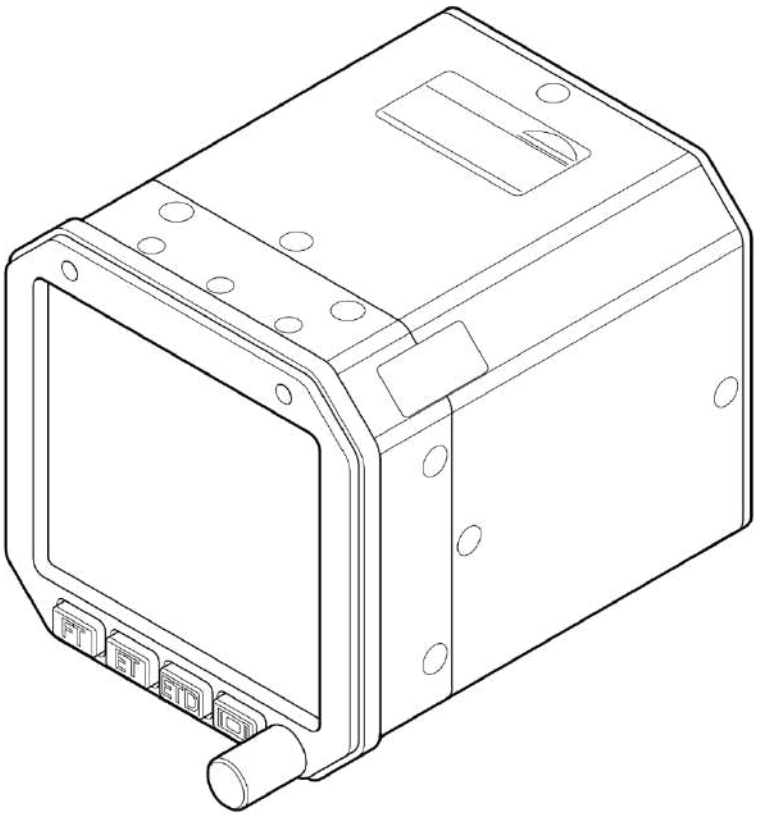
INSTALLATION AND OPERATING MANUAL

STRATOTIMER ST3



ATA 31-20-01

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12/06/2020

THOMMEN AIRCRAFT EQUIPMENT AG
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RECORD OF REVISIONS

Rev.	Date	Reason for Revision	Prepared	Checked	Approved
1.00	12/06/2020	First revision.	J. Garrett	G. Schaffner	A. Savin

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SERVICE BULLETIN LIST

SB No.	Subject	Rev.	Date

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LIST OF EFFECTIVE PAGES

SECTION	PAGE	REV.	DATE		SECTION	PAGE	REV.	DATE
Title Page	1		12/06/20		Description and Operation	1		12/06/20
	2		12/06/20			2		12/06/20
						3		12/06/20
						4		12/06/20
						5		12/06/20
Record of Revisions	1		12/06/20			6		12/06/20
	2		12/06/20			7		12/06/20
						8		12/06/20
						9		12/06/20
						10		12/06/20
Service Bulletin List	1		12/06/20			11		12/06/20
	2		12/06/20			12		12/06/20
						13		12/06/20
						14		12/06/20
						15		12/06/20
List of Effective Pages	1		12/06/20			16		12/06/20
	2		12/06/20			17		12/06/20
						18		12/06/20
						19		12/06/20
						20		12/06/20
Table of Contents	1		12/06/20			21		12/06/20
	2		12/06/20			22		12/06/20
						23		12/06/20
						24		12/06/20
						25		12/06/20
Introduction	1		12/06/20			26		12/06/20
	2		12/06/20			27		12/06/20
	3		12/06/20			28		12/06/20
	4		12/06/20					
	5		12/06/20					
	6		12/06/20					

SECTION	PAGE	REV.	DATE		SECTION	PAGE	REV.	DATE
Fault Isolation	101		12/06/20		Adjustment / Test	501		12/06/20
	102		12/06/20			502		12/06/20
Maintenance Practices	201		12/06/20					
	202		12/06/20					
	203		12/06/20					
	204		12/06/20					
Removal / Installation	401		12/06/20					
	402		12/06/20					
	403		12/06/20					
	404		12/06/20					

TABLE OF CONTENTS

INTRODUCTION

1. Purpose of this Manual

   This Installation and Operating Manual (INSOP) gives a description and operation of the Stratotimer ST3 and the necessary procedural steps to remove/install, inspect and maintain the equipment. It also gives the necessary mechanical and electrical characteristics to make sure that the aircraft is compatible with it.

   For repair procedures, refer to the Component Maintenance Manual (CMM), 31-20-02.

   Only Thommen Aircraft Equipment AG are permitted to repair the Stratotimer ST3.

2. Manual Description

   The page blocks in this manual comply with the Air Transport Association of America (ATA) specification i2200.

3. Revisions

   Thommen Aircraft Equipment AG (TAE) gives the customers (that have a product guarantee) a complete revised manual when a change is included in a manual. The Record of Revisions section gives the reason for the changes done in the current revision.

   A documentation revision service (with a customer portal) is also available for customers that have instruments/devices no longer covered by the new product guarantee. This is especially useful when an upgrade to the instrument/device can improve the operational life and/or reliability of older products. The documentation revision service also includes the necessary Service Bulletins that upgrade/modify the instrument and/or device.

4. Warnings, Cautions and Notes

   4.1 Warnings

   

   WARNING: WARNINGS ARE GIVEN IN THE RELEVANT PAGE BLOCKS TO TELL PERSONNEL ABOUT SOMETHING THAT CAN CAUSE INJURY TO THEM. WARNINGS ARE GIVEN IMMEDIATELY BEFORE THE APPLICABLE TEXT TO WHICH THEY REFER.

   4.2 Cautions

   

   CAUTION: CAUTIONS ARE GIVEN IN THE RELEVANT PAGE BLOCKS TO TELL PERSONNEL ABOUT SOMETHING THAT CAN CAUSE DAMAGE TO THE EQUIPMENT. CAUTIONS ARE GIVEN IMMEDIATELY BEFORE THE TEXT TO WHICH THEY REFER.

   4.3 Notes

   NOTE: Notes give helpful information to the personnel doing the task. Notes are included before or after the text to which they refer.

5. Technical Support

   Please contact Thommen Aircraft Equipment AG at the address given below for technical support.

   THOMMEN AIRCRAFT EQUIPMENT AG

   Hofackerstrasse 48
   CH-4132 Muttenz
   Switzerland

   Phone: +41 (0)61 965 22 22

   Email: tech-support@thommen.aero

   Internet: www.thommen.aero

6. Installer Responsibility

   The installer is responsible for the correct installation of the equipment. This includes the mechanical and electrical configuration and compatibility with the aircraft.

   All installation personnel must be fully qualified and approved to do the work procedures given in this Installation and Operating Manual (INSOP).

7. Maintenance

   Only Thommen Aircraft Equipment AG are authorised to perform maintenance tasks not given in this manual.

8. Warranty

   The warranty for the Stratotimer ST3 is for 24 months.

9. Document/Equipment Feedback

   The Document / Equipment Defect Report (on the next page) gives the customer a way to inform Thommen Aircraft Equipment AG about any defects regarding the equipment or discrepancies in the technical documentation. This feedback will help Thommen Aircraft Equipment AG to make continued improvements to the equipment and/or the technical documentation.

DOCUMENT / EQUIPMENT DEFECT REPORT			
Aircraft Type	**Serial No.**	**Manual No.**	**Operator**

Date	Reported By	Contact Details

Document / Equipment:	
Description of Defect:	

Corrective action taken to continue operation:

Please send to:

THOMMEN AIRCRAFT EQUIPMENT AG
Hofackerstrasse 48
CH-4132 Muttenz
Switzerland

Telephone: +41 (0)61 965 22 22

Email: tech-support@thommen.aero

10. List of Abbreviations

Abbreviation	Description
3-ATI	3 Inch Air Transport Indicator
AMM	Aircraft Maintenance Manual
ARINC	Aeronautical Radio Incorporated
ATA	Air Transport Association
BIT	Built-In Test
CBIT	Continuous Built-In Test
CHRON	Chronograph
CMM	Component Maintenance Manual
CRC	Cyclic Redundancy Check
CS	Certification Specification
DAC	Digital-to-Analog Converter
DAL	Design Assurance Level
DCI	Discrete Input signal
DCIO	Discrete Input / Output signal
DCO	Discrete Output signal
ET	Elapsed Timer
ETD	Elapsed Timer Down
ETSO	European Technical Standard Order
FAR	Federal Aviation Regulation
FC	Failure Code
FRAM	Ferroelectric Random Access Memory
FT	Flight Timer
GND	Ground
GPIO	General Purpose Input / Output
GPS	Global Positioning System
HW	Hardware
Hz	Hertz
IBIT	Initiated Built-In Test
ID	Identification
INSOP	Installation and Operating Manual
IO	Inputs / Outputs
LRU	Line-Replaceable Unit

Abbreviation	Description
LT	Local Time
MAN	Manual
MHB	Management Handbook
MIL-STD	Military Standard
MTBF	Mean Time Between Failures
MTH	Maintenance Time in Hours
N/A	Not Applicable
NVIS	Night Vision Imaging System
PBIT	Power-up Built-In Test
PWM	Pulse Width Modulation
QTP	Qualification Test Procedure
RTCA	Radio Technical Commission for Aeronautics
SB	Service Bulletin
SBIT	Startup Built-In Test
SDRAM	Synchronous Dynamic Random Access Memory
ST3	Stratotimer 3 inch
TAE	Thommen Aircraft Equipment
TFT	Thin Film Transistor
TSO	Technical Standard Order
USB	Universal Serial Bus
UTC	Universal Time Coordinated
VAC	Volts Alternating Current
VDC	Volts Direct Current
WOW	Weight on Wheels

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DESCRIPTION AND OPERATION

1. General

   This section gives a description of the functionality and operation of the Stratotimer ST3.

   The Stratotimer ST3 can be easily installed in all aircraft types with a nominal 28VDC power supply.

   A high resistance to environmental conditions including shock, vibration and mechanical impact is guaranteed by compliance with DO-160G, MIL-STD-202G and MIL-STD-810G qualification tests.

2. Description

Refer to Figure 1.

The Stratotimer ST3 is a digital multifunction clock, designed to be easily installed in an instrument panel of an aircraft using a 3-ATI ARINC square clamp. Connection to a power supply is with a 26-pin, military grade connector on the rear of the device.

The Stratotimer ST3 is a line-replaceable unit (LRU).

Time and timer functions are displayed on a TFT display, with light digits on a dark background (negative image).

The different display options can be changed using an on-screen menu with four push-buttons and a push / turn control knob.

The Stratotimer ST3 has the following display options:

- Universal Time Coordinated (UTC) or Local Time (LT)
- Date
- Flight Timer (FT)
- Elapsed Timer (ET) or Elapsed Timer Down (ETD)
- Maintenance Time in Hours (MTH)
- Alarm indicator for Elapsed Timer Down mode
- S-video

The display of the Stratotimer ST3 has three modes:

- Day mode (colour, high light intensity)
- Night mode (colour, low light intensity)
- NVIS green

The brightness of the display can be either adjusted automatically with two light sensors or adjusted manually.

An internal battery makes sure that the Stratotimer ST3 continues to keep time when aircraft power is not available.

The battery can be easily replaced by opening a cover at the rear of the Stratotimer ST3 (refer to Maintenance Practices, page block 201).

A USB connector can be accessed by opening the same battery access cover. The USB connector is for the use of approved service centres only, for connecting maintenance software.

Capacitors make sure that the Stratotimer ST3 continues to function during momentary power disruptions.

An identification label is attached to the top of the Stratotimer ST3. Refer to Description and Operation, section 3.3 for details.

Two warranty-void labels are attached to the outside of the Stratotimer ST3. The warranty-void labels must not be removed.

Refer to Description and Operation, section 4, for a detailed description of how to operate the Stratotimer ST3.

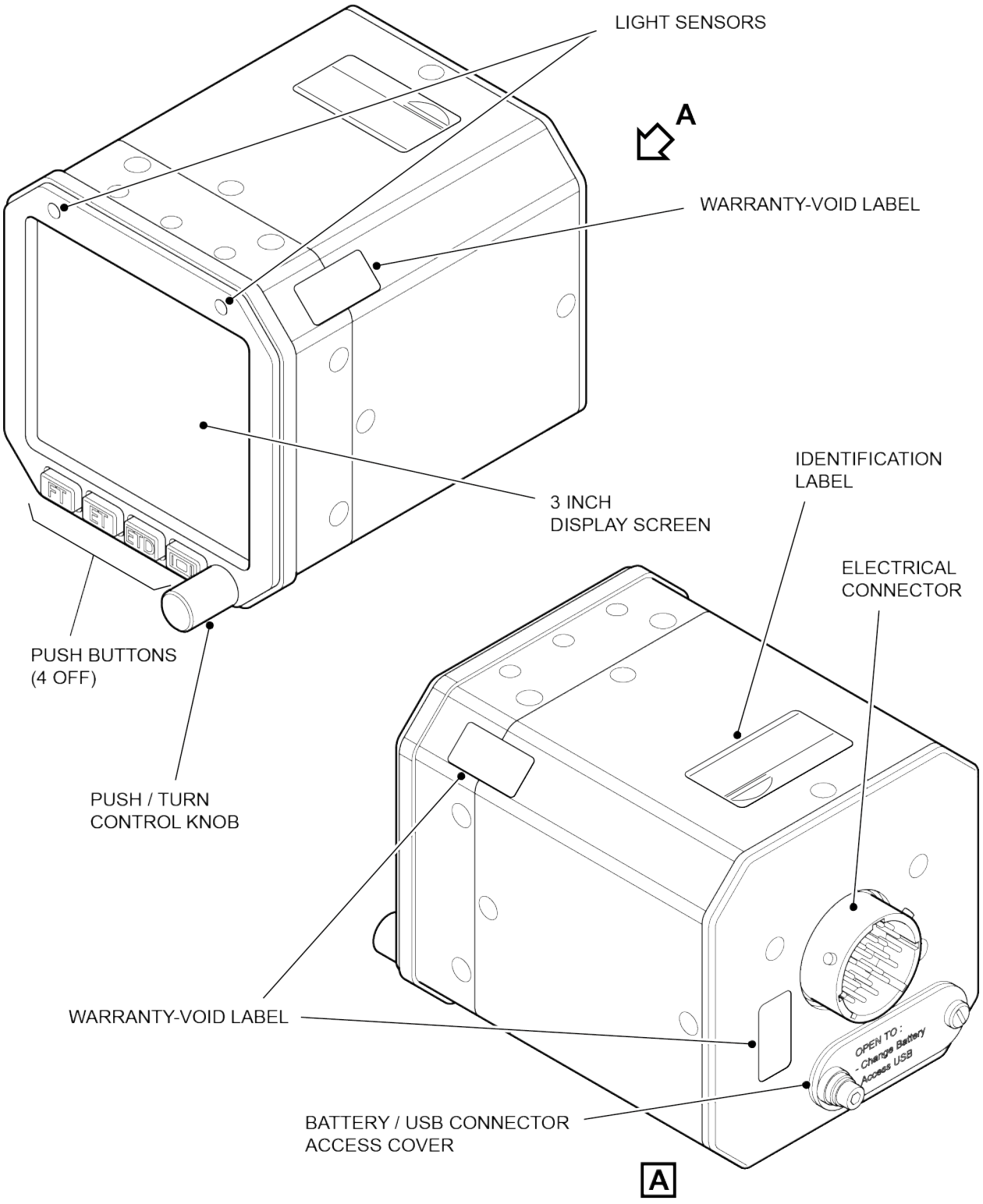

Figure 1 – Stratotimer ST3 Assembly

3. Specifications and Equipment Data

3.1 Specifications and Standards

The relevant specifications and standards, which are the basis of the approvals for the Stratotimer ST3, are given in the Equipment Specification document (ST-SPE-100).

3.2 Environmental Qualification

The environmental qualification for the Stratotimer ST3 is in accordance with the specifications and criteria given in the Qualification Test Procedure document (ST-QTP-100).

3.3 Equipment Identification

The Stratotimer ST3 can be identified with six codes, indicated on the identification label:

- Model code
- Part number
- Manufacturer's code
- Serial number
- Manufactured date
- MOD code

3.3.1 Part Number

The part number is a seven-digit code, written in the following format:

ST3-AABB

Code Digits	Description
ST3	Model code - Stratotimer 3 inch
AA	Software / hardware version: Major changes of software / hardware, starting from 01, up to 99
BB	Customer specification code, starting from 01, up to 99 For customization of, for example: • NVIS • Colour of bezel, buttons or knob • Font • Logo

Table 1 – Part Number

3.3.2 Manufacturer's Code

The manufacturer's code is written in the following format:

CCDD

Code Digits	Description
CC	Software version: Minor changes of software, starting from 01, up to 99
DD	Hardware version: Minor changes of hardware, starting from 01, up to 99

Table 2 – Manufacturer's Code

3.3.3 Serial Number

The serial number is a unique six-digit code for each device, written in the following format:

123456

3.3.4 Manufactured Date

The manufactured date is written in the following format:

MMM/YYYY, for example JAN/2020.

3.3.5 MOD Code

The MOD code is a combination of software and hardware modifications done on an existing customer's device with a Service Bulletin. The MOD code is identified with a mark on the identification label.

The software modifications are from 1 to 9; the hardware modifications are from A to J.

3.3.6 Identification Label

A typical identification label, which is attached to the outside of the equipment, is shown below:

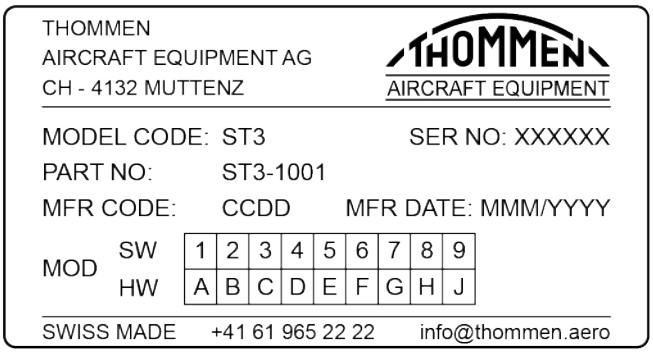

Figure 2 – Identification Label

3.4 Mechanical Characteristics

Dimensions (width x height x depth)	82.8 x 82.8 x 120 mm (3.26 x 3.26 x 4.72 inches)
Weight	540 g (±10 g) (1.19 lb)
Display dimensions (width x height)	64 x 57.2 mm (2.52 x 2.25 inches)
Front bezel colour	Customisable Grey (standard) (AMS-STD-595A-36118)
Material	Aluminium
Mounting	ARINC 408A 3ATI square clamp, 1 inch deep (optional supply, refer to Installation, page block 401, for installation kit) NOTE: For the possibility of alternative mounting of the Stratotimer ST3 with the bezel flush with the aircraft panel, the dimensions of the inner profile of the bezel are identical to the housing. (Refer to Figure 3, Mechanical Dimensions.)

Table 3 – Mechanical Characteristics

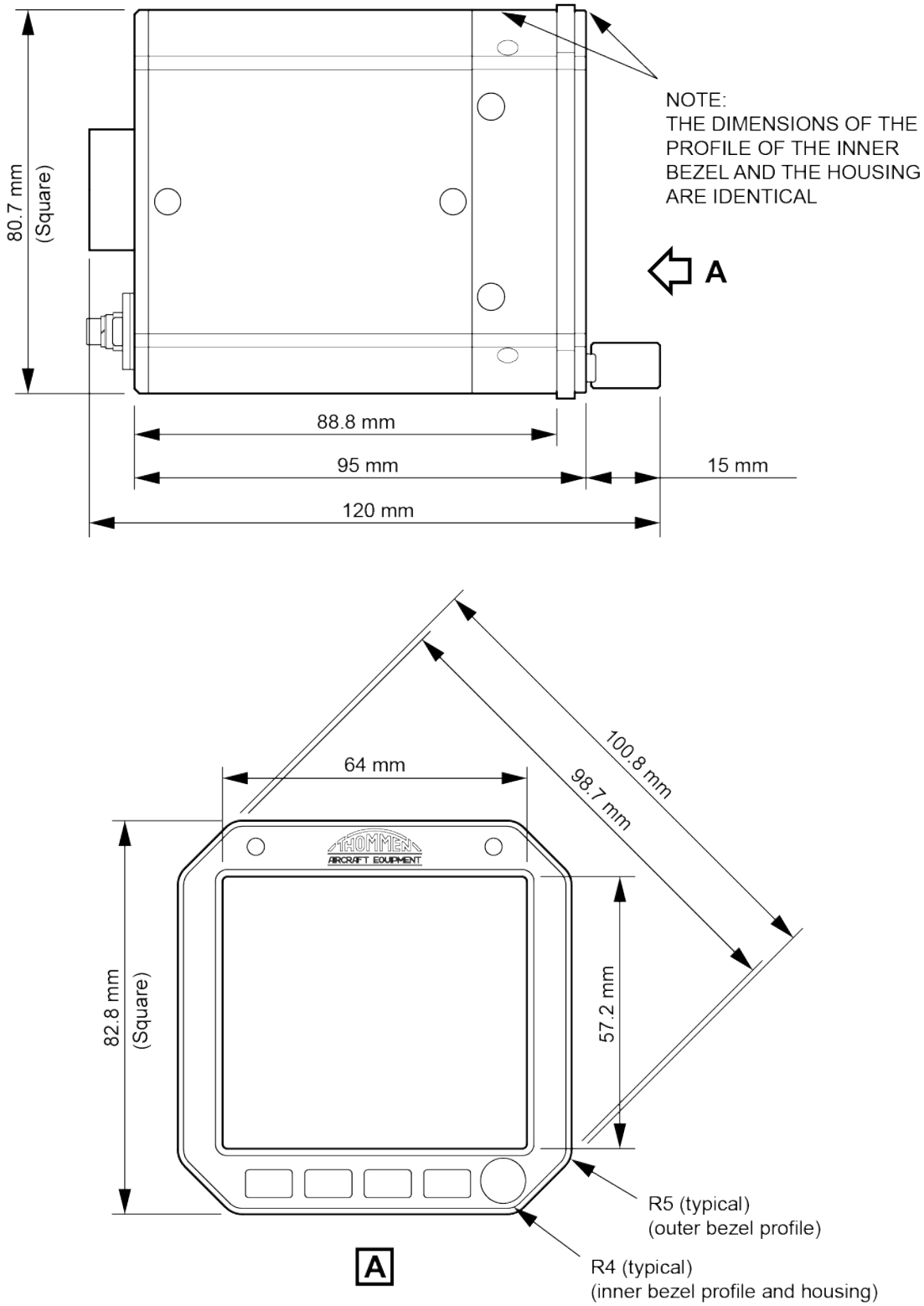

Figure 3 – Mechanical Dimensions

3.5 Electrical and Display Characteristics

Input Voltage	18 to 32 VDC
Power Consumption	7W (250 mA) maximum at 28 VDC input voltage 15W average (3A maximum) at temperature below minus 20°C for 5 to 10 minutes.
DCO Load	1A maximum
Battery	CR2450 (3V)
Battery Service Life	Ten years
Electrical Connectors (MIL-C-26500)	Installed connector 26-pin: PT02E-16-26P Amphenol
	Mating connector 26-pin: PT06E-16-26S(SR) Amphenol (optional supply, refer to Installation, page block 401, for installation kit)
Back Light Modes	Day mode Night mode NVIS mode
Display Resolution	540 (horizontal) x 480 (vertical)
Display Brightness	Day mode: from 6 to not less than 450 cd/m^2 Night mode: from 0.3 to 6 cd/m^2 NVIS mode: from 0.3 to 6 cd/m^2
Display Viewing Angle	80° (U/D/L/R)

Table 4 – Electrical and Display Characteristics

The pin assignments for the 26-pin electrical connector are given in the table below:

Pin No.	Pin Assignments (MIL-C-26500)	Electrical Characteristics
A	Remote chronograph switch 1 (DCI 1)	DCI
B	Remote chronograph switch 2 (DCI 2)	DCI
C	S-video (intensity)	Video input
D	Primary power return	Power input
E	ARINC 429 line A input	ARINC 429 input
F	ARINC 429 line B input	ARINC 429 input
G	S-video (colour)	Video input
H	Case ground	Ground
J	Display test (DCI 6)	DCI
K	Lighting power input	Analog input
L	Lighting power return	Analog input
M	Day / night mode (DCI 4)	DCI
N	Weight on Wheels (WOW) signal (DCI 5)	DCI
P	Select speed GPS input (DCI 3)	DCI
R	Not used	Spare
S	DCIO common	DCIO
T	Alarm function (DCO 1)	DCO
U	Equipment fault (DCO 2)	DCO
V	Primary power input	Power input
W	ARINC 429 line B output	ARINC 429 output
X	ARINC 429 line A output	ARINC 429 output
Y	Secondary power input	Power input
Z	Audio output (+)	Analog output
a	Audio output (-)	Analog output
b	S-video return	Video input
c	Secondary power return	Power input

Table 5 – 26-Pin Electrical Connector – Pin Assignments

3.6 Operational Limitations, Range and Tolerances

At an ambient temperature of 25°C, the clock and timer readings maintain an accuracy of +/- 0.2 seconds per 24 hours. At extreme ambient temperatures of -45°C to 70°C, the clock and timer readings maintain an accuracy of +/- 1 second per 24 hours.

The product life of the Stratotimer ST3 shall be a minimum of 40 000 flight hours.

The Stratotimer ST3 Mean Time Between Failures (MTBF) shall be a minimum of 20 000 hours of operation.

4. Operation

4.1 Button Controls

The Stratotimer ST3 is controlled using the four push-buttons and the push / turn control knob located below the display screen (refer to Figure 4).

The four push-buttons have the following functions (from left to right):

- Flight timer (FT)
- Elapsed timer (ET)
- Elapsed timer down (ETD)
- Back / reset

A short press (less than 2 seconds) of any of the first three buttons enables start / stop of the function. A long press (more than 2 seconds) of the buttons enables a reset of the function.

The back / reset button switches the display screen from main menu view to default view. It functions as back / reset when adjusting the timer settings or the main menu options.

The push / turn control knob can be turned to scroll through the on-screen options. A short push (less than 2 seconds) of the knob will select the option.

A long push (more than 2 seconds) of the push / turn control knob toggles the display screen between default view and main menu view.

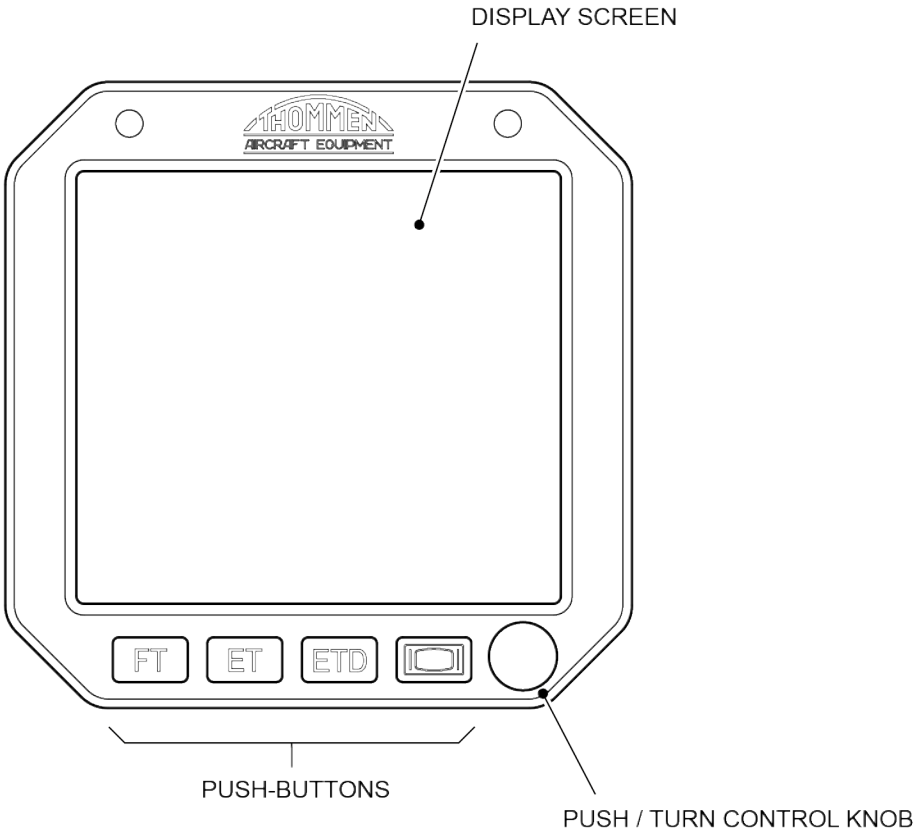

Figure 4 – Front Display

4.2 Background Light Options

The display of the Stratotimer ST3 has three modes:

- Day mode (colour, high light intensity)
- Night mode (colour, low light intensity)
- NVIS green

The light intensity of each of the three modes can be adjusted automatically with the light sensors or manually.

The light modes are only accessible by airline maintenance crew.

Refer to section 4.7, Main Menu Options, for how to access the light modes.

4.3 Overview of S-video and Timer Functions

Access and control of the different video and timer functions is done using the four push-buttons and the push / turn control knob (refer to Figure 5).

To navigate through the video and timer options, turn the control knob clockwise until UTC is displayed above the top line of the display and ET is above the bottom line of the display. (Further turning of the control knob clockwise has no effect.)

Turn the control knob counter-clockwise to navigate to the following options:

- Universal time coordinated (UTC) (top line of display) with elapsed timer (ET) (bottom line of display)
- Universal time coordinated (UTC) (top line of display) with elapsed timer down (ETD) (bottom line of display)
- Local time (LT) (top line of display) with elapsed timer down (ETD) (bottom line of display)
- Date (top line of display) with elapsed timer down (ETD) (bottom line of display)
- S-video

Continue to turn the control knob counter-clockwise to navigate the above options again, starting from the UTC with ETD option.

The four push-buttons have the following functions (from left to right):

- Flight timer (FT)
- Elapsed timer (ET)
- Elapsed timer down (ETD)
- Back / reset

A short press of any of the first three buttons enables start / stop of the function. A long press of the buttons enables a reset of the function.

A short-press of the control knob enables the setting function. Turn the control knob counter-clockwise until the DATE is blinking, then turn clockwise to navigate to the following options:

- Date
- Local time (LT)
- Universal time coordinated (UTC)
- Flight timer (FT)
- Elapsed timer down (ETD)
- Elapsed timer (ET)

Turn the control knob counter-clockwise to navigate the above options in the reverse direction.

Short-press the control knob when the desired option is blinking to change the values. Change the values by turning the control knob, then confirm by short-pressing the control knob.

Escape from any settings and return to the default display by pressing the back / reset button.

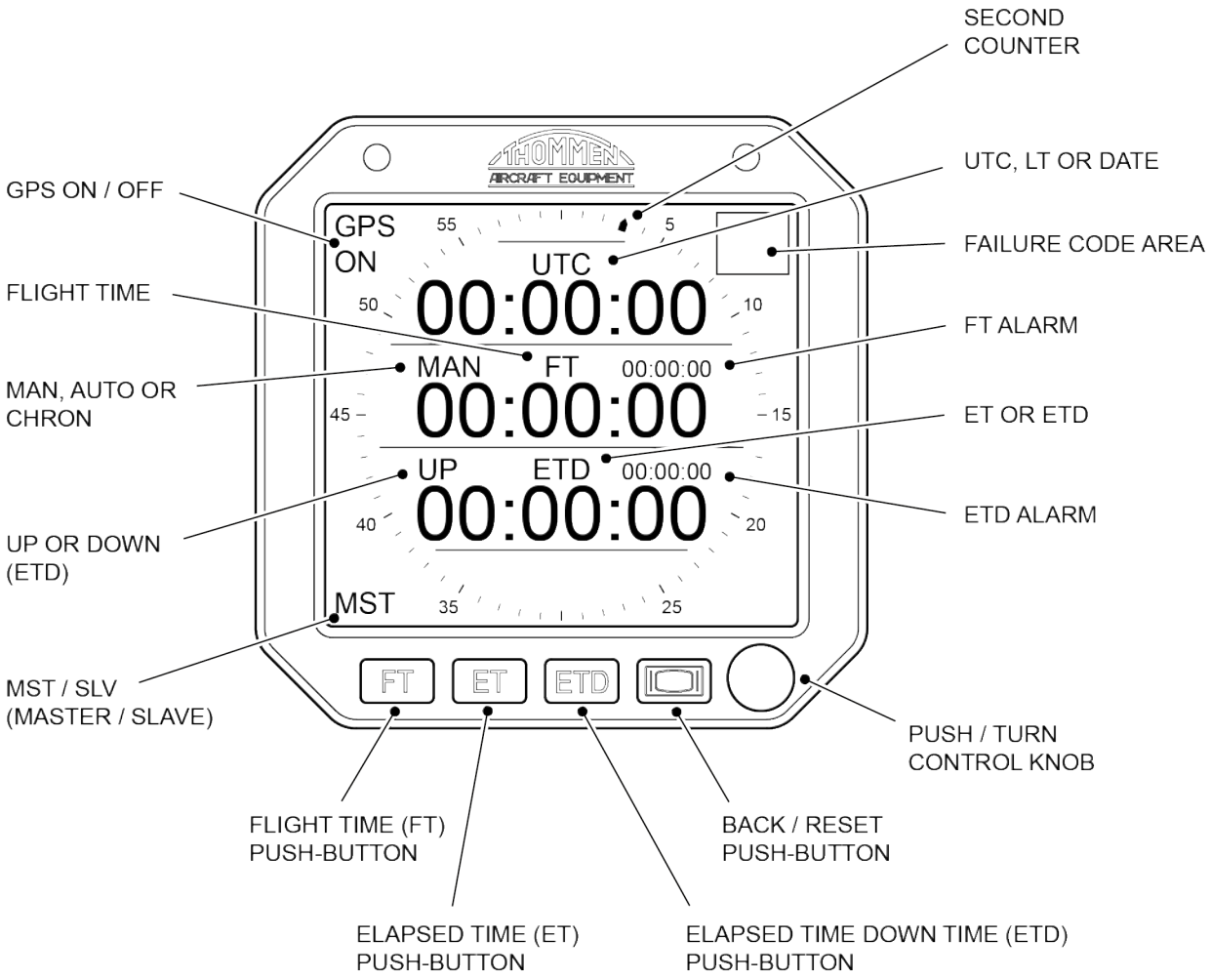

Figure 5 – Timer Functions

4.4 Setting the Date, UTC and LT

The date, the universal time coordinated (UTC) and the local time (LT) are displayed in the top section of the display screen (refer to Figure 6).

The date can be displayed by turning the control knob counter-clockwise. Turn the control knob one increment clockwise to display local time (LT), then another increment to display universal time coordinated (UTC).

The date and the UTC are set automatically when the GPS input is set to ON (refer to Main Menu Options, section 4.7).

To set the local time (LT), adjust the Time Zone setting in the main menu (refer to Main Menu Options, section 4.7). All time zones are pre-set, including fractions of hours where applicable.

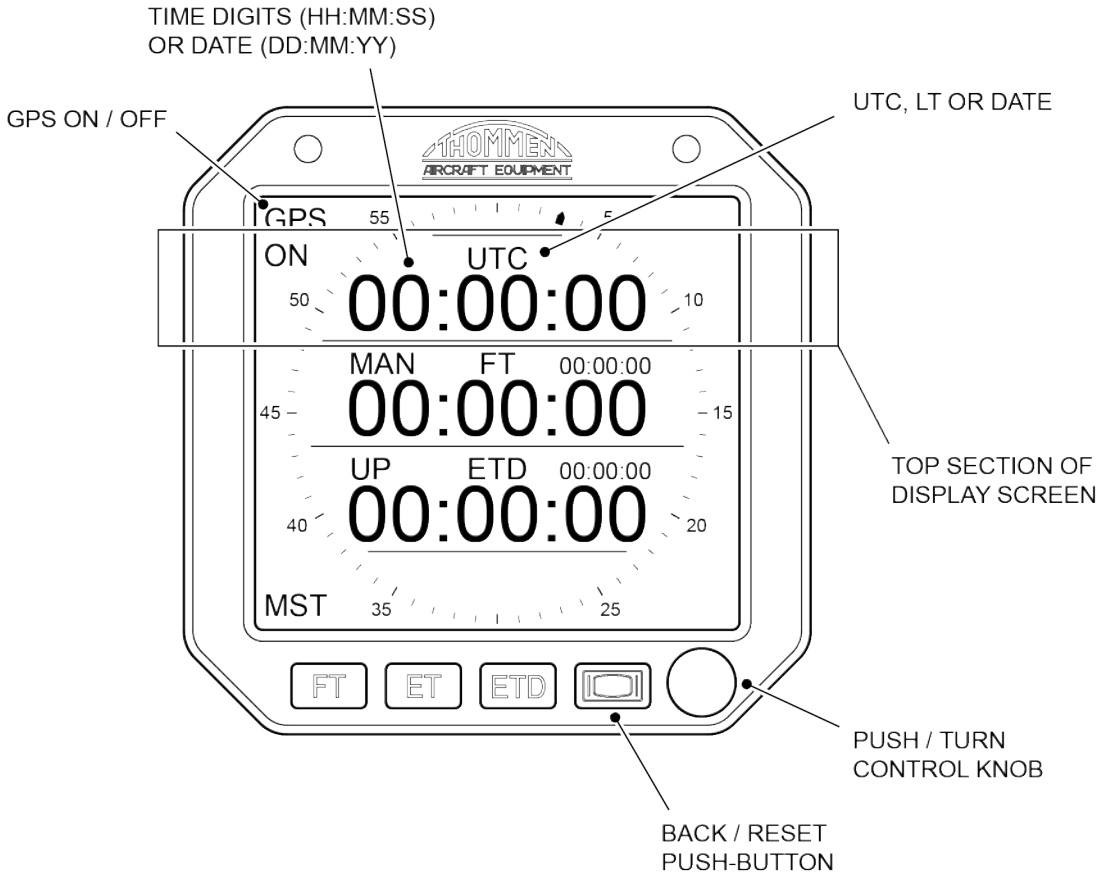

Figure 6 – Top Section of Display Screen

4.5 Setting the Flight Timer (FT) and Flight Timer Alarm

The flight timer (FT) and flight timer alarm are displayed in the middle section of the display screen (refer to Figure 7).

The flight timer (FT) can be set to either manual (MAN), automatic (AUTO) or chronometer (CHRON) (refer to Main Menu Options, section 4.7):

- Manual (MAN): Flight timer (FT) is started and stopped manually.
- Automatic (AUTO): Flight timer (FT) is started and stopped according to the weight-on-wheels (WOW) signal.
- Chronometer (CHRON): Flight timer (FT) is started and stopped using an auxiliary switch in the cockpit.

To start / stop the flight timer (FT) in manual mode, short-press the FT push-button.

To reset the flight timer (FT) in manual mode, long-press the FT push-button.

To set the flight timer alarm:

- Short-press the control knob.
- Turn the control knob one increment counter-clockwise (FT digits flashing).
- Short-press the control knob (hour digits flashing, digits change to amber). Turn the control knob to adjust.
- Short-press the control knob (minute digits flashing). Turn the control knob to adjust.
- Short-press the control knob (second digits flashing). Turn the control knob to adjust.
- Short-press the control knob. The flight time alarm is displayed in amber at the top right of the middle section of the display screen.

When the flight time reaches the flight time alarm, the FT alarm indicator displays ‘ALARM’, the flight time colour changes to amber and the alarm audio is activated (if enabled in the settings). A short-press of the FT push-button stops the alarm audio (if enabled) and changes the FT alarm indicator back to the time setting. The flight time colour remains amber.

To remove the FT alarm indicator the FT alarm must be set to ’00:00:00’.

The flight timer alarm can also be set using the Main Menu (refer to Main Menu Options, section 4.7).

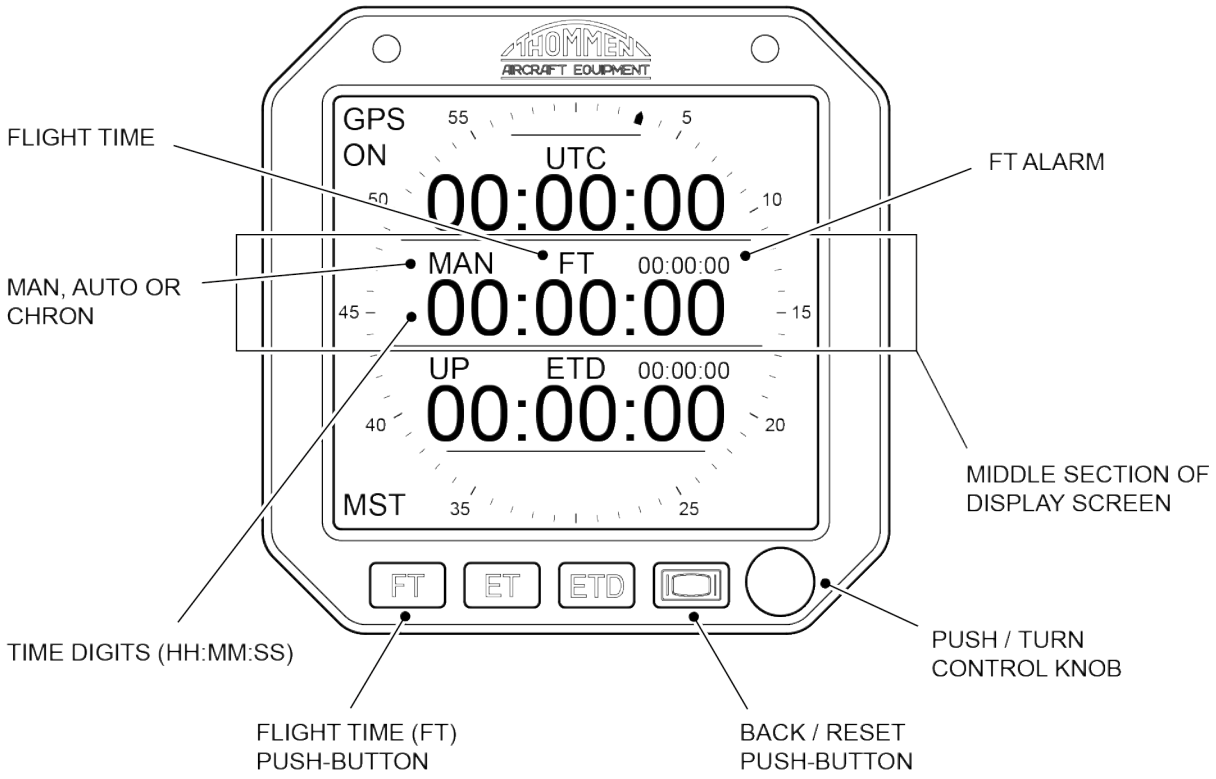

Figure 7 – Middle Section of Display Screen

4.6 Setting the Elapsed Timer (ET), Elapsed Timer Down (ETD) and Elapsed Timer Down (ETD) Alarm

The elapsed timer (ET) and elapsed timer down (ETD) are displayed in the bottom section of the display screen (refer to Figure 8).

The elapsed timer (ET) can be displayed by turning the control button clockwise. Turn the control button one increment counter-clockwise to change the display to elapsed timer down (ETD).

To start / stop the elapsed timer (ET) press the ET push-button. The timer will continue to count in the background when stopped.

To reset the elapsed timer (ET) to zero, long-press the ET push-button.

To set the elapsed timer (ET):

- Display the elapsed timer (ET) by turning the control button clockwise (if necessary).
- Short-press the control knob (all ET digits flashing).
- Short-press the control knob (hour digits flashing). Turn the control knob to adjust.
- Short-press the control knob (minute digits flashing). Turn the control knob to adjust.
- Short-press the control knob (second digits flashing). Turn the control knob to adjust.
- Short-press the control knob to exit setting mode.
- Press the ET push-button and the timer will start counting UP.

The elapsed timer (ET) can also be set using the Main Menu (refer to Main Menu Options, section 4.7).

To start / stop the elapsed timer down (ETD) press the ETD push-button. The timer will start counting UP. The timer will continue to count in the background when stopped.

To reset the elapsed timer down (ETD) to zero, long-press the ETD push-button.

To set the elapsed timer down (ETD) alarm:

- Display the elapsed timer down (ETD) (if necessary).
- Short-press the control knob (all ETD digits flashing).
- Short-press the control knob (hour digits flashing). Turn the control knob to adjust.
- Short-press the control knob (minute digits flashing). Turn the control knob to adjust.
- Short-press the control knob (second digits flashing). Turn the control knob to adjust.
- Short-press the control knob to exit setting mode (amber digits displayed at the top right of the bottom section of the display screen, to indicate alarm setting).
- Short-press the ETD push-button and the timer will start counting DOWN.

The amber elapsed timer down (ETD) alarm indicator displays ‘00:00:00’ when the timer is counting down, then displays ‘ALARM’ when the countdown is finished. The ETD digits display ‘00:00:00’ in amber colour and an alarm audio is activated (if enabled in the settings). A short-press of the ETD push-button stops the alarm audio (if enabled) and changes the ETD alarm indicator back to ‘00:00:00’. The ETD colour remains amber.

Long-press the ETD push-button to exit the ETD alarm.

The elapsed timer down (ETD) alarm can also be set using the Main Menu (refer to Main Menu Options, section 4.7).

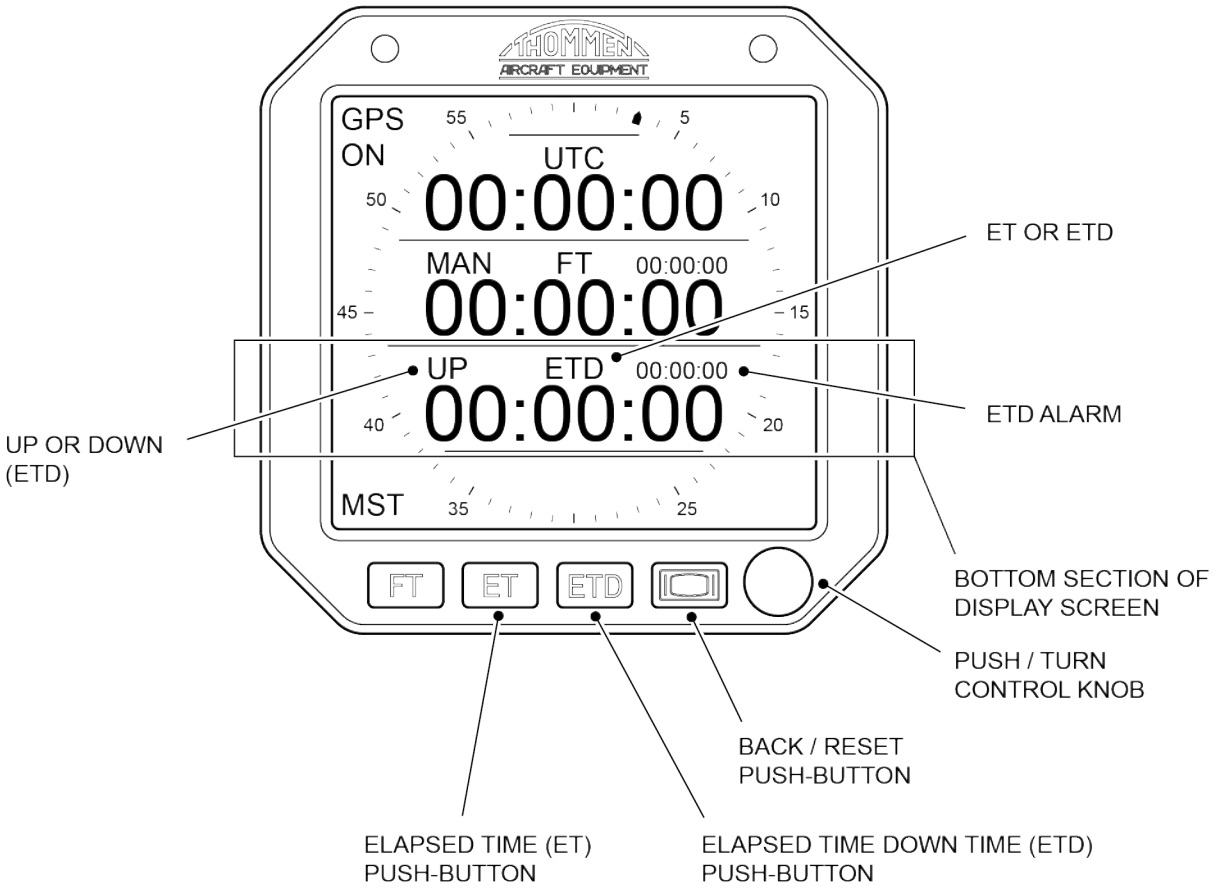

Figure 8 – Bottom Section of Display Screen

4.7 Main Menu Options

Access to the main menu (refer to Figure 9) is done with a long-press (more than 2 seconds) of the control knob.

The top-level of the main menu has the following options:

- Screen Modes
- Display Settings
- Time / Date
- Timers / Alarms
- HW Settings
- Password
- Maintenance
- Test
- Back

Access to menu items specific for airline maintenance crew or TAE administrators are password protected. A different password is used for airline maintenance crew and TAE administrators.

The access rights for TAE administrators includes the options specific for airline maintenance crew.

The access rights for airline maintenance crew does not include the options specific for TAE administrators.

If a menu option is not accessible, it will be displayed in a grey colour.

Switch between the menu options by turning the control knob. Enter the option by short-pressing the control knob.

To adjust a setting, turn the control knob to switch between values, then confirm by short-pressing the control knob.

Exit the menu options by either long-pressing the control knob or short-pressing the BACK option in the MAIN MENU or pressing the back / reset button (as many times as necessary).

The hierarchy of the main menu options is shown in Tables 6 to 9.

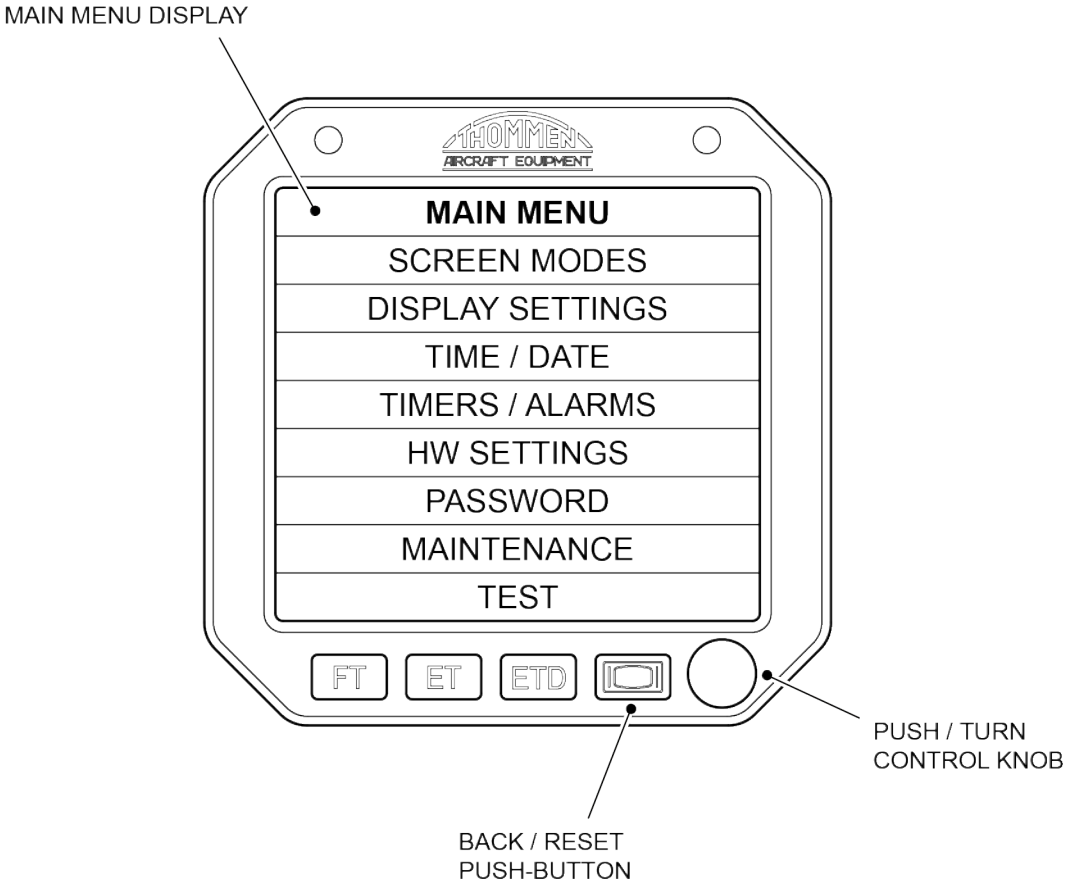

Figure 9 – Main Menu Options

NOTE:

The main menu options shown in Tables 6 to 9 are colour coded according to accessibility:

	Pilot (user)
	Maintenance (airline)
	Administrator (TAE)
	Locked

1st Level	2nd Level	3rd Level
Screen Modes	Main Screen Style	Stratotimer Digital Dial
	Color Theme	ETD White Sections ETD White Green Amber White Custom
	Video Input	On Off
	Back	-
Display Settings	Brightness Mode	Auto Input Manual
	Day / Night Mode	Auto Day / Night Input Brightness Input Day Night NVIS
	Brightness Input	5V DC 14V DC 28V DC 5V AC 14V AC 28V AC 5V PWM 14V PWM 28V PWM
	Day / Night Input	Open / Ground 28V / Open
	Brightness	0% to 100%
	Back	-

Table 6 – Main Menu Options

1st Level	2nd Level	3rd Level
Time / Date	UTC Time	HH : MM : SS
	UTC Date	DD : MM : YY
	Time Zone	UTC ± HH : MM
	Time Format	12H 24H
	GPS Input	On Off
	Master Function	Off Master Slave
	Back	-
Timers / Alarms	Flight Timer	HH : MM : SS
	Flight Timer Mode	Manual Auto - WOW Input Manual + Chron In
	WOW Input	Open / Ground 28V / Open
	Chron Input	Open / Ground 28V / Open
	Elapsed Timer	HH : MM : SS
	ETD	HH : MM : SS
	Flight Timer Alarm	No FT Alarm Set HH : MM : SS
	Audio Alarm Out	On Off
	Back	-

Table 7 – Main Menu Options

1st Level	2nd Level	3rd Level
HW Settings	ARINC 429 Out Speed	12.5 KBaud 100 KBaud
	ARINC 429 In Speed	12.5 KBaud 100 KBaud
	Video Input	On Off
	Brightness Input	5V DC 14V DC 28V DC 5V AC 14V AC 28V AC 5V PWM 14V PWM 28V PWM
	Day / Night Input	Open / Ground 28V / Open
	GPS Input	On Off
	WOW Input	Open / Ground 28V / Open
	Chron Input	Open / Ground 28V / Open
	Audio Alarm Out	On Off
	Audio Volume	0% to 100%
	Back	-

Table 8 – Main Menu Options

1st Level	2nd Level	3rd Level
Password	Current Profile	Pilot Maintenance Administrator
	Enter Login	**********
	Enter Password	**********
	Back	-
Maintenance	FW Version	*.**.***
	FW CRC	**********
	Display Type	3ATI 2ATI
	Color To Change	System Color FT Alarm Color Menu Color FT Line ETD Line Color ETD Arc Color ETD Alarm Color
	Blue Channel Value	0 to 255
	Green Channel Value	0 to 255
	Red Channel Value	0 to 255
	MTH Value	0 to 999999.99
	RTC Calibration	-128 to +127
	USB Bootloader	Start Uploading
	Back	-
Test	Display Test	White Screen Black Screen Red Screen Green Screen Blue Screen Static Text Template
	Heater Test	3 Secs Test
	Audio Test	1 kHz Test
	IBIT	Initiate
	Back	
Back	-	-

Table 9 – Main Menu Options

4.8 S-video

The Stratotimer ST3 can be used to display S-video.

Turn the control knob counter-clockwise until video is displayed.

To exit the S-video mode, turn the control knob either clockwise or counter-clockwise.

4.9 Clock Sync Function

The Stratotimer ST3 can connect with a second Stratotimer ST3 in a master and slave combination.

The slave Stratotimer ST3 will take the UTC and date from the master Stratotimer ST3. All other functionalities can be changed independently.

The ARINC 429 Out pins from the master unit must be connected to the ARINC 429 In pins of the slave unit. Refer to Description and Operation, Table 5 for the pin assignments of the 26-pin electrical connector.

The master unit must be set to Master and the slave unit to Slave in the main menu (refer to section 4.7, Main Menu Options).

4.10 Maintenance Function

The Stratotimer ST3 can be connected to a PC for maintenance.

The maintenance function can be used only when the weight on wheels signal is ‘on ground’.

The maintenance function is password protected.

The Maintenance Time in Hours (MTH) can be displayed using the main menu (refer to section 4.7, Main Menu Options).

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FAULT ISOLATION

1. General

   This section gives all possible failure codes and their required action.

   The Stratotimer ST3 has a built-in test (BIT) function, comprising a power-up built-in test (PBIT) function, a continuous built-in test (CBIT) function and an initiated built-in test (IBIT) function.

   If the status of either PBIT, CBIT or IBIT is Fail, the Stratotimer ST3 switches to failure mode and a record of the failure is written to the BIT history file.

2. Failure Codes

   A list of all possible failure codes and their required actions are shown in Table 101.

   Failure codes are displayed in the top RH corner of the Stratotimer ST3 display.

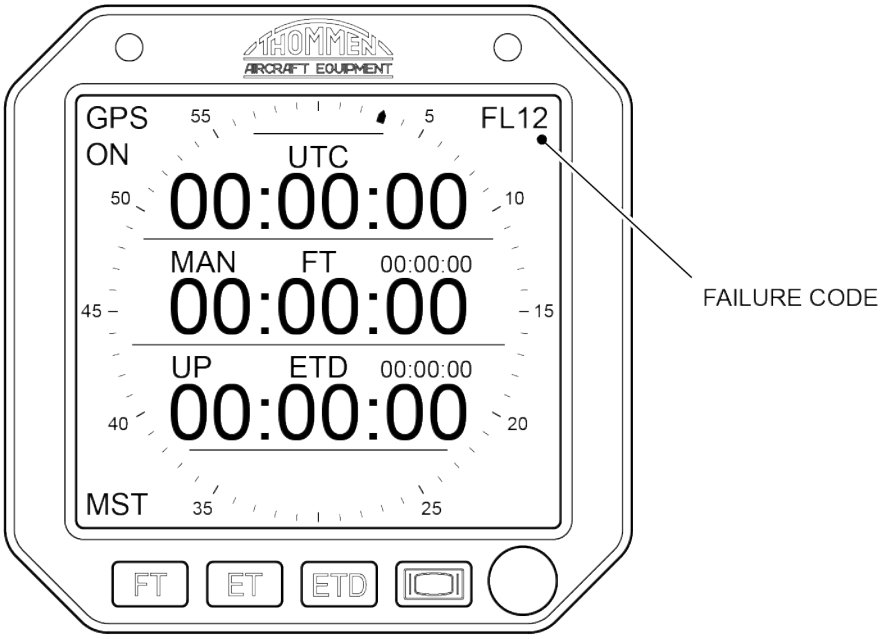

Figure 101 – Failure Codes

Failure Code	Description	Action
FC01	Program CRC error (SBIT, IBIT)	Return the unit to TAE
FC02	Settings CRC error (SBIT, IBIT, CBIT)	
FC03	External watchdog error (IBIT)	
FC10	Control PCB temperature sensor errors (SBIT, IBIT, CBIT) - I^2C interface status	
FC11	Control PCB temperature sensor errors (SBIT, IBIT, CBIT) - temperature status	No action necessary
FC12	Battery voltage errors (SBIT, IBIT, CBIT)	Change the battery
FC13	IO extender errors (SBIT, IBIT, CBIT)	Return the unit to TAE
FC14	ARINC 429 driver errors (SBIT, IBIT)	
FC15	ARINC 429 driver errors (SBIT, CBIT, IBIT)	
FC16	SDRAM errors (SBIT, IBIT)	
FC17	FRAM errors (SBIT, IBIT)	
FC18	FRAM errors (SBIT, CBIT, IBIT)	
FC19	ID chip errors (SBIT, CBIT, IBIT)	
FC20	Power voltages errors (SBIT, CBIT, IBIT) - change of the primary power supply state	Check primary power supply
FC21	Power voltages errors (SBIT, CBIT, IBIT) - change of the secondary power supply state	Check secondary power supply
FC22	Audio chip errors (SBIT, PBIT, CBIT) - I^2C interface status	Return the unit to TAE
FC23	Audio chip errors (SBIT, PBIT, CBIT) - I^2S interface status	
FC24	Video converter errors (SBIT, PBIT, IBIT)	
FC25	Backlight PCB temperature sensor errors (SBIT, IBIT, CBIT) - I^2C interface status	
FC26	Backlight PCB temperature sensor errors (SBIT, IBIT, CBIT) - temperature status	No action necessary
FC27	Ambient light brightness sensor 1	Return the unit to TAE
FC28	Ambient light brightness sensor 2	
FC29	Display backlight DAC errors (SBIT, IBIT, CBIT)	
FC30	Buttons backlight errors (SBIT, IBIT, CBIT)	

Table 101 – Failure Codes

MAINTENANCE PRACTICES

1. Installation Considerations

1.1 General

This section gives the necessary information to make sure that the equipment is compatible with the aircraft.

The customer is responsible for the installation of the Stratotimer ST3 in the aircraft.

1.2 Unpacking and Inspection

Unpack the equipment carefully and make a visual inspection for possible shipping damage. If a claim for damage is to be made, save the original packing box and materials to substantiate the claim.

Retain the packaging for possible storage of the Stratotimer ST3 (ref. section 3, Storage).

1.3 Pre-installation Check

Before installing the equipment in the aircraft, check the information given on the identification label (ref. page block 1, section 3.3 - Equipment Identification), to make sure that the equipment meets the required specifications.

Make sure that the two warranty-void labels on the external housing of the Stratotimer ST3 are undamaged (ref. page block 1, section 2 - Description).

The Stratotimer ST3 equipment does not require any pre-installation adjustment. All adjustments procedures are done by the manufacturer.

A 3ATI ARINC clamp (optional supply) must be used to install the Stratotimer ST3 in the aircraft.

A 26-pin female connector (optional supply) must be used to connect the aircraft wiring to the Stratotimer ST3. Refer to page block 1, section 3.5 - Electrical and Display Characteristics for the pin assignments.

1.4 Electrical Grounding

The electrical grounding of the Stratotimer ST3 is with the 3ATI ARINC clamp.

The installer must make sure that the housing of the Stratotimer ST3 and the 3ATI ARINC clamp are clean and unpainted to ensure good electrical conductivity. The conductivity resistance between the housing and the 3ATI ARINC clamp should be not more than 10 mΩ.

2. Battery Replacement

The battery (CR2450 (3V)) for the Stratotimer ST3 must be replaced every 10 years or when failure code FC12 is displayed in the top RH corner of the display.

To remove the battery, do the following steps (refer to Figure 201):

(1) Remove the Stratotimer ST3 from the aircraft instrument panel (refer to Removal / Installation, page block 401).

(2) Loosen the captive screw from the backplate of the Stratotimer ST3.

(3) Rotate the cover to get access to the battery and the USB connector.

(4) Remove the slot plate and battery.

(5) Remove the battery from the slot plate.

(6) Dispose of the battery in an environmentally friendly manner.

To install the battery, do the following steps (refer to Figure 201):

CAUTION: THE POSITIVE POLE OF THE BATTERY MUST BE AT THE TOP OF THE SLOT PLATE.

(1) Press the battery in the slot plate.

(2) Install the slot plate and battery in the Stratotimer ST3.

(3) Rotate the cover to close the access to the battery and USB connector.

(4) Tighten the captive screw. Do not use Loctite.

(5) Install the Stratotimer ST3 in the aircraft instrument panel (refer to Removal / Installation, page block 401).

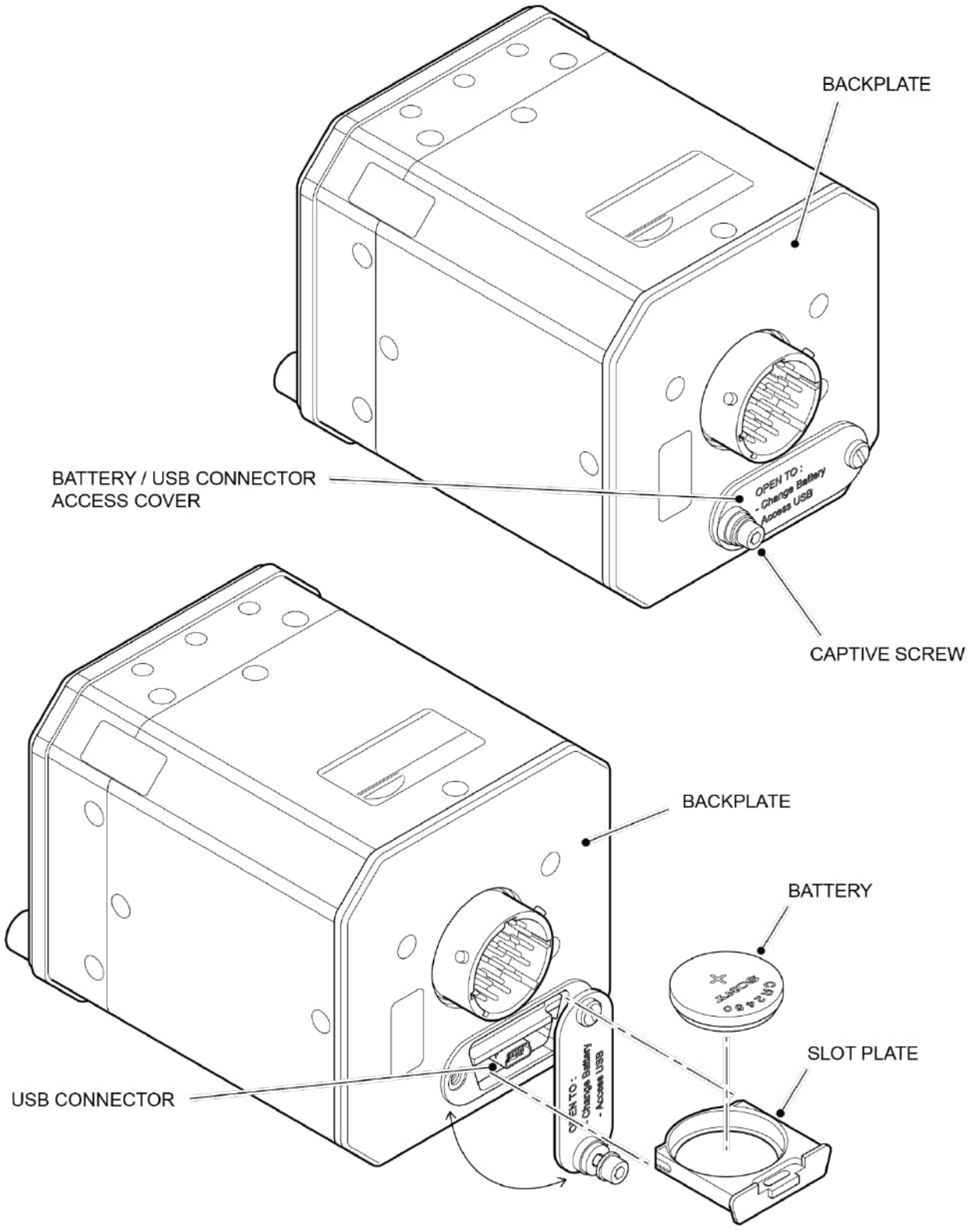

Figure 201 - Battery Replacement

3. Storage

3.1 General

The expendable parts required for storage are listed in the table below:

REFERENCE	ITEM
Local supply	ESD desiccant bag - DIN 55473 - Type B (dust-proof)

Table 201 - Storage

3.2 Environmental Conditions

The Stratotimer ST3 must be stored according to the following environmental conditions:

- Temperature range: between +10°C and +30°C
- Humidity: 70% RH maximum

3.3 Packaging Conditions

Store the Stratotimer ST3 in the original packaging.

Put the original desiccant bags with the device. The bags of desiccant must be changed every 12 months.

REMOVAL / INSTALLATION

1. Removal

1.1 References

REFERENCE	ITEM
Aircraft Maintenance Manual (AMM)	Chapter 24, Electrical Power

1.2 Special Tools and Equipment

REFERENCE	ITEM
Local supply	Protective caps for electrical connectors

1.3 Consumable Materials

None

1.4 Expendable Parts

None

1.5 Preparation

(1) Make sure that the work area is clean and clear of unwanted parts and materials.

(2) Open and tag the applicable circuit breaker to disconnect electrical power to the Stratotimer ST3 (ref. AMM, Chapter 24).

1.6 Removal

Refer to Figure 401.

(1) Loosen the two adjusting screws (3) that hold the Stratotimer ST3 (1) in the clamp (2).

NOTE: The adjusting screws (3) are larger than the mounting screws (4). Do not loosen the mounting screws (4).

(2) Carefully pull the Stratotimer ST3 (1) from the aircraft instrument panel to get access to the electrical connector.

(3) Disconnect the electrical connector and remove the Stratotimer ST3 (1).

(4) Put protective caps on the electrical connectors of the aircraft and the Stratotimer ST3 (1).

1.7 Close-up

(1) Remove all tools and materials and clean the work area.

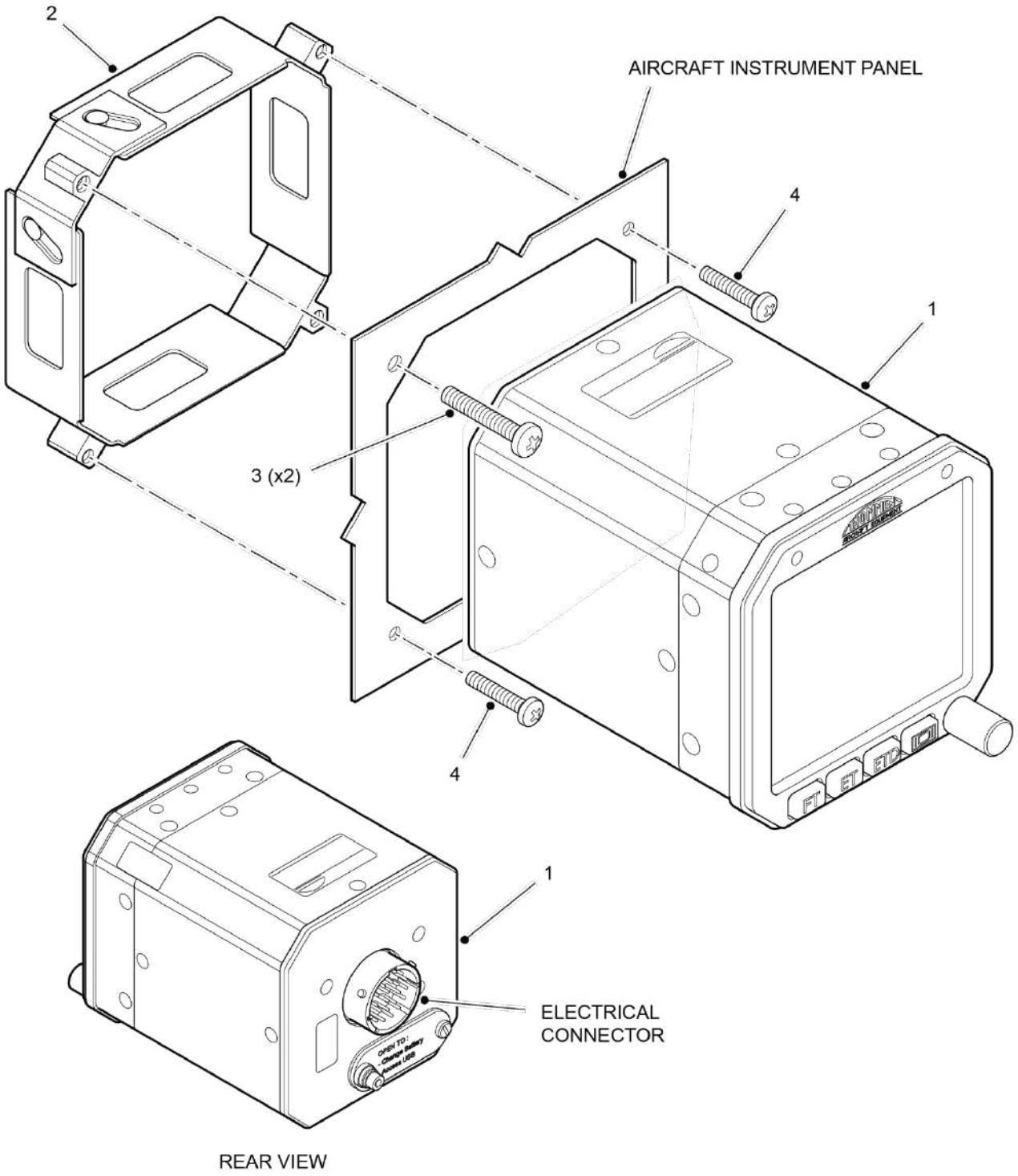

Figure 401 – Stratotimer ST3 Removal / Installation

2. Installation

2.1 References

REFERENCE	ITEM
Aircraft Maintenance Manual (AMM)	Chapter 24, Electrical Power

2.2 Special Tools and Equipment

REFERENCE	ITEM
8500-001	Installation Kit 3ATI - 26 pin (optional supply) (consisting of clamp (square style) 3ATI and 26 pin mounting connector)

2.3 Consumable Materials

None

2.4 Expendable Parts

None

2.5 Preparation

Refer to Figure 401.

(1) Refer to Installation Considerations (Maintenance Practices, page block 201) for pre-installation instructions.

(2) Make sure that the work area is clean and clear of unwanted parts and materials.

(3) Make sure that the applicable circuit breaker is open and tagged (ref. AMM, Chapter 24).

(4) If necessary, install the 3ATI clamp (2) (optional supply, refer to Special Tools and Equipment, above).

(5) If necessary, install the 26-pin connector to the aircraft electrical wiring (optional supply, refer to Special Tools and Equipment, above). For pin assignments, refer to Description and Operation (page block 1), Electrical and Display Characteristics (section 3.5).

(6) Clean the inside surfaces of the 3ATI clamp (2) and the mating surface of the housing of the Stratotimer ST3 (1) in accordance with the applicable aircraft procedures to ensure good electrical conductivity for grounding.

2.6 Installation

Refer to Figure 401.

(1) If necessary, remove the protective caps from the electrical connectors of the aircraft and the Stratotimer ST3 (1).

(2) Make sure that the electrical connectors for the Stratotimer ST3 and the aircraft are clean and undamaged.

(3) Connect the Stratotimer ST3 (1) with the aircraft electrical connector.

(4) Carefully put the Stratotimer ST3 (1) in the clamp (2).

(5) Tighten the two adjusting screws (3) on the clamp (2).

NOTE: The two adjusting screws (3) are larger than the two mounting screws (4).

2.7 Close-up

(1) Do a bonding resistance test (ref. AMM, Chapter 24).

NOTE: Electrical grounding of the Stratotimer ST3 is with the 3ATI ARINC clamp. The conductivity resistance between the housing of the Stratotimer ST3 and the 3ATI ARINC clamp should be not more than 10 mΩ.

(2) Remove the tag and close the applicable circuit breaker for the Stratotimer ST3 (ref. AMM, Chapter 24).

(3) Do an Operational Test of the Stratotimer ST3 (ref. page block 501).

(4) Remove all tools and materials and clean the work area.

ADJUSTMENT / TEST

1. General

   This section gives the necessary procedures to evaluate the operational efficiency of the Stratotimer ST3.

2. Operational Test

   An operational test is to make sure that the equipment fulfils its intended purpose. The task does not require quantitative tolerances. This is a fault finding task.

   2.1 References

REFERENCE	ITEM
Aircraft Maintenance Manual (AMM)	Chapter 24, Electrical Power

   2.2 Special Tools and Equipment

   None

   2.3 Consumable Materials

REFERENCE	ITEM
Local supply	Lint-free cloth
Local supply	Isopropyl alcohol

   2.4 Expendable Parts

   None

   2.5 Preparation

   (1) Install the Stratotimer ST3 in the aircraft (ref. page block 401).

   (2) If necessary, clean the Stratotimer ST3 using a lint-free cloth made damp with either clean water or isopropyl alcohol.

2.6 Procedure

(1) Make sure that aircraft power is ON (ref. AMM, Chapter 24).

(2) Make sure each of the four push-buttons work correctly.

(3) Make sure that the push / turn control knob works correctly.

(4) Navigate through the menu structure and make sure that each of the functions operate correctly (ref, Description and Operation, page block 1, section 4.7, Main Menu Options).