



**OPERATION ZONE SYSTEM  
DS 105**

**OPERATOR'S HANDBOOK**



## NOTICE

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## 1. GENERAL INFORMATION

The PAT Operation Zone System DS 105 has been designed to provide the aerial work platform operator with essential information required to enable the machine to be used within its design parameters. The design parameters are specified by the manufacture's range diagram for your aerial work platform.

The Operation Zone System uses sensing devices to monitor various aerial work platform functions and provides the operator with a display of the systems operational condition.

The Operation Zone System is design to warn the operator if a non-permitted operation zone is approached.

**WARNING**

**Always refer to operational instructions and the range diagram provided by the aerial work platform manufacturer.**

If a non-permitted operation zone is approached, the DS 105 Operation Zone System will warn the operator by a visible warning light, sounding of the existing aerial work platform warning horn, and locking out boom down and tele-out motion.

In the event of a lock out condition, the boom up and the tele-in motion is allowable and functioning. At this time the platform must be repositioned into the operation zone, prior to continuation of use.

## 2. WARNINGS

The Operation Zone System DS 105 is an operational aid which warns the aerial work platform operator of approaching non-allowable operation zones.

The device is not and shall not be a substitute for good operator judgment, experience, or use of acceptable safe operating procedures.

The operator is responsible for operating the aerial work platform within the manufacturer's specified parameters.

The aerial work platform operator shall ensure that all warnings and instructions provided by the manufacturer are fully understood, observed, and remain with the aerial work platform operator.

Prior to operating the aerial work platform, the operator must carefully read and understand the information in this Operator's Handbook so that he knows the operation and limitations of the Operation Zone System DS 105 and the aerial work platform.

To guard against unnecessary system failure, perform the proper daily inspection and observation of the operating instructions set forth in this Operator's Handbook. (See Section 5 for pre-operational inspection).

### **WARNING**

**Tampering with the electronics, hardware, cables, mechanical parts or by-passing the system cut off electrically or mechanically is strictly prohibited. Failure to follow this instruction may result in damage and/or personal injury or death!**

### **3. SYSTEM DESCRIPTION**

The PAT Operation Zone System DS 105 consists of a microprocessor board, LCD board, software, two main boom length sensors, and two main boom angle sensors.

The system operates on the principle of comparing reference to actual data. The reference data is supplied by system sensors, and the actual or manufacture's data is stored in system memory. The microprocessor evaluates the length and angle measurements, if an inaccuracy exists the system generates a warning or cuts out the telescope out and boom down movements.

Actual data is supplied by the manufacture and stored in the processor board memory eeprom. This data is used to calculate the operating range of your aerial work platform.

Boom length and angle are supplied by the length and angle sensors, mounted on the boom. Two length and angle sensors are used to provide duplicate values to the microprocessor and monitor the similar sensor for defects.

Additional electrical signals allow the DS 105 to monitor the boom position.

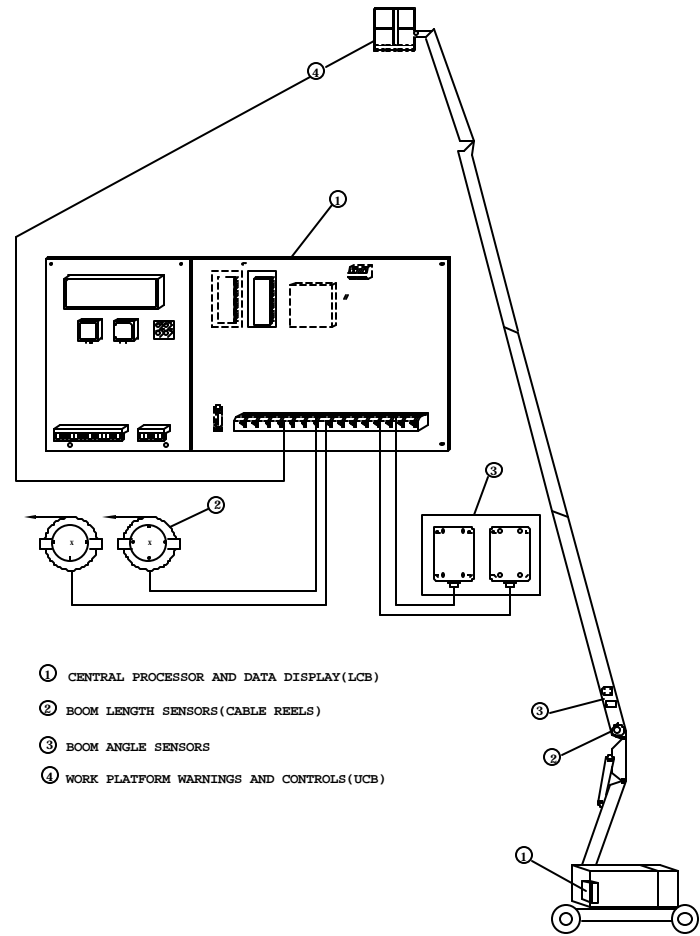


Figure 1.  
 Components of PAT Operation Zone System DS 105



## 3.1 SYSTEM FUNCTION

### START

#### **SELF-CHECK OF OPERATION ZONE SYSTEM**

After ignition of the engine, the system starts with an automatic test of all warning lights, the console display, and the complete Operation Zone System.

### ERROR

In case of system malfunction, an error code number will be shown at the "0:" selection on the data display in the lower control box(LCB). If there is no error code the system is ready for operation. If an error is present see Section 7. Service, Maintenance, and Troubleshooting.

#### **WARNING**

**WHEN SYSTEM ERROR WARNING LIGHTS ARE  
FLASHING, A SYSTEM ERROR IS PRESENT!  
DO NOT ATTEMPT TO FURTHER EXTEND  
OR LOWER THE BOOM.  
FULLY RETRACT AND THEN LOWER THE BOOM.**

**AERIAL WORK PLATFORM MUST NOT BE  
OPERATED UNTIL SYSTEM IS CORRECTED.**

## 3.2 OPERATING DISPLAYS

The system has two displays:

- A. Data Display: Displays important data, information, and error codes relevant to the operation, testing, and troubleshooting of the system.
- B. Operating Condition Display: Indicates system condition during normal operation as follows:
  - in operating zone
  - prewarning of no operating zone
  - no operating zone
  - system error.

A. Data Display is located in the LCB.

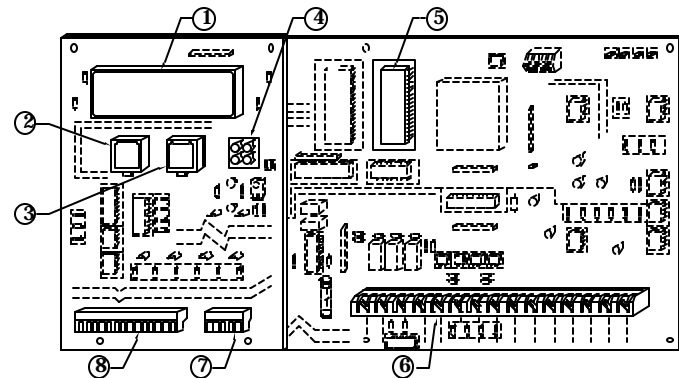


Figure 2. Data Display

1. Digital Display
2. Up button
3. Down button
4. System Error LED
5. EPROM - stores system data.
6. Main terminal(X1) electrical inputs and outputs.
7. UCB display connection(X3).
8. Calibration connection(X2).



### 3.2 OPERATING DISPLAYS (continued)

The number to the left of the colon identifies the selected data. The value to the right of the colon indicates the actual data (i.e. length or angle).

In the event of a system error, the display indicates an error code at 0:(zero). Toggle through the selections to display the error code.

#### 2. UP SELECT BUTTON

The up select button is pressed to display the next selection on the digital display.

#### 3. DOWN SELECT BUTTON

The down select button is pressed to display the previous selection on digital display.

#### 4. SYSTEM ERROR

The system error red warning lights flash and the no operation red warning light comes on when a system error has occurred.

NOTE: When the light flashes or the no operation red warning light comes on, do not attempt to further extend or lower the boom. Fully retract the boom using the telescope-in function, and then fully lower the boom.

**WARNING:**  
**AERIAL WORK PLATFORM MUST NOT BE  
OPERATED UNTIL SYSTEM IS CORRECTED.**

5. EPROM - stores system data.

6. MAIN TERMINAL(X1) electrical inputs and outputs.

7. UCB DISPLAY CONNECTION(X3).

8. CALIBRATION CONNECTION(X2).

### 3.2 OPERATING DISPLAYS (continued)

#### 9. IN OPERATING ZONE

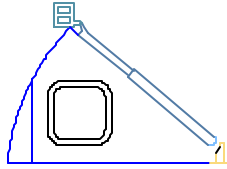


Figure 5. In Operating Zone Symbol

This green light will illuminate when the aerial work platform is being operated in the operating zone specified by the platform's manufacturer and as documented by the aerial work platform range diagram.

#### 10. NO OPERATING ZONE

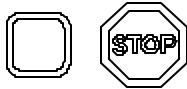


Figure 6. No Operating Zone Symbol

This red light has two functions, one is to warn the operator before the platform reaches the work limit and the other is to indicate a no operation zone/system lockout.

- a. Prewarning: the red light will flash approximately 10% prior to reaching the work platform's allowable working limit. Note, the green operation zone light remains lit.
- b. No operation zone/system lockout: the red light will illuminate when the aerial work platform has reached the operation zone limit or a system error has occurred.(see 4 or 11 for system error indication). When the no operation zone/system lockout light comes on the green operation zone light goes out, the aerial work platform's buzzer sounds, and the tele-out and lifting-down functions are disabled. In order to move the platform into the allowable operating zone, the operator must retract or raise the boom.

### 3.2 OPERATING DISPLAYS (continued)

#### 11. SYSTEM ERROR

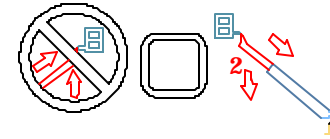


Figure 7. System Error Symbol

The system error red warning lights flash and the no operation zone/lockout red warning light comes on when a system error has occurred.

NOTE: When the light flashes or the no operation red warning light comes on, do not attempt to further extend or lower the boom. Fully retract the boom using the telescope-in function, and then fully lower the boom.

**WARNING:**  
**AERIAL WORK PLATFORM MUST NOT BE**  
**OPERATED UNTIL SYSTEM IS CORRECTED.**

### 3.2 OPERATING DISPLAYS (continued)

#### 12. SYSTEM TEST

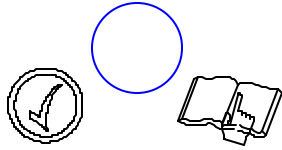


Figure 8. System Test Button

The system test button shall be activated prior to operating the aerial work platform or whenever it is desired. When the test button is pressed the system will automatically test all warning lights, work platform buzzer, the system displays, and input and output signals to the system.

NOTE: The system will be locked out for approximately five seconds, when the test is performed. See pre-operational checks.

**WARNING:**  
**IF EITHER LIGHT OR BUZZER FAIL TO FUNCTION,**  
**DO NOT OPERATE AERIAL WORK PLATFORM**  
**UNTIL SYSTEM IS CORRECTED.**

## **4. SYSTEM OPERATION**

The Operation Zone System DS 105 allows the aerial work platform to be operated within the allowable operation zone (working range) as defined by the aerial work platform manufacturer's range diagram. The Operation Zone System DS 105 will only allow the telescope-out and boom-up functions to operate until the platform has reached a limit value specified in the range diagram.

When the platform reaches to within 10% of the allowable operating limit cut-out line, the red no operation zone warning light flashes while the green operation zone light remains lit. As soon as the allowable operation zone limit is reached, the red no operation zone warning light is lit permanently, the aerial work platform buzzer sounds, and the tele-out and lifting-down functions are disabled. Simultaneously, the green operation zone light switches off.

In order to move the platform into the allowable operating zone, the operator must retract or raise the boom .

**NOTE:** The tele-in and lifting-up functions are not disabled by the Operation Zone System.

In the event of a system error, the red system error warning lights will flash and the no operation zone/system lockout warning light will lit.(See Section 7.)

### **WARNING**

**WHEN SYSTEM ERROR WARNING LIGHTS ARE  
FLASHING, A SYSTEM ERROR IS PRESENT!  
DO NOT ATTEMPT TO FURTHER EXTEND  
OR LOWER THE BOOM.  
FULLY RETRACT AND THEN LOWER THE BOOM.**

**AERIAL WORK PLATFORM MUST NOT BE  
OPERATED UNTIL SYSTEM IS CORRECTED.**



#### 4. System Operation (continued)

The system test button shall be activated prior to operating the aerial work platform or whenever it is desired. When the test button is pressed the system will automatically test all warning lights, work platform buzzer, the system displays, and input and output signals to the system.

NOTE: The system will be locked out for approximately five seconds, when the test is performed. See pre-operational checks.

**WARNING**

**IF SYSTEM DOES NOT FUNCTION AS  
DESCRIBED HEREIN OR IF EITHER LIGHTS  
OR BUZZER FAIL TO FUNCTION, DO NOT  
OPERATE THE AERIAL WORK PLATFORM  
UNTIL FAULT IS CORRECTED.**

## 5 PRE-OPERATIONAL INSPECTION

Prior to operation of the aerial work platform, the following inspection of the PAT Operation Zone System DS 105 shall be performed.

1. Check electrical cable connections for proper connection.
2. Check electrical cables connecting the components of the system for physical damage.
3. Check the components of the system for physical damage.
4. Check the spring-loaded cable reel for the following:
  - The drum rotates freely
  - The cable is not slack
  - The cable is spooled properly.
5. Check the angle sensor installations for tight mountings.
6. Perform system test by depressing the SYSTEM TEST BUTTON as described in Section 4.

### **WARNING**

**IF SYSTEMS DO NOT FUNCTION AS  
DESCRIBED IN THIS SECTION,  
THE AERIAL WORK PLATFORM MUST NOT BE  
OPERATED UNTIL CONDITION IS CORRECTED.**

## 6 OPERATION VERIFICATION

Periodically verify the operation of the PAT DS 105 Operating System. Perform the following steps with caution to prevent damage to the machine or injury to personnel. During the verification no person shall enter or shall be present on the platform. The area surrounding the machine shall be secured to avoid damage or injury to personnel.

Refer to the manufacture's Operator's and Safety Handbook provided with aerial work platform for operating parameters, controls, and safety warnings before performing the following steps.

1. Position work platform on a firm, level surface.
2. Position boom directly over the rear of the work platform and engage the swing lock.
3. Fully retract main boom and lower riser.
4. Lower boom to horizontal(approximately 0°)
5. Using only the controls in the lower control box, carefully extend the main boom until the platform is positioned at the maximum allowable reach as shown on the range diagram. At this time the no operation zone warning light should be lit, the buzzer should sound and the tele-out and lifting-down functions should be disabled. The length of the boom should be within the manufactures tolerance for the conditions of the this operational check.

**WARNING**

**IF SYSTEMS DO NOT FUNCTION  
AS DESCRIBED IN THIS SECTION,  
THE AERIAL WORK PLATFORM MUST NOT BE OPERATED  
UNTIL CONDITION IS CORRECTED.**

## **7. SERVICE, MAINTENANCE, AND TROUBLESHOOTING**

The daily maintenance is described in Section 5.1 PRE-OPERATIONAL INSPECTION. In case of a system error, the SYSTEM ERROR WARNING LIGHT will illuminate and the display will indicate an Error Code (refer to Section 4). The Error Code enables factory authorized service personnel to identify the malfunction.

In the event of system error or malfunction, consult aerial work platform troubleshooting manual or factory service representative.

### **WARNING**

**REPAIRS AND SERVICE SHALL BE PERFORMED BY FACTORY AUTHORIZED SERVICE PERSONNEL ONLY.**

**IMPROPER SERVICE OR REPAIR MAY RESULT IN LOSS OF WARRANTY AND AERIAL WORK PLATFORM.**

**STRUCTURAL MODIFICATIONS OR CHANGES TO THE AERIAL WORK PLATFORM SHALL REQUIRE VERIFICATION OF THE OPERATION ZONE SYSTEM CALIBRATION.**