
Ans: no, it will only shut it down

5 Does the APU have an overheat warning?
Ans: no, only a fire warning

6 Will the APU operate with the battery switch turned off?
Ans: only in flight

7 Why is the system set up that way?
Ans: to preclude an undetected APU fire while the aircraft is unattended on the ground (detection circuit on BATTERY bus)

8 Is it possible to have the APU power both busses in flight?
Ans: only if you takeoff in that configuration

9 What are the temperature limits of the APU?
Ans: start: 760 degrees C
max cont: 710 degrees C

10 What is the maximum electrical load on the APU?
Ans: ground operation: 150 amps
inflight operation: 125 amps

11 Can the APU be started without the battery?
Ans: yes. Using an external DC input plug

12 Are there any precautions involved in doing this?
Ans: yes, if the aircraft battery is low, it must be disconnected

13 When the APU is started, what normal indications are you looking for with respect to the load meter?
Ans: the meter will show a slight discharge at first as the air inlet door opens, then a high discharge as the starter engages.

14 What is the normal fuel source for the APU?
Ans: #1 fuel tank.

15 What is the preferred source if going to run for a long time?
Ans: CTR tank using left boost pump pressure

16 Can the center tank right boost pump supply the APU?
Ans: yes, if the crossfeed is opened

17 Can the APU fuel be heated?
Ans: yes, there is an automatic heating function which utilizes bleed air

18 What is the fuel consumption rate of the APU?
Ans: 250 pph

19 When may the APU be utilized after starting?
Ans: immediately for electrical, after one minute for a pneumatic source

20 How long should the APU be operated without a pneumatic load before shutdown?
Ans: 1 minute

21 If a start is **aborted**, how long should you wait before attempting another start?
Ans: 4 minutes

22 If there is no indication that the starter engaged, what should your action be?
Ans: turn the switch to "off" for 20 seconds before attempting another start. This allows the inlet door to recycle.

23 How many start attempts should be made?
Ans: 2 on the ground, 4 in the air (with 4 mins between each attempt)

24 What would be your indications of a hung start?
Ans: the "APU GEN OFF BUS light would fail to illuminate

25 How high may the APU be started?
Ans: not assured over 25,000'

26 Why should you always use a boost pump to pressurize the APU?
Ans: to extend fuel control unit life.

27 How are the generator and oil cooler provided with cooling air?
Ans: by a gear driven cooling fan.

28 Is this air regulated?
Ans: yes, an air supply valve opens when APU bleed air pressure is detected in the APU bleed air supply duct.

29 How is the APU exhaust shroud cooled?
Ans: exhaust air flows by a venturi in the exhaust duct, drawing ambient air around the exhaust shroud, providing cooling.

30 If the APU inadvertently flames-out on the ground, what could be the cause?
Ans: low fuel in the tanks, causing the supply point to become uncovered during ground maneuvering.

Hydraulics

1 What provides pressure to the A system?
Ans: an engine driven pump **and** an electric pump.
2 What is the power source for the electric pump?
Ans: gen bus #2.
3 What provides pressure to the B system?
Ans: it is constructed the same as the A system with the gen bus #1 powering the electric pump.
4 What is normal system pressure?
Ans: 3,000 psi.
5 Why are the "A" and "B" system reservoirs pneumatically pressurized?
Ans: to prevent foaming of the fluid (causes pump cavitation).
6 Why isn't the standby system pneumatically pressurized?
Ans: it is designed without a provision for **air** to be in the reservoir, but it **is** pressurized **hydraulically** by a balance line from B system.
7 If a leak developed in the "A" system engine driven pump, what indication would you expect to see on the quantity gauge?
Ans: the quantity gauge would read one quarter full.
8 If a leak developed elsewhere in the "A" system, what indication would you expect to see on the quantity gauge?
Ans: quantity would read zero and the pressure would be lost
9 Which annunciator lights would illuminate with a complete loss of "A" system hydraulics?
Ans: 1. MASTER CAUTION
2. FLT CONTROL
3. HYD
4. SYSTEM "A" FLT CONTROL LOW PRESSURE
5. FEEL DIFF PRESS
6. SYSTEM "A" ENG and ELEC PUMP LOW PRESS
10 What components would become inoperative with this condition?
Ans: 1. PTU
2. normal landing gear extension
3. NLG steering
4. alternate brakes
5. ground spoilers
6. inboard flight spoilers
7. "A" autopilot
8.engine #1 has standby reverse operation
11 What should you know about reverser operation in this condition?
Ans: the reverser will probably act slower than normal and may induce a control problem if reverse is used too quickly
12 What is the function of the PTU?
Ans: it provides backup pressure for the autoslats
13 What is the fluid source for the PTU?
Ans: "B" reservoir below the standpipe
14 When would the PTU become operational?
Ans: 1. Flaps between 1 and 5
2. A loss of pressure from system B engine driven pump is sensed
15 What is the power source for the PTU?
Ans: "A" system drives pump, to push "B" system fluid (no fluid transfer)
16 How does this operate?
Ans: "A" system pressure will drive the PTU which will pump "B" system reservoir fluid, to operate the autoslats
17 Where is the cooling unit for the "A" system?
Ans: in the #1 tank, "B" system cooler is in #2 tank
18 Where are the hydraulic reservoirs located?
Ans: in the wheel well. A in the middle, B on the right side.
19 What is the normal fluid level for system "A"?
Ans: full - 4.7 US gals , refill - 4.2 US gals
20 What is the normal fluid level for system "B"?
Ans: full - 7.2 US Gals
refill - 6.4 US Gals
21 If a leak developed in the engine driven pump, what indication would you expect to see in the "B" system?
Ans: the quantity gauge would read half full.
22 If a leak developed in the "B" system electric pump, what indication would you expect?
Ans: the quantity gauge would read nearly empty and "B" system pressure would be lost.
23 Where are the thermal sensors located for the electric pumps?
Ans: in the pump case drain lines and pump housing.
24 Where are the temperature sensors for the engine driven pumps?
Ans: the engine driven pumps do not have sensors.
25 When do the electric pumps automatically shut down?
Ans: they don't.
26 What prevents each system ("A" or "B") from being totally lost due to a pump related leak?
Ans: a system of stand pipes and check valves.
27 Will the engine driven pumps be harmed by pulling a fire handle?
Ans: yes, pulling the fire handles will block pump input and will cause the pumps to be ruined if the engine continues to windmill.

28 What does the control switch do to the engine driven pumps?
Ans: it blocks pump output and will not cause harm to the pump if the engine continues to run or windmill.

29 Which annunciator lights illuminate with a loss of "B" system pressure?
Ans: 1. MASTER CAUTION
2. FLT CONTROL
3. HYD
4. SYSTEM "B" FLT CONTROL LOW PRESSURE
5. SYSTEM "B" ENG & ELEC PUMP LOW PRESS
6. FEEL DIFF PRESS

30 What components will be lost with a loss of "B" system pressure?
Ans: 1. Normal brakes
2. Outboard flight spoilers.
3. Normal leading and trailing edge flaps and slats
4. Yaw damper
5. "B" autopilot.
6. B thrust reverser slow
7. LGTU (landing gear transfer unit)

31 What else would you lose with a loss of "B" system?
Ans: alternate gear retraction

32 If a leak developed in the lines of the electric pump and all pressure was lost, would the PTU still be operational?
Ans: yes

33 How is the standby system reservoir pressurized?
Ans: it is pressurized by fluid from "B" system through a balance line

34 How is the standby system activated?
Ans: 1. by placing either flight control switch to its "standby rudder" position
2. placing the alternate flap master switch to "on"
3. automatically if either "A" or "B" system pressure is lost **and**:
A. the flaps are extended
B. the aircraft is airborne or the wheel speed is above 60k on the ground

35 What else happens when you place either flight control switch to the STANDBY RUDDER position?
Ans: the normal flight control hydraulics are shut off for the associated "A" or "B" system

36 When is the STANDBY LOW QUANTITY light armed?
Ans: it is always armed

37 When is the STANDBY LOW PRESSURE light armed?
Ans: whenever the standby pump is operating

Landing Gear

1 What is the nacelle (NLG) turning authority?
Ans: 7 degrees through the rudder pedals, 78 degrees through the nacelle steering
2 What does the nacelle lockout pin do?
Ans: it locks out "A" system pressure to the nacelle
3 How is the nacelle lockout pin installed?
Ans: the cylinder dome must be pushed inward to install the pin
4 Does this mean that the aircraft can be safely towed with the system pressurized?
Ans: yes
5 Where is nacelle steering fluid taken from?
Ans: from the "down" side of the landing gear hydraulic system
6 What is the function of the **landing gear transfer unit** (LGTU)?
Ans: it ensures gear retraction in the event of a loss of power (N_2-56%) on engine #1 on takeoff
7 What is the power source for the LGTU?
Ans: "B" system **engine** driven pump
8 What activates the LGTU?
Ans: #1 engine rpm dropping below a set value (N_2-56%) with the Landing gear lever in the "UP" position (and the gear not up)
9 What is the normal fluid decrease with gear retraction?
Ans: .8 gal
10 What is the normal decrease with flap extension?
Ans: .4 gal
11 What accounts for this fluid variation?
Ans: led extension and retraction, the flaps are operated by a hydraulically driven jackscrew
12 What conditions are required for the "RTO" to arm?
Ans: 1. the aircraft must be on the ground
2. wheel speed must be less than 60k
3. anti-skid must be on
4. RTO must be selected
5. thrust levers must be positioned to idle
6. normal "B" system pressure available

13 When will the RTO normally be disarmed?
Ans: 1. when the switch is placed to the "off" position
2. when the aircraft becomes airborne (right main gear strut extended)
14 How do you know that the RTO is operational?
Ans: when RTO is selected, the "AUTO BRAKE DISARM" light illuminates for approximately 2 seconds, as a self-test.
15 During normal operations, when would you expect to see the AUTO BRAKE DISARM light illuminate?
Ans: 1. When the takeoff is rejected between 60 & 90 knots
2. 2 minutes after landing if the selector switch has been left in the RTO position.
16 Beyond 90k, when will autobraking be initiated?
Ans: when the throttles are brought to idle.
17 What level of braking is applied by the RTO feature?
Ans: the equivalent of full manual braking.
18 What are the requirements to **arm** the auto brake system?
Ans: 1. the aircraft must be in flight
2. the anti-skid switch must be on
3. the auto brake switch must be selected to the desired braking level
19 Will auto braking be available if "B" system pressure is lost?
Ans: no
20 Once activated, how are the Autobrake feature and RTO **disarmed**?
Ans: 1. moving the speed brake handle to the down position
2. advancing the thrust levers
3. positioning the switch to "off"
4. application of manual brakes
21 When will the "Anti-skid inop" light illuminate?
Ans: whenever there is a system malfunction **or** a disagreement between the parking brake lever and the parking brake shutoff valve position.
22 With the flaps set at 1 degree through 10 degrees, when would you first expect to get a landing gear warning horn?
Ans: when either or both thrust levers are between idle and approximately 10 degrees from the idle position.
23 Can this horn be silenced?
Ans: yes.
24 With the flaps set at 15 degrees, when would you expect to get a warning horn?
Ans: with either thrust lever between idle and 10 degrees with the other thrust lever set at 30 degrees or greater, this horn can also be silenced.
25 When would you get a landing gear warning horn which couldn't be silenced?
Ans. With the flaps at 15 degrees with both thrust levers below 30 degrees, or when the flaps are set at more than 15 degrees with the gear up, regardless of thrust lever position.

26 What does the tire screen annunciator light indicate?
Ans: that one of the tire screen locking pins is not properly seated/screens not secure
27 If this light illuminated on the ground, what would your action be?
Ans: have the problem corrected. Equipment damage could result if the gear was retracted with a loose screen.
28 How can the tire screen light be extinguished?
Ans: only by correcting the problem

Brakes

29 How is hydraulic fluid routed for normal braking?
Ans: through the brake metering valves and the anti-skid valves.
30 Can the brakes be locked with the anti-skid system operational?
Ans: no (unless braking action is "nil")
31 When will alternate braking be in effect?
Ans: whenever "B" system pressure is low
32 Will alternate anti-skid also be available?
Ans: yes.
33 How does alternate anti-skid differ from normal anti-skid?
Ans: alternate anti-skid controls each pair of wheels, as opposed to individual wheels.
34 When alternate braking is being used, how is the fluid routed?
Ans: it is routed through the alternate brake metering valves and the alternate anti-skid valves, using hydraulic system A.
35 If both system "A" and "B" pressure is lost, is there any power source for brake application?
Ans: yes, from the brake accumulator
36 What is the brake accumulator precharge?
Ans: 1000 psi

Flight Controls

1 What is a key for remembering the components on the "B" system?
Ans: 1. B system provides for the primary flight controls (along with A system)
2. thereafter: "Break (brakes) out the leading and trailing edge (outboard flight spoilers) flap yaw damper for alternate gear retraction," all other components and the primary flight controls are on the "A" system.

2 With all hydraulic pressure lost, how are the controls moved?
Ans: the control surfaces are being operated directly, not through tab movement

3 When do the spoilers displace for roll movements?
Ans: when the yoke is moved beyond 10 degrees

4 In the event of a jammed aileron condition, what controls could the First Officer operate?
Ans: the spoilers only

5 Given the same condition, what controls would the Captain's yoke operate?
Ans: none, the ailerons and the Captain's yoke are inoperative (if the ailerons jam, the FO has spoilers, and if the spoilers jam, the Captain has ailerons).

6 What devices provide the pilots with control feel?
Ans: the feel mechanism (ailerons & rudder) and the elevator feel computer

7 What is the function of the trim override switch?
Ans: it bypasses the control column cutout switch, permitting trim to be used when the control column is in an opposing position

8 What powers the yaw damper?
Ans: "B" system hydraulics

9 In the event of a "B" system pressure loss, is the yaw damper disengaged?
Ans: no, this will only occur if the "B" flight control **switch** is positioned to "off",(the yaw damper switch will **then** move to the "off" position,)

10 Does this mean that the yaw damper is still effective with a loss of "B" system pressure?
Ans: no, the system is still sensing, but cannot function without "B" system pressure

11 When else would you expect the yaw damper to automatically disengage?
Ans: with a power loss

12 Does the yaw damper function the same throughout all regimes of flight?
Ans: no, the air data computer limits the yaw damper response at higher airspeeds

13 How many switches could turn on the standby hydraulic pump?
Ans: three, either flight control switch or the alternate flap switch

14 What three things does the alternate flap switch do?
Ans. 1. it closes the trailing edge flap bypass valve
2. it activates the standby hydraulic pump
3. it arms the alternate flap position switch

15 If RTO is selected, is it necessary to position the speed brake lever to the "Armed position?
Ans: no, a piston will drive the lever upward.

16 Whenever the RTO function operates, what is the sequence of events for the RTO function?
Ans:1. below 60k, RTO may be armed
2. between 60 and 90 knots, AUTO BRAKE DISARM light illuminates, and auto braking is not initiated, but spoilers come up
3. ≥ 90k, the spoilers will deploy and full braking will be applied

17 When is the RTO feature disarmed?
Ans: when the right strut extends or the switch is placed to the OFF position

18 What is a requirement for the RTO and Auto Brake functions to work?
Ans: the anti-skid must be "ON"

19 What does the "SPEED BRAKE DO NOT ARM" light tell us?
Ans: there is a failure in the automatic system, the speed brake should not be armed for landing. It must be manually raised on landing.

20 When would you expect to see this light illuminate?
Ans: only when the speed brake is raised from the full down position

21 If the speed brakes lever is in the armed position, when will the flight spoilers raise on touchdown?
Ans: 1. when any two main wheels spin-up, **and**:
2. both thrust levers are in the idle position.

22 When will the ground spoilers deploy?
Ans: when the right strut switch is activated

23 If wheel spin-up is not detected, how does the system operate?
Ans: the speed brakes lever will move to the up position and all spoilers will deploy upon activation of the right strut switch.

24 When will the ground and flight spoilers retract after touchdown?
Ans: when either thrust lever is advanced from the idle position

25 What does the Mach trim system do?
Ans: provides speed stability at the higher Mach numbers. It adjusts the elevators with respect to the stabilizer

26 When is the Mach trim activated?
Ans: above Mach .615

27 What is the speed limit if the Mach trim is inoperative?
Ans: Mach .74

28 If a single Mach trim channel is inoperative, will you see the problem annunciated?
Ans: no, not until the recall function is used. This is a dual channel system

29 When would you expect to see this problem automatically annunciated?
Ans: only when **both** channels have failed

30 How does the speed trim system operate?
Ans: it uses various logic sensors to "conclude" that the aircraft has:

1. a low gross weight
2. a slow speed (90-250 kts)
3. an aft CG
5. flaps extended
6. Five seconds since release of trim
7. 10 seconds after liftoff
8. autopilot not engaged

It uses the autopilot trim to reposition the stabilizer to a new "neutral" position to offer more nose-down authority.

31 When is the speed trim armed?
Ans: whenever the flaps are extended

32 What would cause the speed trim light to illuminate?
Ans: failure of both channels.
Dual channel system

33 What is the normal pressure source for the LEDs?
Ans: "B" system hydraulics

34 What is the alternate pressure source?
Ans: standby pressure

35 When will the leading edge **flaps** extend fully?
Ans: when the flap handle is moved from the "up" position

36 When do the leading edge **slats** normally extend fully?
Ans: when the flap lever is moved **beyond** the 5 degree position

37 When would you expect the autoslats to operate?
Ans: at a high angle of attack, prior to the onset of the stick shaker, (flaps must be extended 1 through 5 degrees.)

38 What is the normal pressure source for the autoslats?
Ans: "B" system

39 What is the alternate source of pressure?
Ans: the PTU, using "A" system pressure to power a hydraulic motor/pump unit, which uses "B" system fluid to pressurize the LEDs

40 What is important for you to know about the position of the flaps?
Ans: from 1 degree through 15 degrees, you are gaining primarily lift. The flaps are not that effective as drag devices until past flaps 15

41 What is the normal maximum altitude for flap operation?
Ans: 20,000 feet

42 What powers the trim system?
Ans: the stabilizer trim is electric/manual, the ailerons and rudder are hydraulic only

43 What determines the stabilizer trim motor speed?
Ans: it operates at high speed with the flaps extended, low speed with the flaps up

44 If hydraulic power is lost to the ailerons or rudder, can they be trimmed in any other way?
Ans: no. Only the stabilizer trim has a manual backup.

45 With respect to the aileron and rudder trim, what mechanism does the trim directly effect?
Ans: the feel and centering mechanism

46 What will cause the elev feel diff press light to illuminate?
Ans: a 25% difference between system "A" & "B" (with flaps extended, light will not illuminate).

47 What would typically cause this light to illuminate?
Ans: a blocked probe on the vertical stabilizer **or** a loss of one hydraulic system.

48 How does the flap load limiter operate?
Ans: when the flaps are at 40 degrees, the flaps will automatically reposition to 30 degrees when the airspeed exceeds approximately 158 ±2 knots. They will again position to 40 degrees when the speed falls below approximately 152 ±2 knots.

49 How are the alternate flaps operated?
Ans: the alternate flap switch must be positioned to the arm position, the flaps are then actuated using the adjacent toggle switch.

Electrical System

1 What are the electrical sources for the 737?
Ans: 1. Engine driven generators.
2. APU.
3. Ground power
4. Battery for Standby Bus

2 What is the max rated output for the engine driven generators?
Ans: 125 amps, 45 kva.

3 How are the normal AC busses arranged?
Ans: each generator "system" consists of a generator, main, and transfer bus. The high load items are on the gen & main busses, so that in the event of an emergency power transfer, the electrical system can't be overloaded.

4 How else could you describe the generator and main busses?
Ans: they could be described as "Non-Essential busses"

5 What is the distinction between the generator & main busses?
Ans: they are separated by a 50 amp circuit breaker

6 Would it then be safe to describe the transfer busses as "Essential busses"?
Ans: yes.

7 What is the main advantage of this type of arrangement?
Ans: downloading and paralleling are never a problem

8 How would you describe the power transfer system on the 737?
Ans: it is a partial power transfer system

9 How does this work?
Ans: if a generator bus fails, its associated transfer bus automatically switches to the opposite generator bus. Also, "auto load shedding" takes place.

10 When you place the gen switch to "ON", what is taking place within the circuitry?
Ans: the generator field is being energized

11 What problem source is indicated if a generator is showing a fluctuating frequency?
Ans: a CSD problem

12 What problem source is indicated by a fluctuating voltage?
Ans: normally, a voltage regulator problem; if it is associated with a high amperage, it could be a system short circuit.

13 If a generator failed and automatic switching of the transfer bus failed, what would be your indication of this condition?
Ans: you would see the TRANSFER BUS OFF, BUS OFF, and GEN OFF BUS lights illuminated.

14 What other lights would you expect to see?
Ans: the MASTER CAUTION lights and the ELEC annunciator

15 If this condition occurred, is there any way to "manually" initiate the transfer of power?
Ans: no, you could only try recycling the associated switches and circuit breakers.

16 Why should you be careful in doing this?
Ans: the problem could be due to a catastrophic failure which would invite trouble by re-exciting the circuit.

17 If you were in doubt as to whether you lost a generator or a generator bus, how could you determine which you had lost?
Ans: try putting the APU generator on the appropriate bus.

18 What forward panel annunciator light would you expect to see if a CSD encountered a high oil temperature condition?
Ans: "ELEC"

19 Where is the CSD oil pressure sensor located?
Ans: in the inlet line to the CSD

20 When would you expect to see the blue "APU GEN" light illuminate?
Ans: whenever the APU is capable of supplying normal AC power to the aircraft and neither bus is currently being supplied by the APU. Does **not** mean this is good power.

21 If ground power is being supplied to the aircraft and APU power is put on one bus, does the ground power trip off the line?
Ans: only to the side being powered by the APU, it will continue to supply power to the other side until ground power is removed, or another power source powers that bus.

22 What is the primary source for DC power?
Ans: three normal TRs and a ground service TR.

23 How are the TRs designed to operate?
Ans: under normal conditions, TR 1 & 2 power their respective DC busses from their respective transfer bus and "backup" each other. TR 3 normally supplies the battery bus **and** it will back-up TRs 1 & 2.

24 Can either TR #1 or #2 backup TR #3?
Ans: no

25 Under what conditions would TR #3 **not** back up DC bus #1?
Ans: whenever the bus transfer switch is "off" **or** both nav receivers are tuned to the same localize frequency and the glideslope has been captured during an autopilot or flight director ILS approach.

26 What would you expect to see on the DC meters if #1 TR or #2 TR failed?
Ans: zero amps when the failed TR was selected, as well as an increased load on the working TR. Voltage would be normal.

27 What would your indication be if TR #3 was selected and #3 TR had failed?
Ans: zero volts **and** amps.

28 Why do you get these particular indications?
Ans: voltage for TR/s #1 & #2 are read from the associated **load bus** (amps from TR); readings for TR #3 are taken directly from the TR.

29 What is the power source for TR #3?
Ans: #2 main bus

30 How could you verify that TR #1 had failed?
Ans: place the bus transfer switch to "off". This isolates TRs #1 & #2, therefore, if TR #1 has failed, it will show zero volts and amps.

31 If you lost a DC bus, what indication would you have?
Ans: component loss only, there is no annunciator or warning light associated with a lost DC bus.

32 Is there a desirable position for the DC meter selector?
Ans: yes, the #3 TR position. In this position, you can monitor #3 TR & possibly see a load increase if #1 or #2 TR failed. This position also gives you the knowledge that the battery bus is being powered normally.

33 What is the normal power source for the standby AC bus?
Ans: #1 transfer bus.

34 If the DC meter switch is placed to the STBY PWR position, what would you be able to read?
Ans: voltage only

35 Normally, what would you expect to happen if the #1 DC bus or the #1 transfer bus failed?
Ans: the battery bus would automatically power the standby AC and DC busses.
What would indicate that the battery bus and the #1 transfer bus had failed?
Ans: the standby power off light would illuminate (which means that you have lost power to the AC STBY bus)

36 What else would this light tell you?
Ans: that the protective circuit had failed to automatically switch the battery bus to the hot battery bus, **or** that you have lost the battery bus.

37 What would your corrective action be?
Ans: place the standby switch to BAT.

38 Will the normal (#1 transfer bus) power source be disconnected if the standby switch is placed in the BAT position?
Ans: yes.

39 When will the auto standby system work?
Ans: in the air only.

40 Why is this information important to us?
Ans: in the event of an evacuation, the standby switch must be positioned to BAT to use the #1 radio.

41 Under what normal condition would you expect to see the Stby Pwr Off light illuminated?
Ans: when turning on the battery switch on a "cold" airplane.

42 How else might you think of the standby power off light?
Ans: it could be thought of as an essential power warning light

43 What would be a reason to switch the standby switch to BAT on the ground?
Ans: when refueling a "cold" airplane **or** needing to use the #1 VHF radio

44 How does the bus transfer system work?
Ans: If a GEN BUS lost power, the respective transfer BUS will automatically receive power from the other GEN BUS.

45 What happens when the bus transfer switch is placed to the "off" position?
Ans: the transfer busses are isolated and the TR #3 Disconnect relay is opened. The battery charger will be prevented from switching to its alternate power source (main bus #2).

46 What is a unique characteristic of the battery bus?
Ans: it is a "floating bus". It is normally connected to TR 3, however it is unpowered with the battery switched off and it is again powered from the hot battery bus with the STBY switch in the BAT position.

47 What is a more accurate perception of the "Battery Switch"?
Ans: it may be more accurately thought of as the "battery bus switch"

48 When is the battery being charged?
Ans: whenever there is AC power on the airplane, the ground service bus is normally powering the battery charger with main bus #2 as an alternate

49 In the event of an automatic power transfer, is the battery still being charged?
Ans: yes,

50 Can the battery be charged from an external battery cart?
Ans: no, the battery is paralleled with the external cart

51 Can the battery bus be powered from two sources at once?
Ans: no

52 What is the rating of the battery?
Ans: 36 amp hour

53 What is considered the "normal" voltage range of the battery?
Ans: 22 - 30 volts

54 How long should it last in a standby power operation?
Ans: 30 minutes

55 In the event of a total loss of electrical power, what should one of your first actions be?
Ans: check the clock to time your battery reserve

56 What is the minimum battery voltage for starting the APU?
Ans: 23 volts

57 What are the two direct sources of power for the battery bus?
Ans: #3 TR, **or** the hot battery bus

58 Which is the primary source?
Ans: #3 TR

59 What are the indirect sources of power for the battery bus?
Ans: the battery **or** the battery charger.

60 What are the two direct sources of power for the battery charger?
Ans: the ground service bus with the main bus #2 as a backup.

61 What are the two sources of power for the ground service bus?
Ans: 1. the #1 generator bus
2. ground power unit via the Gnd Service Switch

62 Is there a condition when the battery charger could be unpowered while an AC source was operating and available?
Ans: yes, if the ground service bus was unpowered with the bus transfer switch in the "off" position.

63 What is the normal voltage range of the TRs?
Ans: 24 - 30

64 What is the normal load limit of the TRs?
Ans: 65 amps with cooling; 50 amps without cooling.

65 What normal loads would you expect to see on the TRs?
Ans: 5 - 15 amps. Max to 65 amps.

66 When is the ground service bus powered?
Ans: whenever external power is available and the Ground Service Switch is "on"
or the generator bus #1 is powered.

67 Where is the ground service switch located?
Ans: at the forward flight attendant station by the forward entry

68 What is the power source for galley power?
Ans: the generator busses.

Ice and Rain Protection

1 What do the amber lights indicate on the windshield Anti Ice control panel?
Ans: that power has been removed to that window **or** an overheat condition

2 How do you test the window heat?
Ans: place the test switch to the overheat position and observe the illumination of the amber light.

3 What is a precaution to observe when using the power test?
Ans: don't test if all green lights are on.

4 If the window heat switches are on and there are no lights illuminated, what condition is indicated?
Ans: the windows are up to design temperature **or** window heat inop

5 What is unique about the #3 side window?
Ans: it is **not** heated, but the double pane **is** vented to cabin

6 What bus **controls** the engine TAI?
Ans: the battery bus.

7 How is the engine TAI valve operated?
Ans: it is electrically **controlled**, pneumatically **operated**.

8 What causes the illumination of the amber COWL ANTI-ICE light?
Ans: high temperature **or** over pressure.

9 What does the engine TAI control operate?
Ans: the engine cowl bleed air valve.

10 What weather conditions require the use of engine TAI?
Ans: whenever icing conditions are anticipated. This is normally defined as a temperature below 50 degrees F, with visible moisture or fog with a visibility less than 1 mile.

11 What would your indication be of a disagreement between the engine TAI switch and the cowl anti-ice valve position?
Ans: you would see a bright blue COWL VALVE OPEN light.

12 Does the wing TAI also protect the leading edge flaps?
Ans: no, only the 3 outboard **slats** (there are 3 slats on each side; total of 6).

13 How are the wing TAI valves operated?
Ans: they are motor operated, powered from the opposite transfer bus. The control switch is on the battery bus.

14 How is the bleed air carried to the individual slats?
Ans: through telescoping ducts.

15 On the ground, when can the wing TAI valves open?
Ans: when the thrust is below the takeoff warning level **and** the bleed air temperature is below 125 degrees C.

16 If the wing TAI **switch** is left in the "on" position, when will it trip to "off"?
Ans: On liftoff. The **valves** will close when the throttles are advanced.

17 With this in mind, what should you be careful to consider when departing in icing conditions?
Ans: be careful to remember to turn the wing TAI **back on** when airborne (800')

18 If a pitot heat annunciator light illuminates, will you expect to see any other lights?
Ans: yes, the master caution and the anti-ice annunciator light.

Fire and Overheat Protection

1 What type of fire detectors does the 737 use?
Ans: kiddie loops for the engines and APU; and a phenol metallic loop in the wheel well area.
2 How many detectors does each engine have?
Ans: 4 dual element overheat/fire detection loops installed in each engine nacelle
3 How many for the APU?
Ans: one
4 How does the system distinguish between an overheat and a fire?
Ans: by a preset temperature threshold
5 Normally, how many loops are required to be in an overheat condition to signal a warning?
Ans: two
6 What is the exception?
Ans: if one loop has failed **or** either A or B are selected on the fire panel, as opposed to "normal".
7 fire **detection**?
Ans: the battery bus
8 What is the power source for the engine and APU **protection**?
Ans: the hot battery bus
9 Does the wheel well light indicate a fire or an overheat condition?
Ans: only a fire
10 Why is a wheel well fire warning so serious on the B-737?
Ans: because a subsequent tire explosion could damage much of the hydraulics and the engine fire bottles.
11 What would this threat lead you to believe?
Ans: that gear extension is an immediate priority in the event of a wheel well fire warning.
12 Where is the external APU fire control panel located?
Ans: in the right wheel well
13 What would be the external indication of an APU fire?
Ans: an intermittent horn and a flashing red light on the external APU fire control panel.
14 Will the horn sound in the air?
Ans: no, on the ground only.
15 What would be an indication that the cockpit crew had canceled the fire bell in the cockpit? Ans: the red light on the external APU fire control panel would change from flashing to **steady**.
16 When would this light completely extinguish?
Ans: only when the detector had cooled below the alarm threshold.
17 Does the APU detector (T handle light) indicate an **overheat** condition as well as a fire?
Ans: no, only a fire
18 Does the APU DET INOP light indicate a **circuit** fault or a **detector** fault?
Ans: indicates a fault in: FM 10-10 says "detection circuit", and FM 10-2 says "fire detection loop". Circuit fault is most accurate.
19 Normally, what does the FAULT light indicate?
Ans: a valid test **or** a failure in **both** loops of either engine
20 What is the exception to the "both" requirement?
Ans: If the detector is set in either A or B position as opposed to "normal".
21 With the test switch placed in the FAULT/INOP position, what is being indicated?
Ans: the APU fault monitoring circuit and APU detector **circuit** is being tested. **Not** the detectors.
22 How many lights would you expect to see illuminated during this test?
Ans: five.
23 What is being tested with the same switch placed in the OVHT/FIRE position?
Ans: all of the detectors.
24 How many lights would you expect to see illuminated during this test?
Ans: 11, if the aircraft has normal AC power; 10 if not.
25 Which light would not illuminate without AC power?
Ans: the wheel well light.
26 What is the power source for the wheel well fire detection?
Ans: #1 AC transfer bus
27 What is being tested in the case of the wheel well fire test?
Ans: circuit continuity. The detectors are **not** being heated.
28 How are the "Bottle discharge" lights tested?
Ans: with the forward panel light test switch
29 What is being tested with the "EXT TEST" switch?
Ans: the individual fire bottle squids.
30 How many lights illuminate with the switch placed in the #1 or #2 position?
Ans: three lights in both positions
31 How many ways can you silence the fire bell?
Ans: three:
1. Either fire master warning light
2. The fire panel "BELL CUTOUT" switch
3. The wheel well fire panel cutout switch

32 What technique should you use in discharging a fire bottle?
Ans: rotate the handle and **hold** it until you see the "discharge" light illuminate.

33 When you pull an engine fire handle, what actions take place?
Ans: 1. One discharge squid is armed on each fire bottle.
2. Closes the: A. Fuel shutoff valve. B. Bleed air C. Thrust reverser, and D. Hydraulic shutoff valve.
3. Trips the generator control relay and generator breaker.
4. Disarms the associated hydraulic "LOW PRESSURE" light.

34 What actions take place when you pull the APU fire handle?
Ans: 1. The fire bottle discharge squid is armed.
2. Closes the air inlet door, fuel shutoff valve, and the bleed air valve.
3. Trips the generator control relay and generator breaker.

35 What precludes the accidental pulling of the fire handles?
Ans: a lock which must be manually unlocked or electrically unlocked due to a fire warning.

36 What would your indication be of a lavatory fire bottle discharge?
Ans: a blackened temperature "dot" and a silvered discharge nozzle tip.

37 What is the normal engine fire bottle pressure?
Ans: 800 psi. at 70 degrees F. (see in wheel well)

38 What is the normal APU bottle pressure?
Ans: 600 psi. (can't see)

39 What would be your external indication of an APU fire bottle discharge?
Ans: a missing yellow disc on the right aft fuselage (the other disc is red for thermal)

40 What agent is used for the extinguishers?
Ans: freon

Powerplant

1 What is the designation of the engines on the B-737-300?
Ans: CFM-56-3.

2 What is the thrust rating of these engines?
Ans: 20,000 lbs.

3 Where is most of the thrust of the engines obtained?
Ans: from the fan blade (80%).

4
Ans: it could be described as a fixed pitch, ducted turbo-prop.

5 How would you describe the function of the fuel control system?
Ans: the power is primarily set through the MEC, according to throttle position, and then "trimmed" through the PMC.

6 How would you describe the fuel control mechanism?
Ans: it is an electronically monitored Fuel Control Unit (FCU), using an electronic power management control.

7 How may the PMC be bypassed?
Ans: by turning off the PMC switches **or** by an automatic shutdown.

8 What inputs does the PMC use?
Ans: throttle angle, N_1 speed, inlet temperature and pressure.

9 Is the PMC dependent on throttle position?
Ans: no, it only uses throttle position as an information input.

10 Does the PMC offer overspeed or over-temperature protection?
Ans: yes, both.

11 Why is this information important to you?
Ans: if you needed to "firewall" the engines in an emergency, the PMCs could limit your power availability to a dangerous degree.

12 With regard to this possibility, what should you be aware of?
Ans: if you could anticipate such a situation, it might be prudent to turn off the PMCs prior to "firewalling" the engines.

13 When does the PMC affect the engine?
Ans: above 46% N_2

14 When would you expect the PMC to automatically shut down?
Ans: whenever its self-test feature detects a fault

15 How would you know that it had automatically shut down?
Ans: it would illuminate the master caution, PMC INOP and the ENG annunciator. The engine N_1 would also start to drift.

16 How does the high idle feature work?
Ans: it precludes the engines from being unspooled in the air.

17 What determines the "high idle" power setting?
Ans: go-around capability

18 When will the engines again go to "low" idle?
Ans: on landing when the aircraft has been on the ground for 4 seconds or longer.

19 What is the approximate "high" idle setting?
Ans: variable, from about 29% N_1 on the ground to about 34% N_1 at cruise

20 When does the LOW IDLE light (overhead panel) illuminate?
Ans: whenever the "high" idle feature fails and is required (ie: you're in Low, when it should be in High)

21 What is the approximate "low" idle setting?
Ans: 21.5% N_1

22 What drives the first and second stages of the fuel pump?
Ans: N_2

23 How is the MEC valve operated?
Ans: it is **mec**hanically connected to the start lever

24 How is the main fuel shutoff valve operated?
Ans: it is a motor operated valve powered by the battery bus, (connected to the start lever **and** fire switch).

25 When is the fuel heated?
Ans: it is constantly heated

26 How is the fuel heated?
Ans: it is heated through an engine oil heat exchanger

27 Where is the oil pressure sensed?
Ans: on the outlet side of the oil pump

28 What is a characteristic of the oil pressure?
Ans: it is unregulated and will vary widely.

29 What is the minimum oil pressure under any conditions?
Ans: 13 psi. Less than 13 psi will illuminate the warning light.

30 Where is the oil temperature sensed?
Ans: the temperature is sensed as the oil leaves the engine.

31 How do the reversers operate?
Ans: **fan** air is deflected forward by a translating sleeve on the engine cowling.

32 What are the requirements for the engine reversers to operate?
Ans: 1. The fire switch must be off.
2. The squat switch must be activated **or** either radar altimeter sensing less than 10'.

33 What actuates the reversers?
Ans: normally, "A" system operates engine 1, "B" system operates engine 2. Standby hydraulics will operate both reversers, however they will be slower acting.

34 If normal hydraulics fail on a reverser, how is the standby pressure actuated?
Ans: through a pressure operated shuttle valve

35 If the reverser(s) are being operated from the standby system what other factors should you be aware of?
Ans: the reversers may not act symmetrically and the reversers may not completely stow after use

36 What hydraulic valves are being operated by the reverse levers?
Ans: the isolation valve (held open by solenoid) and the "deploy/stow" selector valves

37 Is the selector valve mechanically or electrically operated?
Ans: it is mechanically operated

38 When does the overhead reverser light illuminate?
Ans: whenever there is a disagreement between the positions of the isolation valve position **and** the selector valve position or between the reverser sleeve position sensors.

39 When would you normally expect these lights to illuminate?
Ans: during reverser deployment or stowage

40 If there was a problem with the system during stowage, when would you expect to see an annunciation of the problem?
Ans: if a disagreement is sensed for more than 12 seconds, the MASTER caution light will illuminate as well as the ENG annunciator.

41 Under normal conditions, what would you expect to happen if a reverser inadvertently moved aft?
Ans: the "auto restow" function would automatically command the reverser to stow.

42 In flight, what would be an indication that the reverse lock had failed and the system was working properly?
Ans: the reverser UNLOCKED light would cycle, indicating the system was constantly detecting the condition and correcting it.

43 What is the function of the reverse interlock?
Ans: it limits the amount of thrust which can be applied when the reversers are in the incorrect position for the forward or reverse thrust commanded.

44 When is the interlock taken out of the system?
Ans: whenever the reverser sleeves are in the process of being deployed or stowed. What is the minimum pneumatic pressure for engine starting?
Ans: 30 psi. (minus 1/2 psi per 1000' elevation)

45 What is the normal N_2 for raising the start lever?
Ans: 25% normal, 20% minimum (max motoring)

46 When is the latest that you would expect to see N1 rotation?
Ans: 20% N_2.

47 What fuel flow would you expect to see for a normal start?
Ans: 720 pph.

48 During a battery start, when would you raise the start lever?
Ans: after 30 seconds of starter engagement.

49 When would you expect to see starter cutout?
Ans: 46% N_2

50 When is the latest that you must see oil pressure indicated?
Ans: by the time the engine is stabilized at idle

51 Does the igniter selector control individual igniters or each igniter on both engines.?
Ans: each igniter on both engines.

52 Which igniters does the FLT position power?
Ans: both igniters on the individual engine.

53 Which igniters will the CONT position power?
Ans: the selected igniter(s) on the individual engine.

54 What is the power rating of the igniters?
Ans: 20 joule.

55 What is the power source for the igniters?
Ans: the left igniters are powered by the AC transfer bus, while the right igniters are powered by the AC standby bus (required for dispatch).

56 What is the significance of this information?
Ans: the right igniters are a NO-GO item per the MEL.

57 How could you check the right igniters?
Ans: start the engines using the right igniters, then use the left igniters for other needs.

FAA oral given several years ago:

A. what do you have left when on standby power?
B. what engine instruments are left on standby?
C. what are the red lights on N1, N2 & EGT (at 2 & 3 o'clock)?
D. if start valve does not close, what do you do and why?
E. what is difference between LE flaps transit light on fwd panel and transit yellow lights on aft overhead?
F. what are little bars under numbers on flap indicator? Discussion of asymmetrical flaps (2°). Led into low idle light, what is it, when is it on? Flap limit speeds? Don't call for flap speeds till you see that flaps are moving else could exceed flap limit speeds. Look for this on the sim check.
G. Hydraulic
1. what to look for on gages? What do you see if a leak in A or B? Discussion of Landing Gear Transfer Unit. Do system A and B mix fluid? Yes, through LGTU. Boeing incident.
H. Alternate flap limit = 1 cycle. What is 1 cycle? 15° or 40°?, therefore don't normally have to worry about time limit on alternate flaps. Discussion of why time limit, i. e. 0 - 15 = more lift, 15 - 30 = more drag; therefore more effort for motor to drive flaps down.
I. limitations? - all
J. discuss standby power switch - what does it do?
K. discuss bus transfer switch - what does it do?
1. why are these two switches here? to isolate systems
L. what does flight recorder off light mean? Can you go without F. R.?
M. discussion of duct overheat lights? What if in conjunction w/ bleed trip off? What to do, i. e. warm up, cool off?
N. L Wing body overheat light on. where are sensors? What to do? Turn bleeds off and pressure stays up, why? How to find pressure source? Why important? What to do?
O. pressurization - what power sources? What indicators do you have with electrical failure? (Cabin rate of climb). How to control pressure?
P. discussion of fire warning system. What do you see? What do you see on test? Discussion of where are fuel valves and what opens or closes them (fire switch @ fuel control, start lever @ strut). Mentioned to watch for fuel valve closed light to indicate that valve actually closed. Look for this in sim check
Q. Discussion of zero fuel weights

Typical oral:

ALL Limitations! Must know ALL limits up front, or the oral stops at that point!
Basic questions on almost all switch, light, and flag functions; if you know them, you're golden. Moved in depth on some things, but if you've got the basics, you can stumble a little here. P&P problem concerning Max landing weights (use Approach Climb Limit charts, deduct for icing conditions, etc.).

PRACTICE ORAL (Misc. Topics)

(the following practice questions were compiled by a fellow pilot; reference page numbers are off slightly due to flight manual changes)

1. Does the B737 have fire extinguishers in cargo compartments?
   Ans. No. Class D, no air circulation & fire is unsustainable.
2. With the Emer. Exit lights in the armed position what will cause the lights to come on Automatically?
   Ans. Sec 6-32; If the 28v DC Bus fails or if AC power has been turned
   off, the Emer. Exit lites illuminate. i.e. loss of normal electrical power. Last approx.
   20 mins.. Handout Gen. p. 6., Panel notes p. 38. 1 minute on takes 48 min. to recharge.
3. In flight if the gear horn sounds, under what conditions can it be silenced?
   Ans. Sec 6-37. Flaps 1 thru 10: can be silenced.
   Flaps 15: Either Th. lever <10 deg & opposite >30 deg: can be silenced.
   Both Th. levers <30 deg: **CANNOT** be silenced.
   Flaps Greater than 15: Regardless of throttles position, **CANNOT** be Silenced.
4. What is inhibited with the GPWS Switch?
   Ans. Sec 6-45. Inhibits or cancels warnings/alerts caused by the **flaps** not in a landing
   position. i.e. **not** gear & flaps like some airplanes.
5. What conditions will activate the GPWS?
   Ans. Sec 6-38.
   Mode 1 - Excessive Descent Rate
   Mode 2 - Excessive Terrain Closure Rate
   Mode 3 - Altitude Loss After Takeoff or Go-Around
   Mode 4 - Unsafe Terrain Clearance when not in the Landing Config.
   Mode 5 - Excessive Deviation below ILS GS (> 1.3 dots)
   Mode 6 - Below Selected Minimum Radio Altitude
   Mode 7 - Windshear Condition Encountered (**Takes Priority**)
6. With the isolation valve in Auto, what will cause it to open?
   Ans. Any Engine bleed or Pack valve switch to off. Any of 4 corner switches to off. I.E. is "switch sensitive".
7. If the 5th stage bleed air is insufficient, is there an augmenting system?
   Ans. Yes, 9th stage. Sec. 7-3,1
8. Engine bleed valve acts as a pressure regulator, shutoff valve & reverse flow pressure check valve. How is this bleed valve powered?
   Ans. Sec 7-1: DC activated & Pneumatically operated. ie electrically
   activated (controlled) & pneumatically operated.
9. If the Bleed Trip Off light illuminates, what has happened?
   Ans. Sec 7-1,24 Indicates excessive engine bleed air temperature **or** pressure.
   Associated bleed air valve closes automatically & requires reset.
10. With the RECIRC FAN in Auto, when does the fan begin to operate?
    Ans. Sec 7-25. Fan is signaled on **except** when both packs are operating with either
    Pack switch in HIGH.
11. What is purpose of the forward outflow valve and when does it open?
    Ans. Opens when the RECIRC FAN is off. To circulate air around forward cargo
    compartment for heating when RECIRC FAN is off. Forward outflow valve is
    normally closed but will come on if RECIRC FAN goes off. It will close if main
    outflow valve comes within 1/2 degree of closed.
12. Can the Wing-Body-Overheat lite be reset with the Trip Reset Button?
    Ans. No
13. What areas are covered by the Wing-Body-Overheat sensors?
    Ans. Sec 7-4: **Left** Light: Left eng. strut, left leading edge, left-hand air cond. bay, keel
    beam, bleed duct from APU.
    Right Light: right eng. strut, right leading edge, right air cond. bay.
14. When does the flow control valve open?
    Ans. Sec 7-18. Opens to exhaust the cooling air from the E & E compartment
    overboard during ground operation, unpressurized flt., & pressurized flt below approx.
    2.5 psid
15. When would the RAM DOOR FULL OPEN (blue) light be illuminated?
    Ans. Sec 7-11: Whenever the temp. in the compressor discharge side is high enough to require more cooling. ie when on the ground or during slow fight with the flaps not
    fully retracted.
16. Horn sounds in the nose wheel well while doing your walk around. What does this mean to you?
    Ans. Sec 7-15. Loss of **airflow** due to failure of an Equipment Cooling Fan. Will
    illuminate the EQUIP COOLING OFF lite in cockpit.
17. What is the max diff. pressure expected on ground while taxing ?
    Ans. .125 psi.

18. What conditions will cause the AUTO FAIL light to illuminate?
    Ans. Sec. 7-21
    - Loss of "AUTO AC" Power
    - Excessive Rate of Cabin Pressure change (+/- 1800 fpm)
    - High Cabin Altitude (13,875 feet)
19. Which manual mode of operation of pressurization is faster? AC or DC?
    Ans. AC is twice as fast as DC.
20. What will happen if you climb above the Flt Alt set is Auto window?
    Ans. Maintains present altitude until 7.9 psid & then will climb at 500 fpm.

21. When using the STANDBY MODE , how would you set up the Pressurization panel?
    Ans. 7-22: On Grd: set CAB ALT to 200 ft below Takeoff airport Elev.
    After takeoff: Set CAB ALT via Placard
    In Descent: Set CAB ALT window to 200 ft below landing field elev.
    Standby rate indexes DECR = 50 FPM; Middle index = 300 fpm; INCR = 2000 FPM
    Sec 7-29
22. Under what conditions will the DUAL BLEED light illuminate?
    Ans. Sec 7-24
    APU bleed air valve **OPEN** & No. l engine bleed switch **ON**, **OR**
    No. 2 engine bleed switch **ON**, APU bleed valve & isolation valve **OPEN**. i.e.
    anytime engine bleeds can back pressure the APU check valve. Don't
    increase power above idle until close APU BLEED SWITCH.
23. In flight with both EQUIP COOLING (NORMAL & ALTERNATE) fans INOP , do you
    have sufficient cooling & what do you do.
    Ans. Yes, no further action is necessary in flight
24. On normal APU start, where does APU get its electrical power?
    Ans. Battery only.
25. Normal fuel source to start APU?
    Ans. No. l tank. If running APU for long time & want to prevent fuel imbalance: Use
    center tank & turn on left pump.
26. What conditions cause APU auto shutdown?
    Ans. same as 3 amber lites + fire.
    Low Oil Press, High oil Temp, Overspeed and fire.
27. What causes the amber OVERSPEED lite to illuminate?
    Ans. Sec 8-4.
    - APU excessive speed causing auto shutdown
    - aborted start prior to reaching governed cutout speed, but extinguishes following a
      normal start.
    - during APU shutdown indicates overspeed shutdown protection is lost.
28. When the APU electrical & pneumatic load cause EGT to rise above acceptable loads, what happens?
    Ans. The APU bleed valve will modulate toward the closed position.
    ie, electrics have priority. As EGT increases, you get less & less bleed air until bleed
    completely closes.
29. What happens on the ground if you turn Batt Switch to off & the APU is running.
    Ans. Sec 8-2. Will Auto shut down APU. Will not shutdown in flight.
30. What does the APU LOW OIL QUANTITY (Blue) Light illuminated mean to you?
    Ans. Sec 8-4
    - quantity is insufficient for extended operation.
    - Light is disarmed when APU Switch is in off position.

31. What are the APU altitude restrictions? Sec 1-5
    - Bleed & Electrical: **10,000 ft.**
    - Bleed OR Electrical: **17,000 ft.**
    - Electrical only: **35,000 ft.**
32. What are the Max EGT temps for APU? Sec. 1-5
    - Max EGT: **760** deg C
    - Max Cont: **710** deg C
33. If the APU OVERSPEED lite illuminates during a normal shutdown, what's happened?
    Ans. Indicates overspeed auto shutdown protection is Lost. Sec 8-4.
34. Is it possible to start the APU using electrical power source other than the Battery?
    Ans. Yes, using the external power receptacle below the Battery in E&E compartment.
    Sec 8-5
35. Can you use regular external power to start APU if battery is low?
    No, it will not work.
36. What happens to Battery Charger during APU START?
    Ans. Is isolated during start.
37. How long should APU be operated before using as Pneumatic source?
    Ans. One minute.
38. What are the maximum number attempts allowed to start APU?
    - GRD 4 mins. between starts, max. of 2 attempts
    - AIR 4 mins. between starts, max of 4 attempts

39. What are the Max APU generator loads. Sec 1
- GRD 150 amps
- AIR 125 amps.

40. The APU must be shut down approx. 20 sec. before placing the Batt Switch to off. Why?
Ans. To allow the APU door to cycle closed.

41. What would be the proper indication of a APU start cycle?
Ans. Sec 8-5 (See Cockpit Panel Notes p. 57)
- DC meter Selector---- Bat
- APU switch---------- Start
- Low Oil Pressure Lite----Illuminates
- DC Ammeter-----Full scale Negative deflection
- Low Oil Pressure Lite-- Extinguished
- Monitor EGT
- APU GEN OFF BUS LITE--- BLUE illuminates
- Operate one full minute before using as pneumatic source.

42. What are the two sources of power to the Battery Bus?
Ans. TR3 is primary & alternate is Battery Charger via Battery or Hot Battery Bus.

43. What is the primary backup for the Transfer Busses?
Ans. Opposite Generator Bus via Transfer Bus relay.

44. Primary source for DC busses 1 and 2?
Ans. DC Bus #1 is Transfer Bus l thru TR1 & DC Bus #2 is Transfer Bus #2 thru TR2.

45. What is the backup power source for DC Busses 1 & 2.
Ans. With the BUS TRANS switch in Auto, any TR will supply DC Busses #1 & #2.

46. What is the normal & backup power sources for the AC Standby & the DC Standby Buses?
Ans. Normal power for AC Standby is Transfer Bus #1. For DC Standby Bus is #1 DC Bus. Backup for AC Standby Bus is Battery Bus via Invertor. Backup for DC Standby Bus is direct from Battery Bus. Auto in flight only. Loss of either AC or DC.

47. What is "auto load shedding"?
Ans. Automatic switching off of galley power with loss of any generator bus.

48. What are the power sources for the Battery Charger?
Ans. Ground Service Bus with Main Bus #2 as backup.

49. What does the Standby PWR OFF lite illuminated indicate?
Ans. AC Standby Bus is inactive (not powered)

50. Explain how you can tell if a TR has failed?
Ans. TR1 & TR2 would show 0 amps on DC Selector. TR3 would show 0 volts & 0 amps.

51. What function does the BUS TRANS switch allow in Auto position?
Ans. 3 things
-Allows auto transfer of TRANSFER BUSSES upon failure of GEN BUS to the opposite GEN BUS
- Allows TR2 & TR3 to supply DC BUS #1 (via TR3 Disconnect Relay)
- Allows Battery Charger to auto switch to its alternate source, Main Bus #2.

52. Must the Battery Switch be on to use External Power?
Ans. Battery switch must be on for use of normal ground power but not for use of GROUND SERVICE BUS (via forward FA Panel Sw).

53. Name 3 conditions that will restrict the Battery Charger to the trickle mode of operation.
Ans. Grd Pwr Plugged In with GRD POWER AVAILABLE blue lite
- TR3 **not** powered
- Standby Power Switch to BAT

54. What is the power source for fire extinguishing?
Ans. Protection = Hot Battery Bus; Detection Battery Bus

55. During the preflight OVHT/FIRE test what indication would you have if you had a fault in the detection system?
Ans. You would get amber FAULT lite illuminated. This indicates a single loop failure. Would have to test loop A then Loop B to determine which loop is bad. Bad loop would not give fire warning during test. If both loops were bad the fault lite would be on before you started Test.

56. If loop A detects OVHT & loop B detects a fire, what warning will you get?
Ans. OVHT Warning light. It takes **both** loops sensing a fire before get Fire Warning.

57. If you had an actual Fire with OVHT DET switch in normal with a fault in one loop, would the Fire Warning Sound?
Ans. Yes, the faulted loop is automatically deselected by the fault monitoring circuit. Only during test do you discover this.

58. In flight you look down & see the amber FAULT lite illuminated. What does this mean?
Ans. Both loops in any circuit have failed

59. What actions occur when Engine Fire Switch (T handle) is pulled? Sec 10-4
F uel
B leed
E ng Hyd Pump
A rms Squib
L ight Deactivated (Hyd L.P)
G en
T hrust Rev

60. Does APU fire automatically shut down the APU?
Yes, pulling the fire handle backs it up.

61. What should be the indication of a fire in lavatory? Sec 10-8
Early Type: Cabin chimes every 4 seconds & amber call light at Lav.
Later Type: alarm horn activated with continuous tone with red indicator light illuminated.

62. With APU Fire, what indication will occur in cockpit & wheel well?
Ans. Cockpit: Master Fire Light, Bell, APU Fire handle illuminated. Bell cutout handle or pushing Master Fire Lite silences bell & extinguishes Master Fire Light & resets warning system.
Wheel Well: Get Horn & flashing red light. Pushing horn cutout silences horn & causes red light to go from flashing to steady. Horn can be silenced from cockpit by Bell cutout handle or pushing Master Fire warning Light.

63. If you were fighting a APU FIRE in right wheel well, how would you know the fire extinguisher bottle discharged?
Ans. Check to see if the **yellow discharge disc** is missing on right side of aircraft tail **or** go into cockpit & see if **APU BOTTLE DISCHARGED** light is illuminated.

64. When do the Auto-Slats activate? Sec 11-1,14
Ans. At high angles of attack with flaps at 1,2 or 5. Designed to occur prior to stick shaker activation.

65. What is the normal & backup power source for Auto Slats?
Ans. Normal source is B Hyd. Sys, upon failure of B Sys., backup is the PTU using Sys. A Hyd Pressure.

66. There has been complete loss of System B hydraulic fluid due to leak in electric pump. Are the Auto Slats still available?
Ans. Yes, there is certain amount of fluid saved in bottom of reservoir to operate PTU.

67. Which Hydraulic system normally operates the trailing edge flaps? What is the alternate source?
Ans. B System Alternate Source is electrically via **ALTERNATE FLAPS** switch with 25 minutes between 0-15-0 cycles. No asymmetry protection.

68. If during normal flap extension, if an asymmetrical condition develops, what will happen? Ans. Sec 11-12. Hydraulic power will automatically be removed from flap drive unit.

69. If the ailerons mechanically jam, is roll control still available?
Ans. Sec 11-2. Yes, a transfer mechanism allows the F/O to bypass the aileron system and operate the flight spoilers for roll control. The ailerons & the Capt's control wheel are inoperative.

70. In the event of B Hydraulic system failure, will the trailing edge flaps be available for landing? How?
Ans. Yes, Electrically via the ALTERNATE FLAPS switch.

71. If the spoiler system becomes jammed, is roll control available? How?
Ans. Sec 11-2. Force applied to the Capt's control wheel provides roll control from the ailerons. The spoilers & the F/O control wheel are inoperative.

72. What would cause the **FEEL DIFF PRESS** light to illuminate?
Ans. Flaps up: Hydraulic Sys A or B failure, or blockage of elevator feel pitot system. The light is armed when the trailing edge flaps are up. Illuminated lite indicates excessive differential pressure in the elevator feel computer. Sec 11-16 (diag. 11-5)

73. How would you recognize a Mach Trim failure?
Ans. Single Channel: have to press recall on system annunciator (SA) and get Mach Trim Fail on overhead & Master Caution along with FLT CONT on SA.
DUAL CHANNEL: Get Master Caution , FLT CONT on SA & Mach Trim Fail on overhead. MACH .74 Max Sec 11-4,16

74. During takeoff or Go-Around at light gross weights, you notice the trim wheel moving without activating electric trim. What is happening?
Ans. Sec 11-6, 16. The Speed Trim System is providing inputs to the stabilizer during low speed operations with a low gross wt, aft center of gravity, and **flaps extended.**

75. There is a runaway trim condition occurring and you go to cutout with the Stab Trim switch, however the trim condition continues to run away. What has happened?
Ans. Stabilizer brakes have failed. You should grab the trim wheel & hold to stop the runaway. Sec 11-6A & Sec 3-46

76. When would you use the Column Actuated Stab Trim Switch to OVERRIDE?
Ans. Sec 3-37 & Sec 11-18. Jammed Elevator, to restore electric trim. With a jammed elevator, manual or electrical stab. trim may be used to trim in either direction to unload control column forces. If electric trim is desired, the **COLUMN ACTUATED STAB TRIM SWITCH** must be positioned to **OVERRIDE.**

77. Which FLT CONTROL PANEL switches will activate the Standby Hydraulic Pump?
Ans. A & B Flt Control Switches to STDBY RUD, ALTERNATE FLAP master switch to arm.
78. What is the max airspeed for alternate flap operation?
Ans. 230 knots to extend Sec 1-8
79. Can the leading edge devices be retracted using the alternate flap method?
Ans. No (with loss of B hyd), Yes (if TE flap malfunction, with flaps retracted and flap lever positioned to up, and placing the alternate flap Master Switch to off) (Note: no asymmetrical protection using alternate flaps)
80. Under what conditions will the flaps move from 40 to 30 without moving the flap handle? Ans. Sec 11-12. A flap load limiter will auto retract to 30 if airspeed exceeds 158±2 knots. Flaps will return to 40 when airspeed is reduced to 152±2 knots.
81. How is a single channel failure of the AUTO SLAT system detected by the flight crew? Ans. Sec 11-16. By activating Recall on the SA, giving AUTO SLAT FAIL lite on overhead, Master caution, & Flt Cont on SA.

82. How are the ailerons normally powered?
Ans. Hyd Sys. A & B Sec 14-1 diag.
83. What is the normal power to the elevators?
Ans. Hyd Sys A & B.
84. With loss of Hyd Sys A & B, how are the ailerons & elevators powered? Sec 11-2, 4
Ans. Manual Reversion via balance tabs and either control column.

85. Describe the two trim modes of the main electric trim?
Ans. Sec 11-6: High speed with flaps down: Low speed with flaps up.
86. What is the normal power source for the Rudder?
Ans. Hyd Sys A & B.
87. What is the alternate power source for Rudder?
Ans. Standby Hyd Sys. Sec 14-1 & 11-8
88. In the airspeed window of the MCP, what does the blinking alpha symbol (A) mean?
Ans. Sec 12-15 - Minimum Airspeed Reversion: Actual speed has become equal to or slightly less than minimum for the current flap configuration and the AFDS reverts to "LVL CHG". Selecting a speed 15 knots greater than minimum speed reactivates normal MCP speed selection control. When actual speed becomes 15 knots greater than Minimum Speed, the underspeed(A) symbol disappears.
89. What is the difference in the Command and CWS modes of the autopilot.
Ans. Sec 12-3. Command allows all commands of MCP. In CWS , the A/P maneuvers the airplane in response to control pressures applied by either pilot. When control pressure is released, the A/P holds existing attitude.
90. Can you go to CWS while the A/P is in Command mode?
Ans. Yes
91. Review how to enter a flight plan into FMC from IAH to Den.
92. What is the Max fuel imbalance ?
Ans. 1000 lbs between tank 1 & 2 wings tanks
93. Describe the normal fueling sequence.
Ans. Main tanks, center and then Aux.
94. With all tanks full, how is fuel scheduled to engines & why?
Ans. Sec 4-87: Eng #2 is being fed from center tank, Eng #1 from the Aux tank. When Aux runs dry, the center tank feeds both engines. After center runs dry Eng #1 is fed from Main tank No. 1 & Eng #2 from Main tank No.2. Center tank check valves open at a lower differential pressure than the check valves in the No. 1 & No. 2 Main tanks , ensuring that center tank fuel is used before Main tank fuel, even though all fuel pumps are operating.
95. Where does the fuel temp. gage get its reading?
Ans. From No.1 Main tank.
96. Explain the logic of the fuel low pressure lights with respect to switch position & annunciator/recall system.
Ans. Sec 13-6. Any low Pressure lite can be illuminated on recall. Center & Aux Low Pressure lites are armed only with switches in on position. Main tank Low P. Lites are always armed regardless of switch position. 2 low P. lites in same tank gives master caution & Fuel lite on SA. **One low P. lite** in a tank will cause the master caution & Fuel lite on SA to illuminate on **Recall** only. Exception: in Center tank with one pump turned off, the other on pump Low Pressure Lite illuminated will give master caution & Fuel Lite illuminated.
97. With the aircraft parked, normal AC electric on, engine fuel levers in cutoff position, what indication do you have that the fuel valve are closed?
Ans. The blue FUEL VALVE CLOSED lites will be **dim** on fuel panel.
98. In flight, with total loss of normal AC power, can the engine be provided fuel feed? If so, How?
Ans. Yes, from Main tanks No. 1 & No. 2 only via suction feed from engine pumps.

99. Which method eliminates fuel faster to the engine, fuel lever to cutoff or pulling fire handle? Why?
Ans. The start lever to cutoff, shuts off fuel at the MEC, so is faster. The fire handle shuts off fuel in wing.

100. Heat is supplied to fuel under what conditions? Sec 18-5,4
Ans. Continuously via Fuel/Oil heat exchanger.

101. Minimum fuel to operate the Electric Hydraulic pumps on the ground?
Ans. 1,676 lbs in each wing tank Sec 1-10

102. What lites would you expect to see on overhead & forward panel if you loose Sys A hydraulic System?
Ans. Eng 1 Elec & Hyd Low Pressure, Elevator Feel, Flt Control A Low Pressure, HYD & Flt Control on SA, & master caution lite.

103. What would you expect to see if Sys A Hyd Engine pump develops a leak?
Ans. Sec 14-2. 1/4 full approx (stops at standpipe).
Note: if get electric pump leak quantity goes to zero.

104. What would you see if B Eng Pump developed Hyd leak?
Ans. 1/2 full approx.
Note: electric pump leak = zero, but sufficient fluid for PTU to work Auto slats.

105. If you lost all Standby Sys. Hyd. fluid, would you have a cockpit indication?
Ans. Yes, The Standby Low Quantity lite will be illuminated and Sys B will be 3/4 full to standpipe.

106. What activates the Standby Hyd Pump?
Ans. Sec 14-6, 7. Activation in the event of a loss of Sys A or B during TKO or Landing, wheel speed must be >60 kts, or the airplane must be airborne with the flaps extended. The Auto activation is deactivated when flaps are moved to up.

107. What verification is there that the Standby Rudder Shutoff valve is open?
Ans. The Flt Control Low Pressure Lite will be extinguished (Out).

108. If the Standby Hyd Pump is activated by Auto method, what difference if any for the verification that the Standby Rudder Shutoff valve has open?
Ans. There is no verification until Flt Control Sw is moved to STDBY RUD position, then the Flt Control Low Pressure lite becomes a position monitoring lite for the Standby Rudder Shutoff valve. ie lite comes on if Standby Rudder Shutoff valve closes when the Standby pump should be activated.

109. Is the Standby HYD LOW QUANTITY LITE always armed?
Ans. Yes
Note: Low Pressure lite only armed when Standby Pump is activated.

110. What is the purpose of the Landing Gear Transfer Unit?
Ans. Sec 14-9: To provide Sys B Hyd P. for raising the gear with loss of No. 1 Engine (No. l N2 drops below a limit value).

111. Which Hyd Sys. provides normal Brake system pressure.
Ans. Sys B, Alternate Brake Sys = A Sys Hyd.

112. Does the antiskid system work with alternate Brake system?
Ans. Yes, but touchdown & locked wheel protection are not available with the alternate brake sys. Note: Autobrakes are inop. when sys B is not available.

113. What conditions must be met to activate the RTO function of the Autobrakes?
Ans. Sec 14-14. RTO selected, grd speed of 90 kts, retard throttles to idle.

114. As you advance throttles for takeoff, you notice that the AUTO BRAKE DISARM lite illuminates. What should you do?
Ans. Turn selector to off. Lite must be out for T/O. Cannot be re-armed unless throttles at idle & speed < 60 kt.

115. If you left selector in RTO for landing, what kind of auto braking would you get on landing?
Ans. None

116. How do you disarm Auto Brakes after touchdown?
Ans. - Manual brakes
- Advancing throttles
- Moving speed brake handle to down detent
- Auto Brake selector to off

117. Are the Auto Brakes available with alternate Brakes?
Ans. No

118. When does the Anti-Skid Inop lite illuminate?
Ans. A sys mal function or there is a disagreement between the Parking Brake lever & the parking brake shutoff valve position.

119. Following the illumination of the Anti-Skid Inop lite, the Speed Brake handle is positioned to armed, The SPEED BRAKE DO NOT ARM lite illuminates. Why?
Ans. The Anti-Skid sys is required for the speed brakes to operate automatically.

120. When will the Auto Brakes be activated for landing?
Ans. Takes one wheel each side. Armed, wheel spin up, throttles idle.

121. Nose wheel is stopped by snubbers on retraction. How are mains stopped on retraction?
Ans. pressure from alternate brake sys.

122. What components are powered by Standby Hyd Pumps?
Ans. Sec 14-1: Rudder, No. 1 & 2 Thrust Rev, Extension only of Leading edge flaps & slats.

123. What indication would you have in cockpit if tire screen were loose?
Ans. Doors lite on SA referring to overhead Tire Screen lite.
124. How many Brake applications are there on accumulator?
Ans. Several
125. Why is there no gear horn on missed approach with flaps 15?
Ans. Sec 6-37. Both throttles are >30 deg.
126. What does the amber COWL ANTI-ICE lite illuminated indicate.
Ans. Over temp **or** Over Pressure.
127. With L or R VALVE OPEN illuminated bright blue with the Wing Anti Ice switch "on", what must you do?
Ans. Valve is not fully open or in selected position, so avoid icing conditions.
128. What windows are heated with the FWD switch "on"?
Ans. L1 or R1. Side = L2 or R2 + eyebrows L4 &5 or R4 & R5
L3 & R3 not heated.
129. How do you know which windows are being heated?
Ans. Green "on" lites
130. Is there an Overheat lite for L4 & L5 (eyebrows)?
Ans. No, they are not monitored. Sec 15-3.
131. Can the Engine anti-ice valves be checked prior to engine start?
Why or why not & discuss indications.
Ans. Sec 15-7. Cannot be checked prior to engine start because they are electrically
controlled & pressure actuated. Air can't get from APU because Cowl Anti-ice valve is
inside Engine Bleed valve which acts as check valve not letting APU air back inside
bleed valve.

Remember, if you find any errors in these oral questions, that contradict the Flight Manual, please tell me.
<bbulfer@firstnethoulcom>