TGT SPD (c)	F-14 SPD (b)											DTG ►	α =	148
	200	250	300	350	400	450	500	550	600	650	700	750		
200	16.00°	14.18°	12.72°	11.53°	10.54°	9.71°	8.99°	8.38°	7.84°	7.37°	6.95°	6.57°		
250	17.82°	16.00°	14.51°	13.26°	12.21°	11.32°	10.54°	9.86°	9.27°	8.74°	8.27°	7.84°		
300	19.28°	17.49°	16.00°	14.74°	13.65°	12.72°	11.90°	11.18°	10.54°	9.97°	9.46°	8.99°		
350	20.47°	18.74°	17.26°	16.00°	14.90°	13.95°	13.10°	12.35°	11.68°	11.08°	10.54°	10.05°		
400	21.46°	19.79°	18.35°	17.10°	16.00°	15.03°	14.18°	13.41°	12.72°	12.09°	11.53°	11.01°		
450	22.29°	20.68°	19.28°	18.05°	16.97°	16.00°	15.14°	14.36°	13.65°	13.02°	12.43°	11.90°		
500	23.01°	21.46°	20.10°	18.90°	17.82°	16.86°	16.00°	15.22°	14.51°	13.86°	13.26°	12.72°		
550	23.62°	22.14°	20.82°	19.65°	18.59°	17.64°	16.78°	16.00°	15.29°	14.63°	14.03°	13.47°		
600	24.16°	22.73°	21.46°	20.32°	19.28°	18.35°	17.49°	16.71°	16.00°	15.34°	14.74°	14.18°		
650	24.63°	23.26°	22.03°	20.92°	19.91°	18.98°	18.14°	17.37°	16.66°	16.00°	15.39°	14.83°		
700	25.05°	23.73°	22.54°	21.46°	20.47°	19.57°	18.74°	17.97°	17.26°	16.61°	16.00°	15.43°		
750	25.43°	24.16°	23.01°	21.95°	20.99°	20.10°	19.28°	18.53°	17.82°	17.17°	16.57°	16.00°		

Figure 532: Non co-speed intercepts - Test result.

I measured the CATA graphically, htherefore there is a double chance of introducing imprecisions: CB in-game and measurement with GIMP. However, the resulting value is 10.26°, quite close to what the model suggested.

21.2.4 WHAT IS THE PRACTICAL UTILITY OF THIS STUDY?

The issue here is that there is no linear relation between the parameters (at least I can't see one). If, for example, the values of ΔCB expressed as a percentage were constant for different values for DTG, then it would be easy. Unfortunately, this is not the case and the simplest solution in this scenario is using the avionics (e.g. the Collision option on the TID).

There are still some interesting things to notice. Let's start by looking at how the values change for different DTG.

V_{TGT} is constant at 400, DTG is calculated between 80 and 170:

DTG	200	250	300	350	400	450	500	550	600	650	700	750
80	71.67°	65.38°	59.66°	54.54°	50.00°	45.99°	42.46°	39.34°	36.59°	34.16°	31.99°	30.06°
90	63.43°	57.99°	53.13°	48.81°	45.00°	41.63°	38.66°	36.03°	33.69°	31.61°	29.74°	28.07°
100	55.63°	50.96°	46.84°	43.20°	40.00°	37.17°	34.67°	32.45°	30.47°	28.70°	27.11°	25.67°
110	48.14°	44.18°	40.71°	37.67°	35.00°	32.64°	30.55°	28.69°	27.03°	25.53°	24.19°	22.97°
120	40.89°	37.59°	34.72°	32.20°	30.00°	28.05°	26.33°	24.79°	23.41°	22.17°	21.05°	20.03°
130	33.84°	31.14°	28.81°	26.78°	25.00°	23.43°	22.03°	20.79°	19.67°	18.66°	17.75°	16.92°
140	26.92°	24.80°	22.98°	21.39°	20.00°	18.77°	17.68°	16.71°	15.84°	15.05°	14.33°	13.68°
150	20.10°	18.54°	17.19°	16.02°	15.00°	14.10°	13.29°	12.58°	11.93°	11.35°	10.82°	10.34°
160	13.36°	12.33°	11.44°	10.67°	10.00°	9.41°	8.88°	8.41°	7.98°	7.60°	7.25°	6.93°
170	6.67°	6.16°	5.72°	5.33°	5.00°	4.71°	4.44°	4.21°	4.00°	3.81°	3.63°	3.47°

Figure 533: Observations - V_{TGT} = 400.

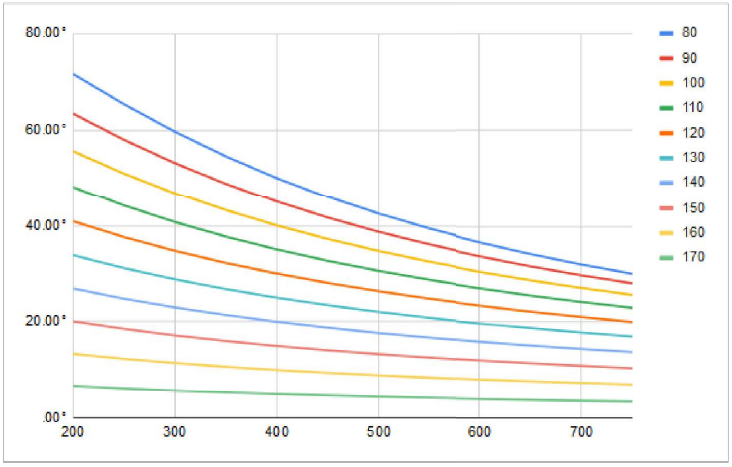

Figure 534: Observations - V_{TGT} = 400. Chart.

It gets even more interesting when we look at the Δ:

DTG	200	250	300	350	400	450	500	550	600	650	700	750
80	-21.67°	-15.38°	-9.66°	-4.54°	.00°	4.01°	7.54°	10.66°	13.41°	15.84°	18.01°	19.94°
90	-18.43°	-12.99°	-8.13°	-3.81°	.00°	3.37°	6.34°	8.97°	11.31°	13.39°	15.26°	16.93°
100	-15.63°	-10.96°	-6.84°	-3.20°	.00°	2.83°	5.33°	7.55°	9.53°	11.30°	12.89°	14.33°
110	-13.14°	-9.18°	-5.71°	-2.67°	.00°	2.36°	4.45°	6.31°	7.97°	9.47°	10.81°	12.03°
120	-10.89°	-7.59°	-4.72°	-2.20°	.00°	1.95°	3.67°	5.21°	6.59°	7.83°	8.95°	9.97°
130	-8.84°	-6.14°	-3.81°	-1.78°	.00°	1.57°	2.97°	4.21°	5.33°	6.34°	7.25°	8.08°
140	-6.92°	-4.80°	-2.98°	-1.39°	.00°	1.23°	2.32°	3.29°	4.16°	4.95°	5.67°	6.32°
150	-5.10°	-3.54°	-2.19°	-1.02°	.00°	.90°	1.71°	2.42°	3.07°	3.65°	4.18°	4.66°
160	-3.36°	-2.33°	-1.44°	-.67°	.00°	.59°	1.12°	1.59°	2.02°	2.40°	2.75°	3.07°
170	-1.67°	-1.16°	-.72°	-.33°	.00°	.29°	.56°	.79°	1.00°	1.19°	1.37°	1.53°

Figure 535: Observations - V_{TGT} = 400. Δ.

DTG	200	250	300	350	400	450	500	550	600	650	700	750
80	-43.3%	-30.8%	-19.3%	-9.1%	.0%	8.0%	15.1%	21.3%	26.8%	31.7%	36.0%	39.9%
90	-41.0%	-28.9%	-18.1%	-8.5%	.0%	7.5%	14.1%	19.9%	25.1%	29.8%	33.9%	37.6%
100	-39.1%	-27.4%	-17.1%	-8.0%	.0%	7.1%	13.3%	18.9%	23.8%	28.2%	32.2%	35.8%
110	-37.5%	-26.2%	-16.3%	-7.6%	.0%	6.7%	12.7%	18.0%	22.8%	27.0%	30.9%	34.4%
120	-36.3%	-25.3%	-15.7%	-7.3%	.0%	6.5%	12.2%	17.4%	22.0%	26.1%	29.8%	33.2%
130	-35.3%	-24.6%	-15.2%	-7.1%	.0%	6.3%	11.9%	16.8%	21.3%	25.3%	29.0%	32.3%
140	-34.6%	-24.0%	-14.9%	-6.9%	.0%	6.1%	11.6%	16.4%	20.8%	24.8%	28.3%	31.6%
150	-34.0%	-23.6%	-14.6%	-6.8%	.0%	6.0%	11.4%	16.2%	20.5%	24.3%	27.9%	31.1%
160	-33.6%	-23.3%	-14.4%	-6.7%	.0%	5.9%	11.2%	15.9%	20.2%	24.0%	27.5%	30.7%
170	-33.4%	-23.1%	-14.3%	-6.7%	.0%	5.9%	11.1%	15.8%	20.0%	23.9%	27.3%	30.5%

Figure 536: Observations - V_{TGT} = 400. Δ%.

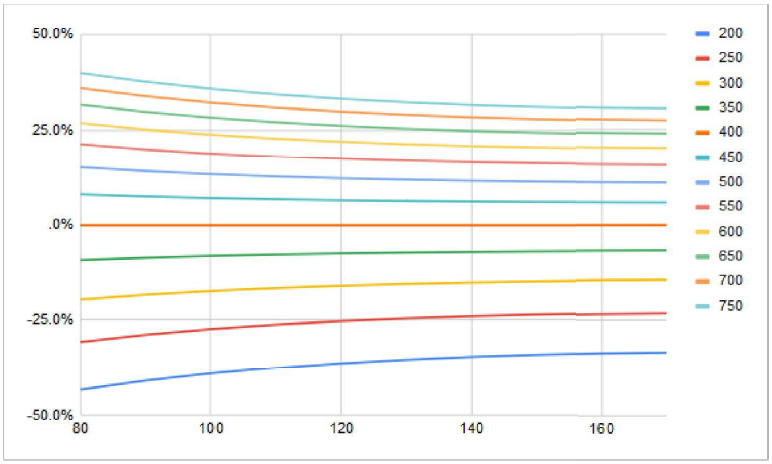

Figure 537: Observations - V_{TGT} = 400. Chart.

21.2.5 OBSERVATIONS AND CONCLUSIONS

After this quick dive into the geometry, what can we conclude?

- **No simple relation**: unfortunately the lack of a simple relation describing the variations of the CATA as a function of ΔV makes the creation of a single model impossible (it would require too many pages: assessing the drift and correcting is much more efficient);
- **Maths & Geometry**. The relation between the parameters is purely geometrical. It does not matter if the values are IAS, TAS, CAS, GS, mm/day; as long as both speeds are measured using the same unit;
- **ΔV**: considering an equivalent ΔV, CB varies more from CBCOSPD when the target is slower than the F-14.
- **Higher DGT** = Less Variation: it may be taken for granted, but there is more: if you look at the Δ percentages of the test right above, they are quite similar after a certain magnitude of DTG, although in reality the variation consists of several degrees. For example, VTGT = 350, DGT = 80 → -9.1%, DGT = 90 → -8.5%. The same interval instead includes from DTG 120 (-7.3%) to DTG 170 (-6.7%). This is important because the RIO can expect a greater variation between the Cut / 2 and the actual CB when Cut is high.
  Therefore, low DTG requires more corrections, since it impacts the angles the most;
- **Low Target Speed**: when VTGT is low, the difference between CBCOSPD and the new CATA is higher.
  For example, considering the Δ for DTG = 130, VTGT = 200 → CB = -8.84°; for VTGT = 600 = 5.33;
- Combining the last two points, we can now identify the case where CB diverges the most from CBCOSPD: low Speed, high Cut (or low DTG). This case is the trickiest as the two parameters make the CB diverge the most from CBCOSPD. On the other hand, the difference decreases along the Cut, to the point where, in extreme cases, reference tables are not even useful anymore.

KNEEBOARD PAGE

A Kneeboard page was added, along this article, to the FlyAndWire pack.

> Note: This page is not meant to be used during a mission, but can be used to draw more conclusions, on top of the ones highlighted in Chapter 21.2.5 . However, in can be an interesting diversion for a bored Radar Intercept Officer :)

This page is quite simple to use: the columns' header with inverted colours is the speed of the F-14 (I choose 400, 500, and 600). The headers are the speed of the target. The rows' header is the Cut. The column having a grey background is the co-speed CB.

CATA for NON CO-SPEED INTERCEPT - v1 **DRAFT**

Cut	200	250	300	350	400	450	500	550	600	650	700	750
100	28°	35°	40°	45°	50°	54°	58°	61°	63°	66°	68°	70°
90	27°	32°	37°	41°	45°	48°	51°	54°	56°	58°	60°	62°
80	24°	29°	33°	37°	40°	43°	45°	48°	50°	51°	53°	54°
70	22°	26°	29°	32°	35°	37°	39°	41°	43°	44°	46°	47°
60	19°	22°	25°	28°	30°	32°	34°	35°	37°	38°	39°	40°
50	16°	19°	21°	23°	25°	27°	28°	29°	30°	31°	32°	33°
40	13°	15°	17°	19°	20°	21°	22°	23°	24°	25°	26°	26°
30	10°	11°	13°	14°	15°	16°	17°	17°	18°	19°	19°	20°
20	7°	8°	9°	9°	10°	11°	11°	12°	12°	12°	13°	13°
10	3°	4°	4°	5°	5°	5°	6°	6°	6°	6°	6°	7°

Cut	200	250	300	350	400	450	500	550	600	650	700	750
100	23°	28°	33°	38°	42°	46°	50°	53°	56°	59°	61°	63°
90	22°	27°	31°	35°	39°	42°	45°	48°	50°	52°	54°	56°
80	20°	24°	28°	32°	35°	37°	40°	42°	44°	46°	48°	50°
70	18°	22°	25°	28°	31°	33°	35°	37°	39°	40°	42°	43°
60	16°	19°	22°	24°	26°	28°	30°	32°	33°	34°	35°	37°
50	14°	16°	18°	20°	22°	24°	25°	26°	27°	28°	29°	30°
40	11°	13°	15°	16°	18°	19°	20°	21°	22°	23°	23°	24°
30	8°	10°	11°	12°	13°	14°	15°	16°	16°	17°	18°	18°
20	6°	7°	7°	8°	9°	9°	10°	10°	11°	11°	12°	12°
10	3°	3°	4°	4°	4°	5°	5°	5°	5°	6°	6°	6°

Cut	200	250	300	350	400	450	500	550	600	650	700	750
100	19°	24°	28°	33°	37°	40°	44°	47°	50°	53°	55°	58°
90	18°	23°	27°	30°	34°	37°	40°	43°	45°	47°	49°	51°
80	17°	21°	24°	28°	30°	33°	36°	38°	40°	42°	44°	45°
70	16°	19°	22°	25°	27°	29°	31°	33°	35°	37°	38°	39°
60	14°	17°	19°	21°	23°	25°	27°	29°	30°	31°	33°	34°
50	12°	14°	16°	18°	20°	21°	23°	24°	25°	26°	27°	28°
40	10°	11°	13°	15°	16°	17°	18°	19°	20°	21°	22°	22°
30	7°	9°	10°	11°	12°	13°	14°	14°	15°	16°	16°	17°
20	5°	6°	7°	7°	8°	9°	9°	10°	10°	10°	11°	11°
10	2°	3°	3°	4°	4°	4°	5°	5°	5°	5°	5°	6°

flyandwire.com

Figure 538: Non co-speed intercepts kneeboard page.

Practical Examples

The following are three simple examples of how the page can be used to determine the CATA.

Example I

VF14 = 500 kts

VTGT = 350 kts

Cut = 40°

CBCOSPD = ½Cut = 20°

We use the second table, fourth column, fourth row from the bottom → 16°. The RIO simply has to command the Pilot to turn until ATA = *16°*.

Example II

This is the same example discussed above in the Practical Test (Chapter 21.2.3).

VF14 = 400

VTGT = 200

Cut = 30

CBCOSPD = ½Cut = 15°

We use the first table, first column, third row from the bottom → 10°. Again, the RIO simply has to command the Pilot to turn until ATA = 10°.

Example III

For the last example I put together a simple scenario:

VF14 = 400

VTGT = 600

Cut = 97

CBCOSPD = ½Cut = 48.5°

Instead, CB in this scenario is *~61°*.

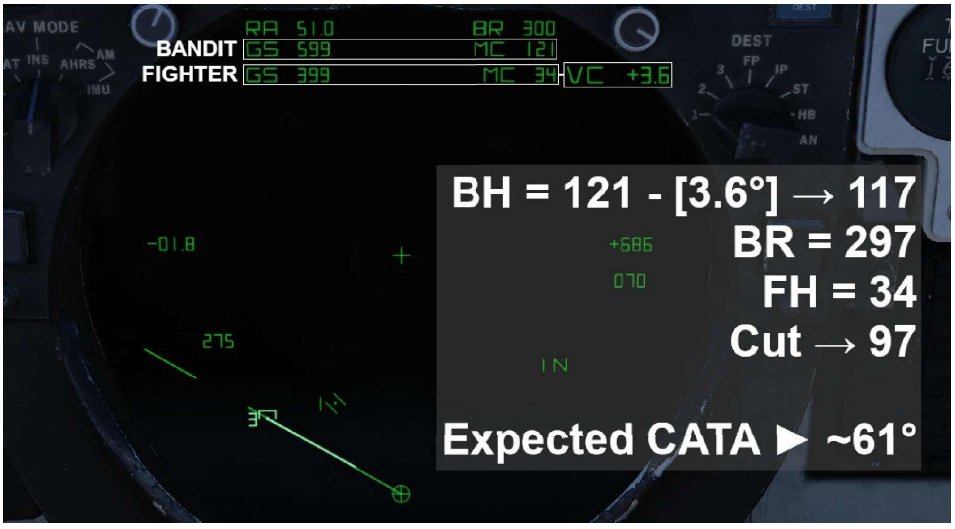

Figure 539: Non co-speed intercepts: practical example of the kneeboard page.

21.3 NS 430: A PORTABLE GPS IN THE F-14

The F-14B is not equipped with a GPS, neither is the F-14A. Nevertheless, both versions flew for a prolonged period, even after the introduction of new technologies and standards such as digital avionics, GPS, LINK16.

The crews took advantage of the GPS technology on older versions of the Tomcat by means of portable GPS. According to the Osprey "F-14 Tomcat Units of Operation Enduring

Freedom" (page 10), the hand-held Garmin Pilot III GPS was one of the devices used by the crews.

DCS has his own stand-alone, cross-module GPS: the Garmin NS 430. Initially released for the Mi-8 and the L-39 (the only two modules featuring a 3D in-cockpit representation of the Garmin NS 430), it is now available for almost any module as a 2D overlay (it seems to have issues for VR players so verify before buying it).

This video shows the Garmin Pilot III used by the RIO for navigation. At 1'32, it clearly shows the latlong coordinates, details about navigation and the moving map over the Afghanistan.

Since even real crews took advantage of GPS devices, why shouldn't we?

DCS NS 430 MANUAL & BASIC CONTROLS

The manual of the NS 430 is available here.

To turn on the GPS, rotate the COM power/volume, located in the top-left corner.

Most of the controls are located to the right of the GPS. The large right knob allows accessing groups of functions of the NS 430. The small right knob is used to access the sub-modes of the selected page.

Figure 540: NS 430 - Main Controls.

The following is a quick overview of the basic and most common functions of the NS 430 combined with the F-14. I don't use the Flight Planning and Navigation functions of the GPS because I mostly rely on INS and TCN; therefore such functions will be barely mentioned.

NAV page

NAV is the first page group and consists of 6 sub-modes. The first and default sub-mode is NAVdef, that displays a number of useful information about navigation. If there is no destination or flightplan set, most of the fields and the graphic display are blank.

A screenshot of this page is visible above. In this case, a single waypoint has been created via the mission editor.

The second sub-mode is NAVmap. This mode shows a coloured moving map centred on the aircraft and oriented similarly to the TID in Ground Stab mode. The displayed range can be adjusted by means of the two dedicated buttons on the right of the screen.

Figure 541: NS 430. NAV → NAVmap.

The map can also be panned by means of the right small knob and a position can be assigned as the current destination by pressing DIRECT-TO and ENT twice (details at page 19 and 20 of the manual). This function is very useful if the INS is degraded and the airfield destination doesn't have a TACAN station. It can also be used as a sort-of ERBL (a function of the ABRIS, aboard the Ka-50).

Figure 542: NS 430. NAV → NAVmap. DIRECT-TO steps: selecting the destination

Figure 543: NS 430. NAV → NAVmap. DIRECT-TO steps: confirming the destination

Figure 544: NS 430. NAV → NAVmap. DIRECT-TO steps: FP updated

If the mission has a pre-set FP created in the mission editor, it will be present in the NS 430 at the beginning of the mission.

The third sub-mode is NAVterrain. This mode shows the terrain in a coloured scale depending on the elevation. This in one of the most commonly used modes in the F-14 if you haven't created a FP.

Figure 545: Ns 430. NAV → NAVterrain

The active Waypoint here displayed has been selected in the example above, by means of NAVmap and DIRECT-TO mode.

The fifth sub-mode is NAVpos. This modes displays the position of the aircraft along with its altitude, ground speed and other info.

Figure 546: NS 430. NAV → NAVpos.

WPT page

This page and its sub-modes display details about the current waypoint. Usually, unless you are flying a pre-built mission or created a FP yourself, you won't use this page unless you have selected a destination by means of DIRECT-TO.

The first and second sub-modes of the WPT page are very useful especially if the destination airfield has no TACAN station, as often happens in the northern part of the Caucasus map.

The first sub-mode of the WPT page is WPTero. It provides the coordinates of the Airport, elevation and other information.

Figure 547: NS 430. WPT → WPTero.

The second sub-mode is **WPTrunway**. The available runways of the selected airport are displayed.

Figure 548: NS 430. WPT → WPTrunway.

As I mentioned already, the WPT page and its sub-modes are not as commonly used as the others unless you plan to create a complete FP or using the DIRECT-TO mode.

More details about those are available in the manual.

NRST page

This is the fourth page and provides information about the nearest airports, VOR, NDB and so on, within 200 miles from your current location. It can be useful in case of emergency or unexpected situation.

Figure 549: NS 430. NRST → NRSTapt.

NRSTapt, for example, allows to select an airfield and see its details by pressing the small right knob (this operation activates the cursor) and selecting an airport ICAO code:

Figure 550: NS 430. NRST → NRSTapt. Cursor activated.

By pressing ENT, information about the airfield are displayed. Press ENT again to return to the previous page:

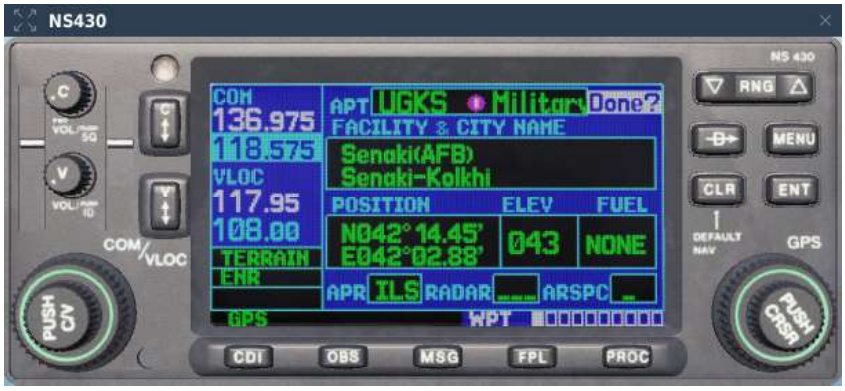

Figure 551: NS 430. NRST → NRSTapt. Details of the airport

The airport highlighted can be used in conjunction with the DIRECT-TO mode. Select the airport and follow the same steps we followed before:

Figure 552: NRST → NRSTapt. DIRECT-TO mode

Figure 553: NS 430. NRST → NRSTapt. New destination set by means of the DIRECT-TO mode.

Other functions

The NS 430 provides information about precision and non-precision approaches and allows the creation of detailed Flight Plans. Such topics are beyond the scope of this article so I won't cover them. More info are available in the manual.

Recap of the Main Functions

This is a summary of the functions that I use the most. Depending on your use of the Flight Planning functions, you may use the following functions or others I haven't covered.

1. NAV (first page group)
    - NAVmap (2nd sub-mode): moving map, can be panned and the destination can be used as destination or to measure distances.
    - NAVterrain (3rd sub-mode): moving map, shows the terrain elevation.
    - NAVpos (5th sub-mode): displays the position and altitude of the aircraft, time, ground speed and other info.
2. NRST (fourth page group)
    - sub-modes allow selecting between the nearest airports, NDB, VOR, etc.

NS 430 rotary knobs

When assigned to a joystick button, such as a rotary encoder, the knobs of the NS 430 tend to turn more than one page or sub-mode with a single pressure. This behaviour is similar to one of the knobs of older modules, such as the KA-50 and its ABRIS.

I found a workaround on ED's forum, credits to Chic. I suggest you to use it along a mod manager such as OvGME.

21.4 IFF AND SRS: PRACTICAL USAGE EXAMPLE

> The following article has been written by **132nd.LooneyT** about the use of the Transponder in the 132nd Virtual Wing.
> The original Google Drive file is available here.

With the use of SRS within the wing, the ability was created to start using the Transponder in DCS and LOTATC.
This enables fast identification of aircraft on the LOTATC radar screen and airport view, allowing a more efficient way of controlling, as well as limiting the number of errors made by controllers.

SRS simulates mode 1, mode 3 and mode 4 IFF systems. Since LOTATC can "see" the altitude an aircraft is at, we can say that mode 3/A is also simulated.

Mode 1 provides a 2 digit, octal (numbers 0 – 7), "mission code" that can be used to identify the aircraft type or mission.

Mode 3/A provides as 4 digit octal identification code for the aircraft, assigned by the controller, and is used to identify the aircraft itself.

Mode 4 is a 3 pulse reply, encrypted, based on an encrypted challenge made by a radar. It is most commonly used as an IFF system onboard radar-capable aircraft to "challenge" a radar contact to see if the reply is correct. Usually, when the reply is incorrect, a contact is labelled something different to Friend, such as Neutral or Hostile.

LOTATC can "read" mode 1 and 3/A codes and will display this information to a controller.

Remember, mode 4 is only used by a pilot in a radar capable aircraft equipped with a mode 4 interrogator in DCS. Aircraft capable of making a mode 4 "challenge" are, among others, the F-16, F-18 and F-14.

This document serves to illustrate the use of the SRS radio overlay and DCS chat commands as well as showing the correct use of the IFF related brevity. Airframe-specific description of the IFF equipment can be described in the squadron's SOP or other document.

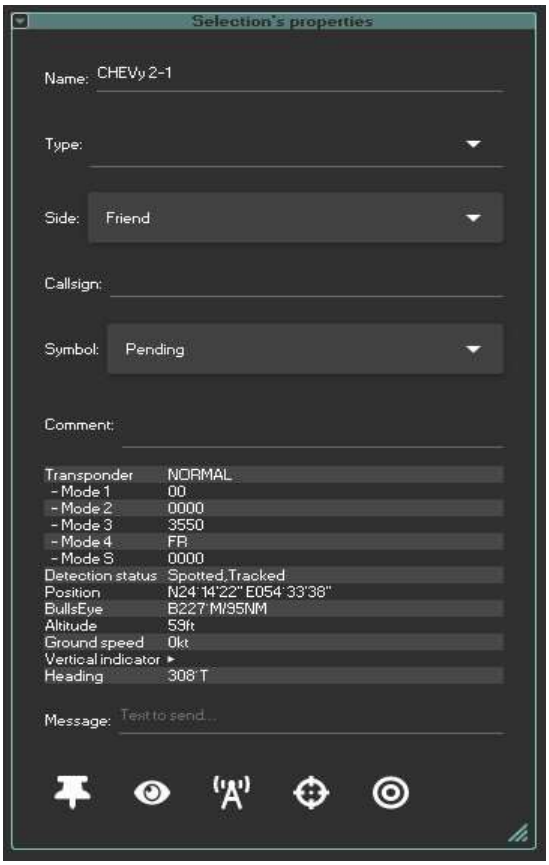

Plate 27: IFF – A contact showing IFF mode 3 and 4 (3550 FR (Friendly)).

As we are using a mix of NATO and Non-NATO airframes within the 132nd, the use of mode 1 and 3 is globally provided by the SRS overlay. Aircraft which are capable of using their onboard DCS IFF are the A10c, F14, F16, F5 and F14 with more to come at the time of this writing.

All other units can use the SRS overlay to set their IFF codes! You can even power on, change and set the different transponder options using the DCS chat. We'll get to that later.

21.4.1 SRS RADIO OVERLAY

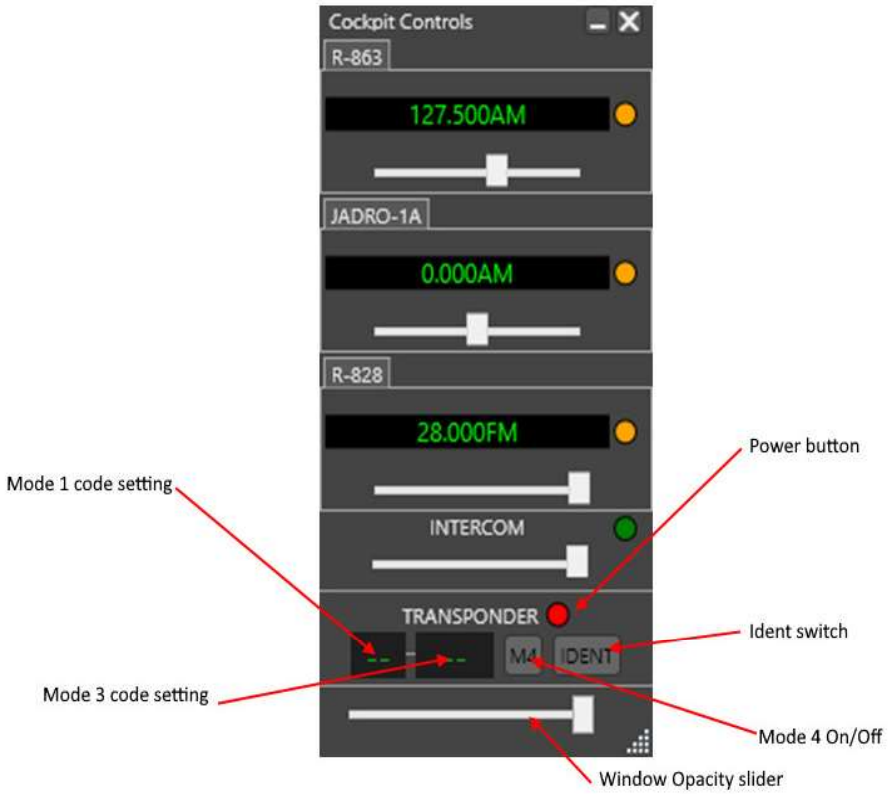

Plate 28: IFF – Example of SRS overlay in an Mi-8.

- **Power button**: Click this red circle to power on the IFF transponder. It will show green once powered. Click again to switch off the IFF transponder.
- **Mode 1 code setting**: Once powered on, you can set a 2-digit, octal (0 – 7) code in this window.
- **Mode 3 code setting**: Once powered on, you can set a 4-digit, octal (0 – 7) code in this window.
- **Mode 4 On/Off**: Switches On/Off the Mode 4 encrypted radar reply system. It will show green once powered On.
- **Ident switch**: This toggles the IDENT function of a transponder. Once pressed it will turn green and the controller will show a red glowing box around the contact's details, indicating it has pressed Ident. The Ident function as active for 40 seconds.
- **Window Opacity slider**: Slider to set the opacity for the complete overlay.

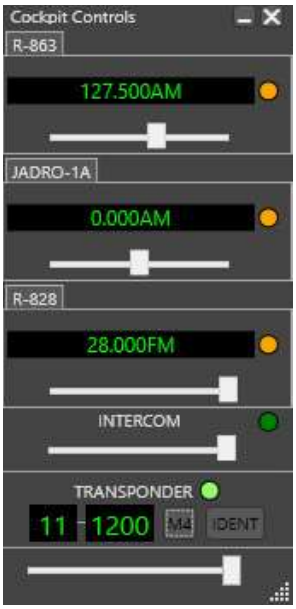

Plate 29: IFF – A powered on transponder.

Plate 29 shows a transponder set to operate, mode 1 code set to 11 and mode 3 code set to 1200. Remember, you must switch on the Transponder before you are able to set a mode 1 or mode 3 code. When powered OFF, the M4 and Ident switch will not work.

Pressing IDENT is usually done at the request of a controller. It helps the controller to quickly locate an aircraft in the clutter of the radar screen. Once pressed, LOTATC will display a contact as shown in Plate 30, allowing it to be easily identified by the controller. After 40 seconds, the IDENT will stop automatically. Note, the 40-second timer may change in the future.

Plate 30: IFF – An aircraft after pressing the IDENT switch on the transponder.

The M4 button is used to set the IFF to the coalition you are currently in. Presently, the IFF in DCS is coalition-based, so anyone will show up as a Friend once M4 is active, and you are being interrogated by another friendly pilot.

Note that the M4 button is only used to indicate to LOTATC which coalition you are in.

21.4.2 DCS CHAT TRANSPONDER SETTING

In order to allow (VR) pilots to set their transponder quick and easy, SRS can be activated using the DCS chat.

Simply use the **`LEFT-SHIFT TAB`** key combination to bring up the DCs chat window in game. Now, a selection of commands are available to fully control the SRS transponder.

All commands are preceded by SRSTRANS. A list of all available commands is listed below.

Plate 31: IFF – DCS chat window with commands to SRS.

TRANSPONDER / IFF PANEL CHAT COMMANDS

Type in chat (local or global)

SRSTRANS e.g. SRSTRANS POWER:ON or SRSTRANS POWER ON

Commands can be chained so you can do SRSTRANS M3 7777 M1 12 M4 ON IDENT ON to set mode 3 to 7777, mode 1 to 12, mode 4 to on and Ident to on.

Complete list is;

- M4 OFF or ON
- M3 OFF or a 4 digit number
- M1 OFF or a 2 digit number
- IDENT OFF or ON
- POWER OFF or ON

21.4.3 BREVITY AND COMMUNICATIONS

With a new function comes new brevity and abbreviations. Within the 132nd the following brevity words are used for use with a transponder;

- **Parrot** – IFF equipment
- **Squawk <code>** – Set your IFF to a certain code
- **Squawk Ident** – Press Ident button on your transponder panel or use SRS overlay
- **Squawking** – Informative call that indicates the sender is responding with a certain code or Ident

- **Sweet** – Equipment is working correctly
- **Sour** – Equipment is broken or malfunctioning

The communication for the correct use of the IFF transponder is usually started by a controller, *all numbers are spoken as separate numerals*. 3412 is spoken as Three Four One Two.

> *Viper1-1 this is Kutaisi ground, squawk 3412.*
>
> *Kutaisi ground this is Viper1-1, squawking 3412*

It is not uncommon for pilots to set their IFF up before contacting a controlling authority and stating they've set their codes to a certain number;

> *Kutaisi ground this is Axe2-1 with information Delta on board, squawking 4412*
>
> *Axe2-1 this is Kutaisi ground, parrot sweet, information Delta is correct…*

If a flight is calling in that has multiple aircraft in it, in this case Falcon flight of 4 times F-16s, a controller may state the following:

> *Falcon 4-1 this is Darkstar, squawk 4401 in sequence*

This means that Falcon4-1 will squawk 4401, Falcon4-2 will squawk 4402, 4-3 uses code 4403 and lastly Falcon4-4 will squawk 4404.

If a mode 1 needs to be set, the call is as follows:

> *Viper1-1 this is Darkstar, squawk mode 1, 14*
>
> *Darkstar this is Viper1-1, squawking mode 1, 14*

If a mode 1 (code 14) and mode 3 (code 4501) needs to be set, the call is as follows;

> *Viper1-1 this is Darkstar, squawk 14 4501*
>
> *Darkstar this is Viper1-1, squawking 14 4501*

Ident is requested as follows;

> *Falcon4-1 this is Kutaisi tower, squawk Ident*
>
> *Kutaisi tower, this is Falcon4-1, squawking Ident*

If a pilot reports a code, but it is not showing up in LOTATC, the controller will inform the pilot using the sour brevity.

> *Falcon4-1 this is Tower, your parrot sour*

Falcon 4-1 now checks his equipment and remedies the situation, now he is squawking correctly.

> *Falcon 4-1 this is Tower, your parrot now sweet*

Any flight can declare their IFF equipment not functioning by making the informative call to a controlling agency;

> *Darkstar this is Axe2-1, my parrot sour*

21.4.4 SPECIAL CODES

Within the aviation world, there are a couple of modes 3/A codes that are used in special cases. These codes are:

TRANSPONDER CODE	ALLOCATED USE
7000	VFR standard squawk code when no other code has been assigned
7600	Lost communications (NOCOMMS), radio failure
7700	General emergency
777	Interceptor aircraft on active air-defense missions and operating without ATC clearance, e.g. Scramble mission

Use of these codes is at pilot's discretion and can be set at any time (except 7777), regardless of what a controller told a pilot to set. These codes will indicate to a controller that something is wrong, except for 7000/7777. Squawking 7700 will also make you glow red on the LOTATC screen so be prepared to answer questions from the controller.

Two codes that *are not allowed to be set* are:

TRANSPONDER CODE	ALLOCATED USE
7500	Hijack or unlawful interference
0000	Non-discrete code, standard LOTATC code for any contact, hence completely unuseful.

When you set your transponder code, care must be taken not to set any emergency code during a code change!

For example, when changing from 0500 to 7000 (VFR code); you might set your first digit to a 7 (thus squawking 7500) and at this time, set your second digit back to zero. However,

since you've set 7500 in the meantime, you will draw a lot of attention to yourself by doing this.

The recommended method to changing code is to first set your transponder to standby or off (in case of in aircraft equipment) or use the DCS chat SRSTRANS method to set a code directly or switch it off in the overlay first.

Mode 1 codes will only be given at the discretion of the mission designer, AMC or controller if it helps to keep things organized. Check the ATO or event page to make sure you set the correct code or hand out the correct code in case of being a controller.

21.5 PILOT'S RIOING BRIEF MANUAL

This chapter has been inspired by the feedback received when hosting workshops about the F-14. One of the most interesting point raised was about providing enough training and documentation to the Pilot so that he can understand the flow, the limitations and the capabilities of the platform and provide valuable suggestions and ideas to the RIO.

Ideally, the Pilot should be able to play as RIO as well, at least at basic level. The bare minimum is reading the manual at least a couple of times (vice versa, the RIO should be familiar with the performance and limitations of the airframe and should actively help the Pilot when WVR for instance by making sure that he is faster than the corner speed).

Golden Rules!

1. Don't do "pilot shit". Last time a dwarf in the front seat did some pilot shit, Goose died. Remember Goose.
2. Don't take the radar unless you are told so, or you are WVR. It messes up RIO's settings and screws up the SA.

21.5.1 AWG-9 WCS & AIM-54: LONG STORY SHORT

This list introduces the AWG-9 / AIM-54 combination:

- Analogue technology from the '60s, originally meant to be used on the F-111B.
- Two radar modes, Pulse and Pulse Doppler (Low and High PRF).
- Detection range of fighter-sized contacts: ~80nm.
- AIM-54 is available in three combinations of seeker and rocket motors. Mk47 is less powerful, C version has digital seeker, hence more resistant to countermeasures.

- AWG-9 is not the first look-down, shoot-down radar, but it still has some issues in such situations. It's unbeatable when looking upwards.
- Notching targets (ergo with relative speed equal to zero) are filtered by the same filter that removes ground returns (MLC). This filter can be manually operated, but the RIO and the antenna should look up to avoid unwanted returns.
- If the speed of the Target and the F-14 are similar, the target disappears (Zero Doppler Filter – ZDF), the RIO can't do much about it.
- Information provided by the WCS are fundamentally the same as more modern aircraft, but the "human interface" is nowhere near as evolved. Operate the WCS takes time.
- The avionics operate in Magnetic only.
- Maintenance procedures, such as re-aligning the INS during very long missions or after a dogfight, usually require the cooperation of the Pilot.

21.5.2 THE MEANING OF THIS ALL

- The AWG-9 WCS is very powerful but old, it provides plenty of information and tools, but it is not as immediate as modern aircraft. It requires a good deal of eyeballing (or time).
- The RIO is usually in charge of comms. On top of the reason above, it means that he can be overwhelmed in some situations.
- The avionics, especially the INS, is very sensible to hard manoeuvre. Don't over-G unless it is really necessary.
- The pilot may seem to be the secondary role in BVR, but he is still in charge of the aircraft. Moreover, he has the duty of overseeing comms, SOP, timeline, maintain SA, manage wingmen and so on. The F-14B is as powerful as both its crewman are proficient and synergic in their roles.

21.5.3 UNDERSTANDING WHAT YOU ARE LOOKING AT

The first step is giving some sense to what the Pilot sees on the TID repeater. The following is a fairly standard view. The Pilot **must be familiar with these views**.
All the necessary additional details are in the manual.

Figure 554: TID NAVGRID, contacts and waypoints on the TID repeater.

The "spider-web"-ish thingy is the NAVGRID (commonly used in DCS as the Bullseye). It originates from the bullseye location and the RIO can set its Width, Number of sectors and Orientation. The image shows one of my usual settings for expected threats from between NE to W. Each sector is 30° wide and I always attempt to have a perpendicular set or arms in order to make the eyeballing process much easier. Each mark on the YY corresponds to 50nm.

The red "L" is our aircraft, the arms spreading on the sides are the radar cone. The direction vector is the bisector of the cone. When this is not the case, the RIO is moving the antenna around. Notice how the arms are represented by a dashed line, each of these (even the missing one) represent 20nm.

The Blue marks highlight the Waypoints. Displayed are WP1, WP2 and HB.

The yellow mark instead shows a radar or DL contact (in this case, our AWACS). If the symbol is shown on the bottom half, it comes from the Datalink. If it's on the top, it's picked up from our radar. In this case, is marked as friendly from the LINK4, but it is still marked as unknown by the RIO. The number on the left represent its altitude ("3" means between 25000ft and 35000ft).

EXAMPLE

If the WP2 were a target, for instance, its YY would be something like:

> *Bullseye, 345 33 20000 thousand*

The bearing from YY is straightforward, being the target between the 360° and 330° arms. The range looks to be further than half of the first mark (=25nm), but not between the haf-mark (=25nm) and the mark (=50nm), which should be 35.7nm. 33 seems a decent approximation. The altitude can be established easily by hooking, here I just write a number that falls into the interval.

Bear in mind that in a real situation the F-14 is moving, the targets are moving and so on. We simply do not have the tools to be as precise as a JDAM, we have to do our best with what we have.

21.5.4 MORE INFORMATION COMING UP

This is another standard view. It shows a contact hooked by the RIO. The target is highlighted and very visible.

Figure 555: NAVGRID reference - TID repeater.

Figure 556: NAVGRID reference - TID repeater.

The top of the screen shows different information (the RIO can select others by means of the CAP).

The information displayed have a different meaning depending on the TID mode used and, if in GS, if the NAVGRID is enabled or not. As a rule of thumb, is you see the NAVGRID, that's the reference point.

Usually:

- **RA**: Range from the YY or F-14B to the hooked object.
- **BRG**: Bearing. In GS+NAVGRID is from the YY, otherwise is the Relative Bearing from the nose of the F-14.
- **AL**: Altitude of the target.
- **MC**: Magnetic Course of the target.

The "34B" reading near the target is the YY reference: heading is rounded and only the two most meaningful digits are displayed (e.g. 337°→"34"). "B" means that the target is in the second YY mark: A=0-50nm; B=50-100nm and so on.

The TID in Aircraft Stabilized mode (Figure 557) still displays the YY reference values (highlighter in blue). Altitude and MC are still the same, but Range and Bearing displayed subsequently (yellow box) are now calculated using the F-14 as reference (compare them with the previous image).

This mode also shows the vertical limits of the radar cone (0-99, red circles) on top of the antenna elevation angle.

Figure 557: TID in Aircraft Stabilized mode - TID repeater.

21.5.5 HOW CAN THE PILOT HELP THE RIO

There are several things that the Pilot can do to help the RIO. There are some of those. These points and others should be discussed by the crew, and appropriate contracts should be developed.

MASTER ARM AND OTHER SETTINGS

Most of the preparations for an engagement are done and cross-checked during the FENCE-IN. Master Arm may be done later (at the Commit phase of the intercept, for example). If the RIO doesn't tell you, don't sit there when he calls FOX-3, tell him and turn on the Master Arm.

ANTENNA ANGLE

If the RIO has issues looking for a target, sometimes the reason can be as simple as a wrong antenna setting (can happen, due to over-saturation of tasks). If he is looking for a target higher than the F-14 and you notice that the antenna elevation angle is very low, tell your RIO.

TIMELINE AND RANGE

The Timeline goes fast, really fast. If two fighters are running head-on faster than Mach one, each step of the timeline may take just a little more than 10"-15". Reading the Slant Range to the RIO may help him a lot, especially if he is new to the procedure.

COMMS HANDLING

The Radar Intercept Officer, especially if new, may be easily overwhelmed by having to handle 2 radios, ICS, AWG-9 WCS, follow the timeline, build SA, develop the geometry and plan and so on, whilst trying to lock a target that keeps notching and jinking. Handling non-necessary comms on the radio is a real life-saver in such situations.

PLAY AS A TEAM AND BE PROACTIVE

This is applicable to both and sums everything up. Be positive, be constructive. Mistakes happen to people that fly for a living, this is just a game.

The RIO loses the target? Peek at the TID repeater, you may recognize a situation the RIO hasn't (ZDF, for instance). Another example, if you think the geometry is not correct, just say it, don't be shy.

21.6 ***COMMON BREVITY CODES

The biggest issue I had when I approached this hobby was putting all those cool words listed here and there over the Internet into an understandable context. There are many sources around but the vast majority are never-ending lists of words with little practical meaning the first you read them.

In this article I try to separate and arrange by context the most commonly used brevities. This is by no means a comprehensive list and it is mostly focused on Air-to-Air operations.

21.6.1 MESSAGE FORMAT

Messages usually follow this structure:

Recipient, Sender, Message.

For example, if the callsign of our F-14B is Diamond 1-1 and the Controller is Darkstar the message we will send on the net to get the picture will be:

> *Darkstar, Diamond 1-1, Request Picture.*

21.6.2 BREVITIES

Some brevities are marked with an asterisk. This marks that the meaning may differ from NATO brevity word. The brevities marked with a caret (^) are not NATO brevities.

> **Important!**
> The meaning of a few brevities changed through the years. In some parts of this book you may find the meaning as the reference documentation used it (see: Abort). The following list is instead based on the 2020 Multi-service document. The context, unless specified, is *Air-to-Air*.

Definitions	**FURBALL**: non-FRIENDLY and FRIENDLY aircraft are inside 5nm from each other. Altitude: • **ANGELS**: Altitude in thousands of feet. Friendlies only. • **CHERUBS**: Altitude in hundreds of feet. Friendlies only. Radar Returns Definition: • **CONTACT(S)**: Individual radar return within a GROUP; • **GROUP(S)**: any number of CONTACT(S) within 3nm in azimuth or range of each other;

	• **PACKAGE**: Geographically isolated collection of GROUPS outside of briefed range. **STRENGTH**: numerical strength of a TRACK or GROUP. Groups Strength Definitions: • **SINGLE**: One GROUP, CONTACT, etc. • **HEAVY**: A GROUP known to contain three or more CONTACTs. • **GORILLA**: Large force of indeterminate numbers and formation of unknown or non-friendly aircraft. Others: **PLAYTIME**: amount of time the aircraft can remain on station, in hours plus minutes (e.g. one plus thirty → 1h30'). **SINGLE**: One GROUP, CONTACT, etc.; **TRACK (Direction)**: GROUP or CONTACTS direction of flight or movement; Answers: • **ROGER:** radio transmission received. It does not indicate compliance or reaction; • **UNABLE**: cannot comply as requested or directed; • **WILCO**: will comply with received instructions. **ZIPLIP**: limit transmission to critical information only.
Controller Status: used when a controller starts providing or terminates services.	• **SUNRISE**: C2 sensors are available. Opposite of MIDNIGHT; DCS: Controller starting services. • **MIDNIGHT**: C2 sensors unavailable due to degradation. DCS: Controller terminating services.
Classification (ROE): classification relative to the ROE of a specific contact/Group, usually filled-in in BULLSEYE/BRAA calls.	• **HOSTILE**: Contact identified as enemy, fire authorized; • **BANDIT**: Contact identified as enemy, fire (usually) not authorized; • **BOGEY**: Unknown identity; ◦ **OUTLAW**: CONTACT meets point of origin criteria for ROE; ◦ **SPADES**: Interrogated GROUP or radar contact lacks all the ATO (or equivalent) IFF or selective ID features modes and codes for the ID criteria; • **STRANGER:** Unidentified traffic not participant in the action in progress; • **^FRIENDLY**: Friendly contact. • **^NEUTRAL**: positively ID object whose parameters

	indicate is neither supporting or opposing FRIENDLY forces.
Request Identification	***DECLARE (GROUP/BRAA)**: Request current identification for specified BRAA or Group. Responses include FRIENDLY, BOGEY, BANDIT, HOSTILE, NEUTRAL, UNABLE, CLEAN or FURBALL (*Note*: 2020 documentation requires the inclusion of Bullseye data.)
Request information: different way to obtain information. PICTURE is default post check-in and it provides information about the tactical theatre using BULLSEYE. Other means use lower tactical level and BRAA. SNAP and CUTOFF can be used to rejoin / intercept tankers or other friendlies.	• ***PICTURE**: Request for air theatre information in Bullseye format; • **STATUS (GROUP)**: Update about the specified GROUP in Bullseye format; • **BOGEY DOPE**: Request closest or specified Group information in BRAA format; • **SNAP**: Request immediate BRAA to the specified GROUP. Indicates fighter intent to intercept of join; • **CUTOFF**: Request for cutoff intercept geometry. • **STERN**: Request for, or directive to, intercept using STERN geometry; Provide information (Controller): • **NEW PICTURE**: used when tactical picture has changed. Supersedes all previous calls and re-establishes PICTURE for all players. • ***POP-UP**: GROUP that has suddenly appeared between the MELD and the threat range. • **THREAT (Direction)**: untargeted HOSTILE or BANDIT or BOGEY is within briefed range of a FRIENDLY aircraft. • **LEAKER(S)**: airborne threat has passed through a defensive layer. ***ALPHA CHECK**: request for confirmation of bearing and range from aircraft to described point;
Distance, request and description	**SEPARATION**: Request for separation between two Groups. The response includes the follow-on GROUPS separation, altitude and fill-ins. Variation of separation: • **CLOSING**: separation is decreasing (positive VC); • **OPENING**: separation is increasing (negative VC).
Positional References: typically the answer	• **BULLSEYE**: Bearing (magnetic), Range, Altitude form

from an enquiry to the controller, BULLSEYE is used for the picture to all the players in the AO, BRAA for tactical control.	a common reference points. • **BRAA**: Position of an objected relative to another (Bearing, Range, Altitude, Aspect).
Contact Description	Altitude: • **HIGH**: Contact altitude over 40000ft; • **MEDIUM**: Contact altitude between 10000ft and 25000ft; • ***LOW**: Contact altitude lower than 5000ft. • **HIT(S)**: Indicates an approximated altitude (e.g. in BULLSEYE calls). Speed: • **VERY SLOW:** contact GS than 100 kts; • **SLOW**: contact GS between 100kts -250 kts; • **FAST**: contact GS between 600kts and 900kts / M1-M1.5; • **VERY FAST**: contact GS higher than 900kts / M1.5. Aspect: • **HOT**: contact aspect stabilized at 160°-180° from the tail or 0°-20° from the nose; • ***FLANK (Direction)**: contact aspect is stabilized between 120°-150° from tail, or 30°-60° from the nose; • **BEAM (Direction)**: contact aspect stabilized within 70°-110°; • ***COLD**: contact aspect stabilized between 0°-20° from the tail, or 160°-180° from the nose; • ***DRAG**: contact aspect stabilized at 0°-60° from the tail, or 120°-180° from the nose. Others: • **CONS/CONNING**: aircraft is producing contrails; • **^MARK**: challenge and response term for requested aircraft to report contrails. • ***MOSQUITO**: low speed and low RCS target.
Taking/Releasing responsibility: these are used for deconfliction and space management. By default, once a	• ***COMMIT**: aircrew intercepts the GROUP of interest or set briefed intercept geometry. • **TARGET**: directive call to take responsibility for a specified GROUP. • **TARGETED**: informative call that an aircrew has taken

friendly has taken responsibility for the specified Group, other friendlies will not COMMIT/TARGET it.	responsibility for the GROUP. • **RESET**: proceed to pre-briefed position (disengaging); • **DROP(ING)**: the aircrew has released monitoring responsibility of a specific GROUP and it is resuming search; • **MONITOR(ING) (Group or Object)**: maintain(ing) sensor awareness on the specified GROUP or object. Implies the communication of tactically significant changes. **SKIP IT**: Directive call for a specific platform to not engage the indicated track. Usually followed by other directions. **(Object) NO FACTOR**: Object is not a threat. **ABORT**: cease action or terminated attack prior to weapons release or event or mission. ***POST ATTACK (Direction, Directive)**: desired direction or directives after completion of intercept or engagement.
Friendly Targeting and Challenge	**BUDDY SPIKE (Position or Heading or Altitude)**: FRIENDLY system radar lock-on indication on the radar warning receiver; **BUDDY LOCK (Position, Heading, Altitude)**: a known FRIENDLY is locked. Normally response to a SPIKED or BUDDY SPIKE call. **RAYGUN (Position, Heading, Altitude)**: radar lock-on to unknown aircraft OR request for a BUDDY SPIKE reply from FRIENDLY aircraft meeting these parameters.
Missile launch call (Employment): broadcast to alert friendlies on the net of a specified missile launch.	**FOX 1-2-3**: Abbreviation from FOXTROT (FIRE) for launch of ait-to-air weapon. • **FOX-1**: semi-active radar guided missile; • **FOX-2**: IR-guided missile; • **FOX-3**: active radar missile. **(2nd) FOX 1-2-3 OR (Number) SHIP**: Missile launch against separate targets (assumes one missile per target). If **2nd** prefix is used, indicates launch of multiple missiles on the same target. **GUNS**: aircraft guns being used. **^SHOOT**: Directive communication to employ weapons on a contact. Does not invoke targeting.
Post Employment tactics and Situations	• ***SKATE**: executing Launch-and-Leave tactics at pre-briefed range. Modifiers can include LONG and SHORT. (CNATRA documentation: leave pre-DOR);

	• **SHORT SKATE**: executing Launch-and-Leave tactics (CNATRA documentation: leave pre MAR/DR); • **BANZAI**: executing Launch-and-Decide. The intent is manoeuvring into the visual arena. **BLOW THROUGH**: directive to call to continue straight ahead at the MERGE and do not become ANCHORED with target(S). **BLOWING THROUGH**: informative call, the intercepting aircraft is dropping targeting responsibility and commencing a BLOW THROUGH. **ANCHORED (Location)**: turning engagement at specified Location. **MERGE(D)**: FRIENDLIES and targets have arrived in the visual arena.
Post Employment Missile status	• **HUSKY**: active radar missile is at HPRF guidance range; • **PITBULL**: active radar missile is at MPRF guidance range (DCS: AIM-54 active); • **TIMEOUT**: shooter assesses valid BVR shot parameters have been met and missile has reached termination; • **TRASHED**: FRIENDLY missile defeated. **SPLASH(ED)**: Target destroyed.
Intercept Control and Description	Description: • **COLD**: the intercept geometry will result in a roll-out behind the target; • **HOT**: the intercept geometry will result in passing in front of the target. ***JUDY**: The crew has control of the intercept and does not need additional guidance. The controller minimizes comms and provides SA information.
Fuel status	**JOKER**: Fuel status above Bingo at which separation or BUGOUT or even termination should; ***BINGO**: Fuel status when recovery begins; **TIGER**: Enough fuel and ordnance to accept a commitment.
Aircraft Status	Aircraft status (colour coded): • **GREEN**: aircraft is in a weapon and/or fuel pre-determined state that allows continuation of the

	mission. • **YELLOW**: aircraft is at a weapon and/or fuel status that is approaching a level insufficient to continue the execution of the mission. • **RED**: aircraft is at weapon and/or fuel pre-briefed state that is insufficient to continue execution of the mission. Status enquiry: • **STATUS (Phase)**: request for an individual's tactical situation; • **^STATUS (Phase)**: Directive call requesting amplifying information on current task or aircraft state. E.g. respond with WORKING, VOID, CONTACT, TARGETED, LOCKED, CLEAN, FUEL (R/Y/G), WEAPON (R/Y/G) ready or plain English. **WHAT STATE**: Request number of, order: 1. Active: Active radar guidance missiles; 2. Radar: Semi-active radar guidance missiles; 3. Heat: IR guided missiles; 4. Fuel: lbs of fuel or time remaining. Example, in response to WHAT STATE: "Blue 44 is 3-1-2 by 7 POINT 5". Equivalent to 3xAIM-120, 1xAIM-7, 2xAIM-9, gun with ammunition, and 7,500lbs of fuel remaining. Ammunition or oxygen are reported only when specifically requested or critical. **^WEAPONS (Status)**: weapons employment. Fire only: • FREE: at target not identified as FRIENDLY in accordance with current ROE; • TIGHT: at targets positively identified as HOSTILE in accordance with current ROE; • HOLD/SAFE: in self-defence or in response to a formal order. Ordnance status: • **^REMINGTON**: No ordinance left except gun or self-protect ammo. • WINCHESTER: No ordnance left. • **SKOSH**: aircraft is out or unable to employ active radar missiles.
Sensors	Radar awareness: • **CLEAN**: no sensor information on a GROUP of interest;

- **FADED**: sensor data lost on GROUP or CONTACT. Requires information of last known position to include number of CONTACTS and TRACK direction.
- **HIT(S)**: Momentary radar return
- **IN THE DARK**: CONTACT is in known radar blind zone.
- **JOINED**: two or more radar returns have come together.
- **LOCKED (GROUP label)**: Radar lock-on, SORT not assumed;
- **LOCKED (Position)**: Radar lock-on, correct targeting not assumed.
- ***SNAPLOCK (BRAA)**: Informative call indicating that the fighter has obtained radar contact inside briefed threat range with BEAM, FLANK or HOT aspect and is unable to complete sanitization responsibilities implying ownership. Response should be BRAA.
- **LOST LOCK**: lost radar or IR lock.
- **GIMBAL**: Sensor target is approaching azimuth or elevation tracking limits.
- **MELD**: Drop sanitising responsibilities and gain situation awareness on the assigned GROUP.
- **SORT**: assignment of responsibility within a GROUP; criteria can be met visually, electronically (i.e. radar), or both.
- **SORTED**: sort responsibilities within a GROUP has been met.
- **STROBE(S) (Bearing)**: radar indication(s) of noise jamming;
- **HIT(S)**: momentary radar return(s).
- **TIED**: Positive radar contact with element or aircraft.
- **VANISHED**: special case of FADED defined as a GROUP or ARM or CONTACT with no available sensor data and is:
    1. not in a known sensor blind zone (terrain masking or Doppler blind zone) AND
    2. correlated to a shot by FRIENDLY forces.

Radar Warning Receiver:

- **MUD (Type with direction, range in available)**: Ground RWR indication with no launch indication.
- **NAILS (Direction)**: RWR indication of airborne interceptor (AI) radar in search.
- **NAKED**: No RWR indications.

	• ***SPIKE(D) (Direction)**: RWR indication of an AI threat in track or launch. Eyeballs Mk I: • ***NO JOY**: crew has no visual contact with the TARGET or BANDIT (opposite: TALLY); • **TALLY**: sighting of a target, non-friendly aircraft or enemy position (opposite: NO JOY); • **BLIND**: no visual contact with FRIENDLY aircraft, ship or ground position (opposite: VISUAL); • **VISUAL**: sighting of FRIENDLY aircraft or ground position or ship (opposite: BLIND); • **PADLOCKED**: aircrew cannot take eyes off an object without risking of losing TALLY or VISUAL; • **SAM (Direction)**: visual acquisition of a SAM in flight or a SAM launch; should include position. Electronic Warfare: • **SPOOFER**: entity employing electronic or tactical deception measures. Others: • **YARDSTICK**: use A/A tactical air navigation for ranging.
Travelling Speed	• **GATE**: fly as fast as possible, using reheat or maximum power; • **BUSTER**: fly at maximum continuous speed (military power); • **LINER**: fly at speed giving maximum cruising speed. • **CRUISE**: after BUSTER or GATE, return to cruise speed.
Radios and Coordination	Radio codes: • **HOTEL FOX**: High Frequency; • **VICTOR**: VHF/AM; • **FOX-MIKE**: VHF/FM; • **UNIFORM**: UHF/AM. **PUSH (Channel**: Select specified channel (DCS: frequency if no preset is available). No acknowledgement required. **BUTTON**: radio channel setting; **ROLEX (± Time)**: timeline adjustment in minutes for the entire mission; always referenced from original preplanned mission execution time (“Plus” = later; “Minus” = earlier). **SCRAM (Direction)**: FRIENDLY is in immediate danger. Withdraw clear in the direction indicated for survival. No

	further mission support from the FRIENDLY asset is expected. **^SCRAM (Direction)**: Cease the intercept and take immediate evasive action. Implies that the target is being engaged by SAMs or other air defence fighters.
Avionics status	• **SWEET (Link Name)**: Equipment indicated is operating efficiently (e.g. TIMBER SWEET – confirms reception of data link information). Opposite of SOUR, cancels BENT. • **SOUR (Link Name)**: Potential problem with net entry; initiates pre-mission link troubleshooting (e.g. "TIMBER SOUR" – issues with LINK16). Opposite of SWEET. • **(System) BENT**: system inoperative. Cancelled by SWEET. ***MUSIC**: radar electronic deceptive jamming.
Manoeuvres and Postures	**CAP(ING) (Location)**: established a combat air patrol at a specified point OR informative call that an aircraft is established in an orbit; Combat Air Patrol: • **COLD**: Initiate(ing) a turn in the CAP away from the anticipated threats; • **HOT**: Initiate(ing) a turn in the CAP towards the anticipated threats; Relative to a Threat: • **IN**: Turn toward a known threat. Opposite of Out. • **OUT (Direction)**: Turn or turning to a cold aspect relative to a known threat; • **OFF (Direction)**: attack is terminated, and manoeuvring to the indicated direction. Tactical Manoeuvres: • **SHACKLE**: one weave; a single crossing of flight paths; manoeuvre to adjust or regain formation parameters; • **HOOK (Direction)**: Perform in-plane 180° turn. • **SLICE (L/R)** or **SLICEBACK (L/R)**: perform high-G descending turn in the stated direction, usually 180° turn; Engagement posture: • **SHOOTER**: aircraft or unit designated to employ ordinance;

- **COVER**: establish a posture that will allow engagement of a specified track or threat if required;
- **SUPPORTING**: speaking unit or element is assuming a supporting role, is in a position to influence the outcome, and assumes deconfliction responsibility.

BUGOUT (Direction): separation from a particular engagement or attack or operation. No intent to re-engage or return.

HARD (L/R, Direction): High-G-force, energy sustaining turn in the indicated direction. Default 180°.

BREAK (Direction): Immediately perform a maximum performance turn in the indicated direction (usually 180°).

***CRANK (Direction)**: Manoeuvre in the (Direction) to illuminate the target at or near the GIMBAL limits.

CHECK (Number, L/R): Turn (number) degrees left or right and maintain new heading.

DEFENDING (Direction): aircraft defends in (Direction) from a threat.

DEFENSIVE: aircraft attacked and manoeuvring. Unable to provide mutual support or deconfliction.

***NOTCHING (Direction)**: aircraft is in a defensive position. Manoeuvring with reference to threat.

ENGAGED: aircraft is manoeuvring in the visual arena and relinquishes deconfliction responsibilities.

EXTEND(ING) (Direction): short-term manoeuvre to gain energy, distance or separation with the intent of re-engaging.

FLASH (ING): activate system for ID purposes (e.g. reheat, flare or chaff, etc).

HOLDING HANDS: aircraft in visual formation.

***JINK**: Perform unpredictable manoeuvre to negate a tracking solution.

PRESS: Requested action is approved and mutual support will be maintained, assumes VISUAL.

PUMP: A briefed manoeuvre to minimize closure on the threat or geographical boundary with the intent do re-engage.

PUSHING: Departing designated point.

RESET: proceed to pre-briefed position or area of operations.

SADDLED: wingman or element has returned to briefed formation position.

	SPLIT: Flight member is leaving formation to pursue a separated attack; VISUAL may not be maintained.
IFF / Transponder. Supported by SRS and LotATC.	• ***PARROT**: IFF selecting ID feature transponder; • **SQUAWK (Mode, Code)**: Set IFF or selective ID feature as indicated or IFF or selective ID feature is operating as indicated;

22. APPENDIX II: A LOOK AT R. SHAW'S "FIGHTER COMBAT: TACTICS AND MANEUVERING"

Note: Surprisingly enough, I didn't open this book until very recently, and only after working on the P-825/02. I knew there were some BFM and ACM considerations, but I had no idea that a chapter about tactical intercepts was present.
Considering the simple language and approach, discovering it earlier would have saved me a lot of time! For that reason, I strongly suggest you to get a copy of this book. The hard-cover version is a bit pricey (£35.50 at the moment of writing), but the kindle version is a theft (only £4.33).
That being said, do not expect to learn a lot of technical details. This book does not go anywhere near the depth of the P-825s – and those are very superficial too!

The drawback of the P-825 2017, 2008 and 2002, is the relative low number of scenarios discussed. It makes sense when considering that they are basic-level and very academic sources. Although spectacular sources to build the forma mentis and the basic knowledge, seeing more variety can be very beneficial. Here comes a classic of the aviation literature: Robert L. Shaw's book, "*Fighter Combat: Tactics and Manoeuvring: Tactics and Maneuvering*". This book is well know in the flight sim community. On top of a lengthy discussion about BFM and ACM, it has a chapter solely dedicated to tactical intercepts.

The goal of this Chapter is to briefly mention the intercepts proposed by Shaw, recapping the pros and cons highlighted by the author, and add some considerations. I do not intend to cover every detail, so I really recommend buying this book.

Before starting, a quick note: Shaw often suggests to split the fighters and introduce vertical separation to hide from the radars of the bogeys. This, of

course, is hardly applicable in DCS because AWACS see better than they Eye of Sauron, without any of the issues that can affect them in real life.

22.1 SECTION TACTICS

Note: I initially reported only the intercept techniques discussed by Robert Shaw is his book. However, many of the mentioned manoeuvres lay on basic fundamentals and tactics applicable in simpler scenarios.
For that reason, I split the Chapter into multiple parts and now included 2v1 tactics and other considerations into this document.

22.1.1 THE BRACKET

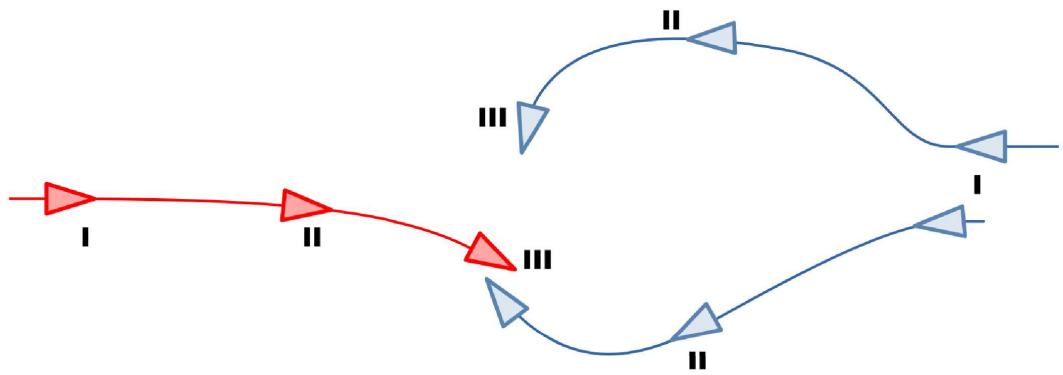

Figure 558: The Bracket.

PROS

- Forces the opponent to choose a target.
- If the bandit does not commit on a fighter, both can convert into its rear;
- One fighter is always in a favourable position.

CONS

- Maintaining mutual support may be difficult due to the wide separation.

CONSIDERATIONS

A classic and "old" manoeuvre, the bracket forces the bandit to commit or turn away. If the bandit commits onto a fighter, the other is immediately in an advantageous position to engage or provide support.

22.1.2 THE SANDWICH

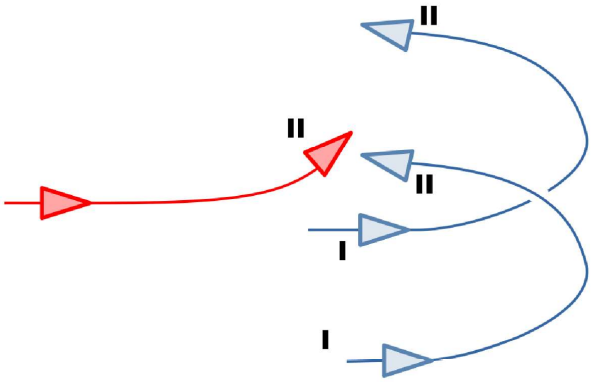

Figure 559: The Sandwich.

PROS	CONS
• Ideal defensive manoeuvre, one fighter ends up "sandwiching" the attacking aircraft; • Maintains formation cohesion.	• Requires awareness before the bandit gets too close and able to engage; • Requires that the bandit firmly commits to one fighter through the manoeuvre; • To be effective, the manoeuvre must be initiated at a distance close to the lateral separation of the fighters; • Compared to a defensive split, it does not necessarily force the bandit to commit onto one of the fighters.

CONSIDERATIONS

This manoeuvre, to be effective, requires a thorough estimation of the distance between the bandit and the fighters. If start too early it may be unsuccessful. The separation requirements may enable the bandit long-range all-aspect missiles, if carried.
In these scenarios, a Defensive Split may be a better option.

22.1.3 DEFENSIVE SPLIT

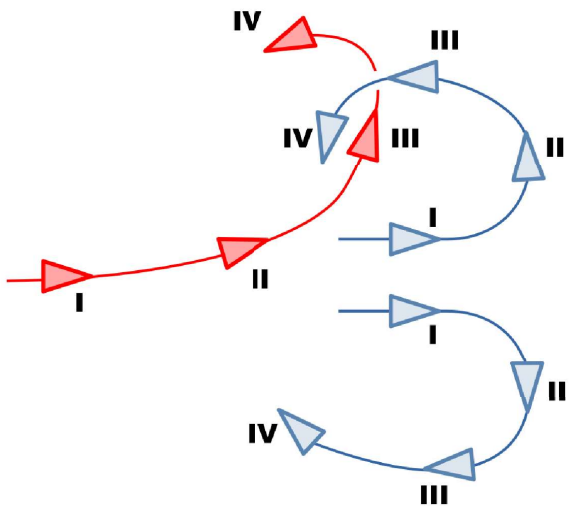

Figure 560: Defensive Split.

PROS	CONS
• Forces the opponent's hand;	• Requires awareness before the bandit gets too close; • Requires that the bandit firmly commits to one fighter through the manoeuvre; • May create an excessive amount of separation between the fighters, leading to loss of awareness and mutual support.

CONSIDERATIONS

Classic defensive manoeuvre, forces the attacker to withdraw or commit to a fighter, whilst the other manoeuvres in an advantageous position. The turns are not breaks, rather performance turns.

If the bandit switches target post status IV, the second and now engaged fighter is in a favourable position, and a 1-on-1 fight can occur. In the meantime, the original defending fighter has room to reposition and support, or scan for other bandits.

A variant of this manoeuvre uses the vertical plane, rather than the horizontal. There are several pros and cons depending on the bandit and the performance of its aircraft, its ability of carrying all-aspect missiles and others. However, it has the advantage of reducing the amount of separation introduced between the fighters.

22.1.4 HALF SPLIT

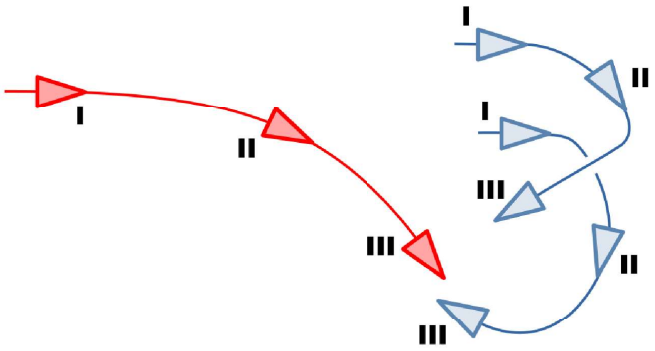

Figure 561: Half-slip - Bogey attacks turning fighter.

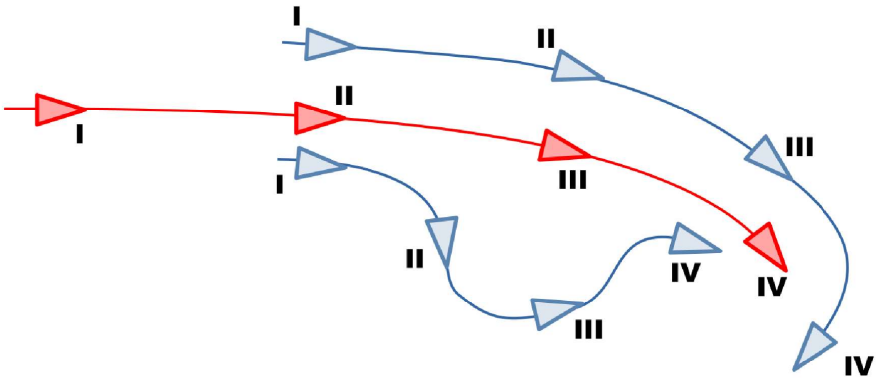

Figure 562: Half-split - Bogey attacks extending fighter.

PROS	CONS
• Ensures awareness and mutual support, whilst limiting the excess of separation introduced. • Forces the opponent's hand;	• Requires that the bandit firmly commits to one fighter through the manoeuvre.

CONSIDERATIONS

A combination of the Sandwich and the Defensive Split. The manoeuvre evolves depending on which target the bandit commits on. In both cases, the "internal" fighter (relative to the turn), executes a performance turn.

22.1.5 THATCH WEAVE

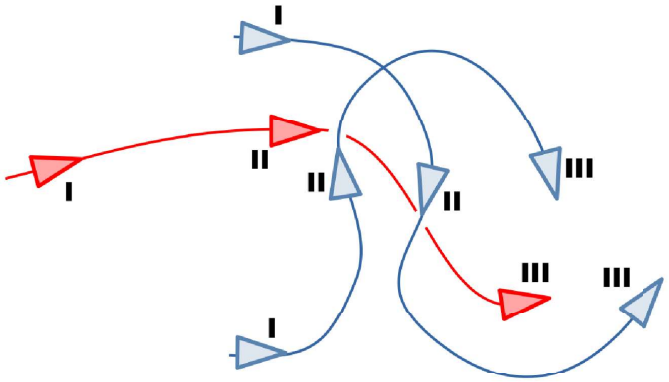

Figure 563: Thatch Weave.

PROS	CONS
• Works against more performing aircraft.	• Short-ranges involved. Besides guns, only all-aspect missiles with low minimum range can be employed.

CONSIDERATIONS

Historically introduced to deal with more performing aircraft, it is probably too convoluted for a modern scenario, due to the low ranges involved. In these cases, a Sandwich or Half-Split are likely more appropriate.
The Thatch Weave It is based on the tactics developed by Wildcat pilots to fight the Zeros, and uses the superior roll rate and durability of the Wildcat to gain the advantage, since the Zero out-climbed and out-turned the Grumman fighters.

22.2 INTERCEPTS VS SINGLETON

22.2.1 FORWARD-QUARTER

As the name implies, this intercept places the fighter into the Forward-Quarter (FQ) of the bandit.

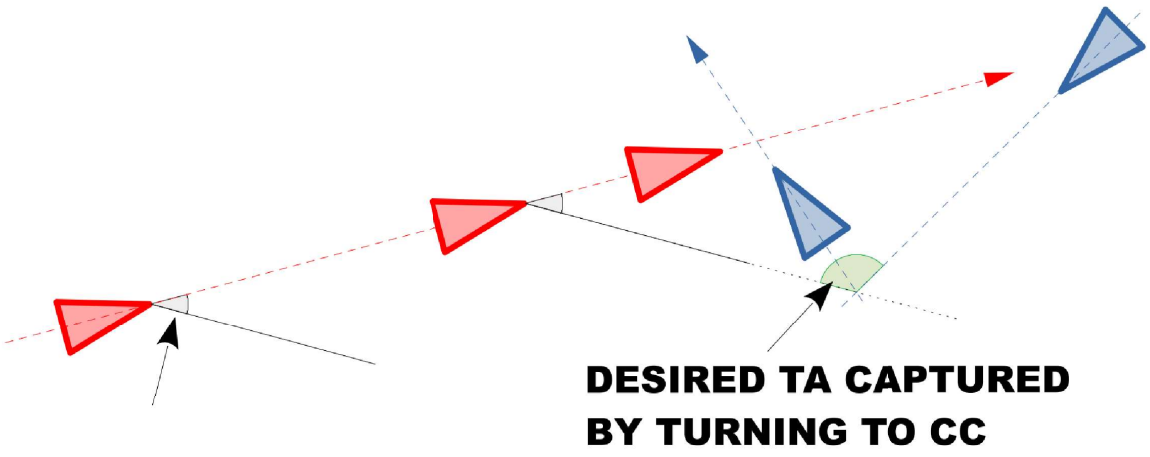

Figure 564: Forward quarter intercept.

PROS	CONS
• Can improves the performance of missiles; • Ease Visual Identification of the target from range; • Good for hit-and-run tactics; • Good versus bombers with rear defensive guns;	• The manoeuvre takes time, allowing the bandit to penetrate further; • The range is not considered in this technique (as instead does the Stern Conversion intercept); • Easy to counter;

CONSIDERATIONS

The mechanic of the manoeuvre is very simple: from a zero/low TA situation, the fighter starts a Cut-away manoeuvre, thus increasing both the Lateral Separation and the Target Aspect (it is a very common response to a zero TA scenario).
Once the desired value of Target Aspect is achieve, the fighter turn in (Cut Into) and captures the value of TA by rolling out on a Collision Course.

22.3 SECTION INTERCEPTS

22.3.1 STERN CONVERSION

Note: This intercept has been thoroughly discussed already, so I am not reporting the intercept flow.

PROS	CONS
• Ends in a favourable position (bandit's rear quarter)	• Requires more time and fuel than the Forward-Quarter intercept (Chapter 22.2.1); • The conversion turn is long and often blind; • Easily countered; • Vulnerable to Chaffs in the end game; • Doppler radars can't may lose track during the beaming part of the manoeuvre; • Potentially dangerous vs bogey in significant trail formation.

22.3.2 SINGLE-SIDE OFFSET

This intercept place both fighters on one side of the bandit's formation. Then the leader performs either a Forward-Quarter intercept or a Stern Conversion.

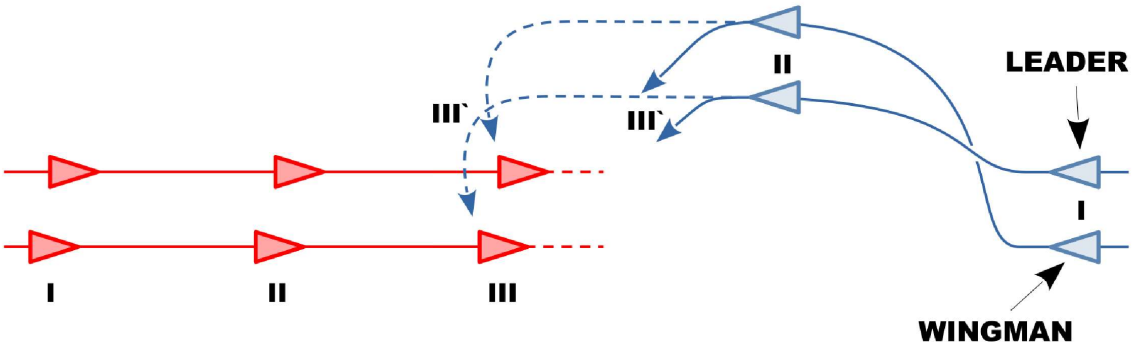

Figure 565: Single-side offset.

PROS	CONS
(see Forward-Quarter and Stern conversion intercepts)	(see Forward-Quarter and Stern conversion intercepts)

CONSIDERATIONS

This is a simple yet interesting intercept: it is easy to fly, allowing the wingman to maintain visual contact, and offering flexibility in the form of FQ or Stern conversion. The flow is simple: Lateral Separation is created by a Cut away, until a good value of LS is capture by turning to Zero-Cut. To maintain a valid Forward-Quarter intercept and enabling FOX-1, the TA at a valid range for the weapon is use should not be too high. For example, max 20° at 15nm for a late AIM-7, resulting in 30k of LS. More than that, and

the AIM-7 probably will arrive without enough energy to be a threat, even with the help of a Lead-Collision turn.
30,000 ft of Lateral Separation is sufficient for a Stern conversion, and can be easily increased if necessary.

22.3.3 TRAIL

This intercept arranges the fighters in a trail at the merge.

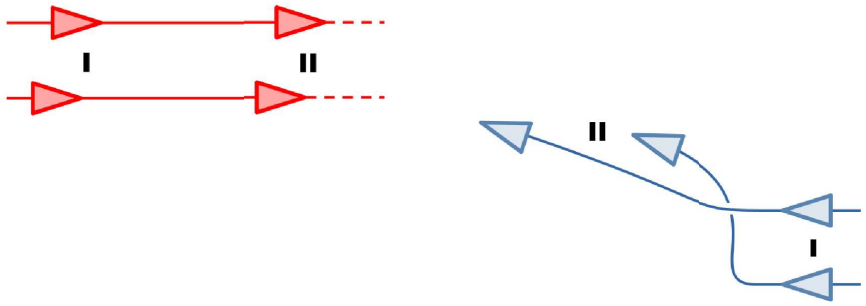

Figure 566: Trail.

PROS	CONS
• Good offensive stance; • Allows VID; • Can potentially hide the trailer (the wingman) to the bogeys;	• Poor defensively, as the leader can't visually cover the wingman; • The wingman must make sure he is targeting the correct aircraft;

CONSIDERATIONS

This intercept consists in a Leader following the already discussed FQ technique, followed by the wingman operating a standard conversion to trail (Yardstick can help to train this manoeuvre and rollout at the accurate distance determined by the Leader), and the distance should not be too high, or the wingman will not be able to provide support.
The wingman can also fly low, to further mask itself from the bogeys.
Post intercept, the fighters can quickly reform by turning hard 90°

22.3.4 SWEEP

This intercept is essentially a Stern Conversion in Trail formation, starting from a standard combat spread.

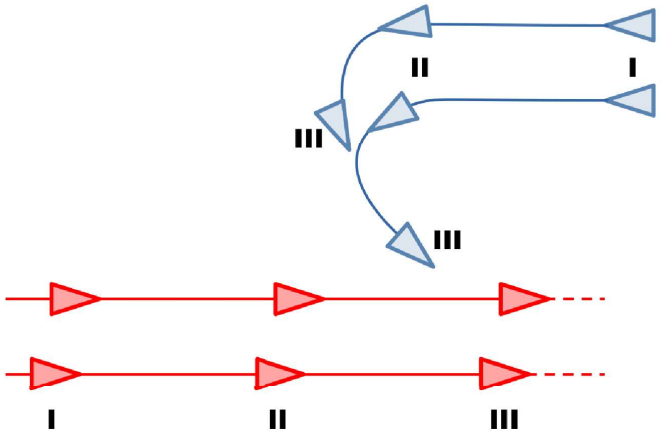

Figure 567: Sweep.

PROS	CONS
• Good mutual support until the conversion turn. Effective versus bogeys in trail formation; • Can potentially hide the trailer (the wingman) to the bogeys.	• Wingman exposed during the conversion turn.

CONSIDERATIONS

The flow of this intercept is quite intuitive, as the wingman simply has to delay his Counterturn and place himself behind the Leader, in a trail formation.

22.3.5 THE PINCER

A wide encircling manoeuvre, it "offers" a fighter to the bogeys whilst the other manoeuvres and attack from behind the formation.

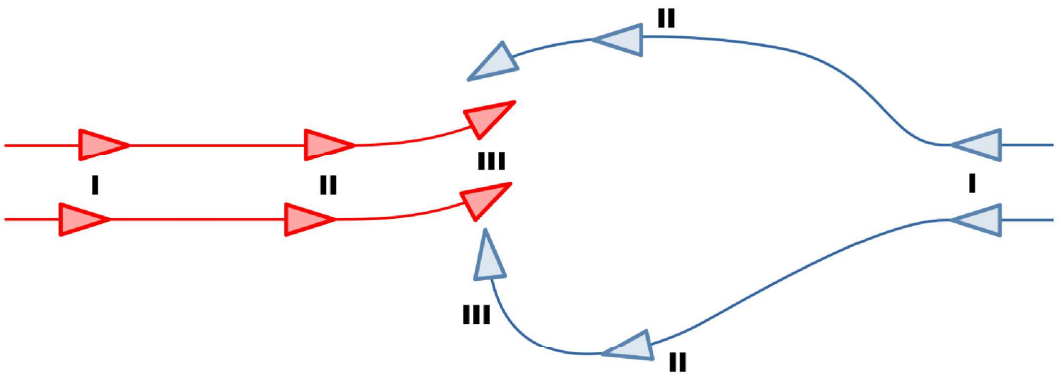

Figure 568: Pincer.

PROS	CONS
• Extremely effective offensive manoeuvre;	• Require considerable training and practice; • Lacks mutual support; • Requires dual radar contact or one dedicated AIC per fighter; • If the bogeys split, there can be two 1-on-1 fights with little mutual support (see Paragraph below);

CONSIDERATIONS

From a "flow" point of view, this is a relatively simple manoeuvre: the Section splits and both aircraft Cut-Away to increase separation (pre-briefing the parameters of the manoeuvre is fundamental). If one is spotted, it tries to maintain the separation, whilst the free fighter "Turns In" from an advantageous position.
Having the fighters flying at different altitudes drastically improve the odds of not being spotted by the bogeys.

CONTINUATION

If the bogey Section splits, there can be two 1-on-1 fights. A solution can be focusing on a single bogey after each fighter meets "his" bogey.
However, as you can imagine:

> *[..] there are a lot of things that can go wrong in such a scenario;*
>
> **L. SHAW, ROBERT. FIGHTER COMBAT - TACTICS AND MANEUVERING (P. 552).**

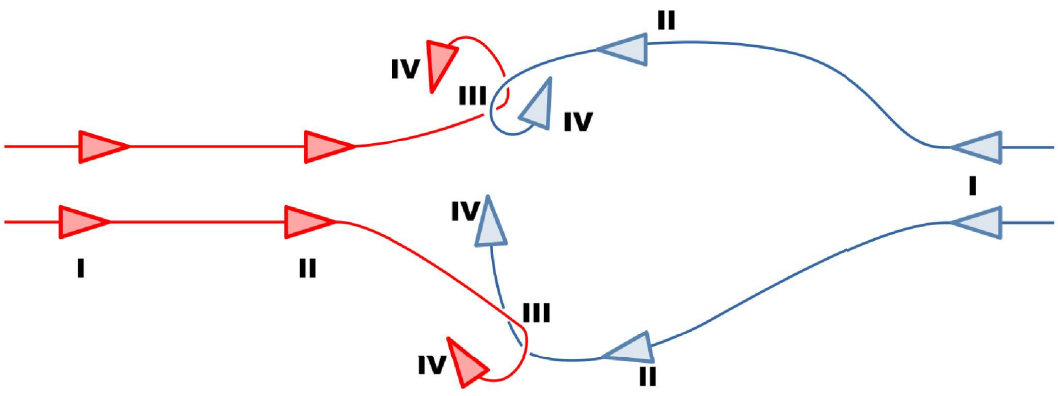

Figure 569: Pincer isolation tactics.

22.3.6 DRAG

This intercept takes to extremes the idea of baiting the bogeys into committing on one fighter, whilst the other manoeuvres in a favourable position.

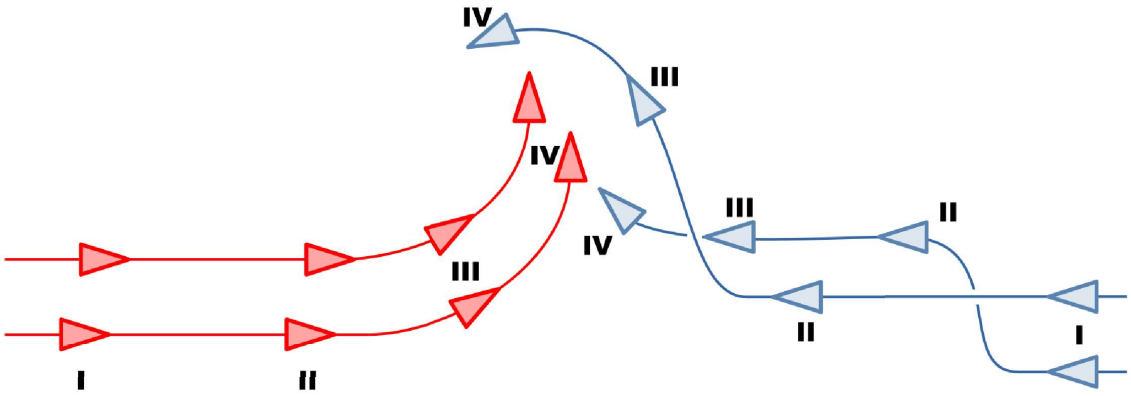

Figure 570: Drag.

PROS	CONS
• Extremely effective offensive manoeuvre; • Effective versus bogeys in trail: if the Lead bogey takes the bait, it can be dealt with before the trailer becomes a factor.	• Require considerable training and practice; • Lead fighter vulnerable to surprise attacks;

CONSIDERATIONS

Flow-wise, the first part sees the wingman repositioning using a manoeuvre similar to Trail. This introduces a certain separation which, added to a drastic change in altitude, should help to hide it from the bogeys. Another contributing factor can be the Leader climbing whilst the wingman dives.

When the Leader reaches a certain range defined by the threat, MAR and other parameters, he Cranks, inviting the bogeys to commit. In the meantime the wingman manoeuvres to an advantageous position.

If the bogeys press for the trailer (the wingman), the scenario evolves in the Lead-Around discussed next.

22.3.7 LEAD-AROUND

This intercept is similar to the Drag discussed before, when the bogeys target to the trailer.

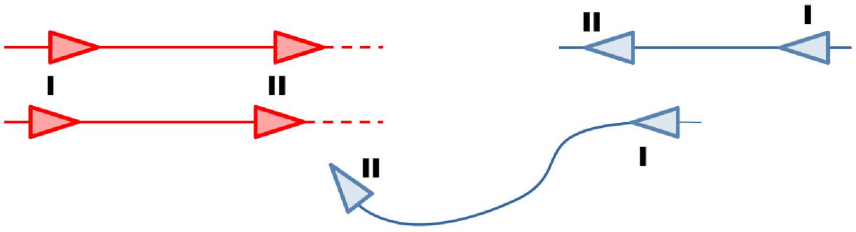

Figure 571: Lead-around.

PROS	CONS
• Good offensive tactic, especially versus bogeys in trail; • The Leader can either do a FQ attack or a Stern Conversion; • Less complex than the Drag;	• Considerable distance between the fighters results in poor mutual support;

CONSIDERATIONS

With bogeys targeting the wingman, the Leader is free to manoeuvre to an advantageous position.

22.3.8 HOOK

Somewhat similar to the trail, enabling VID (Leader) with a shooter (Wingman).

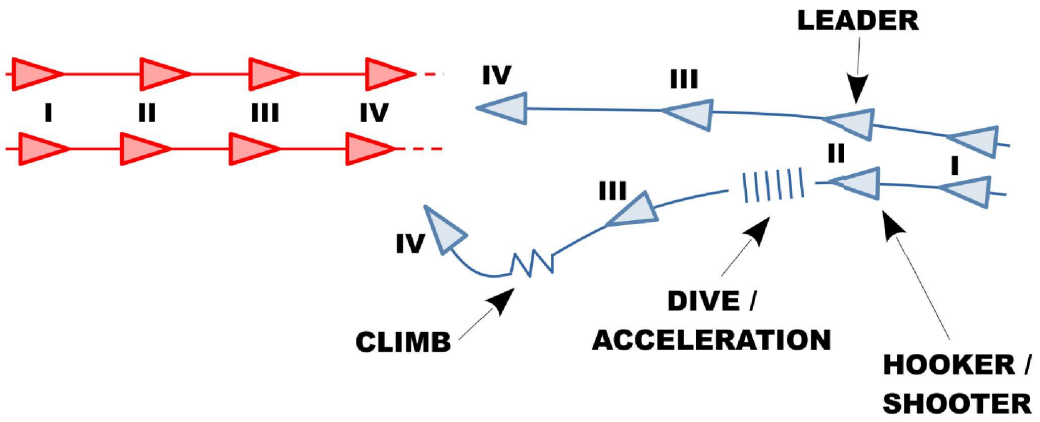

Figure 572: Hook.

PROS	CONS
• Enables VID with mutual support; • More solid defensively than Trail;	• The shooter must ensure separation between target and Leader; • Widely spread formations may

- Effective versus single bogey or closed formations;

increase the danger for the Leader;
- Less effective versus trail formations.

CONSIDERATIONS

From the usual combat spread, the Leader turns to collision whilst the Wingman split and increases the Lateral Separation and Vertical Displacement (either high or low). As the Leader performs a VID, by flying aiming for a close pass, he can enable the shooter (wingman) to engage.

22.3.9 THE OPTION

This “factotum” intercept is de facto a Single-Side Offset intercept open to different follow-up.

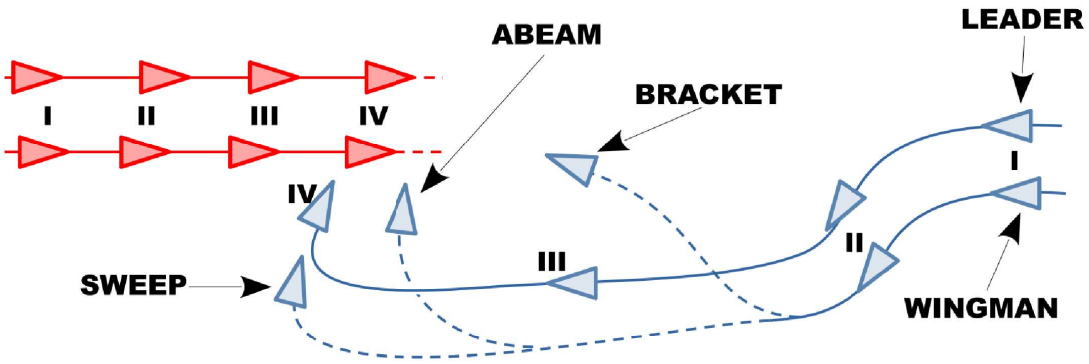

Figure 573: "Option" intercept.

PROS

- Flexibility: Abeam is more defensive, Bracket and Sweep are offensive.

CONS

- Require considerable training and practice;
- A lot of pressure on the wingman.

CONSIDERATIONS

The initial flow is similar to the Stern Conversion or the Forward-Quarter intercept: Lateral Separation is needed, so the Section does a Cut-Away. The wingman should be on the external side of the combat spread. The next step depends on the decision of the Leader, and some options resembles techniques discussed already.

The Leader can perform a:

- Stern Conversion / Forward Quarter: zero-cut to maintain Lateral Separation once the goal is achieved;

The Wingman can perform a:

- Bracket: the wingman does a Cut-Into to decrease the Target Aspect and facilitate