

“SAFETY SHOE”®

AIRCRAFT DOOR PROTECTION & BRIDGE AUTO-LEVELER BACKUP

PRODUCT MANUAL

The “Safety Shoe” (shown below with Black Box):



**Protects the Aircraft Door by providing a backup to the Auto-Leveler
during aircraft loading and unloading operations.**

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Acronyms used in this document.

BB	Black-Box	SS	Safety Shoe
LED	Light Emitting Diode	TB	Terminal Block
PBB	Passenger Boarding Bridge (or Air-Bridge)	TP	Test Point
PC	Printed Circuit (as in pc-board)		

1 GENERAL DESCRIPTION

The “Safety Shoe”® product is used to protect open Aircraft doors. It functions as a backup to the Passenger Boarding Bridge (PBB or Air-Bridge) Auto-Leveler function. It includes a sensor, the “Safety Shoe” (placed under the open aircraft door), and the electronic controls, the “Black Box” with PBB-Down relay control and alarm to alert the user to its activation.

Should the PBB Auto-Leveler fail, the “Safety Shoe” and control electronics will automatically lower the PBB-Cab floor to avoid damage to the Aircraft Door and sound an Alarm to alert the PBB operator or other personnel to the sensor activation.

In normal operations, the PBB operator will place the “Safety Shoe” sensor under the Aircraft door upon arrival of the aircraft to the gate and opening of the aircraft door. When the aircraft door is opened and the PBB is set to “Auto-Level” mode, the “Safety Shoe” setup is activated.

Upon activation, the “Safety Shoe” setup will sound an alarm. This startup alarm serves to alert and remind the operator to place the “Safety Shoe” sensor under the Aircraft door (as well as to indicate the setup is active and ready).

The “Alarm Reset” button serves to acknowledge and silence the alarm. The button and alarm are both integrated to the “Black Box” which is part of the “Safety Shoe” setup. Should the self-test fail, the alarm will NOT reset and the operator should then call maintenance.

The “Safety Shoe” setup has configurable timeouts for single (T1) and multiple (T2) sensor activations. This allows adjustments per various Passenger Boarding Bridge (PBB) types or as desired on a per gate/PBB basis.

The T1 and T2 timing adjustments are set according to desired maximum time of single activation (T1) and maximum time elapsed from multiple activations (T2). The T1 and T2 times are usually set to 100-160mm (4-6 inches) and about 250mm (roughly 10 inches) of movement, respectively.

The “Safety Shoe” setup can also be used for catering trucks or other equipment used in close proximity to the aircraft door where automatic lowering provides an added level of safety.

2 “SAFETY SHOE” FEATURES

The “Safety Shoe” sensor and “Black Box” electronics provides backup to the Passenger Boarding Bridge (PBB) Auto-Leveler function and has the following features:

Basic features, Standard version

- Flexible for use on various PBBs and related aircraft loading/unloading equipment.
- Does not require update of PBB configuration or programming.
- Automatic self-test at each operation (when PBB is set to Auto-Level mode).
- Self-contained alarm (on Black-Box) not coupled to the general PBB-alarm.
- Adjustable timeouts for single and multiple “Safety Shoe” sensor activations.

Enhanced features, adding Gate-occupied detection

- Alarm on “Gate occupied” when PBB is docked to aircraft and Auto-Leveler NOT deployed. This serves as a reminder to the PBB-operator to set Auto-Leveler mode instead of turning-Off the PBB and walking away leaving a safety concern to the aircraft door.

3 “SAFETY SHOE” OPERATION

In normal operation, with the “Safety Shoe” sensor placed under the open aircraft cabin door when the PBB is set to Auto-Leveler mode. The sensor and “Black Box” electronics await any contact of the aircraft door to the sensor as an “activation” of the sensor.

Should an “activation” occur anytime while in operation, the “Black Box” electronics will signal to the PBB “Vertical Down” controls, via normally-open dry-contact closure, to lower the PBB. This prevents damage to the aircraft door (due to excessive force when aircraft level lowers due to loading of aircraft and Auto-Leveler fails to sense the change).

3.1 TYPICAL OPERATION

As simple as 1-2-3...

1. Place the “Safety Shoe” sensor under the open aircraft cabin door (Alarm will sound).
2. Check that the Auto-Leveler is properly deployed (and double-check the “Safety Shoe” sensor).
3. Press the red “Alarm Reset” button on the “Black-Box” to acknowledge and silence Alarm.

The “Safety Shoe” is in operation when the aircraft door is opened and the PBB is set to “Auto-Level” mode. At startup activation (each time it is put into operation), the “Safety Shoe” alarm is sounded to alert and remind the operator to place the “Safety Shoe” sensor under the Aircraft door.

The alarm is silenced by the “Alarm Reset” button unless the self-test of the “Safety Shoe” sensor or electronics has failed. This provides a continual testing for each use.

3.2 SELF-TEST OPERATION

The “Safety Shoe” and “Black-Box” has a self-test function which is performed at each startup activation. There is also continuous monitoring of the sensor and cable for disconnect or failure.

Should the self-test, the “Safety Shoe” sensor, or its wiring fail at any point in its operation, the alarm will sound and NOT be reset or silenced. The operator should then call maintenance.

3.3 “SAFETY SHOE” SENSOR ACTIVATION AND FUNCTIONALITY

When the “Safety Shoe” sensor is activated from contact with the aircraft door, the “Black Box” electronics will activate the PBB “Vertical Down” and alert the PBB-operator via the “Alarm”. Note that the PBB-Down-control is only activated during this activation and limited by timer settings.

The PBB “Vertical Down” stays activated during aircraft-door contact to the “Safety Shoe” to lower the PBB-cab floor for a maximum timeout as defined by the internal “T1” timer setting. The “T1” timer is usually set for the amount of time it takes to lower the PBB-cab floor about 100-160mm (or roughly 4-6 inches). The “T2” timer defines the maximum amount of activation time of all activations and usually set for about 250mm of movement (or roughly 10 inches).

The “T1” timer setting is set to limit the PBB “Vertical Down” movement per any single activation of the “Safety Shoe” sensor. As in, the PBB “Vertical Down” movement will be activated for the maximum time of the “Safety Shoe” sensor press (activation) or the T1-timeout.

The “T2” timer setting limits the overall PBB “Vertical Down” movement in all cumulative T1 activations before the “Safety Shoe” sensor activation alarm is acknowledged by pressing the “Alarm Reset” button.

Further PBB “Vertical Down” movements can continue after alarm acknowledgement.

After any “Safety Shoe” sensor activation, the alarm will continue until the PBB-operator or other personnel press the “Alarm Reset” button on the “Black Box” to acknowledge the PBB Auto-Leveler fail or whatever condition caused the activation. At that time the aircraft door and the “Safety Shoe” sensor should also be checked to confirm there is no further concern.

The “Black Box” provides an “Alarm” contact output which can be used to activate an external alarm (outside the “Black Box”). The audible alarm and “Alarm” contact output is reset via the “Alarm Reset” button on the “Black Box”. The “Black Box” also provides for an external “Alarm Reset” button which can be connected to perform the same function.

Note that any damage to the “Safety Shoe” sensor, a cut in its cable, or removal from the “Black Box” during operation will also serve as a single T1 activation followed by an alarm that cannot be reset. Should this occur, call maintenance to resolve the problem.

4 THE “SAFETY SHOE” SETUP

The “Safety Shoe” setup consists of the following:

- **“Safety Shoe” sensor and cable.** The lightweight sensor incorporates a purpose-built sensing mechanism to provide contact closure when pressure is applied to the sensor surface. The flexible and extendable cable is an integral part of the sensor. The sensor and cable is wired to the “Black Box” and can be stowed out of the way in the PBB-cab area.
- **“Black Box”** with internal pc-board and electronics providing an audible “Alarm”, “Alarm” indicator light, “Alarm Reset” button, “Power On” indicator, and dry-contact signal interface to the Passenger Boarding Bridge (PBB) controls (see Figure-1 below). The “Black Box” electronics provides all functionality to monitor the “Safety Shoe” sensor and cable and provide contact closure output to the PBB “Vertical Down” control.
- **“Enhanced version Black Box”** adds an “Aircraft detect” sensor and “Gate occupied” indicator (enabled when an aircraft is present and the PBB is in “Off” mode). An external sensor can also be configured to be used in addition to, or in place of, that on the “Black-Box”.
- **(Optional & recommended) DIN-rail mounted “Safety Shoe/PBB-Interface board”** to prioritize PBB-Down control on aircraft-door contact to the “Safety Shoe” for PBB designs where Auto-Leveler timeout or failure cuts-out PBB motion-control power. It also accommodates the Vertical limit switches and retracts the Auto-Leveler arm while preventing backfeed of control-voltages to the PBB-Vertical control-circuits. A.C.E.S Inc. can review PBB wiring diagrams to determine when needed. Refer to appendix for additional detail (if used).

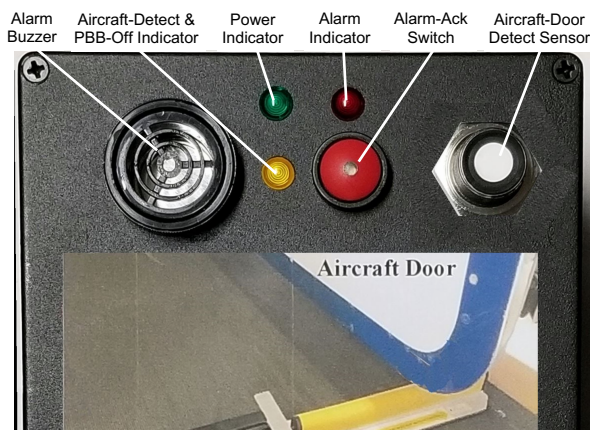


Figure-1: “Black Box” electronics enclosure



Figure-2: “Safety Shoe” sensor (under aircraft door)

5 OPERATOR INSTRUCTIONS

The "Safety Shoe" PBB/Bridge Auto-Leveler Backup and Aircraft Door Protection is simple to operate and provides a self-test functionality on each use. The operational procedure at each aircraft docking is as follows:

1. **Set the Bridge/PBB in "Auto-Leveler" mode** per the PBB Operate/Off/Auto-Leveler switch or controls on the PBB-console. This powers-up and activates the "Safety Shoe" and "Black Box" electronics.
Note "Power" LED is On and in "Alarm" mode to confirm "Safety Shoe" placement and "Auto-Leveler" deployed.
2. **Place the "Safety Shoe" sensor under the aircraft door (as shown above)** and Check that "Auto-Leveler" arm is deployed onto aircraft. The "Black-Box" is still in Alarm mode.
3. **Push the red "Alarm Reset" button to confirm "Safety Shoe" sensor & "Auto-Leveler" are ready.** If all OK, the alarm is silenced to continue operations.
 - *If the "Black-Box" goes into ALARM mode during operations, check the "Safety Shoe" sensor for aircraft door contact (activation). Also, if there is any safety concern to the aircraft door or Auto-Leveler failure. The PBB may need to have Auto-Leveler mode restored.*
 - *Push the "Alarm Reset" button to confirm all is OK. Call service or maintenance if Alarm mode persists (as the "Safety Shoe" setup cannot be used until corrected).*
 - *The self-test functionality is performed by the alarm being silenced indicating all is OK and the "Black Box" is actively monitoring the "Safety Shoe" sensor.*

6 SERVICE AND MAINTENANCE

The service and maintenance of the "Safety Shoe" setup is limited to checkout of the "Safety Shoe" sensor, its cable, and the "Black Box" electronics functionality. The individual components and pc-board are not designed to be repairable on site or by the customer.

If the "Black-Box" functionality is in question, the jumper settings can be checked for desired operation as well as all trimpot settings. See section "10. "Safety Shoe" PC-Board Jumper Settings" for details.

6.1 MAINTENANCE CHECKUP PROCEDURE

The "Safety Shoe" setup can be checked for proper operation as follows:

1. **Set PBB/Bridge to "Auto-Level" mode.** This powers-up and activates the "Safety Shoe" and "Black Box" electronics. Press the "Alarm Reset" button to silence alarm.
2. **Step on the "Safety Shoe" sensor to cause a sensor activation and verify the alarm sounds.** The PBB-cab floor should lower during the activation.
3. **Step on the "Safety Shoe" sensor until the PBB-Down motion stops** as per T1-timeout setting in the "Black-Box" (typically about 100-160mm or roughly 4-6 inches). If needed, open the "Black Box" and adjust the T1-trimpot for desired time setting.
4. **Step on and off the "Safety Shoe" sensor until PBB-Down motion completely stops** as per T2-timeout setting in the "Black-Box" (typically about 250mm for all activations or roughly 10 inches). If needed, open the "Black Box" and adjust the T2-trimpot for desired time setting.
5. **Press the "Alarm RESET" button to complete self-test functionality and acknowledge the "Safety Shoe" sensor is operational by silence of the alarm.**

For “Enhanced version Black Box” (has aircraft sensor and yellow “Gate Occupied” LED-indicator):
Check that the Alarm is persistent and not resettable when the PBB is in “Off” mode and the aircraft-sensor detects anything within 5-6ft (or per the setting on sensor inside the “Black-Box”). This feature reminds the PBB-operator, via alarm, to set the PBB in “Auto-Leveler” mode when the PBB is docked to an aircraft. Alternately, the PBB can be moved away from the aircraft if it will be in “Off” mode (or powered-down) with an aircraft parked at the gate.

6.2 ALARM CANNOT BE RESET

If the alarm cannot be reset, it indicates a problem with either the “Safety Shoe” sensor, its cable, or the “Black Box” electronics. Refer to sections 0 and 0 to check these items. If the problem cannot be found, replace the “Black Box” electronics and pc-board to restore proper operation.

If the alarm cannot be reset and the green “Power” LED-indicator is not lit, it indicates a failure with the “Black Box” internal power supply. Replace the “Black Box” electronics and pc-board to restore proper operation.

For “Enhanced version Black Box” (has aircraft sensor and yellow “Gate Occupied” LED-indicator):
The Alarm will be persistent and not resettable if the PBB is in “Off” mode and the aircraft-sensor detects anything within 5-6ft (or per the setting on sensor inside the “Black-Box”). This is a feature to alarm the PBB-operator to set the PBB in “Auto-Leveler” mode when the PBB is docked to an aircraft. Alternately, the PBB can be moved away from the aircraft if it will be in “Off” mode (or powered-down) with an aircraft parked at the gate.

6.3 ALARM DOES NOT SOUND

The “Black Box” alarm is an integral part of the “Safety Shoe” operation and is activated at each startup or when the PBB is set to “Auto-Leveler” mode. This provides a check of the “Safety Shoe” sensor and cable to assure the “Safety Shoe” setup is operational and ready.

If the alarm does not sound at startup self-test or when the “Safety Shoe” sensor is activated (contacted by aircraft door), it likely indicates a problem with the “Black Box” electronics. Also check the jumper settings on the pc-board inside the “Black-Box” as a misplaced or missing jumper could modify the intended alarm function or enable a timeout feature.

If nothing is found to enable any sound from the Alarm/buzzer, the likely problem is that or the electronics in the “Black Box” has failed. Replace the “Black Box” electronics and pc-board to restore proper operation.

For “Enhanced version Black Box” (has aircraft sensor and yellow “Gate Occupied” LED-indicator):
The Alarm will not be triggered by a “Gate Occupied” situation when the aircraft-sensor detects an aircraft AND the PBB is in the “On/Operate” mode. The “Gate Occupied” alarm is only triggered when the PBB is in “Off” mode with an aircraft present (or detecting anything within 5-6ft).

6.4 “POWER” LED DOES NOT LIGHT

If the “Power” LED does not light at startup self-test, it indicates a problem with the wiring to the “Black Box” electronics in the PBB controls console or inside the “Black Box”.

If the “Alarm” LED-indicator is lit and the green “Power” LED-indicator is not lit, it may indicate a failure with the “Black Box” internal power supply. Check that TP1 is about +12V (to TP2/0v). If not, replace the “Black Box” electronics and pc-board to restore proper operation.

Check for any loose or misplaced wires to the PBB controls console, to TB1 or TB2 in the “Black-Box” wiring, or any incorrect/missing jumper settings on the “Black-Box” pc-board. Also check the “F1” fuse (2A/20mm) on the “Black Box” internal pc-board for continuity. Make sure power to the “Black Box” is Off before checking (set PBB operation switch to “Off” or remove TB1). Check for +12Vdc between TP1 and TP2 on the pc-board when power is restored.

If the problem cannot be found, replace the “Black Box” electronics and pc-board to restore proper operation.

6.5 INSPECTION AND TEST OF THE “SAFETY SHOE” SENSOR AND ITS CABLE

The “Safety Shoe” sensor and its cable are a combined unit. Check these as follows:

1. Turn-Off the Passenger Boarding Bridge (PBB) and confirm the “Power-On” LED of the “Black Box” is Off.
2. Open the “Black Box” enclosure and disconnect the “TB3” connector.
3. Check continuity from TB3-pin1 to TB3-pin4 AND TB3-pin2 to TB3-pin3. If either fails, there is a problem in the cable or the “Safety Shoe” sensor.
4. Check there is NO continuity from TB3-pin1 to TB3-pin2 (make sure sensor is not activated). If this fails, there is a problem in the cable or the “Safety Shoe” sensor.
5. Repair the cable or replace the “Safety Shoe” sensor and cable, if needed, then restore the “Safety Shoe” setup to normal operation.

6.6 INSPECTION OF THE “BLACK BOX” ELECTRONICS

The “Black Box” electronics is not designed to be repairable on site with possible exception to damaged wiring within. An internal inspection may reveal the problem. Check as follows:

1. Turn-Off the PBB (power to the “Black-Box” or remove TB1) and confirm the “Power-On” LED of the “Black Box” is Off.
2. Open the “Black Box” electronics enclosure and inspect for loose wiring or other problems. Refer to supplied wiring diagram for details.
3. Check for proper jumper settings on “Black-Box” pc-board. See section “10. “Safety Shoe” PC-Board Jumper Settings” for details.
4. Reconnect any loose wiring or, if needed, replace the “Black Box” electronics and pc-board. Then restore the “Safety Shoe” setup to normal operation.

7 INSTALLATION DETAILS

The installation of the “Safety Shoe” setup to the Passenger Boarding Bridge (PBB) consists of physical mounting, wiring interface to the PBB controls, check jumper settings of internal pc-board of “Black-Box”, and adjustment of PBB Vertical-down timeout T1 and T2 trimpots (of “Black-Box” pc-board).

A self-test of the “Safety Shoe” setup is performed at each power-On/startup or when the PBB is set to “Auto-Level” operation. The self-test alarm reminds the PBB-operator to set the “Safety Shoe” sensor under the aircraft door and is silenced by press of the “Alarm Reset” button.

7.1 “BLACK BOX” MOUNTING

The “Black Box” is typically mounted to the backside of the PBB-controls console or in the area near the aircraft door when opened. Self-tapping screws can be used to affix it to the PBB-cab wall. The wiring between the “Black Box” and the PBB control-console is done as per convenience to the mounting and per local electrical codes. Ideally, the mounting location will allow the electrical cable to the PBB-controls console to pass thru the backside console wall where the “Black-Box” is installed (to hide and simplify the cabling).

For “Enhanced version Black Box” (has aircraft sensor and yellow “Gate Occupied” LED-indicator):
The mounting of the “Black-Box” needs to be located such that the self-contained aircraft-detect sensor will sense all opened aircraft doors that swing out over the PBB-cab floor. The position shown in “Figure-3: “Black Box” suggested mounting location” should allow a clear line-of-sight

between the aircraft-detect sensor (on the “Black-Box”) and the aircraft door. Some PBBs have a safety gating to take into consideration for the preferred mounting position.

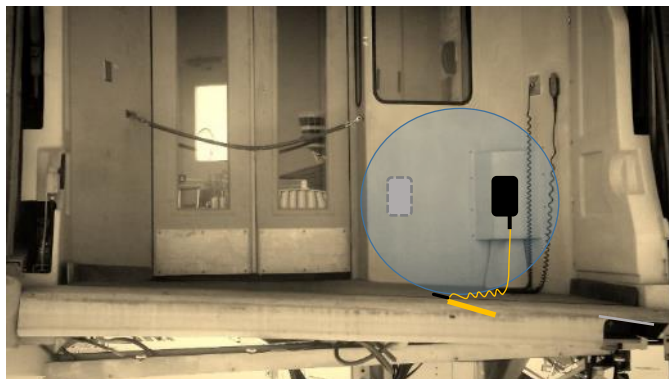


Figure-3: “Black Box” suggested mounting locations

7.2 TYPICAL WIRING DIAGRAM AND “BLACK BOX” SIGNAL INTERFACE (TO PBB)

The typical wiring of “Safety Shoe” setup to the Passenger Boarding Bridge (PBB) is shown below.

Note: Most PBBs likely require the DIN-rail mounted “Safety Shoe/PBB-Interface board” for proper PBB-Down and Auto-Leveler retraction for proper operation on Auto-Leveler failure or timeout (where PBB-motion is disabled). Refer to appendix pages for “Safety Shoe/PBB-Interface board” details for specific PBB types.

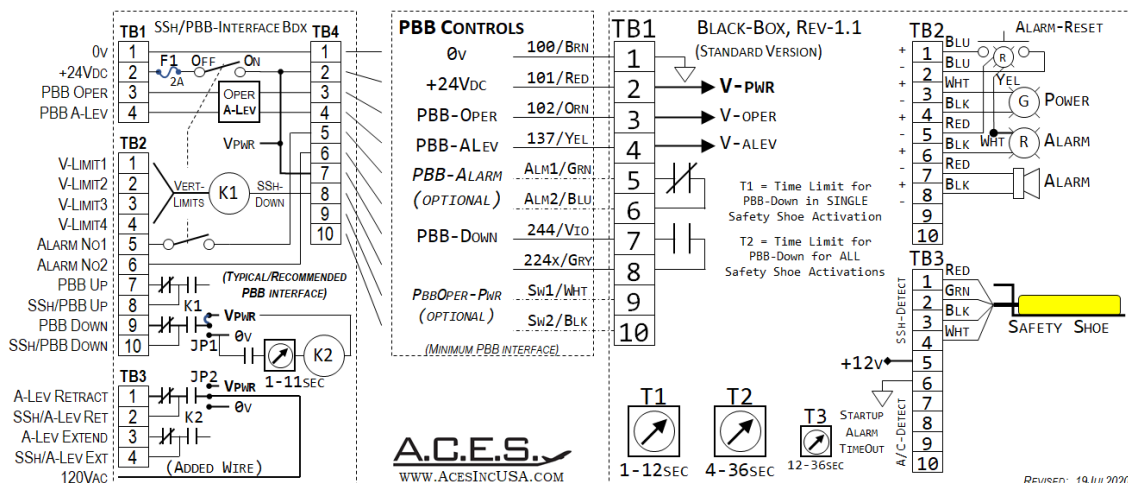


Figure-4: Typical “Standard version” wiring diagram (for “Black Box” to PBB)

All versions of the “Black Box” have signal interface to the PBB as follows (per detail above):

- 1) “Bridge Down” output (TB1-7&8): Normally-open dry contact closure: Closes upon “Safety Shoe” activation. Refer to section “6.1 Maintenance Checkup Procedure” for detail on “T1” and “T2” trimpot settings and activation details.
Note: T1 timing is set to limit “Bridge Down” contact closure for a single activation, T2 timing sets limit of all cumulative T1 activations (set for up to 12 and 36 seconds, respectively).
- 2) “Alarm” output (TB1-5&6): Normally-closed dry contact closure (optional): Opens upon “Safety Shoe” activation or failure of the “Safety Shoe” and “Black Box” setup (fail-safe as closed).
- 3) “Alarm Reset” input (TB2-1&2 or TB4-3&4): Expects normally-open dry contact closure. Allows for external acknowledge of alarms as per the “Alarm Reset” button on the “Black Box”.

For “Enhanced version Black Box” (has aircraft sensor and yellow “Gate Occupied” LED-indicator):

- 4) PBB in “Operate/On” mode output (TB1-9&10): A low power solid-state relay output that switches-On to supply input-power (up to 100mA from TB1-1&2) to external devices such as a laser-highlighter when the PBB is in “Operate/On” mode.

- 5) External aircraft-detect sensor input: Can be added and jumper-configured to be used in addition to, or in place of, that on the “Black-Box”. Contact ACES, Inc. for specific details on sensor types other than dry-contact output types.

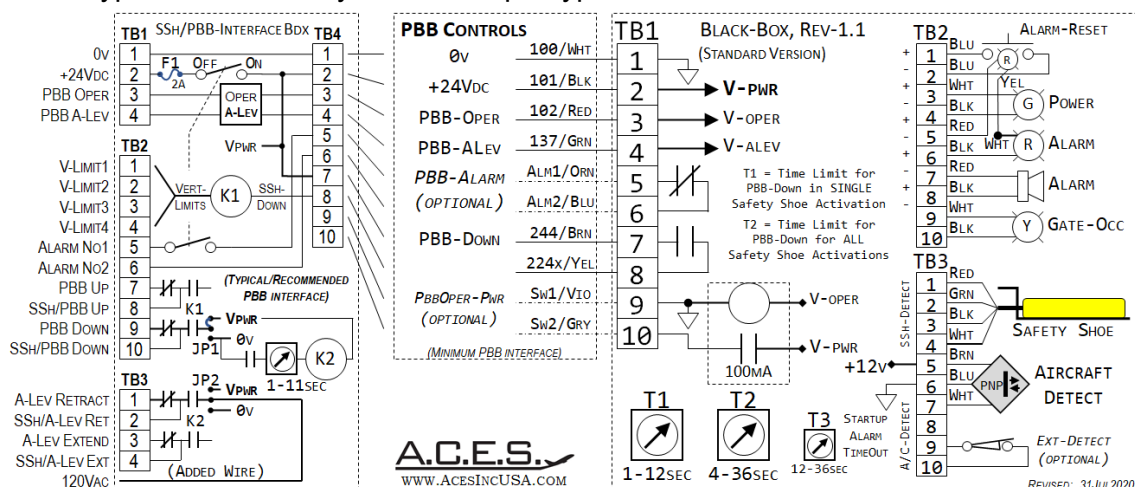


Figure-5: Typical “Enhanced version” wiring diagram (for “Black Box” to PBB)

7.3 “BLACK BOX” INTERNAL ADJUSTMENTS

The “Black Box” has configurable items on the pc-board as follows:

- 1) “T1” timer trimpot: Sets maximum PBB Vertical-down time per single activation).
- 2) “T2” timer trimpot: Sets maximum PBB Vertical-down time per multiple activations).
- 3) “T3” timer trimpot: Sets timeout of startup-alarm (per PBB “Auto-Leveler” mode activation).
- 4) Jumper settings to determine “Black-Box” configuration and functionality. See section “10. “Safety Shoe” PC-Board Jumper Settings” for details.

Refer to section “6.1 Maintenance Checkup Procedure” for detail on “T1” & “T2” trimpot settings.

7.4 “BLACK BOX” AIRCRAFT-DETECT SENSOR SETUP (FOR “ENHANCED VERSION”)

This applies only to the “Enhanced Version” Safety Shoe setup (for “Gate Occupied” detection of aircraft present when the PBB is in “Off” mode). The Black Box can be setup for various types of aircraft-detect sensors whereas the typical, installed to the Black-Box, is an “ultrasonic” type set to detect any object up to, and maybe a few feet past, the edge of the PBB-Cab floor bumper (touching the aircraft when docked). Refer to additional documents on specific sensor used and/or setup instructions. Note that aircraft-detection requires proper setup of the sensor.

8 ELECTRICAL SPECIFICATIONS

The “Black Box” electronics and “Safety Shoe” have the following electrical specifications:

Power Supply:	110-250 VAC, or 12-30VDC (units slightly differ per power-input)
Power Consumption:	Less than 3W
Output Relay Contacts:	Maximum 250V, 5A
Trimpot/timer variances:	T1=2-8 seconds, T2=4-30 seconds, T3=12-36 seconds
“Safety Shoe” sensor voltage:	10-12VDC (low current, powered from within Black Box)

For “Enhanced version Black Box” (has aircraft sensor and yellow “Gate Occupied” LED-indicator):

Power Consumption:	Less than 5W
“Black-Box” aircraft-detect sensor:	12Vdc PNP-output, normally-closed/open-detect (see jumper configuration for other sensor types)

Note: Specifications subject to change without notice.

9 STATUS-LED OPERATIONAL INDICATIONS

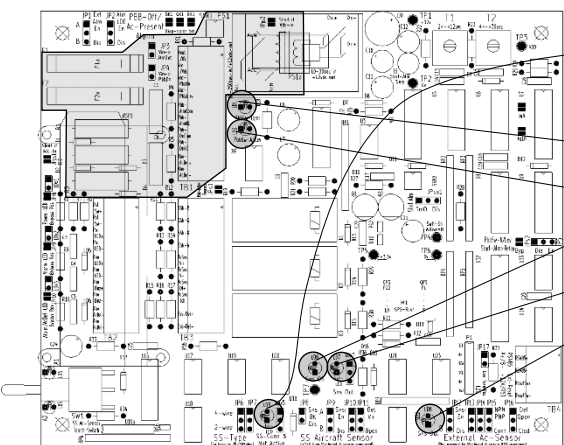
9.1 THE "BLACK BOX" LED-STATUS EXTERNAL INDICATORS:

LED Indicator	LED color	Detail:
Power	Green	Indicates Power-On of +12Vdc power-supply of "Black Box" electronics. <i>Note: This does NOT confirm "Black Box" electronics is operational. Refer to section "6. Service and Maintenance" for details.</i>
Alarm (& LED within "Alarm Reset" button)	Red	<ul style="list-style-type: none"> Indicates "Safety Shoe" sensor has been activated via contact with aircraft-door (and PBB lowered) during normal operation after startup and passing self-test. Indicates "Black Box" electronics in startup and awaiting pass of self-test (alarm silenced and Red-LED Off after press of "Alarm RESET" button). Press "Alarm RESET" button, after check of "Safety Shoe" placement under aircraft-door and PBB "Auto-Leveler" properly deployed, to acknowledge Alarm condition and continue operations.

For "Enhanced version Black Box" (has aircraft sensor and yellow "Gate Occupied" LED-indicator):

Gate-Occupied	Yellow	<ul style="list-style-type: none"> Indicates PBB is in "Off" mode AND aircraft-detect sensor (of the "Black-Box" and/or externally connected to it) has aircraft-door or object within range (the sensed-range of the "Black-Box" sensor is set near its cable or check instructions of the sensor). Typical functionality, per jumper settings, will also extend this "Gate-Occupied" On-status to the "Alarm" LED and buzzer. A false "Gate-Occupied" situation can occur if the Aircraft-detect sensor of the "Black-Box" is removed or sensor-type jumpers set incorrectly. The alarm status related to the "Gate-Occupied" situation, with the PBB in "Off" mode, can only be silenced by setting the PBB to "Auto-Leveler" mode OR moving the PBB away from. Any underlying alarm from the "Safety Shoe" sensor or otherwise can be silenced via the "Alarm Reset" button.
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9.2 THE "BLACK BOX" LED-STATUS INTERNAL INDICATORS (FOR MAINTENANCE PERSONNEL):



LED Description of LED status

LD5 On (typical): Safety Shoe sensor NOT pressed & actively sensing.
Off: Safety Shoe sensor pressed or cable disconnected or broke.

For "Enhanced version Black Box" (has aircraft sensor and external "Gate Occupied" indicator):

LD1 On: PBB is in On/Operations mode (when PBB can be driven).
Off: PBB is in Off or Auto-Leveler mode.

LD2 On: PBB is in Auto-Leveler mode (Auto-Leveler drive PBB Up/Down as needed).
Off: PBB is in Off or On/Operations mode.

LD6 On (typical): Aircraft-detect sensor OK (connected & actively sensing).
Off: Aircraft-detect sensor failed or cable disconnected or broke.

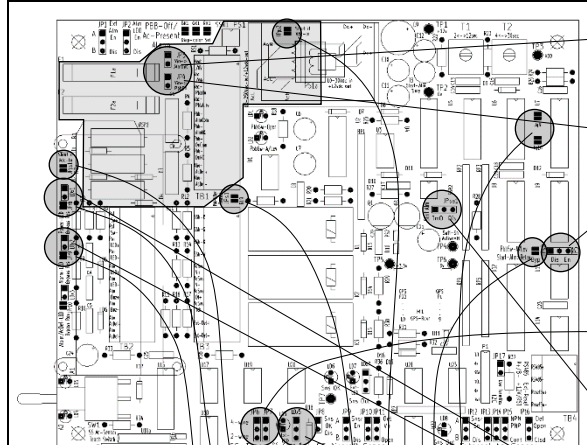
LD7 On: Aircraft-detect sensor output On/closed/+Vdc-out (set JP10/J11 for detect output).
Off: Aircraft-detect sensor output Off/open.

LD8 On: External Aircraft-detect sensor output On/closed (set JP13/J14/J15 for detect output).
Off: External Aircraft-detect sensor output Off/open.

Shaded area at top-left can have shock hazard for 120VAC powered units.

10 “SAFETY SHOE” PC-BOARD JUMPER SETTINGS

10.1 BASIC SAFETY SHOE, “STANDARD VERSION”



Setting JP3: “Alarm” relay contact connection to Vac/Vdc power input (TB1-2 after F2-fuse).

- Open (typical): Use TB1-5 & TB1-6 for external Alarm-relay wiring.
- Shorted: Use TB1-2 & TB1-6 for external Alarm-relay wiring.
- CAUTION:** Jumper-posts JP3 & JP4 can pose a shock-hazard with TB1-2=120VAC.

JP4: “PBB-Down” relay contact connection to Vac/Vdc power input (TB1-2 after F2-fuse).

- Open (typical): Use TB1-7 & TB1-8 for external Alarm output wiring.
- Shorted: Use TB1-2 & TB1-8 for external PBB-Down output wiring.
- CAUTION:** Jumper-posts JP3 & JP4 can pose a shock-hazard with TB1-2=120VAC.

JP5: Activate Alarm-RELAY on Startup.

- Dis: Disabled, timed-out Alarm sound and indicators only (no relay activation).
- En: Enabled, Alarm sound and indicators WITH relay activation (output from Black-Box).
- Note:** Alarm-relay output is typically used for PBB-controls (external to Black-Box). For Timed-out Alarm on Startup only (no relay), set JP5=Dis and JPsa1=TmO.

JP6/JP7: Safety-Shoe sensor type.

- A: Use 4-wire sensor type (typical).
- B: Use 2-wire sensor type (must have 2-10K terminating resistor).

JPsa1: Startup-Alarm Timeout.

- TmO: Enable timed-out Alarm sound and indicators (relay activation requires JP5=En).
- Dis: Disable timed-out Alarm sound and indicators (can still use JP5=En relay activation).
- Note:** Timing for Alarm on Startup controlled by T3/2Mohm & R22/1Mohm (for 11-33sec).

LED-jumpers for 2-pin connector of wired LED-holder (to Black-Box): LDx1, LDx2, LDx5.


- LDx1: Connection for “Power LED” indicator, Shorted if not used (or short TB2-3&4).
- LDx2: Connection for “Alarm-LED” indicator, Shorted if not used (or short TB2-5&6).
- Note:** LDx1 & LDx2 can be used for an additional LED in-series with those wired to TB2.
- LDx5: Connection for “Safety Shoe Connected” (& NOT active) LED-indicator, Use Ext-LED for external LED-indicator OR Short pins next to LED if using onboard LED.

Solder-jumpers: JPps1, JPps2, JPr1, JPr2, JPsa1, JPsa2.

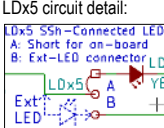
- JPps1: Failsafe-Alarm signal bypass of R3/10K, Open for 120Vac, Shorted for +Vdc input.
- JPps2: TB1-1 AC-Neutral/0v to Logic-ground, typically Shorted for Failsafe-Alarm.
- JPr1: Open for R6/1Kohm inline w/ TB2-3 “Power” LED-indicator, Shorted to Bypass.
- JPr2: Open for R9/1Kohm inline w/ TB2-5 “Alarm” LED-indicator, Shorted to Bypass.
- JPsa1: PBB Auto-Leveler mode Startup-Alarm, Shorted to enable alarm for PBB Auto-Lev.
- JPsa2: Bypass JP5 (if Shorted, JP5 should be set to “Dis” or NOT installed).
- Jq9/Jq10: Open/Short for T2=4-36sec (typ), Short/Open for 2-18sec (Short Only Jq9 OR Jq10).

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LDxN/JPrN circuit detail:

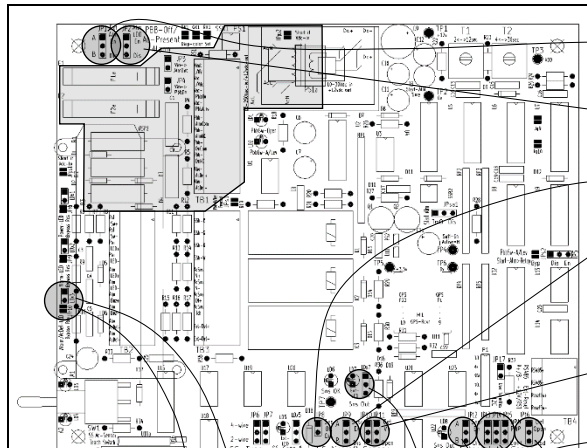


LDx5 circuit detail:



Note: All LDxN jumper positions show +/- polarity (typically for WHT/BLK wire).

10.2 SAFETY SHOE WITH “PBB-OFF WITH GATE-OCCUPIED” ALARM, “ENHANCED VERSION”



Setting JP1: Alarm-relay/output (to PBB-controls) activated by “PBB-Off & Aircraft-present” Alarm.

- A (typical): Enable “PBB-Off & Aircraft-present” Alarm to Alarm-relay/output.
- B: Disabled, do not include this alarm in Alarm-relay/output.

JP2: Black-Box Alarm-buzzer and indicator activated by “PBB-Off & Aircraft-present” Alarm.

- A (typical): Enable “PBB-Off & Aircraft-present” Alarm to Black-Box Alarm-buzzer and indicator.
- B: Disabled, do not include this alarm in Black-Box Alarm-buzzer and indicator.

JP8: Monitor local Aircraft-sensor connected to TB3-5&6 (usually on Black-Box).

- Open (typical): Enabled, Aircraft-sensor monitored for disconnect (not-powered via TB3-5&6).
- Shorted: Disabled, no monitoring of Aircraft-sensor.

JP9: Aircraft-sensor select.

- A (typical): Use local/Black-Box sensor connected to TB3-5/6/7/8 (V+/0v/output/teach).
- B: Use External sensor (supports NPN, PNP, or dry-contact types).
- Note:** External sensor can be 12V powered and monitored if connected to TB3-5/6/7 but MUST be PNP-output type. If sensor powered from PBB, use TB3-9&10 for opto-isolated interface.

JP10/JP11: Local/Black-Box Aircraft-sensor PNP-output detection type (set both to same).

- A: Output as Normally-open (detect=V+).
- B (typical): Output as Normally-closed (detect=open, also gives detect on wire-break).

JP12: Use External aircraft-sensor detection.

- A: Enable detect from External aircraft-sensor.
- B (typical): Disable/ignore detect from External aircraft-sensor.
- Note:** It is possible to use the local/Black-Box sensor connected to TB3-5/6/7 and an External sensor connected to TB3-9/10 in an AND function (for both to validate detect, not typical).

JP13/JP14/JP15: External aircraft-sensor type (set all to same).

- A: PNP or NPN output type.
- Note:** Signals should be 15Vdc or less. If PNP-type, connect detect-signal to TB3-9 & 0v to TB3-10. If NPN-type, connect detect-signal to TB3-10 & +V (up to 15V) to TB3-9. If using a 24Vdc NPN-type, JP13/JP14/JP15=B/A/A and sensor-0v tied to 0v/GND of Black-Box (TB3-6).
- B: Dry-contact output type (connect to TB3-9&10).

JP16: External aircraft-sensor detection type.

- A: Normally-Closed, detect=Open.
- B: Normally-Open, detect=Closed.

LED-jumpers for 2-pin connector of wired LED-holder (to Black-Box): LDx7.

- LDx3: Connection for “Alarm/AcDet-LED” indicator (alarm for “PBB-Off with Gate-Occupied”), Shorted if not used (or short TB2-9&10).
- LDx7: Connection for “Aircraft detect” LED-indicator (for sensor connected to TB3-5/6/7), Use Ext-LED for external LED-indicator OR Short pins next to LED if using onboard LED.

Solder-jumpers: JPr3.

- JPr3: Open for R10/1Kohm inline w/ TB2-9 “Alarm/AcDet” LED-indicator, Shorted to Bypass.

Shaded area at top-left can have shock hazard for 120VAC powered units.

Note: Refer to “Basic Safety Shoe” section for...

- LDx3/JPr3 circuit detail is same as LDxN/JPrN.
- LDx7 circuit detail is same as LDx5.

Applies to gates: