



POH / AFM  
AQUILA AT01-200

POH-Supplement  
AST-03

## SECTION 9

# Pilot's Operating Handbook Supplement AST-03

## Garmin G3X Touch

### GDU460 Primary Flight Display and Engine Indication System with GDU470 Back-up Display



This supplement is applicable and must be integrated into the Airplane Flight Manual if a Garmin G3X Touch Primary Flight Display and Engine Indication System with an additional Garmin G3X Touch Back-up Display is installed into the AQUILA AT01-200. Information in this supplement compliments or replaces chapters in the basic Airplane Flight Manual and, in the case of night VFR, also information in the Supplement AST-04.

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.025.

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| A.01  | Initial Issue     | all            | 27.07.2022    |
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## 1. General

### 1.1. Introduction

The information found in this Airplane Flight Manual Supplement is to be used alongside the basic Airplane Flight Manual.

This Airplane Flight Manual Supplement contains additional information required for the safe operation of an AQUILA AT01-200 equipped with a Garmin G3X Touch Primary Flight Display and Engine Indication System (EIS) with an additional Garmin G3X Touch Back-up Display.

The chapters of this Airplane Flight Manual Supplement follow the same structure as the basic Airplane Flight Manual. Only the chapters listed in this document are affected by the installation of the Garmin G3X Touch Primary Flight Display and Engine Indication System with an additional Garmin G3X Touch Back-up Display.

For further information and comprehensive operating instructions, please reference the current issue of the Garmin G3X Touch Pilot's Guide. Please keep in mind that the Garmin G3X Touch Pilot's Guide must be kept on board the aircraft and be accessible to the pilot at all times. It is the pilot's responsibility to familiarize him or herself with the operation, characteristics and limitations of the Garmin G3X System.

## 2. Operating Limitations

### System Requirements

- The Garmin G3X Touch Primary Flight Display and the additional Garmin G3X Touch MFD must utilize the following or later software versions:

| Component                                                        | Software Version                                      |
|------------------------------------------------------------------|-------------------------------------------------------|
| GDU 460 (10")<br>Garmin G3X Touch Primary Flight Display und EIS | GDU 4XX STC version<br><b>9.02</b> (both units equal) |
| GDU 470 (7")<br>Garmin G3X Touch Back-up Display                 |                                                       |

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## 2.5 MARKINGS on the ENGINE INFORMATION SYSTEM of the Garmin G3X Touch

The following table shows the instrument markings on the EIS and their meaning.

| G3X EIS                                       | Red Line<br>(minimum) | Green Arc<br>(normal<br>operating range) | Yellow Arc<br>(caution)                                 | Red Line<br>(maximum) |
|-----------------------------------------------|-----------------------|------------------------------------------|---------------------------------------------------------|-----------------------|
| Tachometer<br>[RPM]                           | ---                   | 0 – 2260                                 | 2260 - 2385                                             | 2385                  |
| Oil Temperature<br>[°F] / ([°C])              | 122<br>(50)           | 122 - 266<br>(50 – 130)                  | ---                                                     | 266<br>(130)          |
| Cylinder Head<br>Temperature<br>[°F] / ([°C]) | ---                   | ---                                      | ---                                                     | 248<br>(120)          |
| Oil Pressure<br>[psi] / ([bar])               | 11.6<br>(0.8)         | 29 – 72.5<br>(2.0 – 5.0)                 | 11.6 – 29<br>(0.8 – 2.0)<br>72.5 – 101.5<br>(5.0 – 7.0) | 101.5<br>(7.0)        |
| Fuel Pressure<br>[psi] / ([bar])              | 2.2<br>(0.15)         | 2.2 – 5.1<br>(0.15 – 0.35)               | ---                                                     | 5.1<br>(0.35)         |
| Manifold Pressure<br>[inHg]                   | ---                   | 0 – 35                                   | 35 – 40                                                 | 40                    |
| Voltmeter<br>[V]                              | 11                    | 12.5 - 15.5                              | 11 - 12.5                                               | 15.5                  |
| Amperemeter<br>BAT [A]                        | ---                   | -3 - +100                                | < -3                                                    | ---                   |
| Amperemeter<br>ALT1 or ALT2 [A]               | ---                   | ---                                      | ---                                                     | ---                   |
| optional: EGT<br>[°F] / ([°C])                | ---                   | 104 - 1742<br>(40 - 950)                 | ---                                                     | 1742<br>(950)         |
| optional: Fuel Flow<br>[Gal/h] / ([l / h])    | ---                   | 0 - 11.9<br>(0 - 45)                     | < 11.9<br>(< 45)                                        | ---                   |

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## 2.11 Kinds of Operation Limits / Minimum Equipment

Certified for: visual flights by Day and Night (if AST-04 is applied in addition)

| Table 1                             | For VFR by Day*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Additional for VFR by Night*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flight and navigational instruments | <ul style="list-style-type: none"> <li>Garmin G3X 10" Landscape PFD and Garmin G3X 7" Portrait Back-up Display indicating at least: <ul style="list-style-type: none"> <li>Altitude (0 – 20,000 ft)</li> <li>Airspeed (0 – 200 kts)</li> </ul> </li> <li>Magnetic Compass</li> <li>Working timepiece with a seconds hand**</li> <li>VHF Transceiver***</li> </ul>                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Garmin G3X 10" Landscape PFD indicating: <ul style="list-style-type: none"> <li>Attitude</li> <li>Side Slip</li> <li>Directional Gyro</li> <li>Outside Air Temperature (OAT)</li> <li>Vertical Speed</li> </ul> </li> <li>Stby. Flight Display with independent Emergency Battery (e.g. G5) indicating: <ul style="list-style-type: none"> <li>Attitude and Altitude</li> </ul> </li> <li>Transponder with altitude encoding or Transponder without altitude display plus analogue altimeter</li> <li>VOR navigation receiver</li> </ul> |
| Power Plant Instruments             | <ul style="list-style-type: none"> <li>any Garmin G3X EIS indicating at least: <ul style="list-style-type: none"> <li>Fuel Quantity remaining</li> <li>Oil Temperature and Pressure</li> <li>Cylinder Head Temperature</li> <li>Manifold Pressure</li> <li>Tachometer</li> <li>Voltmeter</li> <li>Ammeter BAT</li> <li>Ammeter ATL1 / ALT2 (with toggle switch)</li> </ul> </li> <li>Warning Light ALT 1</li> <li>Warning Light ALT 2</li> <li>Warning Light BOOST</li> <li>Warning Light TCU</li> <li>Warning "FUEL PRESS" (displayed via G3X EIS)</li> <li>Warning "VOLT" (displayed via G3X EIS)</li> <li>BAT2 and TCU</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Lighting                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>navigation lights</li> <li>anti-collision lights (ACL)</li> <li>landing light</li> <li>instrument lighting</li> <li>cockpit lighting</li> <li>flashlight for every crew member</li> </ul>                                                                                                                                                                                                                                                                                                                                                |
| Other Equipment                     | <ul style="list-style-type: none"> <li>Seat belts for each occupied seat</li> <li>Emergency Hammer</li> <li>Battery ≥ 34 Ah and Alternator ALT 2</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

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\* The minimum equipment listed in Table 1 is valid for Germany. Other countries may require different minimum equipment. This may depend on the type of flight being carried out and the route being flown.

\*\* In Germany a watch with a seconds hand may be used as a working timepiece. Please observe all differing national regulations.

\*\*\* In Germany a VHF Transceiver is not required for flights that do not leave the vicinity of an uncontrolled airfield (§4 Abs. 3 FSAV). Regulations of other nations must still be observed.

**NOTE**

*For specific operations, additional equipment may be necessary. It is the aircraft operator's responsibility to observe the applicable requirements.*

## 2.12 Fuel Limitations

**NOTE**

*The fuel quantity, fuel used and fuel remaining functions of the G3X are advisory information only and must be verified by the pilot.*

## 3. Emergency Procedures

### 3.3.3 In-flight Engine Failures

#### C) LOSS OF FUEL PRESSURE

**FUEL PRESS** warning (RED) displayed on the G3X EIS (no separate warning light!)

**WARNING**

*In case of MAIN fuel pump failure the AUX fuel pump has to be switched on within 3 seconds to prevent engine failure at increased boost pressure!*

### 3.10.2 Battery discharges (BAT)

**BATT AMPS** warning (YELLOW) displayed on the G3X EIS

### 3.10.5 Low Voltage Indication

**VOLTS** warning (YELLOW) displayed on the G3X EIS (no separate warning light!)

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### 3.13 Avionics Malfunctions

#### 3.13.4 Primary Flight Display and/or MFD Failure

- |                                                |                   |
|------------------------------------------------|-------------------|
| 1. <b>PFD</b> circuit breaker (see 3.1.1)      | RESET, if tripped |
| 2. <b>ADAHRS 1</b> circuit breaker (see 3.1.1) | RESET, if tripped |
| 3. <b>MFD</b> circuit breaker (see 3.1.1)      | RESET, if tripped |
| 4. <b>ADAHRS 2</b> circuit breaker (see 3.1.1) | RESET, if tripped |
| 5. <b>GAD PWR</b> circuit breaker (see 3.1.1)  | RESET, if tripped |

It is possible to safely continue flight, even if the PFD and/or MFD failure cannot be corrected in flight, by referencing the remaining instruments. It may, none the less, be prudent to land at the nearest airfield.

#### NOTE

*Following information is still available when the PFD and MFD fail:*

|                       |                                                              |
|-----------------------|--------------------------------------------------------------|
| <u>Attitude:</u>      | Natural horizon or standby attitude indicator (if installed) |
| <u>Altitude:</u>      | Transponder altitude, ground visibility                      |
| <u>Heading/Track:</u> | Compass                                                      |
| <u>Airspeed:</u>      | stall warning                                                |

#### 3.13.5 Magnetometer Failure

- |                               |                   |
|-------------------------------|-------------------|
| 1. <b>GMU</b> circuit breaker | RESET, if tripped |
|-------------------------------|-------------------|

#### NOTE

*In the event of a magnetometer failure a red X will be displayed over the course display. If the GDU 460 / 470 is receiving a valid GPS ground track signal, the magnetic heading display will be replaced with the GPS ground track. The GPS ground track is displayed in magenta.*

#### 3.13.6 Complete Navigation System Failure

- |                                                |                   |
|------------------------------------------------|-------------------|
| 1. <b>ADAHRS 1</b> circuit breaker (see 3.1.1) | RESET, if tripped |
| 2. <b>ADAHRS 2</b> circuit breaker (see 3.1.1) | RESET, if tripped |
| 3. Navigation                                  | Compass           |

#### NOTE

*In the event of a complete navigation system failure (magnetometer and GPS ground track) a red X will be displayed over the course display and the markings on the compass rose disappear.*

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### 3.13.7 ADAHRS Failure

- |                                                |                                                                 |
|------------------------------------------------|-----------------------------------------------------------------|
| 1. <b>ADAHRS 1</b> circuit breaker (see 3.1.1) | RESET, if tripped                                               |
| 2. <b>ADAHRS 2</b> circuit breaker (see 3.1.1) | RESET, if tripped                                               |
| 3. <b>GAD PWR</b> circuit breaker (see 3.1.1)  | RESET, if tripped                                               |
| 4. Attitude                                    | Natural horizon or<br>standby attitude indicator (if installed) |

**NOTE**

*In the event of an AHRS Failure, the horizon is no longer displayed on the PFD. Additionally a red "X" and in yellow "AHRS FAILURE" is displayed. A Navigation System Failure, as described in section 3.13.6, accompanies an AHRS Failure.*

### 3.13.8 ADC Failure

- |                                               |                                         |
|-----------------------------------------------|-----------------------------------------|
| 1. <b>AHRS 1</b> circuit breaker (see 3.1.1)  | RESET, if tripped                       |
| 2. <b>AHRS 2</b> circuit breaker (see 3.1.1)  | RESET, if tripped                       |
| 3. <b>GAD PWR</b> circuit breaker (see 3.1.1) | RESET, if tripped                       |
| 3. Continue flight                            | Using stand-by instruments (see 3.13.4) |

**NOTE**

*Failure of the Air Data Computers (ADC) is indicated through a red X and yellow text above the airspeed indicator, the altimeter, the vertical speed indicator, the TAS and the OAT indicators. Certain functions, such as TAS and wind calculation, are no longer usable.*

### 3.13.9 Complete G3X EIS Failure (Loss of Engine Data Display)

- |                                                      |                                               |
|------------------------------------------------------|-----------------------------------------------|
| 1. <b>Fuel Pump AUX</b> switch                       | ON (no warning in case of low fuel pressure!) |
| 2. <b>Engine Instr 1</b> circuit breaker (see 3.1.1) | RESET, if tripped                             |

If the G3X EIS failure cannot be corrected, maintain power settings and land at the nearest suitable airfield.

**NOTE**

*During a total failure of the G3X Engine Data Display AND modified power settings a RPM overshoot is not possible with the following settings:*

- |                                          |                              |
|------------------------------------------|------------------------------|
| 1) <i>Throttle (MP):</i>                 | <i>100% indexed position</i> |
| 2) <i>Propeller Control Lever (rpm):</i> |                              |
| ⇒ <i>During climb:</i>                   | <i>HIGH RPM</i>              |
| ⇒ <i>All other flight phases:</i>        | <i>below marking „MCP“</i>   |

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## 4. Normal Procedures

### 4.5.1 Before Engine Start-up

- |     |                                 |           |
|-----|---------------------------------|-----------|
| 15. | <b>ALT1 / BAT</b> switch        | ON        |
| 19. | <b>VOLTS</b> warning (RED)      | displayed |
| 20. | <b>FUEL PRESS</b> warning (RED) | displayed |

|             |
|-------------|
| <b>NOTE</b> |
|-------------|

*Pay attention to messages that may appear on the PFD and MFD displays while the system is loading.*

*The attitude indicators (AHRS module and stand-by indicator) require several minutes to stabilize. Pay attention to information on the Garmin G3X displays.*

Both GARMIN G3X Touch Display units have an integrated sensor that automatically adjusts the brightness of the display.

It is also possible to adjust the brightness of each display manually.

PRESS TWICE the Menu Key of the G3X Touch display unit to change to Setup page. Select "Display" and "Backlight Control" to switch to "Manual".

To manually adjust the brightness change into "Backlight Intensity" and touch the slider for the appropriate backlight setting. When finished press the ENT button to save the changes.

### 4.5.13 Engine Shut-down

- |    |                          |     |
|----|--------------------------|-----|
| 8. | <b>ALT1 / BAT</b> switch | OFF |
|----|--------------------------|-----|

|             |
|-------------|
| <b>NOTE</b> |
|-------------|

*The Garmin G3X displays are turned off with the ALT1/BAT switch.*

## 5. Performance

There is no change regarding the information in the basic Pilot's Operating Handbook.

## 6. Weight and Balance

There is no change regarding the information in the basic Pilot's Operating Handbook.

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## 7. System Description

### NOTE

*This supplement includes a general description of the integration of the Garmin G3X Touch System into the AQUILA AT01-200. A Complete description and extensive operating instruction can be found in the Garmin G3X Touch Pilot's Guide.*

### 7.1 Introduction

The Garmin G3X Touch is an Electronic Flight Instrument System (EFIS) which provides an intuitive touch screen user interface with a wide array of features.

The system is capable of providing the following functionalities:

- Primary Flight Display (PFD)
- Multi-Function Display (MFD)
- Engine Indication System (EIS)
- Optional Traffic Receiver Display (ADS-B and FLARM)

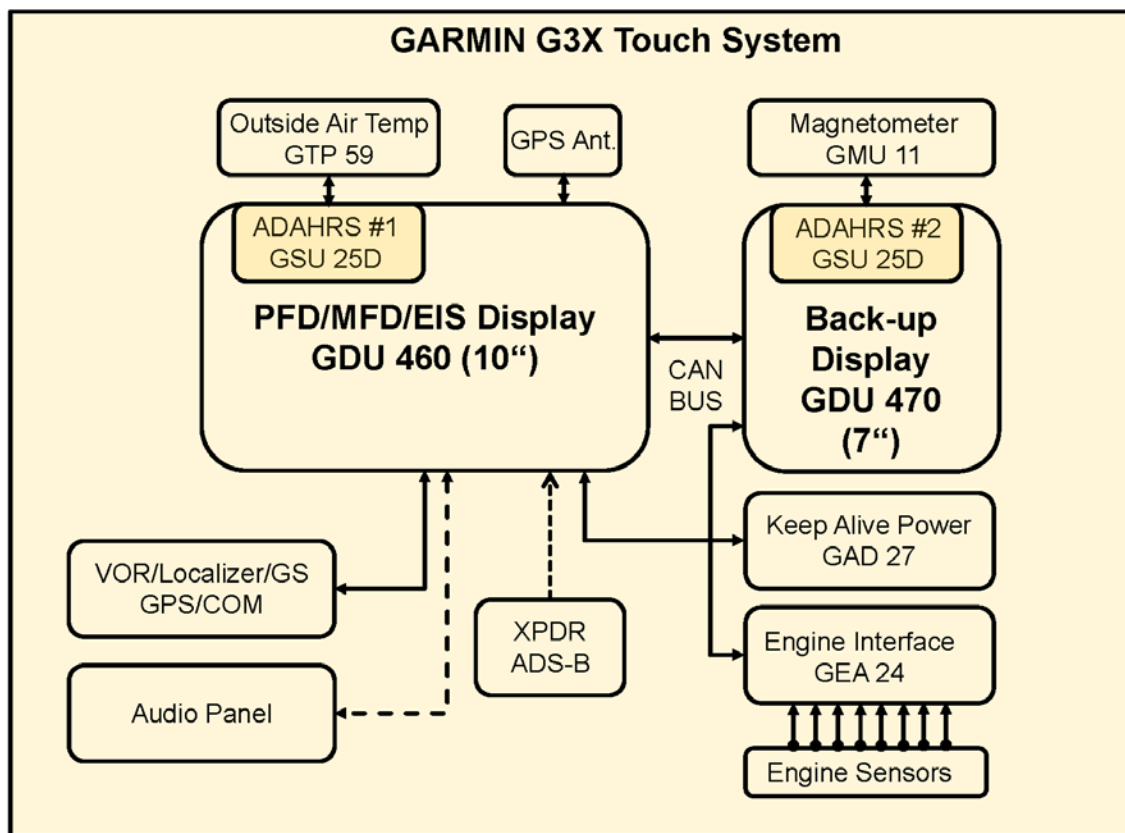
### 7.2 Integration into the AQUILA AT01-200

The Garmin G3X Touch System is composed of several sub units or Line Replaceable Units (LRUs). The LRUs have a modular design and are installed behind or in case of a Garmin Display Unit (GDU) directly into the panel. The GPS Antenna (required for the G3X Touch) is mounted on-top the aft section of the fuselage.

The GMU 11 Magnetometer is located inside the fuselage, behind the baggage compartment. When installed into the AQUILA the Garmin G3X Touch System includes the following LRU's:

|                     |                                                                         |
|---------------------|-------------------------------------------------------------------------|
| <b>GDU 460</b>      | 10,6 inch PFD                                                           |
| <b>GDU 470</b>      | 7 inch MFD                                                              |
| <b>GSU 25D (2x)</b> | Attitude and Heading Reference System and Air Data Computer             |
| <b>GMU 11</b>       | Magnetometer (fuselage mounted)                                         |
| <b>GTP 59</b>       | Outside Air Temperature Sensor (fuselage mounted)                       |
| <b>GAD 27</b>       | Power Stabilization Unit during Engine Startup                          |
| <b>GEA 24</b>       | Engine Sensor Interface Module                                          |
| <b>GPS Antenna</b>  | for the G3X Touch internal GPS receiver, limited to VFR navigation only |

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### Electrical protection of the G3X Touch System

| Circuit Breaker | Current | LRU                         |
|-----------------|---------|-----------------------------|
| PFD             | 5A      | G3X Touch GDU 460 10,6" PFD |
| MFD             | 5A      | G3X Touch GDU 470 7" MFD    |
| ADAHRS 1        | 2A      | PFD's GSU 25D and GMU11     |
| ADAHRS 2        | 2A      | MFD's GSU 25D               |
| GAD PWR         | 10A     | GAD 27                      |
| ENG SNSR        | 2A      | GEA 24                      |

The Garmin G3X Touch System receives power via the aircrafts MAIN BUS and is powered up as soon as the aircrafts MASTER SWITCH is turned ON.

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### G3X Touch display messages

The following tables show the color and significance of the warning, caution, and advisory messages which may appear on the G3X Touch display.

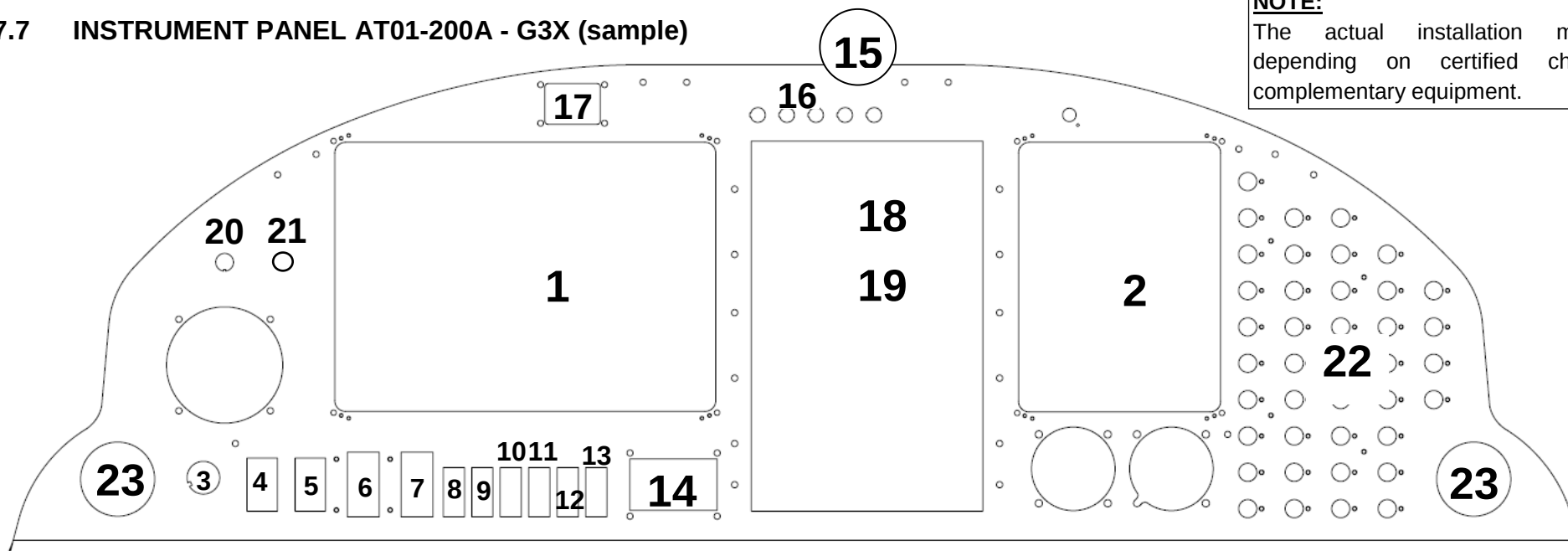
| Annunciation- Red                                                                | Pilot Action                                                                      | Cause                                                                                                 |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Red X</b>                                                                     | Reference the data source or alternate equipment.                                 | A red X through any display field indicates that display field is not receiving data or is corrupted. |
| <b>Red Engine Parameter</b>                                                      | Take appropriate action to correct condition causing engine parameter exceedance. | The engine parameter has exceeded the warning threshold.                                              |
|  | Select full screen mode on display to view WARNING annunciations.                 | Display is in split screen mode and WARNING annunciations are not displayed.                          |

| Annunciation- Amber                                                                | Pilot Action                                                                                                                                                                                                                            | Cause                                                                                                                                             |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HDG (amber background)</b>                                                      | Use standby compass                                                                                                                                                                                                                     | Displayed heading is outside of the internal accuracy limits.                                                                                     |
|  | Select full screen mode on display to view CAUTION annunciations.                                                                                                                                                                       | Display is in split screen mode and CAUTION annunciations are not displayed.                                                                      |
| <b>AHRS ALIGN – Keep Wings Level</b>                                               | Fly aircraft manually and crosscheck attitude indication with standby attitude indicator and other sources of attitude information. Limit aircraft attitude to $\pm 10^\circ$ bank and $\pm 5^\circ$ pitch as AHRS Aligns - OK to taxi. | Attitude and Heading Reference System is aligning. AHRS may not align with excessive pitch/bank angles.                                           |
| <b>AHRS ALIGN</b>                                                                  | Fly aircraft manually and crosscheck attitude indication with standby attitude indicator and other sources of attitude information (airspeed, heading, altitude, etc.)                                                                  | The AHRS monitors have detected a possible AHRS malfunction or an error with the attitude presentation. The AHRS is attempting to realign itself. |
| <b>ADC FAIL</b>                                                                    | Use standby airspeed and altimeter indicator.                                                                                                                                                                                           | Both GSU 25 air data computer have failed.                                                                                                        |
| <b>(Flashing) MESSAGE</b>                                                          | Press the flashing message annunciation to view a new system message.                                                                                                                                                                   | A new system message has annunciated.                                                                                                             |
| <b>Amber Engine Parameter</b>                                                      | Take appropriate action to correct condition causing engine parameter exceedance.                                                                                                                                                       | The engine parameter has exceeded the caution threshold.                                                                                          |
| <b>TRAFFIC</b>                                                                     | Visually acquire the traffic to see and avoid.                                                                                                                                                                                          | The interfaced traffic system has determined that nearby traffic may be a threat to the aircraft.                                                 |
| <b>ECS FAIL</b>                                                                    | NONE                                                                                                                                                                                                                                    | The Electrical Control System has failed (GAD 27 FAILED, no Backup power via GAD 27)                                                              |

For a detailed description and full operating instructions please refer to the current issue of the Garmin G3X Touch Pilot's Guide.

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## 7.7 INSTRUMENT PANEL AT01-200A - G3X (sample)



**NOTE:**

The actual installation may differ depending on certified changes or complementary equipment.

For minimum instrument requirements, refer to Section 2.12 of this manual

| No. | Description         | No. | Description   | No. | Description             | No. | Description         | No. | Description  | No. | Description                        |
|-----|---------------------|-----|---------------|-----|-------------------------|-----|---------------------|-----|--------------|-----|------------------------------------|
| 1   | GARMIN GDU460 - 10" | 5   | ALT2/BAT2     | 9   | ACL                     | 13  | Autopilot (opt.)    | 17  | ELT          | 21  | Toggle Switch<br>Ammeter ALT1/ALT2 |
| 2   | GARMIN GDU470 - 7"  | 6   | Fuel Pump AUX | 10  | Landing Light           | 14  | Flap Control Switch | 18  | COM/NAV/GPS  | 22  | Circuit Breakers                   |
| 3   | Ignition Switch     | 7   | Avionics      | 11  | Instrument Lights (opt) | 15  | Compass             | 19  | Transponder  | 23  | Ventilation Nozzle                 |
| 4   | ALT1/BAT            | 8   | Nav-Light     | 12  | P/S Heat (opt.)         | 16  | Warning Lights      | 20  | TCU - Switch |     |                                    |

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## 7.14 ELECTRICAL SYSTEM

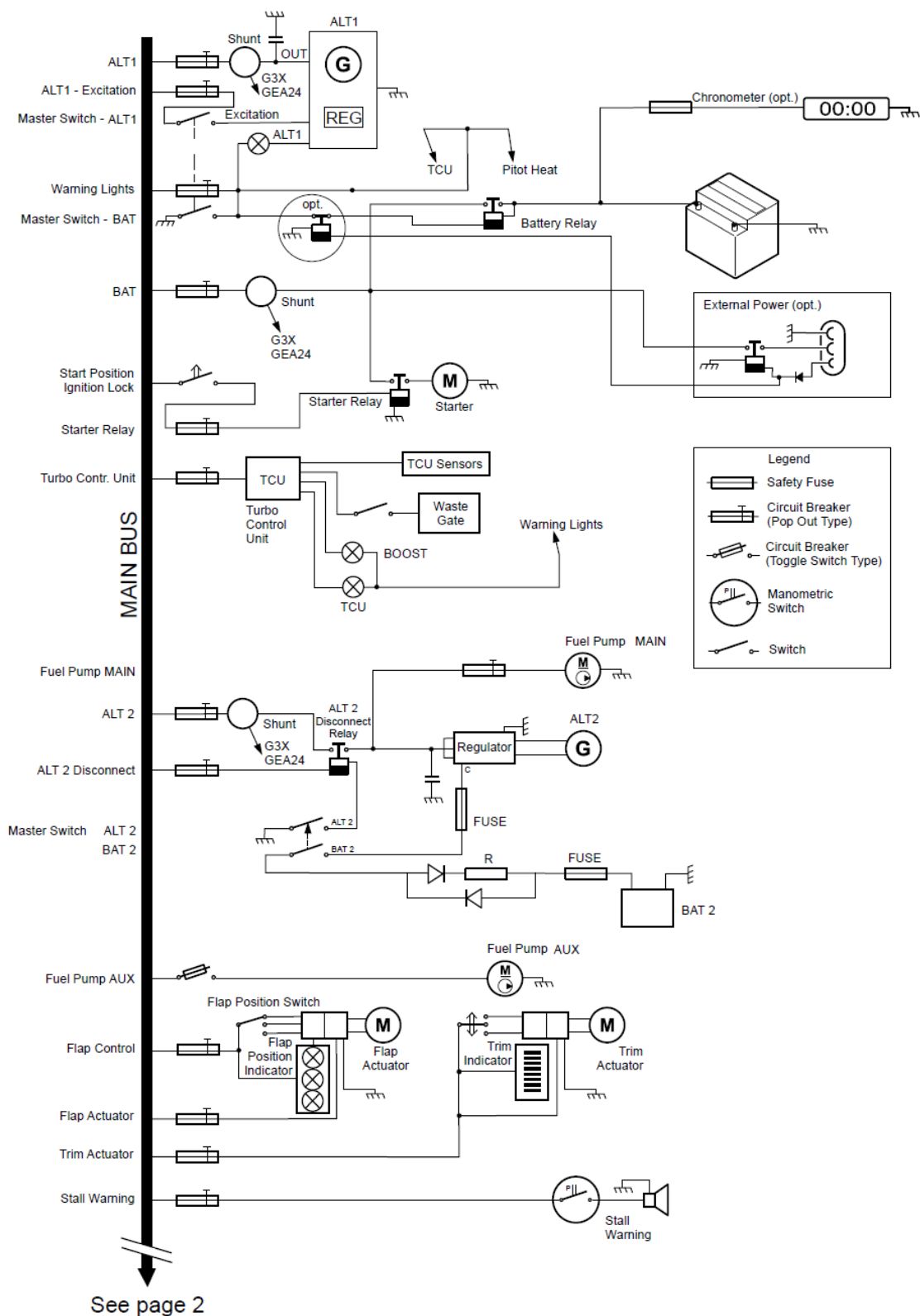


Fig.: Electrical System Schematic 1/2

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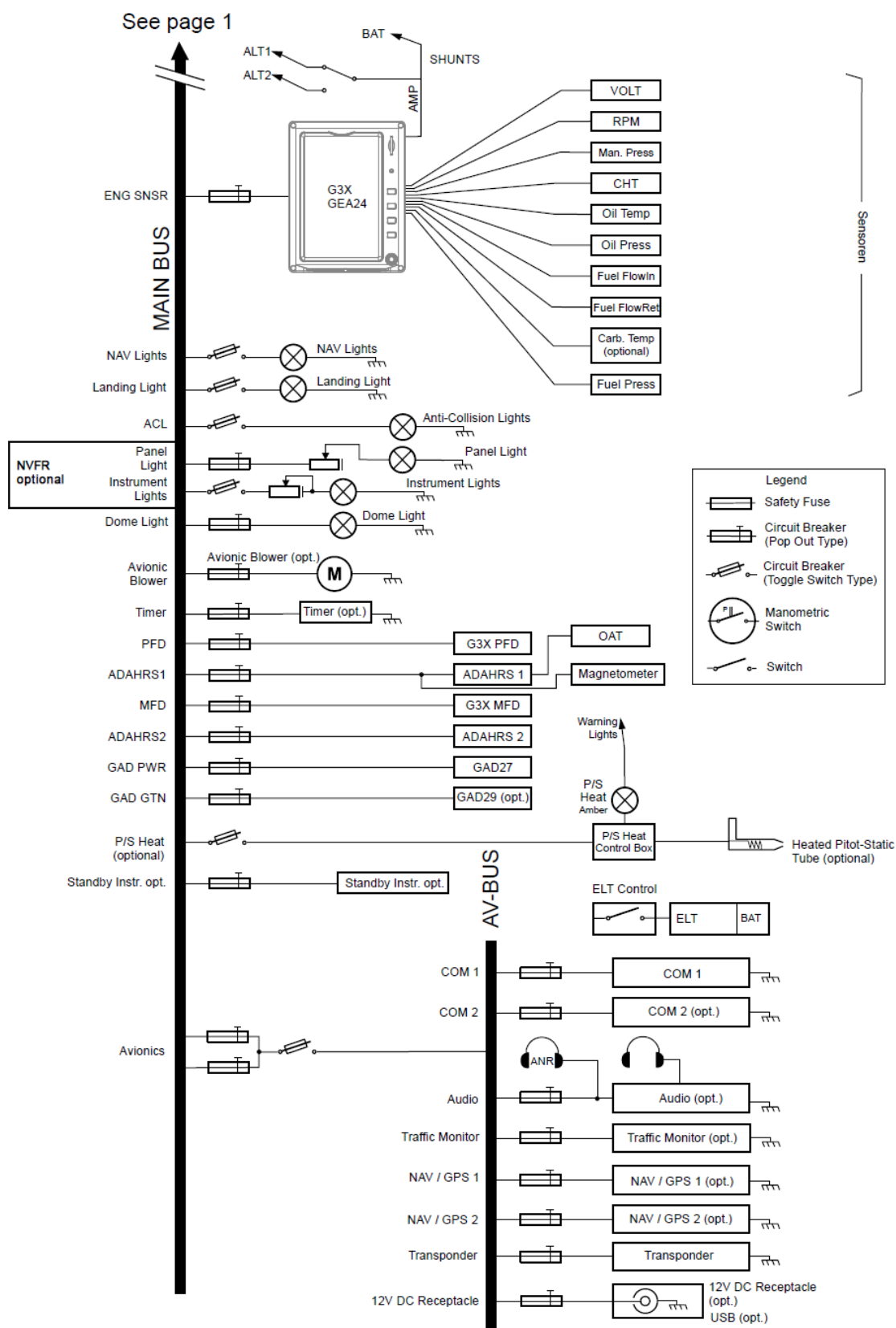


Fig.: Electrical System Schematic 2/2

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## 8. Handling, Servicing and Maintenance

### Display Cleaning

The display uses a lens with a special coating that may be sensitive to skin oils, waxes, and abrasive cleaners. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTIREFLECTIVE COATING.

It is very important to clean the lens using a clean, lint-free cloth and a cleaner that is specified as safe for anti-reflective coatings. Avoid any chemical cleaners or solvents that can damage plastic components.

### Data Logging

Among other things, the G3X Touch records the engine parameters for later analysis.

If an SD card is inserted into the PFD or MFD, a new file is created for each flight, making evaluation much easier.

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