

The Golden (FAA) Rules for a Good Plot

OPSGROUP Team

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Some people really enjoy plotting. If the other pilot has added some tiny krakens or miniature pirate ships to find on the chart, it can be a fun way to pass the time on a dark and endless North Atlantic crossing. For most though it is an irritating thing not made an easier by the somewhat confusing requirements as to **how, when and why** you need to do it.

So here is a brief summary of the FAA Plotting requirements.

What do the rule books say?

The place to find the info is this – AC 91-70B

It is an advisory circular providing '*general information and guidance for commercial and General Aviation operators ("you") planning flights in oceanic and remote continental airspace*'.

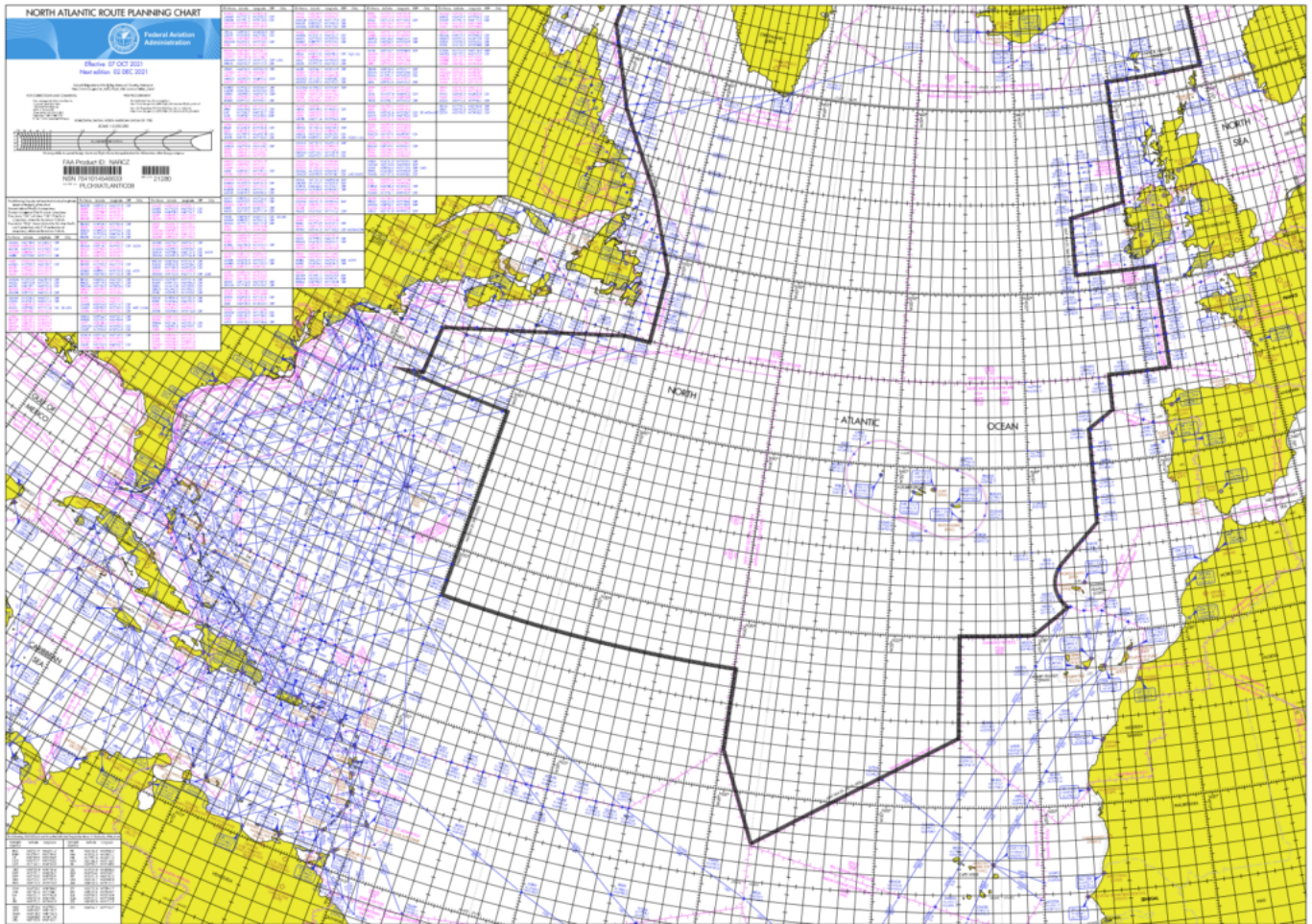
Sounds good until you actually open and discover it is **114 pages long** and the first chunk is a very long list of links to other documents which you also need to refer to for information and guidance. We actually started writing this post in 2019 when the current AC came out...

So, this post is *just* looking at plotting. That's it. Just plotting.

- **Turbojet aircraft:** If you are operating along a route segment where the distance between standards ground based nav aids **exceeds 725nm**
- **Turboprop aircraft:** ditto ditto **450nm**

But – this was removed in the new AC. **So, do you still need to plot?**

Well, the simple answer is yes, and the more complicated answer is that “plotting” means something a little different now. **It isn’t about drawing it on a map so much as checking and cross-checking your position.**



Click to download the official FAA chart.

What is the difference between the cross-checking versus plotting?

Acceptable procedures are outlined in section 6.4.8 of AC 91-70B.

We used to plot manually in order to check we were where we were supposed to be. This cross-check hasn’t really changed – we are still cross-checking the FMS and master document (OFP) against the currently effective route clearance to prevent inadvertent deviations from the cleared route. **The big difference is you don’t actually have to do it on a paper map anymore (6.4.8.2).**

It is also required regardless of the distance from the nearest NAVAID.

So what do we do it on?

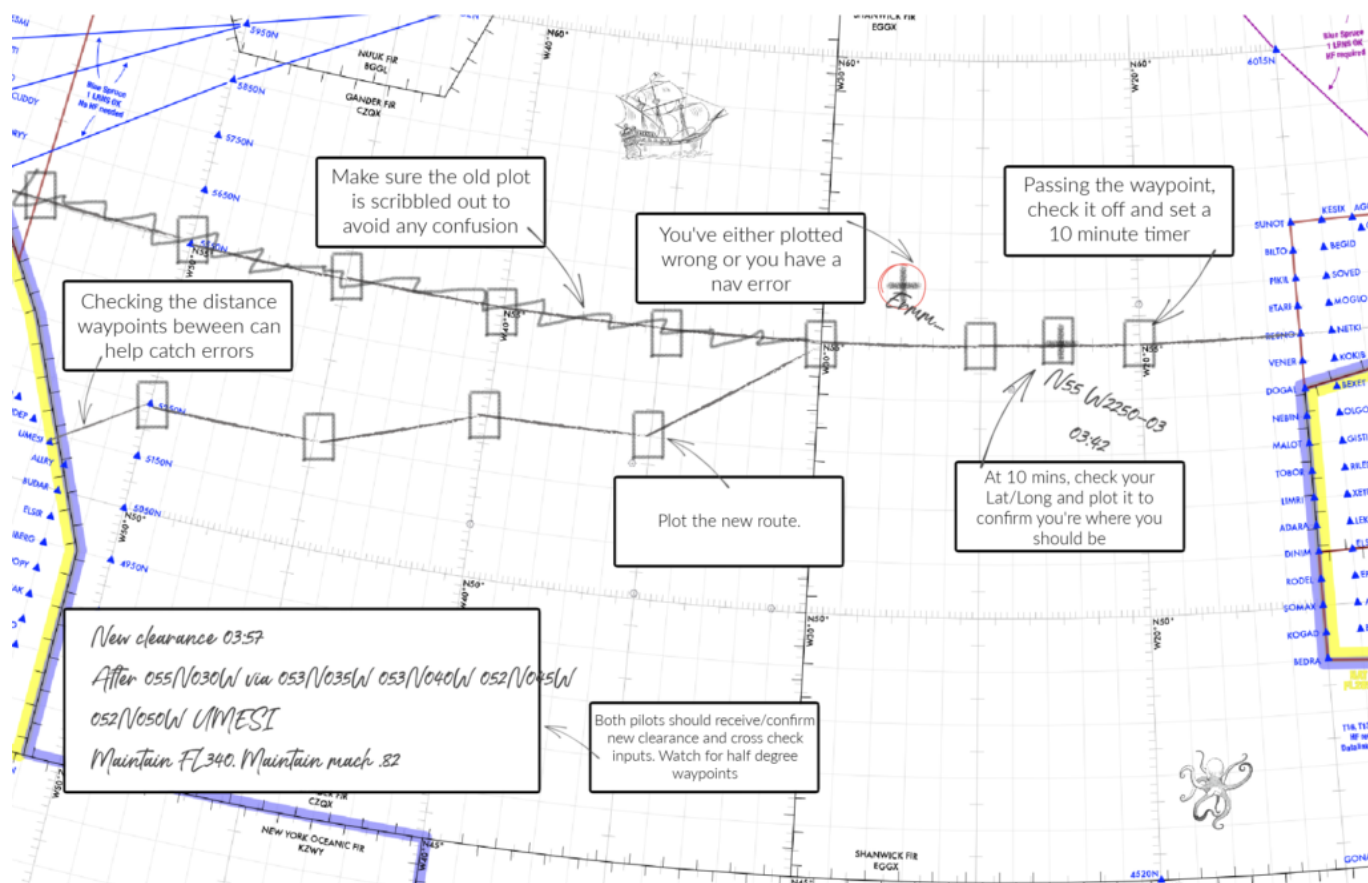
Up until 2019, manual plotting was required, but this changed when the FAA realised FMS-driven navigation displays and what-have-you were actually just as accurate

Opspec/MSpec A061 says you can use an electronic flight bag (EFB) for “interactive plotting” instead of a paper chart (6.3.1.11.2) – in other words an alternate “navigation display”, where the alternate means not necessarily a paper plotting chart.

Back to how we do it...

The aircraft position check should be made at a point approximately 10 minutes after a waypoint.

- Plot your current Lat/Long and record the time.
 - Use the “non-steering” LRNS to find your current lat/long because if your other one is lost it won’t really help you to use it.
 - Confirm the circle/cross/miniature airplane symbol you are using (the nav system is using) to mark your current position agrees with your route clearance. I.e. **its on the right track and not out in the middle of anywhere it shouldn’t be.**
- Next up, have a look at where you’re heading:
 - Check the **active leg** by confirming the **FROM and TO waypoints** of the clearance against the active flight plan
 - Confirm what is in the **FMS matches the clearance**
 - Check you have the **right autopilot mode** in. LNAV/NAv is good. HDG is not good
 - Check the “**expanded**” **waypoint** to make sure there are no rogue minutes in there
 - **Confirm your ETA** over the next waypoint (and check you are flying the assigned Mach number)
 - Check you’re still **SLOP**-ing if you should be, and at some point, make sure the SLOP ends when it should as well
 - Give the wind a quick check as well. It’s just handy to know in case you lose all your LRNS stuff



Just an example, you might do it differently

Re-clearances.

You've done all of the above, prepared a beautiful map ready to go and *horror of horror* ATC send you a new clearance. This is annoying and is the reason most GNE's seem to occur, or rather folk not doing it right is the reason.

- **Confirm the re-clearance** with the other pilot. You both have to "receive" it
- Make sure you tell the aircraft the new clearance otherwise it won't fly where it is supposed to. Both should double check the inputs as well to **catch any finger trouble**
- **Re-plot it** ready for your plotting checks
- It can be a good idea to **check the new distances between waypoints**
- Add in a **little fuel check** in case it is significantly different to your planned route.

A note on half degrees.

Half degree waypoint are fun little things. "Fun" because they are easy to mess up because no-one ever seems entirely sure how to type it into the aircraft computer.

Here is an ICAO paper on it. Well, actually it is on general **waypoint insertion**, but with a focus on half degree ones.

The issue tends to be with the identifiers. For example, ARINC 424 uses an "N-prefix" format which means you might see N5250 and be all *"that looks like half of north 50"* but actually this would mean 52030N

050000W. So you need to potentially check two things here.

- First, if you receive a clearance with a half degree waypoint, confirm the identifier (N5250) has been loaded with the half degree (52030N 050W) like in the picture below
- If you have a clearance with no half degree waypoints and are whacking in pre-loaded Idents, check they **don't** have half degrees - because N5250 might not mean N52000 W050000.



The ident doesn't show the half waypoint - so the full waypoint must be checked. Still confused about what to insert? Read this handy guide from Honeywell.

Watch this space.

The FAA are plotting a new draft - AC 91-70C - which will probably be out towards the end of 2021/ start of 2022.

All done?

We wrote a load of stuff on plotting back in February 2020. Most of it still applies and you can read it here.

We have also made a handy **Opsicle** (refreshing bits of ops info, just for members). This one is called **The FAA North Atlantic Plotting Guide** and if you are a member then you can download it here.

FAA NORTH ATLANTIC PLOTting INFO

A MINI GUIDE TO ANSWER ALL
YOUR QUESTIONS ON THE ART
OF PLOTting, AS PER FAA AC
91-70B

ANYTIME IN OCEANIC OR REMOTE
CONTINENTAL AIRSPACE REGARDLESS OF
DISTANCE BETWEEN GROUND BASED
NAVAIDS

HELPS PREVENT NAVIGATION
ERRORS BEFORE THEY BECOME
GNES

ERRORS

PLOTting MEANS CROSS-CHECKING - CONFIRMING THE
AIRCRAFT IS WHERE IT SHOULD BE.
CAN BE DONE MANUALLY ON A PAPER CHART OR USING A
SUITABLE, ALTERNATE NAVIGATION DISPLAY.

LATERAL DEVIATION EXCEEDS 10
NM FROM CLEARED ROUTE. MUST
BE REPORTED.

GNES

INCORRECT WAYPOINT INSERTED
RE-CLEARANCE NOT LOADED
INCORRECTLY CODED WAYPOINT (HALF DEGREE)
WRONG AUTOPILOT MODE (HDG INSTEAD OF NAV)
FAULTY LRNS
INCORRECTLY ACTIONED CONTINGENCY

CLEARANCE CONFIRMED WITH OFF AND FMS

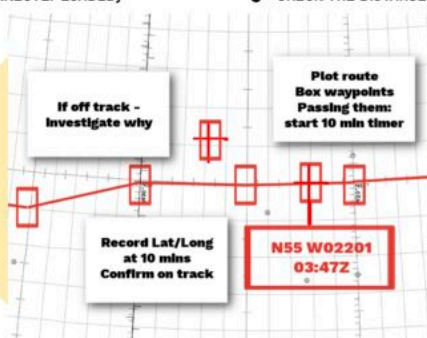
- BOTH PILOTS RECEIVE CLEARANCE
- BOTH PILOTS CHECK CLEARANCE AGAINST
OFF
- INPUT THE CLEARANCE (IF DIFFERENT TO
OFF) INTO FMS, BOTH PILOTS CROSS CHECK
- CHECK EXPANDED WAYPOINT ENTRIES (THE
IDENT MIGHT BE INCORRECTLY LOADED)

VISUAL ROUTE MATCHES CLEARANCE WAYPOINTS

- IF USING A MANUAL, PAPER CHART, PLOT
THE CLEARANCE WAYPOINTS AND DRAW YOUR
TRACK ON BETWEEN THEM
- IF USING AN ALTERNATE NAV DISPLAY, CHECK
IT IS DEPICTING THE CORRECT WAYPOINTS
AND TRACK
- CHECK THE DISTANCES BETWEEN WAYPOINTS

AIRCRAFT IS GOING WHERE IT IS SUPPOSED TO BE GOING

- WHEN YOU PASS A WAYPOINT, MARK IT OFF AND DO A FUEL
CHECK. SET A TIMER FOR 10 MINUTES
- WHEN 10 MINUTES HAS PASSED, CHECK THE NON-
STEERING LRNS FOR YOUR CURRENT LAT/LONG
- PLOT THE LAT/LONG ON YOUR CHART OR CHECK CURRENT
POSITION ON NAV DISPLAY AGAINST CLEARED ROUTE
- INVESTIGATE ANY DISCREPANCY



NEW CLEARANCE 04:05
AFTER 055N030W DIRECT 053N035W 053N035W
053N040W 052N045W 052N050W UMES
MAINTAIN FL340
MAINTAIN MACH .82

RECLEARANCE

OTHER INFO

WEATHER: SAND 300'
EMERGENCY: 30° 5NM
SLOP: 0.1NM INCREMENTS TO 2NM, RIGHT ONLY



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