Airframe Avionics M11 & M13

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Load shedding is reducing the load on one circuit and increasing it on another To carry out a continuity test you would use a low reading ohm-meter Engine running normal speed and a fully charged battery switched out from bus bar - generator output increases To check for correct seating of the brushes on a DC generator - check that spring tension is correct Electrical heater mats are rated in Watts per square foot
Tests done on electronic fuel system are insulation & capacitance Fuel tank capacitance is measured with a decade box
All civil fixed wing turbine engined aircraft over 5700kg and over 19 seats must be equipped with ACAS II
TCAS I provides TRAFFIC ADVISORIES TAs - no avoidance manoeuvre suggested TCAS II provides RESOLUTION ADVISORIES RAs by providing information on vertical movements required to avoid a potential collision
TCAS III provides guidance information in the horizontal plane
Typical TCAS consists of Mode S Transponder, TCAS TransmitterReceiver, ATCTCAS Control Panel, Upper & Lower TCAS Antenna, Upper & Lower Mode S Antenna, Traffic Advisory Display (additionally on EADI)
TCAS operates on SSR-Frequencies 1030 & 1090MHz
TCAS aircraft have same intend a/c with highest address moves
TCAS displays white diamonds, red squares and amber circles
TCAS currently has two antennas and is switched on in cockpit by pilot
On a Radar short range targets are missed by high pulse width

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Position Sensing devices: The name synchro is given to a wide variety of position sensing devices. The word comes from synchronizing and longitudinal accelerations (Erects automatically after 3 minutes). Rate Gyros - 1 deg for Yaw (3-Phase Rate-Signal) - Inclinometer
Rigidity = Flexity in space (Newtons first law: A body at rest (or motion)..)
Precession: Action that occurs when a force tries to change direction of a spinning mass (rotor). Rotor - Free to turn; Erected - up to speed; **Precession:** 2 types 1. `Real Precession` and 2. `Apparent Precession:` Gyros position relative to the earth (pitch & roll) cut off switches Standby Horizon Indicator (115V, 400Hz from static inverter - Universal mount. pitch - Emergency ; roll - backup Gyro is self-contained in unit - no torque motors Accelerometer: E-Type (like loudspeaker) - Pendulum - Proof-mass (INS) - Torodial (with liquid) Rate of change signals by accelerometer and rate gyros have been introduced to 'predict' whether the Aircraft has started to diverge slowly or rapidly from its proper track. Such signals together with displacement signals are fed into an electronic computer. Erection torquers hold axis perpendicular (liquid level tilt switch goes to either coil when unlevel exists) but only in 'level' flight. When 100% in level it goes to both coils - No output! Torquers operate when the aircraft is in level flight only! Directional Gyro is for heading info. Slaving: The DG acts as stable reference for the master compass indicator. Flux Valve furnishes an electrical signal which is established by sensing the earth's magnetic field. Vertical Gyro is for Pitch $\pm$ 85^o and Roll 360^o movement. VG has a startup capacitor for rapid spin up. 11,200 RPM in one minute. Roll erection is automatically disabled (cutoff switch) when turn is greater than 6^o. Pitch erection is automatically disabled (cutoff switch) when takeoff, landing. Sense is being converted by AD Converters presented by **www.EASA66.com**
QFU is RUNWAY HEADING QDM is MAGNETIC DIRECTION TO STATION QDR is TRUE DIRECTION FROM STATION

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Instability in which yawing and rolling motions occur together but out of phase is called Dutch Roll
method of controlling altitude and vertical speed by extending the spoilers during descent is called Direct lift control
when an a/c is disturbed about the longitudinal axis it returns to the wings level condition because the a/c experiences a side slip and the resulting airflow produces a resulting rolling motion in the opposite direction
turbulence mode gain reduction of respective channel
in a Rate Rate system the servomotor speed is proportional to the rate at which the disturbance is taking place
in a Voter system it ensures the automatic faulty system and disengages the same
barometric altimeters are mandatory for all a/c
when using the pulse radar alt `altitude holes` occur when the time taken for energy to travel to the ground and back approximates the multiples of 1/prf time
airborne pulse modulated radar altimeter altitude holes are avoided by varying the prf.
learn a lot of questions on what happens at different radio altitude trips
height o/p current of a FM CW altimeter is obtained by averaging the beta frequency disturbance between transmitted and received frequency
typical o/p of airborne fncw radio altimeter is 0.5 w
a lamp on the radio alt indication of minimum decision height
accurate height near the ground is got by radio alt15airborne doppler is self contained
basic info from the doppler system is G/S and drift
doppler shift is given by Fd=2VF/C
prf and pulse width calculations, Know duty cycle ,average power
radar systems and their respective bands of operation LCSX
DME .....learn questions on DME all very basic like frequency,channel X and Y difference , chicken and egg situation , jitter , sqitter , how dme is related with other nav aids ,no of reply channels,difference between TACAN and DME,memory static and dynamic
interrogation for atc transponder is called mode
learn mode A B C D what are they side lobe suppression when does it reply self test facility on a transponder tests encoder decoder and transmitter and aerial
encoding altimeter is used in mode C
when carrying out a test code used is 0000 25 7600, 7777 stands for radio failure and emergency
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ACARS: Pilots are alerted to incoming message by ON side VHF
Doppler NAV antenna is turned auto aligned to ground track
DMEs recognise own reply by a decoder
The **DECCA** system was a low-frequency hyperbolic navigation system covering much of western Europe, parts of Canada, the Persian Gulf and the Bay of Bengal. DECCA worked by comparing the phase difference of radio signals emitted by several radio stations. Mainly used for Helicopters on Oil Platforms!
Micro Wave Landing System MLS works on TRSB
FM does not have sidebands

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HF: The actual audio output of a 150-watt SSB transmitter is the same as a 600-watt AM transmitter
Power output is the number of RF watts that the transmitting portion of the transceiver will send into the antenna
A single sideband signal removes the carrier and one sideband and concentrates all of its energy in the remaining sideband
Bandwidth is the frequency range within which the antenna can be used for transmitting
Long-wire antennas have excellent directional properties
Impedance must be matched in an HF system for proper operation
Standing Wave Ratio SWR is the ratio of the peak voltage going to the antenna and the measured peak voltage reflected back to the transmitter
Voltage Standing Wave Ratio VSWR (max Voltage min Voltage) should always be kept as low as possible
To obtain matching impedance on the feedline, use coaxial cable with an impedance of 50 to 75Ω
The best ground is to attach the ground strap to the chasis
Bonding is the process of trying all vessel metal into a single electrical point
The cross sectional area of a secondary conductor (used for bonding)must be not less than 18 SWG for a single wire
Check ground connections for corrosion or aging periodically
Antenna couplers are placed as close as possible to the antenna and precisely match the conditions of the antenna to the feeder line
dB gain describes an increase in signal level
Level refers to how loud the signal is
The HF high frequency band extends from 1700 to 30,000 kHz
HF-Sky-Waves travel large distances by multiple bounces in the ionosphere over several thousand kilometers
The critical angle of radiation is the steepest angle at which a radio signal can be refracted by the ionosphere
The maximum usable frequency is lowest at night and highest during the day
HF-Noise consists of natural (thunder) and man-made (fluorescent tubes,electric motors, engines, transformers, faulty power lines) interference
Engine noise can be isolated and bypassed
Fading is the most common form of propagational interference
The signal emission pattern changes depends on altitude
An antenna will generally receive better if it is of the same polarization as the signal that is being received
The GREY LINE REGION is the part of earth that is neither in darkness or daylight – the ionosphere is highly efficient at these times
Frequency stability is critical with a SSB transceiver
Sensitivity is the amount of signal needed for the receiver to distinguish it from the background noise
Duty cycle is the amount of time the transmitter is operating at peak output, and is the percentage of the transmit time to receive rest of a transmitter
Filters control the amount of radio frequency spectrum that can be received at once: the passband
Automatic gain control AGC keeps receiver signal constant to compensate for fading and propagation variations
Noise blanker eliminate very short, very loud interfering signals
High capacitance power supplies provide instantaneous high peak output current
A regulated power supply will hold an output voltage constant over a wide range of input voltage and output load conditions
Speech clipping attenuates the highest signals
Source: HF SSB Users Guide & Professional Products Catalog
121.5 is emergency frequency!
The ILS localizer transmits a highly directional beam on a frequency between 108.**1**0 and 111.**9**5 MHz. The specific frequency can be found on the approach plates or in the A/FD. `There are 40 localizer frequencies available and all of them have an odd number as the first digit after the decimal point.` The localizer is actually two overlapping lobes of radio energy. These lobes get wider as they get further from the localizer antenna array, which is located near the end of the runway opposite the approach end. **Test Question**
VOR = even first decimal and ILS= odd first decimal
VORs operate in the 108 - 118Mhz VHF range - VHF voice is above 118 MHz- They are low power 25-100W and provide 5 degrees navigation accuracy. Audio ident = morse code at 1020Hz is transmitted to identify the VOR . CVOR employs a rotating directional antenna of 1800RPM. DVOR (doppler)is an improved VOR used in crowded areas which has less siting errors.
DME, a secondary radar system to determine the slant distance from the aircraft to a ground station. It uses UHF band from 962 to 1213MHz, employs a 1Mhz spacing and has 252 channels. The aircraft has an Interrogator and the ground station a Transponder. DME is paired with VHF VOR & ILS frequencies. Interrogator transmits pulse stream pairs and simultaneously starts a range-search. Transponder receives the pulse train and re-transmits them after 50uS delay on the interrogation frequency.

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MACH WARNING test use balanced pitot/static
Yawing is stopped in a turn by differential ailerons
A full time yaw damper blocks only low frequencies by use of a bandpass filter

Magnetism: The Si unit of magnetic flux density is the: TESLA.
The area of a hysteresis loop is proportional to the: Energy absorbed in completely demagnetizing the material.
The core material used for an electromagnet is soft iron because: It demagnetizes easily.

Lights: Navigation lights are required on all aircraft: Flying at night.
Anti-collision lights are required on all aircraft: Over 5700 kg.
Landing lights are: Air cooled by the airflow.
The purpose of illuminating the wing leading edge at night is to: Allow the flight crew to inspect visually for ice formation.
Emergency lighting is switched on prior to: An emergency evacuation.
The beam width of a runway turn-off light is: 50 degrees.
Power to the passenger cabin lighting is: 115V a.c.
Cargo lights are fed from: Ground service bus.
What is considered to be an intermittent duty circuit: A landing light circuit.

The color of the left wing tip position light is Red.
The color of the right wing tip position light is Green.
The color of tail position light is White.
Dome lights are fed from the Battery bus or ground service bus.

Batteries & Power Systems ATA 24
Increasing a cell plate area will Increase the capacity.
To obtain a supply of 24V 60AH, connect two 24V 30AH batteries in parallel.
The nominal voltage of a charged lead acid cell is 2.0V
The relative density of a discharged lead acid cell is 1.150.
As a lead acid cell discharges its relative density Decreases.
The vent in a lead acid cell is Leak proof.
The electrolyte in a lead acid cell is A solution of sulphuric acid.

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The nominal voltage of a Ni/Cd cell is 1.2V
The RD (relative density) of the electrolyte in a Ni/Cd cell during the charge cycle Does not change.
To determine the true charge state of a Ni/Cd cell A measured discharge test is carried out.
Ni/Cd batteries are used in preference to lead acid batteries because they give a Constant voltage discharge.
The electrolyte in a Ni/Cd cell is solution of Potassium hydroxide.
The Ni/Cd cell cap Prevents the air contaminating the electrolyte.
During the discharge cycle of a Ni/Cd cell, the electrolyte level Falls.
The discharge voltage of a Ni/Cd cell is 1.0V
The RD of the electrolyte in a Ni/Cd cell is stated in the manufacturers instructions.
Thermal Runaway occurs During the charge cycle.
One method of preventing thermal runaway is to Control the charging current.
A Sign of thermal runaway is High loss of electrolyte from the cell.
The Ni/Cd cell gas barrier can be damaged by Overcharging.
Temperature correction for RD is $+0.003$ for every 4^oC above 15^oC
Spilt Ni/Cd electrolyte is neutralized by Boric acid.
A battery, rated at 15AH at the 1 Hour Rate, on capacity check is discharged at 15 amps, and takes 54 minutes to discharge. The capacity is at 90%
When mixing L/A electrolyte always add Acid to distilled water.
Ampere Hour is a function of Amps x hours.
To measure the RD of an electrolyte use a Hydrometer.
The LEAK TESTER is used on L/A batteries only.
The battery capacity test is done by monitoring The discharge characteristics.
Prior to charging a lead acid battery the cell vent plugs are Unscrewed but left in the vent hole.
On completion of a capacity test the battery is Charged.
The purpose of a battery insulation test is to determine the insulation between the Electrolyte and the metal plate.
A lead acid battery is stored in A fully charged condition.
The white powder in a Ni/Cd battery is an indication of Overcharging.
The type of voltmeter used in the Ni/Cd battery workshop is a Digital voltmeter.
The Ni/Cd cell shorting link is connected during the Discharge when the cell reaches zero volts.
The Ni/Cd cell will gas furiously during Overcharge.
Ni/Cd batteries stored ready for service are Trickle charged.
The battery venting system is to Carry the gases out of the aircraft.
On the aircraft the L/A battery is normally charged with Constant voltage.
When the battery voltage is higher than the battery charger voltage No current will flow between the charger and the battery.
The Ni/Cd battery Requires an approved modification to replace an L/A battery.
When cleaning the cell links on an Ni/Cd battery a Bristle brush should be used.
The battery charger normally charges the battery with A constant current.
The Ni/Cd battery capacity test is carried out At the periods stated in the approved maintenance schedule.
When referring to fuses HRC means High rupture capacity.
An aircraft should carry at least the following number of spare fuses per rating 3ea or 10% whichever is greater.
In addition to the fuse element an HRC fuse will contain Inert powder or granules.
If a fuse -blows- it should be replaced with a fuse of The correct rating.
When the white collar on the actuating button of the push pull circuit breaker is in view it indicates that the circuit breaker Is tripped.
The contacts of a trip free circuit breaker Cannot be held close while a fault exists.
A trip free circuit breaker can be expected to trip in under a minute with a load of at least Twice the rated value.
Remote controlled circuit breakers can be tripped By over-current or remotely.
The current rating of a fuse is The maximum current a fuse will carry continuously without deteriorating. This value will be below the minimum fusing current.
The rupture capacity of a fuse is The maximum current a fuse will carry without shattering.
What is the basic sensing element in a thermal circuit breaker Bi-metal strip.
What does the term trip free mean with regard to circuit breakers A circuit breaker whose contacts cannot be held closed with fault current flowing.
The aircraft d.c. generator voltage is controlled using the Field strength.
Prior to starting the engine the contacts of the vibrating contacts type voltage regulator are Closed.
Prior to starting the engine the carbon pile of the carbon pile voltage regulator is Fully compressed.
The carbon pile in the carbon pile voltage regulator is connected in Series with the generator field.
The transistor voltage regulator operates with Pulse control.
The ballast resistor in the carbon pile voltage regulator is selected to Set the correct ampere turns in the voltage coil.
The d.c. generator main contactor is welded closed. The fault indication is The aircraft engine continues to rotate when shut down.
The d.c. generator switch directly controls the Generator contactor.
The differential cutout contacts are closed using the voltage coil.
The indication of a short circuit in the remote am-meter shunt is that the generator operates normally and the am-meter reads zero.
The equalizing coil in the carbon pile voltage regulator Modifies the effect of the voltage sensing coil.
Load sharing in a d.c. generation system is achieved by changing the Generator field circuit resistance.
Equalization in a d.c. generation system equalizes the generators outputs in terms of Power.

A passenger service multiplex system uses Serial data link.

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Flight Controls:
`Primary flight` controlsailerons, elevator and rudder
`Secondary flight controls` all types of tabs Auxiliary flight controlsflaps, speed brakes, spoilers and slats
Inboard aileronsall flight regimes Outboard aileronsslow speed only
`Servo tabs:` automatically move opposite a flight control to assist movement.
`Trim tabs:` moved opposite flight control by a separate control to relieve control pressure.
`Anti-servo tabs:` move in the same direction to prevent full deflection.
`Control tabs:` unlocked with no hydraulic press. Move opposite to move control surface during manual reversion.
T-tail requires more structural weight but tail is above turbulent airflow from wing.
`Spoilers:` increase drag and reduce lift. Used as Ground Spoilers for landing, Flight spoilers to assist ailerons and Speed Brakes to reduce speed on descend.
`Vortex generators:` prevent shock-induced separation from the wing as aircraft approaches critical Mach by mixing boundary airflow with high energy airflow just above the surface. Increases aileron effectiveness at high speed. Also can prevent low speed flow separation on the rudder and elevator at high angles of attack. Slightly increase parasitic drag.
`Krueger flaps:` extend from leading edge to increase camber
`Slats:` extend from leading edge fwd and downward to create a gap or slot. Directs high energy air from under the wing to delay stall to higher AOA.

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LRU stands for Line Replaceable Unit
An APU generation system does not have a CSD The CSD/IDG governor speed control screw adjusts the generator frequency
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The integrity of an autopilot must be increased when the aircraft is flying at the Approach and landing phase An integrated auto-land system has been selected to Go-around during the auto-land phase, the aircraft will Increase speed and rotate nose up
Go-around mode can be initiated After glideslope capture
If a fault is detected during an auto-land approach the system will totally disconnect if it is a Duplex sys
An auto-land is carried out in which sequence LOC capture, GS capture, Attitude hold, Flare
Signals used during the flare are Rad alt and integrated pitch
What may be added to the flare computation at touchdown Nose down bias
When can the FMS be engaged with the auto-throttle Before takeoff
In a dual FMS, a failure of one computer will result in Give a blank display on one CDU
A Full Authority Digital Engine Control System consists of Electronic Control Unit and all its sensors
The Go-around switches normally located On the thrust levers
With the auto-throttle engaged, the application of reverse thrust will Disconnect the auto-throttle
The auto-throttle system at touch down will Go to idle and disconnect
The stall margin mode is controlled by A O A and flap position sensors
The touch down mode is usually initiated by Weight on wheels
In the auto-throttle EPR mode, the actual EPR is obtained from EPR transmitter/transducer
Cat 3B allows approach land and RVR in the order of 50 metres and no DH
An auto-land failure monitor system will ensure that The aircraft will continue its auto-land in the event of a single failure
An auto-land system with two separate power supplies is Fail passive
During an auto-land the descent rate is detected from Radio altimeter
When will decision height aural warning sound Before decision height
What is the controlling factor in the automatic flare function Radio altimeter
The auto-land decrabbing signal is derived from Heading error
Automatic steering of the aircraft after touchdown is controlled from Localizer signals
A triplex system loses one channel, the system is now Fail operational
Fail passive system in the event of a failure will Produce no significant out of trim condition A triplex system loses one channel, the system becomes a Duplex
system
The definition of fail operational is the ability of a system to a Continue to auto-land
after the first fault What controls are used in response to the PVD display Nosewheel steering or rudder pedals
The ground run monitor presents information of Distance to go and ground speed
Landing lights are air cooled by airflow Emergency lighting is switched on prior to an emergency evacuation

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ATA 45 On Board Maintenance Systems
Components of a CFMS are its Computer, ECAM/EICAS, MCDU's, Printer, ACARS and its transmitting system, Flight Recorder and QAR-Tape Recorder
The CFDS-Computer collects, stores, and displays maintenance information generated by line replaceable units (LRUs)to be accessed by maintenance. Primary access is normally a MCDU or MAT. Faults/Warnings are displayed on EICAS/ECAM, can be printed out or downloaded/downlinked. CFDS can be used for minor, in-depth trouble shooting and long term preventive maintenance. System has BITE = Built In Test Equipment performing
BIT = Built In Tests
Automatic Fault Reporting system reports continuously status of on-line LRU's, even if there are 0-Faults The OBMS may also have a Maint Manual database and LRU-software may be uploaded.