

IFR Pilot Tutorial

Every effort was made to attain 100% accuracy. Please inform the author of any errors or omissions.

This document is NOT to be used for real-world aviation, as it is an uncontrolled document and will become outdated.

This document has been created for use by the members of the International Virtual Aviation Organisation (IVAO).

Keep Them Separated!!

This document is a remake and combination of Martin's IFR Tutorial and Keith Flight Tutorial.

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v2.1 -- February 2006

This tutorial demonstrates the procedures to use on an IFR flight.

Red is Pilot & Blue is ATC. The document follows an IFR flight from Cape Town to Johannesburg.

If any ATC position is not manned the next higher position available, would be responsible. Area ATC's may be responsible for their entire controlled airspace and all the procedures given in this guide.

When reading this document ATCs and Pilots alike; please note in the communications which part of the transmissions are read back and which NOT.

Note: We highly recommend having a pen and paper ready to take down what the ATC says and to read back effectively and act accordingly.

Note 2: Connect on the APRON and never on a RUNWAY and TAXIWAY. Make sure your transponder is in Squawk Mode Standby. In IVAP, click on the round grey button showing STDBY and TX on either side. Make sure it is set to STDBY. Your transponder is then set to Squawk Mode Standby.

Getting started

Get the latest ATIS information and note the Information designator Alpha, Bravo, etc.
File your flight plan (FPL). Go [here](#) to learn how.

Cruising Speed:

File the appropriate True Air Speed (TAS), e.g. 450kts is approx TAS for a B738.

Cruise Flight Level (FL):

Make sure your cruise FL is CORRECT according to the [Semi-Circle rule](#). You might not be able to eventually fly at your intended cruise FL due to traffic, but the ATC must know your initial intentions.

Route:

Flying FACT to FAJS, the route is always TETAN UZ2 ESTED. See [Preferred Routes](#)

Let's get going....

Cape Town Ground, Springbok302, Good day

Springbok302, Cape Town Ground, Good day, go ahead.

If there are any communication problems, it must be resolved before the flight continues, especially when its Teamspeak related, otherwise continue in text, but voice is preferred.

Springbok302, Information Bravo. Parked at A1, request clearance to Johannesburg, FL330

Note: When you request your departure clearance, you must state the weather information that you've received your parking bay and cruise FL on request.

The parking bay tells the ATC where your aircraft is parked on the apron. This helps the ATC when issuing taxi instructions for you.

Springbok302, cleared to Johannesburg, standard TETAN1C departure off runway 01, departure frequency 119.7, squawk 4400

Sounds like a mouthful? Not really, as ATC reads this out to you, all you do is jot down the basics, e.g.

Cld to FAJS

TETAN1C

Rwy 01

APP 119.7, if APP is not open it could be Area (_CTR) frequency

sq4400

Note: The ATC does not provide the cruise FL as this might change in flight and GND/TWR cannot clear you to that level.

Now read back your departure clearance to the ATC

Cleared to Johannesburg, standard TETAN1C departure off runway 01, departure frequency 119.7, squawk 4400, Springbok302

Now, haul out the [TETAN1C](#) chart for FACT runway 01.

Read EVERYTHING on the page, especially the information in the boxes on the left.

Initial altitude to climb is FL090 according to the chart. That is why in your IFR departure clearance, the ATC didn't give an initial altitude climb restriction, as it's on the chart.

Springbok302, Read back is correct, report ready for push and start

Remember helicopters and small engine a/c cannot or do not require push back."

Report ready for push and start, Springbok302

.....

Springbok302, ready for push and start

Springbok302, push back and start-up approved, face South, QNH1016, time (-check) is 04, report ready for taxi.

ATC provides you with a direction to face for taxi; South

The time check is used to synchronize aircraft's clock with the ATS system. Time given in minutes of the present Zulu hour.

Push and start approved, face South, QNH1016, report ready for taxi, Springbok302.

.....

Request taxi, Springbok302

Springbok302, taxi via B to holding point runway 01, contact Cape Town Tower when ready on 118.1

Taxi via B to holding point runway 01, Contact Cape Town Tower when ready on 118.1, Springbok302

Taxi as follows:



At or approaching the holding point. When you are ready, SID in front of you, correct frequencies for ATC and beacons tuned in, contact Cape Town TWR.

Cape Town Tower, Springbok302, Good day, holding point runway 01

Springbok302, Cape Town Tower good day, line up and wait runway

Entering the active runway, switch your transponder to Squawk Mode Charlie. The Squawk Mode switch in IVAP must be on the TX side now. This sets your aircraft to send altitude & other flight information to the RADAR (_APP & _CTR) controllers.

Springbok302, ready for departure

NOTE: Up and until your take off clearance must always been referred to as departure.

Springbok302, clear for takeoff, surface wind 0 1 0 degrees @ 1 0 knots, good day

Cleared takeoff, good day, Springbok302

Once airborne, the pilot must contact Approach as soon as possible. Roughly by the time they passing 2000ft. We suggest changing frequency on IVAP and TS before commencing your take off roll.

Cape Town Approach good day, Springbok302, with you passing 1200ft

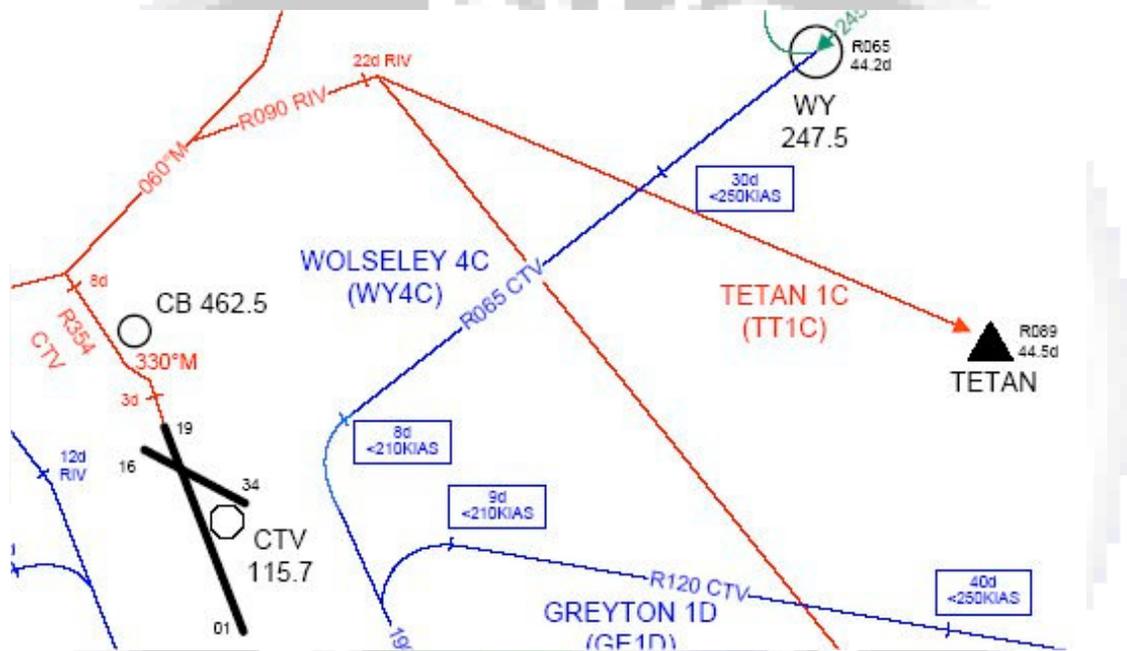
Pilot **MUST** report his altitude passing on very 1st contact with a RADAR controller as indicated on the SID chart. You provide your altitude for the RADAR controller to check your altitude against the readout on the RADAR.

Springbok302, good day, RADAR identified on departure, under RADAR control, climb to FL110

The ATC has now identified you on the RADAR screen and now provides you with RADAR control. This basically means, the ATC is now responsible for providing separation between you and other aircraft.

Under RADAR control, Climb to FL110, Springbok302

While all this is happening concentrate on flying the SID.



TETAN1C description:

Get airborne maintaining runway heading, passing 3DME from CTV (115.7), turn LEFT heading 330°, intercept and establish on Radial 354 from CTV outbound until 8DME CTV, then turn RIGHT onto heading 060°, intercept and establish on Radial 090 from RIV (117.6) outbound, at 22DME from RIV, turn RIGHT direct to TETAN.

While you are flying the SID, you will receive possibly more than 1 climb instructions that you must read back. The ATC might also decide to take you off the SID and vector you possibly for traffic separation and eventually provide you with a track back to waypoint in your route, not necessarily TETAN.

Springbok302, Climb to FL150

Climb to FL150, Springbok302

Before reaching FL150 (the vertical top limit of the FACT TMA), APP will hand you off to FACT_W_CTR (Cape Town West Area control)

Springbok302, Contact Cape West on 125.1, good day

Contact Cape Town West 125.1, good day, Springbok302

Cape Town West, good day, Springbok302
Springbok302, Cape Town West good day, climb to FL330
Climb to FL330, Springbok302

When handed over to Area, ATC will give you further climb instructions up to your requested cruise FL330.

Only once you reach TETAN are you on the UZ2 (RNAV) airway. Keep on this track and advise the ATC as soon as you have navigation problems. Opposite direction traffic is only 20nm to your left.

The UZ2 consists of the following points: **TETAN AXOPA EGTIL APRAX TEVAR ESTED**

Approaching position EGTIL, you will be handed off to Johannesburg Area Central (FAJS_C_CTR) on frequency 120.3

Springbok302, Contact Johannesburg Central 120.3, good day

Contact Johannesburg Central 120.3, good day, Springbok302

.....

Johannesburg Central, good day, Springbok302

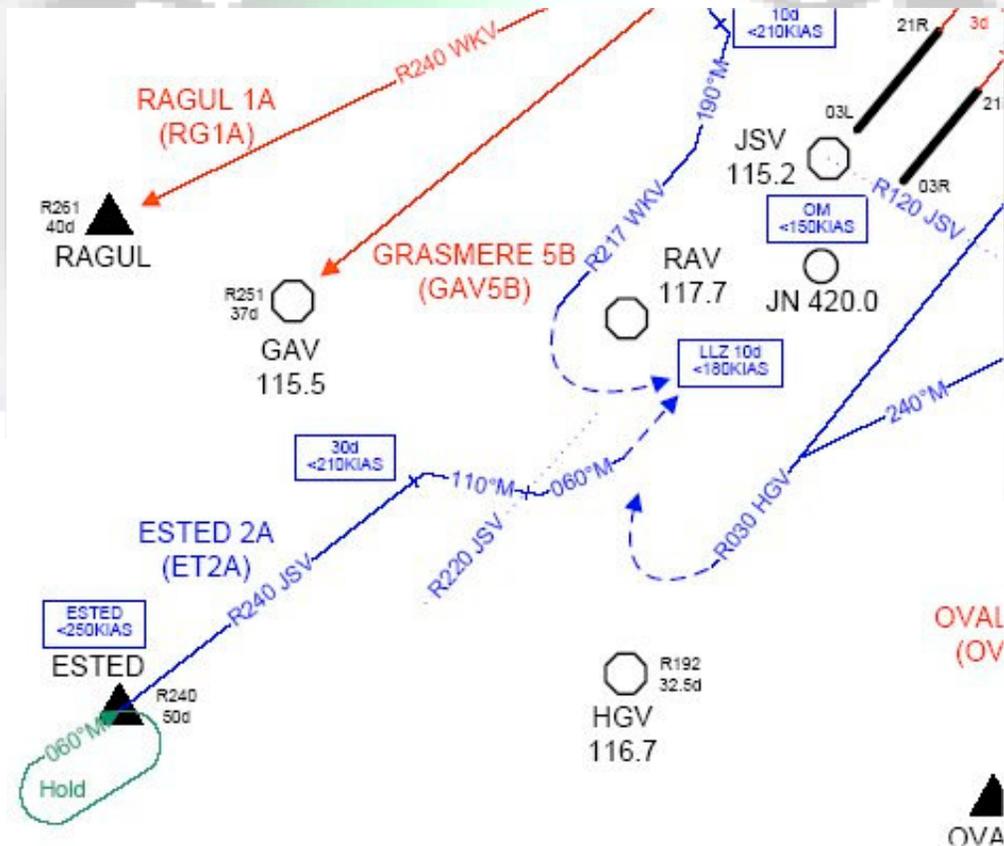
Springbok302, good day, cleared inbound FL330, standard ESTED2A arrival, landing runway 03, information Charlie

Cleared inbound FL330, ESTED2A, runway 03, information Charlie, Springbok302

FL330

The ATC clears you in on your current FL, but could change it
Cld ESTED2A

You've been cleared for the [ESTED2A](#) STAR. So read the chart and familiarise yourself with that arrival, routing, speed restrictions, etc.



The STAR goes as follows:

Passing overhead ESTED make sure your IAS 250kts or less,
route directly inbound to JSV on R240,
cross 30DME at 210kts or less and turn RIGHT onto heading 110°,
crossing R220 JSV, turn left onto heading 060°,
establish ILS of runway 03L or R (we'll have to wait for APP)

Runway 03

The Area Controller is probably not going to issue a runway when parallel runways are in use. Most of the time the APP controller will decide the runway for landing on a per flight basis.

Information Charlie

Get information Charlie, note on IVAO Area controllers does not show ATIS designators. I suggest getting TWR ATIS as well, type **.atis FAJS_TWR** in IVAP

Approaching position APRAX, you will be handed off to Johannesburg Area South (-East) on frequency 128.3

[Springbok302, report ready for descent](#)

[Report ready for descent, Springbok302](#)

At some stage you need to start your descent to land at FAJS. This is calculated as follows with the 3:1 rule (descend 1000ft every 3nm)

Your altitude, FL330 or approx 33000ft

FAJS altitude, 5500ft

Take both altitudes divide it by a thousand and subtract the aerodrome's altitude from your aircraft's altitude. Multiply your answer by 3. Your answer is the approx distance from FAJS that you should start your descent.

$$33000 / 1000 = 33$$

$$5500 / 1000 = 5.5$$

$$33 - 5.5 = 27.5$$

$$27.5 \times 3 = 82.5\text{nm}$$

At approx 82/83nm from FAJS commence your descend at approx 2500ft/min.

The ATC might start your descend earlier or slightly later all depending on his traffic.

Watch your IAS approaching ESTED as you must cross ESTED at 250kts IAS or less, unless otherwise indicated by ATC.

[Springbok302, requesting descent](#)

[Springbok302, descend to FL160](#)

The ATC might impose speed restrictions. Ideally this should be before you descent for you to plan and accommodate for it.

[Speed in the descent 280kts or less](#)

[Speed in the descent 300kts or more](#)

These speed restrictions refer to IAS and are used for sequencing. If the ATC says nothing regarding speeds, it means you must follow the published speeds according to the STAR or in the case of non-standard arrival 250kts IAS or less at 50DME or below 10000ft.

You can also be told there is No Speed Restrictions.

[No ATC Speed restrictions](#)

When the ATC instructs you to maintain or cancel speed restrictions any published speed restrictions are cancelled, unless the ATC told you to comply with it at a later stage.

Note:

If the aircraft is forced to descend at a lower IAS, the pilot will want to start the descent earlier. The faster the descent rate, the faster the IAS. Knowing different aircraft's performance plays a huge role here.

Holds:

If the airspace is busy or weather is bad, you could be instructed to enter a hold overhead a fix or beacon. The green oval shape on the chart around ESTED indicates a published hold procedure. The hold is very easy to accomplish. ATC will give you an altitude to hold at. If you reach/enter the hold before reaching the cleared to FL, then continue the descent in the hold. The chart shows the inbound heading to fly the hold is 060°.

Passing overhead ESTED, turn RIGHT and do a 180° Rate 1 turn. Rate 1 means, turn at 3° per second, thus 180° per minute. Establish on heading 240°, the reciprocal to heading 060°. Fly this heading for exactly 1 minute and execute another Rate 1 RIGHT turn until

back onto heading 060°. Fly the heading for 1 minute, if you flown correctly so far you should get overhead ESTED again. That is 1 4minute hold.
ATC will clear you from the hold.

Springbok302, Contact Johannesburg Approach on 124.5, Good day
Contact Johannesburg Approach on 124.5, Good day, Springbok302

.....
Johannesburg Approach, Information Delta, Good day, Springbok302
Springbok302, Johannesburg Approach, Good day, descend to FL100, vectors for ILS runway 03R
Descend to FL100. vectors ILS runway 03R, Springbok302

You will be given descent according to terrain height.
The ESTED arrival takes you automatically onto an ILS intercept.
Most STARs in South Africa end on the downwind and the ATC will then provide RADAR vectors onto the ILS.

Springbok302, cleared ILS approach 03R, QNH1015
Clear ILS approach, runway 03R, report established, Springbok302

.....
Established on the ILS, Springbok302
Springbok302, contact Johannesburg Tower on frequency 118.1, Good day
Contact Johannesburg Tower 118.1, good day, Springbok302

.....
Johannesburg Tower, Springbok302, good day, On the ILS runway 03R
Springbok302, good day, continue approach, aircraft departing ahead
Continue approach, Springbok302

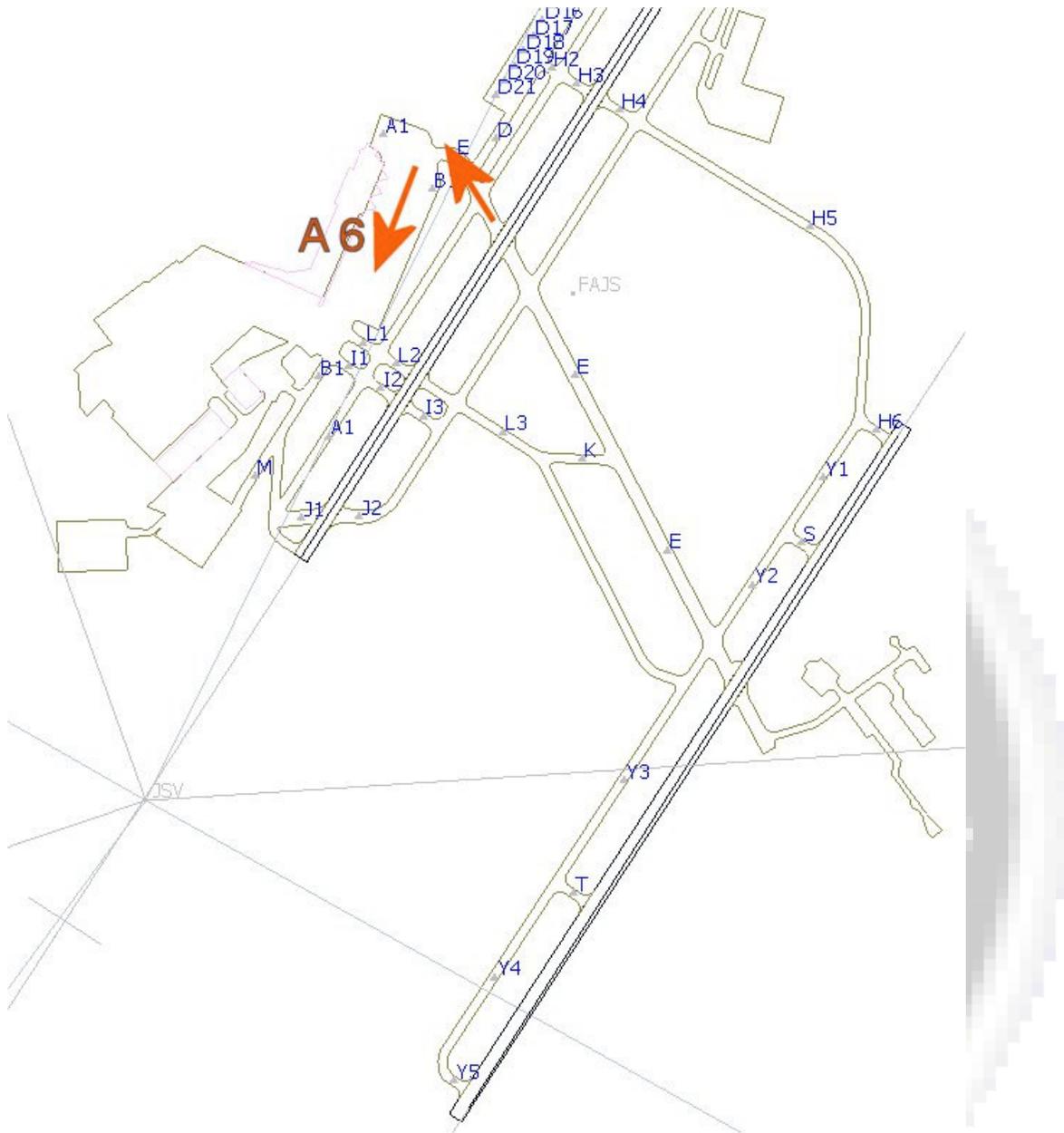
.....
Springbok302, clear to land runway 03R, wind 080 degrees at 1 2 knots”
Clear to land, Springbok302

Wind must be given in degrees Magnetic.
The wind in the ATIS block on IVAC indicates True wind NOT magnetic.
As a general rule in South Africa, add 20 degrees to the True wind to get Magnetic.
When you see the aircraft vacate the runway or pilot reports runway vacated

Springbok302, Contact Johannesburg Ground on 121.9, good day
Contact Johannesburg Ground on 121.9, good day, Springbok302

.....
Johannesburg Ground, Springbok302, good day
Springbok302, taxi via Echo, cross runway 03L/21R, to Alpha 6, report runway 03L/21R vacated
If there is conflicting traffic, keep the aircraft on your frequency until it is clear of all traffic and then release. The request from aircraft to shutdown when at the gate is an overseas procedure and is not used in South Africa, thus tell the aircraft in 1 transmission to taxi and terminate communications.

Taxi to A6 via Echo, cross & report runway 03L/21R vacated, Springbok302



Runway 03L vacated, Springbok302

Springbok302, taxi own discretion, frequency change approved, have a good day

In South Africa it is not expected to report ready for shutdown when parked. Once taxi instructions was given to the apron/parking, continue and change frequency if needed when on the blocks.

Note: When flying overseas, ATC's might still request from you to report on the blocks/ at your parking for shutdown, just follow their lead and comply.

This concludes the flight.

General notes

When trying to contact the ATC on text or voice and he seems busy or does not copy you. Send a message directly to him/her as follows:

.m FAJS_APP <your msg>

.r <your msg>

Using .r will reply to the last person that called you by text

See the IVAP manual for more information

You are encouraged to fly with the autopilot, as it will help reduce the work load during the flight. If you are new to this and feel this is way to difficult for you, don't stay away. Come and try, we are here to help you. Just as long as you know how to very basically fly the aircraft, we'll accommodate you. It's all about taking notes & reading back. The ATC tells you what to do most of the time, so in actual fact, this isn't too difficult.

If you have any questions, please contact any member of our training department.

Q & A

A few questions arose from a previous version of this tutorial from Troy Goldie which Keith thought a good idea to add to the tutorial.

Q1:) I am confused about speed (True Air Speed TAS, Ground Speed GS, Indicated Air Speed IAS, and the speed shown in the aircraft). I have always used the speed indicated in the aircraft as the speed in my flight plan, this is I see wrong. So if my air speed indicator in the aircraft is showing 250kts IAS, what is my GS? If I place 450kts in my flight plan what speed do I set the plane to fly at? I like using Auto-Throttle and IAS in the plane. Is there a formula or some easy way of working this out? I know that you can look in your GPS and it does mention a GS.

Ok, lot's of people get confused between IAS, TAS & GS. IAS is indicated Air Speed, TAS is True Air Speed and GS is Ground Speed. The difference between IAS & TAS is air pressure and temperature corrections. Although your airspeed is Indicating 250kts in the air, your True airspeed is actually different. The effect of reduced pressure and temperature causes your airspeed indications to almost halve. So when flying the plane on autopilot, we set the speed for IAS or Mach, but file TAS in our flight plan. TAS can be found in your aircraft performance charts, or you can look at your GPS for GS. And estimate what your speed will be without wind effect. The only difference between TAS and GS is wind effect.

Q2: The WY4C STAR shows that the speed should be less than 250kts at 30d from CTV. Is this GS and not the speed indicated on IAS of the aircraft.

The speeds on STARs refers to IAS.

Q3: I will be flying a B738 at night and I do not want to crash because I am flying the wrong speed. I see in the manuals that the speed to be flying on landing is between 145-155kts, does this sound right?

Yes, that sounds right

Q4: Saturday will be a busy night with many pilots in the air at the same time. If I am flying at 450kts GS at cruise, can I reduce speed or increase speed without informing the ATC?

No, air law states you must inform ATC if your TAS in the cruise changes by more than 5%

Q5: The STAR says 210kts or less at 8d, which is ok, but how do ATC ensure that I don't fly too slow at that point in an effort to ensure that I do not break the speed limit? In other words, I fly at 180kts from before that point and the pilot behind is flying at the prescribed maximum of say 249kts at WY? I know that holding can be imposed on the later aircraft to provide sufficient separation, but simply put, is there a minimum speed in a STAR?

No there is not. Generally ATC will use their noggin. Using speed control on aircraft and by using vectors or vertical separation they maintain separation between all aircraft. Putting an aircraft in the hold is a very last resort. Leave it all up to the ATC.

Last question: During my flight on the prescribed airway and route indicated, do I have to contact ATC and tell them I have reached a waypoint, unless instructed?

There are compulsory reporting points on most established routes. But in the virtual world only report where instructed to do so.

