


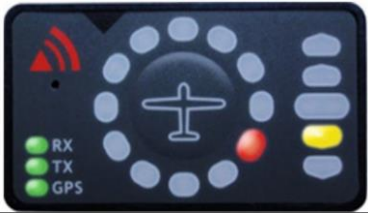
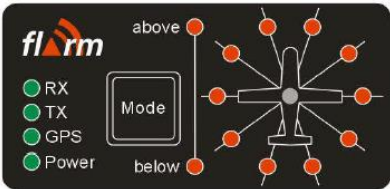

# BSS BRIEFING SHEET - FLARM DISPLAYS AND WARNINGS

## FLARM LED DISPLAYS

The functional indicators are identical for all LED display types. Some displays have a Power status indication LED.

<p><b><u>OPERATIONAL INDICATOR</u></b></p>  <p>Note: During initiation sequence, yellow clockwise circling LEDs indicates 'Copying IGC' files.</p>	<p><b>Functional indicator: Look for solid green GPS light (after initiation sequence)</b></p> <ul style="list-style-type: none"> <li>• RX status LED indicates that Flarm is receiving something from other Flarm units.</li> <li>• TX status LED indicates that Flarm is transmitting data.</li> <li>• GPS status LED has 3 different modes:             <ul style="list-style-type: none"> <li>▪ Fast blinking mode, means, that the display is not receiving any data from the Flarm device. ERROR</li> <li>▪ Slow blinking means, that GPS status is bad. ERROR</li> <li>▪ Solid light means, that GPS status is OK.</li> </ul> </li> </ul>
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The warning modes are similar but the horizontal and vertical indicators vary by LED display type as follows:

<p><b>LXNAV FLARM LED</b> DGZ, GAP, BSS (rear) WUO, GDT</p>  <p>Warning Mode shown</p>	<p><b>NEAREST Mode:</b> The direction to the nearest <u>aircraft equipped with Flarm</u> inside of radio range is shown by one <u>yellow</u> LED permanently lit and no audio. The display will change to Warning Mode automatically if the warning criteria is met.</p> <p><b>WARNING Mode:</b> Warning Mode will activate a red blinking LED in the circular display if another <u>aircraft equipped with Flarm</u> is close and a predicted collision risk has been calculated. The vertical angle (in steps of 14 degrees) is indicated by the column of LEDs on the right. An audio warning will also sound (can be difficult to hear). Higher collision risk will increase the LED blinking frequency and audio beep rate. The warning levels are:</p> <ul style="list-style-type: none"> <li>• First level (Low): Approx 18 seconds before predicted collision</li> <li>• Second level (Important): Approx 13 seconds before predicted collision</li> <li>• Third level (Urgent): Approx 8 seconds before predicted collision</li> </ul>
<p><b>EDIATec FLARM DISPLAY</b> BSS (front)</p> 	<p><b>NEAREST Mode:</b> The direction to the nearest aircraft equipped with Flarm inside of radio range is shown by one red LED permanently lit and no acoustic warning signal is given as long as no danger of collision exists. The display will change to Warning Mode automatically if the warning criteria is met.</p> <p><b>WARNING Mode:</b> The red Collision-LEDs show the horizontal bearing to the most threatening moving aircraft. The level of threat is shown by a flashing red light and acoustic warning signal at the following rate:</p> <ul style="list-style-type: none"> <li>• Low threat: flash/beeps at 2 Hz. Approx 18 seconds before predicted collision</li> <li>• Medium threat (Important): flash/beeps at 4 Hz. Approx 13 seconds before predicted collision</li> <li>• Immediate threat (Urgent): flash/beeps at 6 Hz. Approx 8 seconds before predicted collision</li> </ul> <p>The 2 LEDs "above" and "below" show the vertical bearing to the most threatening moving aircraft as long as the angle exceeds about 7°.</p>
<p><b>LXNAVIGATION FLARM DISPLAY</b> Tug TOJ, Tug ALA</p> 	<p><b>NEAREST Mode:</b> No information published by manufacturer. Believed to be similar to EDIATec</p> <p><b>WARNING Mode:</b> No information published by manufacturer. Believed to be similar to EDIATec.</p>

Descriptions above are based upon extracts from the manufacturers' equipment manuals. In case of any contradiction, the manufacturers' manuals are definitive.

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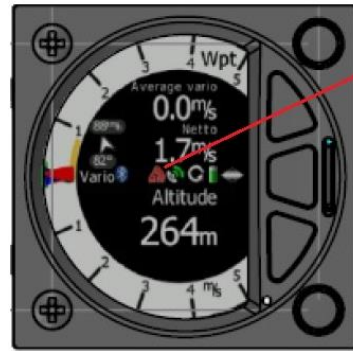
## LXNAV S100/S100D DISPLAYS

**Note:** In DGZ and GAP, the S100 must be switched on to power the Flarm

### FLARM OPERATIONAL INDICATOR – look for Flarm symbol on page 2 of Wpt or Tsk modes

On page 2 of Waypoint (Wpt) and Task (Tsk) modes, the Flarm symbol will be visible on the centre row if the S100 is receiving Flarm data. The symbol is Grey if the unit is functional, Red if it is receiving other Flarm devices.

Flarm is unlikely to be operational whilst the aircraft is in a hangar due to GPS signal screening.



Flarm is operational



when this symbol displayed

### LXNAV S100/S100D FLARM MODE DGZ, GAP, HDL, ZBL

The S100/S100D has a number of inflight selectable display modes, one is “Flarm Mode”.

Flarm Mode displays a map of the relative positions of all Flarm targets that are within range.

- TX/number shows how many Flarm aircraft are identified
- Twist the lower rotary knob to change map scale (range 0.5 km to 150 km). The display shows the radius distance to the edge of the screen (0.5km in example shown).
- Data for selected Flarm aircraft is shown in 4 corners: Flarm Id, Distance, Vario and Relative altitude (Above / Below).
- The Flarm ID will show the aircraft Rego provided it is in the .fln (FlarmNet) file loaded in the S100
- Switch between Flarm targets via the up/down buttons. Red line goes to selected target.

**Low Warning** (1st level) is given at approx 18 seconds before a predicted collision. The audio warning is a long voice message comprising: “Traffic at [position], [distance], [vertical distance]”.



Glider colours show:

- Blue = Glider above
- Green = Glider below
- Red = Glider near or selected

### LXNAV S100/S100D WARNING MODE

DGZ, GAP, HDL, ZBL

If a Flarm equipped aircraft triggers an:

- **Important warning** (2nd level = Yellow)
- **Urgent Warning** (3<sup>rd</sup> level = Red),

then regardless of the selected display mode, the screen will change to the Flarm Warning Mode automatically in the S100's centre display.

Multiple targets can be displayed.

The central white number and chevrons indicate whether the Flarm target is above or below and by how many metres. The white number bottom right indicates the range in metres. The numbers relate only to the closest or most dangerous target.



**Important Warning** 14-18 seconds before predicted collision.

Audio warning is a short voice message short comprising: “Traffic at [position]”



**Urgent Warning** 6-8 seconds before predicted collision.

Audio warning is rapid beeps.

Descriptions above are based upon extracts from the manufacturers' equipment manuals. In case of any contradiction, the manufacturers' manuals are definitive.

# **BSS BRIEFING SHEET - FLARM DISPLAYS AND WARNINGS**

## **HOW FLARM WORKS**

Each Flarm device (eg FlarmMouse, PowerFlarm Core) determines its position and altitude with a highly sensitive state of the art GPS receiver. Based on speed, acceleration, heading, track, turn radius, wind, altitude, vertical speed, configured aircraft type, and other parameters, a very precise projected flight path is calculated. The flight path is encoded and sent over an encrypted radio channel to all nearby Flarm equipped aircraft at least once per second.

At the same time, the Flarm device receives similar encoded flight path information from all surrounding aircraft. Using a combination of own and received flight paths, an intelligent motion prediction algorithm calculates a collision risk for each received aircraft based on an integrated risk model. The Flarm device communicates this, together with the direction and altitude difference to the intruding aircraft, to the connected Flarm display (eg Flarm LED, LXNav S100). Pilots are then given visual and aural warnings of potential collision and can take resolute action.