SECTION 9

Pilot's Operating Handbook Supplement AS-04

GPS and Multifunctional Display FLYMAP L

This AFM supplement is applicable and must be inserted into Section 9 of the Airplane Flight Manual when the FLYMAP L GPS and Multifunctional Display is installed in the AQUILA AT01-100. The information in this supplement adds or replaces information in the basic Airplane Flight Manual.

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AQUILA Aviation GmbH Head of Airworthiness

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Date, Signature Office of Airworthiness

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0.3 TABLE OF CONTENTS

1. GENERAL....3
2. OPERATING LIMITATIONS....3
3. EMERGENCY PROCEDURES....4
4. NORMAL PROCEDURES....4
5. PERFORMANCE....5
6. WEIGHT AND BALANCE....5
7. SYSTEMS DESCRIPTION....5
8. HANDLING, SERVICE AND MAINTENANCE....11

1. GENERAL

This Airplane Flight Manual supplement provides a general description of the FLYMAP L GPS and multifunctional display system and its basic operation and integration into the AQUILA AT01-100. For a more detailed description of the FLYMAP L System and full operating instructions, refer to the effective issue of the FLYMAP L Operating Manual.
The information contained within this supplement must be used in conjunction with the complete Airplane Flight Manual. Furthermore, the Operating Manual of the FLYMAP L Multifunctional Display must always be carried on board the aircraft.

2. OPERATING LIMITATIONS

The utilization of the FLYMAP L System as navigation equipment and as primary flight display is limited to operations under VFR conditions. For this reason, placard 19 of the basic Airplane Flight Manual (refer to section 2.16) must be installed in the instrument panel in the immediate vicinity of the FLYMAP L display:

GPS FOR INFORMATION ONLY

The FLYMAP L system is intended for information purposes only. The installation of the FLYMAP system does not release the pilot from his responsibilities of proper flight planning and preparation as well as complying with the navigation procedures regulated by the applicable national operating requirements during the flight. At any time, the pilot must be able to use other navigation means such as visual navigation in the case of a failure of the FLYMAP L system.

The display of the primary flight display page on the FLYMAP L system also serves solely as additional information for the pilot. The primary analogue instruments are still the relevant information source for the estimation of flight attitude and flight condition. Flight maneuvering must not be based solely on the use of information presented on the PFD display.

If collision warnings and the position of other aircraft are displayed on the FLYMAP L system in the moving map mode on the basis of a data link to external collision warning systems such as FLARM, this information does not release the pilot from his responsibilities to properly and thoroughly observe the surrounding airspace. Prior to initiating any evasion maneuvers due to collision warnings, the pilot has to visually obtain a thorough overview of the real traffic situation in the surrounding airspace, potential obstacles, actual weather situation, the surrounding terrain conditions as well as the position, altitude and direction of movement of the displayed threat. Furthermore, collision warnings are only displayed, if the other aircraft is equipped with the same or a compatible collision warning system. Under no circumstances should a pilot

adopt different tactics or deviate from the normal principles of safe airmanship. Adequate airspace observation should never be replaced by a collision warning system.
It is strongly recommended to thoroughly familiarize yourself with the FLYMAP L system and its various application and configuration opportunities on the ground before operating it in flight. The system must be operated in a way so that the situational awareness of the pilot, particularly with regard to a proper airspace observation, is never compromised.

3. EMERGENCY PROCEDURES

The FLYMAP L system is installed as optional equipment whose failure is uncritical under all operational conditions. In the case of a complete failure of the FLYMAP L system or malfunctions of its subsystems, the remaining navigation equipment must be used as required or visual navigation undertaken.

In the case of fire, smoke, smell of cable burning or electromagnetic incompatibilities caused by the FLYMAP L, the system must be immediately shut down by pulling its circuit breaker which is marked **NAV/GPS 1** or **2**. For further actions, follow the relevant emergency procedure defined in the basic Airplane Flight Manual.

CAUTION

In the case of an alternator failure, follow the relevant procedure defined in the basic Airplane Flight Manual. The FLYMAP L system as optional equipment is not part of the minimum equipment list of the aircraft, whose listed equipment is per definition essential for the safe operation of the aircraft. If the pilot takes the decision on the basis of the actual situation not to deactivate the FLYMAP L system to reduce the electrical load, it is highly recommended to reduce the brightness of the display to the lowest value. The electric power consumption of the FLYMAP L system can be considerably reduced by this measure. In such a case, the function "Nearest Airfield" of the FLYMAP L may be used to navigate directly to the next airfield.

4. NORMAL PROCEDURES

No change to the basic Airplane Flight Manual. A short description regarding the operation of the FLYMAP L system is contained in section 7 of this supplement.

5. PERFORMANCE

No change to the basic Airplane Flight Manual.

6. WEIGHT AND BALANCE

The change in empty weight and the corresponding center of gravity after the installation or removal of the FLYMAP L system must be determined and recorded in accordance with section 6 of the basic Airplane Flight Manual.

7. SYSTEMS DESCRIPTION

GENERAL

The GPS and multifunctional display FLYMAP L is a system that processes and displays GPS navigation data on a moving map providing the capability to support the pilot in the preparation and direct realization of flight planning after entering the planned flight route into the system in terms of displaying all relevant navigation information on the moving map. Beside of the illustration of the planned route as the target flight route and the deviation of the actual flight track with regard to this target route, the FLYMAP L system is furnished with a comprehensive data base containing VFR charts, models of the airspace structure, airfields, VFR approach charts for the stored airfields, terrain information and aircraft checklists, provided that they have been entered and saved by the user.

The FLYMAP L system also offers the capability to recall regularly actual weather data and other relevant information for flight (NOTAMS, etc.) from internet via mobile network und to depict this information on the map or superimpose it on the display if the system is equipped with the optional GSM module. Furthermore, the FLYMAP L system can be connected to TCAS or other collision warning equipment such as the FLARM system by a data cable to show collision warning alerts with other aircraft on the moving map in the navigation mode of the FLYMAP System. For the AQUILA AT01-100, a connection to the FLARM collision warning system is offered as an option provided that the FLARM system is installed into the aircraft.

If the AHRS sensor of the FLYMAP L system is optionally installed in the aircraft, the primary flight parameters may be shown on the display of the FLYMAP L as a primary flight display (PFD). For the determination and processing of indicated airspeed (IAS), altitude and vertical speed, the AHRS sensor has to be connected to the on-board pitot-static pressure system. Furthermore, the AHRS sensor is equipped with an integrated vertical accelerometer and the relevant sensor systems for the determination of aircraft attitude.

The display of the FLYMAP L system has touch-screen technology that considerably simplifies the operation and handling of the system. This enables the user to quickly switch between the different display modes (moving map and PFD) via the system menu. Data input for the flight planning module, the change of the system configuration and display setup is also conducted in the system menu.

Since the user of the FLYMAP L system is provided with a variety of opportunities to configure the kind and manner of the data representation on the display, only the general structure of the menu and the basic functions of the FLYMAP L system are described below. For a more detailed description and full operating instructions, refer to the effective issue of the Operator's Manual of the FLYMAP L System.

OPERATION

In order to activate the FLYMAP L, the **ALT/BAT** switch has to be in the "**ON**" position and the **NAV/GPS1** or **2** circuit breaker pushed in.

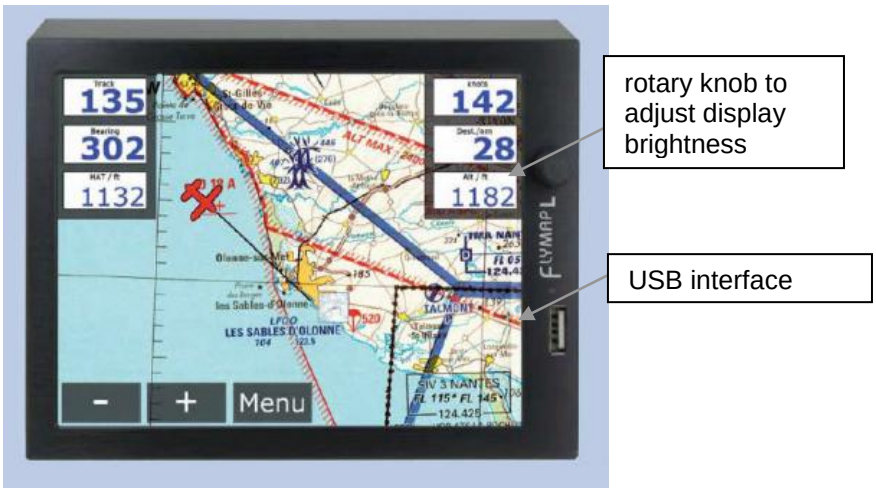
ACTIVATION/DEACTIVATION OF THE FLYMAP L

Provided that the associated circuit breaker is pushed in, the FLYMAP L system is activated as soon as the **Avionic** switch is turned to ON position. After the activation of the system, the FLYMAP L runs through a self-test and system initialization routine. The FLYMAP L is ready for operation as soon as the start-up routine has been completed. After the start-up process, the moving map appears on the display with the aircraft symbol centered on the present position of the aircraft. The aircraft may be operated in this mode without conducting any further operation steps. In this case, the FLYMAP L would act as a normal moving map.

If the planned flight route is to be shown on the display, the departure airfield, destination and all waypoints have to be entered into the FLYMAP L system before take-off by pressing the "Menu" button on the screen and selecting the tab (sub-menu) "Flight Planning" for the entry of the departure and destination airfield and the tab "Waypoints" for the waypoint entry. Selection is done by touching the corresponding button or field on the screen with the finger. Data entry occurs in a similar to that of car navigation systems.

Analogous to the activation of the system, the FLYMAP L system is deactivated when the Avionic Master switch is turned to the "OFF" position. In addition, the FLYMAP L may be deactivated at any time by pulling the **NAV/GPS1** or **2** circuit breaker.

FRONT VIEW OF THE FLYMAP L

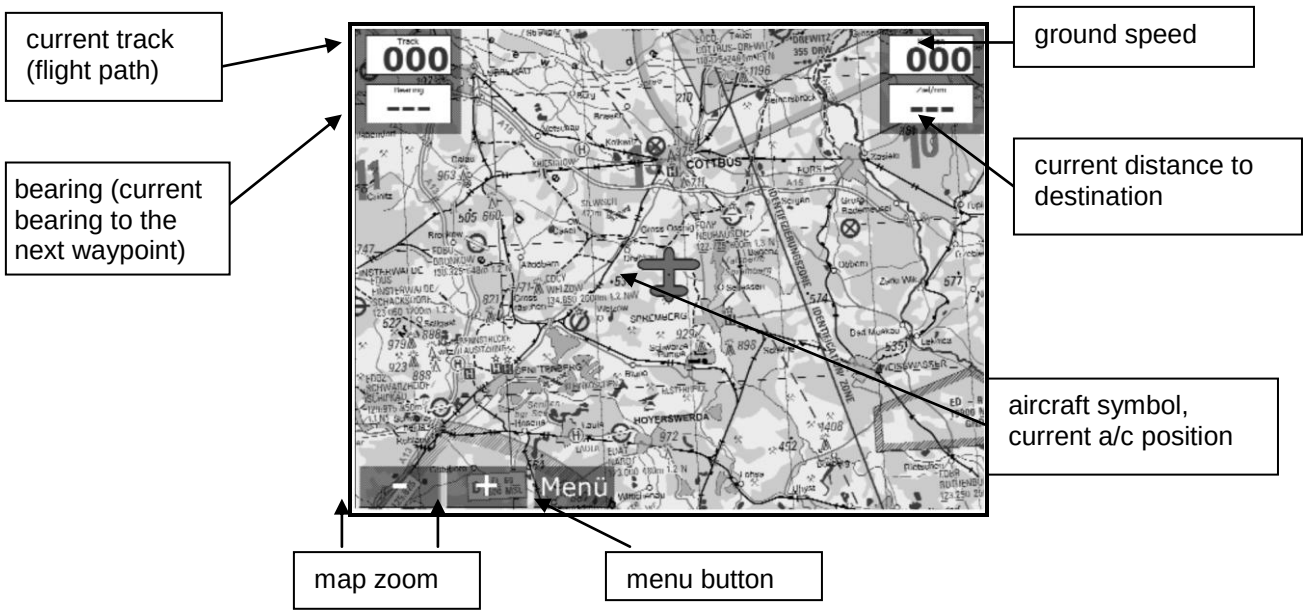


Display brightness can be adjusted by the rotary knob located on the right front side of the display casing. An USB interface for data transfer (planned flights, Flight Logbook entries, flight logs, weather data, chart/system updates, etc.) via USB memory stick is located below the rotary knob.

DISPLAY MODES

MOVING MAP (NAVIGATION MODE)

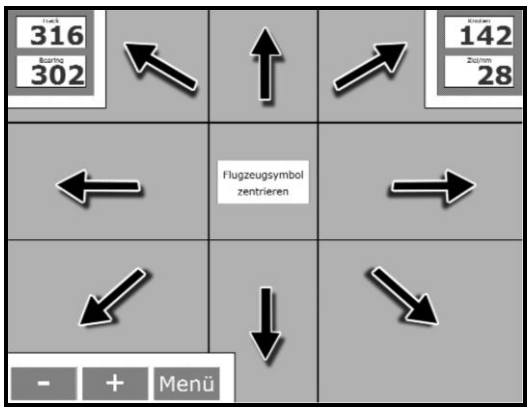
The moving map appears immediately after successful completion of the initialization process during system start-up. The following figure shows an example of the moving map display in the navigation mode.



In addition to the 4 view boxes on the upper left and right corners of the display, additional view boxes with GPS altitude and height above ground may be shown on the right and left side of the display underneath the existing view boxes. This can be achieved by activating the corresponding button in the sub-menu **"Display Options"**. The unit of the parameter shown in the view boxes can be changed by touching the corresponding view box on the display. For ground speed indication, for example, the user may choose between the unit km/h, knots or miles per hour. The analogue applies for the other view boxes. In each case, the last setting will be saved.

The map section shown may be scaled up or down by means of the transparent "**+**" and **"-"** zoom boxes located in the lower left corner of the display. System mode (system configuration and data entry) is selected by touching the transparent "**Menu**" button which is located adjacent to the map zoom buttons. All sub-menus can be accessed by the user via system mode for the configuration and activation of individual modules such as the flight planning module, for data entry, or the change of the system configuration and display settings, respectively.

In navigation mode, the complete touch-screen is subdivided into "hidden" functional fields as shown in the illustration below. The map can be scrolled into the shown direction (left, right, up, down, diagonal, refer to the subsequent illustration) by touching the screen in the corresponding field. If the aircraft symbol disappears after repeated scrolling of the map, the map may be re-centered on the actual aircraft position by touching the central segment of the screen.

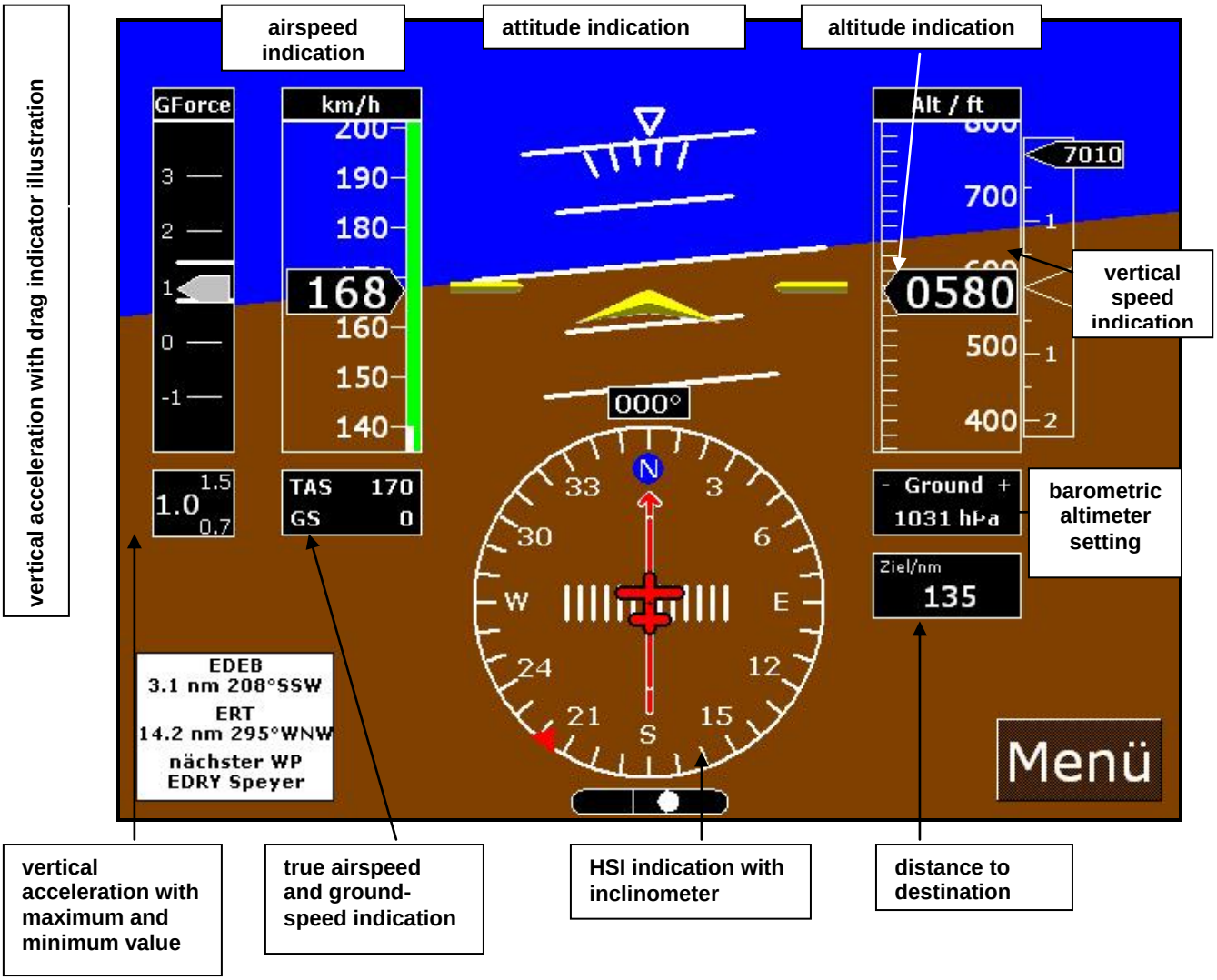


Subdivision of the screen into logic-functional fields

Provided that the departure airfield, destination and all waypoints has been entered in the system mode before take-off (tab/sub-menu "Flight Planning" for the entry of the departure and destination airfield and the tab/sub-menu "Waypoints" for the waypoint entry), the planned flight route is shown, superimposed on the map in the navigation mode as the target route (course). All deviations from this target route are indicated by a deviation bar on a scale located near the upper edge of the display which is similar to the presentation on the CDI (course deviation indicator). An arrow is located in the middle of the course deviation scale pointing towards the direction in which the pilot must turn to regain the target track. If the arrow points straight upwards and the deviation bar is in the middle of the scale congruent with (covered by the) arrow, the aircraft is exactly on the desired target course.

PRIMARY FLIGHT DISPLAY (PFD mode); optional, only if AHRS sensor is installed

The user switches from navigation mode into PFD mode by touching the “Menu” button and selecting the “Activate Horizon” button in system mode. Primary flight parameters appear on the screen as a primary flight display. The illustration below shows the arrangement of the flight parameter indications.



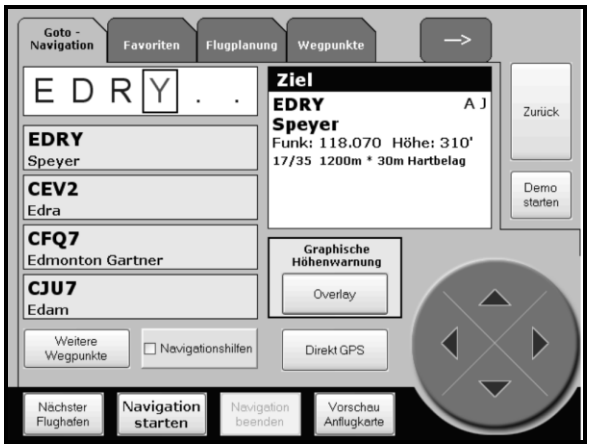
The touch-screen is also available in the PFD mode of the FLYMAP L system and can be used to center the horizon prior to beginning a flight. The barometric altimeter setting may also, for example, be selected by touching the “**+**” or **"-"** in the respective view box.

The moving map of the navigation mode may be superimposed on the primary flight display in a small clipped window by selecting the activating button in the corresponding sub-menu of the system mode. The same applies for the superimposed display of the primary flight display in a small clipped window on the moving map in the navigation mode.

To switch back from PFD mode into navigation mode with the moving map display, touch the “Menu” button and select the “Deactivate Horizon” button in the system mode. The primary flight display is only available if the AHRS sensor module is installed in the aircraft.

SYSTEM MODE (with the various sub-menus arranged as different tabs)

System mode is selected by touching the "Menu" button on the touch-screen. The different sub-menus, in which data entries or configuration and display setting changes may be undertaken, are arranged and displayed in the form of tabs. After selecting the "Menu" button, the following display appears on the screen:



By touching the respective tab, the corresponding sub-menu is selected and appears on the screen. Only 4 tabs are shown on a single menu page. A button containing an arrow is located on the display, adjacent to the right side of the shown tabs. The next 4 tabs (sub-menus) are shown on the display by selecting this button. The arrow points towards the direction of scrolling. In the respective sub-menus, the various flight planning, flight management, and configuration as well as display setting functions and modules may be selected and data entries or configuration and display setting changes may be carried out.
For a more detailed description and operating instructions with regard to the various functions and available modules within the FLYMAP L system as well as the miscellaneous configuration and display setting options, refer to the effective issue of the FLYMAP L Operating Manual.

INTEGRATION INTO THE AQUILA AT01-100

The FLYMAP L system is connected to the avionic bus of the on-board electrical power supply of the AQUILA AT01-100 and protected by a 5 A circuit breaker which enables the disconnection of the FLYMAP L system from the electric power supply. The circuit breaker is labeled **NAV/GPS1** or **2** and installed in the right section of the instrument panel with the other circuit breakers. The circuit breaker may be used to deactivate and activate the FLYMAP L system in flight.

In addition to the main unit with the display and an integrated GPS receiver, the FLYMAP L system consists of a GPS antenna, the optional AHRS sensor module for the PFD mode and the optional data cable to the interface of the FLARM collision warning system (if installed). The GPS antenna is installed on support brackets inside the instrument panel and is connected to the main unit by an antenna cable. The optional AHRS sensor module is installed on a support bracket between the NAV/COM side stiffeners of the midsection of the instrument panel behind the main display unit of the FLYMAP L system and is connected to the on-board pitot-static pressure system. To ensure correct indication of the primary flight parameters, the proper installation position and alignment of the AHRS sensor module is essential. The main unit of the FLYMAP L system with the display and the integrated GPS receiver is installed in the avionic rack in the midsection of the instrument panel above the transponder and the NAV/COM transceiver.

To also provide an indication of collision warning alerts and the position of dangerous objects on the FLYMAP L display, the main unit of the FLYMAP L system may be connected to the corresponding interface of the FLARM collision warning system via a special data cable when this system is installed in the aircraft.

For a detailed description of the integration of the FLYMAP L system into the aircraft and its connection to the on-board electrical system as well as the exact installation positions of its system components, refer to the latest revision of the Maintenance Manual.

8. HANDLING, SERVICE AND MAINTENANCE

In order to increase the service life of the GPS and multifunctional display system FLYMAP L, it should always be deactivated during engine start-up and shut-down as electrical surges during the start-up and shut-down process may cause damage to the unit.

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