

Troubleshooting Ticket Counting Problems in the *Smart Ticket Center*

Ticket miscounting is the most common problem addressed by **Smart Industries'** Technical Support Personnel with regards to the **Smart Ticket Center**.

Smart Industries' engineering department is continually working to make the **Smart Ticket Center** the most well-built product of its kind on the market. With ticket counting being the heart of **Smart Ticket Center** operation, much of the time spent on research and development of the **Smart Ticket Center** by **Smart Industries'** engineers has been focused on increasing the accuracy and longevity of the **Smart Ticket Center** Shredder Unit. Since its inception, a number of changes have been made to that Shredder Unit. (For a listing of many of those changes, see the "Shredder Unit Changes" section [within the "TRC-Timeline" section of the "Tech" section] of **Smart Industries'**s Web Site.) Any **Smart Ticket Center** Shredder Unit manufactured since January of 2000 should include every update that would affect ticket counting.

Many **Smart Ticket Center** operators are familiar with – and have taken advantage of – **Smart Industries'** Shredder Advance Replacement/Upgrade Program. While replacing an existing Shredder Unit can resolve design issues associated with older units, and can eliminate part wear issues on newer units, Shredder Unit replacement is not ALWAYS the most economical solution to problems with ticket miscounting. Nor can Shredder Unit replacement take care of ALL causes of ticket miscounting.

The information presented below is designed to help operators and technicians attempt to isolate the most common causes of ticket miscounting. The checks and tests listed can be performed by any operator without the use of extra equipment such as voltmeters or oscilloscopes. If you have any further questions, or need any further assistance, please contact **Smart Industries'** Technical Support Department at 515/265-9900 or toll-free 800/553-2442. Technical Support assistance is also available via fax (515/265-3148) or e-mail techsupport@smartind.com.

First Level Testing – Insuring Proper Counting on Security Level 0

Before tickets will be counted properly with the **Smart Ticket Center** set to operate at "Security Level 1", it is essential that the Shredder Unit be counting properly when the Ticket Security Level is set to "Security Level 0." (Refer to the **Smart Ticket Center** manual or on-display menu for information on changing the Ticket Security Level.)

Basis of Operation under Ticket Security Level 0

Under "Security Level 0", the number of tickets that pass through the Shredder Unit is determined by the notches on the sides of the tickets; any bar code on the tickets is ignored. While operating under the constraints of "Security Level 0", only information from the Notch Counter Transmitter and Receiver sets are used. The Notch Counter Transmitter Unit is the PC board on the lower half of the Shredder Unit; this board holds two transmitter LEDs. The Notch Counter Receiver Unit is the PC board on the upper half of the Shredder unit; this board holds two photo-receiver transistors. Each transmitter LED and the photo-receiver transistor directly above it form a Notch Sensor Unit.

For a ticket to be counted, at least ONE of the Notch Sensor Units must see a notch at specific intervals. This implies that one Notch Sensor Unit could be entirely blocked, while the other side is seeing notches, then blockage from the ticket, then a notch, then blockage, etc.

If BOTH ticket Notch Sensor Units are continually blocked
OR
if light from either Notch Counter Transmitter is allowed to continually pass around the tickets to one of the Notch Counter Receiver Units, proper counting will not occur.

Problems with Continual Observation of Light around the Sides of Inserted Tickets

Light passing continually around one side of the ticket will occur if a string of tickets jumps out of the Ticket Guide Rails while tickets pass through the Shredder Unit
OR

if the Ticket Guide Rails have been modified in some way.
(**Smart Industries'** Technical Support personnel HAVE seen operator-modified Ticket Guide Rails

where the opening around the notch "viewing area" was enlarged, based on the mistaken idea that the notch in the ticket must be seen by BOTH Notch Sensor Units. As explained above, only ONE Notch Sensor Unit is required to detect the ticket notches. By modifying the Ticket Guide Rails, operators defeat the intended design of those Rails, and usually cause a situation where light is ALWAYS able to pass around the tickets, thereby preventing ANY counting of tickets.)

Supported Ticket Manufacturers

The **Smart Ticket Center** was designed around tickets manufactured by **National Ticket Company**, **Muncie Novelty/Indiana Ticket**, and **Globe Ticket and Label Company**.

If you are using tickets manufactured by some company other than the ones listed above, there may be issues with ticket opacity or with the design of the tickets themselves that may be leading to counting problems.

Differences in Ticket Guide Rails for Tickets from the Supported Ticket Manufacturers

The width of the tickets manufactured by **National** and **Muncie** are the same.

For such tickets,

the **Smart Ticket Center** Shredder Unit should use the black Delrin Ticket Guide Rail sets designed by **Smart Industries** for use with these tickets.

The tickets manufactured by **Globe** are narrower than those produced by the other two manufacturers, and require the use of the white Delrin Ticket Guide Rail sets designed by **Smart Industries** for use with these tickets.

If the Ticket Guide Rails being used are not the appropriate type for the ticket being used, the existing Ticket Guide Rails should be replaced with those designed for the appropriate ticket.

Ticket Guide Rail Wear

Because the Ticket Guide Rails are subject to abrasion by the tickets, they do wear and widen with extended usage.

If the problems with ticket counting are due to Ticket Guide Rail wear, this can usually be determined by watching ticket counting while holding the tickets to the left, then to the right, as tickets are fed into the Shredder Unit.

If miscounting occurs as the tickets are held to one side or the other,

this usually implies Ticket Guide Rail wear,
and the Ticket Guide Rails should be replaced.

Second Level Testing – Insuring Proper Counting on Security Level 1

If tickets are counted properly
when the **Smart Ticket Center** is operating under "Security Level 0",
but fail to be counted properly
when the Ticket Security Level is set to "Security Level 1",
then ticket miscounting can be traced
to either the Bar Code Read Head in the Shredder Unit
OR
to bar code setup within the Service Menu.

Basis of Operation under Ticket Security Level 1

Under "Security Level 1",
the **Smart Ticket Center** still counts the number of tickets
by examining the notches on the sides of the tickets
(exactly as when the unit is set to count under "Security Level 0").
Then, through a proprietary algorithm,
the firmware on the Shredder Unit's Reader Board
uses information found in the bar codes on the tickets
(and read with the Bar Code Read Head)
to determine whether the tickets being inserted into the Shredder Unit
have one of the bar codes programmed (via the Service Menu) as "acceptable".

Problems Caused by Improper Bar Code Setup

If the Main Controller Board (through the Service Menu)
has not been properly programmed to accept
the specific 4-digit number encoded on the tickets being fed into the Shredder Unit,
such tickets will not be properly counted.
If this is the situation, the unit will likely count well while operating under "Security Level 0"
and count nothing when operating under "Security Level 1".
(Refer to the **Smart Ticket Center** manual or on-display menu
for information on setup of the bar codes that will be accepted as valid.)

If proper setup
(within the Service Menu of the *Ticket Center*)
of the bar code on the tickets being used has been assured,
or
if counting under "Security Level 1" is intermittent
AND
(in both instances)
proper counting under "Security Level 0" has been assured,
then it is likely that the Bar Code Read Head is faulty and should be replaced.

Problems caused by intermittent or failed electrical connections

As in any piece of electronics equipment, connection problems can always cause erratic operation. To facilitate both manufacturing and repair of the **Smart Ticket Center** Shredder Unit, a number of plugs and connectors have been incorporated in the Shredder Unit's design.

When troubleshooting any Shredder Unit counting problem, always check to see if the cause of the problem is improperly seated connectors or broken wires.

Based on the experience of **Smart Industries'** Technical Support Personnel, there are certain connection areas to which special attention should be paid.

Connections on the Notch Counter System Transmitter and Receiver Units

Because the connectors for the Notch Counter System's Transmitter and Receiver Units are located near the Latching Mechanism of the Shredder Unit, these connectors and the Transmitter and Receiver PC boards themselves are susceptible to damage by inattentive attendants during opening and closing of the Shredder Unit. Any bending of the Transmitter or Receiver PC boards can lead to hairline fractures on these boards, which – in turn – will lead to intermittent connections and inappropriate operation of the counting circuitry.

Interface Connectors from the Shredder Unit to the Main Controller Board

The **Smart Ticket Center** Shredder Unit has been designed to allow it to be removed from the **Smart Ticket Center** for bench servicing or replacement. To remove the Shredder Unit, two plugs leading from the Shredder Unit to harnessing within the *Ticket Center* itself must be disconnected. One of these connectors is a 3-pin *Mate-N-Lok* connector. This connector provides AC power for the shredder unit motor. The second connector is a 6-Pin **Molex**-type connector.

Problems with the 6-Pin Molex-type connector

The 6-Pin **Molex**-type connector holds 5 wires. Two of these wires provide 12VDC and DC ground connections to the Shredder Unit. The other three wires are used to provide a serial communications interface from the Shredder Unit to the Main Controller Board. These **Molex**-style connectors were NOT designed for frequent connection and disconnection applications.

The connector that stays within the *Ticket Center*

(after removal of the Shredder Unit)

houses female-type pins.

If examined,

it will be noted that these pins are manufactured using stamped metal, and should form a good circular ring to allow a proper connection to the male pins within the Shredder Unit connector.

Where the edges of the stamped metal of the female pins meet to form the circular pin insert area,

there should be only a very small gap.

If the female pins show a large gap,

the overall diameter of the female pins becomes too large

to make proper connection with the male pins within the Shredder Unit connector.

Vibration and temperature changes within the *Ticket Center* cabinet

can lead to intermittent connections of these pins which will,

in turn,

lead to intermittent problems with proper transmission

of ticket count information from the Shredder Unit to the Main Controller Board.

If these female pins are found to be enlarged,

the pins can be pressed back into position to achieve the needed diameter

(using a tweezers or needle-nosed pliers),

or they can be replaced.

In some cases,

operators have chosen to remove the connectors and pins

and provide a direction connection from wire to wire.

Doing this, though,

will make it difficult to easily remove the Shredder Unit from the *Ticket Center* for bench repairs.

Troubleshooting Molex Connector Problems with the "Read Tickets" Test

The "Read Tickets" Test within the Service Mode of the *Ticket Center*

can sometimes assist in troubleshooting problems

associated with the 6-Pin **Molex** connectors,

especially if ticket reading is intermittent.

(Refer to the **Smart Ticket Center** manual or on-display menu

for information on entering the "Read Tickets" Test.)

When the "Read Tickets" Test is first entered,

the display will show **0 0 0**.

*The first number in this grouping shows the number of "Tickets Counted".

*The second number in the middle of the display

shows the number of "Successful Communication" attempts,

or the number of times that the Main Controller Board has successfully requested

AND received ticket count information (other than a count of 0 tickets)

from the Reader Board of the Shredder Unit.

*The final number on the display shows the number of "Communication Errors" that have occurred,

or the number of times that the Main Controller Board has requested ticket count information

from the Reader Board of the Shredder Unit

but has NOT been successful in receiving any information in reply to that request.

The "Communication Errors" count usually increases in groups of three counts for each unsuccessful communications attempt, until the count is greater than 99.

(Only the two most significant digits of the error count are displayed;

after a count of 99 is reached, the internal count increases by 3,

but the display only shows an increase of 1 for every 10 internal counts.)

If, when power is applied to the *Ticket Center*,

the Reader Board on the Shredder Unit is NOT properly initialized

by the Main Controller Board,

the display will never change from the initial **0 0 0** entry during the "Read Tickets" Test.

For this reason, it is important to insure that the acrylic Ticket Deflector behind the Shredder Unit

is in the "accept tickets" position to actuate the Reader Board Power/Ticket Overflow

Microswitch

BEFORE power is applied to the *Ticket Center*.

It is also important that the "Read Tickets" Test be performed when counting is likely to occur (such as after the unit has been allowed to "sit idle" or OFF for a period of time)

[Many intermittent connection problems only occur

after the *Ticket Center* has been in use for some time,

during which internal heating and vibration affect the connections.]

If a known quantity of tickets is inserted into the Shredder Unit,

and only a partial count of those tickets is shown

in the "Tickets Counted" section of the display

AND

NO increase in the number of "Communications Errors" is seen,

the counting problem is NOT likely to be due to problems with the **Molex** connections,

but with the electrical or mechanical aspects of the Shredder Unit's Reader/Cutter assembly.

If a known quantity of tickets is inserted into the Shredder Unit,

and only a partial count of those tickets is shown

in the "Tickets Counted" section of the display

AND

increases in the number of "Communication Errors" ARE seen,

slight movement of the brown or blue wires on the **Molex** connector pair

can assist in isolating the problem.

If movement of the wires stops further increases in "Communication Errors" counting,

but the number of "Tickets Counted" does NOT increase,

the problem is likely due to connections along the brown wire path

(the Reader Board to Main Controller Board transmission line).

If movement of the wires stops further increases in "Communication Errors" counting, and the number of "Tickets Counted" begins to increase (without more tickets being inserted into the Shredder Unit), the problem is likely due to connections along the blue wire path (the Main Controller Board to Reader Board transmission line).

In ALL cases where "Communication Errors" are seen, all connections within the **Molex** connectors should be examined and repaired to insure proper continuity of these communication lines.

Once again, if you have any further questions, or need any further assistance, please contact **Smart Industries'** Technical Support Department at 515/265-9900 or toll-free 800/553-2442. Technical Support assistance is also available via fax (515/265-3148) or e-mail techsupport@smartind.com.