

INTEGRATED TOWER WORKING POSITION (ITWP)

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1 INTRODUCTION

1.1 Document Purpose and Scope

This document describes the current HMI design and functionality of the EUROCONTROL Integrated Tower Working Position (ITWP) **BASELINE** software as of **08 April 2020**, and as included in the eDEP **20.1** release. The document has been created from the original HMI Solution Design document, [D1].

1.2 Methodology

This document describes the general behaviour and design of the different functions available in ITWP. It includes:

- A breakdown and description of the main functional elements that make up the ITWP software.
- An overview of how traffic is managed in ITWP as it passes between controller working positions.
- A description of the general display principles that are applied across all controller working positions.
- A breakdown of all the different graphical elements in the ITWP display. Each element is listed describing their purpose, appearance and the behaviour they provide on each controller working position.

1.3 Structure of the Document

The content of this document is organised as follows:

- Section 2 addresses the main principles within the ITWP software solution.
- Section 3 describes the flight lifecycles within ITWP.
- Section 4 describes the different HMI elements of the ITWP software.
- Section 5 provides appendices on look-up data used to drive HMI functionality and a brief description of the Pseudo-pilot working position (PWP).

2 PRINCIPLES

2.1 TWR Configuration

It is important to note that the TWR forms an integrated part of the system. It is to be regarded as **a sector** just as an APP or ACC sector. The main difference being that the geographical extension of the sector both lateral and vertical is limited compared to ACC and APP sectors.

The Air Traffic Services (ATS) provided by the TWR sector may be delegated to several different controller working positions (CWP's) also referred to as Operator Roles (an operator role is a defined set of working responsibilities to be performed by an operator).

Three different controller working positions will be considered:

- Tower Clearance Delivery (CLD) – the controller handling route clearance and flight data information to departures at the stand.
- Tower Ground controller (GND) – the controller handling the traffic on the apron and taxiways
- Tower Runway controller (RWY) – the controller handling the traffic in the Control Zone (CTR), and on or in the vicinity of the runways.

Notes:

- a) The CLD, GND, and RWY control positions are addressed in this document,
- b) These Operator Roles might be configured in a variety of combinations e.g. RWY arrival controller, RWY departure controller, each controller role separate, two roles merged, or even all roles merged.
- c) A brief description of associated Pseudo-Pilot positions can be found in Appendix C of this document.

2.2 TWR Functionality and Procedures

The TWR sector transfers and assumes flights to/from APP/ACC sectors in the same manner and follows the same rules as are used between other sectors (e.g. APP and ACC sectors).

Inside the TWR sector it is also intended to use system assisted co-ordination between Operator Roles in the same manner as between sectors. It is not foreseen that the full range of messages/or similar data exchange known from the APP/ACC environment should be used, but only specific messages/data exchange such as notification of flights and transfer of communication.

The HMI should however be the same or as close as possible to the HMI used between sectors.

The fixed sequence for **arriving** flights will be:

- [APP] ⇒ RWY ⇒ GND

The fixed sequence for **departing** flights will be:

- [CLD] ⇒ GND ⇒ RWY ⇒ [APP]

Note: in the ITWP solution, APP controller actions will be performed by the System (i.e. a system dummy function used to simulate transfer of flights to/from APP).

2.3 Traffic Planning States

From the perspective of an individual controller, traffic entities (i.e. aircraft, vehicles, and towed aircraft) transition through several distinct states as control over them is assumed and relinquished.

The main traffic planning states considered in ITWP are:

- **Not concerned:** traffic for which the current operator role is not responsible.
- **Pending:** traffic planned to be under control responsibility of the current operator role, but not yet assumed.
- **Pending-In:** traffic planned to be under the control of the current operator role, and the flight crew has been instructed, by the preceding controller, to contact the current operator who has not yet assumed control. Control is 'in-transfer'.
- **Assumed:** traffic for which the current operator role is responsible.
- **Assumed-out:** traffic where the current operator has instructed the flight crew to contact the next control position, who has not yet assumed control. Control is 'in-transfer'.

2.3.1 Transitions Between States

The following figure illustrates the transitions between the identified states for an aircraft, as viewed by an individual controller (Role N), and the actions that trigger the transitions.

Changes between the states are triggered by an 'Assume' event or a 'Transfer' event input on the preceding controller position (Role N-1) or following controller position (Role N+1).

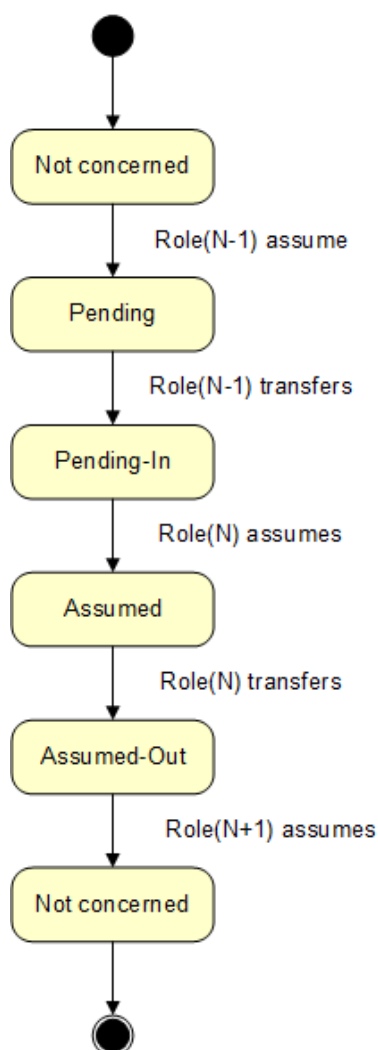


Figure 1: State Transitions – Aircraft

Exceptions to this case are:

- When the RWY controller does not issue the 'Assume', the system may automatically issue the event at a given time before ELDT¹.

1. The time before ELDT is a locally defined parameter, defaulting to zero minutes (i.e. by default the arrival flight is auto-assumed at ELDT)

- When a departure flight or a towed aircraft (performing a planned² movement) is activated in the system, it will appear in a *Pending-In* state on the initial control position (normally the CLD controller position for a departure, or the GND controller position for a towed aircraft), ready for the flight crew to 'call-in'. The traffic appears in the *Pending-In* state at a parameter defined time before EOBT (Tpending-dep). The parameter is defined at local level³.
- When an arrival flight parks at the stand, the traffic will transition from the *Assumed* state to the *Not concerned* state at a parameter defined time after the AIBT - the flight symbol is removed from the controller displays. The parameter is defined at local level⁴.

Vehicles and towed aircraft performing unplanned² movements do not have the strict sequence of control and handover that aircraft require. A controller may 'assume' any uncontrolled vehicle or towed aircraft, and then either 'release' control or transfer control to another control position. The following figure illustrates the state transitions for vehicles and towed aircraft (unplanned movement).

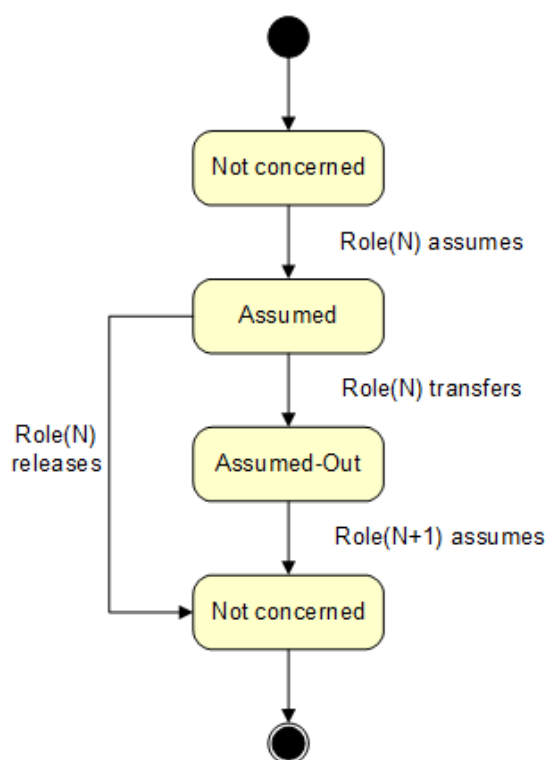


Figure 2: State Transitions - Vehicles and Towed Aircraft (unplanned)

². A towed aircraft movement may be a 'planned' or an 'unplanned' movement. For a planned movement, the traffic symbol will appear in the Pending-In state on the initial control position at a pre-determined time before the scheduled OBT. For unplanned movement, the traffic symbol will appear in the Not Concerned state.

³. The default time is 6 minutes.

⁴. The default time is 30 seconds after the AIBT.

2.4 Colour Coding

2.4.1 Default Colours

A set of default colours are used in ITWP. These default colours are off-line parameters that can be tuned at local level.

a) Traffic type

- 'Arrival colour': set to dark brown;
- 'Departure colour': set to dark blue;
- 'Other Traffic Colour' (i.e. vehicles, towed aircraft, non-identified traffic): dark green.

b) Warning, information alert and alarm

- 'Warning and information alert colour': yellow⁵
- 'Alarm colour': red⁶

c) Traffic planning colour

- 'Pending colour': black
- 'Pending-in colour': white
- 'Assumed colour': as per standard 'Traffic' colour (see above).
- 'Assumed out colour': dark grey
- 'Not concerned colour': dark grey

d) Text colour

- 'Text Colour': black

e) Label callsign background colour

- 'Arrival callsign background': light brown, semi-opaque (while assumed).
- 'Departure callsign background': light blue, semi-opaque (while assumed).
- 'Other traffic callsign background': light green, semi-opaque (while assumed).

f) Route display colour

- 'Planned route': white
- 'Cleared route': pale green

g) Mark background colour

⁵ A warning is an information to the controller (e.g. parking stand is occupied).

⁶ An alarm is an alert of higher severity than an information alert

- 'Mark Colour' (background): green

Notes:

- In the following, 'callsign' refers to the callsign field wherever presented; 'text' refers to text in label and e-strip.
- The background of the callsign in the label is coloured in the appropriate '*Label callsign background*' for the traffic type, when the mobile is in the assumed state.
- Alarm and information alert colours have priority over any callsign background colour.

2.4.2 'Not Concerned' Planning State Colours

Traffic in '*Not Concerned*' planning state have the label text and e-strip text (if any) in '*Not-Concerned Colour*'.

2.4.3 'Pending' Planning State Colours

Traffic in the '*Pending*' planning state have the label text and e-strip text in the '*Text Colour*', and the symbol and callsign are in the '*Traffic Type*' colour.

2.4.4 'Pending-in' Planning State Colours

Traffic in the '*Pending-in*' planning state have the label text and e-strip text in the '*Text Colour*', and the symbol and callsign in the '*Traffic Type*' colour. The callsign background is in the '*Pending-in*' colour.

2.4.5 'Assumed' Planning State Colours

Traffic in the '*Assumed*' planning state have the label text, e-strip text, callsign, and symbol in the '*Traffic type*' colour.

2.4.6 'Assumed-out' Planning State Colours

Traffic in the '*Assumed-out*' planning state have the label text and e-strip text in the '*Not-Concerned*' colour, and the callsign text and symbol in the '*Traffic Type*' colour.

2.5 Electronic Flight Strips (EFS)

EFS are generated by the system for all aircraft, aircraft under tow, and vehicles and are displayed to the controller (when appropriate) in EFS Bays (§2.6). The content and layout of the EFS can be defined in the local configuration, and additionally the controller can select the precise content dependant on the current role.

<input type="checkbox"/> T1000	IBE987	A320/M	102	G	-C-	TOF	▼
<input type="checkbox"/> 01:32	AFR321	A320/M	306	<input type="checkbox"/>	↓↓↓	GO	▼

Figure 3: EFS

The content of the electronic flight strip is described in detail in §4.2.3.

2.6 EFS Bays

As a principle, the EFS bays at each working position should display flight strips for:

- Traffic that will become controlled in the near future (pending traffic),
- Traffic under control (active traffic),
- Traffic for which transfer to another controller role has been initiated (transferred traffic).

Depending on controller role and local considerations, traffic may be presented to the controller in different *bays*. Each bay can then be composed of different *bay sections* for planning and control purpose. Figure 4 (below) illustrates the default flight strip bay arrangement, as configured for a RWY controller role. A bay is represented as a vertical column consisting of several *bay sections*.

GO AROUND RW18									
PENDING ARR RW18									
<input type="checkbox"/>	E1013	IBE789	A320/M	I		ROF	<input type="button" value="▼"/>		
<input type="checkbox"/>	E1010	AZA456	A320/M	I		ROF	<input type="button" value="▼"/>		
<input type="checkbox"/>	E1007	DLH123	A321/M	I		ROF	<input type="button" value="▼"/>		
FINAL RW18									
<input type="checkbox"/>	03:08	KLM987	B738/M	<input type="checkbox"/>		LND	<input type="button" value="▼"/>		
(TD 320/020) RW18 (SE 320/20)									
<input type="checkbox"/>	00:10	BAW654	B788/H	<input type="checkbox"/>	↓↓↓	GO	<input type="button" value="▼"/>		

AIRBORNE RW18										
TAXI IN RW18										
<input type="checkbox"/>	A1000	AFR321	A320/M	<input type="checkbox"/>						<input type="button" value="▼"/>
PENDING DEP RW18										
<input type="checkbox"/>	E1007	AZA654	A320/M	G		TX	ASSUME	<input type="button" value="▼"/>		
HOLDING POINT RW18										
<input type="checkbox"/>	T1002	DLH321	A321/M	G		TX	LUP	<input type="button" value="▼"/>		

Figure 4: Flight Strip Bays (RWY position)

Controllers can arrange, group, and ungroup the bays and bay sections as they wish. The following paragraphs describe the solution adopted for ITWP for the RWY, GND and CLD controllers. Other configurations may be defined depending on local considerations.

2.6.1 RWY Controller Bays

2.6.1.1 'Taxi Out' Bay Sections

PENDING DEP RW18						
<input type="checkbox"/>	E1007	AZA654	A320/M	G	TX	ASSUME
HOLDING POINT RW18						
<input type="checkbox"/>	T1002	DLH321	A321/M	G	TX	LUP

Figure 5: Taxi Out Bay Sections

Two bay sections are used to display flight strips for aircraft that are taxiing to the runway:

- PENDING DEP section:

- The bay section is opened (system-generated) when a departure flight is in a Pending or Pending-in state, and has been issued 'Pushback' clearance (if any) or 'Taxi' clearance (when aircraft pushback is not required).
- The bay section remains open if it contains at least one flight strip.
- Flight strips within the bay section are automatically ordered by ETOT.
- HOLDING POINT section
 - The bay section is opened (system-generated) when a departure flight is assumed by the RWY controller or the GND controller transfers a vehicle to the RWY controller.
 - It will also be opened (or remain open) when the PENDING DEP section contains any flight strip, or if the RWY bay section contains any departure flight strips.
 - Flight strips within the bay section are automatically ordered by the time at which the flight or vehicle was transferred to the RWY controller.

2.6.1.2 'RWY' Bay Sections

GO AROUND RW18						
PENDING ARR RW18						
<input type="checkbox"/>	E1013	IBE789	A320/M		ROF	▼
<input type="checkbox"/>	E1010	AZA456	A320/M		ROF	▼
<input type="checkbox"/>	E1007	DLH123	A321/M		ROF	▼
<input type="checkbox"/>	E1005	KLM987	B738/M		ROF	▼
FINAL RW18						
<input type="checkbox"/>	02:03	BAW654	B788/H	<input type="checkbox"/>	LND	▼
(TD 320/020) RW18 (SE 320/20)						
<input type="checkbox"/>	T1001	DLH321	A321/M	G	-C-	TOF ▼
<input type="checkbox"/>	A1000	AFR321	A320/M	<input type="checkbox"/>	↓↓↓	131.60 ▼

Figure 6: RWY Bay Sections

The 'RWY' bay sections display flight strips for pending arrival traffic, active (departure and arrival) aircraft, and active vehicle/towed aircraft that have clearances to cross/enter the runway.

The following bay sections are included:

- GO AROUND section
 - The bay section is opened (system-generated) when at least one arrival flight that was planned to land on the associated runway is instructed to GO AROUND.
 - The flight strips are ordered in the sequence in which the 'GO' input was made by the controller.
- PENDING ARR section
 - The bay section is opened (system-generated) when at least one arrival flight that is planned to land on the associated runway is controlled by the preceding controller (TMA), i.e. the flight is in the Pending or Pending-in state as viewed from the RWY controller
 - It remains open if there is at least one flight strip in this section.
 - The flight strips in this section are automatically ordered by arrival sequence⁷. When the arrival sequence is not entered, the strips are ordered by ELDT.
 - By default, it is displayed above the FINAL and RWY bay sections.
- FINAL section
 - The bay section is opened (system-generated) when there is at least one strip in the PENDING ARR and when there is a flight strip in this bay.
 - Flight strips appear in this bay section when the corresponding arrival flight is assumed by the RWY controller. Flight strips are removed when landing clearance is issued or following a 'go around' instruction.
 - The flight strips in this section are automatically ordered by arrival sequence⁷. When the arrival sequence is not entered, the strips are ordered by ELDT.
 - By default, it is displayed between PENDING ARR and RWY sections.
- RWY section
 - The RWY bay section is permanently open on the RWY controller position, unless all flight strip bays have been permanently switched off from the EFS tool (see §4.8.1.2.3 – Airport Tool - EFS).
 - The bay section header indicates the RWY that the bay sections are associated with and the surface wind at touchdown (TD) and stop end (SE).
 - Flight strips appear in this bay section for:
 - Arrivals that have been issued with LND clearance

⁷ At time of writing, the assignment of the arrival sequence number is not implemented.

- Departures that have been issued with LUP, conditional LUP, or TOF clearance
- Vehicles/towed aircraft that have been cleared to CROSS/ENTER the runway
- Flight strips are sorted based on the *current clearance* issued to the associated flight or vehicle and its current state (landing, landed etc.). The following list indicates the increasing priority of clearance/state, with the flight strips with the higher priority clearance appearing lower down in the bay.
 - Default – default priority order if no other conditions are met
 - Conditional cross
 - Line-up
 - Cross
 - Enter
 - Take-off
 - Arrival Landing
 - Arrival landed
 - Airborne departure
- When there is more than one flight with the same clearance, then the time that the clearance was issued is used to determine the order.
- By default, it is displayed below the PENDING ARR and FINAL bay sections.

2.6.1.3 Transfer Bay Sections

AIRBORNE RW18				
<input type="checkbox"/>	A1002	DLH321	A321/M G	131.20 ▼
TAXI IN RW18				
<input type="checkbox"/>	A1000	AFR321	A320/M	I ▼

Figure 7: Transfer Bay Sections

- TAXI IN section
 - The bay section is opened (system generated) when an arrival flight strip appears in the RWY bay section and when there is a flight strip for an arrival flight for which the controller has input a VACATE (until the following controller has assumed control).
 - Flight strips are ordered based on ALDT.

- By default, it is displayed to the right-hand side of the RWY bay.
- AIRBORNE section
 - The bay section is opened (system generated) when there is at least one departure strip in the RWY bay section.
 - Strips are displayed in the bay section for departures where the controller has input AIR 'clearance', and remain until the departure is assumed by the next controller position.
 - Flight strips are ordered based on ATOT.
 - By default, it is displayed to the right-hand side of the RWY bay, and above the TAXI IN bay section.

2.6.1.4 Ghost Flight Strips

A 'ghost' flight strip duplicates a flight strip that is active in another bay section. Ghost strips are automatically generated by the system and may be displayed in either the Taxi In section or the RWY section. They are intended as an aide memoir to a controller for when traffic represented by a strip in one section may impact on the traffic represented by flight strips in another. All the text fields in a Ghost strip, apart from the callsign, are shown with a grey foreground colour, and all the fields in the strip are inactive to mouse input – controller inputs made from flight strips must therefore be made using the active strip.

The following figures illustrate the Ghost strip:

Figure 8 shows an active flight strip for an arrival that has just landed on runway 27R, and its corresponding Ghost strip in the Taxi In section for runway 27L.

(TD 320/020) RW27R (SE 320/20)				
A0801	FDX4	MD11/H	<input type="checkbox"/>	HOLD AT ▼

(TD 320/020) RW27L (SE 320/20)				
A0801	FDX4	MD11/H	<input type="checkbox"/>	HOLD AT ▼

Figure 8: Ghost Strip (TAXI IN Section)

Figure 9 shows an active flight strip in the Taxi In section for an arrival that has been issued with clearance to cross runway 27L, the corresponding Ghost strip shown in the RWY section (the orange background is used in the RWY section to highlight flight strips of mobiles that are cleared to cross the runway and have not completed the crossing).

(TD 320/020) RW27L (SE 320/20)				
A0801	FDX4	MD11/H	<input type="checkbox"/>	### 121.60 ▼

TAXI IN RW27L				
A0801	FDX4	MD11/H	<input type="checkbox"/>	### 121.60 ▼

Figure 9: Ghost Strip (RWY Section)

2.6.2 GND Controller Bays

The traffic is organised in two bays; for readability purpose of this document, these bays have been named 'Outbound bay' and 'Inbound bay'.

PENDING DEP					TRANSFER TO RWY				
<input type="checkbox"/> E1011	AFR123	A320/M	G	ASSUME	<input type="checkbox"/> E1005	IBE987	A320/M	G	TX EDIT
<input type="checkbox"/> E1008	BAW456	B788/H	G	PUSH					
PUSHBACK					PENDING ARR				
<input type="checkbox"/> E1012	KLM789	B738/M	G	PB TAXI	<input type="checkbox"/> A1002	BAW654	B788/H		EDIT
TAXI OUT					TAXI IN				
<input type="checkbox"/> E1007	AZA654	A320/M	G	TX 118.10	<input type="checkbox"/> A1000	AFR321	A320/M		TAXI

Figure 10: Flight Strip Bays (GND Position)

2.6.2.1 Outbound Bay Sections

PENDING DEP					
<input type="checkbox"/> E1011	AFR123	A320/M	G	ASSUME	▼
<input type="checkbox"/> E1008	BAW456	B788/H	G	PUSH	▼
PUSHBACK					
<input type="checkbox"/> E1012	KLM789	B738/M	G	PB TAXI	▼
TAXI OUT					
<input type="checkbox"/> E1007	AZA654	A320/M	G	TX 118.10	▼
TRANSFER TO RWY					
<input type="checkbox"/> E1005	IBE987	A320/M	G	TX EDIT	▼

Figure 11: Outbound Bay Sections

The 'Outbound Bay' is organised in the following bay sections:

- PENDING DEP section
 - The bay section is opened (system-generated), when a departure flight in the Pending, Pending-In, or Assumed state is issued with START clearance. It remains open while it contains any flight strips.
 - Flight strips are ordered by EOBT.
 - By default, it is displayed above the PUSHBACK and TAXI OUT bay sections.
- PUSHBACK section
 - The bay section is permanently displayed.
 - Flight strips are displayed in this bay section for departures that are in an Assumed state and have been issued with PUSHBACK clearance.
 - Flight strips are ordered by ETOT.
- TAXI-OUT section
 - The bay section is permanently displayed.

- Flight strips are displayed in this bay section for departures that have been cleared to TAXI and are removed when transferred to and assumed by the RWY controller. For configurations where there are multiple GND controller positions, strips will be displayed in this bay section for departures that are taxiing under the control of the preceding GND control position. If transferring to a subsequent GND controller, the strip will remain in this section until that GND controller assumes control over the departure.
- Flight strips for planned TOW manoeuvres will display in this bay section six minutes (a local parameter) before the planned OBT.
- Flight strips for other vehicles will be displayed from when they are transferred to the GND controller (or when he directly assumes control over the vehicle via the radar label) and until they are transferred out (or released) – i.e. while the jurisdiction state is Pending-in, Assumed or Assumed-out.
- *Note: In certain airport environments (e.g. LOWW), the TAXI-OUT section can be combined with the TAXI-IN section to have only one global TAXI section.*
- **TRANSFER TO RWY section**
 - The bay section is opened (system-generated), when any flight strip is displayed in the TAXI OUT bay section or when there are any flight strips to be displayed in this section.
 - Flight strips for departures that have been transferred from this GND control position to a RWY control position are displayed in this section.
 - Flight strips are ordered by ETOT.

2.6.2.2 Inbound Bay Sections

PENDING ARR					
<input type="checkbox"/>	A1002	BAW654	B788/H	<input type="checkbox"/>	EDIT ▼
TAXI IN					
<input type="checkbox"/>	A1000	AFR321	A320/M	<input type="checkbox"/>	TAXI ▼

Figure 12: Inbound Bay Sections

In ITWP, the Inbound Bay (GND controller) groups the arrival sections (PENDING ARR and TAXI IN sections):

- **PENDING ARR section**
 - This bay section displays flight strips for arrivals that are in a Pending jurisdiction state and that are currently assumed by the RWY control position. The bay section is hidden when there are no arrivals in the required state.

- Flight strips are ordered by landing time (the ALDT if available, otherwise the ELDT is used).
- TAXI IN section
 - The bay section is opened (system-generated) when a flight strip is displayed in the PENDING ARR section.
 - Flight strips are displayed in this section for arrival aircraft in an Assumed jurisdiction state or, where there are multiple GND control positions, when an arrival is controlled by a preceding GND control position and is in a Pending or Pending-In state.
 - Flight strips are ordered by the in-block time (the AIBT if available, otherwise the EIBT is used).
 - *Note: In certain airport environments (e.g. LOWW), the TAXI-IN section can be combined with the TAXI-OUT section to have only one global TAXI section.*

2.6.3 CLD Controller Bay

PENDING DEP					
<input type="checkbox"/> E1006	KLM789	B738/M	G	ASSUME	▼
CLD ACTIVE					
<input type="checkbox"/> E1004	DLH321	A321/M	G	CLR	▼
START					
<input type="checkbox"/> E1002	AZA654	A320/M	G	START	▼
<input type="checkbox"/> E1000	IBE987	A320/M	G	131.60	▼

Figure 13: CLD Bay Sections

Only one bay is defined to organise the CLD traffic. It is organised with three bay sections:

- PENDING DEP section
 - The bay section is permanently displayed.
 - The bay section will display flight strips for departure aircraft that are in a Pending or Pending-in jurisdiction state. For simulation purposes, departures are automatically set to a Pending-in state in the CLD control position six minutes (local parameter) before EOBT.
 - Flight strips are ordered by EOBT.
- CLD ACTIVE section

- The bay section is permanently displayed.
- Flight strips for departure flights that are assumed by the CLD controller and yet to be issued with the Departure Clearance are displayed in this section.
- Flight strips are ordered by EOBT.
- START section
 - The bay section is permanently displayed.
 - Flight strips for Assumed and Assumed-transferred departure flights that have been issued with the Departure Clearance are displayed in this section.
 - Flight strips are ordered by EOBT.

2.7 Routing and Guidance

A default route across the aerodrome is automatically generated by the system for each aircraft and vehicle upon activation of the flight plan (a system event). Factors that influence the default route that is generated include:

- Taxiway rules – the local configuration specifies rules for each segment of each taxiway, these may be directional rules (i.e. one-way travel), restrictions by WTC, and taxi speed restrictions.
- Shortest route or quickest route (specified in the local configuration, the default mode is 'shortest route').
- The preferred runway exit or entry point - a local configuration specifying default exit/entry points for each runway and WTC.
- Interim constraints – for example, avoiding taxiway segments that are currently closed.

If the mobile has yet to be cleared to move on the planned route, then the system will automatically update the default route if any taxiway segments are opened or closed.

The system holds the route assigned to each mobile, and monitors progress against that route. This information is then used by the system to manage clearance requirements, Safety Net Alerts and ground lighting controls.

The route currently assigned to each mobile is displayed in the HMI when the mouse pointer is over the callsign button (wherever that is displayed) or over the traffic symbol. The route may be permanently displayed using a right-mouse click on the traffic symbol. The appearance of the route display changes depending on whether the route is a planned route, cleared route or pending route (Figure 14 and Figure 15, for further detail see §4.14).

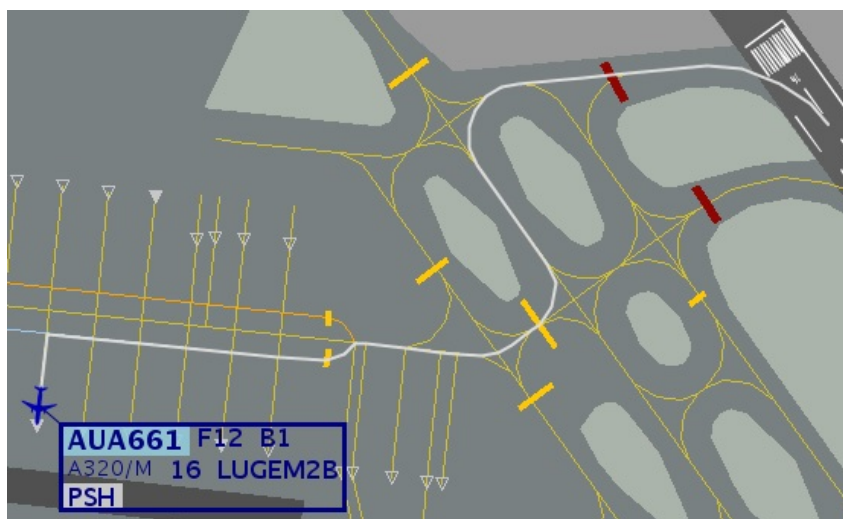


Figure 14: Route Display Showing the 'Planned' route

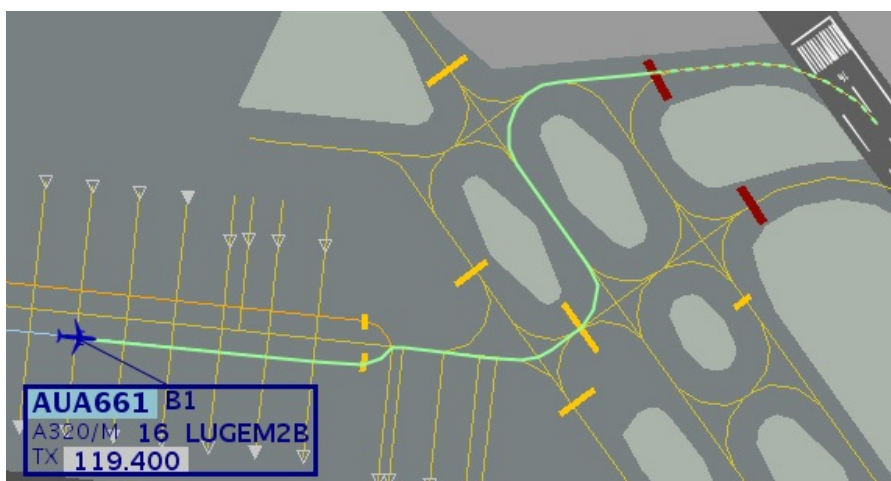


Figure 15: Route Display Showing the 'Cleared' and 'Pending' Route

2.7.1 Route Management

The HMI provides tools and features that permit the controller to modify the default route that was generated by the system. The following paragraphs describe these features.

2.7.1.1 Control Menus

Controllers may update the route using control menus that are accessed from the radar label and EFS; these control menus are the Stand Menu (§4.16.5), Runway Menu (§4.16.4), Holding Point Menu (§4.16.7) and Crossing Point Menu (§4.16.6). The route updates that are set when using these control menus will always obey the local taxiway rules and will provide the shortest or quickest route (depending on the local default).

2.7.1.2 Pushback Procedures

The local airport configuration permits any stand to be designated as 'pushback stand' and, where appropriate, the configuration may define multiple pushback options (procedures) for a stand.

Where no specific procedures are defined for a 'pushback stand', the local taxiway conditions and taxiway rules will *imply* how an aircraft should perform its pushback manoeuvre (e.g. the taxiway that it is pushed back to, and the direction that it should face on that taxiway).

Where multiple pushback procedures are defined, one procedure is defined as the default and is used by the system to generate the default route. The controller may select any of the alternate pushback options at the point of issuing the clearance, which will trigger an automatic update to the cleared and pending route display for that particular aircraft.

The optional pushback procedures that may be defined for a stand are:

- Pushback direction:

Where the taxiway that the aircraft is pushed back to allows taxiing in either direction, pushback procedures may be defined to specify the direction that the aircraft should be turned to face after completing the pushback manoeuvre.

Figure 16 shows an example of a stand with pushback procedures defined for 'Face East' and 'Face West' options – the default procedure is 'Face East', therefore the default route is set for this direction.



Figure 16: Default Procedure - Facing East

The alternate pushback procedure may be selected by the controller from the Callsign Control Menu (Figure 17), or from the EFS Clearances Control Menu (Figure 18) at the point that the clearance is issued, i.e. the 'PUSH W' option is entered into the menu following a "PUSHBACK FACING WEST" instruction to the flight crew.



Figure 17: Control Menu with Face East and West Options

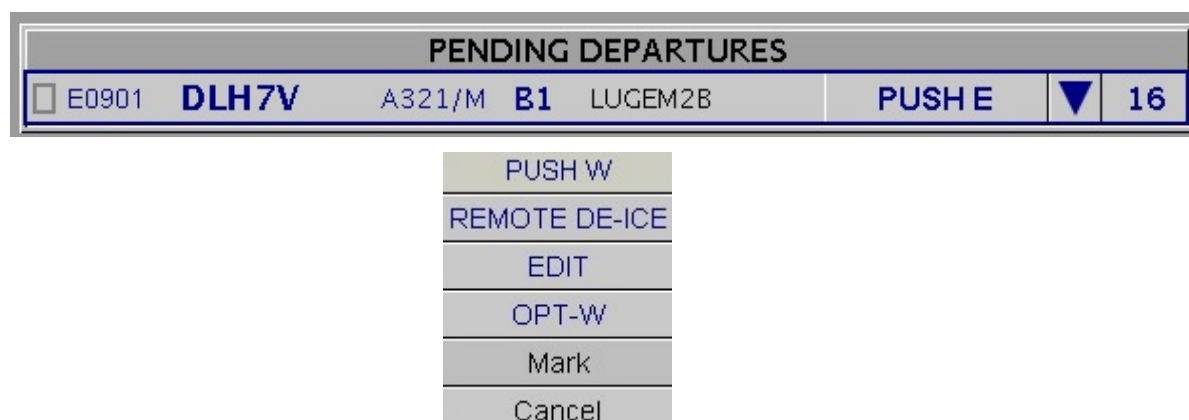


Figure 18: EFS and Clearance Control Menu

- Long Pushback:

A long pushback option may be configured where there is an opportunity to provide an optimised route by clearing the flight crew to pushback further than usual. For example, Figure 19 shows the default pushback route and Figure 20 shows the cleared and pending route following a clearance to perform a Long Pushback manoeuvre.



Figure 19: Default Pushback Route

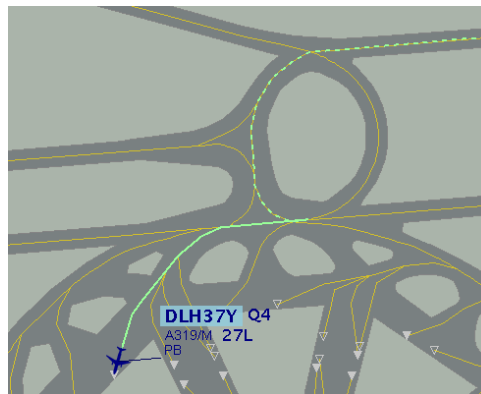


Figure 20: Long Pushback Route

For suitably configured stands, the Long Pushback clearance is available from the “L PUSH” option in the Callsign Control Menu or EFS Clearances Control Menu.



Figure 21: Callsign Control Menu with Long Pushback

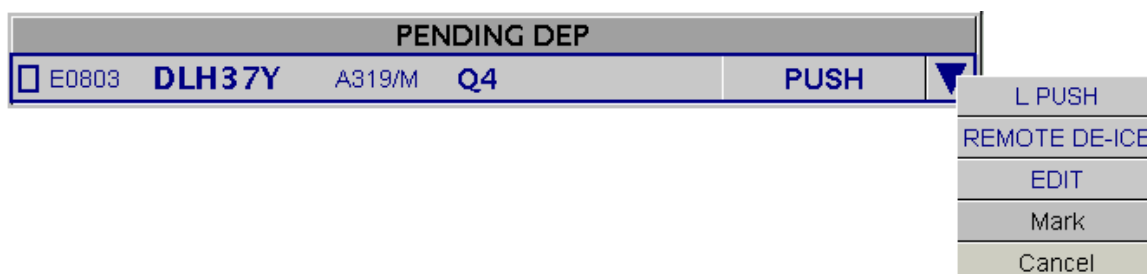


Figure 22: EFS and Clearances Menu for Long Pushback

- Alternate Parallel Taxi Route (APTR):

Pushback procedures may be configured to support pushback to APTR, providing options to pushback to each of the available parallel taxiways. The following figures illustrate the pushback options for a stand that has been configured with procedures to pushback to the standard taxiway, or to the orange and blue APTR taxiways. The default in this example is to pushback to the orange taxiway centre line, facing west.

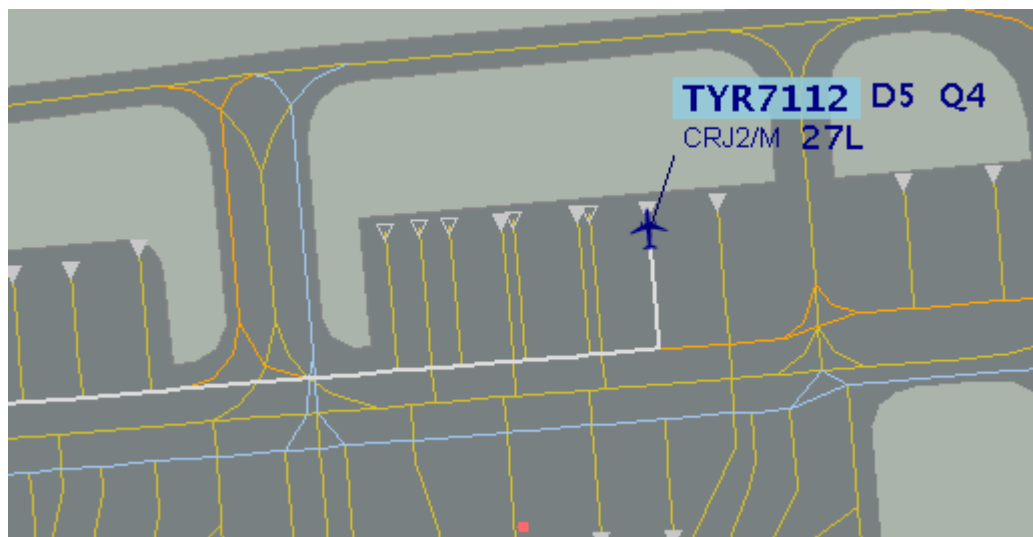


Figure 23: Default Pushback Route to APTR

The following two figures illustrate the Callsign Control Menu and EFS Clearances Menu for the APTR taxiways that are shown in Figure 23. The pushback options available to the controller are:

- Pushback Facing West to Orange centre line (PUSH W O)
- Pushback Facing East to Orange centre line (PUSH E O)
- Pushback Facing West (PUSH W)
- Pushback Facing East (PUSH E)
- Pushback Facing West to Blue centre line (PUSH W B)
- Pushback Facing East to Blue centre line (PUSH E B)

TYR7112
PUSH W O
PUSH E O
PUSH W
PUSH E
PUSH W B
PUSH E B
REMOTE DE-ICE
EDIT
MARK

Figure 24: Callsign Control Menu with APTR Pusback Options

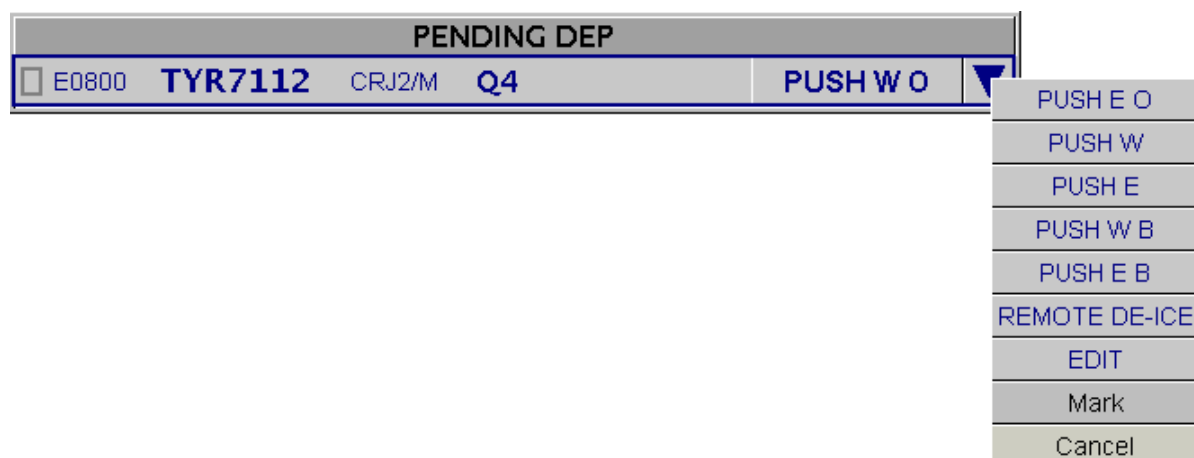


Figure 25: EFS and Clearances Menu with APTR Options

- Push and Pull Forward:

Where opposing stands pushback onto a common taxiway, a 'Push and Pull' procedure may be used to allow one aircraft to pushback to the taxiway and then be pulled forward to clear the opposing aircraft.

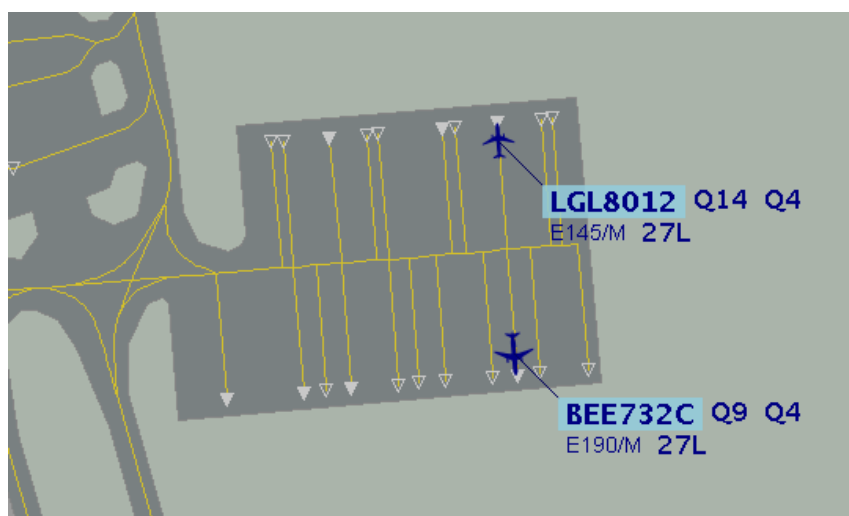


Figure 26: Opposing Stands Pushback to Common Taxiway

For aircraft at stands configured with a 'Push and Pull' procedure, a "PUSH&PULL" option is added to the Callsign Control Menu and to the EFS Clearances Menu.

BEE732C
PUSH
PUSH&PULL
EDIT
MARK
OPT-F&B

Figure 27: Callsign Control Menu with Push and Pull

PENDING DEP					
<input type="checkbox"/> E0802	BEE732C	E190/M	Q4	PUSH	▼
<input type="checkbox"/> E0800	LGL8012	E145/M	Q4	PUSH	▼
					PUSH&PULL
					EDIT
					OPT-F&B
					Mark
					Cancel

Figure 28: EFS Clearance Menu with Push and Pull

After the controller issues a 'Push and Pull' clearance to the flight crew, the system will indicate the cleared route extending ahead of the default pushback position, permitting the aircraft to pulled clear the pushback position.

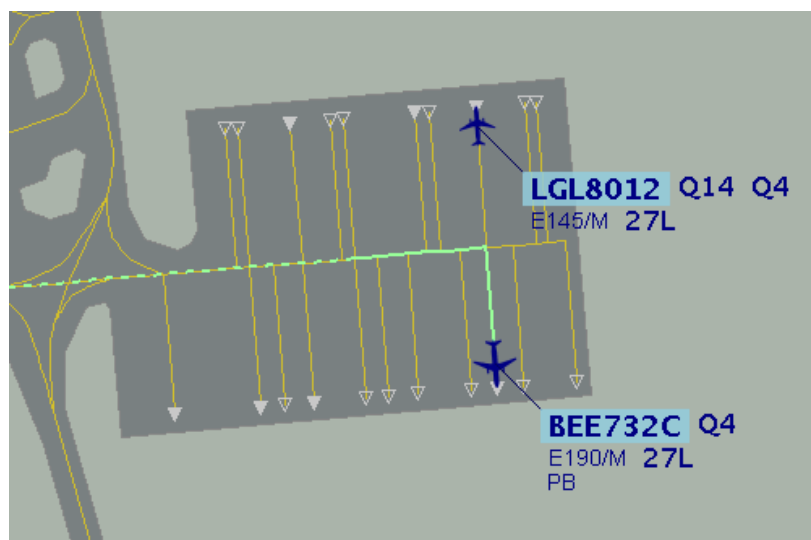


Figure 29: Push and Pull Clearance Issued

2.7.1.3 Optional Routes

The Route Editor Tool assists a controller in editing the route that has been assigned by the system, and permits routes to be set that do not follow the taxiway rules – the Route Editor is described in §4.18.

Where *common* alternate routing options exist within an environment, they may be configured to appear in the Callsign Control Menu and EFS Clearances Menu. Selecting an

'Optional Route' from the menu will launch the Route Editor Tool with the alternate route pre-selected, and a pop-up menu with the option to 'Accept' the alternate route.

For example, the cleared route displayed in Figure 30 shows the default route to the runway following normal taxiway rules for this environment.

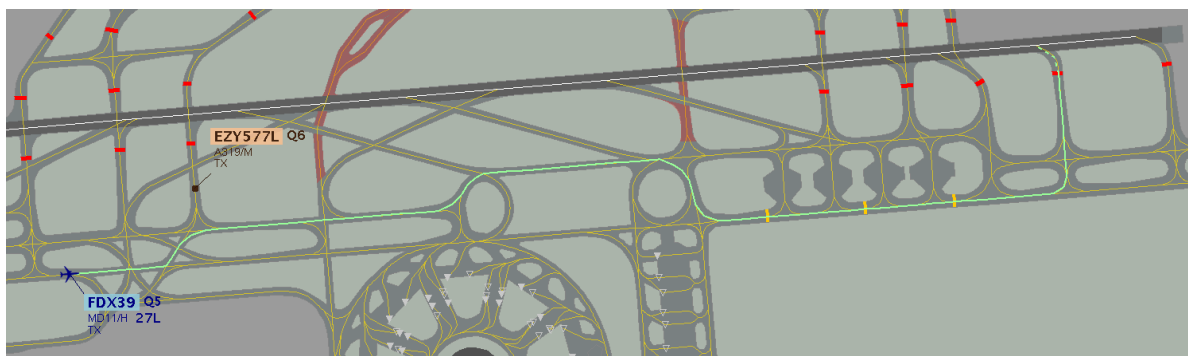


Figure 30: Default Route to the Runway

An optimised route for the departure, when traffic conditions allow, is to continue straight ahead along the current taxiway. The optional route configured for this situation, labelled "OPT-B" in the Callsign Control Menu (Figure 31) will, when selected, display the alternate optimised route in yellow and an option for the controller to 'Accept' the proposal (Figure 32).



Figure 31: Callsign Control Menu with Optional Route

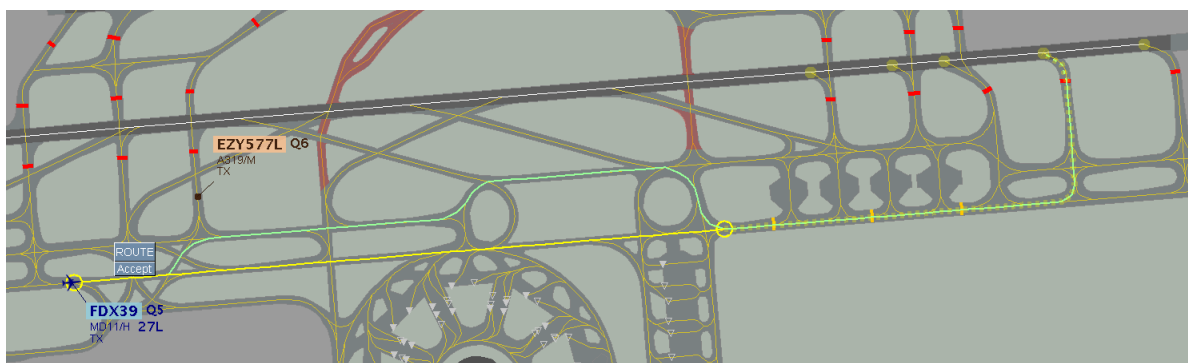


Figure 32: Optional Route Display

2.7.1.4 De-icing Procedures

When conditions require the de-icing of aircraft prior to departure, the HMI supports the allocation and routing of aircraft to designated de-icing aprons⁸.

The controller may update the route assigned to an aircraft to go via a remote de-icing apron by selecting the "REMOTE DE-ICE" option from the Callsign Control Menu or from the EFS Clearance Menu.

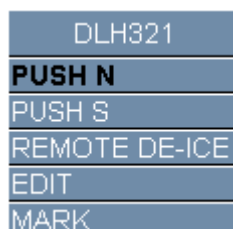


Figure 33: Remote De-Icing Option

Selecting the "REMOTE DE-ICE" option opens the routing tool and displays the proposed route to the default de-icing apron (Figure 34), from where the controller may accept the proposal or select an alternate de-icing apron.

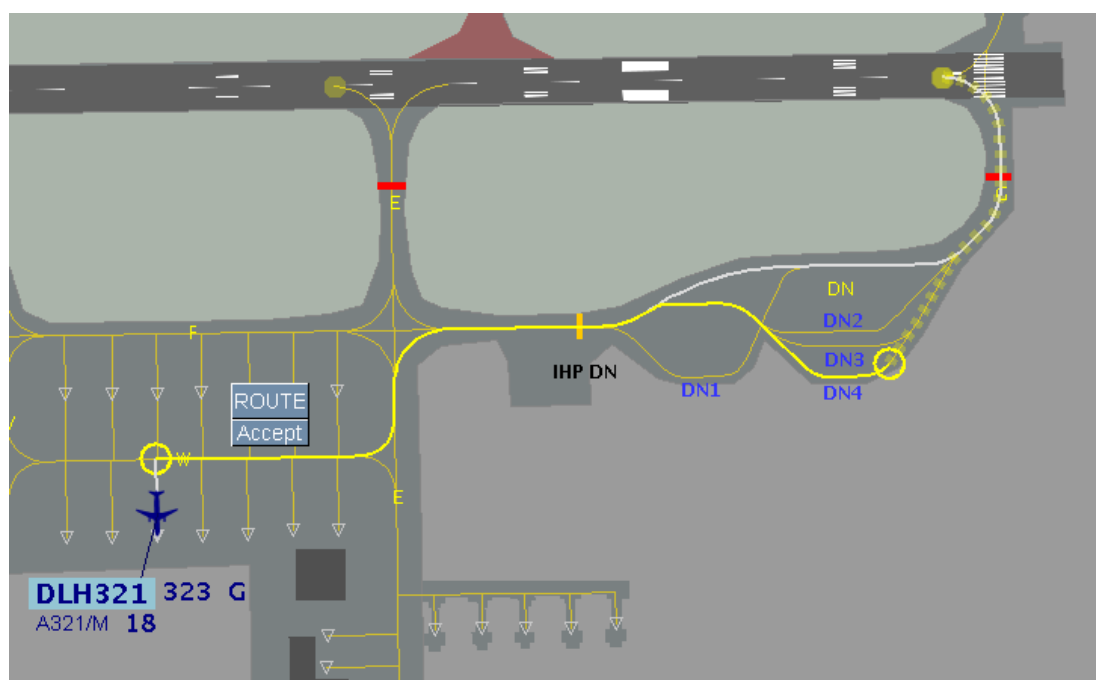


Figure 34: De-Icing Route

When the system detects that a de-icing route has been set, the allocated de-icing apron is shown in the Callsign Control Menu ("DN4" in Figure 35) and in the EFS Clearances Menu, and an option is added to reset the route avoiding any de-icing bays ("NO DE-ICE" in Figure

⁸ To access to the de-icing routing features in the HMI, they must first be enabled from the Airport Tool – Routing (see §4.8.1.2.5)

35). Clicking the allocated de-icing apron triggers a pop-up (Figure 36) providing shortcuts to change the allocated de-icing apron.

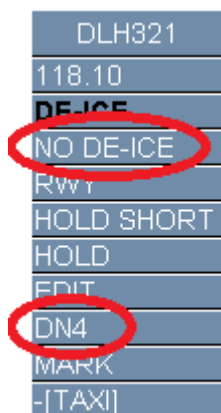


Figure 35: Callsign Control Menu - De-icing selected

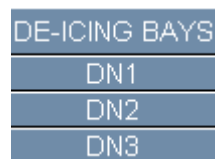


Figure 36: Select Alternate De-Icing Bay Pop-up

2.8 Airport Safety Nets

The Airport Safety Nets monitor all traffic as it moves around or near the airport. It monitors:

- Traffic positions with respect to airport defined exclusion areas.
- Traffic movements against their cleared routes.
- Controller clearances issued to each traffic entity.

The safety net system triggers alerts to inform a controller of incursions into protected areas, traffic not conforming to clearance, and for conflicting ATC clearances that have been (or are about to be) input by a controller.

2.8.1 Alert Presentation

Alerts are classified as either 'Information Alerts' or 'Alarms' depending on their severity, and are presented to the controller in a dedicated window on the controller display, in the label attached to each traffic entity, and wherever the callsign is displayed.

In the case of alarms, the traffic symbol is highlighted and an audible alarm is sounded.

The following three figures illustrate an information alert (yellow) and an alarm (red) displayed in the Alert Window (Figure 37, at the top and centre of the controller display), aircraft labels (Figure 38), and EFS (Figure 39).

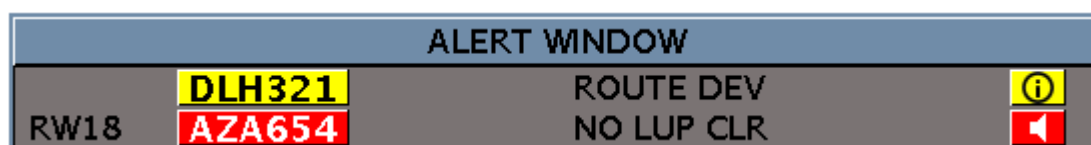


Figure 37: Alert Window

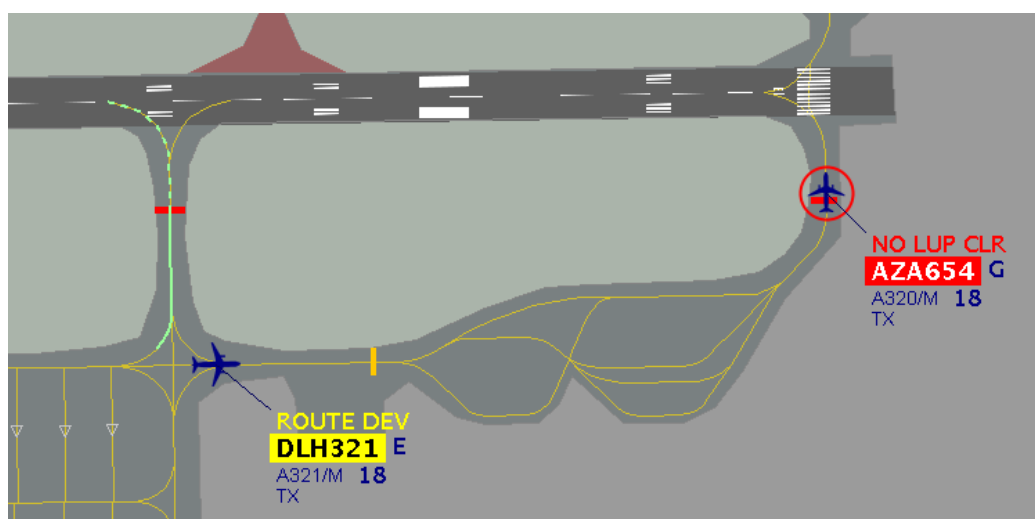


Figure 38: Information Alert and Alarm Displayed in the Label

HOLDING POINT RW18						
<input type="checkbox"/> T1001	DLH321	A321/M	E	TX	LUP	▼
<input type="checkbox"/> T1001	AZA654	A320/M	G	TX	LUP	▼

Figure 39: Information Alert and Alarm Displayed in the Flight Strip

Alert information is displayed on the GND and RWY control positions only and, depending on the particular alert type and jurisdiction of the traffic, it may appear on one of the positions or both. When a number of alert conditions exist for single traffic entity, the flight strip and label display will indicate the highest priority alert state, and the Alert Window will display all alert types that currently apply. The priority rules are documented in the Appendices to this document (§5.1).

Additionally the Alert Window (Figure 37) provides a means on the right hand side of the window for the controller to perform the following actions;

- **For an Information alert** - return the label and flight strip to their normal state by removing the yellow indication.
- **For an Alarm** - stop the audible alert from sounding but leave the red indication on the label and flight strip.

2.8.2 Alert Probe

The Safety Net provides a probe, or 'what if' function, that the controller positions utilise to determine whether a specific clearance would conflict with another clearance if it were to be issued. The system automatically indicates any clearance options that would conflict with another by adding a warning indicator to the display controls used by the controller to record clearances issued (i.e. the flight strip button or clearance menus). The warning indicator is displayed as an orange vertical 'flag' as shown in Figure 40 and Figure 41 below.

HOLDING POINT RW18						
<input type="checkbox"/> T1001	AZA654	A320/M	E	TX	LUP	▼

Figure 40: CATC Warning (Flight strip Clearance)

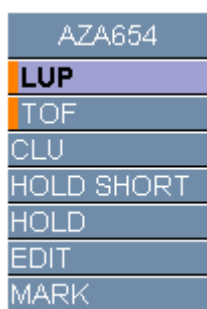


Figure 41: CATC Warning (Callsign Control Menu)

If the 'conflicting' clearance were still to be issued by the controller, a further warning is displayed for the controller to acknowledge (Figure 42). Once accepted in this way, the Safety Net monitoring will cease to warn about the potential conflict.

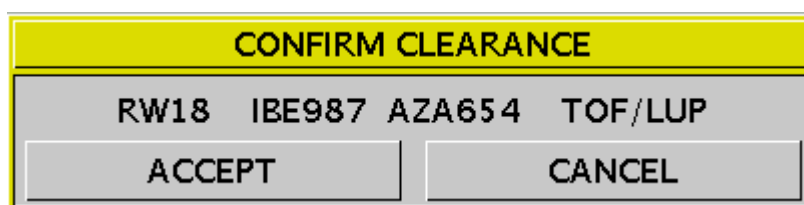


Figure 42: CATC Confirmation

2.8.3 Alert Conditions

The specific alert conditions that are monitored may be configured at a local airport level, and parameters used may be tuned for local operating procedures. The set of supported alert conditions, and the working position (GND or RWY) on which they appear, are detailed in the following paragraphs.

2.8.3.1 Runway Monitoring and Conflict Alerting (RMCA) Alerts

CONFLICT	<p>Triggered when an arrival is within the 'long final time' (parameter) for the runway, and another mobile is within the runway protection area. This may be an alarm or an information alert depending on separation.</p> <p>Triggered when a departure appears to be taking off with an obstruction ahead (alarm). It may also trigger an information alert when two departures are lining up on the same runway (unless the</p>
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	<p>local configuration permits multiple departures to line-up simultaneously).</p> <p>Displayed on all RWY and GND positions (regardless of whether the aircraft has been assumed).</p>
--	---

2.8.3.2 Conflicting ATC Clearances (CATC) Alerts

LUP/LND	<p>Triggered when an aircraft is cleared to line-up in front of an aircraft that is landing or cleared for landing.</p> <p>An alarm alert, displayed on the RWY position.</p>
TOF/LUP	<p>Triggered when an aircraft is issued with clearance to line-up in front of an aircraft with take-off clearance, or issued with take-off with another cleared to line-up in front of it.</p> <p>An alarm alert, displayed on the RWY position.</p>
TOF/LND	<p>Triggered when there is one aircraft cleared for landing and another cleared for take-off from either the same runway or from an intersecting runway ahead of the landing aircraft.</p> <p>An alarm alert, displayed on the RWY positions.</p>
CROSS/LND	<p>Triggered when there is a mobile cleared to cross a runway ahead of a landing aircraft. The alert is dismissed when the landing aircraft passes the crossing point, or leaves the runway before the crossing point.</p> <p>An alarm alert, displayed on the RWY position.</p>
CROSS/TOF	<p>Triggered when there is a mobile cleared to cross a runway ahead of an aircraft that is cleared to take-off. The alert is dismissed when the aircraft taking off has passed the crossing point or when it becomes airborne.</p> <p>An alarm alert, displayed on the RWY position.</p>
ENTER/LND	<p>Triggered when there is a mobile cleared to enter a runway ahead of a landing aircraft. The alert is dismissed when the landing aircraft passes the point where the mobile is due to enter the runway point, or leaves the runway.</p> <p>An alarm alert, displayed on the RWY position.</p>
ENTER/TOF	<p>Triggered when there is a mobile cleared to enter a runway ahead of an aircraft that is cleared to take-off. The alert is dismissed when the aircraft taking off has passed the point at which the mobile is due to enter the runway or when it becomes airborne.</p> <p>An alarm alert, displayed on the RWY position.</p>

LND/LND	Triggered when there are two aircraft cleared to land on the same runway or on runways that intersect. An alarm alert, displayed on the RWY position.
TOF/TOF	Triggered when there are two aircraft cleared to take-off from the same runway or on runways that intersect. An alarm alert, displayed on the RWY position.
LUP/LUP	Triggered when two aircraft are cleared to line-up at the same line-up point on a runway. An alarm alert, displayed on the RWY position.
PUSH/PUSH	Triggered when two aircraft are cleared for pushback with conflicting pushback trajectories An alarm alert, displayed on the GND position.
PUSH/TAXI	Triggered when two aircraft are cleared either for pushback or taxi with conflicting pushback and taxi trajectories An alarm alert, displayed on the GND position.

2.8.3.3 Conformance Monitoring Alerts for Controllers (CMAC)

RWY INCURSION	Triggered for mobiles that are within a runway protection area without appropriate clearance to be there. An alarm alert, displayed on all RWY and GND positions (regardless of whether the aircraft has been assumed).
NO TOF CLR	Triggered when aircraft has moved beyond its assigned line-up point (and is moving). An alarm alert, displayed on the RWY position. (regardless of whether the aircraft has been assumed).
NO LND CLR	Triggered when an aircraft has approached below a given altitude and range from the runway threshold. The range used is a local configuration parameter, and may vary depending on the approach equipment in use by the flight crew. An alarm alert, displayed on the RWY position. (regardless of whether the aircraft has been assumed).
NO LUP CLR	Triggered when a departure aircraft passes the runway holding point (or stop bar) without a line-up clearance. An alarm alert, displayed on the RWY position (regardless of whether the aircraft has been assumed).
NO ENTER CLR	Triggered when a mobile passes the runway holding point (or stop bar) to enter the runway without enter clearance.

	An alarm alert, displayed on the RWY position (regardless of whether the aircraft has been assumed).
NO CROSS CLR	<p>Triggered when a mobile passes the runway holding point (or stop bar) to cross the runway without crossing clearance.</p> <p>An alarm alert, displayed on the RWY position (regardless of whether the aircraft has been assumed).</p>
RED STOP BAR CROSSED	<p>Triggered when a mobile crosses in interim stop bar without clearance.</p> <p>An alarm alert, displayed on whichever position has assumed the mobile or, when the mobile is in transfer between positions, then it is displayed on both.</p>
STATIONARY RPA	<p>Triggered when an arriving aircraft or a towed aircraft has been stationary within the runway protection area for a specified time. The specified time is a local configuration parameter, defaulting to 15 seconds if not specified.</p> <p>An alarm alert, displayed on whichever position has assumed the mobile or, when the mobile is in transfer between positions, then it is displayed on both.</p>
STATIONARY	<p>Triggered by:</p> <ul style="list-style-type: none"> • A departure still stationary 120 seconds after being issued with line-up or take-off clearance. • A mobile stationary for 90 seconds after being issued with clearance to cross or enter a runway. • A departure that is still stationary 90 seconds after being issued with push back or its first taxi clearance. <p>An information alert, displayed on whichever position has assumed the mobile or, when the mobile is in transfer between positions, then it is displayed on both.</p> <p>(The times indicated are local configuration options, with the figure stated being the default value if not otherwise defined).</p>
NO CONTACT	<p>Triggered by an arrival that is less than 120 seconds (a local configuration parameter) from its ELDT, and the flight crew have not contacted the RWY controller (i.e. not Assumed by the controller).</p> <p>An information alert, displayed on the RWY position</p>
ROUTE DEV	<p>Triggered by a mobile deviating from its cleared route. By default, an information alert, however it will be displayed as an alarm if the deviating mobile enters locally defined 'alarm' areas, for example the area surrounding a runway protection area.</p>

	An alert, displayed on whichever position has assumed the mobile or, when the mobile is in transfer between positions, then it is displayed on both.
DEADLOCK	<p>Triggered when two aircraft are taxiing on planned routes that will result in a head-to-head conflict on the same taxiway.</p> <p>An information alert, displayed on whichever position has assumed the mobile or, when the mobile is in transfer between positions, then it is displayed on both.</p>
RWY TYPE	<p>Triggered when a departure has a planned runway line-up point that provides an insufficient runway distance for take-off (based on the known performance characteristics for the aircraft type). An information alert, escalating to an alarm as the departure enters the runway protection area.</p> <p>An alert, displayed on whichever position has assumed the mobile or, when the mobile is in transfer between positions, then it is displayed on both.</p>
HIGH SPEED	<p>For aircraft, the alert is triggered as an information alert when taxi speed exceeds a locally defined limit (default 36 kts), escalating to an alarm when an upper limit is exceeded (default 50 kts).</p> <p>Vehicles near to a runway protection area trigger an information alert when their speed exceeds 40 kts (local parameter). The range from the runway protection area is locally defined.</p> <p>An alert, displayed on whichever position has assumed the mobile or, when the mobile is in transfer between positions, then it is displayed on both.</p>
TRANSFER?	<p>Triggered by a departure aircraft that is still Assumed in the RWY control position, after a pre-defined time (local configuration) following take-off (default 180 seconds).</p> <p>An information alert, displayed on the RWY position.</p>
NO PUSH CLR	<p>Triggered as an information alert when a departure is detected to be beginning a push back manoeuvre without being cleared to do so.</p> <p>Displayed on all GND positions (regardless of whether the aircraft has been assumed).</p>
NO TAXI CLR	<p>Triggered when an aircraft exceeds its taxi clearance limit. This may be by taxiing from the stand before TAXI clearance is issued, by not responding to a HOLD or STOP AT instruction input by a controller, or by taxiing beyond a junction that the flight crew have been instructed to HOLD SHORT of.</p> <p>An information alert, displayed on the RWY position if the aircraft is controlled by that controller or in transfer to him. Displayed on the GND position if the aircraft is controlled by that position, is currently in transfer to it, or yet to be transferred to it</p>

RWY CLOSED	<p>Triggered when an aircraft is assigned a runway that is currently closed. By default, this is an information alert, escalating to an alarm if the aircraft enters (or lands on) the closed runway.</p> <p>Displayed on the RWY position if the aircraft is controlled by that controller or in transfer to him. Displayed on the GND position if the aircraft is controlled by that position, is currently in transfer to it, or yet to be transferred to it.</p>
TWY CLOSED	<p>Triggered when an aircraft or vehicle has a cleared or planned route that passes through a closed taxiway segment. Initially an information alert, escalating to an alarm if the aircraft/vehicle enters the closed segment.</p> <p>Displayed on all GND positions (regardless of whether the aircraft has been assumed).</p> <p>Displayed on the RWY position if the aircraft is controlled by that controller or in transfer to him. Displayed on the GND position if the aircraft is controlled by that position, is currently in transfer to it, or yet to be transferred to it.</p>
TWY TYPE	<p>Triggered when an aircraft has a cleared or planned route that passes through a taxiway segment that is unsuitable for the aircraft type⁹. Initially an information alert, escalating to an alarm if the aircraft travels onto the unsuitable taxiway segment.</p> <p>Displayed on the RWY position if the aircraft is controlled by that controller or in transfer to him. Displayed on the GND position if the aircraft is controlled by that position, is currently in transfer to it, or yet to be transferred to it.</p>

⁹ For the purpose of the current ITWP solution, the wake turbulence category of the aircraft is used to determine taxiway suitability. In an operational system, it would be expected that wing span and/or weight restrictions would be defined for each taxiway segment and used to manage this alert.

2.9 Ground Lighting

The Ground Lighting systems supported (i.e. controlled and displayed) in ITWP include:

- Stop bars
- Runway Status Lights – Runway Entry Lights
- Runway Status Lights – Take-off Hold Lights

Note: The Runway Status Lights system is only implemented in the Paris/Charles de Gaulle (LFPG) airport environment

2.9.1 Stop Bars

Stop bars are displayed as a 'bar' on the Airport View Display (AVD), filled in red to indicate the lights on, or empty for lights off. Only active stop bars are displayed, i.e. CAT III stop bars are not displayed when operating under CAT I conditions.

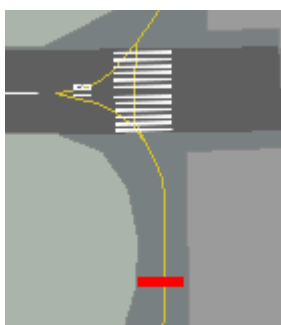


Figure 43: Stop Bar (Lights on)

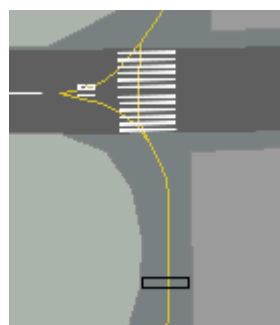


Figure 44: Stop Bar (Lights off)

Stop bars are automatically switched on and off by ITWP - the lights are switched off when a controller issues an appropriate clearance to a mobile waiting at the stop bar, or when a mobile with an appropriate clearance approaches the stop bar. The stop bar lights are automatically turned back on when the cleared mobile has passed the stop bar, or after a fixed time has elapsed (a local parameter, default 45 seconds).

Stop bars may also be manually switched by the controller.

2.9.2 Runway Status Lights – Runway Entry Lights (RWSL-REL)

Runway entry lights are positioned to the right of the taxiway centre line and extend from the Stop Bar to the edge of the runway, and are displayed as a solid line in the AVD. Additionally a single lamp is positioned on the runway centre line. By default, REL remain off and are then automatically switched on when it is deemed unsafe to enter the runway.

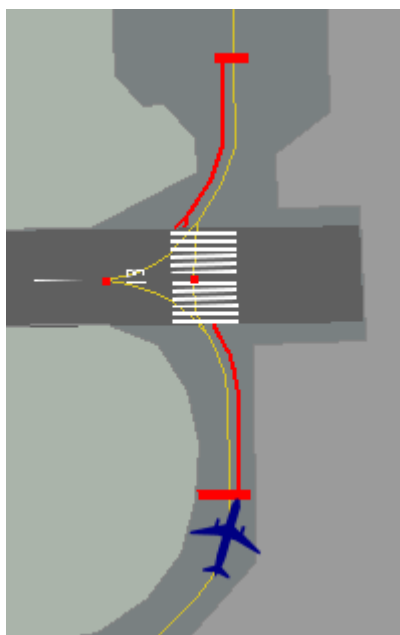


Figure 45: Runway Entry Lights

The switching of the 'lights' is based on surveillance data only. The RELs are turned on when:

- An arriving aircraft on short final is within a pre-defined range of the runway entry position (local parameter, default 1.5Nm).
- When mobiles are travelling along the runway, faster than pre-defined limit (local parameter, default 6 kts), and heading towards the runway entry position.

Illuminated RELs are turned off when:

- The triggering arrival on short final is deemed to be executing a missed approach (increasing speed and/or increasing altitude).
- The triggering mobile on the runway is detected to be vacating the runway (i.e. its heading changes to indicate that it is turning off the runway).
- The triggering mobile is less than a pre-defined time from passing the runway entry position (local parameter, default 0 seconds). This is intended to anticipate the mobile passing the entry point so as not to unnecessarily keep the lights on.
- The triggering mobile decelerates to less than a pre-defined speed (local parameter, default 6 kts).
- The triggering departure aircraft takes off.

2.9.3 Runway Status Lights - Take-off Hold Lights (RWSL-THL)

Take-off hold lights are positioned to the right-hand side of the runway centre line and are arranged in segments. They are automatically illuminated when it is deemed unsafe to commence or continue the take-off roll. Typically, two segments are lit up in front of the aircraft however, if two aircraft are lined up from adjacent line-up points, then only one segment is illuminated.

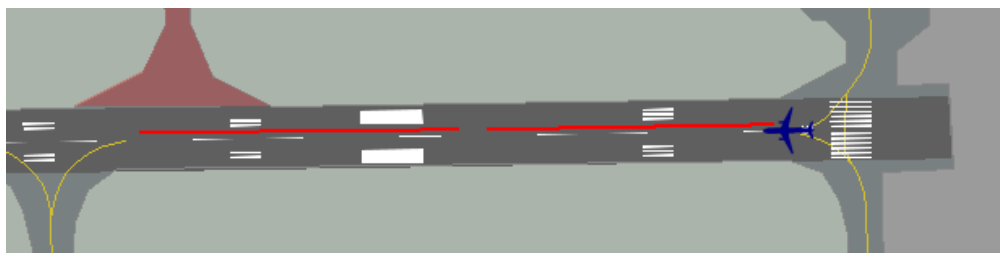


Figure 46: Take-off Hold Lights

The switching of the 'lights' is based on surveillance data only. The THLs are turned on when a mobile is detected on the runway or within the Runway Protection Area ahead of the aircraft that is lined up or lining up.

The THLs are extinguished when the obstacle leaves the Runway Protection Area.

3 TYPICAL FLIGHT LIFECYCLE

This section describes the lifecycle for each radar track type, listing the default clearances used to process each aircraft and vehicle type over its lifetime.

The following figures illustrate the expected clearances for each case as the mobiles pass between the jurisdiction of CLD, GND and RWY controllers.

The system supports some shortcuts in terms of *implied* clearances, i.e. those clearances that, when selected, will automatically assign the preceding clearance. Implied clearances for departures include:

- Push – automatically issues Assume if the aircraft is not already assumed.
- Taxi – automatically issues Assume if the aircraft is not already assumed (when push not required).
- Conditional Line-up – automatically issues Assume if the aircraft is not already assumed.
- Take-off – automatically issues Assume and Line-up clearance, if not already cleared.
- Transfer (from RWY position) – automatically issues 'Air' clearance.

Implied clearances for arrivals include:

- Hold-At – automatically issues Vacate clearance.
- Cross 27L - automatically issues Vacate and Hold-at clearances (for Paris/CDG only).
- Taxi – automatically issues Vacate clearance (for runway configurations where cross will be needed but taxi clearance is required to reach the next runway).
- Runway transfer to ground – automatically issues Vacate if not already entered.
- Taxi – automatically issues Assume clearance in Ground controller.

3.1 Departure

Departure aircraft pass through all three controllers, starting with the CLD position. The CLD position is responsible for issuing the clearances in sequence before transferring to the GND position. No deviations are possible in this sequence.

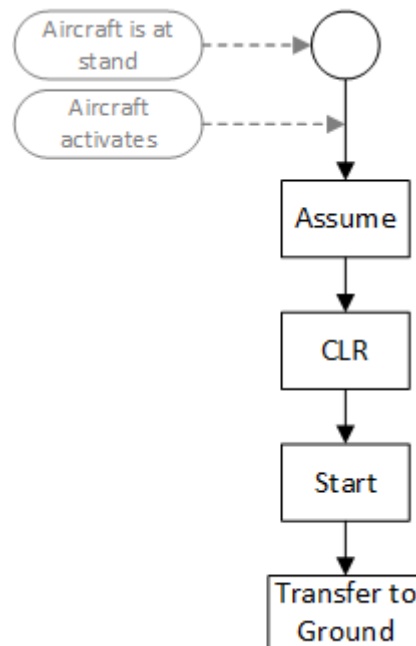


Figure 47 - Departure CLD Clearances

The GND position is responsible for issuing the Push (if required) and Taxi clearances, and will then transfer the flight to the RWY position. At any point in this sequence hold can be issued to stop the flight, before resuming the sequence.

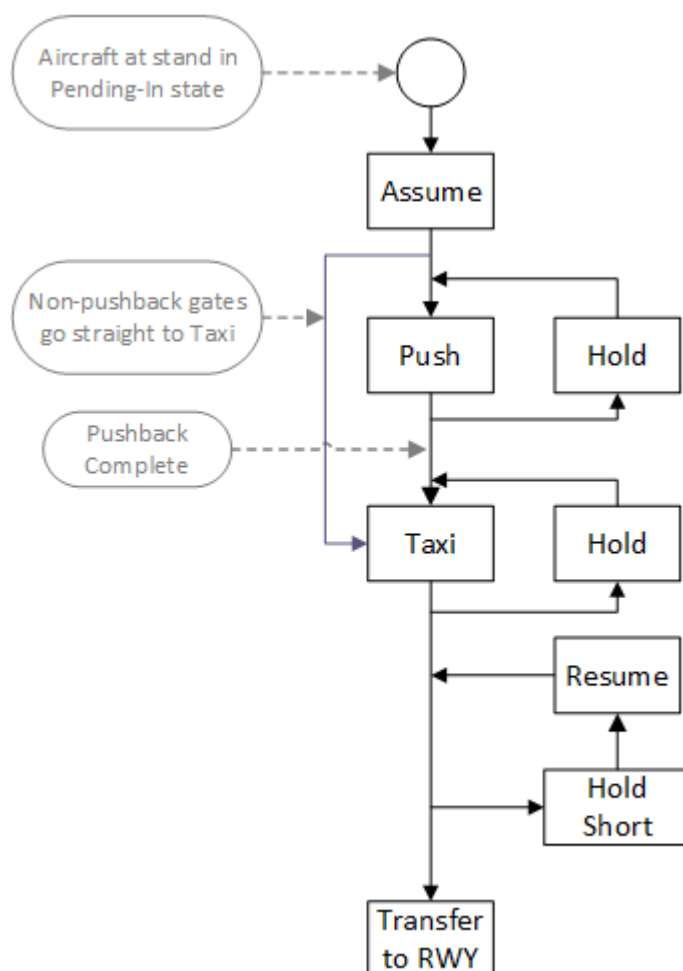


Figure 48 - Departure GND Clearances

The RWY position is responsible for issuing the line-up and take-off clearances, before transferring the flight to departure control. The line-up clearance may be issued in three ways:

- Directly giving line-up clearance.
- Issuing a conditional order which, automatically triggers line-up when the condition is met. Conditions include a target departure taking off or a landing aircraft passing the holding point where the departing aircraft is waiting.
- Issuing take-off clearance, which automatically issues the line-up clearance.

Take-off clearance can be aborted and resumed.

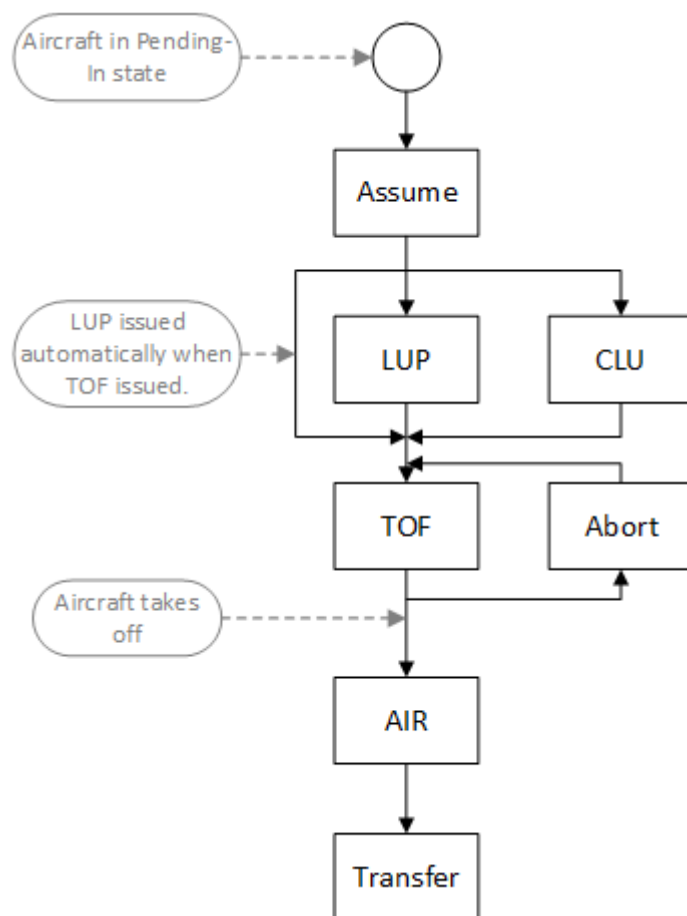


Figure 49 - Departure RWY Clearances

3.2 Arrival

Arrival flights have two different clearance sequences, depending on whether the arrival needs to cross another runway before being transferred to the GND position (e.g. the Paris/CDG environment). The following diagrams show the clearances sequence for each of these conditions.

The RWY position for airports with a single runway is responsible for issuing the land and vacate clearances, before transferring the aircraft to the GND position.

Aircraft are transferred to the runway position on approach, the RWY controller may request that the flight be transferred using the Request on Frequency (ROF) input. The Go Around command can be used to cancel the landing clearance, which can subsequently be re-issued. The vacate clearance can be issued automatically by transferring the flight to the ground position.

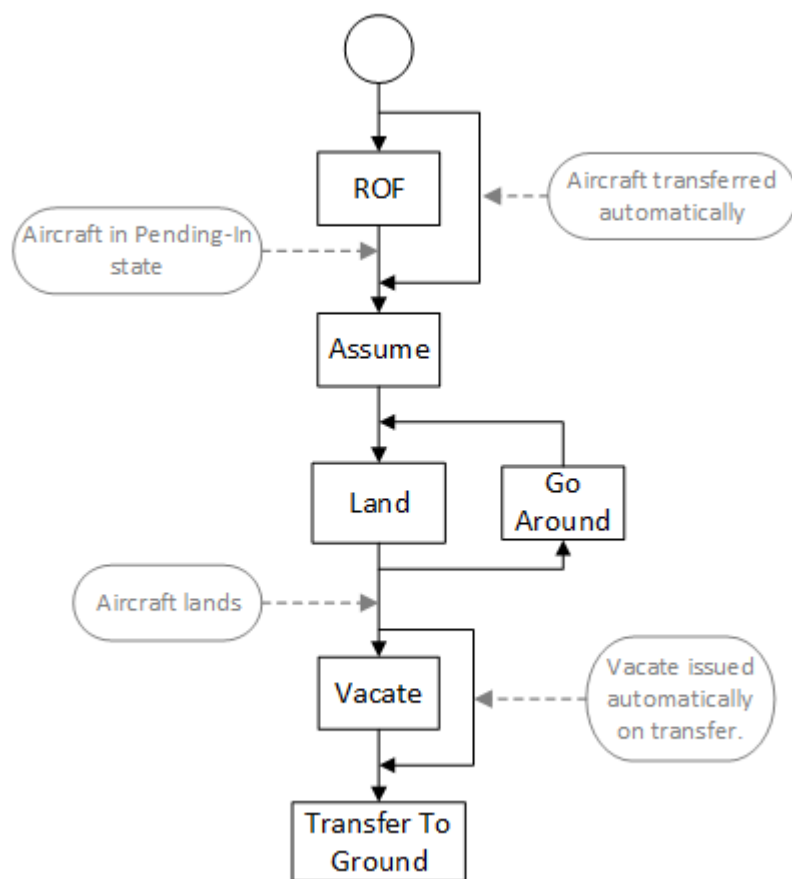


Figure 50 - Arrival RWY Clearances – no cross required

Where a runway crossing is required, the sequence is similar to the single runway setup with the addition that after landing the taxi and cross clearances need to be issued. Hold, taxi and resume taxi clearances can be issued while taxiing. After a cross clearance has been issued, the vacate and transfer sequence is the same as for the single runway setup.

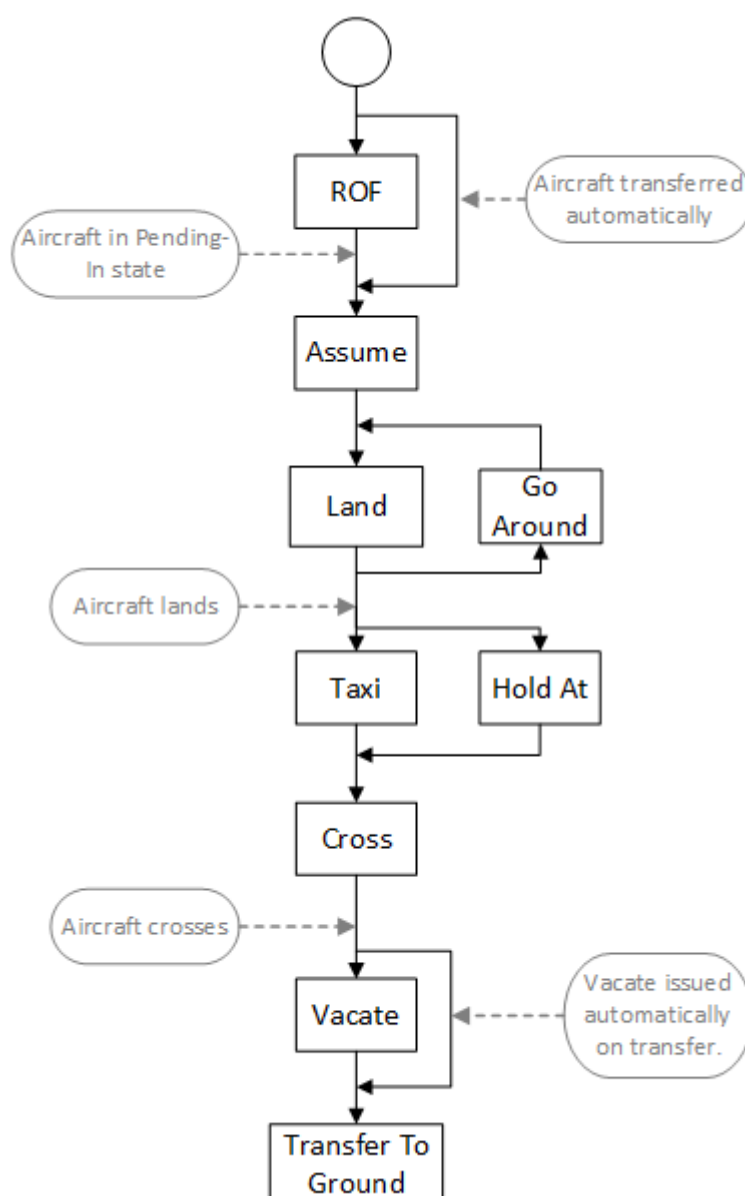


Figure 51 - Arrival RWY Clearances - cross required

The GND position is responsible for issuing the taxi clearances necessary for the flight to reach its stand. Hold, hold short and resume taxi clearances can be issued while taxiing.

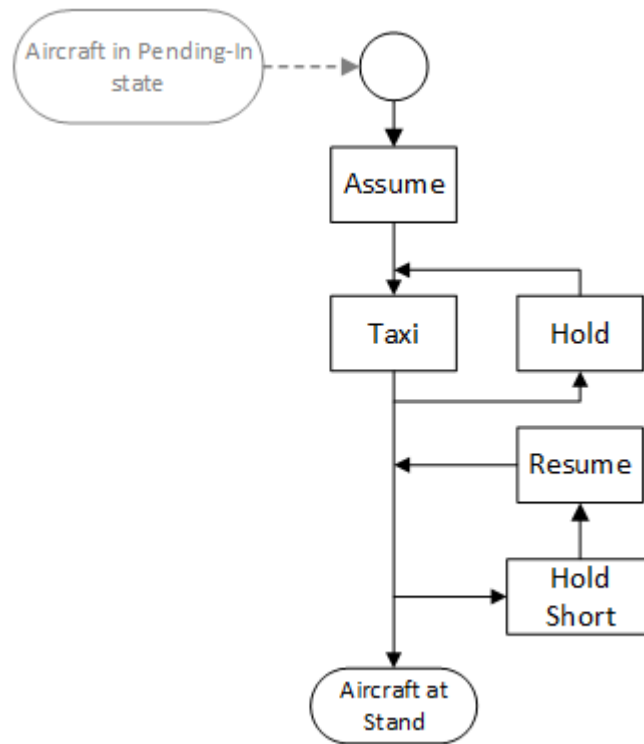


Figure 52 - Arrival GND Clearances

3.3 Towed Aircraft

The GND position is responsible for issuing the tow clearance for towed aircraft. The hold, hold short and resume tow commands can be issued while the aircraft is under tow. The towed aircraft does not need to be controlled all the way to the stand, and can be released by the controller to finish the manoeuvre uncontrolled if needed. Where a runway crossing is required, control is transferred to the RWY controller.

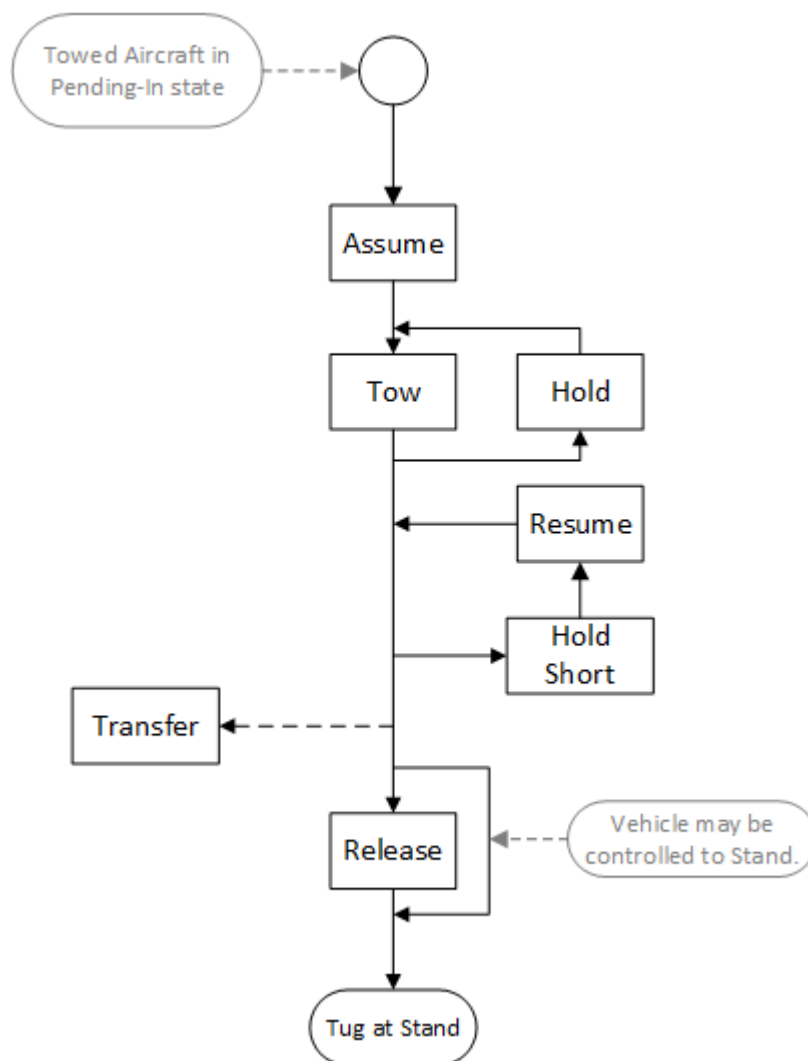


Figure 53 - Towed Aircraft GND Clearances

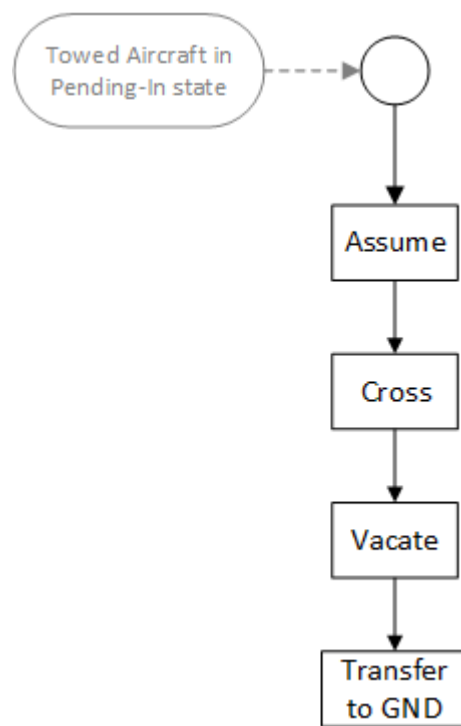


Figure 54: Towed Aircraft RWY Crossing

3.4 Service Vehicles

Vehicles do not require controller clearance to move around the airport unless they need to enter the runway area. An 'un-controlled' vehicle can be assumed at any time by any controller, though once assumed by one controller it will need to be transferred to another controller or released before the next controller may assume control. The vehicle may already be moving, in which case an initial proceed clearance is not required. Vehicles can be released and assumed multiple times.

The following diagrams describe the clearances for vehicles moving around the apron and taxiway areas, and the clearances for vehicles using the runway.

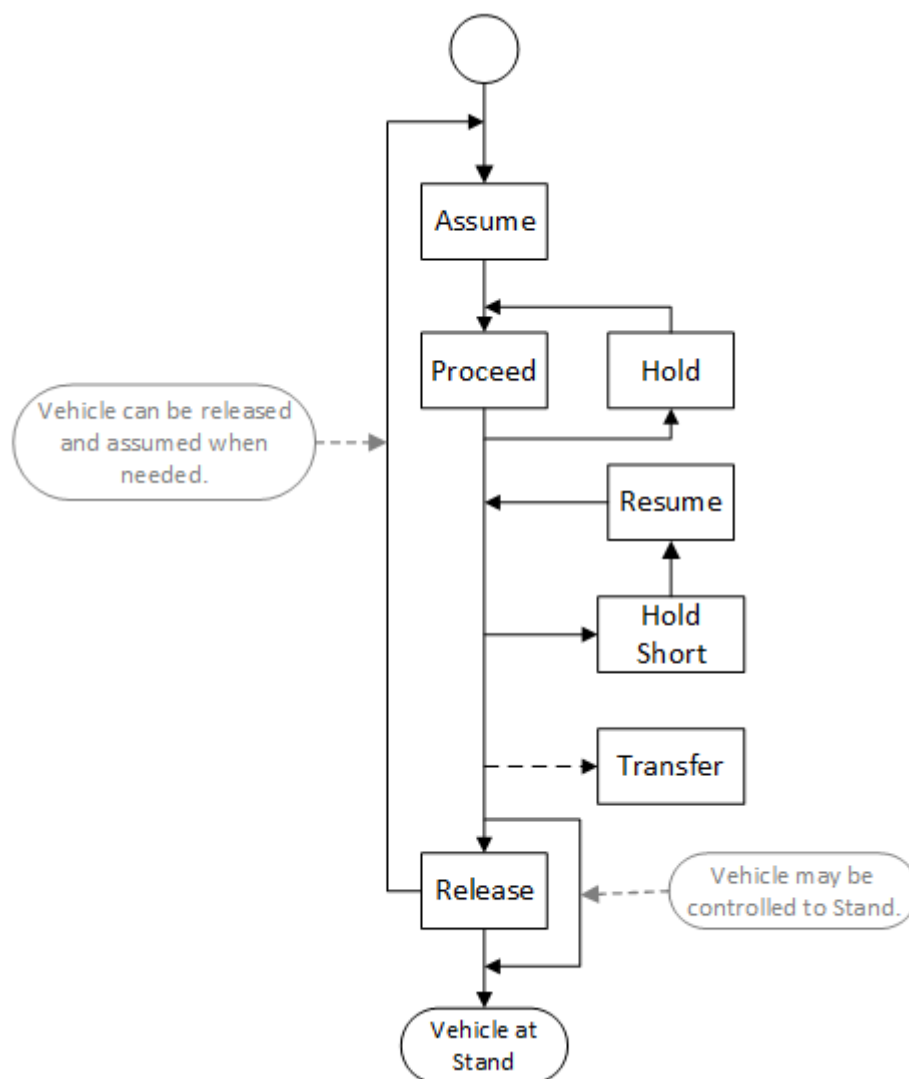


Figure 55 - Vehicle Clearances - no runway.

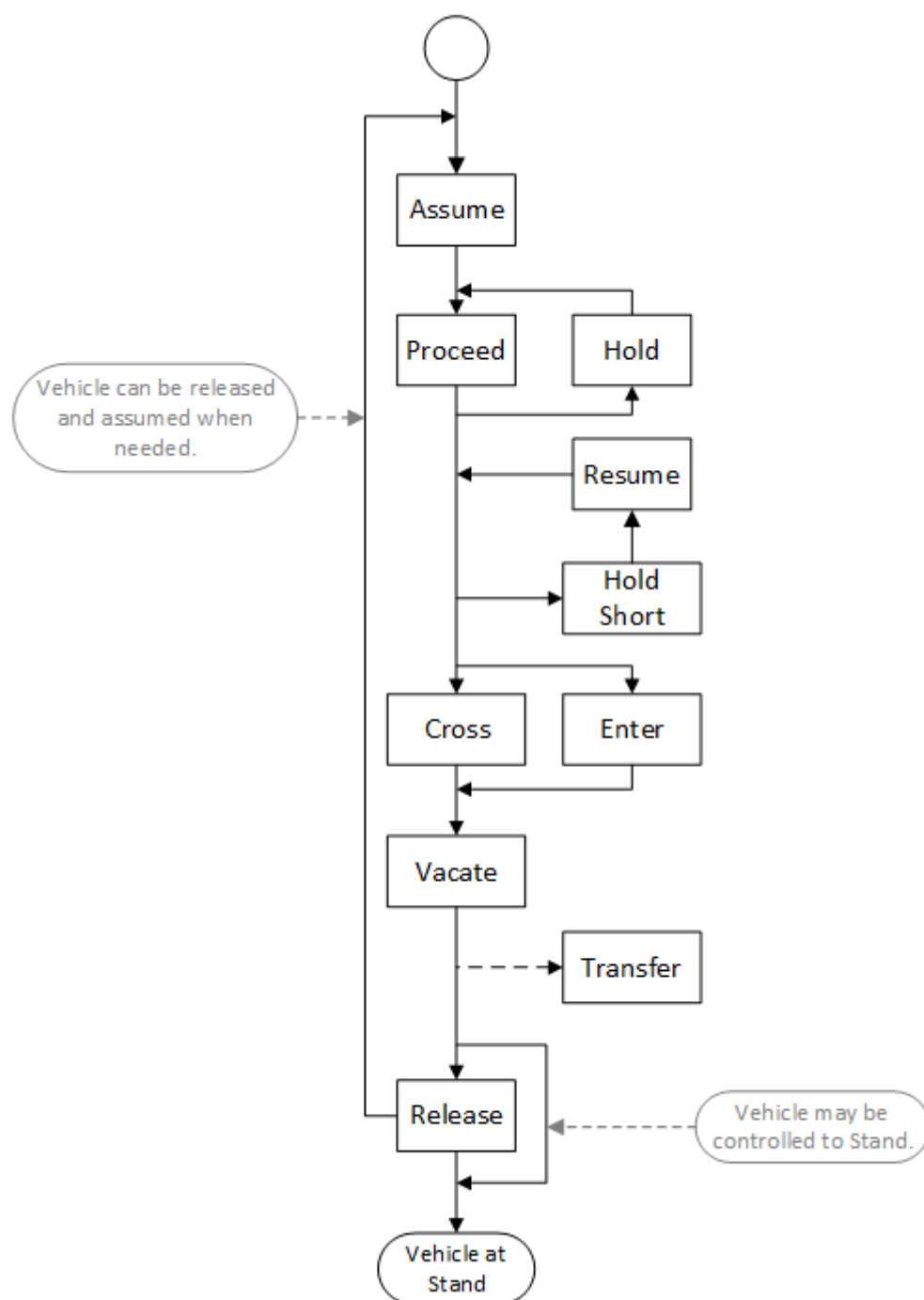



Figure 56 - Vehicle Clearances – runway

Vehicles, such as runway checker vehicles, will stop at the runway holding point and contact the RWY controller for clearance to cross or enter the runway. The vehicle will be monitored while on the runway, before being given vacate clearance. Vehicles are normally released after exiting the runway, but may be controlled for the remainder of their route.

4 DESCRIPTION OF HMI OBJECTS

This section describes each of the graphical elements that are implemented in the ITWP solution, detailing the appearance and interactive behaviour that make up the User Interface.

4.1 ITWP Window

HMI Object	
ITWP WINDOW	
Objective	To encapsulate different processes for the purposes of easy reorganisation of information within the display, and to provide access as needed to an organised display surface, presenting information appropriate to the assigned controller working position.
General Description	<p>An ITWP window is defined by display attributes and its behavioural attributes. The visual appearance and behaviour of a window provide the user with cues as to its available properties. The following details all the possible features of an ITWP window:</p> <p>a) Window Frame.</p> <p>The frame of a window is defined by the operating system that is running ITWP. The frame includes a title bar that contains the text “ITWP” followed by the name of the position (e.g. “ITWP Runway Controller”).</p> <p>The buttons and functionality of the window frame is determined by the operating system. The following buttons have behaviour that is different from the operating system default behaviour for a window:</p> <ul style="list-style-type: none"> • Close – The Close button is deliberately restricted to do nothing in ITWP. The windows are launched and closed remotely. • Cursor – The default system cursor is replaced with an ITWP specific cursor inside of the ITWP window frame. <p>b) Background colour</p> <p>The background colour of the window is a single colour displayed for the entire window. The colour displayed can be set in the local configuration (RGB 155,155,155 ).</p> <p>c) Window size and position.</p> <p>The initial size and position of the window on screen at simulation initiation can be specified in the local configuration, with the default having the window at the top left corner and sized to fill the screen. Coordinates start with (0,0) at the top left corner of the screen.</p>

d) Airport map

An airport map is displayed over the background colour. The map shows the elements of the airport using different coloured areas and lines. The colours of the airport elements can be specified in the local configuration. The mouse can be used to manipulate the map display in the following ways:

- Drag the map around the display - right mouse button (button 3).
- Zoom in and out – scroll wheel (button 2).
- Rotate map – hold Ctrl and rotate the scroll wheel, or hold right mouse button (button 3) and simultaneously rotate the scroll wheel.

The initial position of the map in the window, the scroll level and the rotation factor for each airport are specified in the local configuration.

e) Toolbox

The ITWP window has associated toolboxes with contents (tools) matched to the specific requirements of that window. The toolboxes may be moved (dragged) within the parent window.

When the same tools are required in different windows, they are re-used and identical in form and operation.

The number of toolboxes, the tools they contain, and their initial position on screen can be specified in the local configuration.

f) Alert Window

GND and RWY controller positions show an Alert Window at the top of the screen, in the centre of the display horizontally. The Alert Window is fixed in that location in the ITWP window. All other ITWP elements, apart from companion windows, are drawn under the Alert Window.

g) Flight Strip Bays

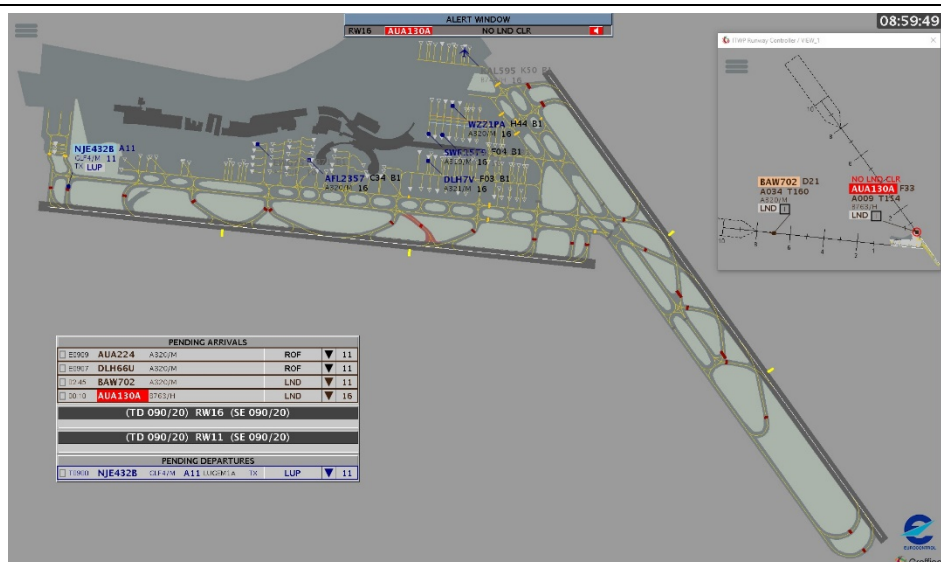
ITWP windows show flight strip bays containing flight information appropriate to the position being used.

Flight strip bays are grouped and arranged together as appropriate to the position. The bays can be dragged as a group by the header bar of any bay.

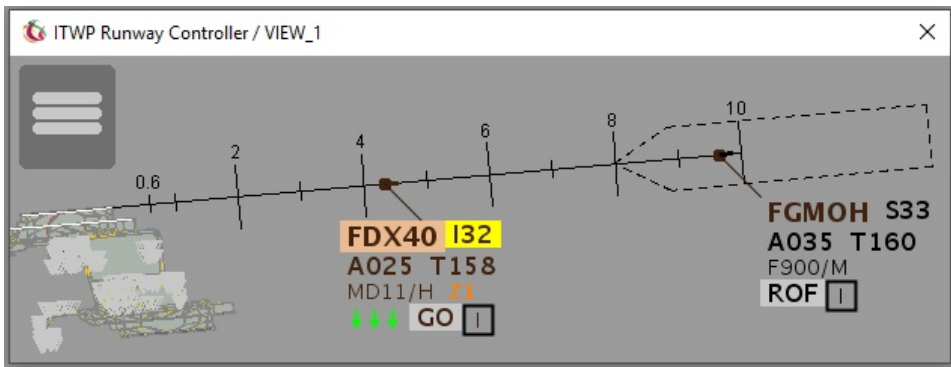
The flight strip bays groups can be ungrouped, re-arranged and re-grouped if required.

The flight strip bay group configuration, flight strip contents, and initial position on screen are specified in the local configuration.

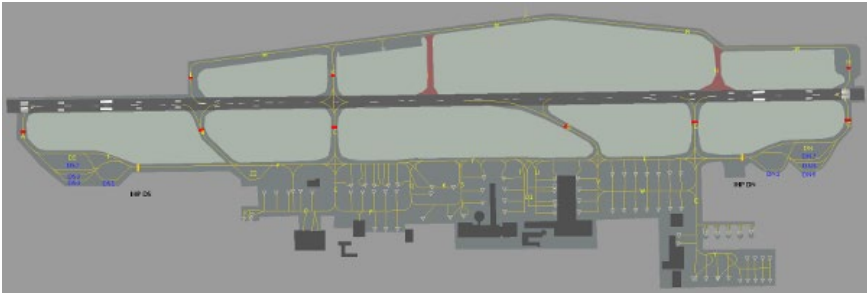
h) Companion windows

	<p>An ITWP Window may have one or more companion windows associated with them, showing alternative tower or approach views.</p> <p>The number of companion window available and their associated details can be specified in the local configuration. Two companion windows are available by default.</p>																																				
Invocation	<p>The display of a window is initiated either automatically by the system, or manually by the controller by designation of objects or invoking fields.</p> <p>When invoked, windows are displayed in accordance with their display priorities.</p>																																				
Display Position	<p>The window display position is defined in terms of X/Y of top left-hand corner, and is expressed in pixels or characters.</p> <p>Default window position relates to the position of the window at simulation initiation, and may vary according to data posting during the course of a simulation, with preferences stored in the user preferences set.</p>																																				
Illustration	 <p>The screenshot displays the ITWP interface with a 3D airport simulation. Key elements include:</p> <ul style="list-style-type: none">Alert Window: Shows 'RW16' and 'AUA130A' with a 'NO LND CLR' status.Flight Data Tables:<table><tr><th colspan="4">PENDING ARRIVALS</th></tr><tr><td>ED09</td><td>AUA224</td><td>ASZOM</td><td>ROF 11</td></tr><tr><td>ED07</td><td>DLH66U</td><td>ASZOM</td><td>ROF 11</td></tr><tr><td>ED45</td><td>BAW702</td><td>ASZOM</td><td>LND 11</td></tr><tr><td>ED13</td><td>AUA130A</td><td>STGJH</td><td>LND 16</td></tr></table> <table><tr><th colspan="4">(TD 090/20) RW16 (SE 090/20)</th></tr><tr><th colspan="4">(TD 090/20) RW11 (SE 090/20)</th></tr></table><table><tr><th colspan="4">PENDING DEPARTURES</th></tr><tr><td>ED09</td><td>NJE432B</td><td>CEJAM</td><td>LUP 11</td></tr></table>3D Simulation: Shows aircraft positions, flight paths, and airport infrastructure.Time: 08:59:49Logos: EUROCONTROL and Grafica.	PENDING ARRIVALS				ED09	AUA224	ASZOM	ROF 11	ED07	DLH66U	ASZOM	ROF 11	ED45	BAW702	ASZOM	LND 11	ED13	AUA130A	STGJH	LND 16	(TD 090/20) RW16 (SE 090/20)				(TD 090/20) RW11 (SE 090/20)				PENDING DEPARTURES				ED09	NJE432B	CEJAM	LUP 11
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PENDING DEPARTURES																																					
ED09	NJE432B	CEJAM	LUP 11																																		

4.2 Companion Window

HMI Object	
COMPANION WINDOW	
Objective	To encapsulate additional airport views for the purpose of observing areas of the airport or approach airspace that may not be clearly visible on the main ITWP window.
General Description	<p>A Companion window is an additional ITWP window associated with a main ITWP window, which is always shown above the parent ITWP window.</p> <p>A companion window can have any of the features available to an ITWP window, but by default is simplified to only show a single simplified toolbar.</p> <p>All configuration options available to an ITWP window can be applied to a companion window separately from its parent in the resources.</p> <p>The number of companion windows, (2 by default), along with their starting size and position, may be configured in the local configuration.</p> <p>a) Window Frame</p> <p>Unlike the ITWP window, the close button on the Companion window frame works to close the window. The Display menu of the ITWP VIEW tool is also updated to show that the window has been closed.</p>
Invocation	The display of a companion window is initiated either automatically by the system at start-up, or manually by the controller by selecting View1 or 2 in the DISPLAY menu of the ITWP VIEW tool.
Display Position	The window display position is defined in terms of X/Y pixel coordinates relative to the top-left corner of the screen.
Illustration	 <p>The screenshot shows a window titled "ITWP Runway Controller / VIEW_1". It displays a runway layout with various aircraft and labels. The runway is marked with numbers 0.6, 2, 4, 6, 8, and 10. Aircraft labels include "FDX40 I32", "A025 T158", "MD11/H 21", "FGMOH S33", "A035 T160", "F900/M", and "ROF". There are also green arrows and a "GO" button.</p>

4.3 Map Features



HMI Object	
MAP FEATURES	
Objective	To provide the 2D graphical representation of features used to depict the airport display.
General Description	<p>The ITWP Window map display utilises different elements to create a representation of an airport. The map shows the elements of the airport using different coloured areas and lines. The colours of the airport elements can be specified in the local configuration</p> <p>The MAP tool (§3.8.1.1) enables the map display elements to be turned on or off - a subset of the display elements are displayed by default, with others being enabled as required. The elements displayed by default may be set in local configuration, or saved and applied using the preferences setting (§3.8.3.1).</p>
Invocation	Always visible in the ITWP Window.
Display Position	The map centre, rotation and zoom level are set in the local configuration, and may be saved/set using the preferences settings (§3.8.3.1).
Illustration	<p>Default map display:</p> 

4.3.1 Airport Area

HMI Object	
AIRPORT AREA	
Objective	Display the total area covered by the airport.
General Description	<p>The geographical area covered by the airport, onto which all other features are layered above.</p> <p>The default colour is grey (RGB 121, 128, 129 ■).</p>
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.




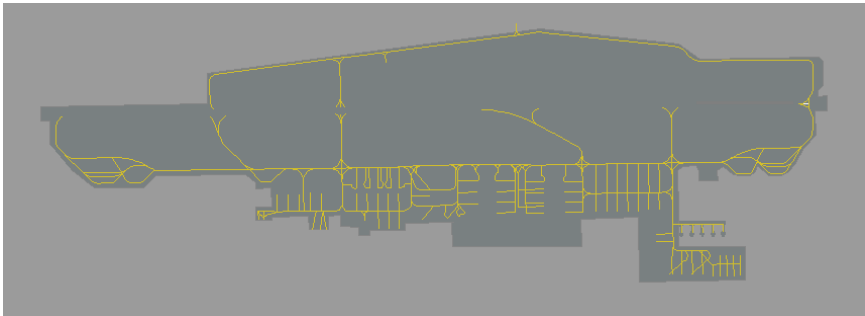
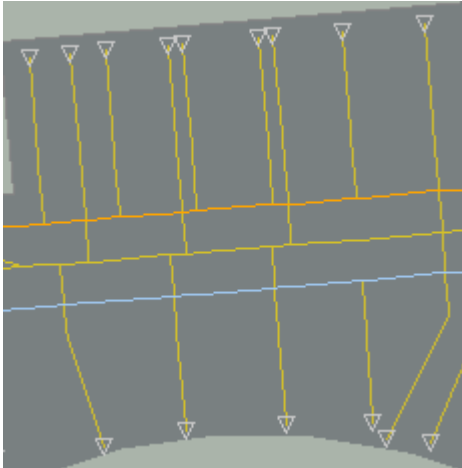
Illustration	
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4.3.2 Taxiway Areas

HMI Object	
TAXIWAY AREAS	
Objective	Defines the taxiway areas.
General Description	Geographical area placed over the airport area, used to define taxiway spaces. The default colour is pale green (RGB 170, 180, 170 ).
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.
Illustration	

4.3.3 Taxiway Centre Lines

HMI Object	
TAXIWAY CENTRE LINES	
Objective	Display the taxiway centre lines on the airport surface.
General Description	Lines depicting the routes taken by aircraft around the airport.

	The default colour is yellow (RGB 212, 192, 42 ) , but may be customised, e.g. for Alternate Parallel Taxi Route (APTR) centre lines (RGB 160, 200, 240  and RGB 255, 165, 0 ).
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.
Illustration	<p>a) Standard taxiway centre lines:</p>  <p>b) APTR centre lines:</p> 

4.3.4 Runway Area


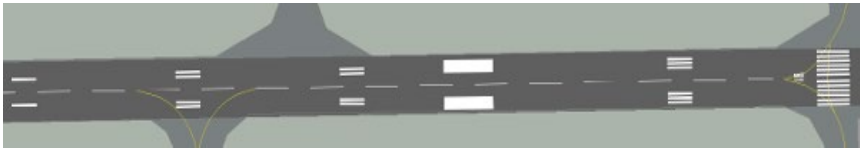
HMI Object	
RUNWAY AREA	
Objective	Display the runway area(s) on the airport surface.
General Description	Area showing the runway surface. The default colour is dark grey (RGB 95, 95, 95 ).
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.

Illustration	
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4.3.5 Runway Markings


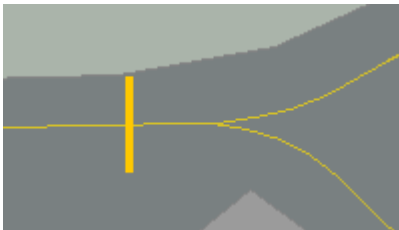
HMI Object	
RUNWAY MARKINGS	
Objective	Display 'painted' runway markings on the runway surface.
General Description	Runway markings typically painted onto the surface of the runway. The default colour is white.
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default, and only displayed within suitable zoom levels.
Display Position	Moves with composite display.
Illustration	

4.3.6 Buildings

HMI Object	
BUILDINGS	
Objective	Display the building areas on the airport surface.
General Description	Shows the location of buildings on the airport surface. The default colour is dark grey (RGB 80, 80, 80 ■).
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.


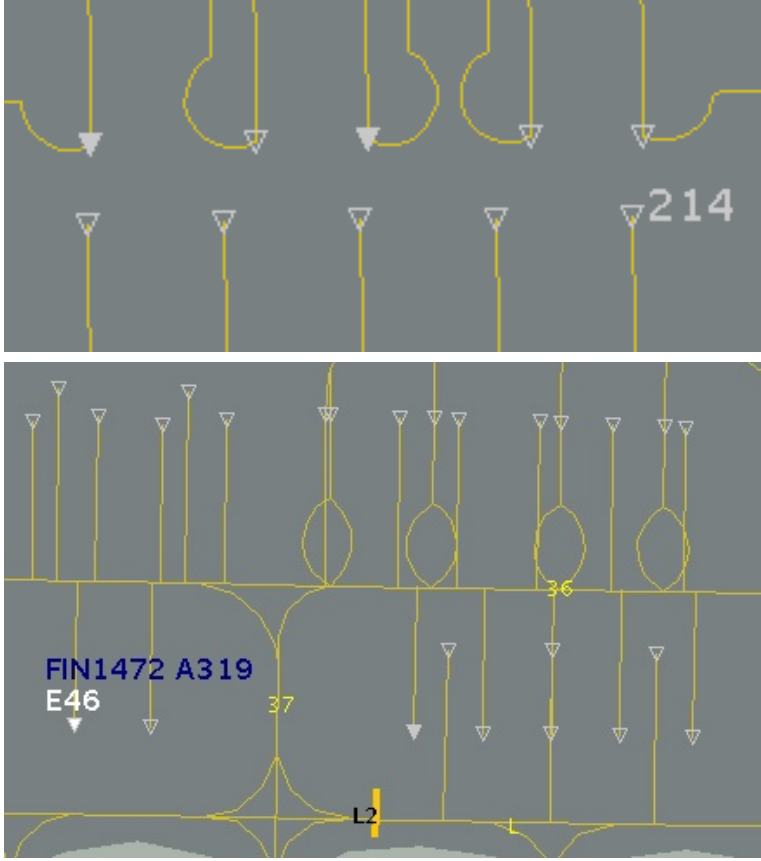
Illustration	
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4.3.7 Intermediate Holding Point



HMI Object	
INTERMEDIATE HOLDING POINT	
Objective	Display the Intermediate Holding Points on the taxiway surface.
General Description	A line 'painted' onto the surface of taxiways to represent intermediate holding points. The default colour is 'orange' (RGB 255, 200, 0 ).
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.
Illustration	

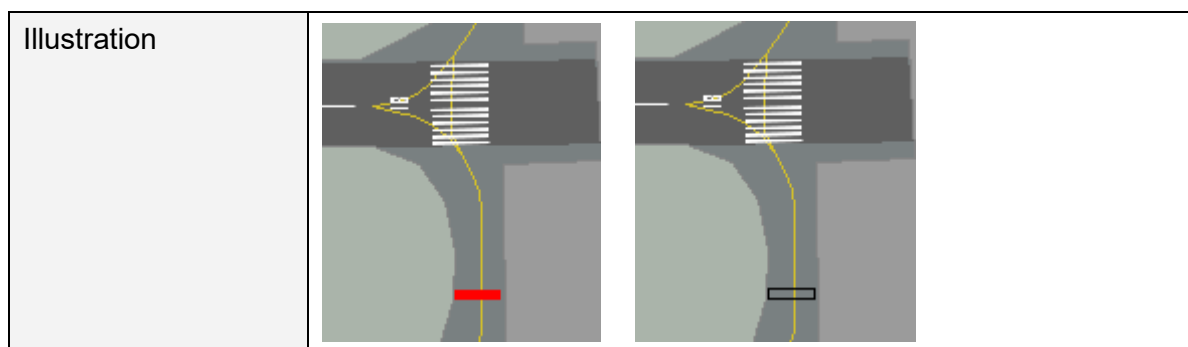
4.3.8 Stands

HMI Object	
STAND	
Objective	Display the location of stands on the apron surface.



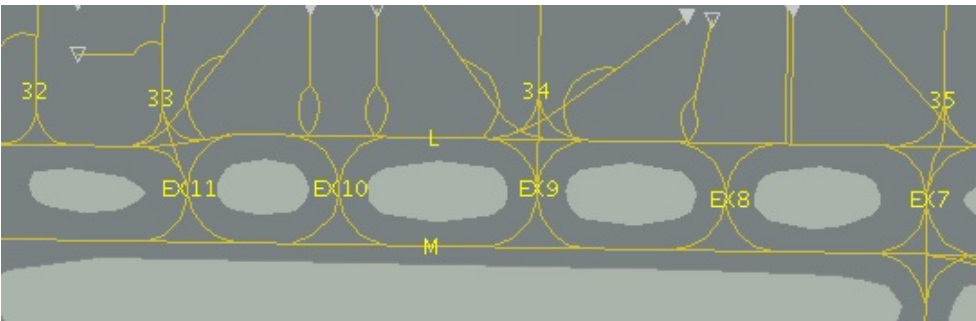
General Description	<p>Stand locations are displayed as a triangular shape drawn with a light grey colour (RGB 200, 200, 200 ).</p> <p>Stands have the following behaviour:</p> <ul style="list-style-type: none"> • Filled shapes indicate stands that are occupied, though the flight may not be active and visible parked there. • Empty (non-filled) shapes indicate free stands. • Mouse highlight the stand to show the stand name. When the stand is occupied, the Callsign and Aircraft type are shown as well. • Mouse left-click on shape to display the stand name permanently (toggle on/off) • Mouse right-click to mark the stand as occupied (added to support working with live data with inaccurate flight plan details)
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.
Illustration	 <p>The illustration consists of two screenshots of a flight display. The top screenshot shows a grid of stands represented by light grey triangular shapes. Yellow lines indicate flight paths or boundaries. A stand on the right is labeled '214'. The bottom screenshot shows a more complex display with multiple stands, yellow lines, and labels including 'FIN1472 A319', 'E46', '37', '36', and 'L2'.</p>

4.3.9 Stop Bars


HMI Object	
STOP BAR	
Objective	Display the location of a Stop Bar on the taxiway surface.
General Description	<p>A line 'painted' onto the surface of taxiway to represent the location of each Stop Bar.</p> <p>Stop Bars are displayed with a solid red colour (RGB 255, 0, 0 ) to indicate the stop bar in the 'stop' state (lights on), or as an unfilled shape to indicate the stop bar in an 'open' state (lights off).</p> <p>Stop Bars can be classified as Runway Stop Bars or Taxiway Stop bars.</p> <p>Stop Bars are automatically switched in accordance with the relevant clearances given.</p> <p>Runway Stop Bars are by default ON and turn OFF according to clearances given.</p> <p>Separate Runway Stop Bars can be defined for Cat I or Cat II/III operations</p> <p>Runway Stop Bars only OPEN (lights off) if the subject aircraft that is cleared to cross the Stop Bar is within a certain distance from the Stop Bar (configurable parameter)</p> <p>Runway Stop Bars automatically turn ON (lights on) when the subject aircraft has crossed the Stop Bar or after a defined time (local) parameter.</p> <p>Stop bars can be manually switched as well via the Stop Bar state menu (invoked by a left-click on the Stop Bar) (see §3.18.1) :</p> <ul style="list-style-type: none"> • The Stop Bar menu displays the name of the Stop Bar • The current state of the Stop Bar is displayed on a darker background in the Stop Bar state menu • The state of the Stop Bar can be switched (toggle) by a left-click on the non-active state 
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), enabled by default.
Display Position	Moves with composite display.



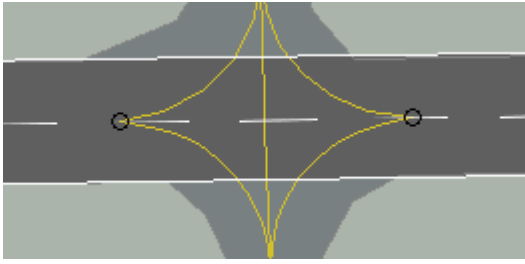
4.3.10 Taxiway Labels

HMI Object	
TAXIWAY LABEL	
Objective	To identify taxiway names and de-icing bay names.
General Description	<p>A text label that may be superimposed on line airport display to indicate names of taxiways and de-icing bays.</p> <p>The labels are displayed using the following colours:</p> <ul style="list-style-type: none">• Taxiway Label – yellow (RGB 255, 255, 0 ).• De-icing bay (RGB 51, 51, 255 .
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), disabled by default.
Display Position	<p>Moves with composite display.</p> <p>The taxiway names are removed from the display when the map is zoomed out below a pre-set level (local configuration).</p>
Illustration	

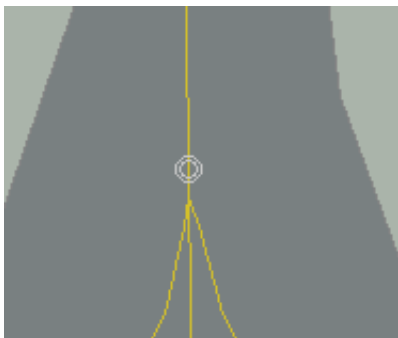
4.3.11 Runway Holding Point

HMI Object	
RUNWAY HOLDING POINT	
Objective	To indicate the location of runway holding points on the taxiway surface.
General Description	A symbol drawn to indicate the position of runway holding points (normally coinciding with a stop bar). Represented on the display as a symbol consisting of grey concentric circles with a line drawn through.
Invocation	Not selectable, not enabled by default.
Display Position	Moves with composite display.
Illustration	

4.3.12 Runway Entry and Exit Points

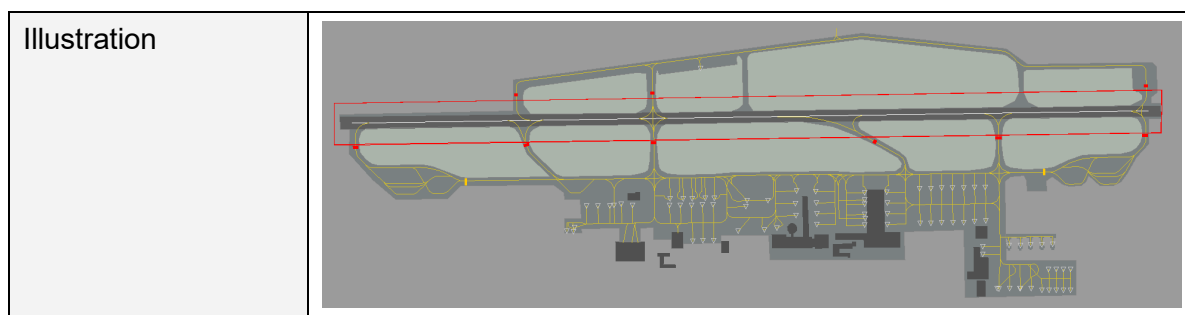
HMI Object	
RUNWAY ENTRY AND EXIT POINT	
Objective	To indicate the 'normal' places where aircraft access or leave the runway.
General Description	A circular symbol (black) drawn at the limits of taxiways where aircraft are expected to access or leave the runway.
Invocation	Not selectable, not enabled by default.
Display Position	Moves with composite display.
Illustration	

4.3.13 Clearance Points

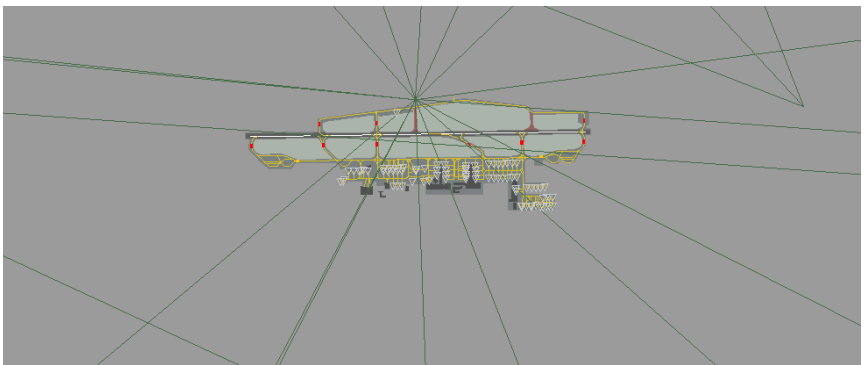
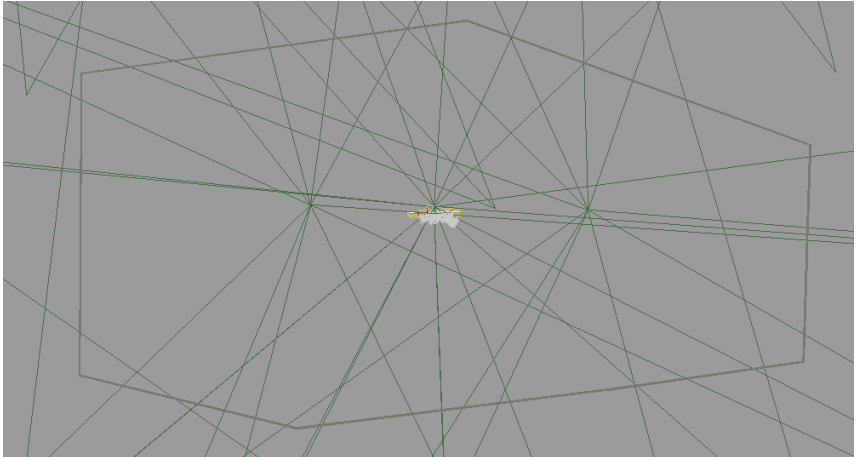
HMI Object	
CLEARANCE POINT	
Objective	To indicate the location where aircraft are required to gain clearance to continue on the taxiway.
General Description	A grey symbol drawn as concentric circles on the taxiway centre line at those points where aircraft are required to gain TAXI clearance to continue (e.g. arrivals to continue onto the taxiway after vacating the runway, aircraft as they pass from the jurisdiction of one GND controller to another).
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), not enabled by default.
Display Position	Moves with composite display.
Illustration	 <p>The illustration shows a grey symbol consisting of two concentric circles, representing a clearance point. This symbol is positioned on a yellow line that represents the taxiway center line. The background is a dark grey area representing the taxiway, with a lighter grey area representing the runway or other taxiway sections.</p>

4.3.14 Runway Protection Areas

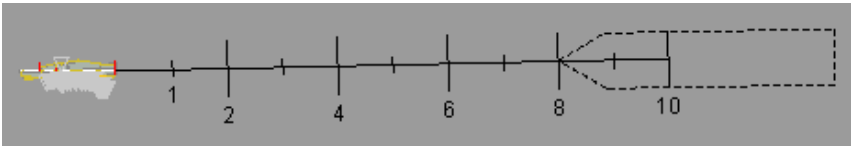
HMI Object	
RUNWAY PROTECTION AREA (RPA)	
Objective	To indicate the boundary of the runway protection area.
General Description	<p>A boundary line drawn in red that indicates the boundary of the runway protection area.</p> <p>Depending on the airport configuration, more than one RPA may be defined to correspond to CAT I and CAT III protection areas respectively. In this case, only the boundary line for the current condition is displayed. Switching between CAT I and CAT III conditions is performed from the Airport Setup Tool (§3.8.2.6).</p>
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), not enabled by default.
Display Position	Moves with composite display.



4.3.15 Airspace

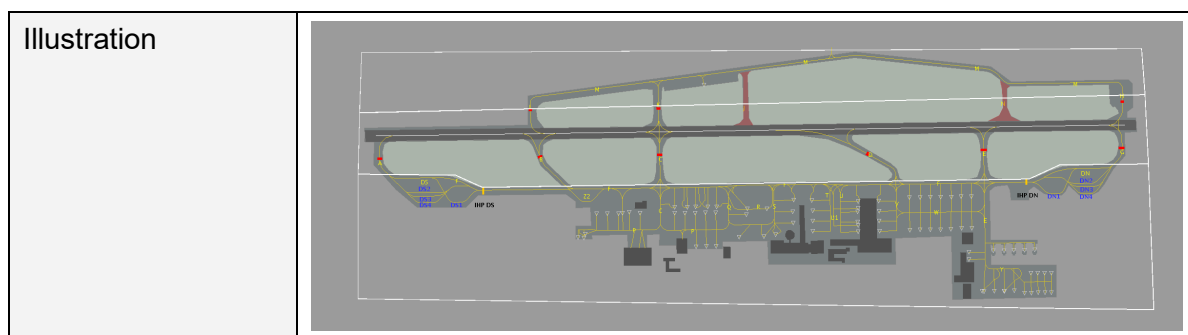
HMI Object	
AIRSPACE	
Objective	To indicate the defined routes through the airspace and airspace sectorisation boundaries.
General Description	Green lines drawn to indicate defined routes used by airborne aircraft into and over the airport, and grey boundary lines indicating sector boundaries.
Invocation	Not selectable, not enabled by default.
Display Position	Moves with composite display.
Illustration	
	

4.3.16 Runway ILS Display

HMI Object	
ILS DISPLAY	
Objective	To display an indication of the ILS capture area on an extended runway centre line.
General Description	<p>The graphical 'ILS' display shows an extended runway centre line, with markers indicating the distance (nautical miles) to the runway threshold.</p> <p>An area indicated with a dashed line is displayed to represent the ILS system capture zone.</p> <p>The distance markers (major and minor) are set in the local configuration.</p>
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), not enabled by default.
Display Position	Moves with composite display.
Illustration	

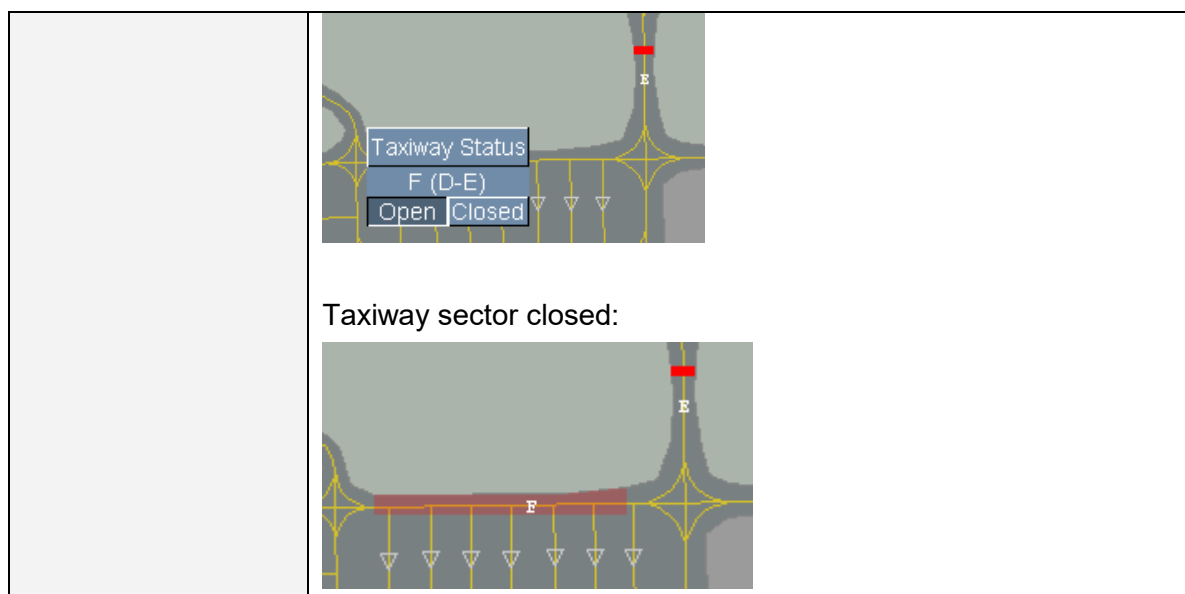
4.3.17 Jurisdiction Areas

HMI Object	
JURISDICTION AREA	
Objective	To display the boundaries of the jurisdiction areas of the GND and RWY controllers.
General Description	<p>Each controller position has a defined area of responsibility, for reference purposes these areas can be displayed over the map.</p> <p>The jurisdiction areas are displayed with a white boundary line.</p>
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1) (Areas of Responsibility), not enabled by default.
Display Position	Moves with composite display.



4.3.18 Taxiway Sectors

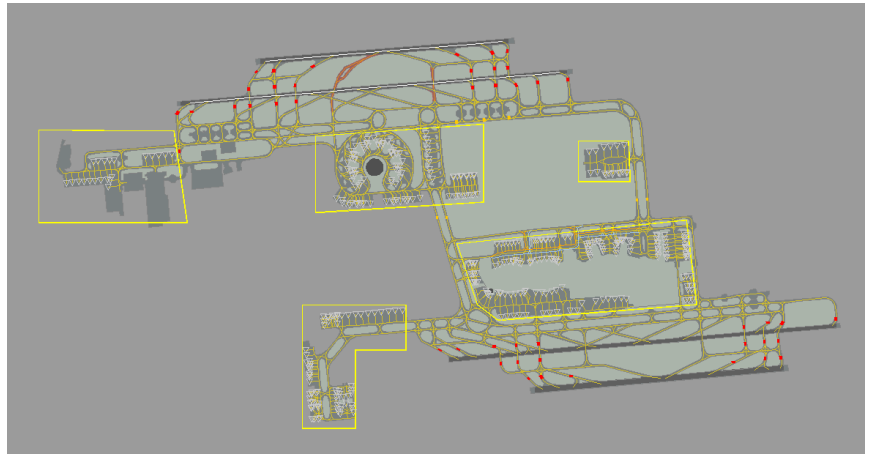
HMI Object	
TAXIWAY SECTOR	
Objective	To display interactive labels that may be used to set pre-defined taxiway sectors as being open to traffic or closed.
General Description	<p>Taxiway sectors are indicated using a white label to denote a sector that may be opened or closed.</p> <p>Taxiway sector (labels) have the following behaviour:</p> <ul style="list-style-type: none"> • Right click on the label to open the taxiway sector control menu. • Closed taxiways are shown with a red-overlay. <p><i>Note 1: Permanently closed and closable sectors need to be manually defined in the local configuration.</i></p> <p><i>Note 2: the alternative means to open and close taxiway sectors is to use the Airport Tool – RWY/TWY (§4.8.1.2.4).</i></p>
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), if closable taxiway sectors are defined, not enabled by default.
Display Position	Moves with composite display.
Illustration	<p>Taxiway sector label:</p> <p>Taxiway sector menu:</p>




4.3.19 Vehicle Mask Areas





HMI Object	
VEHICLE MASK AREA	
Objective	Vehicles operating on the apron areas are frequently of no interest to certain controllers, and may therefore be hidden from the controller display. The option for hiding vehicles is available from the Airport Setup Tool (§3.8.2.6). The Vehicle Mask Areas define the areas of the airport where vehicles may be hidden from the controller display.
General Description	<p>Vehicles operating on the apron areas are frequently of no interest to certain controllers (e.g. RWY controller), and may therefore be hidden from the display. The option for hiding vehicles is available from the Airport Setup Tool (§3.8.2.6).</p> <p>The Vehicle Mask Areas show the areas of the airport where vehicles will be hidden from the controller display, assuming that the controller has chosen to hide vehicles. The areas are shown with yellow borders around 'masking' area.</p> <p>The size and shape of the 'masking' areas are set in the local configuration.</p>
Invocation	Selectable from the MAP Items tool (§4.8.1.1.1), not enabled by default.
Display Position	Moves with composite display.

Illustration



4.4 Cursor








HMI Object	
CURSOR	
Objective	To indicate to the user the locus of interaction and possible actions on the interface.
General Description	<p>ITWP cursors are larger than the standard operating system cursor so that they are clearly visible even on the larger screens used for controller working positions.</p> <p>Different coloured cursors are used to indicate when different operating modes block the standard mouse interaction with features such as flight labels and flight strip bays.</p> <p>The following cursor types are available in ITWP:</p> <ul style="list-style-type: none"> • Standard cursor – White cursor with black border used by default in the ITWP window, unless one of the other cursors takes priority. • Route Editor Cursor – Yellow cursor with black border used to indicate when the route editor is active. The route editor may be activated by left-clicking on a flight or vehicle symbol, or by issuing the edit command from the control menu. Double right-click to cancel the route editor mode and return to the standard cursor. • Hold Short Cursor – Green cursor with black border used to indicate when the hold-short editor is active. The hold-short editor is activated by giving the hold-short command to a flight or vehicle from the control menu. Right-click to cancel the hold-short editor and return to the standard cursor. • Re-centre Display Cursor – Red cross with no border used to indicate when the re-centring tool is active. Activated from the CENTRE option in the ZOOM tool. A left click with this cursor will cause the map to move so that the selected point is at the centre of the screen. Right-click to cancel the re-centre mode. • Range and Bearing Tool Cursor – Yellow cross with no border used to indicate when the Range and Bearing (R&B) tool is active. Activated from the R&B tool. Right-click to close the R&B tool.
Invocation	Always present.
Display Position	Anywhere in the ITWP window, depending on the user's action on the pointing device.
Illustration	 <p>Standard Cursor</p>

		Route Editor Cursor
		Hold Short Cursor
		Re-centre Display Cursor
		Range and Bearing Tool Cursor


4.5 Menus

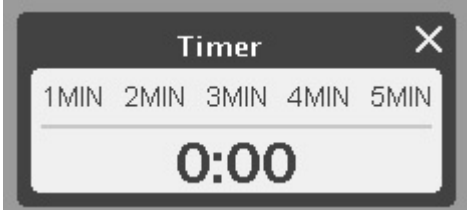
HMI Object	
MENU	
Objective	To provide a dialogue object allowing the user to select one value from within a range of possible inputs.
General Description	<p>A menu appears as an area on the display surface presenting a set of selectable items. The appearance of a menu consists of a set of the following display features:</p> <p>a) Menu frame.</p> <ul style="list-style-type: none">• The main menu area can include any of the following features:• Header (or name bar) located along the top edge of the menu frame. The header can display one or two lines of text. The text font parameters and colour, and the background colour of the header part can be defined in the local configuration. The header portion of the menu is not scrollable. The header of a menu related to a particular aircraft always displays the identity (callsign) of that aircraft, and sometimes the identification of the menu on a second line.• Scrolling mechanism. If a menu is defined to be scrollable it contains arrow buttons situated above and below the menu items• Background colour. The background colour of a menu is a single colour displayed as the background for the entire menu.• Number of menu items. The number of items that can be displayed is defined for each menu. This also defines the vertical size of the menu. <p>b) Additional controls.</p> <ul style="list-style-type: none">• Menu items can be composite objects, with two or more buttons making up each row in the menu to allow variations in the type of action to take from selecting the given menu item.• Alongside the main menu elements, toggle or push buttons can be added to the menu allowing for additional functions.• Sub-menus can also be added, shown to the right of the highlighted menu item. As the highlighted item changes, the sub-menu changes to show a relevant list of items appropriate to the new selection. The mouse can enter the

	<p>sub-menu without closing the original menu, and allow selection of an item from that list instead of the primary list.</p> <p>c) Default value. A default value is defined for each menu. The default value is identified by black and bolded text on the menu item.</p> <p>d) Menu Position. The menu position when opened usually falls into one of the following cases:</p> <ul style="list-style-type: none"> • Default value – the menu is positioned so the cursor is centred on the default value. • Current value – the menu is positioned so the cursor is centred on the current value. • Header – the menu is positioned so the cursor is centred on the menu header. • Adjusted for window edge – the menu is positioned using one of the above strategies, and then adjusted so that no elements are off-screen. <p>e) Closing the menu. The menu can be closed in two different ways:</p> <ul style="list-style-type: none"> • Dismiss on mouse out – the menu is closed when the mouse exits the menu past a certain margin. The margin around the menu at which the close is triggered can be specified in the local configuration. • Right click – the menu is closed following a right mouse click.
Invocation	The display of a menu is initiated by designation of fields or objects, called “initiating objects”.
Display Position	The display position of the menu is defined relative to the invoking field or to the cursor position. Unless otherwise specified, when invoked, a menu is displayed so that the default value is under the cursor (to avoid cursor movement).
Illustration	Examples of menus: Arrival stand menu, departure holding point menu and departure runway and SID sub-menu.






	BTI35G				
	STAND				
					
	301				
	302				FGMOH
	303				RUNWAY
	304			27R	FGMOH
	305			09L	SID
	306	AFL2683		27L	AGOPA
	307	HOLD POINT		09R	OPALE
	308	C		26R	BUBLI
	309	D		08L	
	311	E		26L	
		G		08R	
	H				


4.6 Toolbox Tool Window

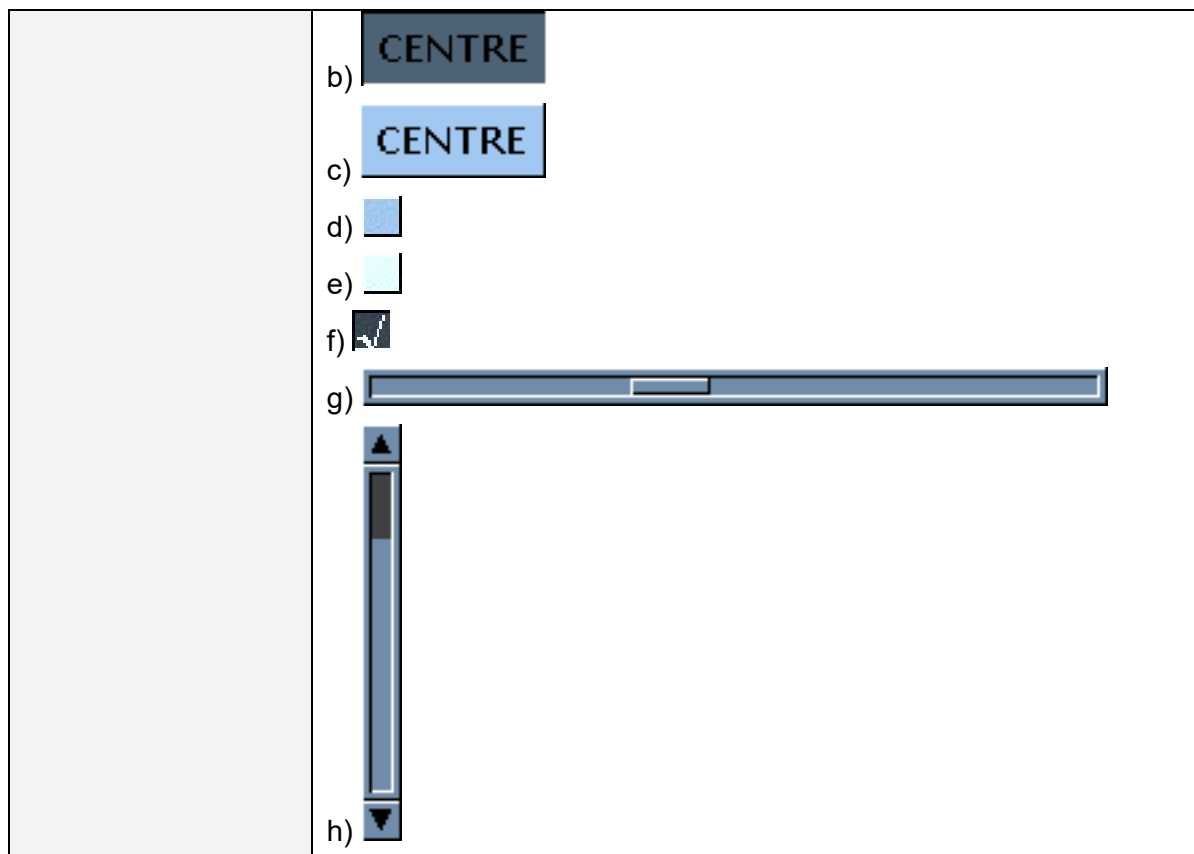
HMI Object	
TOOLBOX TOOL WINDOW	
Objective	To encapsulate UI Controls for the purpose of providing access to controls for configuration of the display and to utilities provided by the system.
General Description	<p>A toolbox tool window is the standard window frame used to provide a standard appearance and set of behaviours for all tools opened via the toolbox.</p> <p>A tool consists of the following elements:</p> <p>a) Main frame</p> <p>The main frame for the tool window clearly defines the area covered by the tool and provides a space for controls to be placed. It has the following appearance:</p> <ul style="list-style-type: none"> • Solid background colour (RGB 112, 140, 168 ). • White shadow on the left and top sides of the frame. • Black shadow on the right and bottom sides of the frame. <p>b) Header row</p> <p>The header row is a standard button as described in the Toolbox and Tool Controls entry (§3.7). It contains a single line of black text to be displayed as the title for the tool.</p> <p>The header button can be used to drag the entire tool frame around the screen using the left mouse button.</p> <p>c) Close button</p> <p>The close button is a standard button as described in the Toolbox and Tool Controls entry (§3.7). It displays a white X. When clicked, the close button triggers the removal of the tool window and updates the toolbox display to show the tool as 'unselected'.</p> <p>d) Scrollbars</p> <p>If a tool window requires more space than is available in the ITWP window it occupies, then horizontal or vertical scrollbars may be added as required, and the tool window re-sized to fit in the space available. This ensures all the controls in the tool window are accessible.</p>
Invocation	Tool windows are displayed by pressing a button in a toolbox which triggers the display of a specific tool.

Display Position	<p>The initial position for each tool is associated with the position of the button used to open it, adjusted to ensure the tool window is displayed on screen.</p> <p>After initial opening, each tool window retains the position it was in when last closed.</p>
Illustration	<p>Manual Timer tool.</p> 

4.7 Toolbox and Tool Controls

HMI Object	
TOOLBOX AND TOOL CONTROLS	
Objective	To provide a standard set of controls for use in Toolbox tool windows.
General Description	<p>There are a number of different types of controls available in the ITWP window displays:</p> <p>a) Standard buttons</p> <p>Rectangular buttons with the following appearance (illustration a):</p> <ul style="list-style-type: none"> • Black text colour. • Solid background colour (RGB 112, 140, 168 . • White shadow on the left and top sides of the button. • Black shadow on the right and bottom sides of the button. <p>Buttons can be pressed-in, either when the mouse button is pressed down or by acting as toggle buttons that are either on or off. When pressed-in, their appearance changes in the following ways (illustration b):</p> <ul style="list-style-type: none"> • Solid background colour (RGB 78, 98, 117 . • Black shadow on the left and top sides of the button. • White shadow on the right and bottom sides of the button. <p>Buttons show a highlight when the mouse is over them and no buttons are pressed with the following changes (illustration c):</p> <ul style="list-style-type: none"> • Solid background colour (RGB 160, 200, 240 . <p>b) Checkbox buttons</p> <p>Small square buttons used to indicate when an option needs to be shown as selected or active. The unchecked buttons have the following appearance (illustration d):</p> <ul style="list-style-type: none"> • No foreground text or graphic. • Solid background colour (RGB 160, 200, 240 . • White shadow on the left and top sides of the button. • Black shadow on the right and bottom sides of the button. <p>The unchecked buttons show a highlight when the mouse is over them and no buttons are pressed with the following changes (illustration e):</p> <ul style="list-style-type: none"> • Solid background colour (RGB 228, 255, 255 . <p>A single left-button mouse click will mark the checkbox as selected (or remove the selected mark). When selected, the checkbox has the following appearance (illustration f):</p>

	<ul style="list-style-type: none"> • White “tick” mark. • Solid background colour (RGB 54, 68, 81 ■). • Black shadow on the left and top sides of the button. • White shadow on the right and bottom sides of the button. <p>c) Slider control</p> <p>The slider control is used to allow the user to select a value from within a linear bounded range. Sliders are usually used when selecting a number from a range of values, such as selecting a zoom value between the minimum and maximum values.</p> <p>A slider is composed of the following elements (illustration g):</p> <ul style="list-style-type: none"> • A frame with a solid colour (RGB 112, 140, 168 ■), white shadow on the left and top sides, and black shadow on the right and bottom sides. • A tray, defining the area available for the selection. Drawn with a solid background colour (RGB 112, 140, 168 ■) with a black shadow on the left and top sides, and white shadow on the right and bottom sides. • A button capable of being dragged using the left mouse button, and constrained to the area of the tray. The button is a standard button as described above with no text. <p>d) Scrollbars</p> <p>Scrollbars may be used in Toolbox tool windows when the ITWP window is too small to fully display the contents of the tool when it is opened.</p> <p>A scrollbar is composed of the following elements (illustration h):</p> <ul style="list-style-type: none"> • Buttons are placed at either end of the scrollbar and used to increase or decrease the scroll position. Standard buttons as described above, with arrows pointing in the appropriate direction for the position of the button. • A slider control between the two buttons based on the slider control listed above, with a different tray button. The scrollbar tray button is a solid colour (RGB 64, 1, 64 ■) and with no shadow effect.
Invocation	Not applicable.
Display Position	Anywhere on the screen.
Illustration	<p>a) </p>

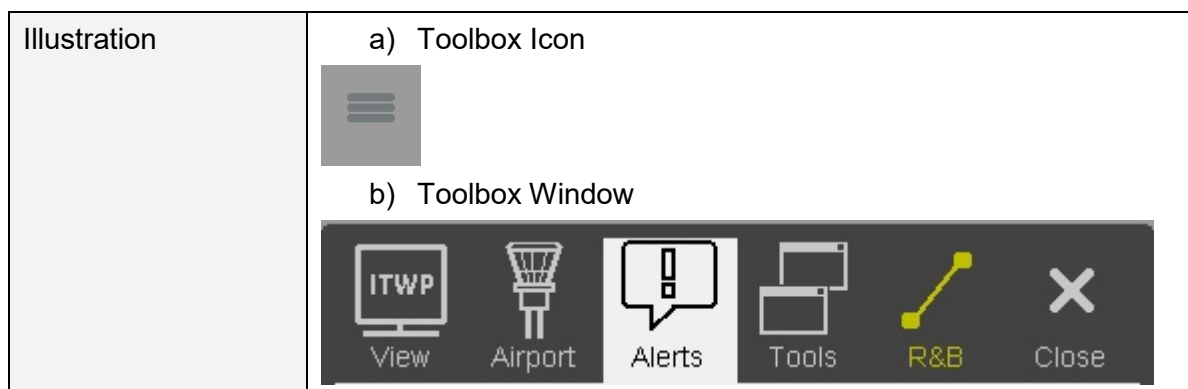


4.8 Controller Toolbox

There are different tools available on each CWP. These tools provide a means of accessing different functions for the controller including displaying the MET window. This section describes the different tools available on the Controller Working Position.

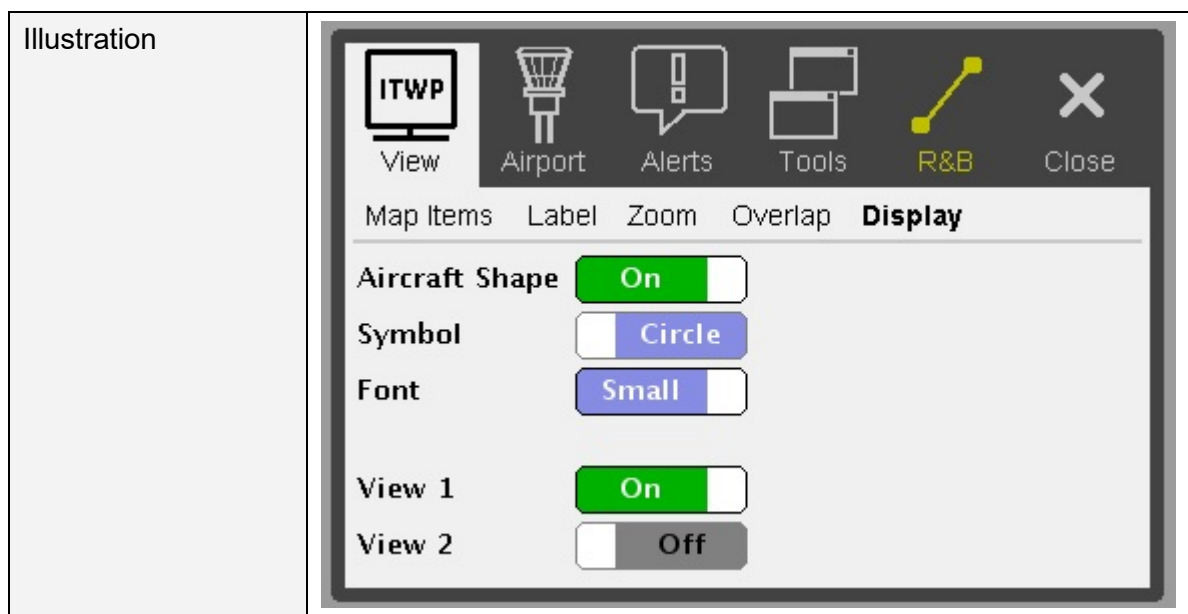
4.8.1 Toolbox Window

HMI Object	
TOOLBOX WINDOW	
Objective	To group together all the tools available to the operator for altering the look-and-feel of the HMI and for the user configuration of the available functionalities of the Integrated Tower Working Position.
General Description	<p>The Toolbox contains a row of buttons that provide access to tools and functionalities that affect the look-and-feel of the HMI as well as menus to configure the functionalities included in the ITWP.</p> <p>The following tools can be accessed from this menu:</p> <ul style="list-style-type: none"> • ITWP View Tool • Airport Tool • Alerts Tool • Other Tools • Range and Bearing (R&B) Tool <p>A single left mouse click on the Close button will iconify the Toolbox window.</p> <p>The exact list and functions may vary by local configuration, with the above list being the default options. Each Tool is described in a section below.</p> <p>The Toolbox (and the associated Toolbox Icon) can be dragged allowing it to be re-positioned by the user.</p>
Invocation	On system initialisation, the Toolbox icon is displayed.
Display Position	<p>By default, in the top left of the working position with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Toolbox Window</p>



4.8.1.1 ITWP View Tool

HMI Object	
ITWP VIEW TOOL	
Objective	To set-up the map display and the general behaviour of the generic ITWP functionalities.
General Description	<p>The ITWP View Tool consists of sub-menus that group different display items and possible behaviours. The five sub-menus available are:</p> <ul style="list-style-type: none"> • Map Items • Label • Zoom • Overlap • Display <p>Each sub-menu has text labels and associated check-boxes which allows the named element to be altered (e.g.: shown or hidden). Items selected by default is subject to local configuration and requirements.</p> <p>The precise list of items available for display is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Toolbox Window.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>

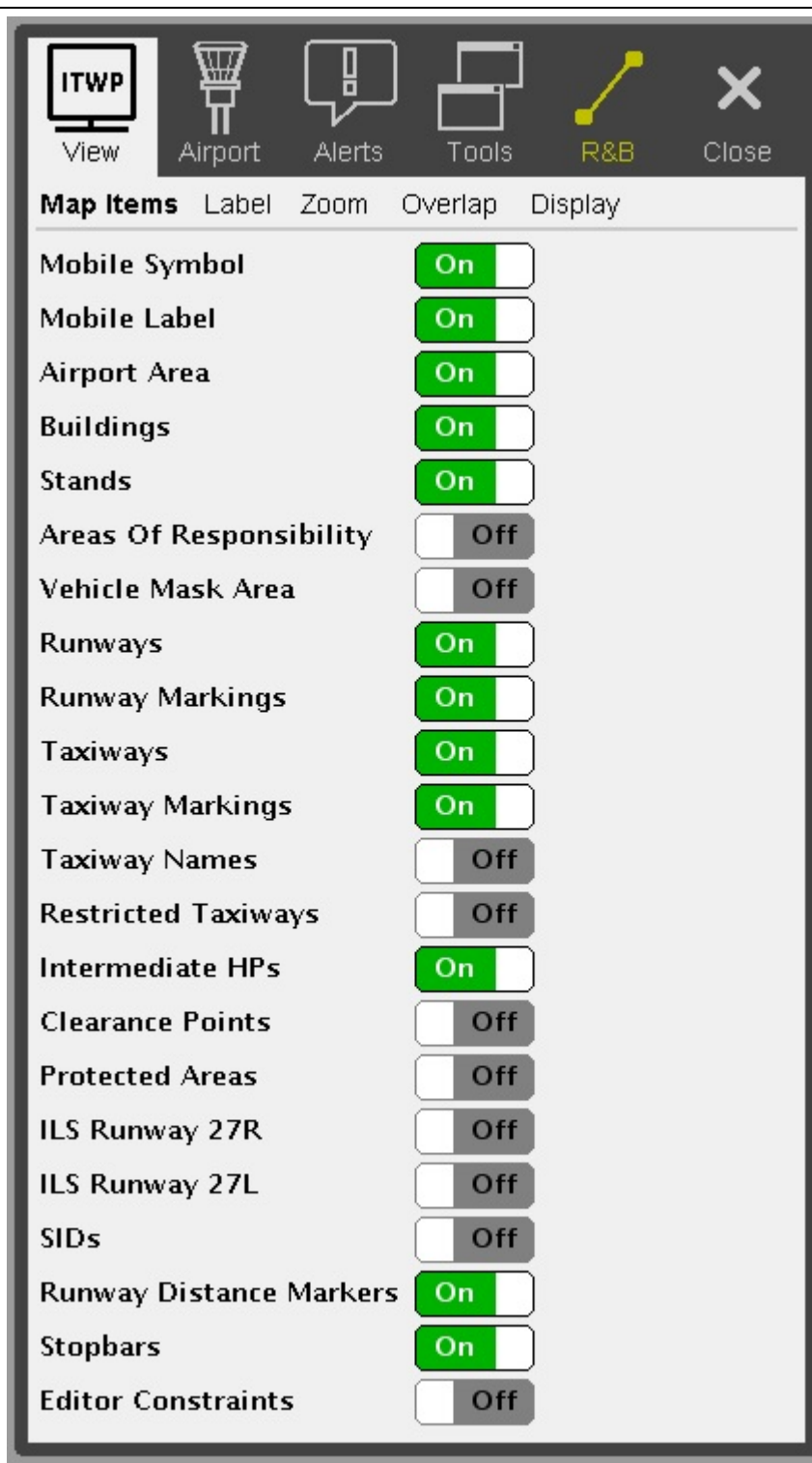


4.8.1.1.1 ITWP View Tool – Map Items

HMI Object	
ITWP VIEW TOOL – Map Items	
Objective	To show or hide elements on the map display.
General Description	<p>The Map Items Tool consists of a list area with text labels and switch buttons for the selection of items to be visible or hidden on the map display, such as (non-exhaustive list):</p> <ul style="list-style-type: none"> • Mobile Symbol • Mobile Label • Airport Area • Buildings • Stands • Areas of Responsibility • Vehicle Mask Area • Runways • Runway Markings • Taxiways • Taxiway Markings • Taxiway Names • Restricted Taxiways • Intermediate Holding Points

	<ul style="list-style-type: none">• Clearance Points• Protected Areas• ILS Extended Centre Lines• Standard Instrument Departure Routes (SIDs)• Runway Distance Markers• Stopbars• Editor Constraints <p>Each text label has an associated check-box which allows the named element to be shown or hidden.</p> <p>Items selected by default is subject to local configuration and requirements.</p> <p>The precise list of items available for display is subject to local configuration and requirements.</p>
Invocation	Available as an option of the ITWP View Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>

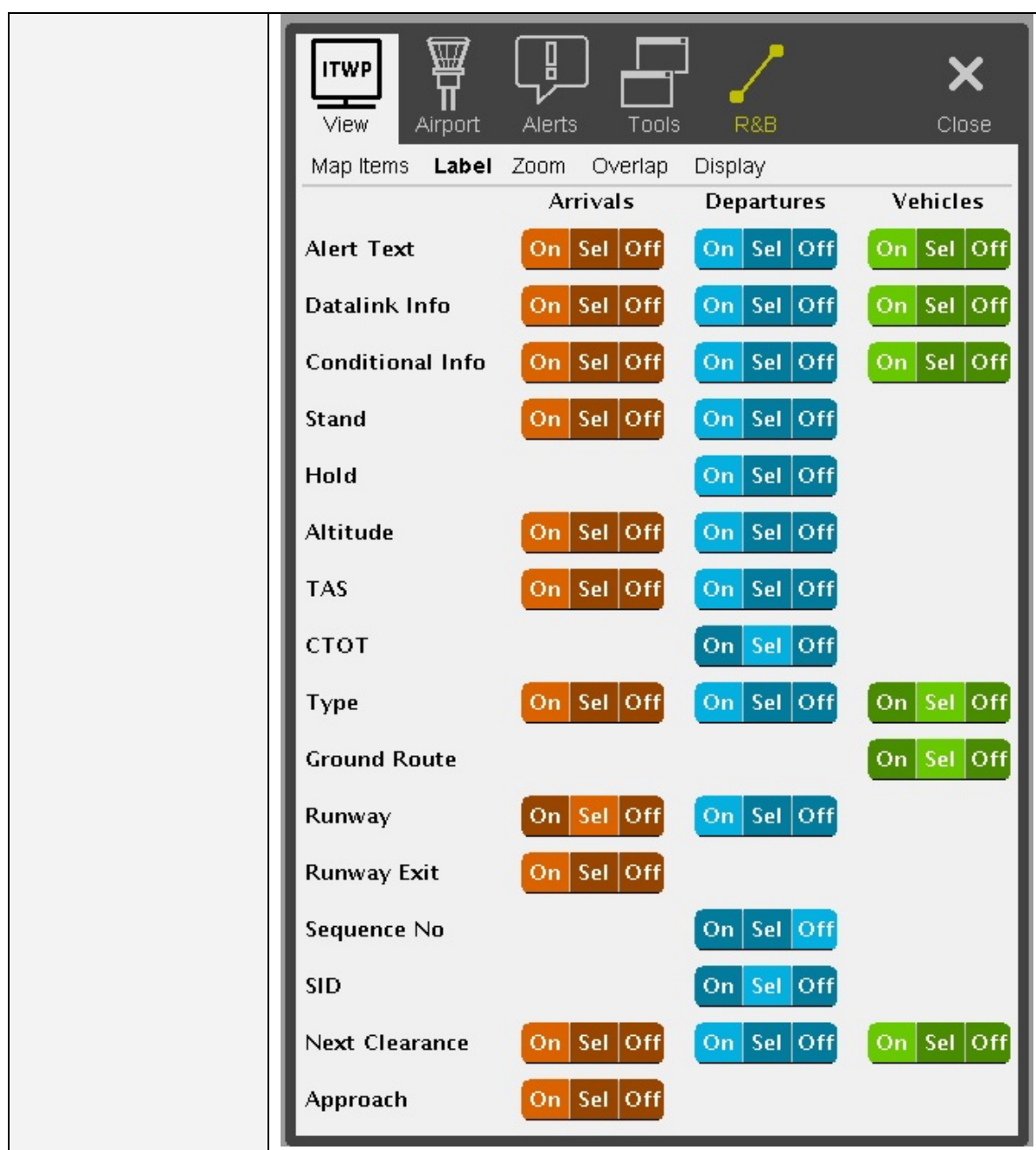
Illustration



4.8.1.1.2 ITWP View Tool – Label

HMI Object	
ITWP VIEW TOOL – Label	
Objective	To display / remove supplementary data in either the ‘minimal’ or ‘selected’ view of all radar labels.
General Description	<p>The Label Tool consists of a list of field names for items that may be displayed globally in the radar labels, along with corresponding toggle buttons to show or hide that field in the label.</p> <p>The toggle buttons are displayed in columns labelled ‘On’, ‘Sel’ or ‘Off’ for each mobile type – Arrivals, Departures and Vehicles.</p> <p>Selecting ‘On’ will display the label field in both the minimal and selected labels</p> <p>Selecting ‘Off’ will hide the label field in both the minimal and selected labels</p> <p>Selecting ‘Sel’ will display the label field in the selected label but will hide the field in the minimal labels</p> <p>The label fields listed in the tool, and the initial state for each field may be adapted in the local configuration.</p> <p>Some label fields are not present in the tool as they are deemed mandatory fields and shall always be present in the label.</p> <p>Mandatory fields may be set in local configuration, by default the mandatory fields are:</p> <ul style="list-style-type: none"> • Callsign • ‘Mark’ indicator • Clearance indicator • Runway crossing indicator <p>The default initial states for each of the label options are:</p> <ul style="list-style-type: none"> • Alert text: ON for Arrivals, Departures and Vehicles. • Datalink Info: ON for Arrivals, Departures and Vehicles. • Conditional Info: ON for Arrivals, Departures and Vehicles. • Stand: ON for Arrivals and Departures (<i>Option not available for Vehicles</i>). • Hold: ON for Departures (<i>Option not available for Arrivals and Vehicles</i>). • Altitude: ON for Arrivals and Departures. • TAS: ON for Arrivals and Departures.. • CTOT: SEL for Departures (<i>Option not available for Arrivals and Vehicles</i>). • Type: ON for Arrivals and Departures and SEL for Vehicles.

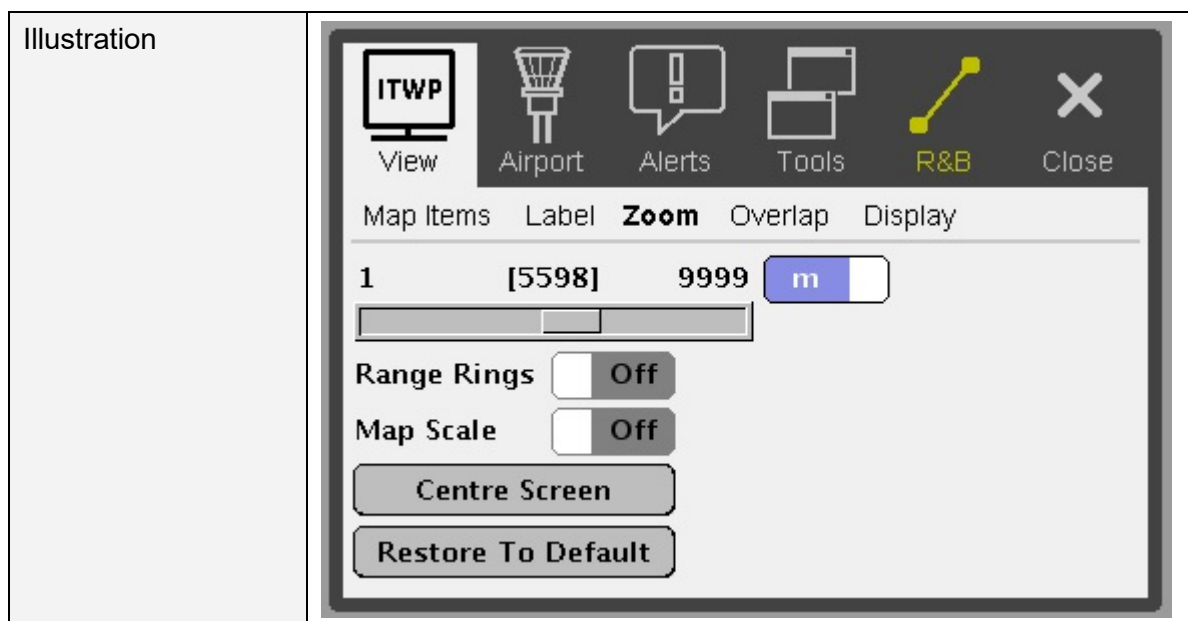
	<ul style="list-style-type: none">• Ground Route: SEL for Vehicles (<i>Option not available for Arrivals and Departures</i>).• Runway: SEL for Arrivals and ON for Departures. (<i>Option not available for Vehicles</i>).• Sequence Number: OFF for Departures (<i>Option not available for Arrivals and Vehicles</i>).• SID: SEL for Departures (<i>Option not available for Arrivals and Vehicles</i>).• Next Clearance: ON for Arrivals, Departures and Vehicles.• Approach: ON for Arrivals(<i>Option not available for Departures and Vehicles</i>).
Invocation	Available as an option of the ITWP View Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>
Illustration	



4.8.1.1.3 ITWP View Tool – Zoom

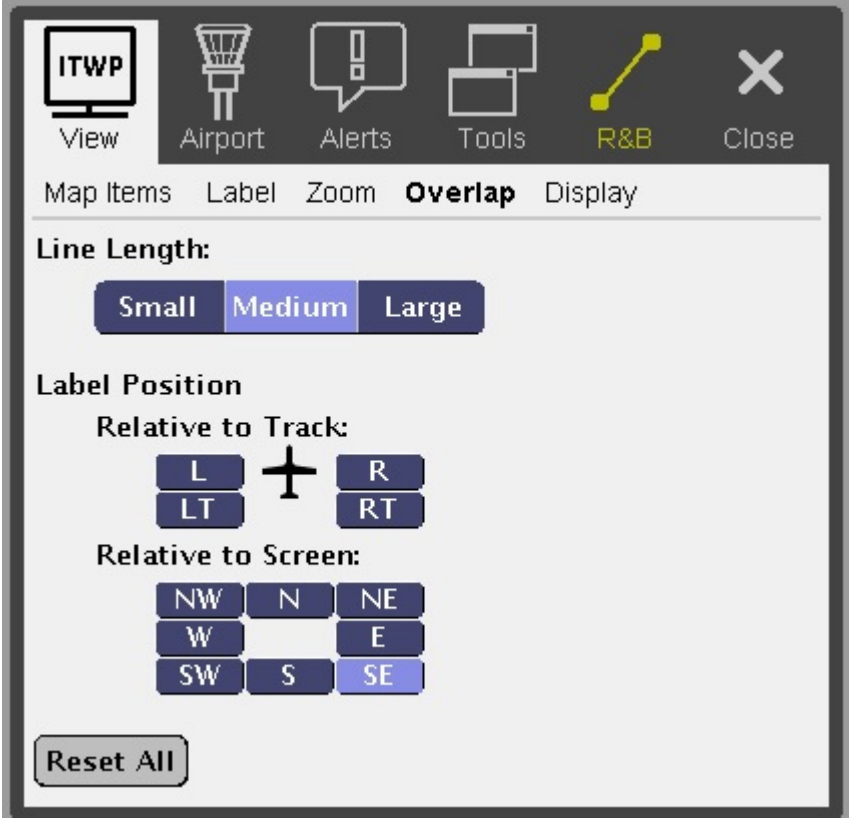
HMI Object	
ITWP VIEW TOOL – Zoom	
Objective	To change the radar display range, to store a particular zoom range, and to offset the situation display window centre.

General Description	<p>The Zoom Tool consists of a slider control that allows the display to be zoomed by dragging with the mouse.</p> <p>The slider control has a scale that may be toggled to display the scale in metres or nautical miles, and which represents the distance across the map display (the 'x' range).</p> <p>The zoom range may be defined in local configuration, the defaults are 1Nm to 50Nm when the 'nautical mile range' is selected, or 1m to 9999m when the 'metres range' is selected.</p> <p>The scale will automatically switch to the metres scale from the nautical mile scale when the zoom level is dragged below the approximately 5.4Nm (i.e. 9999 metres) level.</p> <p>Four additional functions are provided in the Zoom Tool:</p> <ul style="list-style-type: none">• Range Rings: Slider to select/de-select the display of concentric circles equally spaced by 1Nm. The centre of the Range Rings is determined by the Centre Screen value• Map Scale: Slider to select/de-select the display of scale indicator. The scale indicator is by default positioned in the bottom left of the working position. It can be dragged to be positioned anywhere on the working position.• Centre Screen: To select the centre of the airport map. When selected, the cursor changes to a RED CROSS. A left mouse click permits the selection of the new centre.• Restore To Default: When pressed, restores the airport map to the pre-defined default centre and zoom level for the working position.
Invocation	Available as an option of the ITWP View Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>



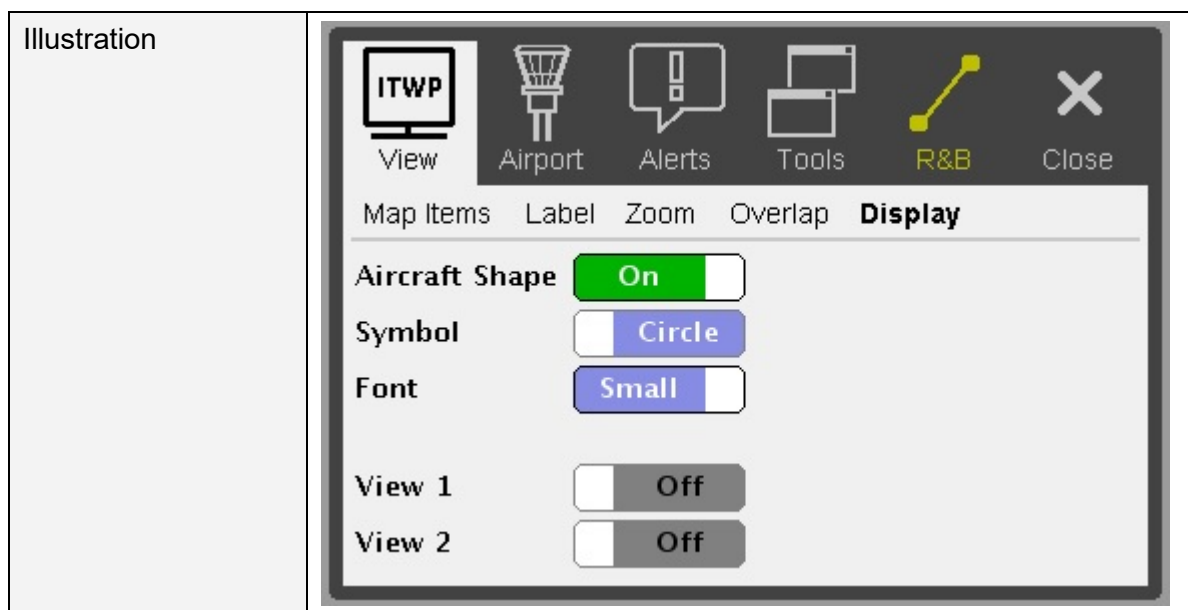
4.8.1.1.4 ITWP View Tool – Overlap

HMI Object	
ITWP VIEW TOOL – Overlap	
Objective	To manage the radar labels' positions by providing manual control of the position of the radar labels, with the ability to set the orientation and leader line length of all labels relative to either the owning aircraft or a compass bearing.
General Description	<p>The Overlap Tool consist of 3 submenus to define Leader Line Length, Label Position and a Reset All button.</p> <ul style="list-style-type: none"> • Line Length: 3 Toggle buttons (Small, Medium and Large) to define the default leader line length between radar track and radar label for all mobiles displayed on the working position. • Label Position: The label position, for all mobiles displayed on the working position, can be either set relative to the direction of the track of the mobile (which forces the label position to change as the aircraft bearing changes), or relative to the screen. <p>The options for 'Relative to the Track' are:</p> <ul style="list-style-type: none"> ○ Left ○ Right ○ Left Trailing ○ Right Trailing

	<p>The options for 'Relative to the Screen' are defined by compass nomenclature (e.g. NW implies the default position is above and to the left of the track symbol).</p> <ul style="list-style-type: none"> • Reset All: When pressed, restores the leader line length and the position of manually dragged radar labels to the values defined under Line Length and Label Position
Invocation	Available as an option of the ITWP View Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>
Illustration	

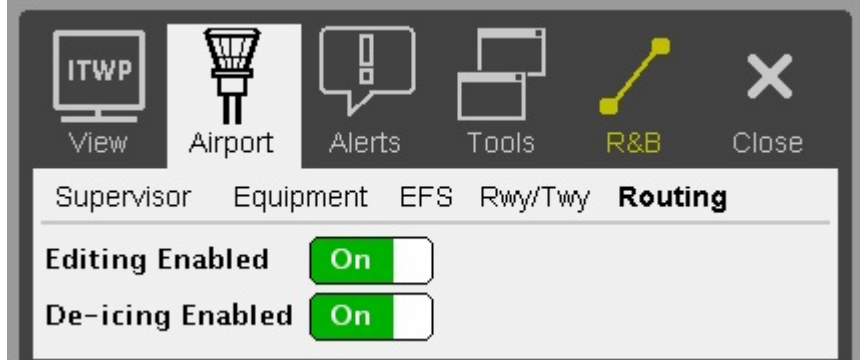
4.8.1.1.5 ITWP View Tool – Display

HMI Object	
ITWP VIEW TOOL – Display	
Objective	To manage the display characteristics of the radar tracks, the overall font size of the working position and the display of additional sub-view windows.
General Description	<p>The Display Tool consists of 5 submenus to define the display characteristics of the radar tracks, the overall font size of the working position and the display of additional sub-view windows.</p> <ul style="list-style-type: none">• Aircraft Shape: Slider to select/de-select the display of aircraft shapes instead of track symbols globally on the working position.• Symbol: Slider to select the shape of the track symbols (Square or Circle). This slider is only effective if the Aircraft Shape slider is in the Off position• Font: Slider to select globally on the working position the Font size (Small or Large)• View 1: Slider to open or close the first additional sub-view window• View 2: Slider to open or close the second additional sub-view window <p>Items selected by default is subject to local configuration and requirements.</p>
Invocation	Available as an option of the ITWP View Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>



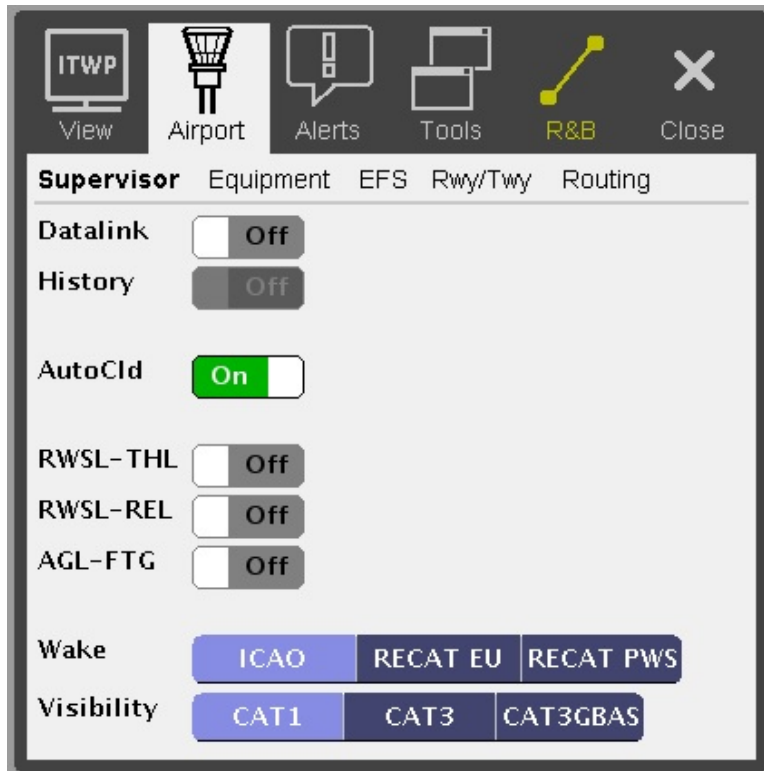
4.8.1.2 Airport Tool

HMI Object	
AIRPORT TOOL	
Objective	To group together the tools used, normally by the supervisor, to enable or disable specific functions of ITWP, to manage aspects of the Airport environment (such as lighting) and the look-and-feel of the working position in general.
General Description	<p>The Airport Tool consists of sub-menus that group different functionalities available in the Airport environment. It allows to set up the operational airport environment as well as the way the Working Position is configured. The five sub-menus available are:</p> <ul style="list-style-type: none"> • Supervisor • Equipment • EFS • RWY / TWY • Routing <p>Each sub-menu has text labels and associated check-boxes which allows the named element to be altered (e.g.: shown or hidden, activated or de-activated).</p> <p>Items selected by default is subject to local configuration and requirements.</p>

	The precise list of items available for display is subject to local configuration and requirements.
Invocation	Available as an option of the Toolbox Window.
Display Position	By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user. Last position and selected Tool are memorized when re-opening the ITWP View Tool.
Illustration	

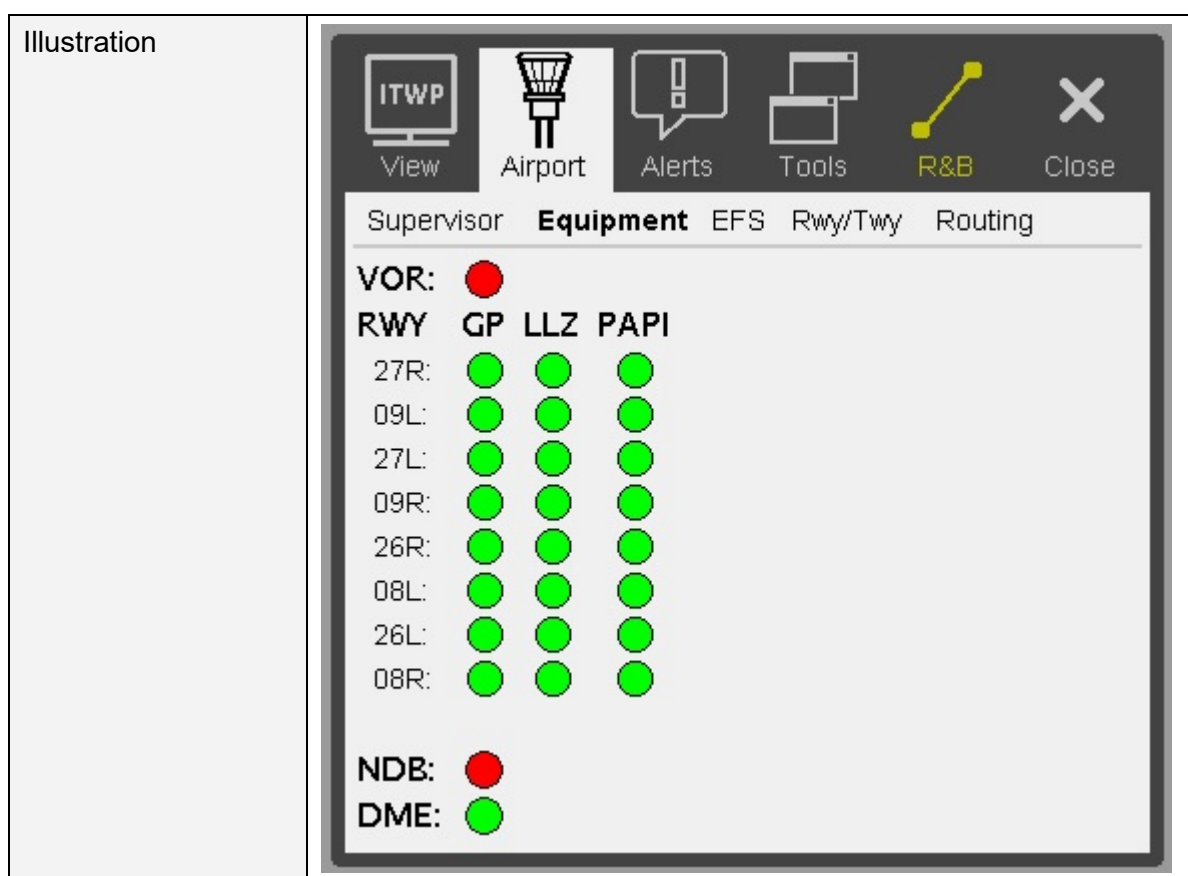
4.8.1.2.1 Airport Tool – Supervisor

HMI Object	
AIRPORT TOOL – Supervisor	
Objective	To activate / de-activate specific ITWP functionalities and manage the display of airport lighting functions.
General Description	<p>The Supervisor Tool consists of a list area with text labels and switch buttons for the selection of specific ITWP functionalities and to manage the display of airport lighting features.</p> <ul style="list-style-type: none"> • Datalink: Slider to enable/disable datalink communication functionalities • History: Slider to select/de-select the display of the Datalink History Window. If Datalink is disabled this slider is not accessible. • AutoCld: Slider to enable/disable the automation of controller actions on the Clearance Delivery (CLD) Working Position in ITWP • RWSL-THL: Slider to select/de-select the display of the Take-off Hold Lights of the Runway Status Lights feature

	<ul style="list-style-type: none"> • RWSL-REL: Slider to select/de-select the display of the Runway Entry Lights of the Runway Status Lights feature • AGL-FTG: Slider to enable/disable the “Follow-the-Greens” functionality and the display of the Taxiway Centreline Lights illuminated by the FTG function. • Wake: 3 Toggle buttons to select the type of Wake Vortex Turbulence Category indicators to be used. (ICAO, RECAT-EU, RECAT PWS) • Visibility: 3 Toggle buttons to select the visibility conditions that are linked to the airport operational procedures to be used by ITWP. (e.g. Cat 3 Stopbars in low visibility conditions) <p>Items selected by default is subject to local configuration and requirements.</p> <p>The precise list of items available for display is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Airport Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>
Illustration	 <p>The screenshot shows the 'Airport' tool interface. At the top, there is a toolbar with icons for 'View' (ITWP), 'Airport' (selected), 'Alerts', 'Tools', 'R&B', and 'Close'. Below the toolbar, there are tabs for 'Supervisor', 'Equipment', 'EFS', 'Rwy/Twy', and 'Routing'. The 'Supervisor' tab is active, displaying several configuration options:</p> <ul style="list-style-type: none"> Datalink: Off (toggle) History: Off (toggle) AutoCld: On (toggle) RWSL-THL: Off (toggle) RWSL-REL: Off (toggle) AGL-FTG: Off (toggle) Wake: Three buttons: ICAO (selected), RECAT EU, and RECAT PWS. Visibility: Three buttons: CAT1 (selected), CAT3, and CAT3GBAS.

4.8.1.2.2 Airport Tool – Equipment

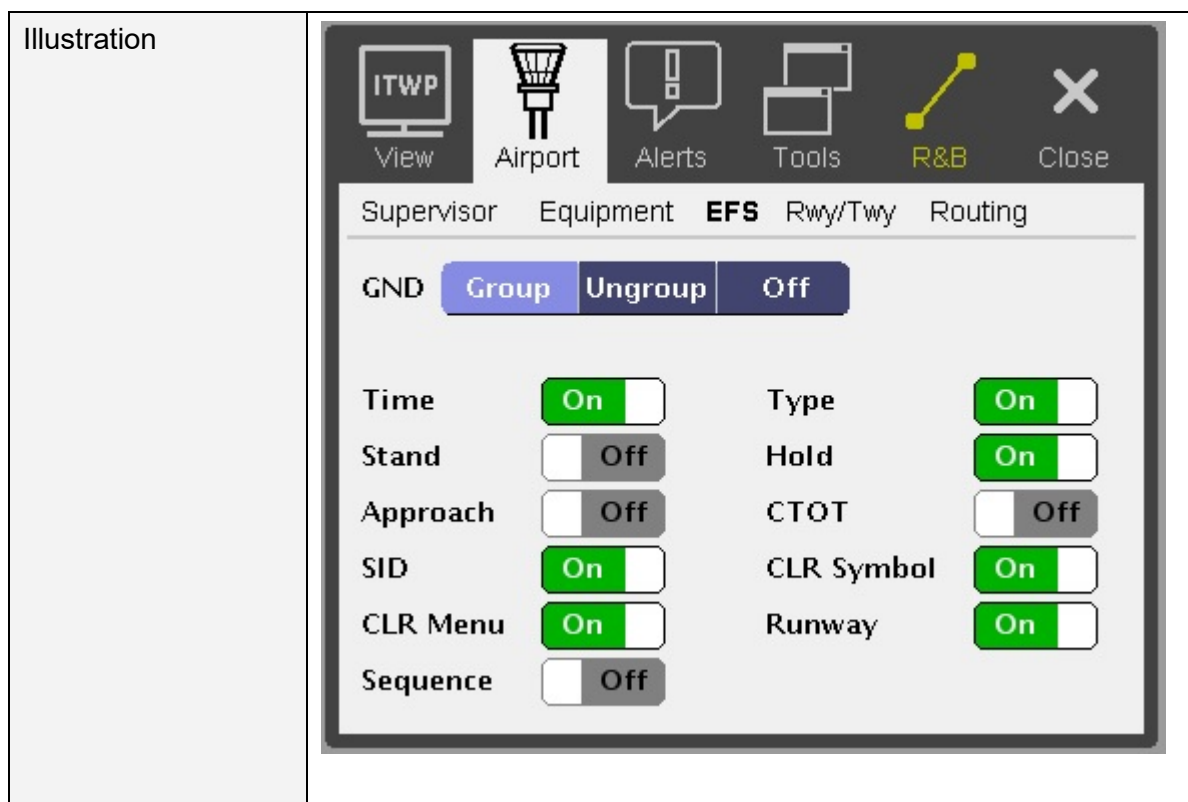
HMI Object	
AIRPORT TOOL – Equipment	
Objective	To display the status of essential airport navigational equipment
General Description	<p>The Equipment Tool contains serviceability information regarding (radio) navigation aids systems. The navigational systems available for aircraft are:</p> <ul style="list-style-type: none">• VHF Omni-directional Radio range (VOR)• Distance Measuring Equipment (DME)• Non-Directional Beacon (NDB) <p>The systems available for each runway (local parameter) are:</p> <ul style="list-style-type: none">• Glide Path (GP)• Localizer (LLZ)• Precision Approach Path Indicator (PAPI) <p>The precise list of items available for display is subject to local configuration and requirements.</p> <p>No interaction via the image is possible (display only)</p>
Invocation	Available as an option of the Airport Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>



4.8.1.2.3 Airport Tool – EFS

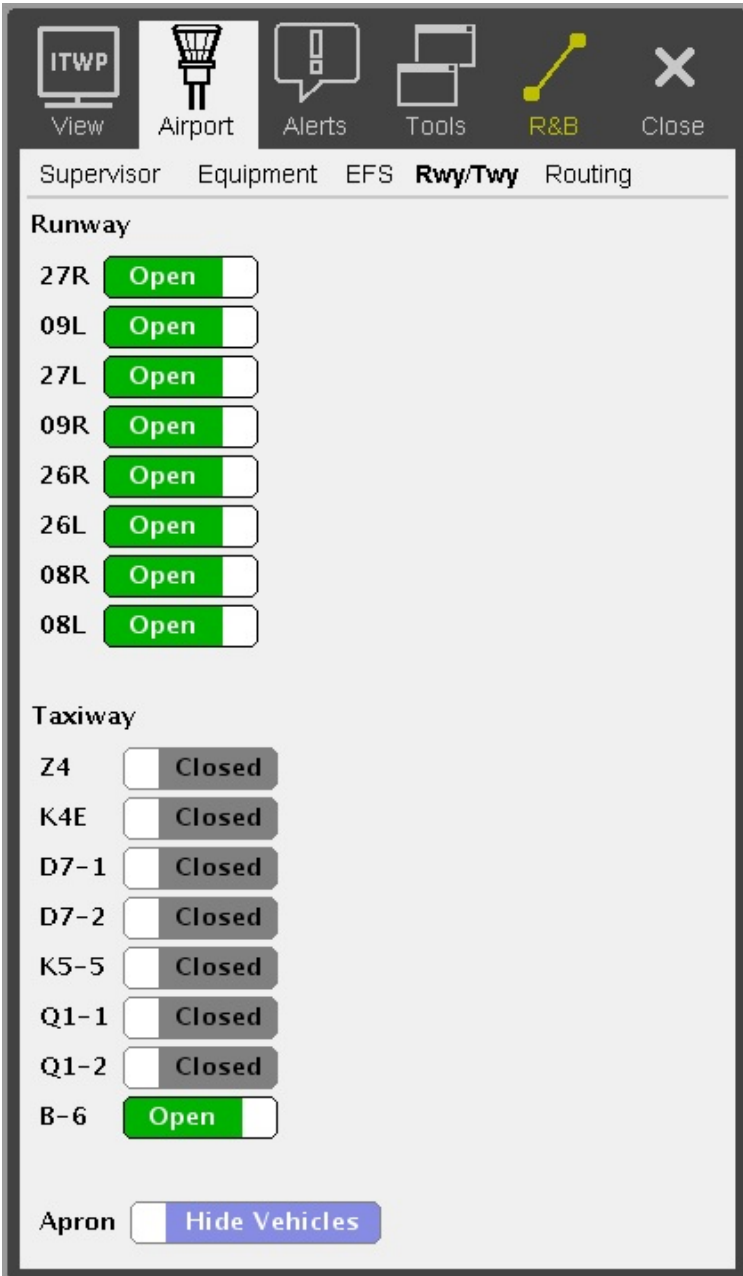
HMI Object	
AIRPORT TOOL – EFS	
Objective	To manage the layout of the Electronic Flight Strips (EFS) Bays presented on the Working Position and as well to select/de-select fields to be displayed in the EFS.
General Description	<p>The EFS Tool consists of 2 sub-menus to manage the layout of the Electronic Flight Strips (EFS) Bays presented on the Working Position and as well to select/de-select fields to be displayed in the EFS.</p> <p>The layout of the EFS Bays can be selected via three toggle buttons</p> <ul style="list-style-type: none"> • GROUP • DEGROUP • OFF to remove the display of the EFS Bays on the Working Position.

	<p>A list of fields that can be hidden or displayed in the EFS with a via a slider to the right of each field name.</p> <ul style="list-style-type: none">• Time:• Stand:• Approach• SID• CLR Menu• Sequence• Type• Hold• CTOT• CLR Symbol• Runway <p>The selections made via the EFS Tool are role dependant (GND, RWY, CLD) and specific to the Working Position.</p> <p>Items selected by default is subject to local configuration and requirements.</p> <p>The precise list of items available for display is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Airport Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>

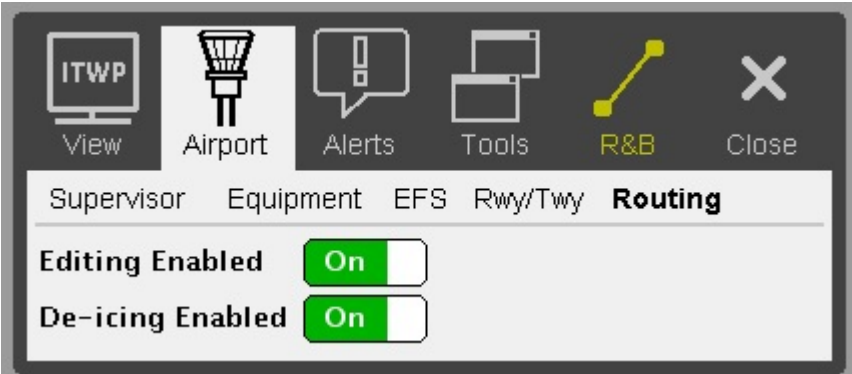


4.8.1.2.4 Airport Tool – RWY / TWY

HMI Object	
AIRPORT TOOL – RWY / TWY	
Objective	To provide a means to indicate that runways or taxiways are open or closed to traffic and to permit vehicles operations on the aprons to be hidden on the Working Position.
General Description	<p>The RWY / TWY tool consists of 2 sub-menus to manage the status of</p> <ul style="list-style-type: none"> • Runways (Open or Closed) • Taxiway segments (Open or Closed) <p>The RWY / TWY tool allows as well to select whether vehicles are shown or hidden in dedicated Apron areas (Vehicle Mask area). Items selected by default is subject to local configuration and requirements.</p> <p>The precise list of items available for display is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Airport Tool.

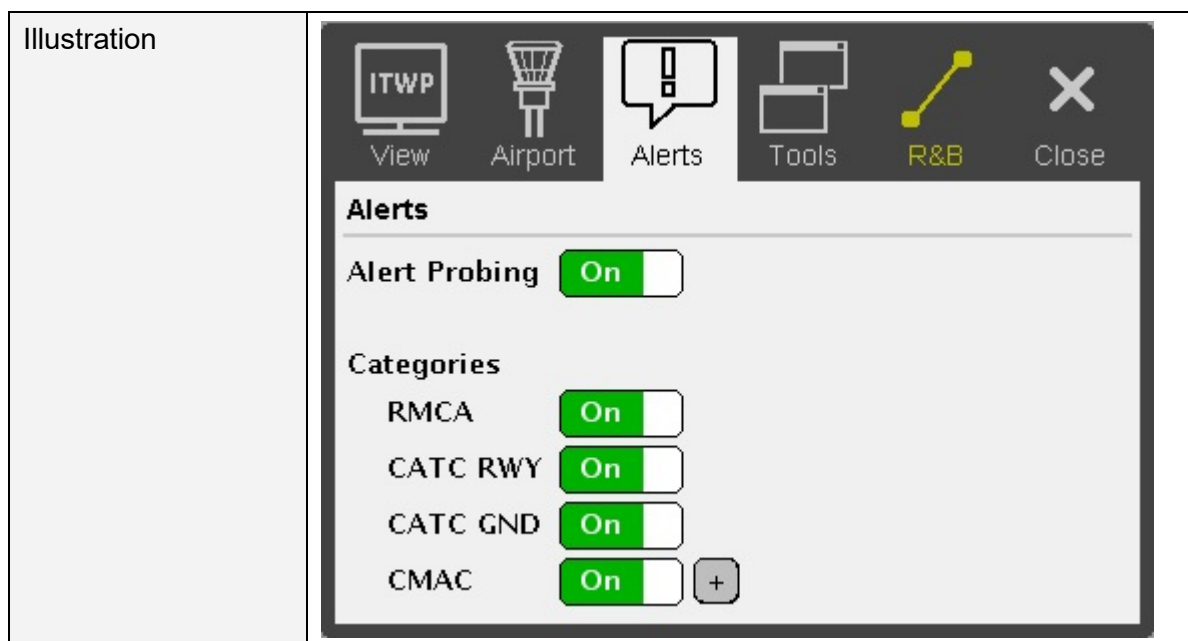
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>																																								
Illustration	 <p>The screenshot displays the 'Airport' tool interface. At the top is a toolbar with icons for 'View' (ITWP), 'Airport' (selected), 'Alerts', 'Tools', 'R&B', and 'Close'. Below the toolbar is a tabbed menu with 'Supervisor', 'Equipment', 'EFS', 'Rwy/Twy' (selected), and 'Routing'. The main content area is divided into three sections: 'Runway', 'Taxiway', and 'Apron'. The 'Runway' section lists eight runways (27R, 09L, 27L, 09R, 26R, 26L, 08R, 08L) with 'Open' status indicators. The 'Taxiway' section lists eight taxiways (Z4, K4E, D7-1, D7-2, K5-5, Q1-1, Q1-2, B-6) with 'Closed' status indicators, except for B-6 which is 'Open'. The 'Apron' section has a 'Hide Vehicles' button.</p> <table border="1"><thead><tr><th>Runway</th><th>Status</th></tr></thead><tbody><tr><td>27R</td><td>Open</td></tr><tr><td>09L</td><td>Open</td></tr><tr><td>27L</td><td>Open</td></tr><tr><td>09R</td><td>Open</td></tr><tr><td>26R</td><td>Open</td></tr><tr><td>26L</td><td>Open</td></tr><tr><td>08R</td><td>Open</td></tr><tr><td>08L</td><td>Open</td></tr></tbody></table> <table border="1"><thead><tr><th>Taxiway</th><th>Status</th></tr></thead><tbody><tr><td>Z4</td><td>Closed</td></tr><tr><td>K4E</td><td>Closed</td></tr><tr><td>D7-1</td><td>Closed</td></tr><tr><td>D7-2</td><td>Closed</td></tr><tr><td>K5-5</td><td>Closed</td></tr><tr><td>Q1-1</td><td>Closed</td></tr><tr><td>Q1-2</td><td>Closed</td></tr><tr><td>B-6</td><td>Open</td></tr></tbody></table> <table border="1"><thead><tr><th>Apron</th><th>Action</th></tr></thead><tbody><tr><td>Apron</td><td>Hide Vehicles</td></tr></tbody></table>	Runway	Status	27R	Open	09L	Open	27L	Open	09R	Open	26R	Open	26L	Open	08R	Open	08L	Open	Taxiway	Status	Z4	Closed	K4E	Closed	D7-1	Closed	D7-2	Closed	K5-5	Closed	Q1-1	Closed	Q1-2	Closed	B-6	Open	Apron	Action	Apron	Hide Vehicles
Runway	Status																																								
27R	Open																																								
09L	Open																																								
27L	Open																																								
09R	Open																																								
26R	Open																																								
26L	Open																																								
08R	Open																																								
08L	Open																																								
Taxiway	Status																																								
Z4	Closed																																								
K4E	Closed																																								
D7-1	Closed																																								
D7-2	Closed																																								
K5-5	Closed																																								
Q1-1	Closed																																								
Q1-2	Closed																																								
B-6	Open																																								
Apron	Action																																								
Apron	Hide Vehicles																																								

4.8.1.2.5 Airport Tool – Routing

HMI Object	
AIRPORT TOOL – Routing	
Objective	To allow the Route editing features to be enabled or disabled, and to enable or disable de-icing routing procedures.
General Description	<p>The Routing Tool consists of a 2 sub-menus with text labels and sliders to enable or disable the Routing function of ITWP and to activate or de-activate specific routing features when de-icing procedures are in operation at the airport.</p> <ul style="list-style-type: none"> • Editing Enabled (On or Off) • De-icing Enabled (On or Off). If Editing Enabled is set to Off this slider is not accessible. <p>Items selected by default is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Airport Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>
Illustration	


4.8.1.3 Alerts Tool

HMI Object	
ALERTS TOOL	
Objective	To configure which alert categories are to be monitored by the Airport Safety Net as well as to activate/de-activate the Alert probing function of the Conflicting ATC clearances function and to modify the Conformance Monitoring Alerting Parameters.
General Description	<p>The Alerts Tool consists of sub-menus that group different alerting functionalities available in the Airport environment.</p> <p>The Alerts Tool consists of sub-menus with text labels and sliders to enable or disable the Alerting functions of ITWP.</p> <p>The tool allows each of the following alert categories to be enabled or disabled independently:</p> <ul style="list-style-type: none">• Alert Probing• Runway Monitoring and Conflict Alerts (RMCA)• Conflicting Clearances for the RWY Controller (CATC RWY)• Conflicting Clearances for the GND Controller (CATC GND)• Conformance Monitoring Alerts (CMAC) <p>Items selected by default is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Toolbox Window.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>



4.8.1.3.1 Alerts Tool – CMAC Alert Parameters

HMI Object	
ALERTS TOOL – CMAC Alert Parameters	
Objective	To configure and modify the Conformance Monitoring (CMAC) Alerting Parameters.
General Description	<p>The CMAC Alert Parameters Tool consists of 4 sub-menus that group different alerting parameters available in the Airport environment.</p> <p>The CMAC Alert Parameters Tool consists of 4 sub-menus with text labels and modifiable value fields to modify the values of the triggering conditions of certain Conformance Monitoring Alerts of ITWP.</p> <p>The tool allows the modification of the parameters of the following CMAC alerts:</p> <ul style="list-style-type: none"> • No Landing Clearance Alert (NO LND CLR) • No Contact Alert (NO CONTACT) • Stationary Alert (STATIONARY) • Transfer Alert (TRANSFER?) <p>Default values for each parameter is subject to local configuration and requirements.</p>

	<p>Modified values that are not yet applied or saved are presented on a light green background.</p> <p>The Reset button allows reverting to a not yet applied or saved previous value of modified fields</p> <p>The Apply button allows to validate the newly entered values</p> <p>The Save button allows to replace the default values with the newly entered values.</p>
Invocation	<p>Available as an option of the Alerts Tool Window by selecting the  next to the CMAC slider.</p>
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>

Illustration

Alerts CMAC

Alert Parameters

NO LND CLR

Approach Distance GBAS CAT1 (Nm)	<input type="text" value="0.6"/>
Approach Distance GBAS CAT3 (Nm)	<input type="text" value="0.6"/>
Approach Distance ILS CAT1 (Nm)	<input type="text" value="0.6"/>
Approach Distance ILS CAT3 (Nm)	<input type="text" value="2.0"/>
Approach Distance VIS CAT1 (Nm)	<input type="text" value="0.6"/>
Approach Distance VIS CAT3 (Nm)	<input type="text" value="2.0"/>

NO CONTACT

No Contact Limit (seconds)	<input type="text" value="120"/>
----------------------------	----------------------------------

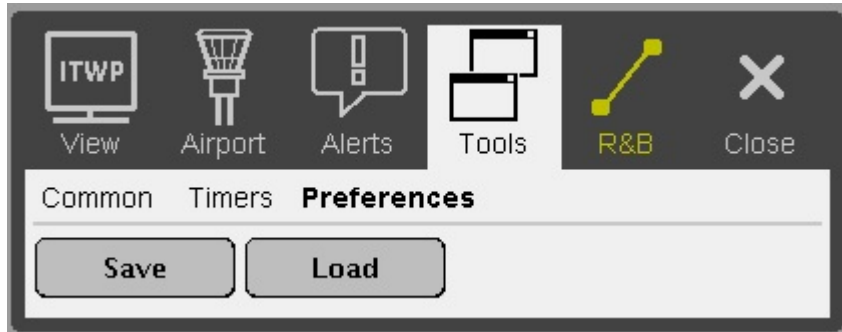
STATIONARY

First Taxi Stationary Time (seconds)	<input type="text" value="85"/>
Taxi Stationary Time (seconds)	<input type="text" value="91"/>
Pushback Taxi Stationary Time (seconds)	<input type="text" value="91"/>
Cross Stationary Time (seconds)	<input type="text" value="91"/>
Runway Stationary Time (seconds)	<input type="text" value="16"/>
Line-up Stationary Time (seconds)	<input type="text" value="120"/>

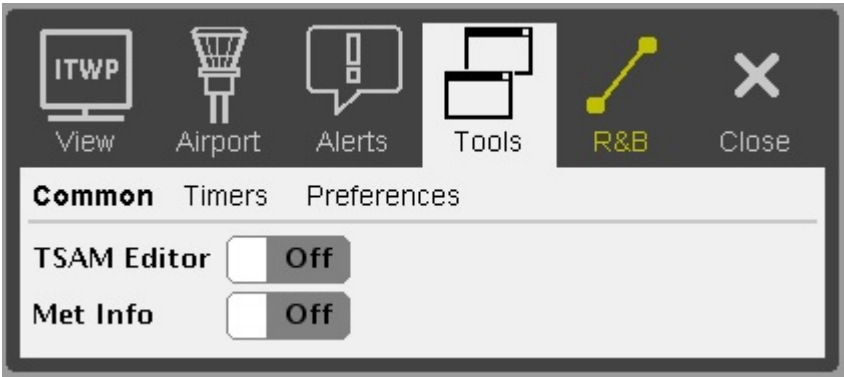
TRANSFER?

Transfer Delay Time (seconds)	<input type="text" value="180"/>
-------------------------------	----------------------------------

4.8.1.4 Tools Tool

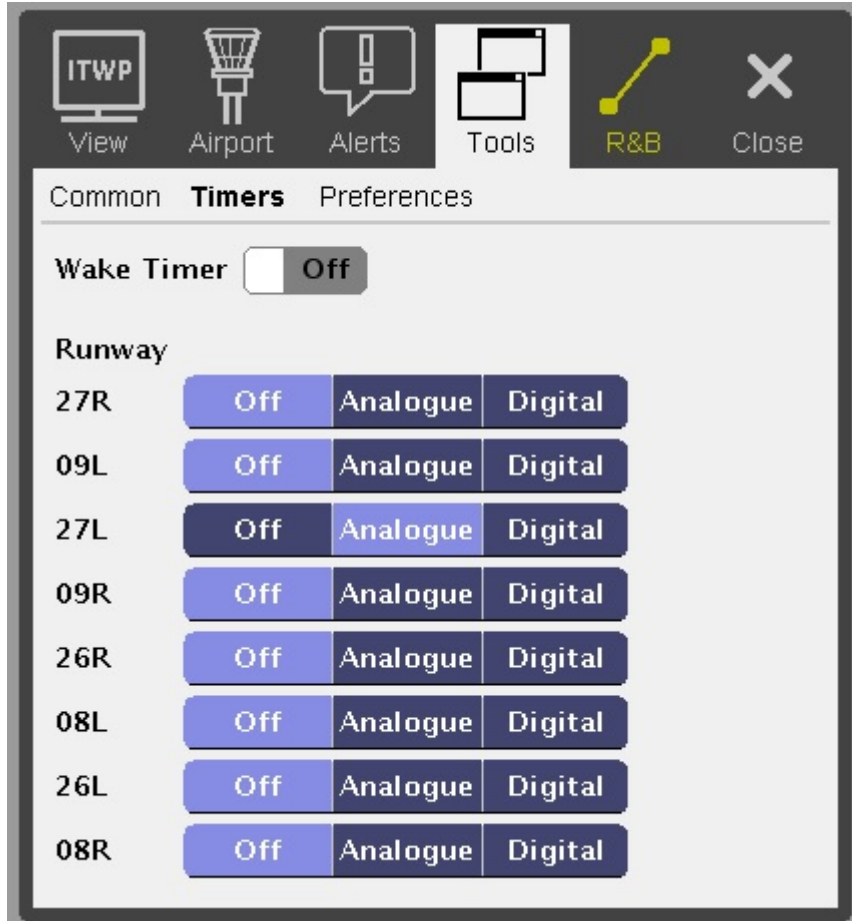
HMI Object	
TOOLS TOOL	
Objective	To group together additional tools available in ITWP, to enable or disable the display of Wake Vortex timers for departures and to save and load predefined Working Position configurations.
General Description	<p>The Tools Tool consists of sub-menus that group different functionalities available in ITWP. It allows to set up the operational airport environment as well as the way the Working Position is configured. The three sub-menus available are:</p> <ul style="list-style-type: none"> • Common • Timers • Preferences <p>Each sub-menu has text labels and associated check-boxes which allows the named element to be altered (e.g.: shown or hidden, activated or de-activated).</p> <p>Items selected by default is subject to local configuration and requirements.</p> <p>The precise list of items available for display is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Toolbox Window.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the ITWP View Tool.</p>
Illustration	

4.8.1.4.1 Tools – Common

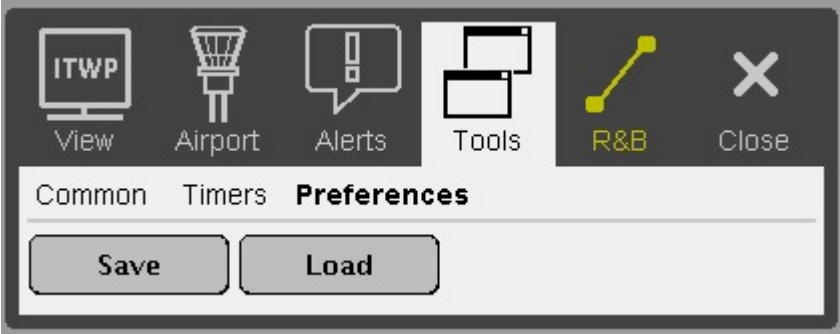
HMI Object	
TOOLS – COMMON	
Objective	To allow access to the Traffic Sample (TSAM) Editor and to hide or display the Meteo Information window on the Working Position.
General Description	<p>The Common Tool consists of a list area with text labels and sliders for the selection of specific ITWP functionalities</p> <ul style="list-style-type: none"> • TSAM Editor: Slider to Open and Close the Traffic Sample Editor to edit the traffic sample • Met Info: Slider to select/de-select the display of the Meteo Window on the Working Position.
Invocation	Available as an option of the Tools Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>
Illustration	

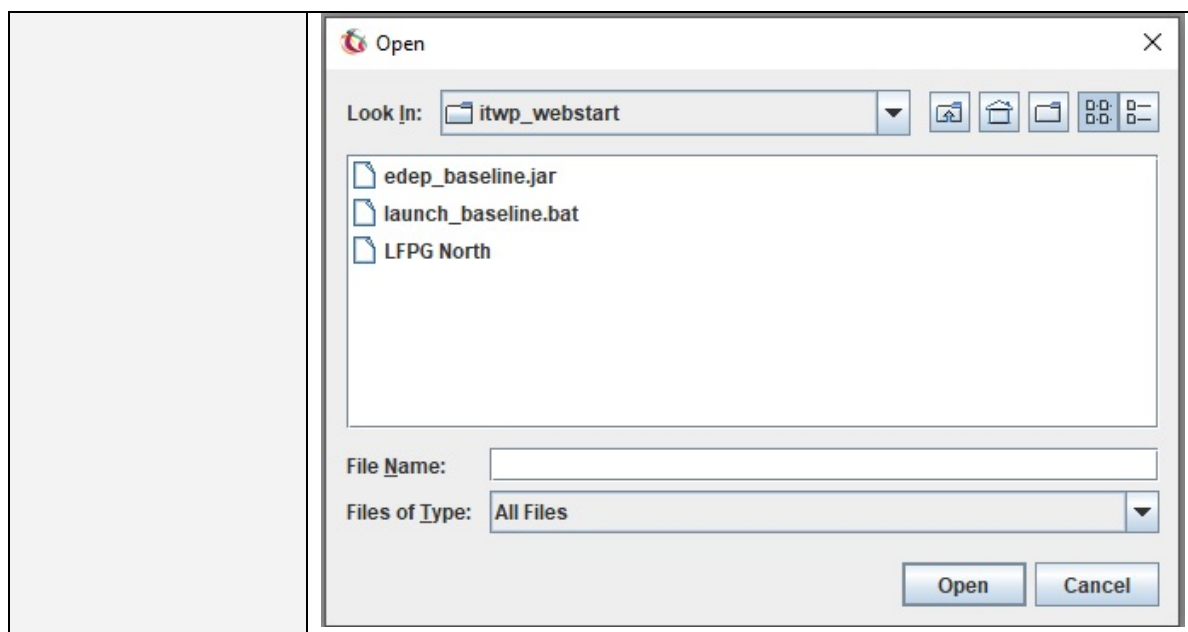
4.8.1.4.2 Tools – Timers

HMI Object	
TOOLS – TIMERS	
Objective	To allow the selection and display of the Wake Vortex separation timers for departures on the Working Position.
General Description	The Timers tool consists of 2 sub-menus to manage the Wake Vortex separation for departures on the Working Position

	<ul style="list-style-type: none"> • Wake Timer: Slider to select/de-select the display of the Manual Wake Vortex Timer for departures on the Working Position. • Runway: List all available runways in the Airport environment and allows the selection of the Automatic Wake Vortex Timer for departures for each runway via three toggle buttons. <p>The Automatic Wake Vortex Timer can be either in Analogue or Digital format.</p> <p>Items selected by default is subject to local configuration and requirements.</p> <p>The precise list of items available for display is subject to local configuration and requirements.</p>
Invocation	Available as an option of the Tools Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>
Illustration	 <p>The screenshot shows the 'Airport' tool interface. At the top, there are icons for ITWP, Airport, Alerts, Tools, R&B, and Close. Below these is a tabbed interface with 'Common', 'Timers', and 'Preferences'. The 'Timers' tab is active, showing a 'Wake Timer' slider set to 'Off'. Below this is a 'Runway' section with a list of runways: 27R, 09L, 27L, 09R, 26R, 08L, 26L, and 08R. Each runway has three toggle buttons: 'Off' (highlighted in blue), 'Analogue', and 'Digital'.</p>


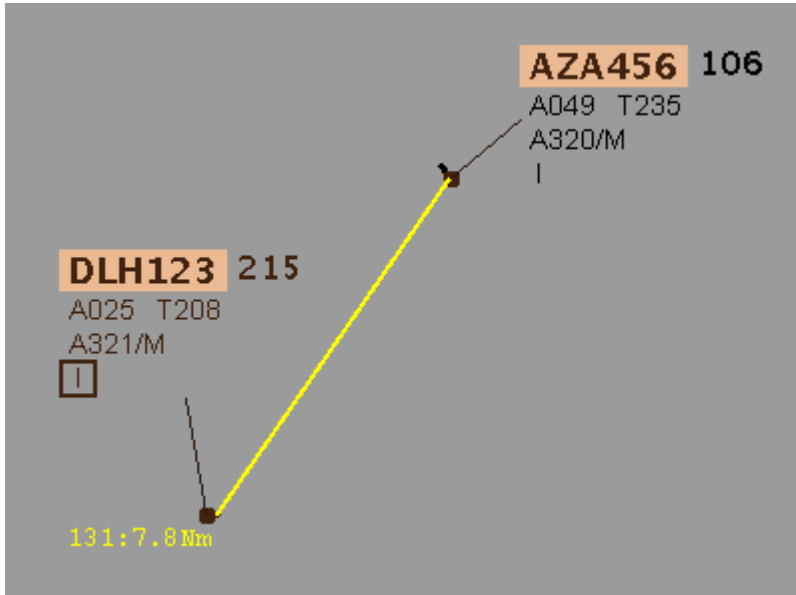
4.8.1.4.3 Tools – Preferences

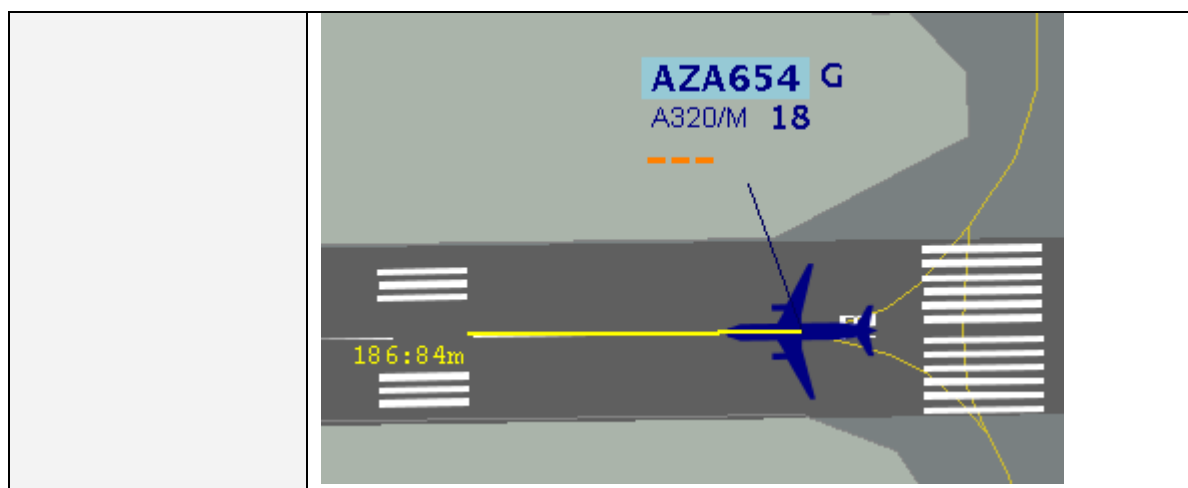
HMI Object	
TOOLS – PREFERENCES	
Objective	To save and restore a preferred screen set-up.
General Description	<p>The Preferences Setting tool allows the user to save the physical layout of the Working Position and to re-load those settings when required.</p> <p>A single left mouse click on Save will open a file name list folder to either create and save a screen set-up or to replace an existing screen set-up for the Working Position.</p> <p>A single left mouse click on Load will open a file name list folder to select a previously saved screen set-up to load on the Working Position.</p>
Invocation	Available as an option of the Tools Tool.
Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>
Illustration	



4.8.1.5 Range and Bearing (R&B) Tool


HMI Object	
RANGE AND BEARING TOOL	
Objective	<p>To provide readout of bearing and distance as measured from one point to another.</p> <p>To link two points, one or both of which can be dynamic (an aircraft and a fixed point, or two aircraft), and to monitor the change in relative heading, distance and time over time.</p>
General Description	<p>Allows the user to select a starting point (e.g. an aircraft, vehicle or a point) and displays a line between that point and the current cursor position with the range and bearing being displayed at the destination point.</p> <p>This elastic vector can be attached between 2 airborne arrivals which shall be maintained independently of the cursor.</p> <p>The tool is closed by right clicking the mouse (assuming that the second link is not attached to a mobile) or by right clicking on the range and bearing text between text.</p> <p>The range is displayed in nautical miles when the starting point of the elastic vector is attached to an airborne aircraft, otherwise the range is displayed in metres.</p>
Invocation	Available as an option in the Toolbox Window.

Display Position	<p>By default, in the top left of the working position after the Toolbox Icon has been selected with the ability to be re-positioned by the user.</p> <p>Last position and selected Tool are memorized when re-opening the Airport Tool.</p>
Illustration	<p>a) Select Range and Bearing tool</p>  <p>b) Range and Bearing 'elastic vector' attached between two airborne arrival aircraft, note that the range is displayed in nautical miles.</p>  <p>c) Range and Bearing 'elastic vector' attached to departure aircraft (on the ground), note that the range is displayed in metres.</p>









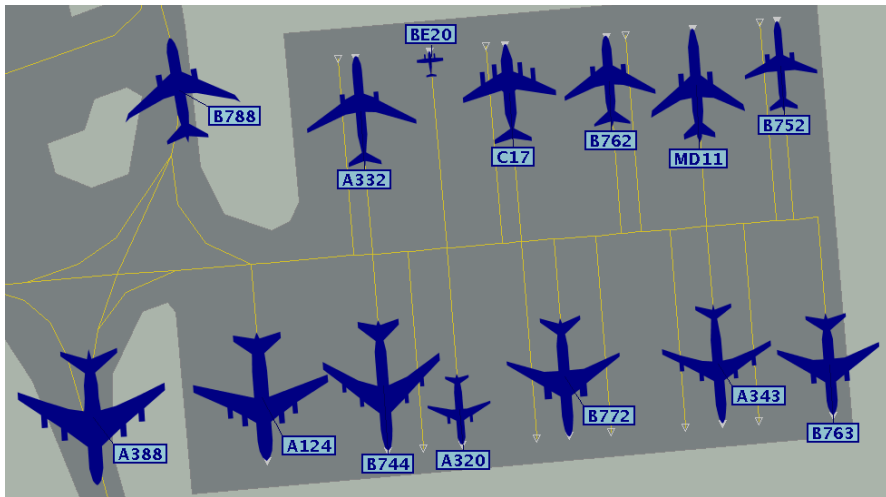
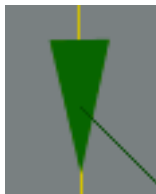

4.8.2 Miscellaneous Tools

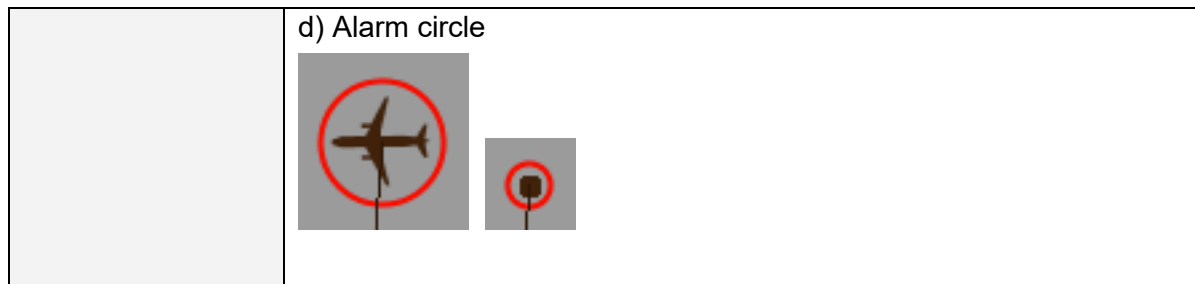
4.8.2.1 Clock Window

HMI Object	
CLOCK WINDOW	
Objective	To display the time (UTC).
General Description	The Clock displays the UTC time.
Invocation	System generated.
Display Position	By default, the clock tool is displayed in the top-right corner of the CSD Window; then can be moved anywhere on the CSD Window by left clicking and drag.
Illustration	

4.9 Radar Track Symbol

HMI Object	
RADAR TRACK SYMBOL	
Objective	To provide graphical representation of traffic position.
General Description	<p>The radar track symbol has the following features:</p> <p>a) Aircraft or vehicle symbol:</p> <p>The aircraft symbol indicates the aircraft type and, where available, uses a symbol shape that resembles that type. If the specific aircraft shape is not available, then a default shape of the appropriate wake turbulence category is used. Available symbols are as follows (see illustrations a and b):</p> <ul style="list-style-type: none"> • Light: BE20 • Medium: A320 • Heavy: B788, A332, C17, B762, MD11, B752, A124, B744, B772, A343, or B763 • Super Heavy: A388 • Vehicles: Triangle <p>The size of the symbol is scaled to match the length and width information associated with the aircraft type.</p> <p>Zooming the map changes the size of the symbol. When zooming out, if the symbol becomes too small it is replaced with a simple dot. Zooming in again will replace the dot with the original symbol.</p> <p>The orientation of the symbol indicates the direction of movement for the aircraft, except when pushing back where the orientation is reversed.</p> <p>b) Track History</p> <p>While airborne, track symbols show a set of 0-6 trail dots of equal size which indicate the position of the track from previous radar updates (see illustration c).</p> <p>c) Colours</p> <p>The symbol is coloured to indicate the type it represents as follows:</p> <ul style="list-style-type: none"> • Arrival Normal – Brown (RGB 64, 34, 10 ) • Arrival Highlighted – Brown (RGB 91, 49, 13 ) • Departure Normal – Blue (RGB 0, 0, 137 ) • Departure Highlighted – Blue (RGB 0, 0, 194 ) • Vehicle / Tug Normal – Green (RGB 7, 101, 0 ) • Vehicle / Tug Highlighted – Green (RGB 14, 143, 0 )

	<p>d) Alarm Circle</p> <p>When an alarm is active for the track symbol a red circle is displayed around the symbol (see illustration d). The circle is removed when the alarm is cleared.</p> <p>e) Mouse Interaction</p> <p>Left-click on the radar track symbol to open the route editor.</p> <p>Right-click on the symbol to toggle the current route display. Route will be displayed until toggled off from the symbol.</p>
Invocation	Displayed when the traffic is present on the situation display.
Display Position	At traffic co-ordinates provided by the Surveillance System.
Illustration	<p>a) Aircraft type symbols</p>  <p>b) Vehicle symbol</p>  <p>c) Trail history</p> 






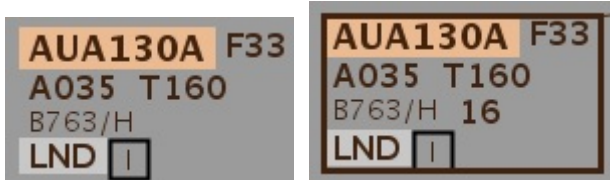

4.10 Radar Label

HMI Object	
RADAR LABEL	
Objective	<p>To provide the minimum flight information needed by the controller, directly attached to the radar track symbol of any traffic present on the situation display. The information provided includes:</p> <ul style="list-style-type: none"> • Traffic information. • Planning state. • Indication of the necessity of controller action. <p>To provide the ability to easily access additional information concerning the aircraft on controller request.</p>
General Description	<p>The radar label is composed of a block of aircraft data (label) connected to the associated radar track symbol (leader line).</p> <p>a) Leader line</p> <p>The leader line is a 1 pixel thick solid line connecting the centre of the radar track symbol to the label. The leader line connects to the label at one of the corners or the mid-point of one of the sides as appropriate to the label position.</p> <p>The radar label movement is restricted to a maximum of 450px from the radar track symbol.</p> <p>b) Standard label contents</p> <p>The radar label shows the minimum required information by default, and shows more information when highlighted. The contents of the radar label are different for arrivals and departures. The radar label content is the same for all controlled states of the associated radar track except the Assumed-Out state</p> <p>The contents of the radar track labels can be changed by using the LABEL tool (§3.8.1.6). The default label contents can be changed in the local configuration.</p> <p>c) Arrival label contents.</p> <p>See illustrations a-e.</p> <p>Airborne normal label contents:</p> <ul style="list-style-type: none"> • Line 0: Callsign, Stand • Line 1: Altitude, Ground Speed • Line 2: Aircraft Type / Wake Turbulence Category (WTC) • Line 3: Next Logical Clearance , Approach type






	<p>Airborne and highlighted, the label adds the following to the normal contents:</p> <ul style="list-style-type: none"> Line 2: Aircraft Type / WTC, Runway <p>After landing, the normal label contents change to:</p> <ul style="list-style-type: none"> Line 0: Callsign, Gate Line 1: Aircraft Type / WTC, Planned Rwy exit Line 2: Next Logical Clearance <p>After landing and while highlighted, the label adds the following to the normal contents:</p> <ul style="list-style-type: none"> Line 1: Aircraft Type / WTC, Runway, Planned Rwy Exit <p>The controller has the option from the control menu to add a mark button to the label. When selected, the mark button is in the following location:</p> <ul style="list-style-type: none"> Line 0: Callsign, Mark Button, Stand <p>d) Departure label contents</p> <p>See illustrations f-i.</p> <p>Normal contents before pushback:</p> <ul style="list-style-type: none"> Line 0: Callsign, Stand, Runway Holding Point Line 1: Aircraft Type / WTC, Runway Line 2: Next Logical Clearance <p>When highlighted, the label adds the following to the normal contents:</p> <ul style="list-style-type: none"> Line 1: Aircraft Type / WTC, Runway, SID <p>After pushback, the stand is removed from the label in Line 0 and the current clearance is added in Line 2:</p> <ul style="list-style-type: none"> Line 0: Callsign, Runway Holding Point Line 1: Aircraft Type /WTC, Runway Line 2: Current Clearance, Next Logical Clearance <p>The controller has the option from the control menu to add a mark button to the label. When selected, the mark button is in the following location:</p>
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	<ul style="list-style-type: none"> Line 0: Callsign, Mark Button, Stand (as appropriate), Runway Holding Point <p>e) Colours for radar track states</p> <p>See illustrations a-e for arrival state colours, and f-i for departure state colours.</p> <p>The colour of the callsign and colour of the rest of the label text changes depending on the controlled state of the radar track. The states and their respective colours are:</p> <ul style="list-style-type: none"> Not concerned: Callsign and label text is grey. Pending: Callsign text colour is the arrival or departure colour as appropriate, label text is black. Pending-In: Callsign text colour is the arrival or departure colour as appropriate, callsign background is white, label text colour is black. Assumed: Callsign and label text colour is the arrival or departure colour as appropriate, callsign background is a lighter shade of the callsign colour. Assumed-Out: Callsign text colour is the arrival or departure colour as appropriate, label text is grey. <p>f) Temporary label contents</p> <p>Other information is sometimes added to the label, adding up to 2 additional lines at the top of the radar track label display:</p> <ul style="list-style-type: none"> Alert message (see illustration j) Warning message (see illustration k) Clearance indicators (see illustration l) Conditional order details (see illustration m) <p>g) Label fields description</p> <ul style="list-style-type: none"> Callsign: up to 7 characters (ref. doc. ICAO 4444), e.g. BAW429. Mark Button: green square with black and white shadow effect, used to help distinguish flights of interest for easy location on screen. Stand: stand identification, e.g. 67, F32L, G142. Runway Holding point: the planned runway holding point assigned to the departure.
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	<ul style="list-style-type: none"> • Altitude: altitude format is 'Annn' ('A' for altitude, nnn in feet/100); e.g. A070 stands for an altitude of 7000 (070x100) feet. • Ground Speed: The ground speed in knots. • Aircraft type: 2 up to 4 characters. • Wake Turbulence category – may be ICAO classification, or RECAT EU classification: <ul style="list-style-type: none"> ○ ICAO - 'J', 'H', 'M', 'L' ○ RECAT EU – 'S', 'G', 'H', 'K', 'M', 'L' • Runway: runway field, e.g. 01L, 19R, 26, 08 etc. • Standard Instrumented Departure (SID): the name of the route away from the airport to be flown on take-off. • Approach type: the type of approach being flown by the flight. Instrumented (I), GBAS (G) or Visual (V). <p>h) Label Field Behaviours</p> <p>Many of the buttons in the radar track label have specific behaviours, either showing additional information to the controller or supporting interaction via the mouse.</p> <ul style="list-style-type: none"> • Callsign button: <ul style="list-style-type: none"> ○ Left click to open the Clearances Menu. ○ Right click to toggle the Extended Label Window display. ○ White background indicates track is in the pending-in transfer state. ○ Yellow background indicates track has an active warning message. ○ Red background indicates track has an active alarm message. • Stand button: <ul style="list-style-type: none"> ○ Left click to open the Stand Menu. ○ Yellow background indicates that the chosen stand is already occupied by another aircraft. • Runway button: <ul style="list-style-type: none"> ○ Left click to open the Runway Menu. ○ Yellow background indicates current route doesn't reach the assigned runway. • Holding point button: <ul style="list-style-type: none"> ○ Left-click to open the holding point menu. • Approach type button: <ul style="list-style-type: none"> ○ Left-click to open the Approach type menu.
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	<ul style="list-style-type: none"> Mark Button: <ul style="list-style-type: none"> Left-click to remove the mark button.
Invocation	System generated.
Display Position	Attached to the radar track symbol with the leader line.
Illustrations (default settings)	<p>a) Arrival label – Not Concerned – normal and selected.</p>  <p>b) Arrival label – Pending – normal and selected.</p>  <p>c) Arrival label – Pending-In – normal and selected.</p>  <p>d) Arrival label - Assumed – normal and selected.</p>  <p>e) Arrival label – Assumed-Out – normal and selected.</p>  <p>f) Departure label – Not Concerned – normal and selected.</p>




	<div>SWR1579 F04 B1 A319/M 16</div> <div>SWR1579 F04 B1 A319/M 16 LUGEM2B</div>
	g) Departure label - Pending – normal and selected.
	<div>SWR1579 F04 B1 A319/M 16</div> <div>SWR1579 F04 B1 A319/M 16 LUGEM2B</div>
	h) Departure label – Pending In – normal and selected.
	<div>SWR1579 F04 B1 A319/M 16 PSH</div> <div>SWR1579 F04 B1 A319/M 16 LUGEM2B PSH</div>
	i) Departure label - Assumed – normal and selected.
	<div>SWR1579 F04 B1 A319/M 16 PSH</div> <div>SWR1579 F04 B1 A319/M 16 LUGEM2B PSH</div>
	j) Alarm label entry.
	<div>NO LND CLR AUA130A F33 A010 T154 B763/H LND 1</div>
	k) Information alert label entry.
	<div>NO PUSH CLR WZZ1PA H44 B1 A320/M 16 PSH</div>
	l) Controller clearance level indicators – Push Back, Taxi, Line-up, Take-off clearance, Landing clearance respectively.
	<div>SWR1579 F04 B1 A319/M 16 PB TX</div> <div>SWR1579 B1 A319/M 16 TX 119.400</div>





		
		
	m) Conditional line-up clearance indication.	
		
	n) Mark button.	
		

4.11 Vehicle Radar Label

HMI Object	
VEHICLE RADAR LABEL	
Objective	<p>To provide the minimum vehicle information needed by the controller, directly attached to the radar track symbol for any vehicle present on the situation display. The information provided includes:</p> <ul style="list-style-type: none"> • Traffic information. • Planning state. • Indication of the necessity of controller action. <p>To provide the ability to easily access additional information concerning the vehicle on controller request.</p>
General Description	<p>The vehicle radar label is composed of a block of vehicle data (label) connected to the associated radar track symbol (leader line).</p> <p>a) Leader line</p> <p>The Leader line is a 1 pixel thick solid line connecting the centre of the radar track symbol to the label. The leader line connects to the label at one of the corners or the mid-point of one of the sides as appropriate to the label position.</p> <p>The radar label movement is restricted to a maximum of 450px from the radar track symbol.</p> <p>b) Standard label contents</p> <p>The vehicle radar label shows the minimum required information by default, and shows more information when highlighted. The content of the label is different depending on the controlled state for the vehicle.</p> <p>The contents of the vehicle radar label can be changed by using the LABEL tool (§3.8.1.6). The default label contents can be changed in the local configuration.</p> <p>c) Not Concerned label contents</p> <p>See illustration a.</p> <p>When the vehicle is not Assumed by any controller position, the default label display is as follows:</p> <ul style="list-style-type: none"> • Line 0: Vehicle Callsign <p>While not Assumed by any position and highlighted, the label display is as follows:</p>

	<ul style="list-style-type: none"> • Line 0: Vehicle Callsign • Line 1: Origin and destination gates. <p>The controller has the option from the control menu to add a mark button to the label. When selected, the mark button is in the following location (see illustration b):</p> <ul style="list-style-type: none"> • Line 0: Vehicle Callsign, Mark Button <p>d) Assumed, Assumed-Out, Not Concerned label contents See illustration c.</p> <p>While the subject vehicle is Assumed by any controller position, the default label contents for these controlled states are as follows:</p> <ul style="list-style-type: none"> • Line 0: Vehicle Callsign, Controlling Position <p>While Assumed by any position and highlighted, the label display is as follows:</p> <ul style="list-style-type: none"> • Line 0: Vehicle Callsign, Controlling Position • Line 1: Origin and destination gates. <p>When vehicle has Cross clearance, an additional line is added to the bottom of both normal and highlighted labels (see illustration e):</p> <ul style="list-style-type: none"> • Line 1 or 2: Cross clearance <p>The controller has the option from the control menu to add a mark button to the label. When highlighted, the mark button is in the following location (see illustration d):</p> <ul style="list-style-type: none"> • Line 0: Vehicle Callsign, Mark Button, Controlling Position <p>e) Colours for vehicle track states.</p> <p>The colour of the vehicle callsign and the colour of the rest of the label text changes depending on the controlled state of the vehicle track. The states and their respective colours are:</p> <ul style="list-style-type: none"> • Not concerned: Callsign and label text is grey (see illustration a). • Assumed: Callsign and label text colour is the vehicle colour, callsign background is a lighter shade of the callsign colour (see illustration c). • Assumed-Out: Callsign text colour is the vehicle colour, label text is grey (see illustration f).
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	<ul style="list-style-type: none"> Pending-In: Callsign text colour is the vehicle colour, callsign background is white, label text colour is black (see illustration g). <p>g) Label field descriptions</p> <ul style="list-style-type: none"> Callsign: up to 7 characters, e.g. FIRE3. Mark button: green square with black and white shadow effect, used to help distinguish flights of interest for easy location on screen. Controlling position: indicates the position currently controlling the vehicle – RWY or GND Origin and destination stands: origin stand and destination stand in the following format – “<origin>-<destination>” <p>h) Label field behaviours.</p> <ul style="list-style-type: none"> Callsign button: <ul style="list-style-type: none"> Left click to open the Clearances Menu. Controlling position button: <ul style="list-style-type: none"> Left click to open Transfer menu. Mark Button: <ul style="list-style-type: none"> Left click to remove the mark button.
Invocation	System generated.
Display Position	Attached to the radar track symbol with the leader line.
Illustrations (default settings)	<p>a) Not Assumed – normal and selected:</p>  <p>b) Not Assumed – mark button:</p>  <p>c) Assumed – normal and selected:</p>  <p>d) Assumed – mark button:</p>








	
	e) Cross clearance: 
	f) Assumed-Out: 
	g) Pending-In: 





4.12 Towed Aircraft Radar Label

HMI Object	
TOWED AIRCRAFT RADAR LABEL	
Objective	<p>To provide the minimum towed aircraft information needed by the controller, directly attached to the radar track symbol for any towed aircraft present on the situation display. The information provided includes:</p> <ul style="list-style-type: none"> • Traffic information. • Planning state. • Indication of the necessity of controller's action. <p>To provide the ability to easily access additional information concerning the towed aircraft on controller request.</p>
General Description	<p>The towed aircraft radar label is composed of a block of towed aircraft data (label) connected to the associated radar track symbol (leader line).</p> <p>a) Leader line</p> <p>The Leader line is a 1 pixel thick solid line connecting the centre of the radar track symbol to the label. The leader line connects to the label at one of the corners or the mid-point of one of the sides as appropriate to the label position.</p> <p>The radar label movement is restricted to a maximum of 450px from the radar track symbol.</p> <p>b) Standard label contents</p> <p>The towed aircraft radar label shows the minimum required information by default, and shows more information when highlighted. The content of the label is different depending on the controlled state for the vehicle.</p> <p>The contents of the vehicle radar label can be changed by using the LABEL tool. The default label contents can be changed in the local configuration.</p> <p>c) Not Concerned label contents</p> <p>See illustration a.</p> <p>This section describes the label contents when no position is controlling the towed aircraft.</p> <p>When the towed aircraft is not Assumed the default label display is as follows:</p>

	<ul style="list-style-type: none"> Line 0: Vehicle Callsign <p>While not Assumed and highlighted, the label display is as follows:</p> <ul style="list-style-type: none"> Line 0: Vehicle Callsign Line 1: Aircraft Type / Wake Turbulence Category, Origin and destination gates. <p>The controller has the option from the control menu to add a mark button to the label. When selected, the mark button is in the following location (see illustration g):</p> <ul style="list-style-type: none"> Line 0: Vehicle Callsign, Mark Button <p>d) Assumed label content. See illustrations b-f.</p> <p>This section describes the label contents after one position has taken control of the aircraft. The label content is the same regardless of the controlled state on that specific position.</p> <p>When the towed aircraft is not Assumed the default label display is as follows:</p> <ul style="list-style-type: none"> Line 0: Vehicle Callsign, Controlling Position <p>While Assumed by any position and highlighted, the label display is as follows:</p> <ul style="list-style-type: none"> Line 0: Vehicle Callsign, Controlling Position Line 1: Aircraft Type / Wake Turbulence Category, Origin and destination gates. <p>When the towed aircraft has Cross clearance, an additional line is added to the bottom of both normal and highlighted labels (see illustration i):</p> <ul style="list-style-type: none"> Line 1 or 2: Cross clearance <p>The controller has the option from the control menu to add a mark button to the label. When highlighted, the mark button is in the following location (see illustration h):</p> <ul style="list-style-type: none"> Line 0: Vehicle Callsign, Mark Button, Controlling Position <p>e) Colours for towed aircraft track states.</p>
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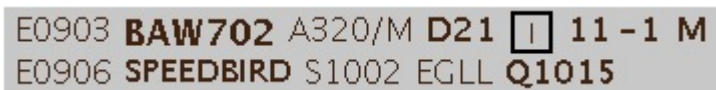
	<p>The colour of the vehicle callsign and the colour of the rest of the label text changes depending on the controlled state of the towed aircraft track. The states and their respective colours are:</p> <ul style="list-style-type: none"> • Not concerned: Callsign and label text is grey (see illustration a-b). • Assumed: Callsign and label text colour is the vehicle colour, callsign background is a lighter shade of the callsign colour (see illustration c). • Assumed-Out: Callsign text colour is the colour, label text is grey (see illustration d). • Pending: Callsign text colour is the vehicle colour, label text colour is black (see illustration e). • Pending-In: Callsign text colour is the vehicle colour as appropriate, callsign background is white, label text colour is black (see illustration f). <p>g) Label field descriptions</p> <ul style="list-style-type: none"> • Callsign: up to 7 characters, e.g. TOW1. • Mark button: green square with black and white shadow effect, used to help distinguish flights of interest for easy location on screen. • Controlling position: indicates the position currently controlling the towed aircraft – RWY or GND • Aircraft type: 2 up to 4 characters. • Wake turbulence category – may be ICAO classification, or RECAT EU classification: <ul style="list-style-type: none"> ○ ICAO - 'J', 'H', 'M', 'L' ○ RECAT EU – 'S', 'G', 'H', 'K', 'M', 'L' • Origin and destination stands: origin stand and destination stand in the following format – “<origin>-<destination>” <p>h) Label field behaviours.</p> <ul style="list-style-type: none"> • Callsign button: <ul style="list-style-type: none"> ○ Left click to open the Clearances Menu. • Controlling position button: <ul style="list-style-type: none"> ○ Left click to open Transfer menu. • Mark Button: <ul style="list-style-type: none"> ○ Left click to remove the mark button.
Invocation	System generated.

Display Position	Attached to the radar track symbol with the leader line.
Illustrations (default settings)	<p>a) Not Assumed by any position – normal and highlighted:</p>  <p>b) Not Concerned – normal and highlighted:</p>  <p>c) Assumed – normal and highlighted:</p>  <p>d) Assumed-Out – normal and highlighted:</p>  <p>e) Pending – normal and highlighted:</p>  <p>f) Pending-In – normal and highlighted:</p>  <p>g) Not Concerned and not assumed on any position – mark button:</p>  <p>h) Assumed – mark button:</p>

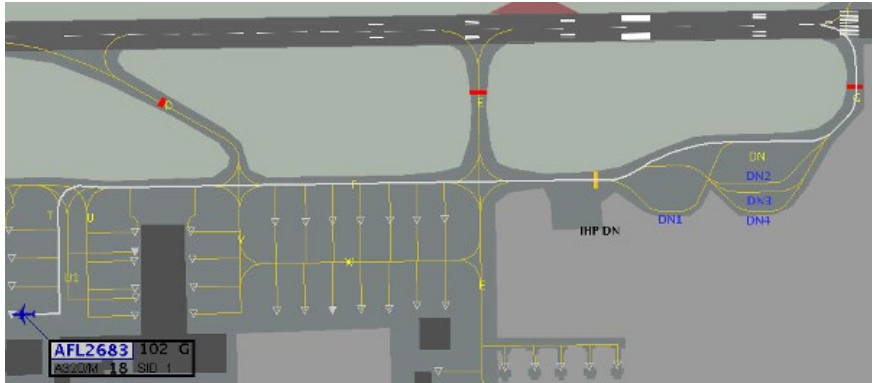
	 
	<p>i) Cross clearance – normal and highlighted:</p>  

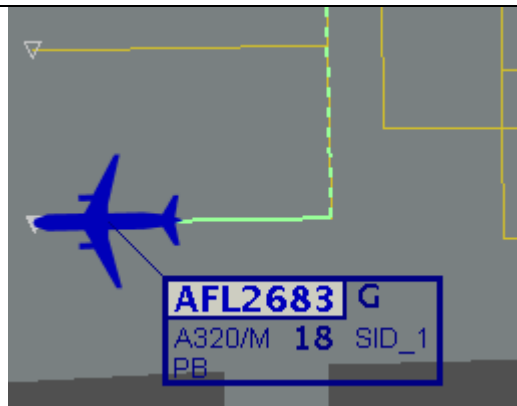
4.13 Extended Radar Label Window

HMI Object	
EXTENDED RADAR LABEL	
Objective	To provide, in a fixed format, additional information relating to an aircraft.
General Description	<p>The Extended Radar Label Window displays additional information about a flight. The following fields are displayed (left to right, top to bottom):</p> <ul style="list-style-type: none"> • Landing/Take-off time: displays the take-off time for a departure, or the landing time for an arrival, preceded with a character 'E', 'T', or 'A' to indicate estimated, target, or actual times, i.e. the ELDT, ATOT etc. The time format is HHmm e.g. '1350.' • Callsign: This is the callsign of the aircraft. This is interactive, replicating the functionality of the Callsign field in the Radar Label. • Aircraft type and Wake Turbulence Category: shows the aircraft type or vehicle type with the wake turbulence indicator e.g. "A320/M." The WTC indicator may be ICAO or RECAT EU depending on the selection made in the WTC Toolset (§3.8.3.10). • Stand: This is either the starting stand for departure or the destination stand for arrivals. • Runway Holding Point: for departures, this displays the current runway holding point. The field is interactive, displaying the Holding Point Menu (§3.18.7) when selected. • Approach type: displays the approach type that the aircraft is equipped for, and including a border when the flight crew have confirmed their approach. The field displays 'V' for Visual approach, 'I' for Instrument approach or 'G' for GBAS approach. The field is interactive, displaying the Approach Type Menu (§3.18.8) when selected. • Runway: This is either the take-off runway for a departure, the landing runway for an arrival. The field is interactive, displaying the Runway Menu (§3.18.4) when selected. • Sequence Number: If sequence number is available, then it is displayed here. If not available, then the field will default to -1. • Mark: Allows the controller to 'mark' the flight (i.e. show a green square in the label highlighting the flight.) This button displays 'M' when the mobile is not marked and 'UM' when it is marked. When it is UM, the button will have a green

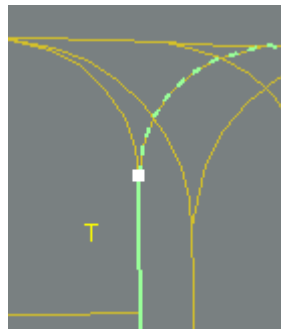
	<p>background when the mouse cursor is within the Extended Label Window.</p> <ul style="list-style-type: none"> • In-block/Off-block time: displays the In-Block time for arrivals, or the Off-Block time for departures, preceded with a character 'E', 'T', or 'A', indicating estimated, target, or actual times. The time format is HHmm e.g. '1350.' • Airline: displays the R/T callsign, or blank/UNKNOWN if none has been defined in the flight plan. • SSR: displays the SSR code prefixed with an 'S' e.g. 'S1357' • Airport: displays the ICAO airport designator of the departure airport if it is an arrival or for the destination airport if it is a departure. • QNH: displays the barometric pressure (in hectopascal) adjusted to sea level, prefixed with the letter 'Q' e.g. 'Q1015.'
Invocation	<p>Displayed when the Controller right mouse button clicks the callsign button, and then dismissed by a right click anywhere within the Extended Label Window.</p> <p>A preview is available using a mouse right-click and hold, this is then dismissed when the mouse button is released.</p>
Display Position	Is displayed immediately above the callsign label that is clicked, and may be dragged anywhere using the left mouse button.
Illustration	 <p>The illustration shows a screenshot of the Extended Label Window. It contains two lines of text. The first line is 'E0903 BAW702 A320/M D21 11-1 M', where 'BAW702' is in bold and '11-1 M' is in a larger font. The second line is 'E0906 SPEEDBIRD S1002 EGLL Q1015', where 'SPEEDBIRD' is in bold and 'Q1015' is in a larger font. A small square icon is visible between the two lines.</p>

4.14 Radar Track Route Display

HMI Object	
RADAR TRACK ROUTE DISPLAY	
Objective	To display the current route planned for the radar track along with the clearance limit state.
General Description	<p>The route display is a simple thin line showing the route from the radar track symbol to the assigned destination. The colour and style of the line indicates the state or clearance of the flight:</p> <ul style="list-style-type: none"> • White line – the PLANNED route, no movement clearance given. • Solid green line – the CLEARED route, i.e. the portion of the route that the mobile has been cleared to travel. • Dashed green line – the PENDING route, i.e. the remaining portion of the route after the current clearance limit. • White square – hold short point indicating the controller has instructed the flight to stop at the specified location.
Invocation	<p>The Radar Track Route Display is temporarily shown when the mouse is moved over the track symbol and when the mouse is over the callsign button (wherever it appears).</p> <p>The display may be toggled on and off with a right mouse click on the track symbol.</p>
Display Position	Shown from the radar track symbol to the radar tracks destination.
Illustrations (default settings)	<p>a) The PLANNED route:</p>  <p>b) The CLEARED route to the pushback position, and PENDING taxi route:</p>



c) "Hold Short" clearance display – CLEARED route up to the 'hold short' point, and PENDING route beyond it:

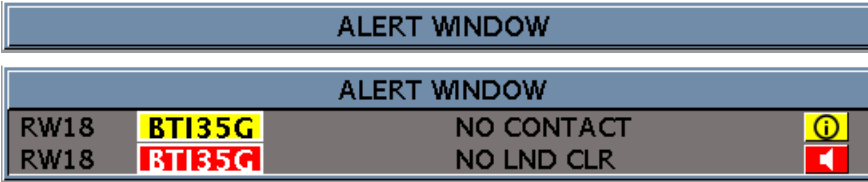


4.15 Airport Safety Net

The Airport Safety Net monitors traffic as it moves around or near the airport and triggers alerts to inform the controller of incursions into protected areas, of traffic not conforming to clearances, and monitors clearances issued to traffic to warn of potential conflicting clearances from being issued (described in §2.8).





The paragraphs in this section describe the HMI elements that display alert conditions to the controller.

4.15.1 Alert Window

HMI Object	
ALERT WINDOW	
Objective	To display details of all active information alerts and alarms to the controller, and to allow individual alerts or alarms to be acknowledged.
General Description	The Alert Window initiates as an empty window, and expands or shrinks when alert/alarm conditions are detected or resolved. A row is displayed for each alert and alarm and the rows are ordered by the time the alert was detected. The fields within each alert row are described in §3.15.2.
Invocation	System Generated
Display Position	Top centre of the CSD Window. This position is fixed.
Illustration	

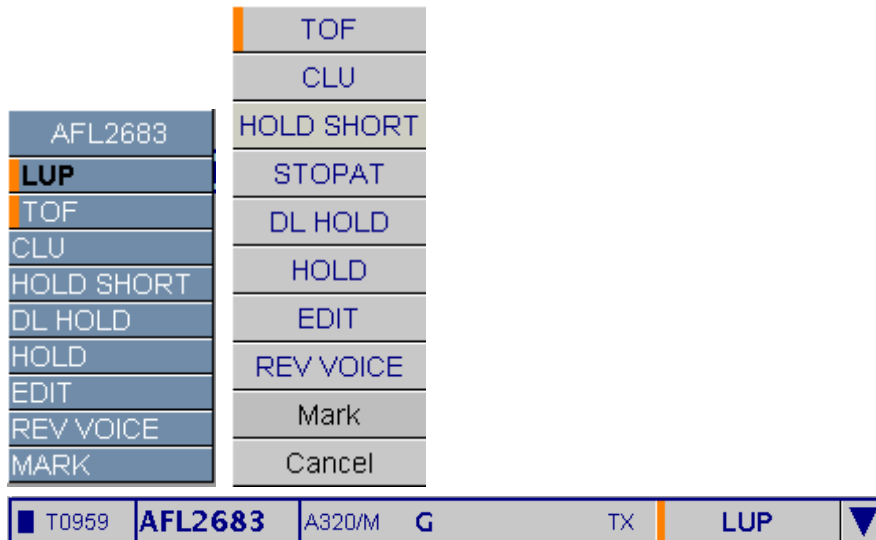
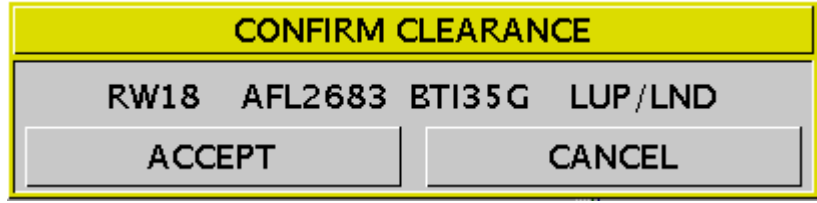
4.15.2 Alert Window Entry

HMI Object	
ALERT WINDOW ENTRY	
Objective	To display details of an active alert or alarm
General Description	<p>Each alert entry (displayed in the Alert Window) may include the following fields:</p> <ul style="list-style-type: none"> Runway: where an alert or alarm is related to a specific runway, the name of the runway is displayed. Callsign: displays the callsign of the primary mobile involved in the alert condition. The background is displayed in red to indicate an alarm state, or yellow to indicate information alert.

	<ul style="list-style-type: none"> Conflicting callsign: for alert conditions that involve multiple mobiles, the secondary (conflicting) callsign is displayed. The background is displayed in red to indicate an alarm state, or yellow to indicate information alert. Alert text: the text associated describing the alert. Alert acknowledgement: displays either a white <i>loudspeaker</i> symbol for alarm alerts or a black <i>information</i> symbol for information alerts. <p>The Alert Acknowledgement mutes the audible alarm (for alarm alerts), or removes the alert indications from the radar label and EFS (for information alerts).</p>
Invocation	System generated.
Display Position	Within the alert window.
Illustration	<p>Alarm alert - no conflicting mobile, or related runway.</p>  <p>Information alert specifying a conflicting callsign and runway.</p>  <p>Informational alert acknowledge buttons:</p>  <p>Alarm alert acknowledge buttons:</p> 


4.15.3 Conflicting Clearance Confirmation

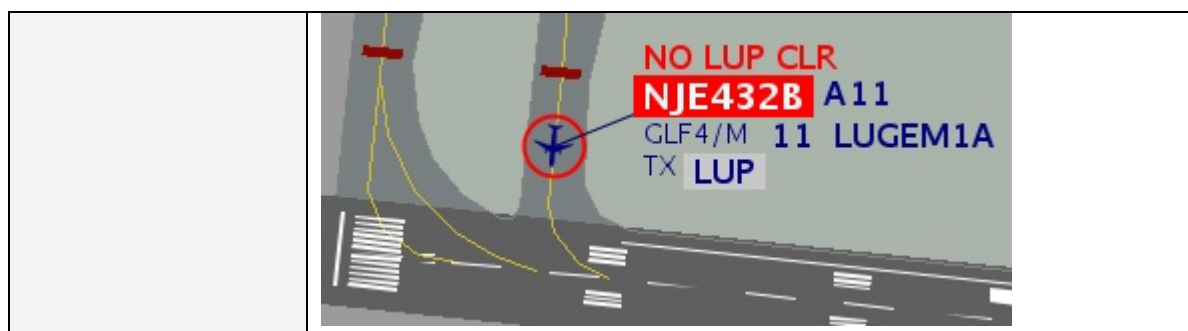
HMI Object	
CONFLICTING CLEARANCE CONFIRMATION	
Objective	To provide an indication to the controller of actions that, if input, would result in a potential conflict of ATC clearances.
General Description	<p>Conflicting ATC Clearances Alerts (CATC) are triggered when two aircraft have clearances that may conflict with each other.</p> <p>The system predicts which clearances, if they were to be issued, would create such a conflict and indicates those to the controller by adding an orange indicator to the HMI elements used to enter those clearances – see illustration a) below.</p> <p>When the controller makes a clearance input that the system predicts will trigger a CATC alert, then a warning dialog is presented that details the potential conflict, and provides options for the</p>

	<p>controller to cancel the input, or to accept the conflict – illustration b) below. Accepting the conflict will override the Airport Safety Net for Conflicting ATC Clearances and prevent the alert from being issued.</p> <p>The warning dialog displays a list of the potential conflicting clearance that would be triggered were the clearance to be input. For each potential alert, the following fields are displayed:</p> <ul style="list-style-type: none"> • The runway associated with the alert (if any). • The callsign. • The conflicting callsign (if any). • The alert text. • Options to Accept or Cancel the input.
Invocation	System generated.
Display Position	<p>An orange 'bar' is displayed on each button that may be used to enter the clearance.</p> <p>The confirmation dialog is displayed in the centre of the CSD.</p>
Illustration	<p>a) CATC warning on clearance buttons</p>  <p>The screenshot shows a list of potential conflicting clearances on the left and a confirmation bar at the bottom. The list includes:</p> <ul style="list-style-type: none"> AFL2683 LUP TOF CLU HOLD SHORT DL HOLD HOLD EDIT REV VOICE MARK <p>The confirmation bar at the bottom displays:</p> <p>T0959 AFL2683 A320/M G TX LUP</p> <p>b) Clearance confirmation dialog</p>  <p>The screenshot shows a yellow header with the text "CONFIRM CLEARANCE". Below the header, the text "RW18 AFL2683 BTI35G LUP/LND" is displayed. At the bottom, there are two buttons: "ACCEPT" and "CANCEL".</p>

	CONFIRM CLEARANCE	
	RW18 DIRWR BTI35G TOF/LND RW18 AFL2683 DIRWR TOF/TOF	
	ACCEPT	CANCEL

4.15.4 Radar Label Alert

HMI Object	
RADAR LABEL – ALERT CONDITION	
Objective	To provide an alert indication to the controller in the radar label.
General Description	<p>The Radar Label is updated to indicate alert states that apply to a specific mobile:</p> <ul style="list-style-type: none"> The Callsign is presented with a red background (alarm state) or yellow background (information alert). Text describing the alert is displayed above the callsign. <p>Where more than one alert condition applies to an individual mobile, then the alert with the highest priority is shown in the label. The prioritisation between alerts are detailed in the Appendices (see §5.1).</p>
Invocation	System generated.
Display Position	The alert details are displayed in the radar label.
Illustration	<p>a) Information alert</p>  <p>b) Alarm alert</p>



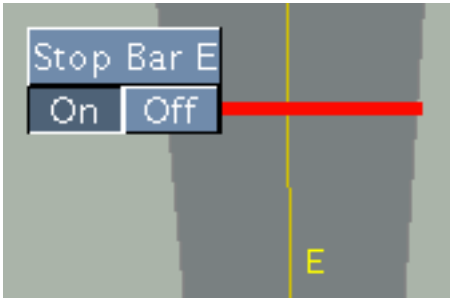
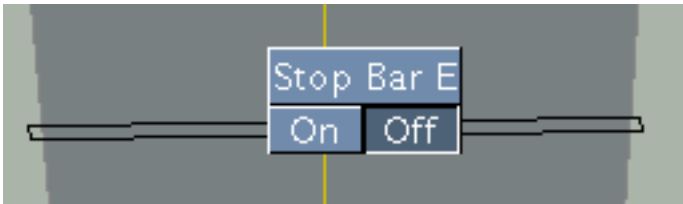
4.15.5 EFS Alerts

HMI Object	
EFS – ALERT CONDITION	
Objective	To provide an alert indication to the controller in the EFS.
General Description	The EFS is updated to indicate alert states that apply to a specific mobile, in particular the Callsign is presented with a red background (alarm state) or yellow background (information alert).
Invocation	System generated.
Display Position	The EFS
Illustration	<p>a) Information alert</p> <p><input type="checkbox"/> T1001 DLH321 A321/M E TX LUP ▼</p> <p>b) Alarm alert</p> <p><input type="checkbox"/> T1001 AZA654 A320/M G TX LUP ▼</p>

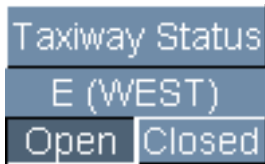
4.16 Control Menus

Pop-up menus provide the means for a controller to make inputs into the HMI and indicating to the system that, for example, a clearance has been issued, the planned route for a mobile has been updated, or that the state of physical aspects of the airport have changed (e.g. switch stop bar lights off). The generic appearance and behaviour of menus are described in §3.5, the paragraphs below describe the specific menus that are provided.

4.16.1 Stop Bar Menu

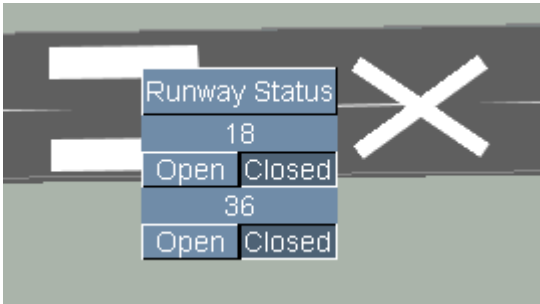
HMI Object	
STOP BAR MENU	
Objective	To provide the ability to turn a Stop Bar on or off.
General Description	<p>The stop bar menu provides two buttons for the state of the stop bar, on and off, with the button for the current stop bar state shown as pressed-in.</p> <p>Selecting either button will close the menu.</p> <p>Selecting the button for the opposite state turns the stop bar on or off as appropriate.</p>
Invocation	Mouse left-click on the stop bar.
Display Position	Displayed with the mouse centred on the Off button.
Illustration	<p>a) Menu when stop bar is on:</p>  <p>b) Menu when stop bar is off:</p> 

4.16.2 Taxiway Status Menu

HMI Object	
TAXIWAY STATUS MENU	
Objective	To provide the ability to open and close a taxiway.
General Description	<p>The taxiway status menu contains the following elements:</p> <ul style="list-style-type: none"> • Name associated with that taxiway sector. • Two buttons for the taxiway state – “Open” and “Closed”. <p>The button for the current taxiway state is shown as pressed-in.</p> <p>Clicking the opposite state button changes the taxiway display to match and closes the menu.</p> <p>Right-click, clicking either button or moving the mouse out of the menu closes it.</p>
Invocation	Right-click on a taxiway sector label.
Display Position	Under the mouse cursor.
Illustration	<p>a) Taxiway status menu:</p> 

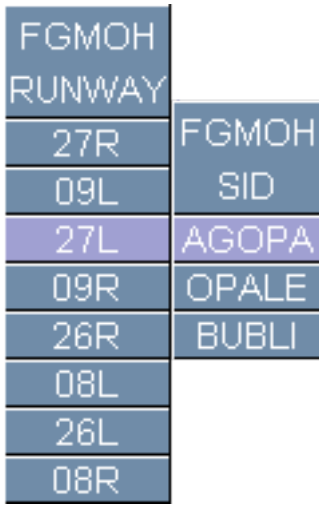

4.16.3 Runway Status Menu

HMI Object	
RUNWAY STATUS MENU	
Objective	To provide the ability to set the runway status to open or closed.
General Description	<p>The runway status menu shows the status for both directions associated with the runway. Each direction has two buttons, open and closed, with the appropriate button shown as pressed-in depending on the current runway state.</p> <p>Clicking any button will close the runway menu.</p> <p>Selecting the button for the opposite state marks the appropriate runway direction as open or closed as appropriate.</p>
Invocation	Mouse right-click on the runway.
Display Position	Displayed with the mouse inside the menu.
Illustration	a) Menu showing both directions open:

	<div data-bbox="517 262 762 483"> Runway Status 18 Open Closed 36 Open Closed </div> <p data-bbox="517 539 1394 611">b) Menu showing runway closed in both directions, including example of a runway closed “X” marking:</p> 
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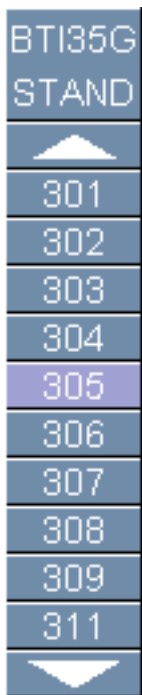
4.16.4 Runway Menu

HMI Object	
RUNWAY MENU	
Objective	To provide the ability to change the runway assigned to an aircraft and, in the case of a departure, the SID.
General Description	<p>The runway menu allows the runway assigned to the flight to be changed for departures and airborne arrivals.</p> <p>The departure runway menu has a secondary menu attached to it showing the available SIDs associated with that runway.</p> <p>Interactions:</p> <ul style="list-style-type: none"> • For departure flights, highlight a runway button with the mouse to show the SIDs available for that runway. • Mouse left-click on a runway button to assign that runway to the subject flight and recalculate the flights ground route. If the runway has been changed then the default SID associated with that runway will also be set for the flight. • Mouse left-click on a SID to assign that SID and the associated runway to the subject flight, and recalculate the flights ground route. • Mouse right-click to close the menu.
Invocation	Mouse left-click on the runway button in the label or flight strip.

Display Position	Displayed with the mouse centred on the currently selected runway button.
Illustration	<p>a) Departure runway menu:</p>  <p>b) Arrival runway menu:</p> 


4.16.5 Stand Menu

HMI Object	
STAND MENU	
Objective	To provide the ability to change the Stand assigned to an arrival.
General Description	<p>The Stand menu allows the stand assigned to the arrival flight to be changed.</p> <p>The Stand menu contains up to 10 stand buttons as well as arrow buttons at the top and bottom of the list. The arrow buttons can be used to move through the list of available stands when more than 10 are available at the airport.</p> <p>Interactions:</p> <ul style="list-style-type: none"> Mouse left-click on a stand button to assign that stand to the subject flight and recalculate the flights ground route.

	<ul style="list-style-type: none"> • Mouse left-click on the up or down arrows to move the list one stand in the appropriate direction. • Mouse left-hold on the up or down arrows to scroll the list in the appropriate direction. • Mouse right-click to close the menu.
Invocation	Mouse left-click on the runway button in the label or flight strip.
Display Position	Displayed with the mouse centred on the currently selected stand button.
Illustration	<p>a) Stand menu with current stand highlighted:</p> 

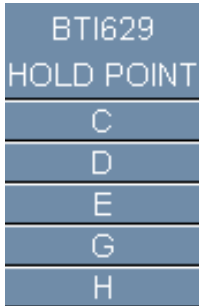
4.16.6 Crossing Point Menu

HMI Object	
CROSSING POINT MENU	
Objective	To provide the ability to change the runway crossing point that should be used by an aircraft to cross a runway.
General Description	<p>The crossing point menu is available for arrival flights after landing clearance has been issued, until the vacate clearance is issued after crossing the runway.</p> <p>The menu contains options for each available crossing point other than the one currently assigned to the radar track.</p>

	Clicking any of the buttons will assign the selected holding point and update the aircraft's route. Mouse right-click or move the mouse out of the menu to close.
Invocation	The crossing point menu is opened by mouse left-click on the crossing point in the radar track label, when present.
Display Position	When opened, the menu is positioned with the mouse over the first option.
Illustration	

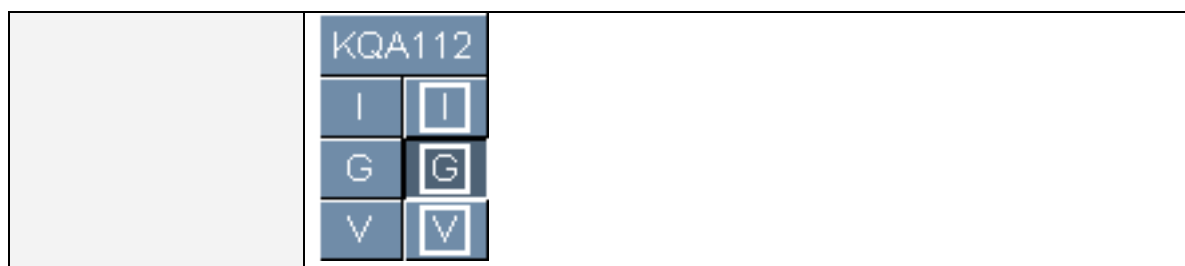
4.16.7 Holding Point Menu

HMI Object	
HOLDING POINT MENU	
Objective	To provide the ability to change the runway holding point assigned to a departure.
General Description	<p>The holding point menu allows the runway holding point assigned to a departure to be changed.</p> <p>The holding point menu contains entries for each holding point on the runway assigned to the aircraft, and which are reachable using normal routing rules. Each row may contain two buttons:</p> <ul style="list-style-type: none"> • Button to assign the runway holding point in the local system and trigger a route update. <p>Interactions:</p> <ul style="list-style-type: none"> • Mouse left-click on a holding point button to assign that holding point to the subject flight and recalculate the flights ground route. • Mouse right-click to close the menu.
Invocation	Mouse left-click on the holding point button in the label or flight strip.
Display Position	Displayed with the mouse centred on the currently assigned holding point.

Illustration	
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4.16.8 Approach Type Menu

HMI Object	
APPROACH TYPE MENU	
Objective	To provide the ability to change the indicated approach type being flown by the flight crew.
General Description	<p>The approach type menu is used to change the indicated approach type that is being flown by the flight crew. The menu contains up to three rows, each with two approach type state buttons.</p> <p>The options available include:</p> <ul style="list-style-type: none"> • I – Instrument approach • G – GBAS approach • V – Visual approach <p>The first button in each row is used to indicate the expected approach type. The second button in each row (a square shaped symbol surrounding the indicator) is used to indicate that the flight crew have confirmed the approach procedure.</p> <p>Interactions:</p> <ul style="list-style-type: none"> • Mouse left-click on an 'approach type' state button to set the desired state. • Mouse right-click to close the menu.
Invocation	Mouse left-click on the approach type button in the label or flight strip.
Display Position	Displayed with the mouse over the menu header.
Illustration	a) Arrival approach type menu:



4.16.9 Callsign Control Menu

HMI Object	
CALLSIGN CONTROL MENU	
Objective	To provide the controller with options to indicate clearances issued to the flight crew or to access system tools and aids.
General Description	<p>The callsign control menu contains a list of options available to allow the controller to indicate clearances or to access system tools and aids. It contains the following contents:</p> <ul style="list-style-type: none"> • The movement clearances available for that flight. • Route editing options (EDIT and HOLD SHORT) command – opens the route editor tool. • Mark command – adds a mark button to help distinguish the flight on screen. • Undo command – indicated by “-<command>” it cancels the last issued movement clearance command. <p>The list of available options varies depending on the current state of each aircraft (e.g. its assigned route, and clearances that may have already been issued).</p> <p>Interactions:</p> <ul style="list-style-type: none"> • Mouse left-click on a command button to perform the required action. • Mouse right-click to close the menu. • Move mouse out of the menu to close the menu.
Invocation	Mouse left-click on the callsign button in the label or flight strip.
Display Position	The menu is displayed with the mouse centred over the next logical clearance. This next logical clearance is displayed in BOLD text
Illustration	a) Departure control menus:


		AFL2357	
		LUP	
		TOF	
		CLU	
		REMOTE DE-ICE	
		HOLD SHORT	
		HOLD	
		EDIT	
		MARK	
		OPT-W	
	AFL2357		
	PUSH		
	REMOTE DE-ICE		
	EDIT		
	MARK		
	OPT-W		

b) Arrival control menus:

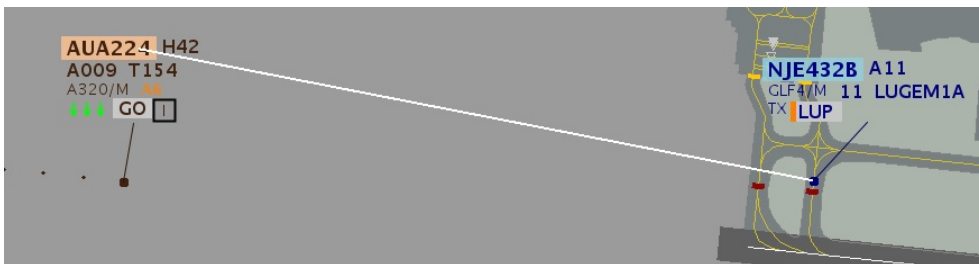
AUA130A	AUA130A	AUA130A
LND	GO	TAXI
GO	EDIT	HOLD SHORT
EDIT	MARK	EDIT
MARK	-[LND]	MARK

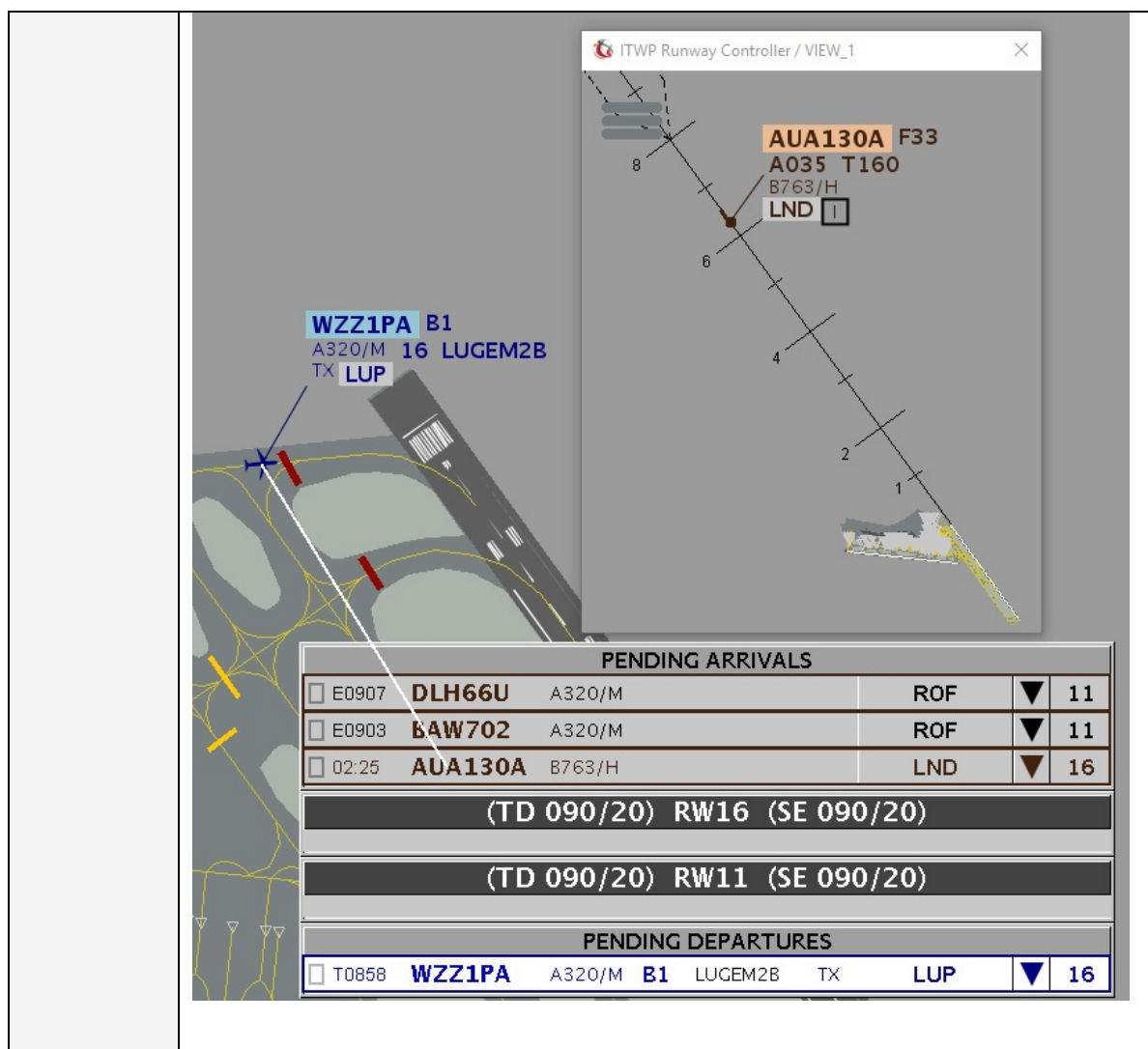
4.16.10 Clearances Control Menu

HMI Object	
CLEARANCES CONTROL MENU	
Objective	To provide the controller with options to indicate clearances issued to the flight crew or to access system tools and aids.
General Description	<p>The clearances control menu is situated in the EFS and provides access to a list of alternate options available to allow the controller (i.e. other than the next logical input that is displayed in the flight strip). It contains the following contents:</p> <ul style="list-style-type: none"> • The movement clearances available for that flight. • Route editing options (EDIT and HOLD SHORT) command – opens the route editor tool. • Mark command – adds a mark button to help distinguish the flight on screen. • Cancel – closes the menu. <p>The list of available options varies depending on the current state of each aircraft (e.g. its assigned route, and clearances that may have already been issued).</p>

	<p>The clearances control menu appearance is styled based on the flight strip colours, with a grey background and blue or black text.</p> <p>Interactions:</p> <ul style="list-style-type: none">• Mouse left-click on a command button to perform the required action.• Moving the mouse out of the menu closes it.
Invocation	Mouse left-click on the down arrow next to the clearance button in the flight strip.
Display Position	Displayed with the mouse located on the top item in the menu.
Illustration	<p>a) Clearances control menu:</p> 



4.17 Conditional Clearance Target Selector

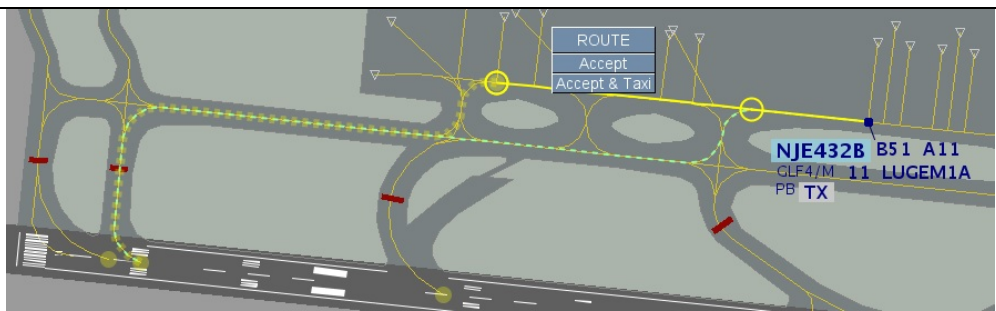
HMI Object	
CONDITIONAL CLEARANCE TARGET SELECTOR	
Objective	To provide the ability to select the target flight of a conditional clearance.
General Description	<p>The conditional clearance target selector is used to indicate that a clearance is linked to a specific condition, e.g. "line-up after the next landing aircraft".</p> <p>The link line is displayed as a single white line connected to the subject radar track symbol and extending to the mouse position. When the line is over a valid target a white circular marker is added at the end of the line, under the mouse cursor.</p> <p>Valid targets for a conditional command are the following graphical displays for another flight (i.e. the target of the condition, <i>not</i> the subject flight):</p> <ul style="list-style-type: none"> • Radar track symbol. • Radar label. • Callsign button in a flight strip. • Any of the above features in a companion view window. <p>Interactions:</p> <ul style="list-style-type: none"> • Mouse left-click while over a valid target to select that flight and close the link line. • Mouse left-click while not over a valid target closes the link line and cancel the clearance. • Mouse right-click to close the link line and cancel the clearance.
Invocation	Select the conditional line-up clearances from the control menu.
Display Position	Displayed from the centre of the subject flights radar track symbol to the current mouse position.
Illustration	<p>a) Link line over target (radar label):</p>  <p>b) Link line over target (EFS):</p>



4.18 Route Editor

HMI Object	
ROUTE EDITOR	
Objective	Provides a tool to enable the editing of the route assigned to a mobile.
General Description	<p>The graphical route editor is a composite of several display features, each conveying different information about the current or planned route.</p> <p>a) Graphical features</p> <p>The following graphical features combine to make the route editor:</p> <ul style="list-style-type: none"> • The current route – shown in white or green as appropriate for the state of the route (i.e. planned or cleared route). This is provided as a reference for the controller while creating the new route. • The currently selected route – solid yellow line with yellow circles around any selected constraint points. This indicates the route built so far. • Route to highlighted constraint point - solid yellow semi-transparent line from the last selected constraint point to the constraint point highlighted by the mouse. Indicates the shortest route, ignoring traffic rules, that would result from adding the highlight constraint point to the route being built. • Route to current destination – dashed yellow semi-transparent line from the highlighted constraint point to the current destination. Indicates the suggested route from the highlighted constraint point to the currently assigned destination, following the traffic rules for the airport. • Constraint point highlight markers – yellow semi-transparent circle indicating the closest constraint point to the current mouse position. • Runway entry / exit markers – constraint point highlight markers indicating the departure line-up points and airborne arrival runway exit points. • Accept Route menu – a menu used to allow the controller to finalize the route edition and to validate and update the route information in the system. <p>Two options are available, namely ACCEPT to only update the Route information in the system and ACCEPT & TAXI to simultaneously update the route information in the system and to clear the aircraft for taxi.</p> <p>The menu is positioned adjacent to the last route constraint point added to the route.</p> <p>b) Behaviours and interaction</p>

	<ul style="list-style-type: none"> • Move the mouse pointer over a highlighted constraint point marker to show the route that would be created by selecting that point as a constraint. • Left-click on a constraint point highlight marker to add that point as a selected constraint for the route. • Right-click – remove the last added constraint point from the route, or close the route editor if no constraint points have been specified. • Double left-click to add the point as the final point and accept the route. The route will end at the constraint point selected instead of continuing to the original destination. • Left-click on menu buttons to confirm the route changes and close the route editor tool.
Invocation	Select EDIT from the Control Menu, or left-click on the mobile symbol with the mouse.
Display Position	The route editor display starts from the mobile symbol and ends at the currently designated end point as appropriate to the mobile type.
Illustration	<p>a) Default display before route changes:</p>  <p>b) Highlight of constraint marker showing the resulting modified route:</p>  <p>c) Display following selection of a constraint marker:</p>

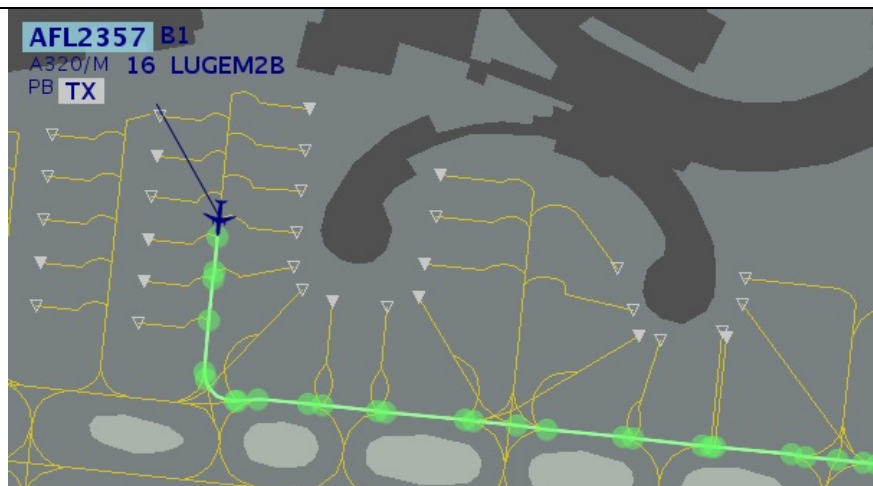


d) Display following completion of new route, showing new and previous route:

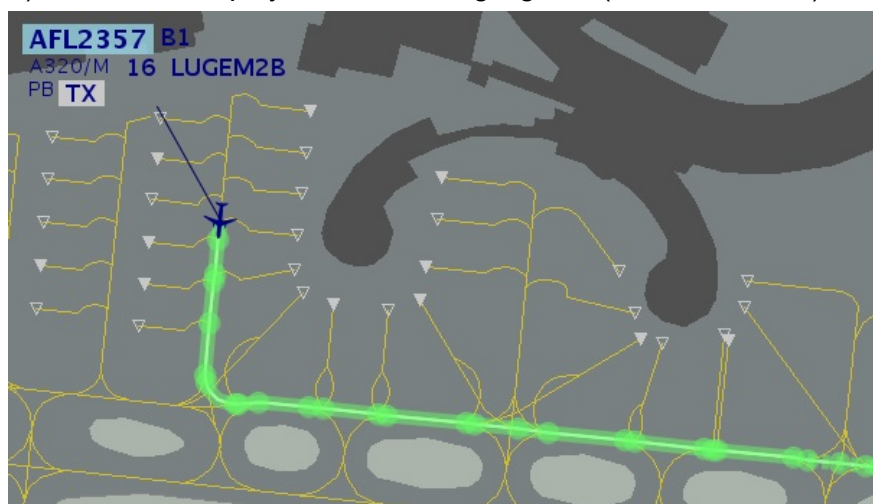


4.19 Hold Short Tool

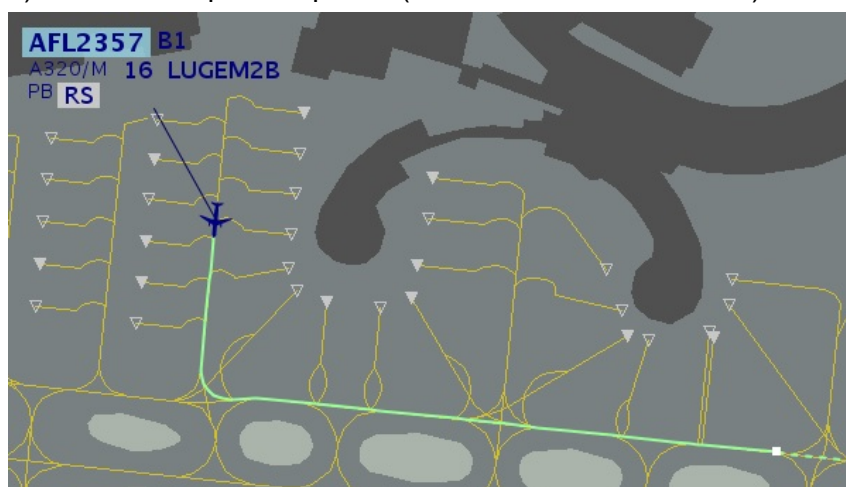
HMI Object	
HOLD SHORT TOOL	
Objective	To provide a tool to enable the setting of a hold-short point.
General Description	<p>The hold-short tool combines graphical features to provide information about the current route to the controller, and to indicate the places that may be selected as a hold-short position for the mobile.</p> <p>a) Graphical elements</p> <p>The graphical elements are:</p> <ul style="list-style-type: none"> • Original route display – standard route display showing the current route, with cleared section shown as a solid green line and uncleared section shown with a dotted line (see illustration a). • Hold point highlight markers – green semi-transparent circles indicating the points on the route that can be selected as a hold-point (see illustration a). • Hold-point route – a thick green semi-transparent route display showing the result of selecting the given point. Shown when a hold point highlight marker is highlighted by moving the mouse over it. The resulting cleared route is shown as the solid section of the line up to the selected hold point, and the uncleared route shown from the hold-point to the destination (see illustration b). <p>b) Interactions.</p> <p>The following interactions are possible with the hold-short tool:</p> <ul style="list-style-type: none"> • Mouse over a hold short point highlight markers to show the resulting route clearance if that point is selected. • Mouse left-click on hold point highlight marker to select the given highlight marker and trigger the display of the new cleared route with the hold short point. • Mouse left-click on RESUME on EFS (or RS in radar label to remove hold short point from the route. • Mouse right-click to cancel and close the hold-short tool.
Invocation	Displayed by selecting hold-short from the control menu.
Display Position	The hold-short tool has a graphical element that is displayed over the top of the current route of the mobile (see the illustrations below).
Illustration	a) Hold-Short tool display on opening the tool:



b) Hold-Short display with marker highlighted (i.e. mouse over):



c) Hold-short input completed (left mouse click on marker):

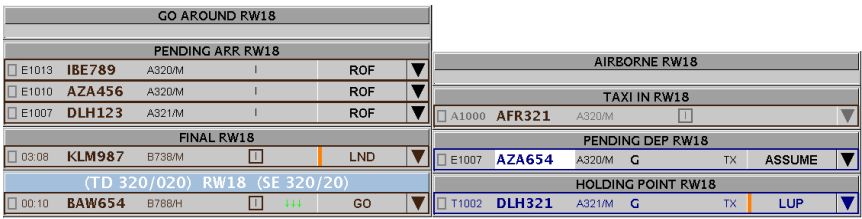


4.20 EFS

EFS are generated automatically by the system, and positioned in “Flight Strip Bay Sections”. The “Flight Strip Bay Sections”, by default, are logically grouped into one or more “Bays”.


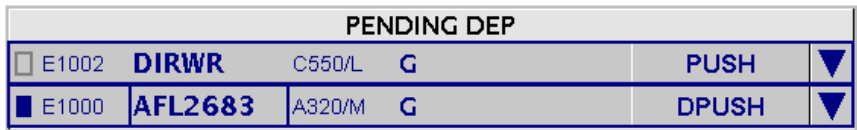
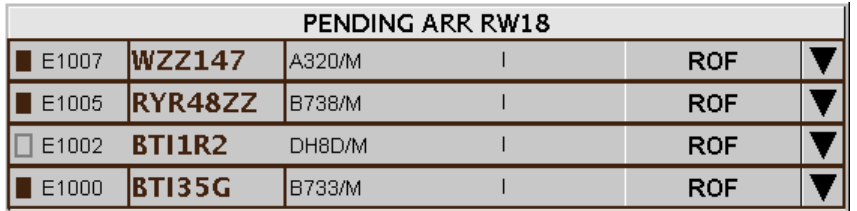
The general principles behind the implementation of Flight Strips, Flight Strip Bay Sections, and Flight Strip Bays are discussed in §2.5 and §2.6 above.

4.20.1 Flight Strip Bay

HMI Object	
FLIGHT STRIP BAY	
Objective	To provide a logical grouping of bay sections.
General Description	<p>A flight strip bay is a group of flight strip bay sections.</p> <p>The Bay Sections within the Bay are typically grouped together so that they maintain their connection to adjacent sections as the sections expand or contract.</p> <p>Dragging a single flight strip bay section drags the entire flight strip bay at the same time.</p> <p>The Bay may optionally be ‘un-grouped’ so that the Bay Sections may be moved independently or re-arranged.</p>
Invocation	By default, the bay is displayed at system start-up, it may be hidden using the Flight Strip Bay Tool (§3.8.2.1).
Display Position	Defined in local configuration.
Illustration	<p>Flight strip bay – runway position.</p> 

4.20.2 Flight Strip Bay Section

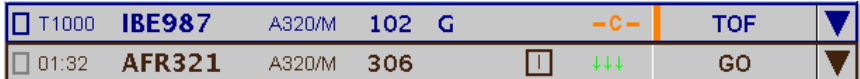
HMI Object	
FLIGHT STRIP BAY SECTION	
Objective	To provide a container to group and organise flight strips.
General Description	<p>A flight strip bay section consists of two main elements:</p> <ul style="list-style-type: none"> • A title bar indicates the state associated with any flight strips that it contains. • An area for storing flight strips.

	<p>The area for storing flight strips expands vertically to fit and show all strips it contains.</p> <p>The flight strip bay section can be dragged by using a mouse left-button drag on the title bar.</p>
Invocation	Bay sections are typically managed by the system – they may permanently be displayed, or they may be displayed or removed by system generated events (see §2.6).
Display Position	Defined in local configuration.
Illustration	<p>a) Empty flight strip bay section.</p>  <p>b) Departure flight strip bay section.</p>  <p>c) Arrival flight strip bay section.</p> 

4.20.3 Flight Strip


HMI Object	
FLIGHT STRIP	
Objective	To provide relevant information regarding a radar track to the controller, and to provide access to mechanisms to manage the track.
General Description	<p>EFS are generated for arrival and departure aircraft, for aircraft under tow, and for vehicles under ATC control and are displayed to the controller in EFS bays.</p> <p>The EFS contains a number of fields, many of which can be added or removed using the EFS Tool (§3.8.2.5) on each controller position. The default settings are defined in the local configuration.</p>

	<p>The text colour in flight strips matches the default colours defined for arrival, departures or vehicles.</p> <p>A flight strip has the following fields available:</p> <ul style="list-style-type: none"> • 'Strip handle' (a square marker) – an interactive 'button' allowing the controller to 'undo' the last clearance that was input (right mouse click), or move the strip from its 'system assigned' position in the bay section (left mouse click and drag). This cannot be hidden by the controller. • Navigation time – shows the time relevant to the controller position, and to the movement that the particular aircraft is performing. The times are preceded with a character to indicate estimated, target or actual time ('E', 'T', or 'A'). On the RWY control position, the time field displays a countdown to touchdown, starting from five minutes (a local parameter). For example, the EOBT is displayed for a departure at the stand, changing to the ETOT after it has left the stand. For an arrival, the ELDT time is displayed, changing to ALDT after touchdown. • The callsign of the flight or vehicle, an interactive button that cannot be hidden by the controller. The callsign button has the following behaviour: <ul style="list-style-type: none"> ○ Mouse left-click to open the control menu used to make clearance inputs. ○ Mouse right-click to display the 'extended label' window. • Aircraft or vehicle type – the aircraft model designator or vehicle type with Wake Turbulence Category (WTC). • The departure stand or arrival stand, depending on strip type. For arrival strips, this 'button' may be interactive thereby allowing the stand (and consequently the route) to be updated. On RWY control positions it is interactive when the flight is in the Assumed state, and on GND control positions when the flight is in a Pending, Pending-In or Assumed state). • Holding point - on a departure strip this button shows the planned runway holding point. The 'button' is interactive when the flight is in an Assumed state: <ul style="list-style-type: none"> ○ Mouse left-click opens the holding point menu to change the planned runway holding point and update the planned taxi route. • Approach equipment – shown for arrivals, indicates the approach equipment that the aircraft is reported to be equipped with - Visual, Instrumented, or GBAS ('V', 'I', or 'G'). When the flight crew have confirmed the approach
--	--

	<p>procedure, it will be indicated with a square around the character.</p> <ul style="list-style-type: none"> ○ A left mouse-click on this 'button' allows the RWY controller to update this indicator in response to information received from the flight crew. • Calculated Take-off Time (CTOT) – time field shown if provided in the flight plan or by external systems (not shown in the illustrations). • Current clearance - an indication of the current clearance level for the traffic, e.g. PB, TX, conditional line-up, line-up, take-off, land, cross or enter. • Clearance – shows the next logical clearance for the traffic. <ul style="list-style-type: none"> ○ Mouse left-click to issue the indicated clearance. ○ Mouse left-click on the arrow button provides access to the other available clearance options ○ Shows an orange vertical strip when issuing the displayed clearance would raise a safety net alert or alarm. • Runway - the assigned runway (not shown in illustrations). This 'button' is interactive on all controller positions when the flight or vehicle is in the Assumed state, allowing the assigned runway to be updated. For departure strips, the assigned SID may be changed at the same time. • Sequence number - the arrival or departure sequence number (not shown in illustrations).
Invocation	Flight strips are system generated.
Display Position	Shown in a flight strip bay section.
Illustration	<p>Departure flight strip (top) and arrival flight strip (bottom).</p> 

4.20.4 Ghost Flight Strip

HMI Object	
GHOST FLIGHT STRIP	
Objective	Used as an aide memoir to a controller when traffic represented by an active flight strip in one bay section may impact on the traffic represented by flight strips in another bay section.
General Description	A ghost flight strip duplicates a flight strip that is active in another bay section. The 'controls' on the ghost strip are inactive.

	The typical use is for a RWY control position that manages multiple runways, where traffic landing on one runway needs to cross another runway while taxiing in order to reach its assigned stand.
Invocation	System generated.
Display Position	Positioned in the appropriate bay section by the system.
Illustration	 The illustration shows a horizontal display element with a grey background and a thin black border. It contains the following information from left to right: a small square icon, the time '00:12', the flight number 'TAY124H' in bold, the aircraft type 'RJ85/M', a small square icon, three downward arrows '↓↓↓', the word 'GO', and a small downward-pointing triangle icon.

Appendix

A APPENDICES

A.1 Appendix A: Alert Prioritisation

Where a number of alert conditions exist for single traffic entity, the flight strip and label display will indicate the highest priority alert state. The following chart illustrates the priority rules implemented.

ALERT TRIGGERED/Previous one

	RMCA	RMCA	RWY INCURSION	NO X ENTER CLR	NOTOF CLR	RTE DEV	NOLND CLR	HIGH SPEED	STATIONARY IN RPA	RED STOP BAR CROSSED 1	RWY CLOSED	RWY TYPE	TWY CLOSED	RWY INCURSION	RTE DEV	NOLND CLR	NO CROSS CLR	LND WRONG RWY	LUP WRONG RWY	HIGH SPEED	NO TAXI CLR	NO PUSH CLR	RWY CLOSED	TWY CLOSED	RWY TYPE	STATIONARY	NO CONTACT	NO TRANSFER
RMCA																												
RMCA																												
RWY INCURSION																												
NO LUP CLR																												
NO X ENTER CLR																												
NOTOF CLR																												
RTE DEV																												
NO LND CLR																												
HIGH SPEED																												
STATIONARY IN RPA																												
RED STOP BAR CROSSED 1																												
RWY CLOSED																												
RWY TYPE																												
TWY CLOSED																												
RWY INCURSION																												
RTE DEV																												
NO TOF CLR																												
NO LND CLR																												
NO LUP CLR																												
NO CROSS CLR																												
LND WRONG RWY																												
LUP WRONG RWY																												
HIGH SPEED																												
NO TAXI CLR																												
NO PUSH CLR																												
RWY CLOSED																												
TWY CLOSED																												
RWY TYPE																												
TWY TYPE																												
STATIONARY																												
NO CONTACT																												
NO TRANSFER																												

Any CATC

	the new alert has more priority: it should be displayed immediately
	the previous alert has more priority: it shall remain displayed until a more important one appears
	to be decided / to be discussed
	considered as not possible

1- red stop bar here indicates a stopbar that can be found on a twy and that is not protecting a rwy
 2- what is the use case here ?

A.2 Appendix B: Automatic Wake Turbulence Timers

The following tables detail the parameters used by the automatic Wake Separation Tool (§3.8.3.4) to indicate when there is safe wake turbulence separation between aircraft taking off. Two sets of parameters are used – one for when the following aircraft lines-up at the same line-up point or behind the preceding aircraft, and another set of parameters for when the following aircraft lines-up at a line-up point ahead of the preceding aircraft.

Values are shown for each of the ICAO and RECAT EU classifications.

A.2.1 ICAO Wake Turbulence Categories – Separation in Seconds

Same LUP		FOLLOWER			
		J	H	M	L
PRECEDING	J	-	120	180	180
	H	-	-	120	120
	M	-	-	-	120
	L	-	-	-	-

LUP in front of preceding a/c		FOLLOWER			
		J	H	M	L
PRECEDING	J	-	120	240	240
	H	-	-	180	180
	M	-	-	-	180
	L	-	-	-	-

A.2.2 RECAT EU Wake Turbulence Categories – Separation in Seconds

Same LUP Point			FOLLOWER					
			J	H		M		L
			S	G	H	K	M	L
PRECEDING	J	S	80	100	120	140	160	180
	H	G	-	-	-	100	120	140
		H	-	-	-	80	100	120
	M	K	-	-	-	-	-	120
		M	-	-	-	-	-	100
	L	L	-	-	-	-	-	80

LUP in front of preceding a/c			FOLLOWER					
			J	H		M		L
			S	G	H	K	M	L
PRECEDING	J	S	140	160	180	200	220	240
	H	G	-	-	-	160	180	200
		H	-	-	-	140	160	180
	M	K	-	-	-	-	-	180
		M	-	-	-	-	-	160
	L	L	-	-	-	-	-	140

A.3 Appendix C: Pseudo-Pilot Working Position

As part of the eDep Tower Simulator package, the ITWP software provides as well a pseudo-pilot working position (PWP).

This ITWP PWP uses the same design principles as developed for the ITWP Controller Working Position (CWP).

The main purpose of the PWP is to allow the execution of Controller instructions in order to move the mobiles (aircraft and vehicles) on the airport surface and in the airspace in the vicinity of the airport.

Each PWP is linked to a Controller Working Position and is role dependant (GND, RWY or CLD).

Specific PWP only features allow that a single pseudo-pilot operator can follow and move multiple mobiles around the airport.

A.3.1 PWP Main Window principles

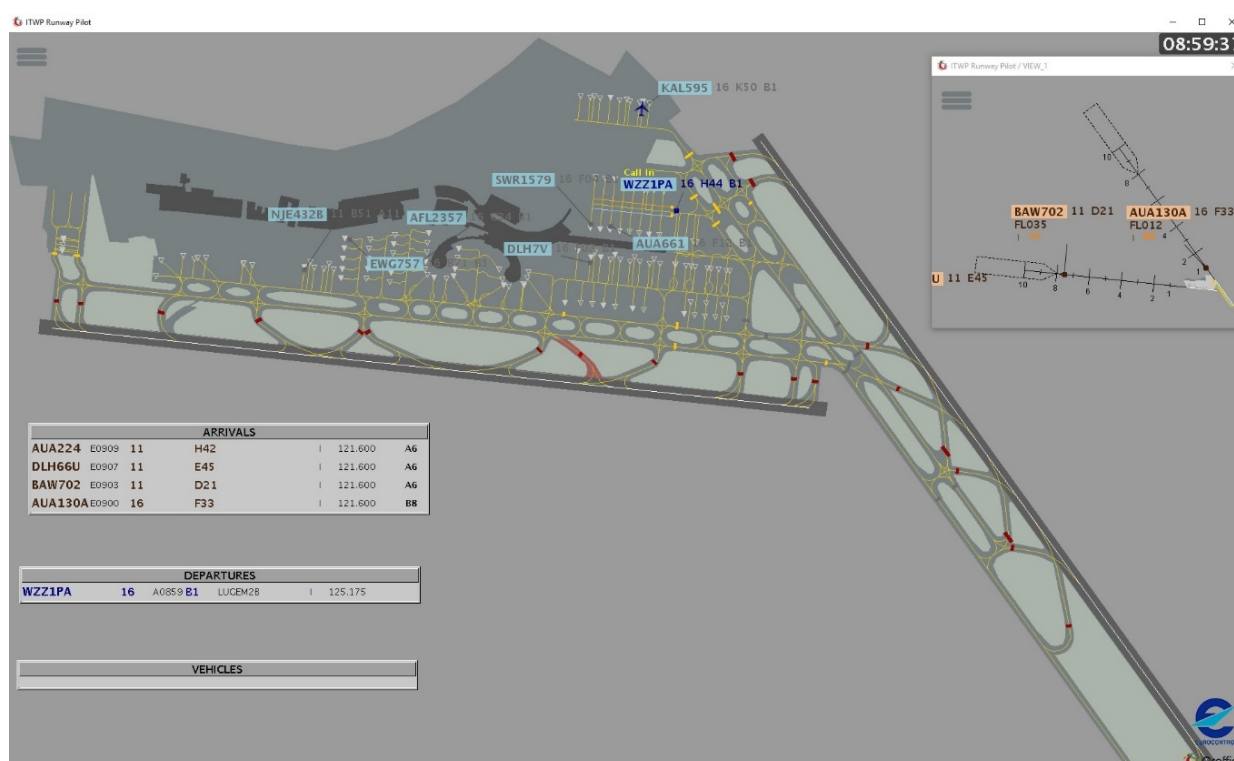
The PWP main window consists of the same **detailed airport map** as provided for the Controller Working Position (CWP).

The set-up of this environment uses the **same Toolbox Window** as defined for the CWP (see chapter [4.8.1](#)).

Instead of using Electronic Flight Strips, the PWP only provides dedicated **Mobile Lists** per type of movement (Departures, Arrivals and Vehicles Lists).

The **Radar labels** on the PWP contain additional fields in order to control the behaviour (e.g. possibility to adjust the speed of movement) and to know the status of each mobile (e.g. when an aircraft is ready for pushback or taxi)

The PWP does not display the Alerts and Alarms that are triggered on the CWP.



A.3.2 PWP Mobile Lists

For each type of mobile, a dedicated list is available listing the mobiles that are assigned to and managed by the PWP.

Interaction with the system is possible via the some of the fields of the Mobile Lists.

A.3.2.1 Arrivals List

The Arrivals List displays all aircraft arrivals currently assigned to and managed by the PWP.

The following information is provided for each arrival:

- Callsign
- Estimated Landing Time (changes to Actual Landing Time after landing)
- Landing Runway
- Arrival Stand
- Aircraft equipage
- Next Frequency
- Runway Exit (from Planned route)

ARRIVALS						
AUA224	E0909	11	H42		121.600	A6
DLH66U	E0907	11	E45		121.600	A6
BAW702	E0903	11	D21		121.600	A6
AUA130A	E0900	16	F33		121.600	B8

Interaction with the system is available with the following fields:

- **Callsign** – This will open the callsign menu for interaction
- **Arrival Stand** – To change the arrival stand
- **Next Frequency** – To transfer the aircraft to the next PWP
- **Runway Exit** – To change the runway exit and change the planned route accordingly

A.3.2.2 Departures List

The Departures List displays all aircraft departures currently assigned and managed by the PWP.

The following information is provided for each departure:

- Callsign
- Departure Runway
- Estimated Off-Block Time (This changes to Actual Off-Block Time when movement has started)
- Runway Holding Point
- SID
- Aircraft equipage
- Next Frequency

DEPARTURES						
EWG757	16	E0905	B1	LUGEM2B		121.600
AUA661	16	E0904	B1	LUGEM2B		121.600
KAL595	16	E0902	B1	WGM7B		121.600
DLH7V	16	E0901	B1	LUGEM2B		119.400
AFL2357	16	E0901	B1	LUGEM2B		119.400
SWR1579	16	E0900	B1	LUGEM2B		119.400
NJE432B	11	E0857	A11	LUGEM1A		119.400

Interaction with the system is available with the following fields:

- **Callsign** – This will open the callsign menu for interaction
- **Departure Runway** – To change the Departure Runway and SID
- **Runway Holding Point** – To change the Holding Point and change the planned route accordingly
- **Next Frequency** – To transfer the aircraft to the next PWP

A.3.2.3 Vehicles List

The Vehicles List displays all vehicles currently assigned to and managed by the PWP.

The following information is provided for each vehicle:

- Callsign
- Type of vehicle
- Next Frequency

VEHICLES		
VEH3	✓	121.600
TOW3	✓	121.600

Interaction with the system is available with the following fields:

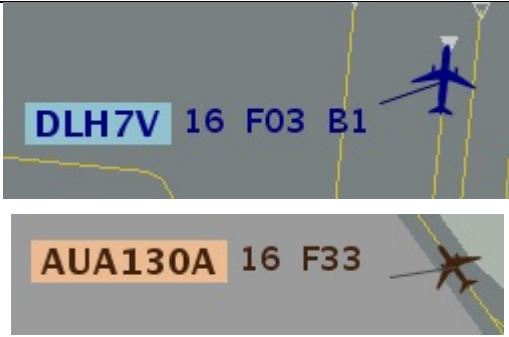

- **Callsign** – This will open the callsign menu for interaction
- **Next Frequency** – To transfer the aircraft to the next PWP

A.3.3 PWP Radar Labels

As for the ITWP CWP, two kinds of radar labels exist on the PWP.

By default, the **Minimum Radar Label** is displayed. When moving the mouse cursor over a radar label, the **Extended Radar Label** is displayed

Departure labels are presented in **Blue**, **Arrival** labels in **Brown** and **Vehicles** in **Green** (same as on CWP)

Minimum Radar Labels	Extended Radar Labels
	

A.3.3.1 Departure Label



The following information is provided in the **Minimum Departure Label**:

- **Line 1** : Callsign, Departure Runway , Stand Name, Runway Holding Point

The following information is provided in the **Extended Departure Label**:

- **Line 1** : Callsign, Departure Runway , Stand Name, Runway Holding Point
- **Line 2** : Aircraft Type and WTC, Next Frequency, Current Speed

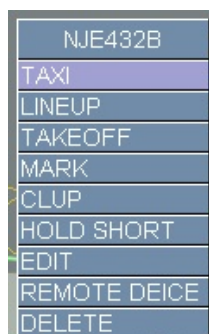
In addition, the System triggers, for each aircraft, prompts to inform the pseudo-pilot operator of certain events to be requested in order to receive an approval to move the aircraft . These prompts are displayed on **Line 0** above the Callsign in **Yellow**.

Prompts Minimum Departure Label	Prompts Extended Departure Label
	

The prompts can be removed by a left mouse click on the yellow text, or are automatically removed when the associated clearance is input for the aircraft via the callsign menu.

Interaction with the System is available via the following fields:

- **Callsign** – This will open the callsign menu for interaction



To be noted in the callsign menu on the PWP is that all possible remaining inputs in the flight lifecycle are available (as opposed to the callsign menu on CWP, where the possible inputs are restricted to those inputs available for the role of the ATCO (CLD, GND or RWY))

An aircraft can be deleted as well from the Simulation via the selection of DELETE in the callsign menu.

- **Departure Runway** – To change the Departure Runway and SID



- **Runway Holding Point** – To change the Holding Point and change the route accordingly



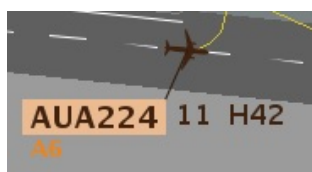
- **Next Frequency** – To transfer the aircraft to the next PWP
- **Current Speed** – To adjust the taxi speed of the aircraft



A.3.3.2 Arrival Label

The following information is provided in the **Minimum Arrival Label**:

- **Line 1** : Callsign, Arrival Runway, Stand Name
- **Line 2** : Planned Runway Exit (displayed until leaving Landing Runway)



The following information is provided in the **Extended Arrival Label**:

- **Line 1** : Callsign, Arrival Runway , Stand Name
- **Line 2** : Aircraft Type and WTC, Next Frequency, Current Speed
- **Line 3** : Planned Runway Exit (displayed until leaving Landing Runway)



In addition, the System triggers, for each aircraft, prompts to inform the pseudo-pilot operator of certain events to be requested/announced in order to receive an approval to move the aircraft . These prompts are displayed on **Line 0** above the Callsign in **Yellow**.

Prompts Minimum Arrival Label	Prompts Extended Arrival Label
 The left column shows two screenshots. The top one is labeled 'Call In' in yellow, with the call sign 'AUA224 11 H42' in black, 'A320/M 121.600 77' in black, and 'A6' in orange. The bottom one is labeled 'REQ TAXI' in yellow, with the call sign 'AUA224 11 H42' in black, 'A320/M 121.600 77' in black, and 'A6' in orange. Both show a small aircraft icon on a greyish-blue background with yellow lines.	 The right column shows two screenshots. The top one is labeled 'Call In' in yellow, with the call sign 'AUA224 11 H42' in black, 'A320/M 121.600 15' in black, and 'A6' in orange. The bottom one is labeled 'REQ TAXI' in yellow, with the call sign 'AUA224 11 H42' in black, 'A320/M 121.600 15' in black, and 'A6' in orange. Both show a small aircraft icon on a greyish-blue background with yellow lines.

Interaction with the System is available via the following fields:

- **Callsign** – This will open the callsign menu for interaction



To be noted in the callsign menu on the PWP is that all possible remaining inputs in the flight lifecycle are available (as opposed to the callsign menu on CWP, where the possible inputs are restricted to those inputs available for the role of the ATCO (CLD, GND or RWY))

An aircraft can be deleted as well from the Simulation via the selection of DELETE in the callsign menu.

- **Stand Name** – To change the assigned Stand and change the route accordingly



- **Next Frequency** – To transfer the aircraft to the next PWP
- **Current Speed** – To adjust the taxi speed of the aircraft



A.3.4 PWP Routing functions

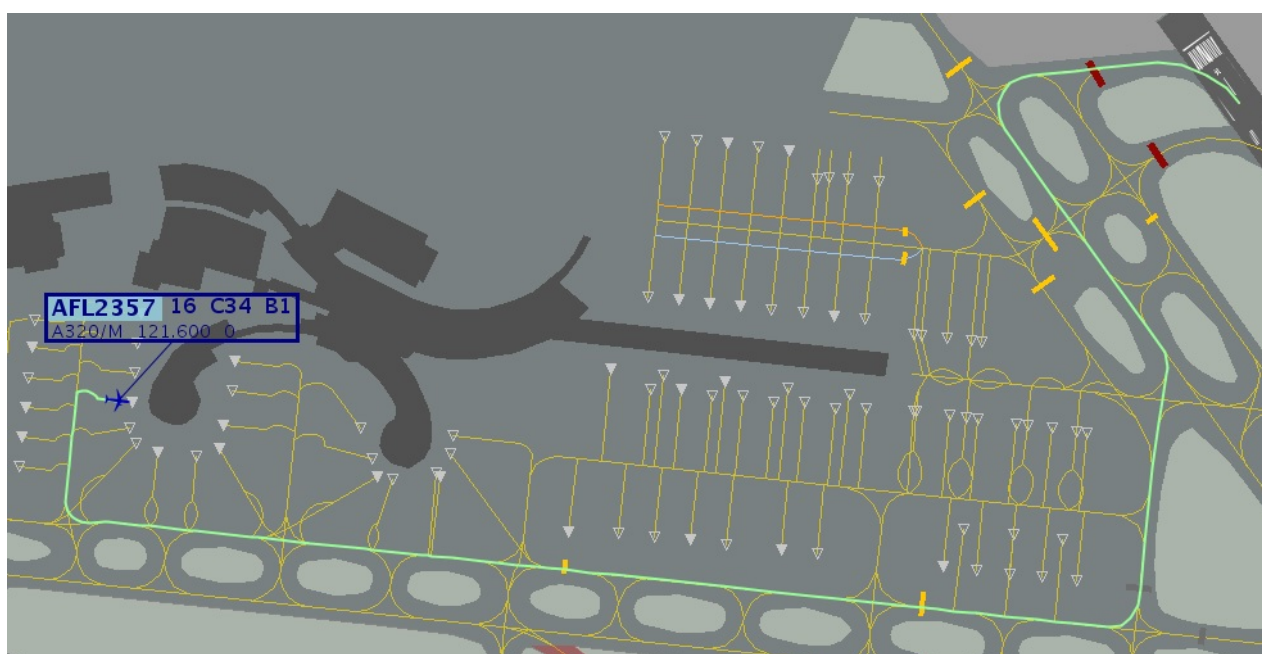
Routing information and functions on the PWP are similar to what is available on the ITWP Controller Working Position (CWP).

The System generated initial planned route is the same route on both PWP and CWP.

This route of a mobile can be visualized on the PWP by hovering the mouse cursor over the Callsign field of each mobile.

The route can be modified either through standard route editing (same functionality as on CWP) or via shortcuts to speed-up the route editing process.

On the PWP, no differentiation is made between Planned, Pending or Cleared routes by colour coding as is done on the CWP. All routes are displayed in solid green colour.

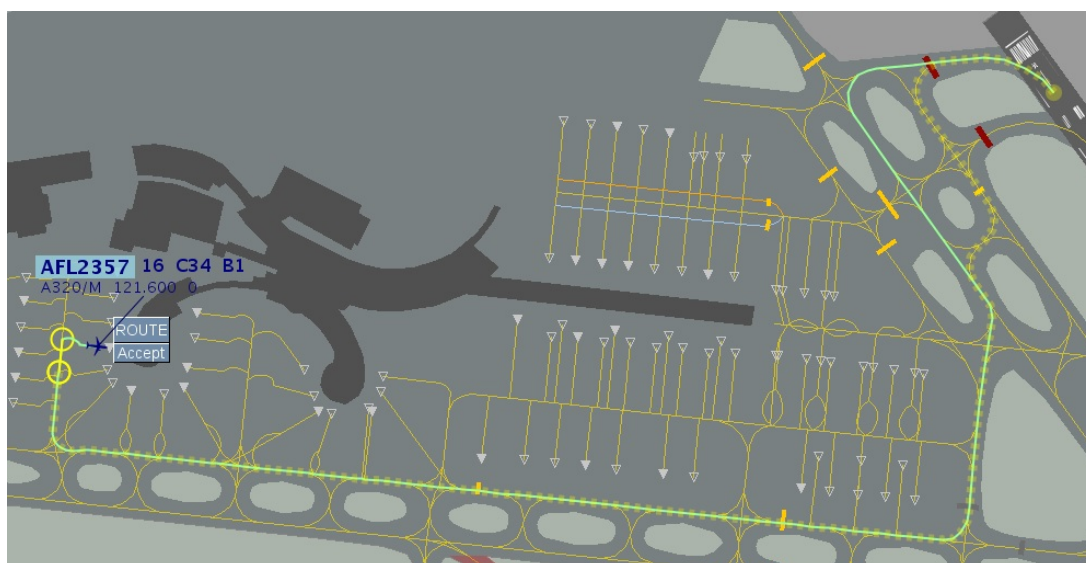


Several possibilities exist to modify the route of a mobile and its associated behaviour on the PWP. They are listed hereafter :

- 1) **Standard Route Editing:** Via the Callsign menu and selection of the EDIT Button

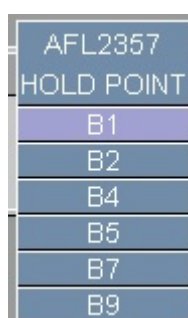


Left mouse click on **EDIT** will open the Route Editor allowing modification of the route.



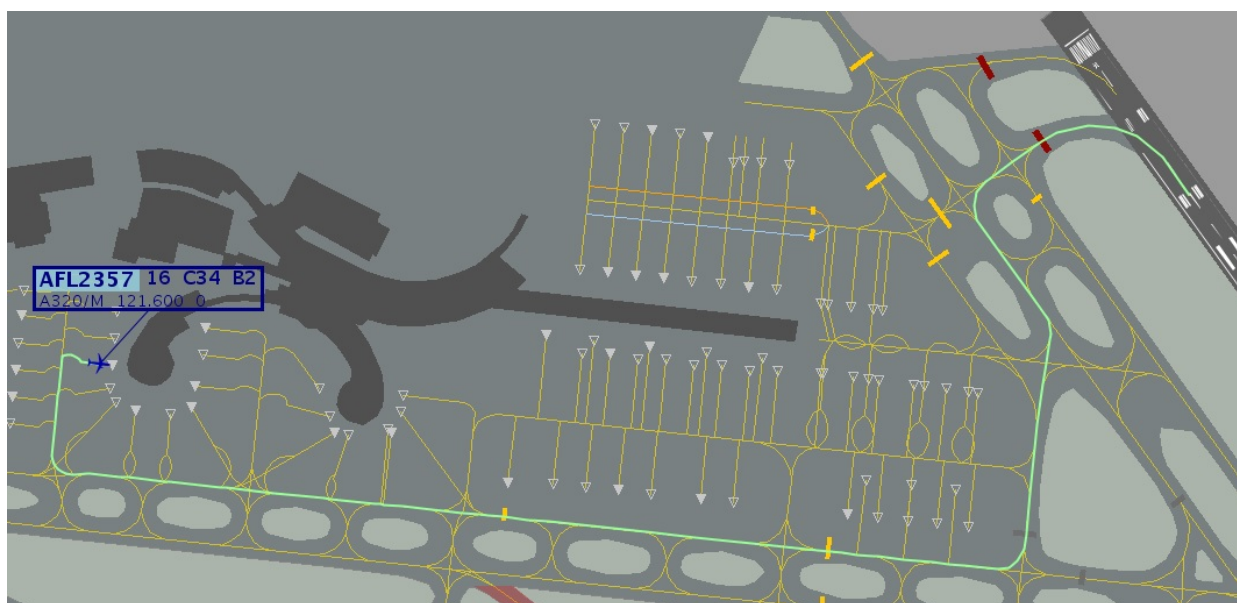
A detailed description of this function is described in chapter [4.18](#).

- 2) **Change of Holding Point Shortcut** : Via the Holding Point field in the radar label or the Departure List

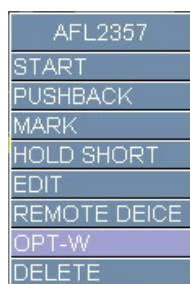


Selection of another Holding Point will update the route of the aircraft following the routing constraints known by the System.

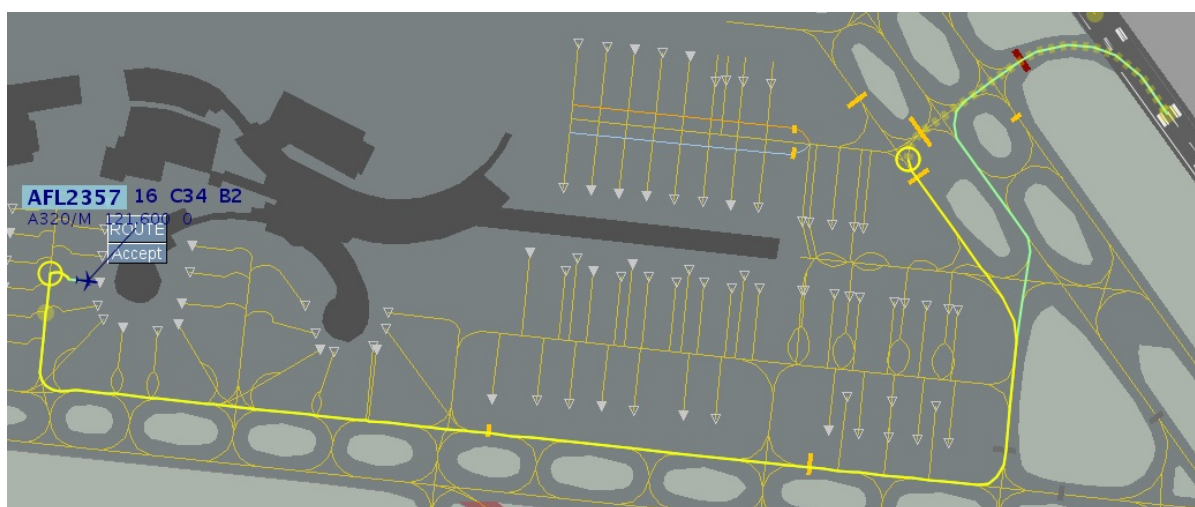
*Note: The same principle applies for a **Change of Stand** or a **Change of Runway Exit** for an Arrival flight (via Stand field in Radar Label or Arrival List)*



3) **Change of Route via Optional Route Shortcut** : Via the **OPT** field in the callsign menu



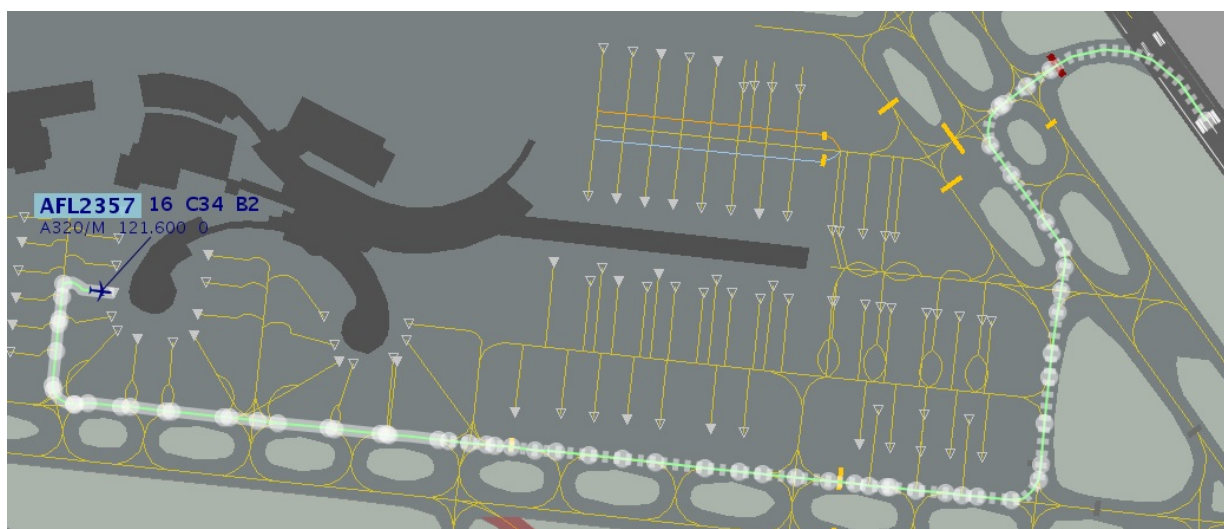
Selection of the appropriate OPT field (in the example via Taxiway W) will update the planned route of the aircraft.



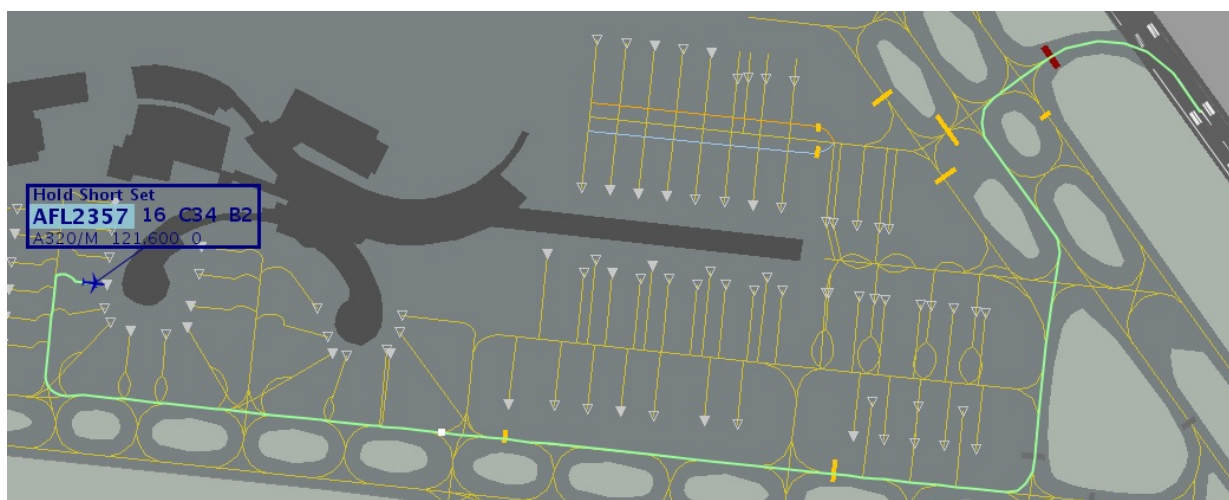
- 4) **Insertion a HOLD SHORT point on a Route:** Via the **HOLD SHORT** field in the callsign menu



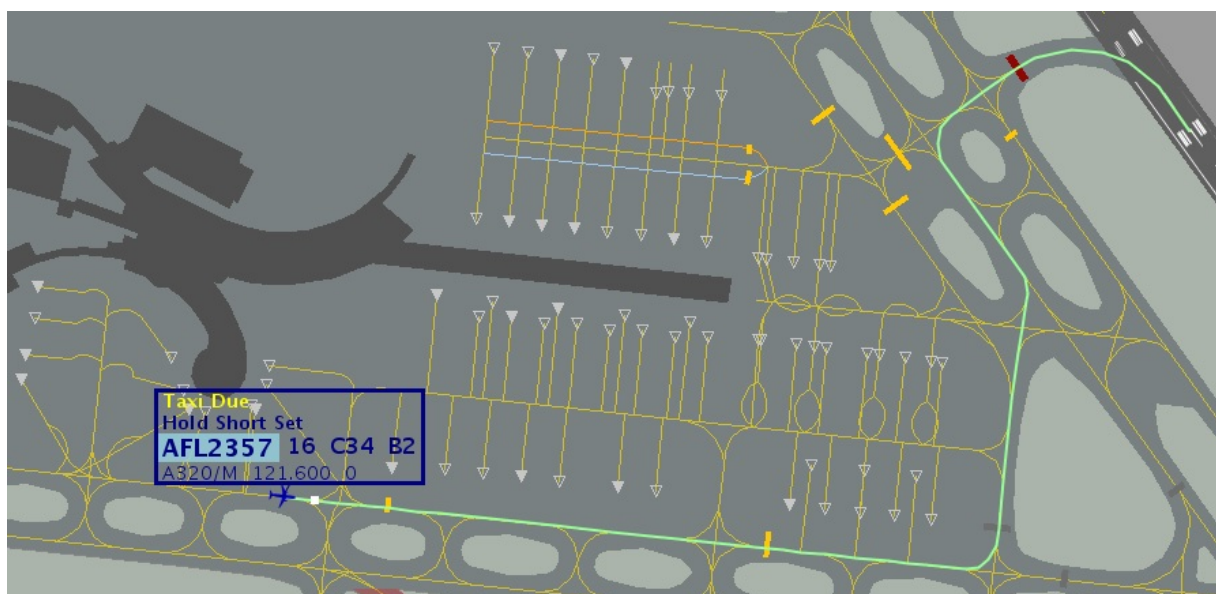
Left mouse click on HOLD SHORT will open the Route Editor allowing selection of the point on the route where the mobile shall stop.



Once the Stop point has been selected, the route information will be updated with a WHITE dot and the text **"Hold Short Set"** shall be displayed on Line 0 of the Radar Label.



When reaching the HOLD SHORT point, the mobile will automatically stop and a Yellow **Taxi Due** prompt will be displayed on line 0 of the Radar Label.

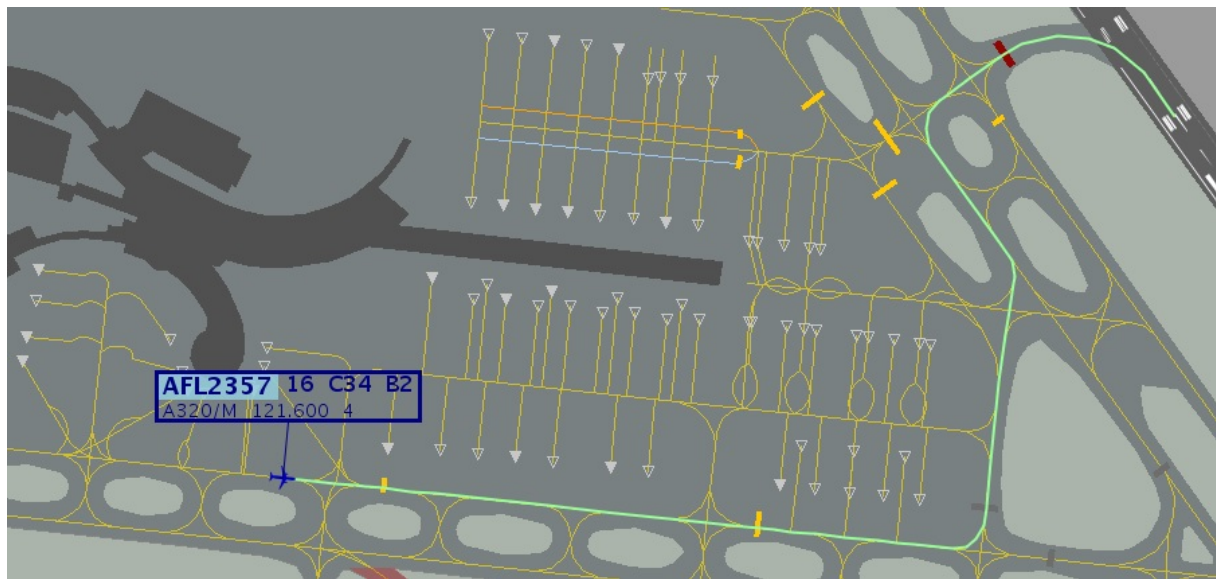


- 5) **Removal a HOLD SHORT point on a Route:** Via the **RESUME** field in the callsign menu



Left mouse click on **RESUME** will remove the HOLD SHORT point (white dot) and remove the text **"Hold Short Set"** on Line 0 of the Radar Label

The mobile will automatically resume its taxi (or will not stop if RESUME was input before the mobile reaches the HOLD SHORT point).



References

- [D1] EUROCONTROL ITWP HMI Description V4.0 20 JAN 2017.pdf
- [D2] ITWP – HMI Solution Specifications Draft V3.0, 1 March 09, EUROCONTROL

Abbreviations

Term	Definition
ACC	Area Control Centre
AIBT	Actual In Block Time
ALDT	Actual Landing Time
APP	Approach
APTR	Alternate Parallel Taxi Route
ARR	Arrival
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATS	Air Traffic Service
AVD	Airport View Display
BTV	Brake to Vacate
CATC	Conflicting ATC Clearances
CLD	Tower Clearance Delivery Controller
CLR	Departure Clearance
CLU	Conditional Line-up Clearance
CMAC	Conformance Monitoring Alerts for Controllers
CPDLC	Controller Pilot Datalink Communication
CSD	Composite Situation Display
CTOT	Calculated Take-off Time
CTR	Control Zone
CWP	Controller Working Position
DEP	Departure
DME	Distance Measuring Equipment
eDEP	EUROCONTROL Development and Evaluation Platform
EFS	Electronic Flight Strip(s)
EIBT	Estimated In-block Time
ELDT	Estimated Landing Time

EOBT	Estimated Off-block Time
ETA	Estimated Time of Arrival
ETOT	Estimated Take-off Time
GBAS	Ground-Based Augmentation System
GND	Tower Ground Controller
GP	Glide Path
IBT	In-block Time
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IHP	Intermediate Holding Point
ILS	Instrumented Landing System
ITWP	Integrated Tower Working Position
LDT	Landing Time
LLZ	Localizer
LND	Landing Clearance
LUP	Line-up Clearance
HMI	Human Machine Interface
MET	Meteorological
NDB	Non-Directional Beacon
NLC	Next Logical Clearance
OBT	Off-block Time
PAPI	Precision Approach Path Indicator
PB	Pushback
PREF	Preferences
PWP	Pseudo-pilot Working Position
R&B	Range and Bearing
RECAT / RECAT EU	European Wake Turbulence Re-categorisation
REL	Runway Entry Light
RGB	Red-Green-Blue
RMCA	Runway Monitoring and Conflict Alerting
RPA	Runway Protection Area
R/T	Radio Transmission

RWSL	Runway Status Lights
RWY	Tower Runway Controller
SID	Standard Instrumented Departure
SSR	Secondary Surveillance Radar
SUP	Supervisor tool
TC	Tower Controller
TCL	Taxiway Centreline Lights
THL	Take-off Hold Light
TMA	Terminal Manoeuvre Area (also known as Terminal Control Area)
TOF	Take-off Clearance
TOT	Take-off Time
TWR	Tower
TWY	Taxiway
TX	Taxi
UI	User Interface
UTC	Coordinated Universal Time
VOR	VHF Omni-directional Radio
WTC	Wake Turbulence Category

Table 1 - Abbreviations table



SUPPORTING EUROPEAN AVIATION



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