# DECLARATION OF DESIGN AND PERFORMANCE



**CONFIDENTIAL**

TITLE: **STRATOTIMER ST3-1001 DECLARATION OF DESIGN AND PERFORMANCE**

DOCUMENT NO.: **ST3-DDP-100**

VERSION: **1.0**

PROJECT: **15486**

MANUFACTURER: **THOMMEN AIRCRAFT EQUIPMENT AG**
**Hofackerstrasse 48**
**CH-4132 Muttenz**
**Switzerland**

ISSUING OFFICE: **R&D DEPARTMENT**

| CHANGE HISTORY | | | | |
|---|---|---|---|---|
| **Version** | **Modification Description** | **Date** | **Author** | **Checked** |
| 1.0 | Initial Release | 26 May 2020 | G. Barbier | |

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# 1. Name and Address of Manufacturer

**THOMMEN AIRCRAFT EQUIPMENT AG**
Hofackerstrasse 48
CH-4132 Muttenz
Switzerland

# 2. Description and Identification

| | |
|---|---|
| Type No | ST3-1001 |
| Modification | None |
| Master drawing No. | 1020-900-001 rev F |
| Form Factor | 3ATI ARINC 408A housing |
| Weight | 540 g ( ±10 g ) |
| Dimensions | L 124mm (4.9 in) x W 83mm (3.3 in) x H 83mm (3.3 in), see also Figure 2 : Generic Type Identification Drawing |


**Figure 1 : Example of Identification Label**

### 2.1 Description

The THOMMEN STRATOTIMER (ST3) is a digital multifunction clock as Line Replaceable Unit (LRU) to provide time, counter, and alarm functions with high density multicolor TFT display in 3-ATI cases for CS23, CS25, CS27, CS29.

- Universal Time Coordinated (UTC), Local Time (LT)
- Flight Time (FT), Elapsed Time (ET), Elapsed Time Down (ETD)
- Flight Time Alarm (FTA), Elapsed Time Down Alarm (ETDA)
- Integrated Alarm Output (Audio)
- Maintenance Time in Hours (MTH)
- GPS Sync – ARINC 429
- Day Mode / Night Mode with integral lighting dimming curve
- Sunlight readable, high density, sharp contrast ratio, and configurable display
- Primary and Secondary Power Input
- Elapsed Time Count Down for helicopters before engine turning off
- S-Video input

# DECLARATION OF DESIGN AND PERFORMANCE



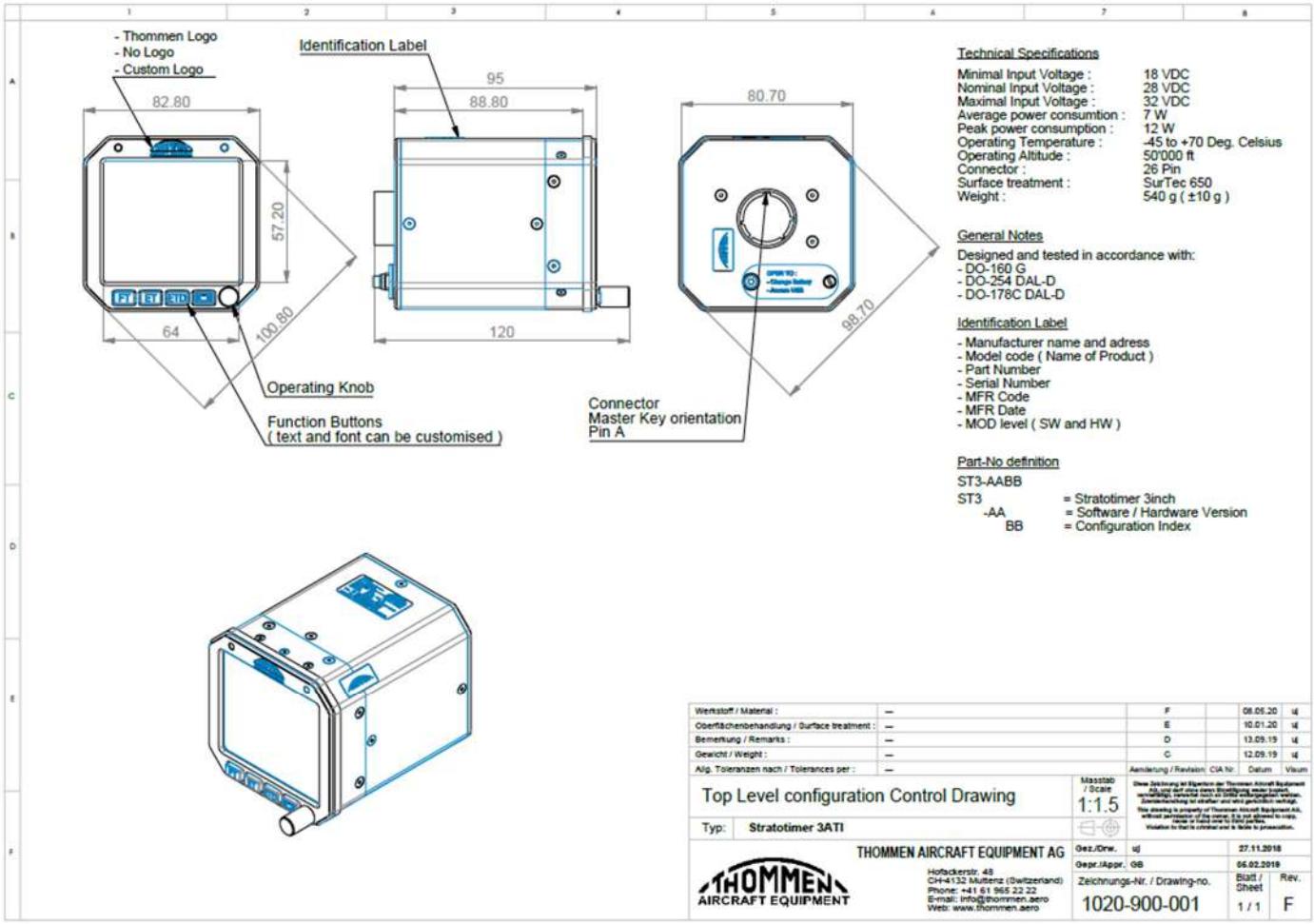


**Figure 2 : Generic Type Identification Drawing**

# 3. Specification Reference

| | | |
|---|---|---|
| • EASA/PART 21, Subpart K | Certification of aircraft and related products, parts and appliances and of design and production organizations | N/A |
| • EUROCAE ED-14D/RTCA/DO-160G | Environmental Conditions and Test Procedures for Airborne Equipment. | December 8, 2010 |
| • EUROCAE ED-12B/RTCA/DO-178C | Software Considerations in Airborne Systems and Equipment Certification. | January 5,2012 |
| • EUROCAE ED 80/RTCA/DO-254 | Digital Clock Installation in Aircraft | April 19, 2000 |
| • FAA/AC20-94A | Digital Clock Installation in Aircraft | April 13, 2007 |
| • MIL-STD-3009 | Lighting, Aircraft, Night Vison Imaging System (NVIS) Compatible | February 2, 2001 |
| • ST-SPE-100 | Equipment Specification | Rev 2.1 |
| • ST3-FMECA-100 | Failure Mode Effect Analyses | Rev 2.0 |
| • ST3-RP-100 | Reliability Prediction | Rev 2.0 |
| • ST3-ECID-100 | Equipment Configuration Index | Rev 2.02 |

# 4. Rated Performance

**Performance Specification:**

| | |
|---|---|
| • Mean Time Between Failures | > 39.000 hours of operation in AIC environment*<br>> 26.000 hours of operation in AIF environment*<br>> 12.000 hours of operation in ARW environment*<br>**not in Storage Mode of Operation* |

**Qualifications:**

| | |
|---|---|
| • RTCA/DO-160G | [as defined in Table 1: Environmental Qualification Category] |

**Electrical Characteristics:**

| | |
|---|---|
| • Supply Power | 28 VDC < 300 mA<br>@ 28 VDC |
| • Lighting Control Input Signal | 0-5 / 0-14 / 0-28 VDC < 5 mA<br>0-5 / 0-14 / 0-28 VAC @ 400 Hz < 5 mA<br>0-5 / 0-14 / 0-28 VDC PWM < 5 mA |
| • Lighting Mode Input Signal | 0 to Supply Power Voltage sinks < 5 mA against power return |

**Interfaces:**

| | |
|---|---|
| • User interface | The ST3 provides 4 push buttons and 1 rotary knob with push button for selecting operational mode, start/stop counters and increase field values |
| • System connector | The system connector provides connection to aircraft power and ground, inputs to accomplish Day/Night dimmable lighting, input for weight-on-wheels signal and output for alarm signal. ARINC 429 input, ARINC 429 output. |
| • USB interface | For configuration and maintenance purposes. |

## 5. Reference to Qualification Test Report

The ST3 was tested in accordance with procedures and specifications given in the Aerospace Standard RTCA/DO-160G to the categories as listed in Table 1: Environmental Qualification Category. The reports and results of these qualification tests are given in the Test Report with Part. TAE No. ST3-QTR-100.

## 6. Service and Instruction Manual Reference

The ST3 is described in terms of installation and functionality in the following TAE document:

- Installation and Operation Manual
  ST3-INSOP-100 (31-20-01)

# 7. Conformance

At the time of writing this DDP, neither EASA nor FAA have issued a Technical Standard Order (TSO) for chronometers or clocks. The ST3 is airworthy because EASA Part 21 Subpart K – Parts and Appliances is applicable. Furthermore, the ST3 is designed and constructed to meet the requirements of FAA/AC20-94A.

# 8. Compliance with the Ability to withstand Various Ambient Conditions

| **Environmental Criteria** | | | | |
|---|---|---|---|---|
| ***Section 4.0*** | ***Temperature & Altitude*** | Cat. **B2** | | |
| | Continuous & Short Time Operating Temperature | -45° to 70°C | | |
| | Ground Survival Temperature | -55 to +85 °C | | |
| | In-Flight Loss of Cooling | +40°C | | |
| | Altitude | 25,000 Feet | Extended 50,000 Feet | |
| | Decompression | N/A | | |
| | Overpressure | N/A | | |
| ***Section 5.0*** | ***Temperature Variation*** | Cat. **B**<br>5 °C / min. | | |
| ***Section 6.0*** | ***Humidity*** | Cat. **B** | | |
| ***Section 7.0*** | ***Operational Shocks and Crash Safety***<br>(Fixed Orientation for Helicopters and All Fixed-Wing) | | | |
| | Operational Shock | Cat. **B**<br>6g, 11 mSec | | |
| | Crash Safety - Impulse | Cat. **B**<br>20g, 11 ms | Up<br>Down | 4.0g<br>20.0g |
| | Crash Safety - Sustained | Cat. **B**<br>20g, 11 ms | Forward<br>Aft<br>Side | 18.0g<br>1.5g<br>8.0g |
| ***Section 8.0*** | ***Vibration*** | Cat. [**U2**] with curves F & F1 | | |
| ***Section 11.0*** | ***Fluids Susceptibility*** | Cat. **F**<br>Fuels, Hydraulic Fluids, Lubricating Oils, Solvents & Cleaning Fluids | | |
| ***Section 12.0*** | ***Sand and Dust*** | Cat. **S** | | |
| ***Section 13.0*** | ***Fungus Resistance*** | Cat. **F** | | |
| ***Section 14.0*** | ***Salt Fog*** | Not Tested | | |
| ***Section 15.0*** | ***Magnetic Effect*** | Cat. **Z** | | |
| ***Section 16.0*** | ***Power Input*** | Cat. **Z** | | |
| | ***Normal Operating Conditions (DC)*** | | | |
| | Max. voltage<br>Nominal voltage<br>Min. voltage<br>Emergency operation voltage level | 30.3 VDC<br>**28.0 VDC**<br>22.0 VDC<br>18.0 VDC | | |

| Environmental Criteria | | |
|---|---|---|
| | Ripple voltage | +/- 2 V peak to peak DC ripple voltage |
| | Momentary power interruptions | Up to 1000 ms |
| | Normal surge voltage | Up to 50 V for 50 ms |
| | Engine starting under voltage operation | 10.0 to 20.5 VDC |
| | ***Abnormal operating conditions (DC)*** | |
| | Voltage steady state<br>Maximum<br>Minimum | <br>32.2 VDC<br>20.5 VDC |
| | Low voltage conditions | 0 to 20.5 VDC |
| | Momentary under voltage operation | 12.0 VDC up to 7 s |
| | Abnormal surge voltage | up to 80 V for 100 ms<br>up to 48 V for 1 s |
| ***Section 17.0*** | Voltage Spike | Cat. **A** |
| ***Section 18.0*** | Audio Frequency Conducted Susceptibility – Power Inputs | Cat. **Z** |
| ***Section 19.0*** | Induced Signal Susceptibility | Cat. **ZC** |
| ***Section 20.0*** | Radio Frequency Susceptibility (Conducted and Radiated) | Cat. **R**<br>Conducted Susceptibility – Category R<br>Radiated Susceptibility – Category R |
| ***Section 21.0*** | Emission of Radio Frequency Energy | Cat. **M** |
| ***Section 22.0*** | Lightning Induced Transient Susceptibility | Cat. **[A3J3L3]**<br>- Pin test waveform set A, level 3<br>- Cable bundle test waveform set J, Single/Multiple Stroke Level 3<br>- Multiple Burst Level 3. |
| ***Section 25.0*** | Electrostatic Discharge (ESD) | Cat. **A**<br>(15 KV) |

**Table 1: Environmental Qualification Category**

# 9. Statement of Criticality of Software

The ST3 software was developed to EUROCAE ED-12B/RTCA/DO-178C rigor for:

- **DAL D**

Software whose anomalous behavior (as shown by the system safety assessment process), would cause or contribute to a failure of system function resulting in a minor failure condition for the aircraft.

# 10. Statement of Hardware Design Assurance

The ST3 hardware was developed to EUROCAE ED-80/RTCA/DO-254 rigor for:

- **DAL D**

Hardware functions whose failure or anomalous behavior (as shown by the hardware safety assessment) would cause a failure of system function resulting in a minor failure condition for the aircraft.

# 11. Declaration

The declaration in this document is made under the authority of THOMMEN AIRCRAFT EQUIPMENT AG

THOMMEN AIRCRAFT EQUIPMENT AG cannot accept responsibility for equipment used outside the limiting conditions stated in paragraph 8 without written acceptance and agreement.

The user is responsible for checking with Thommen Aircraft Equipment AG to make sure that this declaration is to the latest issue.

Date: 27.05.2020 Accountable Manager

Daniel Grosch