



Active RFID Systems, Inc.

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A proposal for a wine barrel automatic locating system

A significant obstacle to the adoption of most indoor tracking systems is the need for installed infrastructure and the set-up, maintenance, and the associated change process which is complex and costly. Active RFID Systems, Inc. has developed a family of inexpensive RFID tags and an exceptionally easy to install and setup system.

The system consists of battery powered tags that are placed on the ceiling of the warehouse to form a grid. In figure 1, below, a grid formation of ceiling mounted tags with their attendant infra-red signal zones and a typical pallet are depicted. This grid is the means by which forklift (and therefore pallet) locations are determined by row and length. The third dimension, stack position is derived from a sensor attached permanently to the forklift. All data is written to a tag affixed to a pallet and transmitted wirelessly from this tag to the forklift truck and thence relayed to a wireless network in the warehouse.

The ceiling grid utilizes battery powered tags which can be adhesively bonded to the ceiling of the storage warehouse. These provide a signal telling the forklift automatically where it is located within the warehouse when it is positioned under one of these tags. These tags are spaced according to the desired warehouse location precision. i.e. we recommend a tag be placed every 4-6' apart on the ceiling. These tags would operate for 10+ years.

The system would also utilize battery powered tags, one each, located on the front of each pallet. These pallet tags are dual mode in that they operate with both infra-red and RF. Location data will be "written" to these tags automatically when the pallet is positioned within the warehouse. This location and pallet identification value is then transmitted to the forklift and thence to a network all wirelessly. These tags would have a 10 year battery life.

- *The tag ID would be "read" as the forklift was in an area not covered by overhead tags. This becomes the "reference" pallet ID for association with location.*
- *The pallet row would be recorded as the forklift passed beneath the ceiling mounted tags (refer to figure 1).*
- *The reader would continuously monitor the position of the forklift tines as "height above ground".*
- *The reader would monitor forklift motion and pallet position on the tines to determine when a pallet was actually being placed in a stack.*
- *At the time of the above, the reader would transmit an infra-red signal to the tag indicating its height above ground (vertical stack position 1-4); the row the forklift is in and the location from the reference wall (particular grid tag the forklift is under at time of pallet placement.*
- *This data would then be transferred from the tag back to the forklift reader via RF when the pallet was in position).*
- *The forklift reader would transmit this data to a central database,*

This system does not require new wiring or expensive location mapping. Location mapping is consistent with building walls and overhead tag locations.

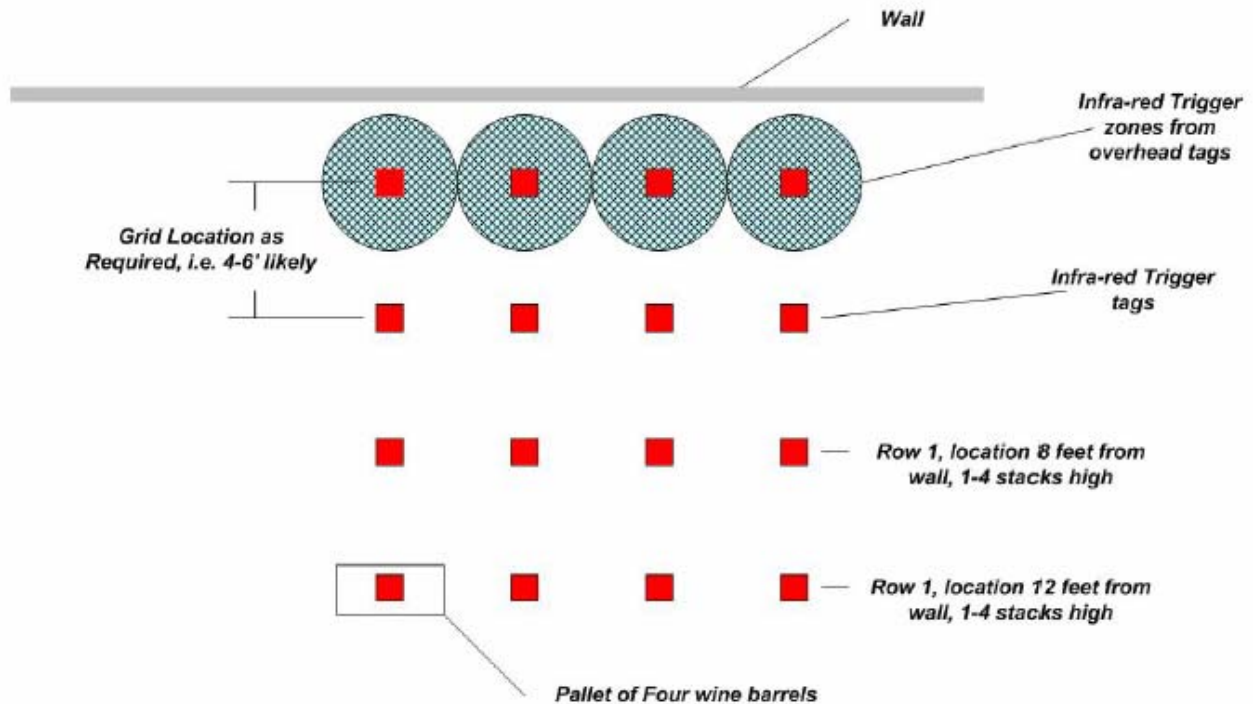


Figure 1: Location system

This system is derived from existing Active RFID Systems, Inc. products with the exception of the height above ground measuring system for the forklift. We propose the following effort to demonstrate the capabilities of such a system:

1. Task #1: We propose to have two Active RFID Systems, Inc. personnel visit your facility for one day and determine the physical parameters associated with the site and the forklift truck itself. During this time we would demonstrate the first principals of our hardware and software to you.
 - a. Non Recurring Cost (NRE) is \$3,800.00.
2. Task #2: Supply approximately 20 each ceiling mounted tags and one forklift sensor and reader assembly. Transmit forklift data to a laptop and 802.11.b/g access point. This cost estimated at \$27,000.00 including installation and field support at your facility.
3. Task #3: Supply complete system with the following estimated costs:
 - Ceiling grid tags at \$24.00 each. (40000 sq. ft. warehouse with 6 ft. spacing = 1112 tags at ~\$26,688.00 total cost)
 - Seven each Forklift readers and sensors @\$6000.00 each = \$42,000.00
 - Software integration into your existing system estimated at \$5-12,000.00
 - Pallet tags, 10,000 units at \$14.00 each = \$140,000.00
 - Installation and training as required @ \$120.00/man hour plus expenses.

This system is expected to have a one time installation and set up cost and should operate for a period of 10 years without additional cost. The system would provide location of each pallet within the errors associated with grid spacing. No operator interface would be required for the system to operate.



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Active RFID Systems, Inc. can provide additional options such as temperature monitoring, automatic inventory collection, "search and locate" of specific wine barrels, processing verification, transactional records, etc. These can be added subsequently.

Respectfully submitted,

Anthony Corrado

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President*