

August
2011

NPPL LEARNING

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Air Law

DATES:

1-1-84 – 1st flown b4; type accepted. After date – type approved. If over 70kg empty

1-1-87 – 1st flown type accepted date if under 70kg

1-4-88 – Noise certs required for microlights

July 2002 – Microlight now a NPPL rating

Jan 2003 – 1st flown b4 390kg SSM exempt from 300k if kit built

Distress – mayday x3 on freq in use or 121.5 – visual sos in morse or red pyros, red parachute or any cont sound

Need to land but don't need help – white pyros, landing or nav lights flickered

Urgent – Pan x6 on freq in use or 121.5 – visual xxx in morse or sound xxx in morse

Nav lights – used at night; 110 deg spread from dead ahead, Red to port (left) and Green to s/bord (right) with white on tail with 140 deg spread (adds to 360)

Air Beacon Light – 2 letter morse @ 12 secs.

Red=military and Green=civilian

Aerodrome Light – usually alternates white and green

Obstructions mapped @ 300' & lit @ 500'

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Microflight definition; 450kg MTOW, + 22.5 chute & 45floats. 300kg SSLP +15 chute and 30 floats.

390k SSLP ok if 1st flown prior Jan 03 + kit built
Stall not lower than 35knots, 41mph, 65kph
SSLP & FLPFM only exceptions to EASA and CAA reg

Privileges; NPPL(M) or (PP)

VFR under VMC – always clear of cloud, in sight of surface, 3k vis, 5k over 3000'. 1500' above highest object within 2000'

Medical; 44-45b day or 5 yrs whichever is longer
45-59 – 5yrs, 60-64 until 65 or 1 yr. 65+, 1 yr
Licence – for life but rating lasts 2 years – need 12hrs, 8 as PIC inc 12 t/o and land + 1 hr instruction and 6 of those hours in last 12m. If expired >5yrs = further training, oral and GST.

Low Fly Rule; >500' from any person, vessel, vehicle or structure except t/o and land + gliders + race or comp or display with permit. Fly clear over built up or 1000' over highest point within 2000' – except SVFR and to land. Assy of 1000 peeps – stay 1000' or height to clear and no t/o or land within 1000m unless it's an aerodrome or landing site used with organiser's permission.

Aircraft, airships, gliders, balloons

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Ground Signals



Stay on hard
ground poor



land on
hard

but ground ok



Landing prohib



RH circuit



Gliders in
area
use

Tow drop



Light air
Can land



Use [] area



R.I.U.



Move only with ACT
permission



Report pt



Unsafe or work area



No services



Civil craft
land in block



<Safe only in emerg
Manoeuvring poor>



Dir to land ← ball says t/o can differ



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At end of runway = landing dangerous. 2 or more 45deg to centre line no more than 300m apart denotes unfit area for aircraft

Airspace

Below 19500'; 2 FIR's – London and Scottish

Above called upper UFIR's – same names. CTR –

Zone – is surface to a height. CTA – Area – height to height.

GA – level to level. Airway – 5nm each side of the line, vert limits id by letter and number.

TMA – big CTA like LTMA (London)

Advisory Service Area is for separation

Advisory Route is like airway with separation

Classes of Air

A- Airways & some CTR, CTA and TMA – only can use with IFR or SVFR. B- not allocated in UK

C- Upper air, i.e. 19500'+. D – Defined CTR + CTA's

E- As defined eg Scot TMA sub 6000'

Uncontrolled – F (advisory routes) G

(General)

General – give way to aircraft on your right

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Signals On ground – inter **green** – move on apron

Cont **green** – take off. Int **red** – clear landing area.

Cont **red** – stop. Int white – return to start.

Signals To Air – int **green** – return & wait permission. Cont **green**- land. Int **red**- do not land; not suitable. Cont **red** – give way & circle. Int white – land after cont **green**. **Red flare** – no land, wait permission.

From air – **Red** – need assist. Cont or int **green** – day – may I change land dir. Night – may I land. Int white – I need to land

Going overseas – file flight plan, seek FAA permission, take radio licence, C of A, Pilot licence, copy of interception procedures, aircraft reg cert.

Flying in a display needs pilot to get authority from CAA and if type accepted, aircraft needs permission too.

BMAA limits – bank 60deg, Pitch 30 deg and no stalls

Notifiable accident – death or serious injury. **Damage to strength or flight. Aircraft missing or inaccessible.** Except – engine, prop, wing tips,

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tyres, brakes, fairings, small dents and punctures to skin.

Notify air accident investigation branch and enter in log book before next flight or end of day, whichever comes first.

Airprox – Radio ATSU & confirm in 7 days to CAA using form.

Alcohol – 8 hours clear

Licences;	Microlight		Powered Parachute	
	Min	inc solo	min	inc solo
Restricted	15	7	4	1
Unrestricted	+10	5nav	11	5
nav				
Therefore	25	7solo 5nav	15	1
solo 5nav				
+ 2solo nav	40nm	15 o/l	25	10
o/l				

PP also – no passengers under 15 hrs inc 6 as PIC and unrestricted needs 25 t/o & L inc 6 done solo

Restricted means; max 10kph surface wind, no cloud under 1000', in flight vis >10k and radius no more than 8k

Categories of Aircraft – type approved, type accepted and home built permits to fly – need

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annual insp and check flight; both within a month of an another and within a month of application

Aircraft Restrictions – most are no public transport, no aerial work, no overflying assemblies of persons, no aerobatics, no turns >60

Aerodromes o/s controlled airspace

ATZ- 2000' up and 2nm dia + if rwy >1850m then dia 2.5nm. Report pos + ht entering and leaving.

MATZ- up to 3000' & 5nm + may have panhandle from 1000' to say 3000' 4nm x 5nm

Military low flying area to 2000' usually 250/500'

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Meteorology

ISA Temp= 15deg @ MSL ISA atmosphere 1013.25

Pressure change each mb = 30' after 20-30,000' = 50-60' – pressure drops so altimeter rises.

For pressure <1013.25, the flight level is lower than instrument shows.

Katabatic wind – cold air down a hill.

Anabatic wind – warm air up a hill

Wind shear – vertical true speed at 2000'

Wave effect – standing waves ripple effect in lee of a hill – leads to

Orographic cloud where warm moist wind blown up the hill condenses and on the ripples does same – Stratiform cloud in stable and cumiform if unstable conditions.

Wake turbulence – take off same spot = 2minutes.

Any spot inside last t/o = 3m. Landing – H=4m, M=3, S=2

Lapse rate = temp drop with height= 2deg/ 1000'

Inversion=temp inc with height.; associated smog

Troposphere= weather area app 36.000', Tropopause, Stratosphere.

Adiabatic cooling lapse rate – as warm air rises, gas expands, cooling effect.

DRY (**DALR**) 3deg/1000' Saturated – wet (**SALR**)

1.5deg/1000' to 6000' then incr till =DALR @ 30,000'

Because condensation gives off heat

ELR – environmental lapse rate. ELR less than DALR means clouds form and fall back so stable atmosphere

Adiabatic warming also takes place and is where air descends and gets denser. Colder air holds less water.

Cloud formation – convection; **High pressure** = anticyclone – winds clockwise; air is converging.

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Geostrophic = earth rotation effect on wind as it moves from Hi to Lo areas. At earth surface, friction causes wind to blow into a low and out of a high at **30deg (10 over sea)**. The **Coriolis** effect introduces these curves due to earth rotation.

Centre of low pressure will be to your left with back to wind (high would be to right) so fly with strong wind on left and you fly into a low or away from a high – makes altimeter read high.

Air Mass; polar maritime/continental – Tropical maritime/continental Airstreams formed when one pressure system gains dominance and as it moves over surface it transforms – eg, polar maritime goes south, warms on tropical and if back is a Returning Polar Maritime Airmass. Straight South would be an arctic maritime airstream.

Radiation fog- no clouds, land cools, air in contact condenses, can form quickly. **Advection fog – warm moist air over cold surface such as sea air.**

Thunder – large water drops taken up and frozen, brought down and broken down charges them –ve. Allow 5 sec/mile

Trough – like depression but not long lasting. **Col-** neutral weather. **Ridge** – period of settled weather between 2 poor spells.

ICE – with no freezing nuclei, water can stay liquid under freezing – called super-cooled. **Hoar frost (direct sublimation)– water vapour changes direct to solid by freezes on contact with frozen**

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object. Rime ice – super cooled water freezes on contact with aircraft – leading edge only. Clear or glazed ice – fly thro large cu-nim, strike very large super cooled drops which part freeze and runs back over the wind and freezes. Rain ice – as above but aircraft in sub-zero. Super cooled raindrops freeze on contact with aircraft.

CAVOK – ceiling and vis OK = 10km

CLOUD -Low (<6500')- stratus (St)– sheet gives drizzle; in winter persists all day “anticyclonic gloom”. Nimbo-stratus (N St)- dense cloud can be thick; continuous rain base of a warm front. Fracto-nimbus (F Nim)- scud cloud formed in saturated air under nimbo-stratus. Strato cumulus (St Cu)– lumpy with no great thickness or shape sometimes produces light rain. Small cumulus (Cu)– flat base, puffy, length >height “fair weather cloud”. Large cumulus (Cu)– height>width towering, cauliflower head – crisp head=active, ragged then stopped; heavy or light showers. Running parallel with wind = streets. Cumulo Nimbus”rain” (cb)– Large cumulus climbed into high cloud levels – tops become ice crystals known as false cirrus. Top spreads like anvil and moves faster at top. Violent weather. Associate with cold front & Wind shear. Gusting from thunderstorms 10 miles or more.

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Mammatus (mamma)– forms under the anvil of cu-nim & look like inverted cumulus like an udder.

Cloud-Medium (6500-23000)– alto cumulus (ac) is strato cum at med height, **Alto Cumulus Lenticularis (Ac Lent)** – cigar, medium, standing waves – don't move with other cloud. **Alto-Cumulus Castellanus (Ac Cast)** usually after very hot spell, hard turreted outline, warns of unstable and thunder

Cloud-High – (18-45000), Cirrus (Ci) – ice crystals. **Cirro Cumulus (Ci Cu)** similar to alto-cum in looks but usually ice, forms mackerel sky. **Cirro Stratus (Ci St)& (CS)** stratus at high level, if it thickens and lowers into alto stratus in the west, first sign of a warm front coming. Strato Cumulus (SC) – weak rain.

Equatorial pressure band – equatorial trough (low)

Altimeter shows changes in static pressure

Polar maritime airflow = unstable showery

For above 50% humidity – each 1deg decrease in temp, humidity goes up 5 so 30 °C and humidity 75%, dew pt temp approx 25 ° because $100-75=25/5=5$ off 30.

Anticyclonic= fog

Atmosphere **density** = 1225 grm/m³

Virga = rain evaporates b4 ground

Wind will **VEER** on passing of a front

Convergence – where 2 flows meet and interact eg sea breeze v opposite prevailing wind

Nitrogen=78% by volume

Wind is described **direction/speed** ie 270/25 knots

Advection is the horizontal transfer of air and heat

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Energy req'd to change temp consider; spec ht, reflectively, conductivity - specific heat of copper is 11x higher than water.

Isotach – joins places of equal wind

Foehn effect – warming and drying of air passing over a mountain and raining

Tropical maritime flows = mild, damp

∇ = Showers. (Two Octa cloud = FEW) Δ = Hail
= = widespread mist

warm front=Warm air cooling on climbing over cold = shallow gradient 1:150. 1st sign – high cloud 600nm ahead of surface front as it passes, expect low stratus and poor vis.. **cold front**=Warm air rising and being undercut by cold air = steeper 1:50; moves faster than warm front.

FOG- international is vis <1k, UK is 200yds.

Low pressure = depression – wind anti-clockwise

Ridge – tongue of HP, **Trough** - tongue of LP; **Col**= neutral between systems.

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Airplanes Technical

Airplanes Technical

Angle of attack – meets airflow in relation to chord line. **Angle of Incidence** – bet chord line and longitudinal axis Curve is called **Camber** -2/3 lift. Airflow defl down produces a Resultant up (1/3) **Bernoulli**- a restriction made fluid speed up and pressure at sides of restriction reduced - 2/3. **Parallelogram of forces** ie vertical and horizontal of resultant or total force. **4 forces** – **Weight** (vertically down), **Lift** (right angles to airflow + equal to weight in straight level flight), **Thrust**(varies with power and AOAttack), **Drag** (aspeed / ditto). **Equilibrium** is all forces equal. Less lift produced in a climb than a descent. **Thrust without power** is a result of weight and lift. **Lift on bank** is 90deg to wings but wings at angle means not equal to weight which is straight down. **Drag – Induced** (is hor comp due to lift being 90deg off wing but wing being in Angle O Attack for deflected airflow underneath. **Resultant** (mid) lift (left) Drag (red). This is cause of uneq press – incd press below tries to equalize with low press above and acts at wing tips – results in 2 dir flow out undr wing and in ovr wng – when they meet, x-flow called trailing edge vortex – the numerous ones of which move



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toward each tip to a main wing tip vortex. Where lift is produced – so is increased drag. Reduce this by long span narrow chord (sailplanes) – called aspect ratio ($20L \times 5w = AR4$) Low AR=fighters(hi ind drag), Hi=sailplanes. Parasite Drag– form drag, skin friction, other fitments. Power Parachute open front causes back pressure and an invis leading edge. Form drag increases as a proportion of tot drag with speed. **Total Drag** – Parasite low at low speed, Induced=high so there is a speed with lowest combined drag. Speed sq Law – form drag is proportional to sq of speed. Applies to lift/ speed also. Angle of attack – incr aoa will incr speed of air over top and decr under side = more lift but induced drag goes way up comp to lift. Climb too steep without enough power and speed drops off and you stall (mush first ie angle looks like a climb but you travel horizontal for eg).

Thrust with no power is –ve aoa, see drag become thrust. So decrease angle of attack = redce lift, incr speed and so incr drag. Increase aoa = incr lift, dec speed, dec parasite drag (form, skin, other) but big increase in induced drag. **Lift/Drag ratio** – airspeed and aoa produce lift

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+ drag. So there is a best airspeed. **Best Glide Angle** is a ratio or angle which assumes you fly at best speed (still air, so can increase in headwind and decrease in tail). **Rate of Climb (Vy)** – speed for max height in min time – where diff bet engine power and the power required to overcome the aircraft's drag is the greatest (maximum excess power). **Angle of Climb (Vx)** – slower speed but gives steeper angle to cover less ground but go higher. Occurs at the speed for which the difference between thrust and drag is the greatest (maximum excess thrust). **Stability** – to revert to flight path without pilot input. Vertical for Yaw, Longitudinal for Roll and Bank, Lateral for Pitch. **Dihedral** – lifted wing angle at tips. **Fin or Keel for Yaw** (further effect of yaw = outer wing faster so lifts), **Tailplane for Pitch** Flexwing uses sweepback wings to simulate tailplane or reflexed trailing edges on the inboard halves of their wing. Control surfaces on V tail are called ruddervators. **Centre of Pressure** – in incr aoa cop moves forward and v/v – managed by tailplane and reflexed trailing edge. **Pendulum effect** – low wing have bigger dihedral. **Control** – movable surfaces called aerodynamic controls. **Pitch= elevators**. **Power = inc to climb and v/v** **The Turn (Aerolons)** – Roll = maneuver on long axis to set up angle of bank. **Bank produces the force to set up a turn**. **Spoilers**

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can induce roll by deploying one to destroy lift on 1 wing so it drops. 2 axis has to turn by rudder alone since no ailerons. Adverse Yaw can also be produced when down aileron increases aofat on out wing and drags – fixed by differential aerolons where down airolon arc reduced so up airolon causes more drag and pulls into arc. Rudder – curb skids and slips and counter adverse yaw and allows 2 axis to turn. Balanced turn (bal ball) is one where plane turns at correct angle of bank for desired rate of turn at const speed with no skid or slip. Flaps – max lift for min airspeed – fat aerofoil with plenty of top camber but produces form drag hence flaps for temp use – simple, split, fowler. Small angle – small incr drag, large inc lift. Large angle – large inc drag, little more lift. Slats (Slot) – channel air thro gap on leading edge – venturi effect. Slotted wing type also. Trim Tabs small movable surface in trailing edge of control surface – tab deploys in opp dir to exert force against main move for effort reduction. Graduated balance or shielded horn – so when moved protrudes and pushes rest of surface in right direction. Balance tab operates without pilot input, moves opposite to main airolon to assist in moving controls. Air Brakes – move out 1/3 from leading edge and destroy lift to slow down or lose height. Spoilerons used for

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bank one at a time, used together become brakes.

Flexwing – control frame, tube at bottom is control bar, shifts weight so cofg. Pitch trim system – wing shape optimised 4 cruise by reduce reflex or billow of wing Billow shift uses floating cross tube to make inner wing slacken and outer tightens which draws down trailing edge – raising aofa to set full roll in motion - Yaw is brought about by more form drag on inner wing. Luff Lines are to prevent trailing edge inverting @ H speed. Wing Tip Rudder is a control device. Canard – front tailplane. Powered Para Control Lines/handles change shape of trailing edge. Pitch – pull both, lip makes big drag but some increased lift. Turns (Yaw) – pull one handle to form lip, more drag = turns that way. Power = climb/descend and trim for fatty's will alter cruise speed. CofG- nose down or nose up, needs constant pitch control to stay level. Thrust Line – engine out of drag line. Sudden power change then causes sudden pitch changes

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Maneuver out of S&L – pitch up in a bank will pull into bank @ 90deg will change direction not height

Turn = combo roll and yaw; centripetal force. Need more power to stop loss of height. As turn develops – rudder starts to act as elevator. Counter this with pitch up and take off Yaw. Trike – cannot yaw conventionally so start by induced bank setting up centripetal force thro change of form drag on each side.

Stall speed in a Turn 15deg, V is 95% of W and Lift req'd is $1.04 \times \text{weight}$, 30deg; 85%/1.16, 60deg; 50%/2x. For a balanced turn with no height loss crucial $V=W$, only achieved by increased AofA but induced drag means decreased airspeed so gradual increase in power req'd. Stall speed also increases – a 30mph stall becomes at 60deg - Because lift req'd is x2 and sq root of 2 is 1.4 and 1.4 of 30 is 42. (because if speed goes up by 2, lift goes up by 2^2)

High Speed Stall – high speed dive, pull up; continues on orig line but with sharp inc in AofA – may stall even tho airspeed is high. Spin off a turn – yaw speeds up outer wing, slows down inner, plane rolls inward – maybe outer wing=36mph and inner is 28mph, tot speed = 32 but stall is 30; inner wing stalls – plane flicks over and spiral descent about vertical axis. Fix by reduce to idle, correct roll, then pitch. Also, if wings not level at a stall, down wing meets air with greater AofA

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and stall first. Wash Out (applies to props also) decreases angle of incidence at tips v roots so tips stall last. Loading – centrifugal reaction fires outward against centripetal force pulling us into turn. The resultant of CR (horiz out) and W (vert down) acts straight thro seat at all angles of bank and is called Loading. Same figs as stall speed increase so at 60deg it's x2. Maneuvering Speed – speed a plane can handle rough air.

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Power and Ancillaries

4Stroke – Induction, Compression, Power, Exhaust; Butt vlv

2Stroke – Compression/Induction, Power/Exhaust Needle plunger. 1 rotation for complete cycle. Altitude and humidity– reduce air density, makes fuel mix rich

Carb Ice – press decr=temp decr. Evap also = temp decr so venturi causes decr press and fuel evap in airflow can = 33 deg in a second.

Flight Instruments – Altimeter; static pressure, aperture at right angles to airflow. Blocked static vent will fail to show changes in level ASI – dynamic pressure, forward facing pitot tube, uses static input and dynamic called total pressure, fit on lhs of panel. Less dense air makes it read low. Ditto high temps

VSI – shows rate of change of Static pressure has instant entry to capsule but jacket allows only gradual on its pinhole – so in climb, pressure inside instantly decreases momentarily higher than jacket which can only equalise slowly – capsule contracts. Need to anticipate due to delay – watch altimeter as levelling or may chase VSI in oscillating flight. **Problems** – blockage, icing, Pitot tube is also large aperture, can pick up blockages Sleeve).

Compass – normally 5 deg sub-divisions inside 30deg marks. Needle tends down toward NMP (magnet dip). To alleviate, needle is suspended so pendulums in any direction so cog displaced and corrects itself. **Problems** –

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inc or dec speed, height, heading, indicated heading can change. **Unusable** above lat 70n 1s **Northerly roll out – early**. Southerly – late. Accelerate East heading in N hemi & compass under reads.

Under wing strut takes load under tension and compression. A **Mass Balance** removes flutter

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Human Performance Limitations

21% oxy, 78% Nitr, 1% carbon dioxide

Hypoxia >10k' but can tell at 8k' if below par. At lower height its ability to learn rather than ability practice. >10k add oxy, 33.7-40k breath 100% Oxy, >40k' 100% Oxy under pressure. Aircraft at 30k' are pressured to 10k'. Slow hypoxia effect until 30k' – lips and fingertips turn blue.

Judgments sloppy. Slow judgment, touch, vision and hearing all affected. Personality change.

Smoking, long exposure, higher altitudes, energy demands, unwell in first place; eg a cold, alcohol – all can accelerate effects.

Hyperventilation; exhaling more carbon monoxide than necessary. Can happen at surface as well as height. – caused by anxiety, air sickness, heat and vibration.- tingling of extremities, hot/cold feelings anywhere. Pilot performance and tunneled or clouded vision. If confused over hypoxia or hyper vent – treat as hypoxia unless below 10k'. Barotraumas – pocket of trapped air.- descent; swallow hard, hold nose and blow hard.Common ailments – diarrhea, nausea, vomiting. **Decompression** – scuba dive no fly within 12hrs or 24hrs if >30' dive. Air Sick –

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motion undergone v expected – overcome by adaption. Hearing – short term loud=temp loss but long term = permanent. 30% inc over 90db does same damage in 1 min as 90 in 8 hours.

Sight – read #plate at 40m not 23m as per a car.

Toxic – carbon mon. 20 cigs= 3-4k'. Blood pressure – OK. Epilepsy – no fly. **Alcohol** – 1 unit 8 hrs. 21/28pw man, 14/21 woman.

Disorientation – flying in cloud. Airprox – 3nm closing speed of 600knt is <20secs. 5nm 500knt c 35 secs. Eyes rods are for night and peripheral while cones are for colour and need more light. Eyes focus at 2m with nothing to focus on.

Aircraft on steady toward bearing appear to grow suddenly large as they come close. Prevent shock with sweet tea. Vertigo is sense rotation when is none.

RADIO OPERATORS

Section

ATC/MATZ call follows.....

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ATC/MATZ CALL

Request - zone transit/**Matz penetration**/Radar infoation Service. For SVFR (class A only) eta at zone bound req'd

C	Curr pos + Dep point
H	Heading
A	Altitude/FL + press
V	Flight Condition
E	Enroute to ETA Bound
R	Reqs't -in Matz this 1 st

"Station", Eurostar G-CCMO request **MATZ penetration**/zone transit/ Joining instructions/ etc "pass your message....."

POS'N REP (no squawk)

"Eurostar G-CCMO"

P	Position
A	Altitude
T	Time (Just minutes)
N	Next reporting point
E	ETA next rep point

Use for eg if unable to Squawk or Charlie.....

URGENCY(PAN)

DISTRESS(MAYDAY)

N	Name of station
A	Aircraft
N	Nature of emerg
I	Intentions
P	Posn, Level, Headg
P	Pilot qualifications
O	Other information

Urgency = not yet grave and imminent danger; Pan x3 Distress = MAYDAY x3.

"Eurostar G-CCMO"

VFR

DEPARTURE/PENETRATION POSITION/JOIN

East Midlands
Ground/ Control,
OR ATSU for LARS

"Pass your message....."

Current position
 Departure point

Heading

Altitude/FL and pressure

VFR

En rout to ETAbound

Reqst; Transit SVFR Penetration etc
if SVFR, etc at zone boundary is required
Advise when leaving

Call on leaving area
If Asked for position

Position

Altitude

Time (mins only)

Next reporting point

ETA for nxt rep point
"East Midlands Control"

Position

Height

Eurostar G-CCMO, request transit **OR MATZ Penetration OR** Request lower airspace radar service **OR** request crossing of airway _____ at _____

VFR

G-CCMO

"East Midlands, G-CCMO... request change to _____ on _____"

G-CCMO

G-CCMO

request join for one visual circuit"

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Standard Join;

Overfly 2000', determine circuit direction if not known, by signals square, traffic and sock. Cross "Overhead" Descend to circuit height on "descending dead side", join circuit by crossing upwind end @ circuit height crosswind and position "downwind", late downwind" "baseleg" (optional) and call in on "Final" – East Midlands Control, G-CCMO Finals on 22 , "landing roll completed"

All digits pronounced separately, 18 one eight.

Remember Zero, Tree, Fower, Niner. There is no Eleven etc. 10= One Zero. 100= One hundred (not one, zero, zero). 2500= Two thousand Five hundred.

11000= One, One, Thousand. 25000= Two, Five Thousand. "Channel" not used. 118.125 = one, one, eight, **decimal** one two five. Time is usually only in minutes. 2400=midnight. 0000= beginning of day.

08:23 = Time two three. Affirm = yes. Break= separate messages. Break Break separates 2 aircraft. Area Control= control. Approach Control = Approach. Aerodrome Control= Tower. Categories – Air Traffic Control (ATC), Flight Information Service Officers, Aerodrome Air/Ground Comms Service (AGCS), Radio Operators.

VOLMET – Taf and Metar. **SIGMET** – Met Safety messages. **ATIS** – Auto terminal info service. **AIS** – Aeronautical info service.

Aircraft should request service required on initial contact e.g. East Midlands Control, Eurostar G-CCMO, request Departure Information/penetration and basic service/request join. G-CCMO radio check 118 decimal 725 and request taxi information. 10 miles south, altitude 2500 feet QNH 1008, request straight in approach.

"Transmission blocked" if jammed.

Add "degrees" where heading ends zero. Add "millibars" for pressure under 1000.

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SAFETECOM – 135.475 only when no more than 2000' over aerodrome or not more than 1000' over circuit height & within 10nm. 129.825 – microlight equivalent.

Unattended examples; Departure; Hucknall traffic, G-CCMO taxiing for runway 33 LH

or lining up for departure runway 33 rolling runway 33 or climbing out runway 33. **Joining;** Hucknall traffic, G-CCMO Overhead, joining for runway 33 LH and Deadside descending runway 33. **In the circuit;** Hucknall traffic, G-CCMO, Downwind, Runway 33 LH and (optional) base leg, runway 33, and Final runway 33.

Volmet – 126.6, weather automated.

Squawk; reset (reselect code), Ident – operate ID button, Squawk mayday, Mode/Squawk standby (SBY), Squawk Charlie (set ALT), Squawk Alpha (ON) . 7000 general squawk 7010 VFR circuit traffic, 7700 EMERGENCY 7600 loss of comms. 7500 HIJACK. – careful not to dial through these when setting.

Danger Areas – East Mids approach, G-CCMO, request “crossing service” for danger area 113.

QNE- is the indication which the altimeter will give on landing, at a particular time and place, when the millibar scale is set to 1013.2 mb

Distress A condition of being threatened by serious and/or imminent danger and of requiring immediate assistance. ‘MAYDAY, MAYDAY, MAYDAY’

Urgency A condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight, but does not require immediate assistance. ‘PAN PAN, PAN PAN, PAN PAN’ Pilots should address their **emergency calls on 121.5** MHz to ‘London Centre’ when south of N55°, and ‘Scottish Centre’ when north of N55°

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If a pilot is in communication with a civil or military ATSU, before the emergency arises, assistance should be requested from the controller on the frequency in use. In this case, any SSR code setting previously assigned by ATC (other than the Conspicuity Code 7000) should be retained until instructions are received to change the code setting. If, however, the pilot is not in direct communication with an ATSU and the aircraft is equipped with an SSR transponder it should be switched, preferably before the emergency call is made, to Emergency Code 7700, with Mode C if available.

Emergency Message NANIPPO ; Mayday or Pan
Name of station addressed ; **A**ircraft Callsign & type;
Nature of the emergency; **I**ntention of the pilot-in-command; **P**resent or last known position, flight level/altitude and heading; **P**ilot qualifications (VFR)
Other useful information e.g. endurance remaining, POB aircraft colour/markings, any survival aids.

“MAYDAY MAYDAY MAYDAY.....”

N - Hucknall Approach

A – Eurostar Golf – Charlie Charlie Mike Oscar

N – Engine failure

I – Forced landing

P – One zero miles south of Watnall

P- VFR

O- 1 POB”

If **relayed**, as above but Hucknall approach, G-CCHO has intercepted MAYDAY from G-CCMO, I say again.....

For Urgency rather than distress, PANx6 should be used for instance where N= “passenger with suspect heart attack and I=divert to Watnall”

RELAY - MAYDAY MAYDAY MAYDAY

East Mids Tower, G-ABCD, have intercepted MAYDAY from G-BJRD, I say again G-BJRD Cessna 172 engine failure forced landing 10

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miles west of Wicken VOR, 1000 feet descending, heading 120, IMC rating, over

AIRPROX REPORT: Aircraft Callsign; SSR Code; Position of AIRPROX; Aircraft heading, Flight level, altitude or height, Altimeter setting, Aircraft attitude (level / climbing / descending / turning), Weather conditions, Date and time (UTC) of the AIRPROX, Description of other aircraft, First sighting distance and details of flight paths of reporting and reported aircraft. Confirm in writing within seven days of the incident.

ICAO has split the VHF communications band from 25 kHz to 8.33 kHz channel spacing. Referring to 8.33 kHz channels to request the capability of the radio equipment: "G-CCMO, **confirm eight point three three**". "Negative 8.33" or "Affirm UHF".

MILITARY phraseology intentionally missed.

FREECALL – your details have not been passed to the next ATS

Read Metar – EGNX *Manchester 280720Z 28th 7:20am 25011kt wind from 250deg at 11 knots, 9999 greater than 10k vis, FEW011 a few clouds at 1100' 13/10 – temp 13, dew point 10, Q1014, QNH 1014 millibars.*

Calc humidity; For every 1 deg diff in dpt to temp = 5% humidity drop from 100. E.g. temp 13, dp 10 is diff 3 x 5 = 15 off 100 = 85% approx

Message priorities: Distress (Mayday), Urgency (Pan,Pan), Direction finding, Flight Safety, Meteorological, Flight regularity.

VHF Direction finding (VDF)

Station callsign, G-CCMO request QDM, G-CCMO

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QDM = heading to steer to station (no wind correction), QDR = aircraft bearing from station (ie qdm-180) QTE= aircraft true bearing from station
QUJ= aircraft true track to station.
Class A= +/-2 deg, B=5, C=10 & D= worse than Ct –

Radar Information Service CHAVER (for outside controlled airspace) – gives traffic info inc bearing & distance + level when known, of conflicting aircraft.

(Radar advisory service expects flight in IMC)

“East Midlands approach, Golf, Charlie, Charlie Mike Oscar request Radar Information Service” “...pass your message”

G-CCMO, **C**urrent position, **H**eading, **A**ltitude, **V**FR, **E**n route to, **R**quest radar information service

Traffic information may include instructions but if not

you can ask. If warned of traffic use “Looking” or “Roger” or “Visual” or “Traffic in sight” or “Negative contact, request vectors” for a reply such as “G-CCMO, turn right heading two zero five”

MATZ penetration CHAVER a Military Aerodrome Traffic Zone is 5nm radius and 3000' high.

Panhandles 1000' to 3000' and 5x4nm. Make contact 15nm or 5mins away. A number of MATZ controlled by 1 Clutch Matz who's QFE is used. Main difference in phraseology is...

“Cottesmore zone, Golf Charlie, Charlie, Mike Oscar, request Matz Penetration” “...pass your message”

Current position, **H**eading, **A**ltitude (inc qnh), **V**FR, **E**stimate zone boundary **R**quest comes up front in a Matz “Request Matz penetration”

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Danger Area Danger Area Crossing Service (“Dacks”) or Danger Area Activity Information Service (“Day-iss”) – identify which type on 1:500
 “Plymouth Military, G-CCMO request DACKS of D009”
 “Lakenheath, G-CCMO, request DAY-ISS for Thetford Range”

Radio Failure – Squawk 7600 and Mode Charlie.
Receiver working; One short = Yes, Two short = No, Three short = Say again. Four short = request homing (or for initial alerting), One long (4 secs) = manoeuvre completed. One long, 2 short, one long (SOS) – I have another emergency.
If receiver is not working – “Hucknall radio, G-CCMO, transmitting blind 130 decimal 8 due to receiver failure, I say again..... and trans deadside approach, downwind & final.

Training Fix, Training fix, Training Fix – Golf – Charlie, Charlie, Mike, Oscar” G-CCMO, your position is 15 miles n of Derby” – use emergency channel 121.5 in quiet periods for training or if lost.

Categories of Aero comms – ATC, Flight info (“Information”), Air/Ground (“Radio”), Unmanned (“Traffic”)

These instructions must be read back;
 Taxi, heading level, speed, airway or route clearances. Runway in use (wind directions quoted from where they are coming from – runway directions are based on where they point to i.e opposite of wind), clearance to enter circuit, take off, backtrack or hold short of active runway. SSR (secondary surveillance radar) operating instructions, altimeter

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and VDF info, frequency changes and type of radar service.

Conditional clearance will contain Callsign, Condition, Subject of the condition and instruction. Eg "Golf-Mike, Oscar; after landing Eurostar completes backtrack, line up runway 33". Use "ready for departure", only use "take off" to acknowledge ATC clearance to "take off"

SVFR is special instructions by ATC for flight in class A control zone (or any other zone in IMC or at night) instead of flying IFR. Requires ETA Zone Boundary.

QFE= Height. QNH= Altitude. 1013mb = Flight Level

Max ranges for radio use:

International Airport –	Tower	<= 25nm & 4,000'
	Approach	<= 25nm & 10,000'
Other Airports -	Tower; immediate vicinity &	<1,000'
	Control;	<= 10nm & <3,000'

TYRO (suffix) = low hours or inexperienced pilot

Flight Information Service provides information for the safe and efficient conduct of flights in the ATZ.

Basically, all calls except position report and emergency are Curr Position (3 axis inc headg and alt), VFR, where you're going and what you want.

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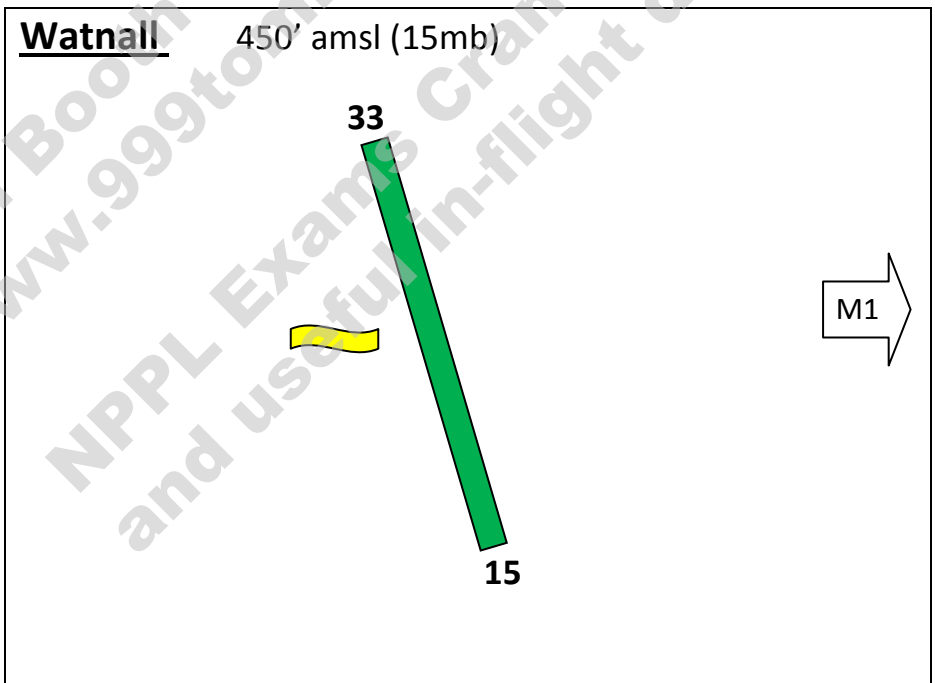
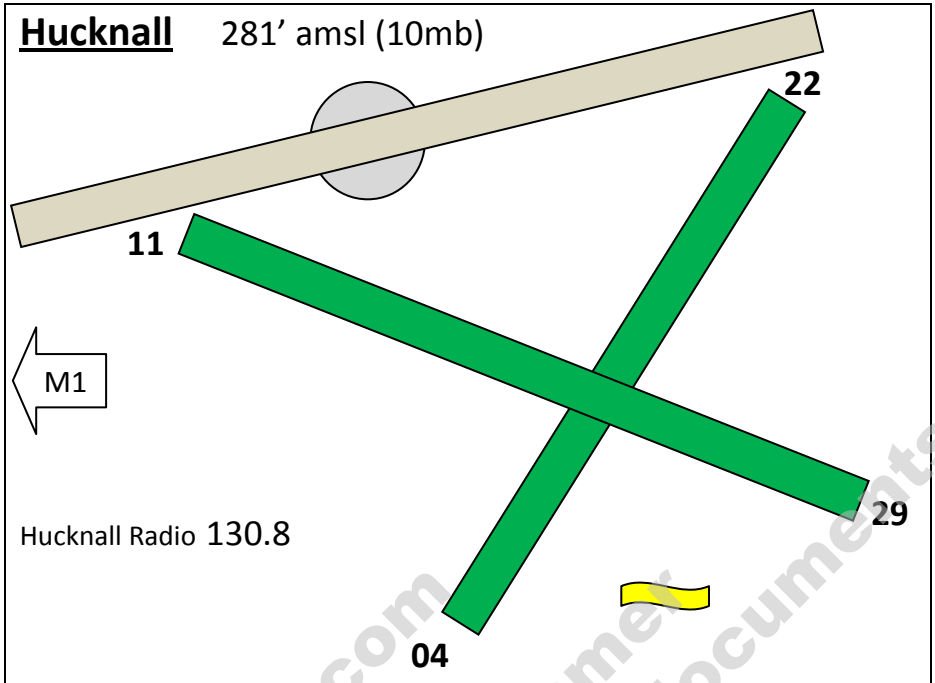
The airspace below all airways and the Clacton, Cotevold, North Sea, Strangford and Worthing CTRs is part of the forecast QNH Altimeter Setting Region System (ASRS). Within all CTRs and within and below all TMAs and all other CTRs, during their notified hours of operation, the airspace does not form part of the forecast QNH ASRS.



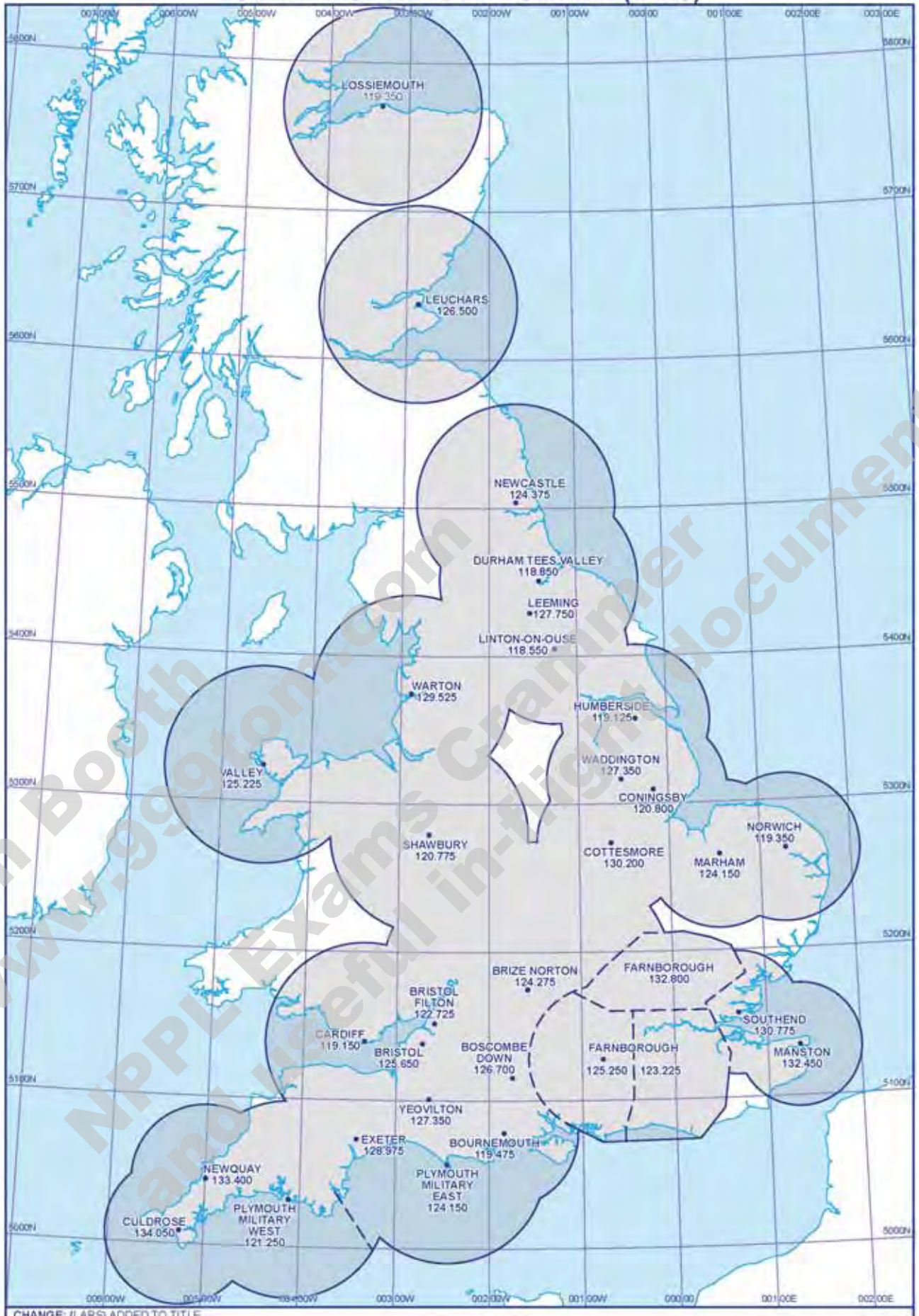
(2 Jun 11) ENR 6-1-7-1

AMDT 6/11

CHANGE: DAVENTRY REMOVED FROM TEXT BOX
 AERO INFO DATE 10 MAR 11
 FOR THE LATEST CHANGE IN INFORMATION THIS CHART SHOULD BE CHECKED AGAINST THE ENR SECTION OF THE U.K. AIP



LOWER AIRSPACE RADAR SERVICE (LARS)

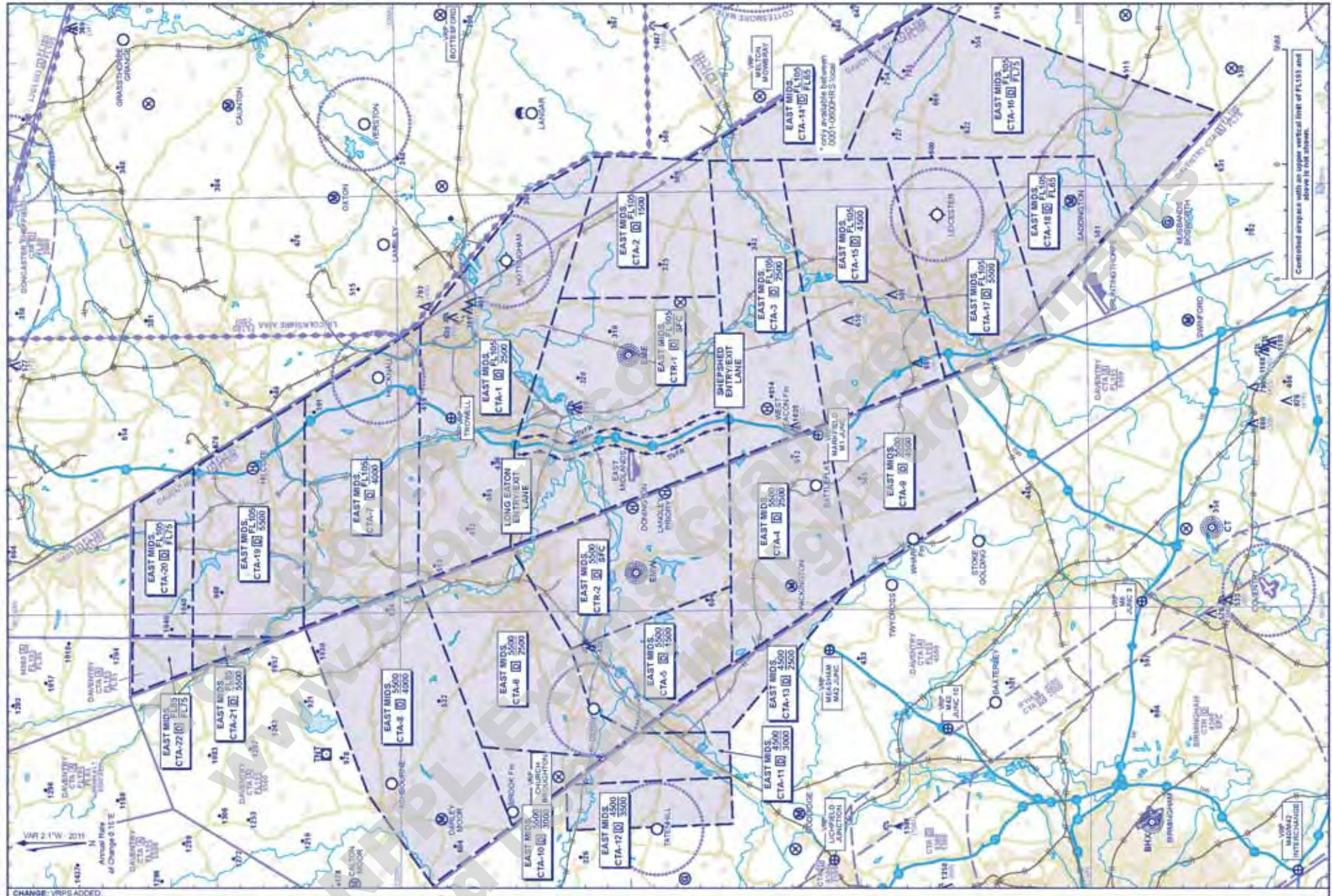


CHANGE: (LARS) ADDED TO TITLE

AERO INFO DATE 1 SEP 10

CONTROL ZONE AND CONTROL AREA - ENTRY/EXIT LANES AND VRPs

EAST MIDLANDS



CHANGE: VRPs ADDED.

AERO INFO DATE: 11 JAN 11

Take off and Landing roll factors

TAKE-OFF			LANDING	
CONDITION	INCREASE IN TAKE-OFF DISTANCE TO HEIGHT 50 FEET	FACTOR	INCREASE IN LANDING DISTANCE FROM 50 FEET	FACTOR
A 10% increase in aeroplane weight, e.g. another passenger	20%	1.20	10%	1.10
An increase of 1,000 ft in aerodrome elevation	10%	1.10	5%	1.05
An increase of 10°C in ambient temperature	10%	1.10	5%	1.05
Dry grass - Up to 20 cm (8 in) (on firm soil)	20%	1.20	15% ⁺	1.15
Wet grass - Up to 20 cm (8 in) (on firm soil)	30%	1.3	35%	1.35
Wet paved surface	-	-	15%	1.15
A 2% slope	Uphill 10%	1.10	Downhill 10%	1.10
A tailwind component of 10% of lift-off speed	20%	1.20	20%	1.20
Soft ground or snow*	25% or more	1.25 +	25% ⁺ or more	1.25 +

Listening Squawks	Channel	Squawk	Emergency Squawk	
			Doncaster	126.225
Manchester	118.575	7366	HIJACK	7500
Birmingham	118.050	0010	RADIO FAILURE	7600
Luton	129.55	0013	GENERAL EMERGENCY	7700
Stanstead	120.625	0013		

Four levels of ATC service:

Basic – as per the name, no advice, just general information.

Traffic – basic plus surveillance info

Deconfliction – advice on headings and levels

Procedural - none surveillance; deconfliction provided only against other aircraft which are also in receipt of a Procedural service from the same controller.

A Basic Service is intended to offer the pilot Maximum autonomy and the avoidance of other traffic is solely the pilot's responsibility. The controller/FISO will pass information pertinent to the safe and efficient conduct of flight. This can include weather, changes of serviceability of facilities, conditions at aerodromes and general activity information within a unit's area of responsibility.

A Traffic Service provides the pilot with surveillance derived traffic information on conflicting aircraft. No deconfliction advice is passed and the pilot is responsible for

collision avoidance. A Traffic Service contains the information available in a Basic Service. In addition, controllers provide surveillance derived traffic information on relevant conflicting traffic. Headings and/or levels may also be issued for positioning and/or sequencing.

A Deconfliction Service

provides the pilot with traffic information and deconfliction advice on conflicting aircraft. However, the avoidance of other aircraft is ultimately the pilot's responsibility. A Deconfliction Service contains the information available in a Basic Service. In addition, controllers shall aim to assist the pilot with his responsibility for the safety of the aircraft by passing traffic information and deconfliction advice. Headings and/or levels will also be issued for positioning, sequencing and/or deconfliction advice.

A Procedural Service is a non surveillance service in which deconfliction advice is provided against other aircraft in receipt of a Procedural Service from the same controller. The avoidance of other aircraft is the pilot's responsibility.