ANTICOLLISION SYSTEM (ACS)
OPERATION MANUAL. Ver 2
for the MINI-EXPRESS TRAIN – 48 volts train

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1 Warranty notice.

**One Year Limited Warranty**

For the Wattman Trains & Trams Anti-Collision System fitted to the 48-Volts Mini Express Train

Effective Nov 1st 2010, Wattman Trains & Trams, Inc (WATTMAN) hereby warrants to the Original Purchaser (Owner) that the Anti-Collision System (ACS) shall be free from any material defect for a period of 1 (one) year while in the possession of such Original Retail Purchaser. This warranty IS NOT TRANSFERABLE to any subsequent buyer.

No compensation will be considered for loss or delays.

It is the responsibility of the owner of the vehicle to make sure that the driver is properly trained and instructed in the safety features and operation of the ACS on the vehicle. (Refer to this Users Manual)

To initiate warranty coverage on any WATTMAN vehicle, the customer must communicate the problem to WATTMAN, which in turn, will determine and communicate the appropriate procedure to the customer.

If the procedure requires on-site (customer location) servicing, WATTMAN will determine the authorized service center that will perform servicing. In the case where parts need to be sent to an authorized service center, all transport cost will be at the expense of WATTMAN.

Operators shall read, understand and follow the safety operating instructions in the WATTMAN `"USER MANUAL` (this book) before driving and must always evaluate and care for all peculiar situations that he or she may meet while driving. The driver assumes the inherent hazards related to this activity and is responsible for any passenger on the train, just like for any other passenger carrying vehicle. Therefore, WATTMAN suggest and strongly recommend that the authorized driver should be at least 18 years of age.

WATTMAN disclaims any liability for incidental or consequential damages including, but not be limited to, personal injury or property damage arising from vehicle misuse, lack of maintenance or any defect in the vehicle.

It is the responsibility of the Owner of the vehicle to make sure that the Service technicians shall read, understand and follow instructions in the WATTMAN manual before servicing the vehicle. Only qualified and authorized personnel shall be permitted to maintain, repair, adjust and inspect the vehicle.

WATTMAN prohibits, and disclaims responsibility for, any modification altering the speed of the train or any settings within the control unit or the sensors and any modifications affecting the safety of the vehicle. Such modifications can cause serious personal injury or property damage for which WATTMAN disclaims all responsibility.

For Owners that are located outside North America, the warranty period continues until 1 (one) year after the date of the customer receiving the train from the factory. All defective parts must be returned to WATTMAN at the Owner’s expense for warranty repairs.
2 Safety Notice.

IMPORTANT SAFETY NOTICE
READ THIS FIRST

It is not a co-incidence if the very first section of this manual is related to safety.

The owner of the train as well as all drivers must read and understand all safety topics described in this manual.

The Anti-Collision System (ACS) must be tested each day before use.

3 Introduction.

Congratulations on purchasing the Anti-Collision system (ACS) for your Mini-Express Train manufactured by Wattman Trains & Trams. This product is intended to be used to improve the safety of the general public when the train is used in busy or confined areas of shopping malls and aims to facilitate the operation in shopping malls that may otherwise be unavailable to trains without this system because of local regulations or operating procedures.

Wattman products are renowned for their quality and reliability. This system will be supported by Wattman engineers and it is expected that this system will set the standard for the future.

This manual describes the most important safety procedures to follow and should be read thoroughly before operating the train.
4 Warnings and Advice.

- The ACS control system is integrated into the train to provide reliable control and operation with the minimum of intervention required by the operator.
- The ACS system is intended as an "Assistant" to the Operator/Driver.
- The ACS does NOT replace the skill and the correct operation of the train under the control of a trained operator.
- The system and its sensors have been tested on a variety of materials and shapes of body parts and other obstructions. WE CANNOT GUARANTEE that the system will accurately detect ALL obstacles, people, small children, dogs and cats etc. under ALL circumstances.
- Do Not test the system by driving at full speed into a wall or other obstacle, follow the test procedure later in this document.
- Check the system every day AND report any failures to Wattman promptly.
- Contact ++(450) 378 3333 ext 233 for faults or advice.

5 ACS Components.

- The ACS consists of 4 main components that work together to detect obstacles in the path of the train and to control the speed of the train to allow it to stop safely before a collision occurs.
- ACS main control unit, this is mounted on the rear of the sliding loco boiler and contains NO user serviceable parts. The complete unit can be removed if required and returned to Wattman for service.

Anti-Collision System user Manuel, EN 48volts Version : 2.1
- ACS Operator interface. This is mounted on the train dashboard and contains no user serviceable parts. This can be removed and returned to Wattman for service.

- ACS Wiring harness. This connects the ACS main control unit to the electrical systems on the train.

- ACS Sensors. These sensors are mounted behind the “Cow Catcher” at the front of the train. The sensors monitor the area in front of the train, they DO NOT monitor the areas at the side of the train. The ACS Sensors do not monitor the area very close to the ground or at heights above 24 inches from the ground. The sensors use Ultra-Sonics to record the reflection of sound waves from a target and measure the time for this reflection to return to the sensor to provide a distance measurement to the ACS control unit. Do not obstruct the sensors. These sensors contain no user serviceable parts, They can be removed and returned to Wattman for service.
6 Method of Operation.

- The ACS is designed to operate at all times when the train is in motion. The system will perform an automatic POST (Power On Self Test), each time the train Ignition key is turned to the ON position. The Operator screen will energize and show the Wattman Logo and the software Version reference (V2.1).

- Each sensor will then energize in turn and the control system will check to ensure that each sensor records a correct value for the current distance to any object in front of the train. For this to operate correctly the area in front of the train MUST be clear for at least 9 feet from the front of the cow catcher. If a sensor operation is correct it will indicate > 95% on the POST screen. The left sensor (LH) is checked first and then the right sensor (RH) is checked last. If any sensor fails this test it will indicate this to the operator and F1 can be pressed to perform this test again. The usual cause of a sensor failure is an object or person crossing in front of the train.

- When this test has been completed the Operator will see a confirmation screen and then the screen will change to the “normal” running screen. This process takes approx. 4 seconds to complete.

- Note:- If the train is parked in a garage or is too close to a fixed object such as a storeroom wall etc. then the train can still be moved by using the temporary override facility. (see section 7)
- The train is now ready to go. The operator will select FOR or REV and press the pedal to control the speed as normal. The ACS works in the background keeping a constant check on the area in front of the train.

- The ACS has three predetermined values in the operating program, first is the maximum range of operation. Second is the controlled speed range and third is the train stopping range. These are factory set. (see section 9 for distances).
• If an object or person (target) is detected within the maximum range of any sensor then the ACS will determine the speed of the train and distance to the target. The ACS will indicate to the driver that an obstruction has been detected and that the train is slowing. The ACS will then reduce the maximum speed of the train to a controlled value to safely slow the train before a collision occurs.

• If the target moves out of range then the maximum speed will return to the control of the operator. Unless the target is within the “Train Stopping” range in which case the train WILL stop. The ACS will indicate this to the operator.

• To continue the operator must release the Accelerator pedal and when he is certain that the route is clear he can press the pedal and proceed as normal. If an obstruction is still present the train will not move.

• The operator can select reverse to move away from an obstruction – Note that the ACS system is DISABLED when reverse is selected.
• If the obstruction is a fixed object the operator may use the “temporary override” detailed later, (section 7)
7 ACS Operator Screen Functions

• **F1 = Reset Power On Self Test.** This can be pressed at any time but it should generally be used only when the train is stationary and the area in front of the train is un-obstructed to avoid incorrect operation.

![Reset Power On Self Test Screen](image)

• **F2 = ACS sensitivity adjustment screen.** (Password protected, see section 8 for instructions) This is used to select one of 4 sensitivity levels for the ACS depending on the OWNER preference or shopping mall requirements. This is not needed by the Driver. If it should accidentally be pressed the driver can return to normal operation without changing the sensitivity by turning the Ignition switch OFF and then turning the Ignition switch ON again noting that the POST will be performed again automatically so this should be done in a clear area with the train stationary!

![Password Protection Screen](image)

• **F3 = Dashboard Mode.** This screen will give the driver information regarding the Train Speed, The approximate level of charge remaining in the main battery, an approximate “time remaining” of normal operation based on 2 x 8hr days with loading and unloading of passengers. A hours run counter is also provided. On the bottom right a level (0-3) is displayed for the current sensitivity of the ACS to allow easy verification by the Owner or the shopping mall representatives.

![Dashboard Mode Screen](image)

• **F4 = Maintenance screen.** This gives information in engineering values for maintenance purposes that may be required by Wattman engineers for diagnosing problems on the train. There is also 2 indicators for the smoke system that show when the machine should be operating and also when the machine is locked out. The smoke machine will operate for a maximum of 4 seconds when the smoke button is pressed and then it will lock out for 10 seconds to allow the battery to recover, It will also lock out when the battery is below 11.5volts. This will indicate a fault and this should be referred to Wattman. An Odometer is provided for total distance traveled in Miles and Kilometers.

![Maintenance Screen](image)
• **F5 = Temporary override.** Pressing this button will give a return to normal, driver controlled operation for 10 seconds only. This can be used at any time to override the system to allow movement in confined areas, store rooms etc. It can also be used when a driver sees an obstruction ahead that he is certain he can avoid. F5 can be pressed to give a 10 second override to prevent the ACS slowing the train.

• **In the event of a sensor failure or processor problem** the system can be put into **override mode** by **pressing and holding F5 for more than 7 seconds.** The detection system override screen will be displayed and will remain in this mode until the ignition switch is turned OFF.

• **Contact Wattman for further advice.**

  ![Detection System Override Active]

• **WARNING,** Pressing F5 will override the entire ACS system. This means that it is possible to drive **Forwards** or **Reverse** during the override period even if there is an **obstruction** in the path of the train. If the override screen is displayed then **ALL movements of the train are controlled by the driver.** This is done to ensure the driver can perform any maneuver that the driver decides is **required to ensure the safety of the public.**

• Note that the ACS system is disabled when **REVERSE** is selected.
8 Sensitivity setting of the ACS

- This must be done with the train stationary and with a clear area in the front of the train.
- If the sensitivity setting is (F2) is accidentally pressed while the train is in motion the operator MUST stop the train before pressing ANY other buttons. If the sensitivity is changed while the train is in motion there is a possibility of unexpected operation of the speed control.
- Select Neutral (centre position on drive direction switch)
- Press F2 This will display the following screen

![Password Entry Screen]

- Use F1,F2,F3 repeatedly to set the password that has been supplied to the OWNER. If you do not know the password turn the ignition OFF and then ON again to return to normal operation without making any changes.
- Press F5 If the password is correct this screen will then change to the sensitivity level change screen. If it is incorrect it will stay on the current page.

![Sensitivity Level Setting Screen]

- Press F1 to change the sensitivity level to either 0 = NO ACS, 1 = Short range, 2 = Medium range or 3 = maximum range.
- When you are happy with the selection press F3 to set the current value to the system.
- Press F4 to complete the process and return to the POST,

![Power On Self Test Screen]

- Note that When level Zero is selected the ACS system is disabled and only screen 3 (Dashboard) and screen 4 (maintenance) will display.
- In this mode the ACS system has no control of the train speed and will not detect objects or people in the path of the train.
- Trains supplied without ACS will have level Zero factory set.


9 Sensitivity Settings (see section 8 for password details)

<table>
<thead>
<tr>
<th>Distance / Sensitivity Setting</th>
<th>Speed (MPH)</th>
<th>Sensing distance (in) (A)</th>
<th>Set Stopping distance (in)</th>
<th>Full stop Distance to target (in) (B)</th>
<th>Maximum speed of train that is allowed MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 = Maximum Range (Most Sensitive)</td>
<td>3.7</td>
<td>96</td>
<td>32</td>
<td>15</td>
<td>3.7 = (6.0 KPH)</td>
</tr>
<tr>
<td>2 = Medium range</td>
<td>3.0</td>
<td>65</td>
<td>32</td>
<td>12</td>
<td>3.0 = (4.8 KPH)</td>
</tr>
<tr>
<td>1 = Short Range (Least Sensitive)</td>
<td>2.7</td>
<td>45</td>
<td>32</td>
<td>12</td>
<td>2.7 = (4.3KPH )</td>
</tr>
<tr>
<td>0 = NO ACS</td>
<td>3.7</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>3.7 = (6.0KPH)</td>
</tr>
</tbody>
</table>

10 Test Procedure for the ACS and the train.

- Put the train into a safe location to perform the test. This location should be clear of obstacles and people. It should be completed either at the beginning or the end of a normal day but can be done at anytime if the operation of the ACS is required to be verified.
- **MAKE A RECORD OF THESE TESTS.** They may be required by the authorities if there is an incident.
- Turn on the ignition and allow the POST to complete.
- Press F3 to verify the sensitivity level selected. (1, 2 or 3 ACS) for the chart above.
- Find a suitable target such as an empty cardboard box 24in x 10in x 10 in approx. The top needs to be at least 18 inches from the floor.
- Face a flat side towards the train.
- Place the box at least 20 feet in front of the train.
- UNCOUPLE THE CARRIAGES and COAL CAR.
- Drive at **1.0 mph** towards the box, you will feel the train begin to slow at the distance (A) in the chart above and it should stop completely at the distance (B).
- These distances are from the front lower part of the cow catcher to the box that is being used as a target.
- The train should stop completely and indicate this to the driver.
- Release the pedal and then attempt to drive forward.
- The train stopping warning should be displayed and the train should not move.
- Press F5 to check the override function. (10 seconds of override only)
- This completes the test and confirms that the system is operational.