Radio frequency identification tag system and programming equipment

The invention includes computer system to emulate a magstripe card reader connected to a fuel dispenser terminal based on radio frequency signals, the system having a first radio frequency transmitting antenna, a separate first radio frequency receiving antenna and a controller for electronically controlling the system which is connected to both the transmitting and receiving antenna. The controller is adapted to develop and emulate magstripe card reader signals based on signals received from the receiving antenna. A multiplexer is utilized for selectively communicating magstripe card reader signals from the controller to the fuel dispenser terminal system. A method is described of combining a radio frequency tag identification system having a multiplexer with a fuel dispenser system by disconnecting a magstripe card reader from a fuel dispenser system card reader input, connecting the radio frequency tag identification system multiplexer to the fuel dispenser system card reader input; and then connecting the previously disconnected magstripe card reader to the multiplexer.
Description

BACKGROUND OF THE INVENTION

1. Field of the invention.

[0001] The present invention relates to a system and method for emulating a magnetic card swipe within a dispenser payment terminal. The system also enables radio frequency input of information, such as credit card information or user ID to a host computer system. In addition, the system provides a retrofit capable of adding the above system to a currently installed fuel dispenser, or point of sale (POS) system.

2. Description of the related art.

[0002] There are many instances where additional information is required other than operator information during fueling operations from a dispenser payment terminal (DPT). Additionally, there are some situations where it may be necessary to pass additional information or promotions during fuel filling to a particular customer and in providing alternatives for credit or debit card billing or providing records including odometer readings, etc., for service or maintenance of a specific vehicle.

[0003] The currently installed base of POS systems and DPT systems are associated and installed at fueling centers such as gasoline stations and fleet operation areas. Recently there has been a need identified for providing credit card transaction or other customer identification and transaction enabling data information to a dispenser payment terminal without the use of a conventional plastic card nor with the use of manually entered information, such as by keypad entry.

SUMMARY OF INVENTION

[0004] The present invention is a computer system to emulate a magnetic strip card reader with the system enabling radio frequency input of credit card information or similar information via such magnetic strip card reader emulation to a host computer system such as a DPT or a POS system. The digital computer system, interrogator system, and radio frequency tags may be used as a retrofit kit for adding radio frequency communication functionality to the currently installed base of DPT and POS systems having magnetic stripe card readers.

[0005] The system includes a multiplexer for supplying credit card data to a DPT or POS system utilizing credit card reader technology with radio frequency (RF) technologies. The multiplexer of the present invention provides an interface to the DPT without effecting the host or POS system. The system controller of the present invention is able to determine the state of system, either a DPT or a POS, to which it connects.

[0006] A particular advantage of the present system is that it utilizes a multi-channel radio frequency interrogator with RF switches and circulators to multiplex tag data from a plurality of different transmit and receive antennae. Such antennae are placed at various locations about a typical fuel dispensing island, preferably on both sides of such standard fuel dispensing islands, so that radio frequency communication and fueling may be accomplished on both sides substantially simultaneously.

[0007] Credit card data and other prerecorded data are stored in a radio frequency identification card (RF Tag). For purposes of this application, two types of RF Tag cards are described, although other embodiments may be equivalently utilized. The first being a vehicle mounted RF Tag card, called for the purposes of this application a radio frequency tag or simply tag. The second type is that of a keyfob, a personally held RF Tag card carried by a user and normally attached to a keychain or the like. Both the tag and keyfob include structure to reflect particular coded radio-frequency signals transmitted by the interrogator, then modulate the signal to encode pre-stored credit card information, upon reception of a predetermined identification signal.

[0008] Another feature of the present invention is that digital circuitry is included to control an array of light displays possibly including alphanumeric messages, in addition to normally present indicators located on the outside cover of the DPT or a neighboring dispenser panel, identifying to the customer that a) the system dispenser with RF Tag capability is ready; b) that the system is authorizing such transaction; and c) that it is an appropriate time to activate the customer's selected fuel pump or nozzle.

[0009] The present invention also includes a software algorithm in the dispenser control system to provide feedback to the digital computer providing the DPT state and/or the dispenser state and other credit card status.

[0010] The present invention further may utilize a vehicle sensor to determine if a vehicle is located near the system antennas. By only transmitting signals when a vehicle is known to be present, the system saves battery charge on the vehicle radio frequency tag thereby increasing its operational lifetime. Further, by not constantly transmitting, the system of the invention obtains a better RF tag reading when required along with reduced interference from other antennas and dispenser systems.

[0011] An additional invention disclosed is that of a keyfob or tag programmer. The unit in one form is a small desktop type device in which a non-programmed or misprogrammed keyfob or RF identification tag is inserted and into which the customer's credit card is inserted. The programming unit then activates, transfers, or enters data supplied by the customer, such as but not limited to, credit card data from the credit card (or customer through a manual keypad entry) into the keyfob or RF tag for subsequent system use. The sys-
The present invention allows retrofit of the new system to equipment currently installed. Another advantage of the present invention is that there is no requirement for significant modification of the station point of use or point of sale device with the present system and method.

The present invention, in one form thereof comprises a computer system to emulate a magstripe card reader connected to a fuel dispenser terminal system, the computer system having a first radio frequency transmitting antenna, a separate first radio frequency receiving antenna, and a controller, for electronically controlling the system, connected to the transmitting antenna and the receiving antenna. The controller is adapted to develop and transmit magstripe card reader signals based on signals received from the receiving antenna. Multiplexer means are included for selectively communicating the emulated magstripe card reader signals from the controller to the fuel dispenser terminal system or POS system.

The present invention, in one form thereof, further comprises an control board connected to a first indicator light and an second indicator light, and to the controller. The controller illuminates the first light when a radio frequency tag (keyfob or vehicle tag) has been detected, and the second indicator light is lit when the system identifies that tag data previously programmed into the radio frequency tag has been correctly received by the system.

The present invention, in another form thereof, includes a vehicle sensing switch connected to the controller to signal if a vehicle is present near the fuel dispenser terminal. The controller activates the transmitting antenna only when the vehicle sensing switch signals a vehicle is present near the fuel dispenser terminal.

The present invention, in another form thereof, includes multiplexer means that additionally connects to a magstripe card reader connected to the fuel dispenser terminal. The multiplexer means selectively communicates magstripe card reader signals from either the controller or the magstripe card reader to the fuel dispenser terminal system or point of sale system. The system includes a radio frequency tag that modifies and reflects signals received from the transmitting antenna to the receiving antenna.

The present invention, in one form thereof, includes two transmitting antennas and a single receiving antenna, the transmitting antennas and receiving antenna only respectively transmitting and receiving signals to a vehicle mounted radio frequency tag. The system further may include a separate patch antenna for both transmitting and receiving signals only to a hand held keyfob radio frequency tag. The computer system may also include a multichannel radio frequency interrogator to multiplex signals from the antennas to the controller. Further, the system may include a second radio frequency transmitting antenna and second separate radio frequency receiving antenna, with the second antennas located on an opposite side of the fuel dispenser terminal system from the first antennas. The radio frequency switch means is controlled by the controller and connected to the transmitting antennas.

The present invention, in one form thereof, includes a method of combining a radio frequency tag identification system having a multiplexer with a fuel dispenser system, the method comprising: disconnecting a magstripe card reader from a fuel dispenser system card reader input; connecting the radio frequency tag identification system multiplexer to the fuel dispenser system card reader input; and connecting the previously disconnected magstripe card reader to the multiplexer.

The present invention, in one form thereof, comprises a multiplexing system for communicating tag data, such as credit card data, to a dispenser payment terminal or point of sale system having a particular operating state and a magstripe card reader. The multi-
plexing system includes a radio frequency tag means for holding tag data and communicating the tag data via radio frequency signals; an antenna for receiving the radio frequency signals; and a controller connected to the antenna for receiving the radio frequency signals from the antenna and processing the signals and transmitting magstripe card reader signals containing the tag data received from the tag means. A multiplexer means is connected between the magstripe card reader and its associated dispenser payment terminal or point of sale system for either of permitting transferring of magstripe card reader signals from the magstripe card reader and permitting transferring of magstripe card reader signals from the controller to the associated dispenser payment terminal or point of sale system.

[0023] Sensing means may also be included for determining the state of the associated dispenser/POS and maintaining synchronization therewith. The sensing means may also provide a signal back to the controller providing an indication of the associated dispenser payment terminal and the fueling process status.

[0024] The present invention, in one form, comprises a magstripe card reader through which a magstripe card having encoded credit card data may be slid, a radio frequency transmitting antenna, a radio frequency receiving antenna, and an encoder connected to the magstripe card reader and antennas. The encoder is programmed to transmit encoded signals through the transmitting antenna to a programmable radio frequency tag after a magstripe card (credit card) has been slid through the magstripe card reader. After programming the tag, the encoder may verify that the radio frequency tag has received and saved the previously transmitted encoded signals by receiving encoded signals from the programmable radio frequency tag through the receiving antenna. A keyboard may be utilized for alternate manual entry of credit card data into the encoder for transmission. Such radio frequency tag programmer may be connected to a fuel dispenser payment terminal or point of sale system. Alternatively, the programming function may be included in the existing system located in the DPT.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become more apparent and the invention will be better understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

Fig. 1 shows a functional block diagram of one embodiment of the components of the present invention;

Fig. 2 is a functional block diagram of the radio frequency tag and keyfob programmer of the present invention;

Fig. 3 is a flow chart of how a radio frequency tag is programmed (step 1).

Fig. 4 is a flow chart of how a radio frequency tag is programmed (step 2).

[0026] Corresponding reference characters indicate corresponding parts throughout the several views. The exemplification set out herein illustrates one preferred embodiment of the invention, in one form, and such exemplification is not to be construed as limiting the scope of the invention in any manner.

DETAILED DESCRIPTION OF THE INVENTION

[0027] Referring now to the drawings and particularly to Fig. 1, there is shown the components of one embodiment of the RF Identification system 10.

[0028] In accordance with the present invention, system 10 is additional structure that is added between a typical magnetic strip (magstripe) card reader 12 normally already located in each side of a typical fuel dispenser island and connected by an output line to the dispenser payment terminal (DPT) card reader input line 14. System 10 includes a multiplexer board 16, which is electrically connected between magstripe reader 12 and DPT input line 14. The particular multifunctionality of multiplexer board 16 and the other components of system 10 will be further described herein.

[0029] The present invention is designed for installation in a dispenser island having two sides, side "A" being one side of the dispenser island to which a customer may drive up for vehicle fueling, and side "B" being the opposite, but similar side of the dispenser island. In regards to each dispenser pump, the system provides one but preferably two or more transmit antennae 18 for communication for an RF vehicle (car) tag. Such transmit antennae are located adjacent the dispenser island for optimum transmitting capability with the radio frequency tag attached to the vehicle to be refueled.

[0030] An independent and separate receive antenna 19 on each side of the fuel dispenser island is used with system 10. Such receive antennae 19 are utilized to detect and receive the signal transmitted from antennae 18 and reflected and modified (with embedded credit card data) by the RF vehicle tag (not shown) or card reader.

[0031] Closely associated with the dispenser nozzles and controls there is a patch antenna 20 for both transmitting and receiving radio frequency data with a customer keyfob unit.

[0032] System 10 utilizes a controller 22 comprising an Intel 386-type microprocessor running a standard DOS operating system (for example, MSDOS Version 6.2). Controller 22 is connected by communication line 23 to a radio frequency interrogator 24. Interrogator 24 is responsible for reading card information from the RF tags via antennae 18 and 20 and associated circuitry.
The card information is embedded in the RF tags and is then passed to controller 22, which formats the data to emulate magnetic strip data.

[0033] Controller 22 also controls and switches multiplexer board 16. Switching of multiplexer board 16 occurs to permit either data originating at magstripe card reader 12 to be supplied to the DPT card reader input 14 or having emulated magstripe data from system 10 be supplied to the DPT.

[0034] Multiplexer board 16 includes a watchdog circuit so that in the event that the controller 22 of system 10 functions outside of its intended parameters, multiplexer board 16 will interrupt the controller from emulating card swipe data, and thereby cause its dispenser to revert back to a normal dispenser payment terminal function with its normal credit card reading functionality. On any fault or error in the RF system 10, no change of the current functionality of the DPT terminal or its standard magstripe card reader 12 occurs.

[0035] In normal DPT operation, the magnetic card reader 12 passes credit card information to the DPT. When a RF tag or keyfob is read, controller 22 switches multiplexer board 16 and then provides data (credit card information embedded within the tag) and control signals to the DPT. Controller 22 also controls an auxiliary circuit board entitled, AC control board 26. AC control board 26 uses digitally controlled solid state relays to selectively illuminate two particular alternating current (AC) status light assemblies 28. Although the light assemblies 28 in this embodiment control AC power applied to indicator lights, alternatively direct current could be similarly controlled.

[0036] For customer inspection during fueling operations, two AC status lights are identified. "Indicator Light 1" is illuminated when the RF ID tag or keyfob is in range of one of antennae 18 and 20 on that particular dispenser side and has been validity interrogated. When such keyfob or tag has been validly interrogated controller 22 will send a signal to AC control board 26 to illuminate Indicator Light 1.

[0037] The second light (Indicator Light 2) associated with each AC status light assembly 28 indicates to the customer that the tag data imbedded within the keyfob or tag has been correctly sent to the DPT or alternatively a POS.

[0038] At this stage of operation, the DPT standard display would notify the customer that it is processing authorization of the credit card information and/or tag data and/or that the customer may begin the fueling operation.

[0039] Now focusing attention to the antenna system design of system 10, interrogator 24 preferably utilizes two channels. Channel One is used for the keyfob while Channel Two is used for vehicle RF tag use. Keyfob patch antenna 20 is optimally located in the face of the dispenser (one per side) while the vehicle antennae 18 and 19, preferably two transmit antennae 18 and one receive antennae 19 per side, are located adjacent the associated dispenser for acquiring RF tag data about the fueling area, although other antenna placing arrangements are possible. Software embedded within controller 22 is designed so that it will ignore keyfob data if within range of the vehicle tag antenna 19 and vice versa.

[0040] RF interrogator 24 is connected to antennae 18 through an RF switch 32. Switch 32 is utilized to communicate transmit power from interrogator 24 to the four individual vehicle transmit antennae 18. One type of switch utilized is that of a commercially available four output RF switch Model ZSDR-425 from Mini-Circuits of Brooklyn, New York, although others may alternatively be utilized. Control lines 36 are connected from RF controller 22 to switch 32.

[0041] RF interrogator 24 is also connected to a second radio frequency switch 39 for communications with patch antennae 20. RF interrogator 24 is connected to radio frequency switch 38 through the use of an RF circulator 40 available from MA-COM INC., of 9430 Lima Road, Suite C., Fort Wayne, Indiana. RF circulator 40 is used to permit RF energy to proceed in only one direction.

[0042] System 10 operates via controller 22, which can control RF switches 32 and 38 through the use of RF interrogator 24 and continuously poll through the different vehicle antennae 18 on each side, and the keyfob patch antennae 20. Once the RF interrogator 32 detects a tag or keyfob on a particular antenna, the RF interrogator 24 will attempt to transmit or receive data from the particular antenna 18, 19, or 20 on the side which it had previously detected a tag or keyfob. System 10 continues to poll the other detecting antennas while completing a particular transaction. System 10 and controller 22 uses a single thread operating system to sequentially process RF tag data.

[0043] As shown in Fig. 1, a power supply 42 is connected to controller 22 and RF interrogator 24 for application of electrical power to the units. As shown in Fig. 1, an RF splitter 44 is used as a combiner to combine the signals from receive antennae 19 so they can be combined as a single input to RF interrogator 24.

[0044] An alternate embodiment of system 10 may use a sensor 46 to determine whether a vehicle is present at the fuel dispenser. Such sensor 46 activation by a present vehicle will cause controller 22 (to which it is connected) to begin transmitting and interrogating a possible tag on the sensed vehicle. Sensor 46 may consist of a ultrasonic sensor, photo-eye, limit switch, or any other equivalent mechanism to identify to system 10 that a vehicle is present. Controller 22 will activate the transmitting antenna only when the vehicle sensor 46 signals a vehicle is present near the fuel dispenser terminal.

[0045] A communication line 48 is utilized to determine the state or operating condition of the DPT and its associated Universal Dispenser Controller (UDC) which controls the fueling process and valves of the dispenser.
Communication line 48 is able to pick up the signals between the DPT and UDC to thereby determine fueling state information to help system 10 remain in synchronization with the associated DPT or possibly an associated POS. Alternatively, if an invasive communication connection is required or desired, the DPT could be directly connected to the present RF ID system, but such connection may require additional programming of RF ID software or other changes in RFID system architecture.

The vehicle RF tag and/or keyfob unit needs to be pre-programmed with the fuel purchaser’s credit card information or other customer identification information prior to use with system 10. As shown in Fig. 2, the keyfob or RF ID tag code programmer 60 is shown.

Fig. 2 shows one embodiment of the system to encode a keyfob or vehicle RF tag. A programmed computer, such as a personal computer 60 is shown having an associated keyboard 62 and printer 64. Computer 60 is connected to a dispenser payment terminal (DPT) via a communication line 66. The DPT 68 is shown with a conventional magstripe card reader 70.

Connected to computer 60 via communication line 72 is RF interrogator 24 and the rest of system 10. In some embodiments, the encoder subsystem may be implemented within system 10, and in that case communication line 72 is actually line 23 as shown in Fig. 1. In other embodiments, the encoder subsystem would be a separate and possibly a stand alone device from system 10, with possibly a magstripe card reader connected directly to computer 60.

In some embodiments of the system, it may be possible to eliminate use of an RF circulator 40. In such embodiment, it would be preferable to have antenna 20 transmit only while antennae 19 receive only tag or keyfob data. The operation of programming a tag (keyfob or vehicle tag) is shown in the flow charts of Figs. 3 and 4.

Program operation has been split in to a Step 1 program (Fig. 3) and Step 2 program (Fig. 4).

To encode a RF tag (keyfob or vehicle tag) Step 1 program begins (80) and commands are generated to program the reader (84). If the program has not been commanded to exit the card reading stage by user input (86), the customer will insert their credit card into the magstripe card reader (88). The system will then prompt the customer to remove the credit card (90, 92). The credit card data collected by magstripe card reader 70 will then be communicated to computer 60 (step 94). If no further credit card or user ID data is to be entered, program flow will end (98) and continue with Step 2, as shown in Fig. 4.

Step 2 of the programming procedure requests (100) the user to select the type of RF tag to be programmed, either keyfob or vehicle tag, or asks the user if they wish to exit the program (200). The program then determines if the user selected exit (102) and whether there is any previously recorded credit card data (from Step 1) to process (104).

If there is credit card data to store to a RF tag, then the program will read and obtain the previously stored credit card data or other data (106). The program will then transmit the credit card data and store it to the tag (108) by activating and controlling the associated RF interrogator 24 (Fig. 2) and antennae system.

After entry of data or credit card data to either the RF ID tag 68 or keyfob 66, the system will read the information from the tag to determine if the RF tag (keyfob or vehicle tag) was properly encoded. Keyboard 62 is used to encode additional data on RF tags, by supplying additional data to computer 60 for transmittal through RF interrogator 24.

By having a small self-contained unit computer 60 each gasoline dispensing station or fuel kiosk may be able to encode such RF tags quickly and easily, without necessitating a customer sending his/her credit card or other information to a central processing site. A preferred keyfob or RF tag system for utilization with the present invention is that of a Model No. MS1MX402D supplied by Micron Communications of Boise, Idaho. Such RF tags may include microchips and other remote intelligence communication technology as is known in the art or later comes into being.

The present invention includes additional functionality to permit particular identification of a keyfob or RF tag and keeping such information regarding vehicle purchase habits and other information useful to the fuel dispensing station owner.

While this invention has been described as having a preferred design, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and which fall within the limits of the appended claims.

Claims

1. A computer system to emulate a magstripe card reader connected to a fuel dispenser terminal system, said computer system comprising:

   a first radio frequency transmitting terminal system;
   a separate first radio frequency receiving antenna;
   a controller for electronically controlling said system, said controller connected to said transmitting antenna and said receiving antenna; said controller adapted to develop and transmit magstripe card reader signals based on signals received from said receiving antenna; and
   multiplexer means for selectively communicating said magstripe card reader signals from said controller to the fuel dispenser terminal.
2. The computer system of Claim 1 further comprising an control board connected to a first indicator light and an second indicator light, said control board further connected to said controller, said controller controlling the operation of said control board to illuminate either of said indicator lights based on signals received from the receiving antenna.

3. The computer system of Claim 2 in which said first indicator light is lit when said system identifies a radio frequency tag and said second indicator light is lit when said system identifies that credit card data previously programmed into the radio frequency tag has been correctly received by the system.

4. The computer system of Claim 1 further comprising a vehicle sensing switch connected to said controller to signal if a vehicle is present near the fuel dispenser terminal.

5. The computer system of Claim 4 in which said controller activates said transmitting antenna only when said vehicle sensing switch signals a vehicle is present near the fuel dispenser terminal.

6. The computer system of Claim 1 in which said multiplexer means additionally connects to a magstripe card reader connected to the fuel dispenser terminal, said multiplexer means selectively communicating magstripe card reader signals from either said controller or the magstripe card reader to the fuel dispenser terminal system.

7. The computer system of Claim 1 in which said system includes a radio frequency tag that modifies and reflects signals received from said transmitting antenna to said receiving antenna.

8. The computer system of Claim 1 in which said system includes two transmitting antennas and a single receiving antenna, said transmitting antennas and receiving antenna only respectively transmitting and receiving signals to a vehicle mounted radio frequency tag said system further including a patch antenna for both transmitting and receiving signals only to a hand held keyfob radio frequency tag.

9. The computer system of Claim 8 further comprising a vehicle sensing switch connected to said controller to signal if a vehicle is present near the fuel dispenser terminal.

10. The computer system of Claim 9 in which said controller activates said transmitting antenna only when said vehicle sensing switch signals a vehicle is present near the fuel dispenser terminal.

11. The computer system of Claim 1 further comprising a multichannel radio frequency interrogator to multiplex signals from said antennas to said controller.

12. The computer system of Claim 11 in which said interrogator is connected to a second radio frequency transmitting antenna and second separate radio frequency receiving antenna, said second antennas located on an opposite side of the fuel dispenser terminal system from said first antennas.

13. The computer system of Claim 11 further comprising a radio frequency switch means controlled by said controller for selecting and applying a signal to one of said transmitting antennas.

14. The method of combining a radio frequency tag identification system having a multiplexer with a fuel dispenser system, the method comprising:

- disconnecting a magstripe card reader from a fuel dispenser system card reader input;
- connecting said radio frequency tag identification system multiplexer to said fuel dispenser system card reader input; and
- connecting the previously disconnected magstripe card reader to said multiplexer.

15. A multiplexing system for communicating credit card data to a dispenser payment terminal or point of sale system having a particular operating state an a magstripe card reader, said multiplexing system comprises:

- a radio frequency tag means for holding credit card data and communicating said credit card data via radio frequency signals;
- an antenna for receiving said radio frequency signals;
- a controller connected to said antenna for receiving said radio frequency signals from said antenna and processing said signals and transmitting magstripe card reader signals containing the credit card data received from said tag means; and
- multiplexer means connected between the magstripe card reader and its associated dispenser payment terminal or point of sale system for either of permitting transferring of magstripe card reader signals from said magstripe card reader and permitting transferring of magstripe card reader signals from said controller to the associated dispenser payment terminal or point of sale system.
16. The multiplexing system of Claim 15 further comprising sensing means for determining the state of the associated dispenser payment terminal or point of sale system so said controller maintains synchronization therewith.

17. The multiplexing system of Claim 15 further comprising a sensing means for providing a signal back to said controller providing an indication of the associated dispenser payment terminal or point of sale system operating state and a credit card transaction status.

18. A radio frequency tag programmer comprising:

a magstripe card reader through which a magstripe card having encoded credit card data may be slid;
a radio frequency transmitting antenna;
a radio frequency receiving antenna; and
an encoder connected to said magstripe card reader and said antennas, said encoder programmed to transmit said encoded signals through said transmitting antenna to a programmable radio frequency tag after a magstripe card has been slid through said magstripe card reader.

19. The radio frequency tag programmer of Claim 18 in which said encoder verifies said radio frequency tag has received and saved said previously transmitted encoded signals by receiving encoded signals from said programmable radio frequency tag through said receiving antenna.

20. The radio frequency tag programmer of Claim 18 further comprising a keyboard for alternate manual entry of credit card data into said encoder for transmission.

21. The radio frequency tag programmer of Claim 18 connected to a fuel dispenser payment terminal.

22. The radio frequency tag programmer of Claim 18 connected to a point of sale system.
Step 1
Start

1. Program the DPT to retrieve magstripe card input
2. Prompt customer to insert card
3. PC User Exit?
   - Yes
   - No
   4. Customer Inserts Card
5. Prompt customer to remove card
6. Customer Removes Card
7. Card Data Sent to the PC

End
Goto Step 2

Fig. 3
Step 2
Start

Prompt user to pick tag type or exit

PC User Exit?
Yes

End of Card Data?
Yes

Read Card Data Stored on PC by Step 1

Program Card Data on Tag

End

Fig. 4