Wing and a Prayer Design Document
Chapter 6: The WAAF in Game

We appreciate that this section looks both large and intimidatingly complicated.
Please rest assured that:

- Each player will only have a relatively simple job to do.
- Our playtests have given us confidence that it's easy to pick the job up, and much easier as soon as you're actually practising them rather than just reading.
- The section is big because it describes everybody's job - you only need to worry about your own.
- WAAF players only need to be familiar with whichever Section they are playing in; RDF, Filter or Operations.

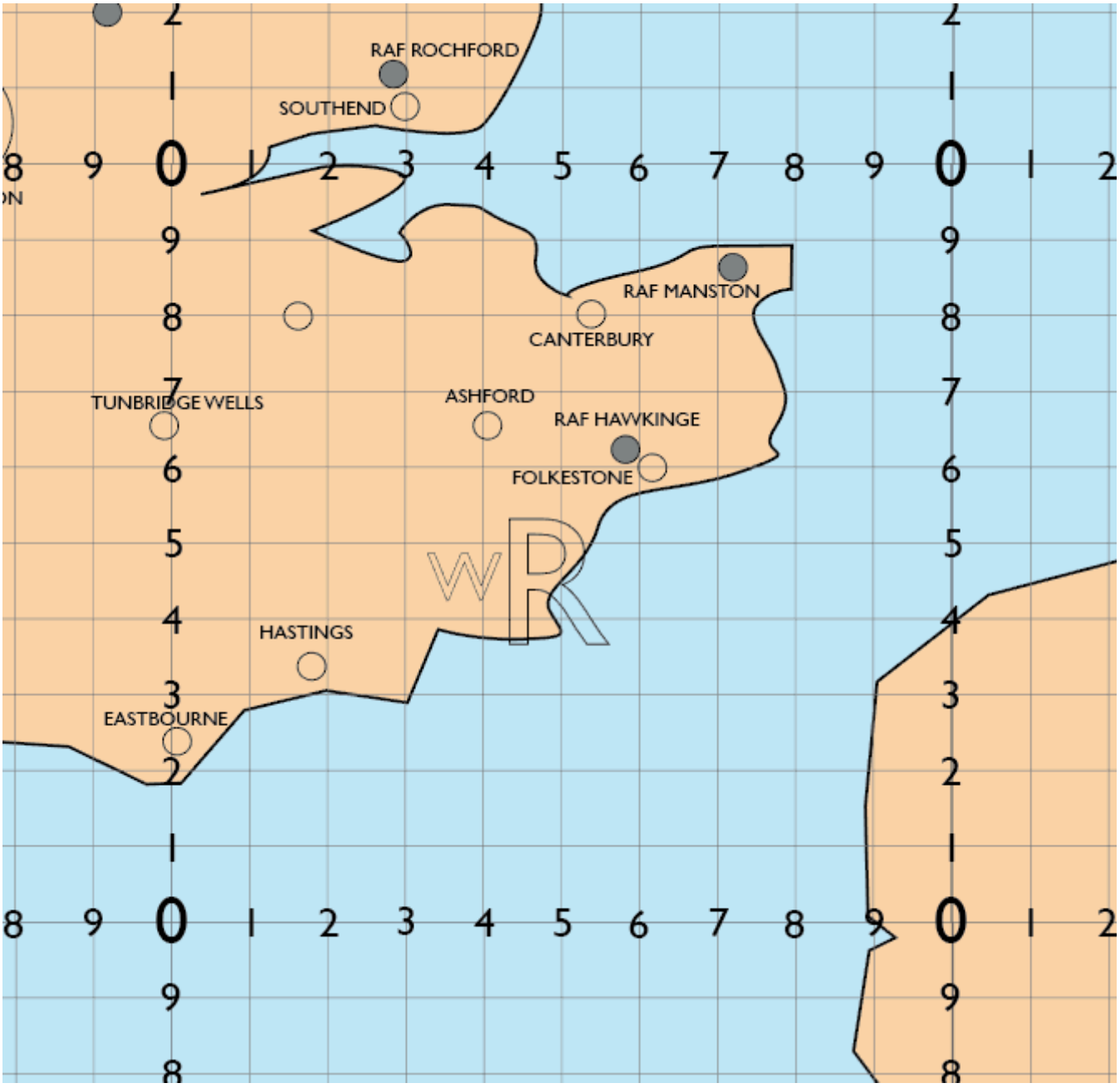
Overview

When on duty, the WAAF characters will operate a radar station and an operations room. They will control the RAF players in action, who voice-act flying their fighters from the off-game room we're calling The Sky.

Underpinning the wargame is a computer system called BLITZ. This constantly tracks the position of all aircraft, and feeds information into the radar terminals, and to various NPCs playing off-site radar operators, Royal Observer Corps volunteers, etc. As players you won't interact with BLITZ directly - you will work with in-game interfaces like a radar terminal or a voice on a telephone line.

The Map and Grid References

One thing which nearly all players will need to understand is the grid used to communicate locations on a map. All the maps in *Wing and a Prayer* use the same grid system, as shown in the figure below.



The map is divided into large squares, each 100km on a side and assigned a pair of letters. The large square shown above is WR, or WILLIAM ROBERT in the phonetic alphabet. (All the squares on our maps start with WILLIAM.)

The large square is divided into a hundred smaller squares, each 10km on a side, and identified by a number for its bottom left corner. You can identify a 10km square by giving the letters for the large square it is in, and then the coordinates of its bottom left corner, reading along the horizontal axis before going up the vertical. For example, the town of Hastings is in square WR 1 3, or WILLIAM ROBERT, ONE, THREE.

For nearly all purposes it is important to be more accurate than that, so we add a second digit. Hastings is on the right-hand side of the square, about 80% of the way across it, and just under halfway up it, perhaps 40% of the way up. So we could say Hastings' location as WR 18 34, or WILLIAM ROBERT, ONE EIGHT, THREE FOUR.

It can help to put a small pause between groups of letters or numbers. Remember that you can take it slowly and ask for confirmation - and more importantly, the system is robust so making a mistake won't break anything!

Some example locations:

- Folkestone - WR 62 60
- RAF Manston - WR 72 87
- Canterbury - WR 54 80
- Ashford - WR 41 66
- RAF Hawkinge - WR 58 62

To put the distances here in context, a fighter flies at about 600 km/hour and WR is 100km across, so it would take a fighter about ten minutes to cross the entire WR square, crossing a small square every minute. Bombers fly rather more slowly at 300km/h, so take about twenty minutes to cross the WR square, crossing a small square every two minutes. In daylight aircraft can see each other at about 10km, so getting fighters within a small square of a bomber raid is good enough to intercept them.

The WAAF In Game

The WAAF are responsible for:

1. Keeping track of the locations of various formations in the air
2. Controlling friendly squadrons in response to enemy movements

RDF Section

The RDF Station contains two Radio Direction Finding terminals; one for the Chain Home set, and one for the Chain Home Low set. In-game these are connected to very large antenna towers conveniently located out of sight; off-game, they are connected to the BLITZ computer system which tracks the location of nearby aircraft.

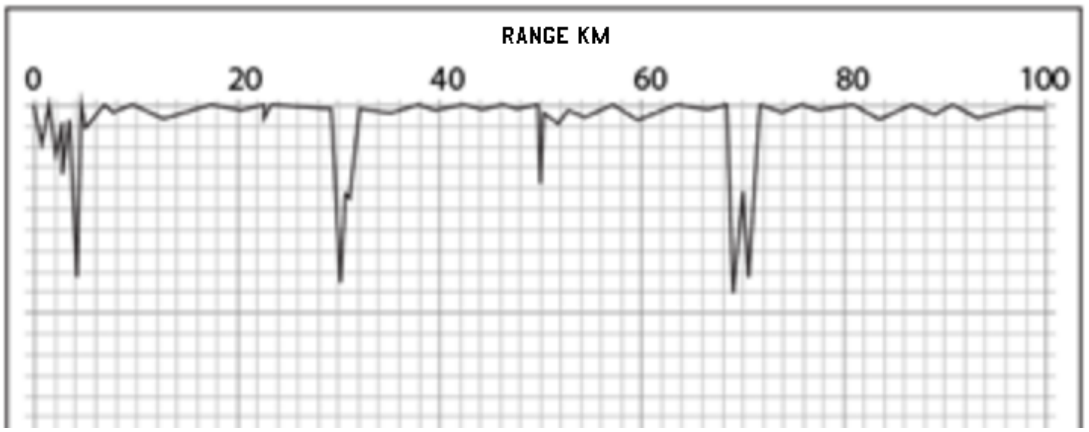
Chain Home is the primary set, with a range of around 200km. It has two primary weaknesses; it cannot look inland behind itself, and it cannot detect aircraft below about 5,000 feet. The latter weakness is addressed by the Chain Home Low set, which has a range of only about 100km, but can see aircraft down to 500 feet.

In single-shift operation, the RDF station is staffed by the on-duty RDF Plotter and two RDF Operators. The RDF Operators control the Chain Home and Chain Home Low radar sets. The RDF Plotter plots any contacts that either detects and communicates them to the Filter Table.

In double-shift operation, the Standby RDF Plotter takes over dedicated plotting for the Chain Home Low set, while the extra two RDF plotters share the Operator duties, allowing each to take breaks.

RDF OPERATION

Each RDF terminal has one display (the A-SCOPE) and one control (the goniometer knob.) The A-SCOPE is a single screen, like the one shown below.



The scale across the top is range in km from the station, and the scale down the side is signal strength. The A-SCOPE above shows three contacts.

1. From 0-5km is ground clutter - reflections from the ground in front of the RDF transmitters. This will always be present.
2. There is a strong contact at 30km. This probably represents a substantial number of aircraft - perhaps several dozen.
3. There is a small contact at 50km. A small number of aircraft, or a single one.
4. There is a large, notched contact at 70km. The notch results from the Identification, Friend or Foe equipment installed on friendly aircraft, or IFF (pronounced eye-eff-eff.) Notched contacts can therefore be assumed to be friendly - this is important information which should be reported to the Filter Table.

The goniometer knob is a control which effectively swings the radar beam from left to right. As the beam swings, the strength of contacts (the size of their spike) will change. When a contact is at its strongest, the beam is pointing directly at it, and the bearing to that contact can be read off the goniometer knob. It's difficult to get the bearing exactly right, but as long as you're within a few degrees the Filter Table will be able to pin down a detailed position.

If fitted with special equipment, RDF can also estimate the altitude and the number of aircraft in a contact, but Stow Maries does not have this equipment yet. The neighbouring RDF Stations will provide this information to the Filter Table - you do not need to worry about it.

Suppose that the contact at 70km had been found to give the strongest return when the goniometer knob was turned to 108 degrees, the RDF operator would report to their Plotter:

RDF Op: "Standby - new contact. Bearing one zero eight, range seventy kilometres, showing IFF"
Plotter: "Contact, one zero eight, range seventy, IFF"

- Standby is a warning to pay attention, if you had been chatting, or otherwise not in the middle of passing contact data back and forth.
- Contact signifies that you are about to report a contact.
- New Contact signifies that you are reporting a contact which has not before been reported.
- Bearing is the compass direction to the contact. You might say "Bearing one zero eight degrees" but either bearing or degrees may be omitted in a hurry.
- Range is the distance to the target in km.
- IFF means that the notch of an IFF signal has been observed, and the contact is likely friendly.
- The Plotter reads back the range and bearing to confirm and help them remember.

Remember that you can converse like humans. If you didn't hear, you're allowed to ask them to repeat the numbers. The terse format above is efficient and you will find that useful when a lot is going on, but you can do whatever works!

RDF PLOTTING

Each RDF Plotter is equipped with a special plotting table with a bearing circle drawn on it, centred on the RDF Station. This allows the plotter to measure a range and bearing and convert it into a grid position to be reported to the Filter Table.

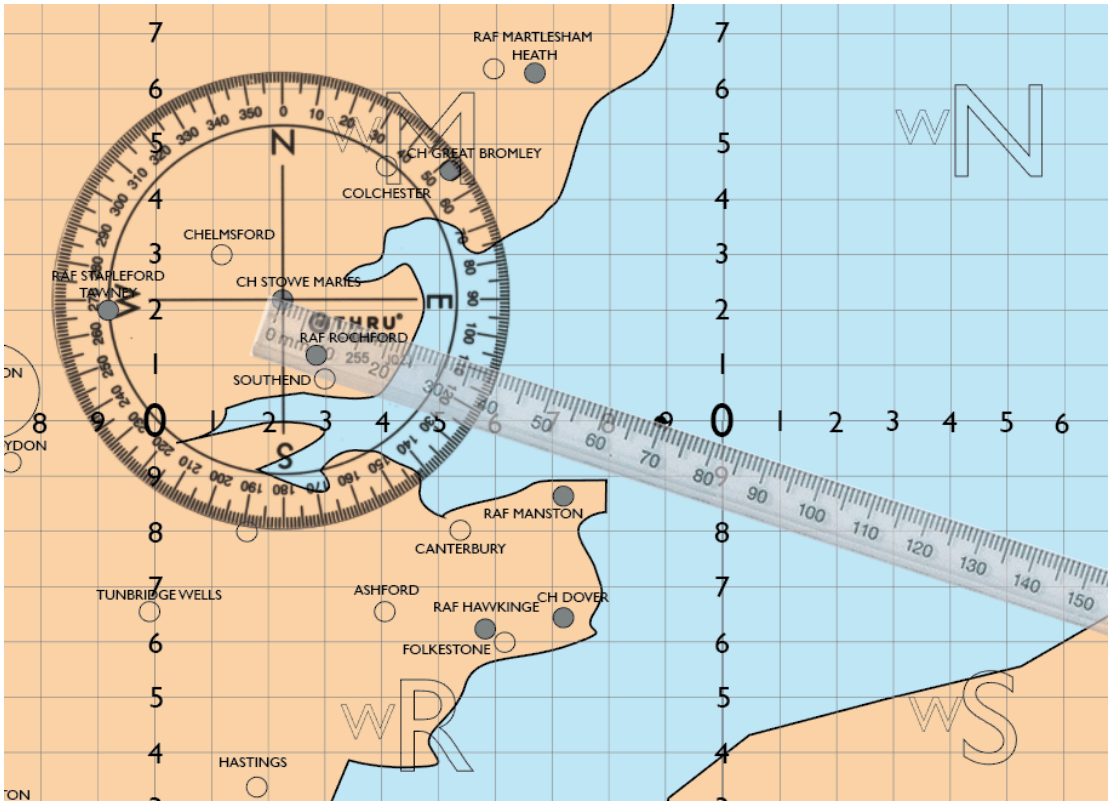
On receiving the report above:

> RDF Op: “Standby - new contact. Bearing one zero eight degrees, range seven zero kilometres, showing IFF”

The Plotter first reads back the report, to ensure they heard it correctly.

> Plotter: “One zero eight, range seventy, IFF”

They then measure that range and bearing, as shown below.



Seventy kilometres along bearing 108 corresponds to the dot marked above - WM 89 00. The plotter marks that position on their map with a pencil and reports it over their headset to the Filter Table. The position is reported twice, followed by any information.

Remembering that this is a new contact, and it was reported with IFF, the report would be:

> RDF Plotter: “Standby, new contact. BLUE. WILLIAM MONKEY, EIGHT NINE, ZERO ZERO, WILLIAM MONKEY, EIGHT NINE, ZERO ZERO, showing IFF.”

BLUE is the colour code for Stow Maries on the Filter Table. It is not necessary to specify if you are the only station talking to your filter plotter, but when shorthanded you may not be the only RDF station on the voice circuit, so it is very helpful to your plotter to confirm your station colour before each contact so they know which colour counter to use.

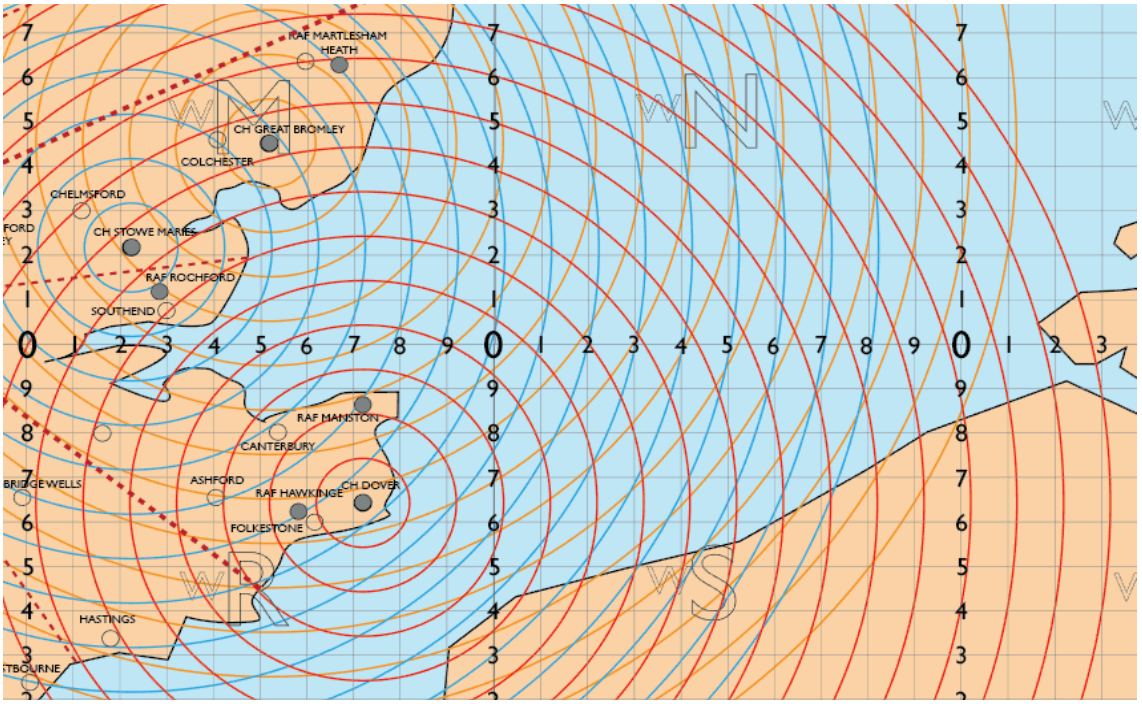
It can help the plotter maintain situational awareness if they keep marking positions in pencil and joining the dots with the path of raids. Clean maps will be available if they get too cluttered. Some error in RDF position reporting is to be expected, so the tracks may “wiggle”. Don’t worry about those errors - dealing with them is the job of the Filter Table crew.

Filter Section

The Filter Section operates the Filter Table, a large map table. The Section is under the control of the Filter Officer, assisted by three Filter Plotters. Its purpose is to combine information from three Chain Home RDF stations (at Stow Maries, Great Bromley and Dover), to remove errors and to make deductions about what each contact is likely to be, before passing this information over to the Operations Section (who will decide what to do about it.)

The Filter Table has distinctive concentric circles drawn on it; one set centred on each of the connected RDF stations, and each in a different colour.

- Stow Maries: Blue
- Great Bromley: Yellow
- Dover: Red



FILTER PLOTTING
On single shift operation, there are three Filter Plotters. Two of them wear headsets connecting them to the three RDF stations; normally one plotter connected to Stow Maries (Blue), and one connected to both Great Bromley (Yellow) and Dover (Red). The third Filter Plotter helps the Filter Officer, either preparing Raid Trays and keeping the Filter Table in good order, or passing information to the Ops Section.

The filter plotters are armed with a box of counters, colour coded to match the three RDF stations. Most of these counters are circular, numbered from 1 to 5. (There are also square counters for strength, triangular counters for altitude, and square IFF counters.)

Suppose the Filter Plotter has received the following call from Stow Maries RDF:

> RDF Plotter: “Standby, new contact. BLUE. WILLIAM MONKEY, EIGHT NINE, ZERO ZERO, WILLIAM MONKEY, EIGHT NINE, ZERO ZERO, showing IFF.”

Their first action is to confirm the information (or ask for it to be repeated):

> Filter Plotter: “New contact, BLUE. WILLIAM MONKEY, EIGHT NINE, ZERO ZERO, IFF.”

Next they would look at the Filter Clock - divided into five sections labelled 1 to 5. Since this report came from Stow Maries - Blue - they would take a blue counter, with the same number as currently shown on the Filter Clock, and place it at WM 89 00.

With the location marked, they then add any supplementary information. Stow Maries RDF does not have height finding equipment and has not estimated the raid strength - but has declared an IFF (Identification Friend or Foe) signal, marking the contact as friendly. They take a blue IFF counter and place it next to the raid.

Reports from Dover or Great Bromley may include estimates of contact strength (number of aircraft) and altitude. Contact is reported as “[number] plus”, recognising that there might always be more than estimates. Altitude is reported as “at [number]” in thousands of feet. For example, Dover might report the same raid as above as:

> RDF Plotter: “Standby, new contact. RED. WILLIAM MONKEY, EIGHT FIVE, ZERO SEVEN. WILLIAM MONKEY EIGHT FIVE, ZERO SEVEN. TWO ZERO PLUS, AT ONE FIVE. Showing IFF.”

The position is slightly different - that is to be expected and why we have a Filter Table.

- **Two zero plus** means at least twenty aircraft. The plotter marks the raid with a red square “20+” counter.
- **At one five** means at fifteen thousand feet. The plotter marks the raid with a red triangular “15” counter.

The plotter can expect to receive an updated report from the RDF station a minute or so later. They will place a new counter (with the number matching the Filter Clock) and shift any information counters next to the latest counter. Eventually the Filter Clock will catch up to the first counter placed - at which point it should be removed and re-used. Only counters from the last five Filter Clock segments should remain on the map, or things can get confusingly busy!

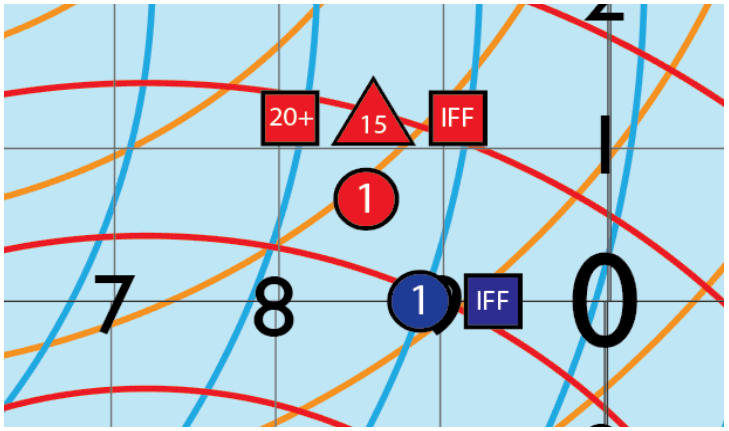
When operating with a double shift, the standby filter plotters normally assist the Filter Officers with administrative tasks, freeing the Filter Officers up to concentrate on Filtering.

FILTERING
The Filter Officer is responsible for her section but will spend much of her time concentrating on filtering - the act of combining information from multiple RDF stations to determine an accurate position and deducing additional information about the raid.

Filtering is easier than it looks (which has the advantage that you look like you're a wizard but it's not actually that hard.)

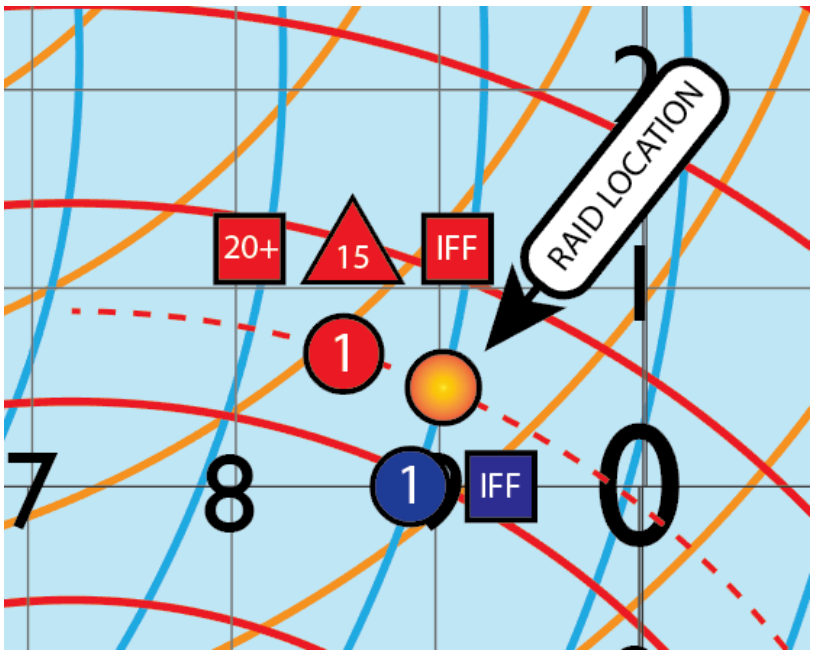
The first thing to do is resolve an accurate position. RDF stations are very good at measuring range, but they're not very good at measuring bearing accurately. This means that two (or three) RDF stations reporting the same contact will probably report it in three different places, and it's your job to figure out where it really is.

Suppose the Filter Table currently looks like this:



From this we can see that we have contacts reported by BLUE (Stow Maries) and RED (Dover) - the round counters. We can see that they are close, and they were reported at around the same time, since both counters arrived during segment 1 on the Filter Clock. Given that each station has only detected one contact in that general area, they are probably the same contact reported with a position error. We can also see that RED (Dover) is reporting that the contact is 20+ aircraft, at 15,000 feet, with IFF detected. Stow Maries does not have height finding equipment but has reported IFF detected.

The first thing to do is establish a position. We know that RDF stations often get the bearing wrong but are usually very accurate when measuring range. The blue contact is on a range ring; everywhere on that ring is at the same range from Stow Maries, so the true position is probably somewhere on that ring. The red contact is not on a range ring, but we can imagine a red ring passing through its position; the true position is probably also on that imaginary ring. Look for the point where those two rings intersect, and that is probably the actual position of the raid. Given that you don't know which direction the raid is moving, you mark its first position with a little wooden board game piece called a halma. (Once you have more than one location, you know which direction the raid is moving, and you'll use arrows to mark positions.)

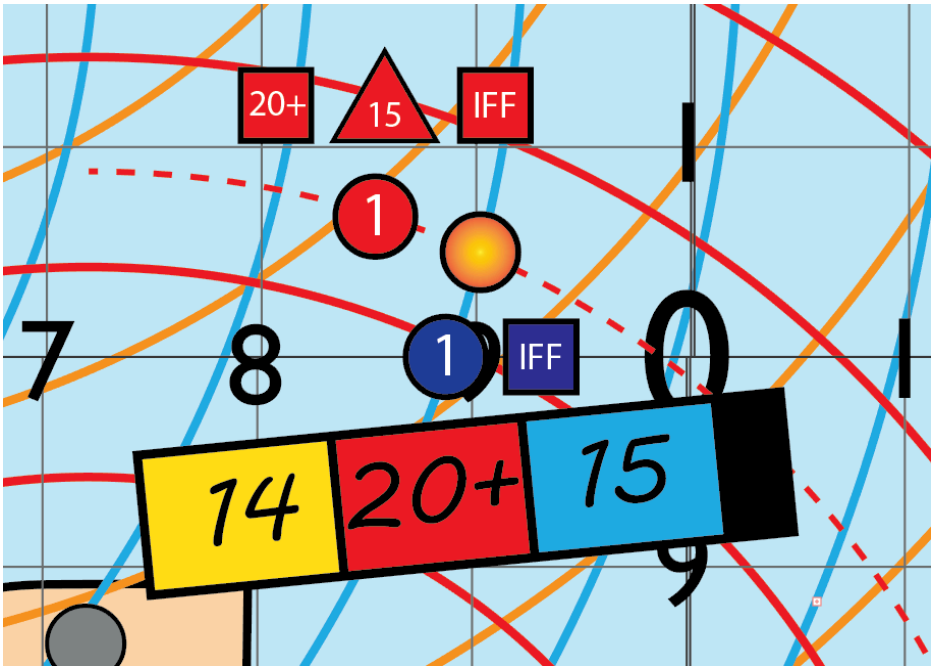


The second thing to do, since this is a new track, is to prepare a Raid Tray. This is a marker which summarises key information about the raid. If you have a second shift on duty, you should have a spare plotter who can handle this for you. There will be a stack of blank Raid Trays at the table. They are rectangular panels with a yellow section, red section and blue section. You can write on the panels using a wax pencil. (You'll usually have a Plotter available to handle this for you.)

The yellow panel is for identification. You will assign a unique ID number to this raid. Start with 01 for the first raid detected in the morning and use the next unused number for each new raid. Write this number on the yellow section, and in the Raid Logbook. Let's assume the next unused number is 14.

The red panel is for raid strength - red for danger! If you have any information about the strength of the raid you put a number in this panel. We have an estimate of 20+ from Dover, so we'll write 20+ on the red panel. If you have conflicting reports of strength from different stations, err on the side of caution and take the bigger number.

The blue panel is for altitude - blue for the sky! Again, if you know - and we do, because Dover has reported an altitude of 15 (thousand feet) - you write that in here. If you have two conflicting reports of height, the station closer to the raid is more likely to be accurate so use their estimate.



The third thing is to see if you can assess whether this raid is friendly or hostile. It is *possible* for two formations flying close together to look like an IFF return, but if two RDF stations looking from different directions report IFF, then it's almost certainly friendly. The other thing to check is the Movements Log - a document provided to you at the start of every day with all planned friendly aircraft movements in your area. If the raid appears in the movement Log, it's probably friendly. If you don't have any reason to assume it's friendly, and it's behaving like an enemy, you should declare the raid Hostile and write an H before its raid ID number. So Raid 14 would become Raid H14 - although of course, with two reports of IFF Raid 14 is probably not hostile.

Finally, you need to report this raid to the Ops Section over your headset. You can do this yourself, or you can delegate the headset to a spare Plotter if you prefer. For example, you would report this raid as:

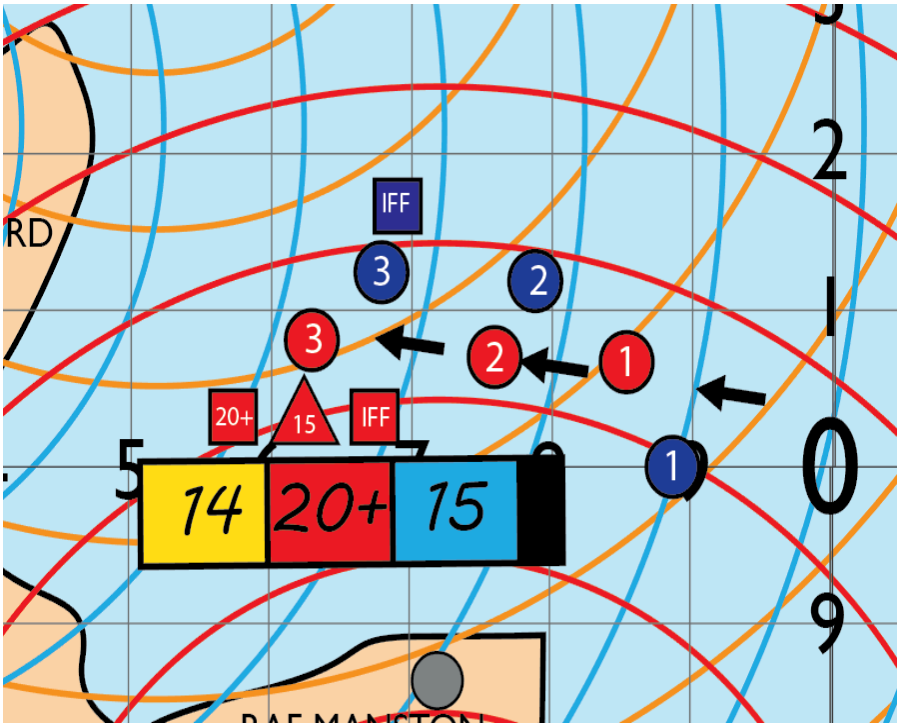
> Filterer: Standby - new raid, ONE FOUR, WILLIAM MONKEY, NINE ZERO, ZERO FIVE. WILLIAM MONKEY, NINE ZERO, ZERO FIVE. TWO ZERO PLUS AT ONE FIVE. IFF.

- **Standby** - a warning to expect information. Can be omitted if you know they're concentrating.
- **Raid** - reporting a raid location. (Note that you are reporting a raid, not a contact. You've assigned it a Raid ID number and made it official.)
- **New raid** - reporting a raid for the first time, you've just made up a Raid Tray for it.
- Give the **raid number**. (HARRY ONE FOUR if you had declared this one hostile.)
- You give the **location** twice.

- Then give the **strength** and **altitude** if you have them on the Raid Tray.
- Then give any **additional information**: for example, that you have IFF contact.

Once a raid has been on the table for a few minutes and you have multiple contacts, you know which direction it is moving in, and you mark its positions with arrow counters rather than halma pieces - put the arrow's point at the raid location. Report the new location to Ops every time you plot it.

After a few minutes, our plotting table might look like this:



We can see two more contact reports (at time-slots 2 and 3), and the arrows resolving their true position. The course of the raid is becoming clear. The Raid Tray and information counters have been moved to keep up with the most recent positions.

When operating with a double shift, you will have three extra plotters (who can help by taking notes, assist you with preparing raid trays, logging new raids, consulting the Movements Log and reporting to the Ops Section. You will also have a second Filter Officer - if the table is busy you can choose to split it between you, each handling half the raid tracks, or you can have them handle the filtering while you control the team and maintain awareness of the big picture. Do whichever seems most sensible at the time.

Operations Section

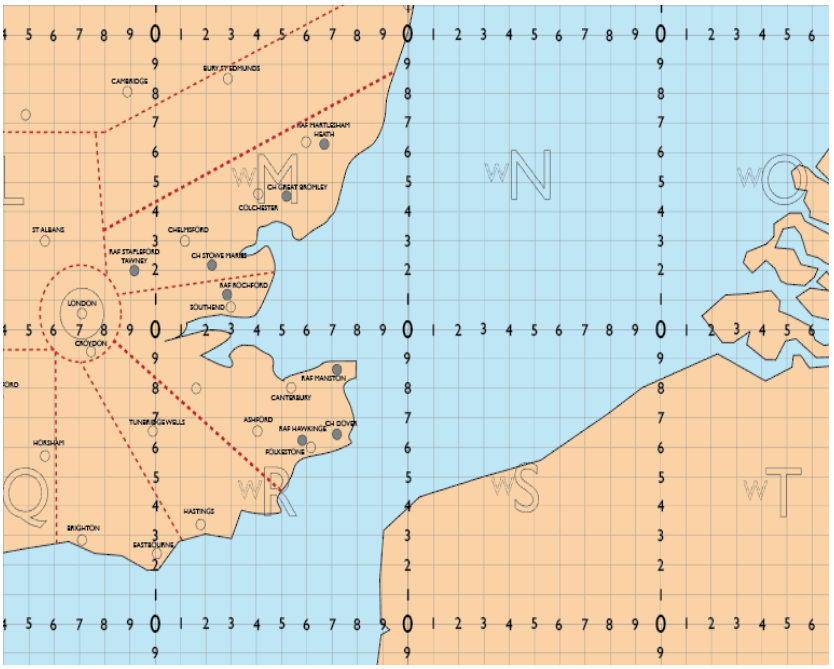
The Ops Section has three functions:

1. Plotting - maintaining a picture of what is in the air
2. Decision making - deciding which raids to intercept, with which squadrons
3. Fighter Control - controlling RAF squadrons to make the planned intercepts

The Operations Officer is responsible for the Section's activities, although the Watch Supervisor will normally take a hands-on role in supervising the Operations Table directly.

The section manages two key pieces of equipment; the Operations Table, and the Squadron Status Board.

The Operations Table is a large map of the South-East of England and nearby sea. It shows the boundaries of 11 Group's sectors, the location of key towns and RAF Stations.



The Squadron Status Board is a large vertical chart showing the current situation of each of the RAF Fighter Squadrons under the section's control.

	46 HURRICANE ANGEL	303 HURRICANE APANY	222 SPITFIRE KOTEL	603 SPITFIRE VIKEN	600 (NF) BLENHEIM GARDENER	264 (NF) DEFIANT PLATER	
	STAPLEFORD TAWNEY	*MANSTON*	*MARTLESHAM HEATH*	*ROCHFORD*	*HAWKINGE*	*ROCHFORD*	
RELEASED					600 (NF) BLENHEIM GARDENER	264 (NF) DEFIANT PLATER	RELEASED
STANDBY	46 HURRICANE ANGEL			603 SPITFIRE VIKEN			STANDBY
AIRBORNE			222 SPITFIRE KOTEL				AIRBORNE
IN POSITION							IN POSITION
ENEMY SIGHTED							ENEMY SIGHTED
RETURNING TO BASE		303 HURRICANE APANY					RETURNING TO BASE
LANDED & REFUELLING							LANDED & REFUELLING
	P *16* A *12*	P *16* A *12*	P *16* A *12*	P *16* A *12*	P *16* A *12*	P *16* A *12*	

Each column corresponds to a squadron. The top row lists the squadron's number, aircraft type and radio callsign. Below that is a space to chalk in the RAF station the squadron is currently assigned to.

The central section of the board is a grid - each row corresponding to a possible status for the squadron. Marker plates are moved between the rows of this grid, allowing the officers to understand the readiness of their squadrons at a glance. The possible status options are:

1. Released - the squadron is not ready, and the pilots are resting.
2. Standby - the squadron is ready for action, on a few minutes notice.
3. Airborne - the squadron is in the air, flying to their assigned location.
4. In position - the squadron has reached their assigned location and is waiting.
5. Enemy sighted - the squadron has sighted enemies and is engaging
6. Returning to base - after combat or with low fuel, the squadron is flying home
7. Landed and refuelling - the squadron is refuelling before returning to readiness

At the very bottom of the Status Board is a section to record the number of available pilots (P) and aircraft (A) in each squadron. A full-strength squadron has twelve aircraft available and normally a few extra pilots.

PLOTTING

The purpose of plotting is to maintain an accurate picture of what is going on in the sky, staying as up to date as possible. Plotters mark aircraft positions on the map, having received information from:

1. The Filter Table, providing filtered RDF data on aircraft over the sea.
2. The Royal Observer Corps, who report on aircraft over land
3. The Pipsqueak system, reporting the position of friendly fighters.

When operating with a single shift the Ops Section has three Ops Plotters. Normally one will be connected to the Filter Table via headset, and the other will be connected to both the Royal Observer Corps and the Pipsqueak operator. The third Ops Plotter assists the Ops Officer in keeping the table in good order.

Both plotters on headsets will receive information in a similar format, using the standard map grid reference system. For example:

> Filter Officer: RAID, ONE FOUR. WILLIAM MONKEY, NINE ZERO, ZERO FIVE. WILLIAM MONKEY, NINE ZERO, ZERO FIVE. TWO ZERO PLUS AT ONE FIVE. IFF.

- **Raid** - this is a formally identified group of aircraft.
- **New Raid** - this is a raid being reported for the first time.
- **One Four** - this is the Raid ID number. It would be Harry One Four if the Filter Officer had declared it hostile.
- **WILLIAM MONKEY, NINE ZERO, ZERO FIVE** - the location
- **TWO ZERO PLUS** - at least 20 aircraft
- **AT ZERO FIVE** - altitude of 15 (thousand feet)
- **IFF** - the raid is showing IFF (Identification Friend or Foe) signals, i.e. is friendly.

Alternatively, Pipsqueak might report a friendly squadron:

> Pipsqueak: SQUADRON, TWO TWO TWO, WILLIAM MONKEY, FOUR ZERO, ONE FIVE. WILLIAM MONKEY, FOUR ZERO, ONE FIVE. AT TWO ZERO.

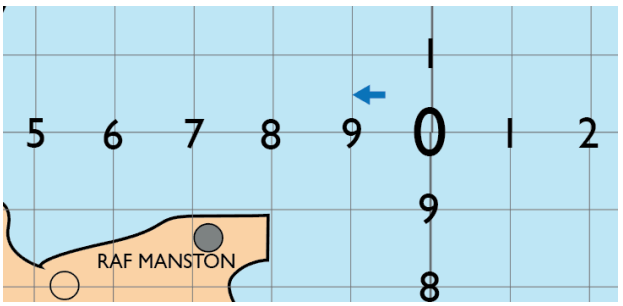
- **Squadron, two two two** - this is 222 Squadron, a Spitfire squadron
- **WILLIAM MONKEY, FOUR ZERO, ONE FIVE** - the location
- **AT TWO ZERO** - altitude of 20 (thousand feet)
- Pipsqueak does not report squadron strength - this is known to the Ops Room already.

The plotter repeats the information to check they have it correct, before marking it on the map:

> Ops Plotter: RAID, ONE FOUR. WILLIAM MONKEY, NINE ZERO, ZERO FIVE. TWO ZERO PLUS AT ONE FIVE. IFF.

Raids are marked on the map using card arrows and wooden blocks. The position should first be marked with an arrow. Arrows come in three colours; red, yellow and blue. To choose which arrow to use, the plotter checks the Squadron Clock on the wall.

The plotter selects an arrow matching the colour the clock's minute hand is pointing to - currently blue - and places it on the map with its point at the indicated location.



With the position marked, they prepare a wooden block to mark the raid. The blocks come in two types - one for friendly fighters, and one for all other raids. Each has coloured panels on the front that can be written on with wax pencil, and the fighter blocks have holes in the top to allow squadron “flags” to be inserted.

Given that this raid is not a friendly fighter squadron, the plotter takes one of the right-hand blocks, and fills it in accordingly. The colour code is the same as on the Filter Table’s Raid Tray:

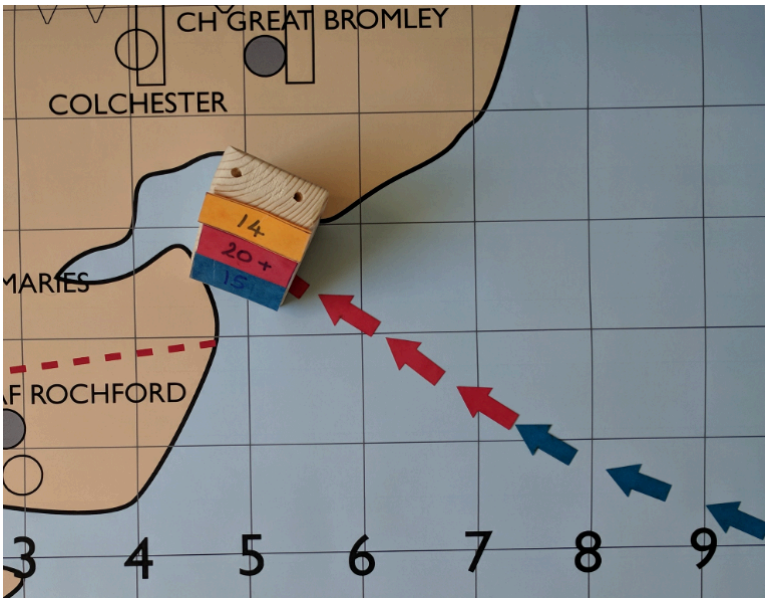
- Yellow for Raid ID
- Red for strength (red for danger!)
- Blue for altitude (blue for the sky)

The block is then placed on top of the leading arrow.

New position reports will come in every minute or so; each one marked with a new arrow, and the block moved to the head of the line. After ten minutes, the map might look like the one below. Note that the arrows changed from blue to red after five minutes.

At this point, the clock is about to move into a yellow sector, and the plotter will switch to yellow arrows. It’s good practice to have at most two colours of arrow on the table at once (to avoid clutter and potential confusion) so once you start putting down yellow arrows, you can clear up the blue ones.

Friendly squadrons are plotted using flags, so that they look visually distinct from aircraft not under the section’s control. If two squadrons are formed up together, two flags can be used on a single block.



DECISION MAKING
Once the plotters have assembled a picture of what is approaching, command decisions must be made. Which raids are hostile? Which are bombers, and which are fighters? Which are the priorities to intercept, and which squadrons should be employed to do so? Decisions must be made quickly because, in the fifteen minutes it will take fighters to climb to combat altitude, bombers will have crossed seven or eight map squares.

These decisions are normally made by the Watch Supervisor, although she may delegate them to the Operations Officer.

Which raids are hostile?

- Raids marked with a H- prefix have been assessed as probably hostile by the Filter Officer
- The Royal Observer Corps may report identifying aircraft in a raid as German
- Raids with IFF reported are almost certainly friendly
- Friendly aircraft sometimes turn off IFF, so lacking IFF does not always mean hostile

Which are fighters, and which are bombers?

- Bomber formations usually fly at 15,000 feet
- Fighters usually fly at 20,000 feet to maximise their fuel endurance.
- Bombers fly at around 300km/h, crossing about two and a half map squares in the five minutes between arrow colours changing.
- Fighters fly at around 600km/h, crossing about five map squares in the five minutes between arrow colours changing.
- A formation of bombers may be escorted by fighters - the fighters will usually match the bombers' speed but fly above them.

What are the priority targets?

- Large formations of bombers will cause massive damage if they are allowed to reach their targets without interference - they are the top priority.
- Smaller formations of bombers should be intercepted if possible but are a lower priority than large formations.
- Escorted bombers are a lower priority than unescorted, and you must be sure to use enough fighters to keep the escorts busy AND then attack the bombers.
- Formations of fighters alone should be avoided - they can do little damage to ground targets but pose a risk to your fighters.

Which squadrons to use?

- You can only use Spitfires and Hurricanes (day fighters) during the day, and can only use Blenheims and Defiants (night fighters) at night.
- Spitfires are (slightly) better than Hurricanes against fighters.
- Hurricanes are (slightly) better than Spitfires against bombers.
- You will likely be constrained by having to use whichever squadrons are ready and in a position that can make the intercept, even if they are not ideal.

As a rough rule of thumb, sending half to two-thirds as many fighters as there are bombers in a raid will probably completely disrupt the raid - any more fighters than this is wasteful.
If engaging escorted bombers, the best approach is to send a squadron to engage the escorts, and another squadron (or two) to engage the bombers while the escorts are busy.

Fighter Command's tactical doctrine has wavered between massing a large force to attack incoming raids, and constantly harassing them with individual squadrons. Currently the latter tactic is in favour; it allows quicker intercepts but is risky if it runs into fighter escorts.

Once the Watch Supervisor has decided which squadrons to send against which raids, she instructs the Operations Officer. For example:

> Watch Supervisor: Ops, scramble three oh three to intercept Harry One Six. I think they're going for Folkestone, so try and catch them over the sea.
>
> Ops Officer: Yes ma'am. Scramble three oh three to intercept Harry One Six over the sea.

- **Ops** - the quick way to refer to the Operations Officer
- **Scramble** - the instruction to order a squadron to take off as quickly as possible
- **Three oh three** - 303 Squadron, the squadron of Hurricanes based at RAF Manston; presumably ready for take-off, and near Raid H16's path.
- **Harry One Six** - the hostile raid H16
- **Additional information**; assessing their target likely to be a coastal town, the WS has requested the intercept happen over the sea to ensure it prevents the bombers reaching their targets.

FIGHTER CONTROL
Fighter control is the act of passing orders to fighter squadrons to put them in the right place at the right time to intercept enemy raids. It is normally the province of the Operations Officer and the Squadron Liaison.

The first step is to pass orders to the relevant squadrons to scramble. This is done by telephone. Little information is needed - simply which squadrons should scramble. The squadron may have pilots based at Stow Maries - they can be alerted by a runner and/or the scramble bell.

Squadron Liaison: "Hello Manston? Ops Room. Scramble three oh three."

RAF Manston: "Very good, Ops. Scrambling three oh three."

After a few minutes, 303 Squadron will radio in to report they are airborne and formed up.

303 Squadron: Ops, APANY reporting in, airborne.

- APANY - the radio callsign for 303 Squadron

The squadron liaison then moves their placard on the Squadron Status Board from READY to AIRBORNE.

During this time, the Ops Officer will have chosen their intercept point, and will pass this to the squadron along with information about their expected target. They use slightly different language than the Ops Plotters have previously used, since the RAF operate with slightly different vocabulary than the WAAF.

Ops Officer: APANY, move to WILLIAM SUGAR, ZERO ZERO, SIX FIVE. WILLIAM SUGAR, ZERO ZERO, SIX FIVE. ANGELS ONE EIGHT. Look for TWO ZERO PLUS HOSTILE BOMBERS FROM THE EAST, ANGELS ONE FIVE

303 Squadron: Ops, roger. APANY moving to WILLIAM SUGAR, ZERO ZERO, SIX FIVE, ANGELS ONE EIGHT

- APANY - the radio callsign for 303 Squadron
- ANGELS - altitude in thousands of feet (Note the potential for confusion with ANGEL, the callsign for 46 Squadron. Sorry; it's historical.)

The Ops Officer has ordered 303 Squadron to a particular position at 18,000 feet, and to look for 20+ bombers coming from the east at 15,000 feet. Generally, fighters need to be within 5,000 feet of an enemy formation to intercept it, and they gain an advantage if they attack from above.

The squadron will fly to the ordered position and wait there, circling and looking for enemy formations. When they reach that position, they will radio in:

303 Squadron: Ops, APANY in position. WILLIAM SUGAR, ZERO ZERO, SIX FIVE, ANGELS ONE EIGHT.

On receipt of this, the Squadron Liaison will move 303 Squadron's placard to the IN POSITION box.

The Ops Officer can re-task them at any time, but the general tactic is to put them in the path of the enemy raid and let it run into them - more reliable than trying to get two paths to cross at the exact same time.

Aircraft can spot enemies at roughly 10km in daytime - one small map square. (This may be reduced if there is heavy cloud - about which your meteorological officer will brief you at the start of each shift - so heavy clouds should be avoided for intercepts where possible.)

Aircraft can spot enemies at much shorter distances at night - only 1-2km. Night fighters equipped with Airborne Intercept Radar have a huge advantage here and can spot enemies at nearly 10km even at night. However, with the towns blacked out it is very difficult for night fighters to know where they are, and the Ops Room will probably have to tell them which bearing to fly in rather than a map grid.

When the squadron spot an enemy formation, they will call TALLY HO and engage, requiring no further input from the ground. The Squadron Liaison will move their placard to ENEMY SIGHTED.

> 303 Squadron: Ops, APANY, TALLY HO, twenty plus bombers. Engaging. Alright, chaps, gun switches to ARM, etc etc….

After the engagement, the squadron will report in. After all but the very smallest skirmish they will need to return to base for fuel and ammunition.

> 303 Squadron: Ops, APANY, returning to base. Four kills, six probables. Lost two Hurricanes.

Again, the Squadron Liaison moves 303's placard to RETURNING TO BASE. Once they have landed, RAF Manston will telephone the Ops Room to confirm:

> RAF Manston: "Hello, Ops Room, RAF Manston. Three oh three squadron recovered. Two Hurricanes lost; strength now one zero aircraft, one four pilots. They'll be ready in about thirty minutes."

Again, the Squadron Liaison moves their placard on the board to LANDED & REFUELLING and adjusts the chalk numbers at the bottom of the board to reflect the squadron's new strength.

Finally, about half an hour later, Manston will telephone again to report 303 ready.

> RAF Manston: "Hello, Ops Room, RAF Manston. Reporting three oh three squadron ready for operations."

The Squadron Liaison moves the squadron's placard to the READY box, and the cycle can begin again.

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