PERSONAL IDENTIFICATION CREDENTIAL SYSTEM (PICS) USER'S MANUAL

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1.0 SCOPE

This document is intended to provide guidance to the end user of the Personal Identification Credential System (PICS) for normal operations. This revision covers the Production Prototype system only. It describes typical operation of the Personal Identification Credential (PIC), the PICS Enrollment Station, and the PICS Reader. It also covers the operation of the software items included with the system, including the enrollment software (PICS Manager), the PICS Reader Service (PICS Reader Service) and the status display (PICS Status).

In general, the roles discussed within this document cover the PIC user, the PICS Enrollment Station operator, and the PICS maintainer. The PIC user need only be concerned with the operation of the PIC itself. The PICS Enrollment Station operator will need to be familiar with both the PIC operation and the PICS Enrollment Station operation. The PICS maintainer will need to be familiar with all three roles.

1.1 Glossary

PIC	Personal Identification Credential (handheld identification unit incorporating biometric sensor and RF link)
PICS	Personal Identification Credential System
PICS Enrollment Station	Enrollment subsystem that assigns a PIC to an individual and maintains the database
PICS Reader	Interrogation unit that communicates with the PIC and is interfaced with a local access control system
Proof of Concept (POC) PICS	Prototype PICS that closely resembles the production system
PIC User(s)	The PIC Users are the end users of the system. The PIC users will be assigned a PIC and be enrolled in the PICS. The PIC users will interact only with the PIC to which they have been assigned
Enrollment Station Operator	The Enrollment Station Operator uses the Enrollment Station on a regular basis to enroll and disenroll PIC users.
PICS Maintainer	The PICS Maintainer is responsible for system configuration operations and troubleshooting problems which may arise. This includes setting up/configuring the PICS Reader, setting up, configuring and maintaining the PICS Enrollment Station and its software, including the PICS Enrollment Station software and its associated database. The PICS Maintainer roll may be accomplished by more than one individual.

1.2 Documentation Conventions

Screen Labels	Represents labels that appear on the screen in the PICS Manager software.
Database Field Names	Represents fields in the PICS database.
User Entered Data	Represents data which the user must enter.
`File Contents`	Represents the listing of files used by the system.

2.0 REFERENCE DOCUMENTS

EG&G Drawing 126764-10, PICS Installation

EG&G Drawing 126762-10, Assy, PICS Reader Terminal Unit

3.0 DESCRIPTIONS

The Personal Identification Credential System (PICS) provides access control using a Personal Identification Credential (PIC), which can be issued to individual users. The PIC is a small, handheld, wireless biometric device small enough to fit in a shirt pocket. In the initial application, users will operate the PIC from within a vehicle in order to gain access to a facility.

In addition to the PIC, the system will include a PICS Enrollment Station, which consists of a MS Windows based PC software application with an RF interface attached to a serial port. The Enrollment Station software will run under the MS Windows environment and provide enrollment capability and enrollment database maintenance.

Lastly, the PICS Reader is used to control access of users to the system. The PICS Reader provides interrogation of PIC units and validation of PIC enrollment. The PIC is responsible for validating the fingerprint, but the Reader is responsible for insuring that a given PIC is to be allowed in the system.

3.1 PIC Operation

The operation of the PIC is straightforward, but the nature of the biometric fingerprint sensor is such that the user will need to become well practiced in using it. The guidelines given here may not work for everyone. Some users may find that a different approach to using the sensor will yield better results. Unfortunately, the typical user will have little time to experiment with using the PIC before being permanently enrolled in it. Therefore, it is important that the PICS Enrollment Operator be well experienced in using the PIC and training new users.

The act of sliding open the fingerprint sensor activates the electronics inside. The PIC automatically turns itself off after approximately 10 to 15 seconds. Upon activation, the PIC will immediately flash the LED amber to indicate that it is alive. Following a brief delay, the PIC will then flash the LED green and emit a short high pitch tone. This is an indication that the internal battery is good. If the user places a finger on the sensor immediately upon activating the PIC, the LED may go directly to a flashing amber LED without going green first. If the battery is getting low, the PIC will emit three short low pitch beeps and briefly flash the LED red. If the PIC emits a long, low pitch beep and flashes the LED red, this is an indication of an internal error and the user may need to be re-enrolled. If the battery gets too low, the PIC may not function at all, or it may function erratically. Any time the PIC indicates that the battery is low it should be recharged at the earliest opportunity. Note that the internal battery cannot be removed. It must be recharged in the supplied charging unit.

Once the PIC is turned on, it will immediately start scanning for a valid fingerprint. It is important for the user to be consistent in applying the finger to be tested. In order to facilitate the correct application of the fingertip, the user should place the fingertip in the indented portion of the slide cover, then slide the cover open and place the flat part of the fingertip on the sensor. The opening of the sensor and the application of the finger

should occur quickly. If the finger slides across the sensor slowly, the sensor my read an image before the finger is actually in place. Figure 1 shows correct and incorrect placements of the fingertip on the sensor.

Correct	Incorrect

Figure 1 PIC Fingertip Placement

Once the finger is placed on the sensor, the LED will start blinking amber indicating that the PIC is reading the sensor and processing the image. If the acquired image is satisfactory, the LED will then switch to blinking green if the fingerprint is accepted. If the fingerprint is rejected, the LED will blink red, and the sensor will attempt to acquire the fingerprint again. The color of the LED represents the state of the verification process, as explained in Table 1.

Table 1 PIC LED Status

Blinking Amber	Processing/Poor Image The PIC is still processing the image or the image is of poor quality. If the LED remains amber for more than a few seconds, remove the finger and reapply.
Blinking Red	Unsuccessful Match Red indicates that the PIC was unable to match the finger to one of its stored templates. This could be due to changes in the fingertip, such as damage to the skin or varying skin conditions. It could also be due to improper positioning of the fingertip on the sensor. Removing the finger and reapplying

	it will frequently solve this problem.
Blinking Green	Successful Match Green indicates that the fingerprint was matched successfully. A blinking green LED should be accompanied by a single, short, low pitch beep. Initially, the LED should blink green. Once the PIC has received confirmation from the PICS Reader that the PIC has been validated, the LED will remain on continuously and another short, high pitched beep will be emitted. If the PIC fails to receive validation from the Reader by the time the timeout occurs, three short high pitched beeps will be emitted prior to the PIC shutting itself down.
Solid Green	Entry Authorized Once the PIC communicates with the PICS Reader, and PICS Reader has validated the user in the database, the PIC will emit a short high pitch beep and the LED will stop blinking. If the PIC accepts the users fingerprint but never gets validation from the PICS Reader, there are three possible sources for the problem. The most likely is failed communication with the PICS Reader. Simply moving the PIC around can help this problem. The second possibility is a hardware or software failure inside the PICS Reader. The third possibility is that the user has been disenrolled from the database.

The PIC will generally time out (turn itself back off) between 10 to 15 seconds after being turned on, depending on the status of the PIC and other factors.

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3.2 Enrollment Station Operation

The Enrollment Station operator is responsible for enrolling users into the PICS system. This task is accomplished via the PICS Manager software package running on the Enrollment Station PC. The Enrollment Station operator must be familiar with the PICS Manager software and the operation of the PIC units. The Enrollment Station operator will most likely be required to train PIC users during the enrollment process. In addition to the PICS Manager software itself, the Enrollment Station must have access to an Interbase SQL database (either on the local PC or a remote PC connected via Ethernet) with tables configured as described in paragraph 3.3.6. When the PICS Manager software starts, the operator may be prompted to enter a username and password for the database. The user name and password must be created by the maintainer. In some environments it may be desirable to avoid logging into the database each time the program starts. If this is the case, a user name and password may be set in the configuration screen to have the software automatically log in when it starts. This feature

should be used with some caution since it compromises the security of the system. The enrollment process places information in the database which is used by the PICS Reader Service to update the database in the Reader itself. It is not necessary for the Reader and the PICS Reader Service to be operating during enrollment, but it is recommended.

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3.2.1 Enrollment Operation

There are two tabs on the main screen of the PICS Manager enrollment software. They are Users and Config. Of these two, the operator will spend very little time on the Config tab.

3.2.1.1 User Database

The first tab on the PICS Manager screen selects the Users screen, shown in Figure 2. This screen is used to add and remove users from the PICS database and to start the enrollment process for a user. Clicking the NEW button will bring up a dialog box allowing the operator to enter the user's pertinent information (Name, User ID, and a Duress ID). Delete removes a user from the database. ENROLL is only available for users that a not currently enrolled. It will bring up a dialog box for enrolling the user into a PIC. DISENROLL simply removes the user's enrollment information from the database. It does not remove the user from the database. The user's PIC will still work, but the PICS Reader will no longer allow the user access to the system. The REFRESH button is used to update the current list from the database. This function is not normally required since the software attempts to track changes as they occur. The TEST MODE button brings up the enrollment dialog box in a test mode, which can be used to verify that a PIC has been enrolled correctly. UPDATE READER can be used to force an update to the PICS Reader. Normally, the PICS Reader will be kept up to date by the PICS Reader Service, but this function can be used in cases where the operator has reason to believe the PICS Reader database has been corrupted. The operator can determine whether a given user is currently enrolled by checking the PIC ID field for that user. A blank PIC ID field will indicate that the current user is not current enrolled in the database. When creating a new user, the operator should be aware that the USER ID is the string that will be output from the PICS Reader after a successful verification. The Duress ID will be output after a successful verification of the user's duress fingerprint. This is only pertinent for systems which send such information to a gate controller system. The User ID is also used for some database lookups, so it is still required to be entered.

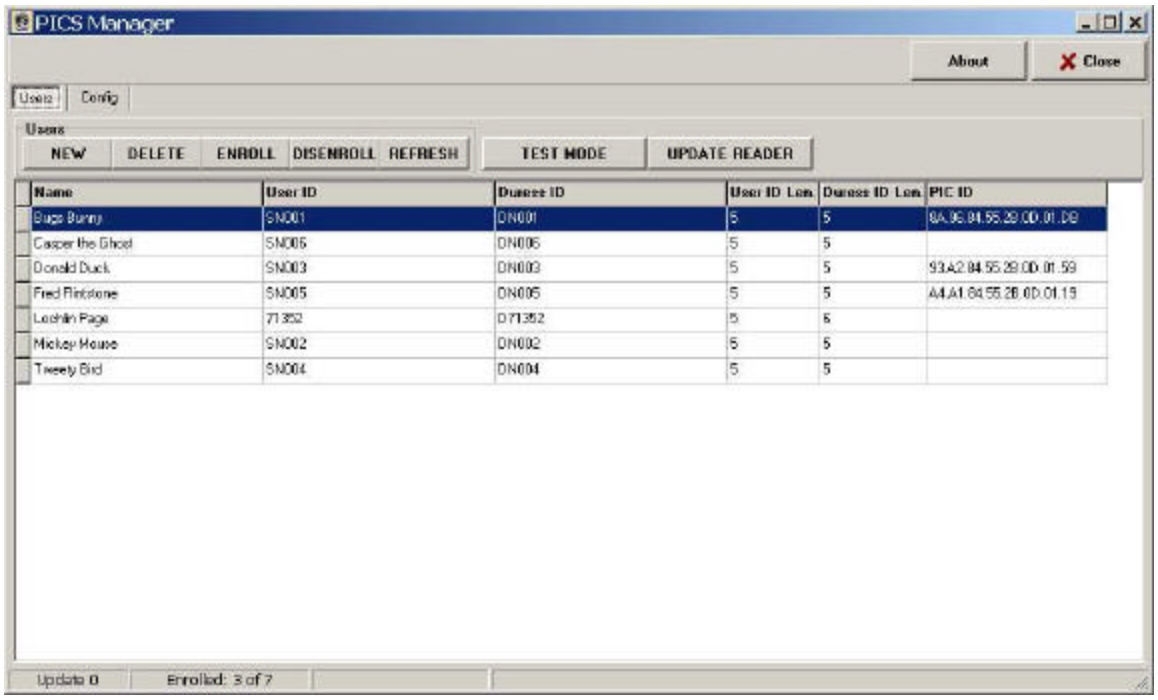

Figure 2 PICS Manager Users Screen

3.2.1.2 Configuration Screen

The Configuration Screen is shown in Figure 3. It contains three sections. The Enrollment Comm Port should be set to the RS-232 port that has the Enrollment Station RF Interface attached. The baud rate should be set to 38400. The Light Tree Comm Port should be set to disabled at present. The Database Configuration section contains a path to the Interbase database, a database user name and a database password. The path must be set to the database defined in paragraph 3.3.6. The Database User Name and Database Password must be set if the software is required to log in automatically to the database. If the Database User Name is left blank, the operator will be required to enter a correct login before he is allowed access to the data. In order to set the User Name and Password, enter the data in the correct fields and press Set User/Password. If the two copies of the password disagree, the action will fail.

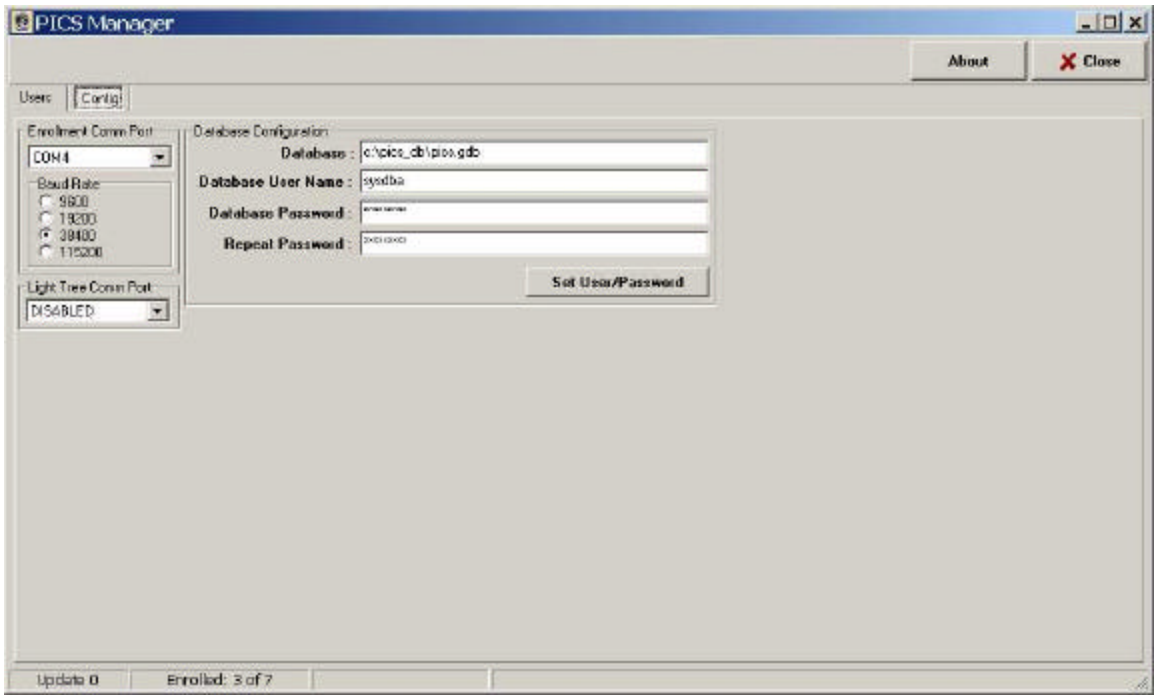

Figure 3 PICS Manager Configuration Screen

3.2.1.3 Enroll Screen

The operation of the Enrollment Screen is the most complicated part of the PICS Manager software. The typical operation is as follows:

1) First, the operator selects the correct user from the list on the USERS screen. If the user is not in the list, the operator may have to add the user. Once the user is selected, the operator presses the ENROLL button.

2) The operator presses the Enroll button on the Enroll PIC User dialog box (Figure 4). This will bring up the Start PIC Enrollment dialog box. This box is an indication that the Enrollment Station is attempting to communicate with a PIC. If a PIC is on within communication distance, this dialog box will disappear immediately.

3) The PIC user opens the PIC slide, without touching the fingerprint sensor. Once the Enrollment Station communicates with the PIC, it will start the enrollment process. The PIC will begin by blinking the LED with an amber color for approximately 15 to 20 seconds. During this time, the PIC is calibrating, clearing memory and calculating encryption keys. Once it is complete, the PIC will beep and turn off the LED. The Enroll PIC User dialog box will then begin displaying status. It should indicate that the PIC is in Enroll Mode, list the number of templates currently enrolled (should start at zero) and display the PIC battery voltage. The nominal battery voltage is 3.7 to 3.8 volts. A completely full charge should be at or above 4.0 volts. **Note that once the enrollment process begins, all previous enrollment in that**

PIC will be deleted. For this reason, it is important to be sure that there is one and only one PIC turned on during this process.

4) The operator would then press either the Enroll Finger button or the Enroll Duress button. The enrollment operation is identical for both buttons, except the PIC will identify the finger enrolled as a duress finger and inform the PICS Reader during the verification process. Whenever a duress finger is enrolled in the PIC, the Duress Enrolled status will be displayed on the Enroll PIC User dialog box.

5) After the step 4 above, the PIC Status should indicate PLACE FINGER. The PIC user should place the appropriate finger on the sensor. The PIC LED will light green and the status will indicate REMOVE FINGER. This process should be repeated two more times (total of three times) to complete the enrollment. When it is done, the PIC Status will indicate either ENROLLMENT COMPLETE or ENROLLMENT FAILURE. If the enrollment completes successfully, the user should attempt to verify the finger just enrolled. If the user cannot verify the enrolled finger, the finger can be disenrolled using the Disenroll Last Finger button, and the finger can be re-enrolled. If the enrollment fails, the finger should simply be re-enrolled. A new user may take several attempts before successfully enrolling.

6) Repeat the above process for each finger to be enrolled and for a single duress finger. Note that in the event of more than one duress finger being enrolled, the last one enrolled is in fact the only duress finger identified by the PIC. The previous duress fingers will be treated as normal enrollments.

7) Once all the desired fingers have been enrolled, the Enrollment Station Operator should unclick the Enroll button. This will complete the enrollment process for the PIC.

8) At this point, if the PIC system includes a keypad for backup operation, the Enrollment Station Operator should click the Set PIN button and allow the PIC to enter a PIN for keypad operation. The PIN should be 4 to 8 digits long.

9) The final step required for enrollment is for the operator to click the Done button. This will actually store the enrollment information in the database and in the PICS Reader. If the operator presses the Cancel button or closes the dialog box without pressing the Done button, the PIC will still recognize the user, but the PICS reader will not recognize the PIC or the user. After the Done button is pressed, the list on the USERS screen should include the PIC ID.

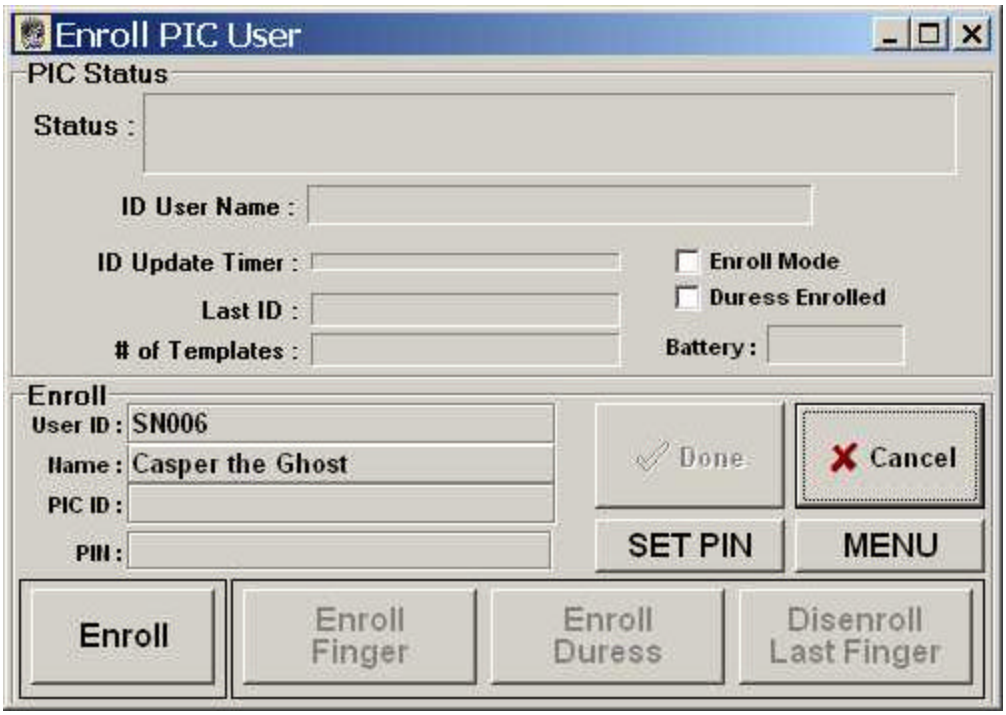

Figure 4 PICS Manager Enrollment Screen

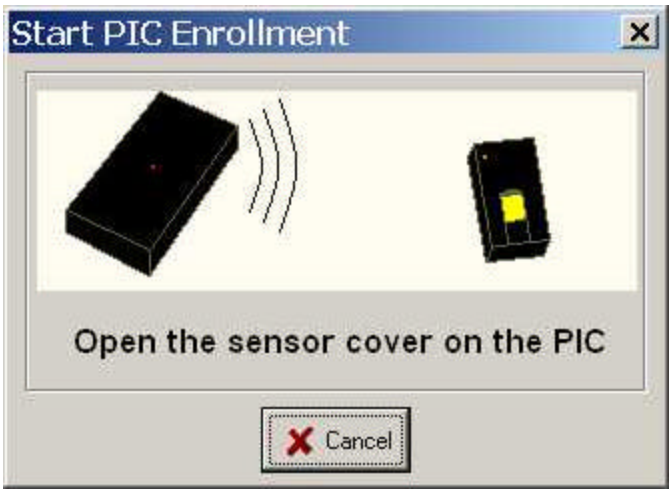

Figure 5 Start PIC Enrollment Dialog Box

3.3 Operation of PICS Reader Control

The PICS Reader Control is a Windows NT service which runs in the background on a designated computer (most likely the same computer which hosts the Interbase database) and maintains the PICS Reader. All communication to the PICS Reader occurs from the PICS Reader Control. The service keeps the PICS Reader database up to date with the local Interbase database, monitors status from the PICS Reader, and provides a mechanism to update the PICS Reader software. The functionality of the PICS Reader Control is not intended for use by typical operators. It is meant to be used by the PICS

maintainer. The top row of buttons are available regardless of which screen is selected. The Enable button allows the service to communicate with the PICS Reader. If it is unselected, the service will disconnect from the PICS Reader. The About button display an about dialog which contains the software version number. The RF Test button places the PICS Reader in a test mode, in which it will send RF test messages to a PIC. Any activated PIC which receives an RF test message will immediately respond with an ID message. This allows the maintainer to verify the Reader RF radiation pattern, as well as troubleshoot general RF problems.

The Status Bar at the bottom of the screen contains four fields. The first field indicates whether the service is communicating the PICS Reader. The second field indicates the number of records in the database which need to be updated in the PICS Reader. The third field indicates if service is communicating with the Interbase database.

3.3.1 Monitor Screen

The Monitor screen provides a means for the maintainer to view status messages from the Reader. The maintainer can also send specific commands to the PICS Reader using the command list and the Send button. The Connect and Disconnect buttons will cause the service to connect or disconnect from the PICS Reader. The software will attempt to reconnect automatically if the Disconnect button is pressed. Figure 6 shows the Monitor screen. The Status Display Count field indicates the number of connected PICS Status displays.

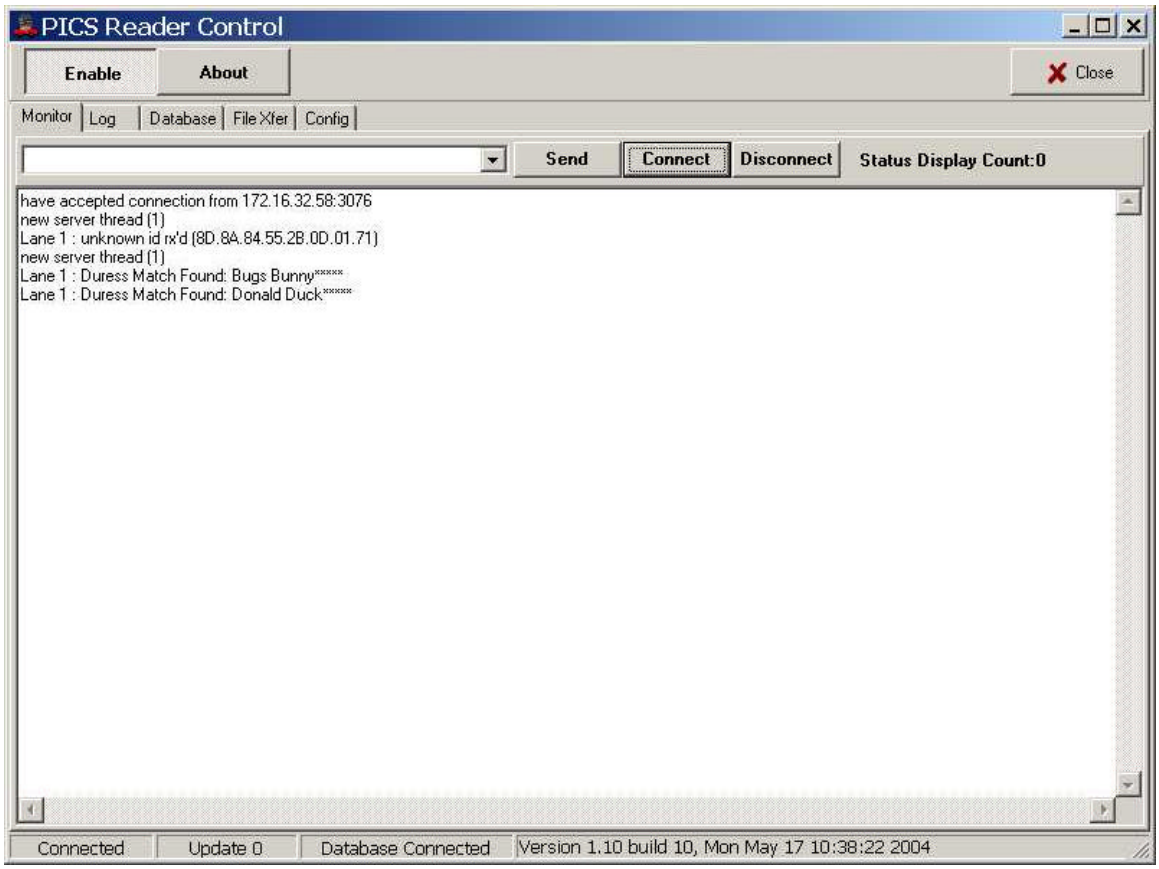

Figure 6 PICS Reader Control Monitor Screen

3.3.2 Log Screen

The log screen displays a dump of the log from the PICS Reader. If the function is enabled in the PICS Reader and the service is configured to automatically download the log, this screen will be updated automatically. The log will also be stored in a file defined on the Config screen. Pressing the Dump button will force downloading the latest log information. The automatic download function operates approximately once per hour.

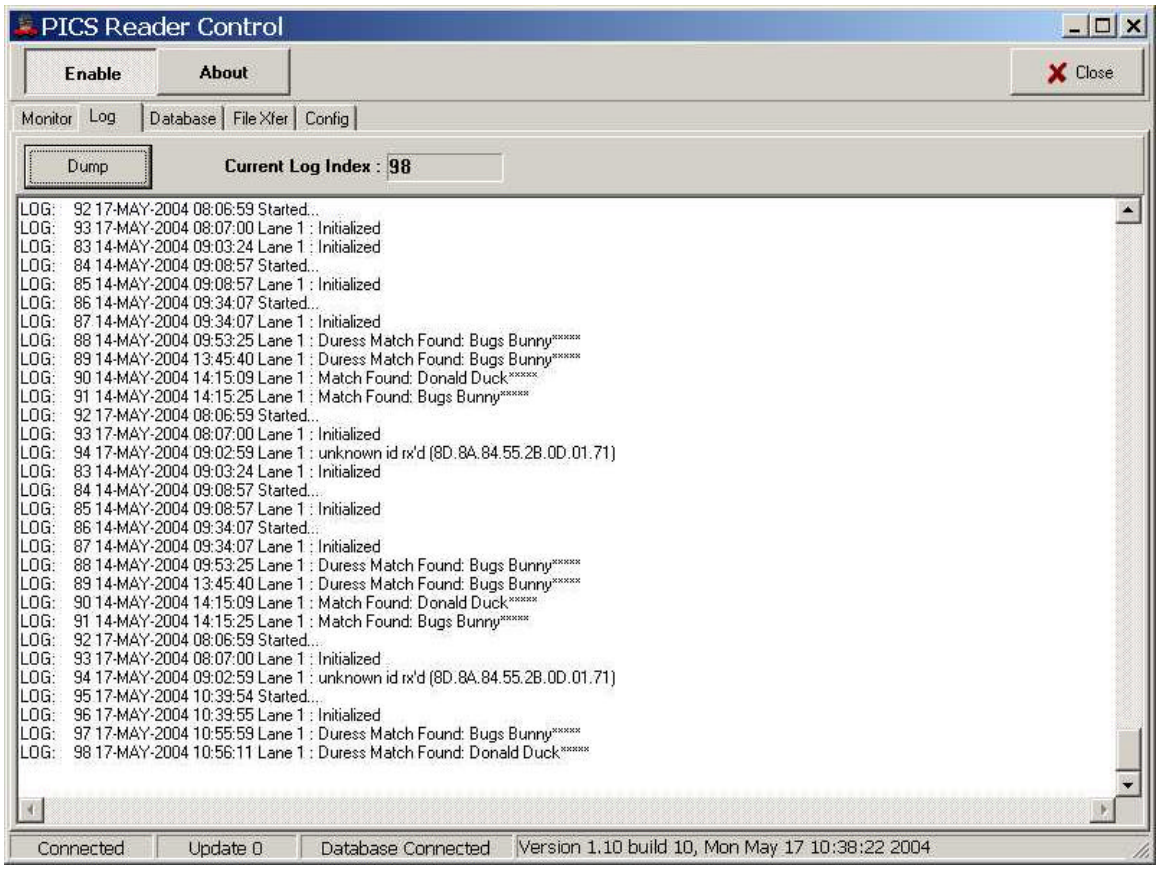

Figure 7 PICS Reader Control Log Screen

3.3.3 Database Screen

The Database screen can be used by the maintainer to verify the contents of the Reader database, clear it out, and force a new download of the database. Under normal circumstances, the Auto Update button should always be selected. After using this screen, the maintainer/operator should ensure that this button is selected. If this button is not selected, the database in the Reader will not be kept up to date. The Reader Database screen is shown in Figure 8.

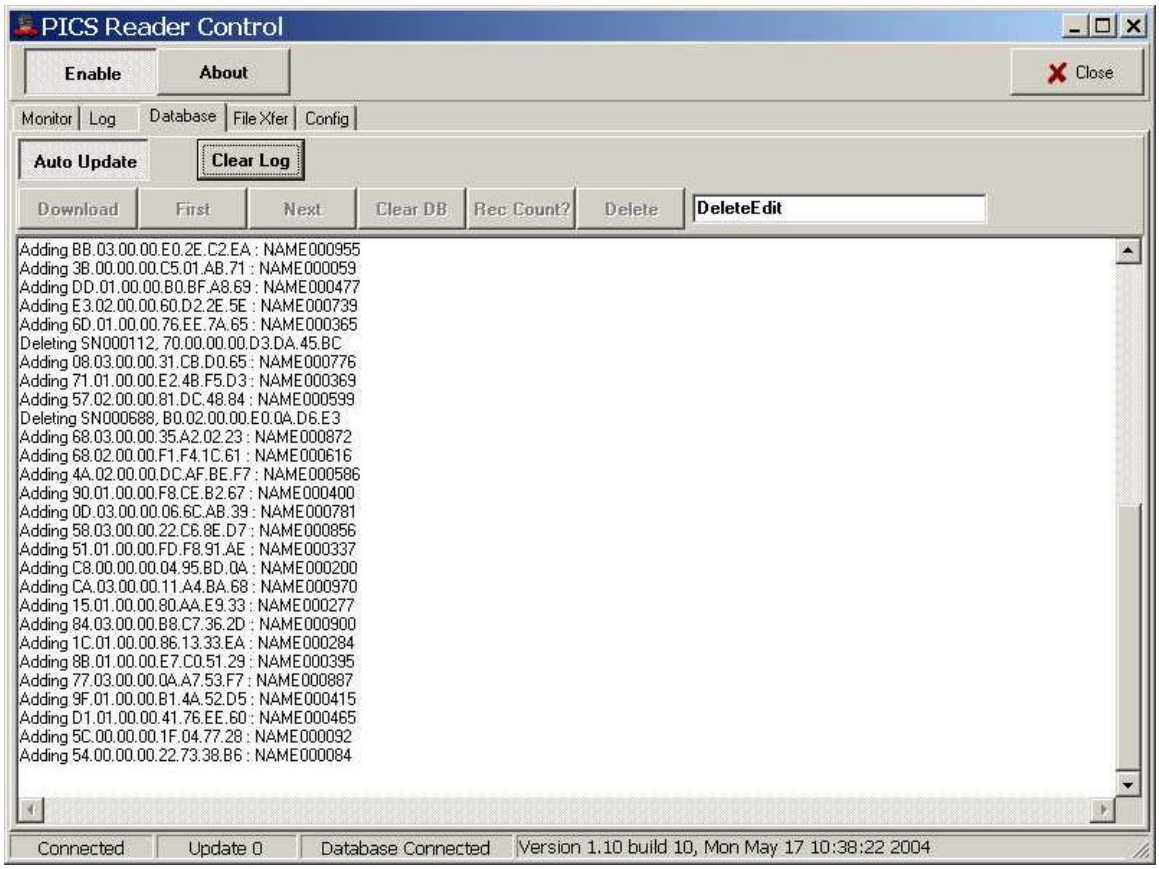

Figure 8 PICS Reader Control Database Screen

3.3.4 File Transfer Screen

This screen provides the ability to send and receive files to/from the Reader. This screen should only be used by qualified personnel, as changing the wrong file could prevent the Reader from booting. The File Xfer screen is shown in Figure 9.

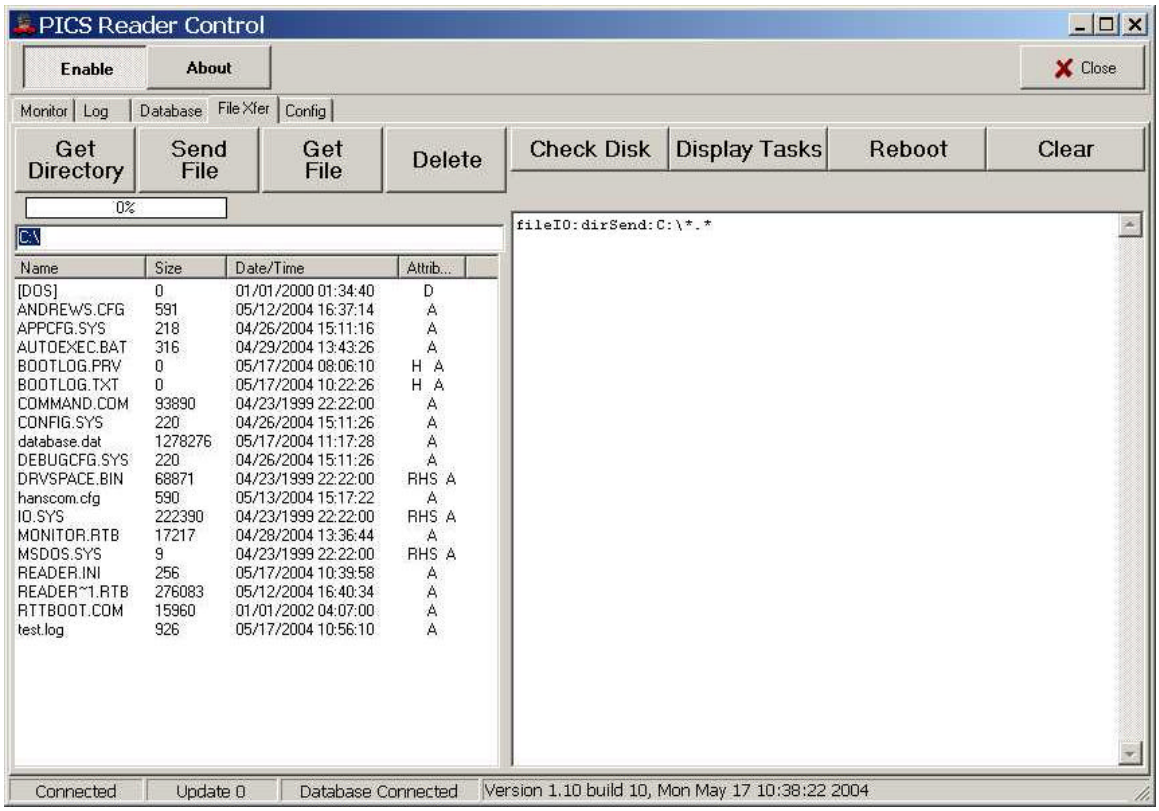

Figure 9 PICS Reader Control File Transfer Screen

3.3.5 Configuration Screen

The Configuration screen allows the maintainer to change the configuration of the PICS Manager software. Once the system is set up, the configuration should require very little change. Figure 10 shows the Configuration screen. With the PICS Reader Service installed and running, the Config screen can only be reached by right clicking on the icon in the task bar and selecting Config.

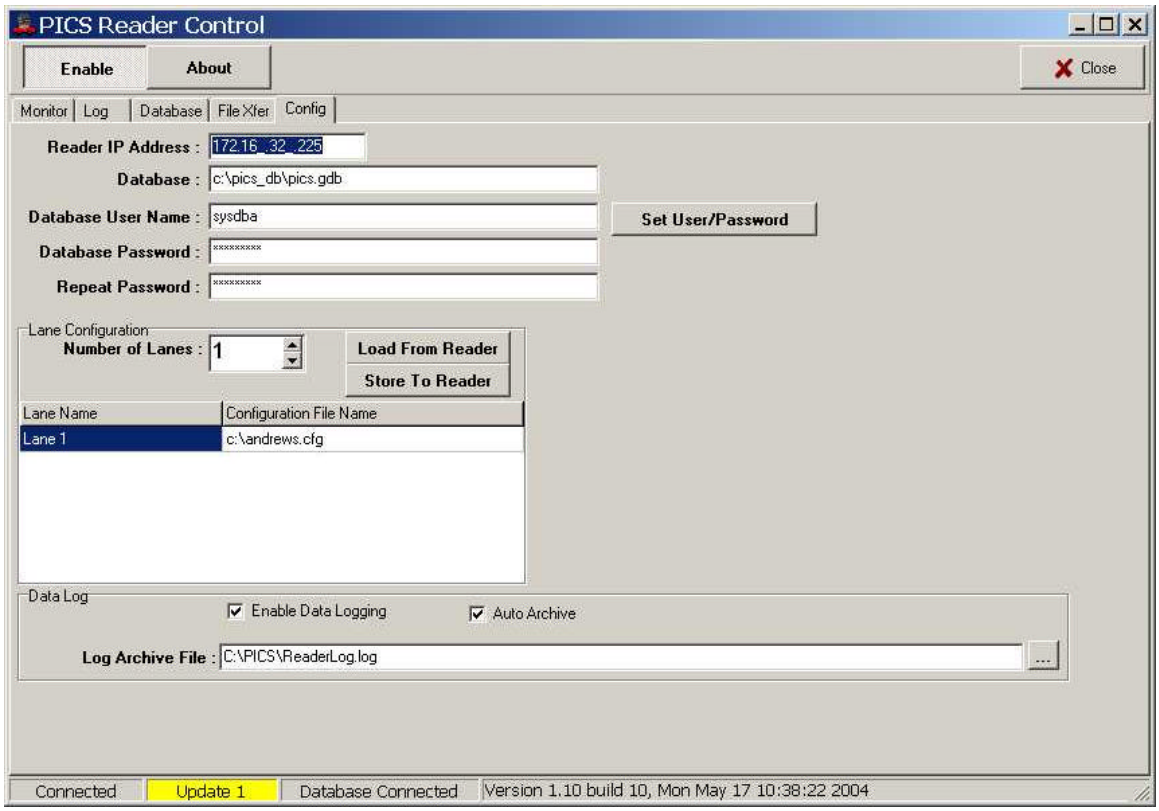

Figure 10 PICS Reader Control Configuration Screen

3.3.5.1 Reader IP Address

This field sets the Reader's IP Address. The Reader must use a fixed IP address, which should be entered into this field. Changing the Reader's IP address is discussed later in this document.

3.3.5.2 Database Location

This field specifies the location for the Interbase database file. This location is determined during the initial setup of the database. To specify a database on the local machine, just type in the location as specified in the Interbase database definition. To specify a remote database, enter *<computer name>:<database location>*, where computer name is the name windows networking uses, and the location is the path of the file, excluding the drive specifier (e.g. *'PICS_ENROLL:\PICS\Database\PICS'*).

3.3.5.3 Database Username and Password

The user name and password fields must be filled in for the PICS Reader Service to operate stand alone. A valid user log in is required. If these fields are not filled in, or they are not valid, the operator will have to log in to the database before the service will be granted access to it. When these fields are edited, the operator needs to press the Set User/Password button to have the information stored.

3.3.5.4 Create Database Button

The Create Database button is used to create a database at the location specified by the database location and with a user name and password specified. The operator should be sure that the path for the file exists prior to clicking this button. This should only be required during system initialization. See details in paragraph 3.3.6.

3.3.5.5 Lane Configuration

These fields allow the maintainer to change the lane configuration for the PICS Reader. The PICS Reader can manage more than one lane at a time. Configuration files within the PICS Reader determine the lane configuration.

3.3.5.6 Data Log Configuration

This section controls how the PICS Reader Service handles the log file stored in the PICS Reader.

3.3.6 Interbase SQL Database Configuration

The Create Database button on the PICS Reader Service should be used to create the Interbase database table. It can be done manually using the following configuration. This operation should be completed only by the PICS maintainer. Once the Interbase setup is complete (refer to Interbase documentation), create a database and execute the following SQL script. This will create the database with the required tables and fields. Make note of the physical location of the database to set in the configuration screen.

```
CREATE TABLE "PICS" (
  USER_ID     VARCHAR(64) NOT NULL,
  USER_ID_LEN INTEGER,
  PIC_KEY     VARCHAR(512),
  NAME        VARCHAR(64),
  PIC_ID      VARCHAR(24),
  PIC_KEY_LEN INTEGER,
  DURESS_ID   VARCHAR(64),
  DURESS_LEN  INTEGER,
  PIN         VARCHAR(16),
CONSTRAINT "USER_ID" PRIMARY KEY ("USER_ID")
);

CREATE TABLE "PICS_UPDATE" (
  USER_ID VARCHAR(64) NOT NULL,
  PIC_ID VARCHAR(24) NOT NULL,
  CMD VARCHAR(32),
  CMD_INDEX INTEGER
);

CREATE ROLE Administrators;
CREATE ROLE Users;

GRANT ALL ON PICS TO Administrators;
GRANT ALL ON PICS_UPDATE TO Administrators;
GRANT SELECT,DELETE,INSERT,UPDATE ON PICS TO Users;
GRANT SELECT,DELETE,INSERT,UPDATE ON PICS_UPDATE TO Users;
```

3.4 PICS Status Operation

The PICS Status software provides a means to display on screen what is currently occurring at the PICS Reader. The display includes indicators for the current traffic light status, as well as the PIC user's name and the current battery voltage of their PIC. This software can run on any computer connected to the database server and the computer running the PICS Reader Control. The display is shown in Figure 11. Note that a green light and a blinking yellow light together indicates that the user validated using their duress fingerprint.

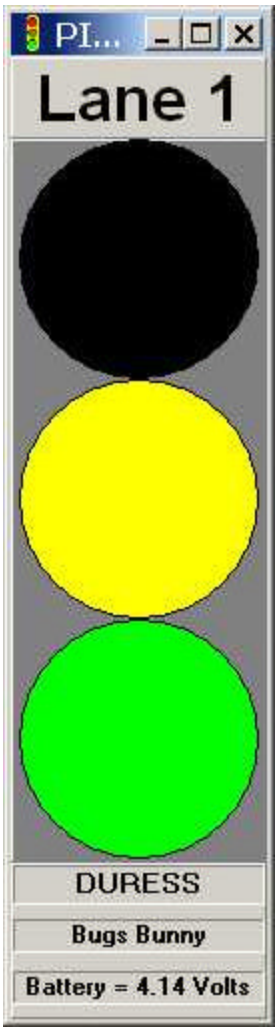

Figure 11 PICS Status Display

3.5 Reader Operation

The PICS Reader contains an embedded PC running an embedded, real time operating system. The Reader software uses an initialization file called reader.ini, which is located in the root directory. The reader.ini file also points to one or more lane initialization files, one for each lane. A keyboard and monitor may be attached to the Reader for troubleshooting purposes and configuration management. In addition, the reader.ini file may be updated via the File Transfer screen in the PICS Reader Control software (assuming the Ethernet connection to the Reader has been established).

The Reader takes about 35 to 40 seconds to begin operating after power is applied. Once the Reader has booted, the gate control I/O should go to its default state (as defined in the lane configuration file, up or down).

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SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

3.5.1 PICS Reader Initialization File

A sample listing of the reader.ini file is shown below.

```
[SYSTEM]
DISPLAY ENABLE=1
LANE COUNT=1

[TCPIP]
IP ADDRESS=172.16.32.225
NET MASK=255.255.255.0
DEFAULT GATEWAY=172.16.32.1
DNS SERVER=0.0.0.0
PORT NUMBER=50000

[LANE 1]
LANE NAME=Lane 1
CFG FILE NAME=c:\hanscom.cfg

[LOGGING]
ENABLE=1
```

Table 2 Reader.ini Field Definitions

Section	Field	Meaning
SYSTEM	LANE COUNT	Identifies the number of lanes the reader is intended to operate. For each lane, there is a separate section (named LANE 1, LANE 2, LANE n) which identifies a configuration file for that lane.
	DISPLAY ENABLE	Set to 0 to disable message output to the monitor. Typically should be left at 1.
TCPIP	**IP ADDRESS**	This is the IP address assigned to the Reader by the network administrator. Specified as xxx.xxx.xxx.xxx
	NET MASK	This is the net mask associated with the IP address. This value may be obtained from the network administrator.
	DEFAULT GATEWAY	This is the IP address for the default gateway. This value may be obtained from the network administrator.

Section	Field	Meaning
	DNS SERVER	This value specifies the DNS server. The Reader does not support DNS. This value should be set to 0.0.0.0
	PORT NUMBER	This specifies the port number that the Reader will accept socket connections on. It is currently hard coded in the PICS Manager software to 50000.
LANE 1 through LANE2	**LANE NAME**	This is the name the reader will refer to this lane by. It is included in all status messages and log events.
	CFG FILE NAME	Specifies the complete path to the configuration file for that lane. The lane configuration can be changed through the PICS Reader Service user interface.
LOGGING	**ENABLE**	Indicates whether the reader should maintain a log file of user accesses. This feature can be controlled through the PICS Reader Service user interface.

The fields that are shown in bold are fields which the maintainer may have to adjust as part of the installation, or if the system configuration is changed. It is recommended that a copy of the current reader.ini file be stored somewhere safe. This copy can be used as a template for making a new file should changes be required.

3.5.2 PICS Reader Lane Configuration File

For each lane identified in the reader.ini file, there is a lane configuration file. The lane configuration file specifies how the reader should talk to the PIC units. It also specifies what the reader should do with the results of communication with the PIC. Currently, there are two options available. Option 1 is the IO_GATE configuration. This specifies that there is hardware attached to the CPU which controls traffic lights and/or an actual gate. The second option is the MSG_GATE, which tells the reader how to send RS-232 messages to an external gate controller or computer. Both options may be used by the same lane.

```
[SYSTEM]
io_mode=cpu
name=Lane 1
type=io_gate
ID UNIT BAUD RATE=38400
ID UNIT COM PORT=2
DEBUG ENABLE=0
GATE INTERFACE COUNT=2
GATE INTERFACE 1=IO_GATE
GATE INTERFACE 2=MSG_GATE
```

```
[IO_GATE]
RED_A=0,0x01
GREEN_A=0,0x02
YELLOW_A=0,0x04
YELLOW_B=0,0x08
GATE=1,0x10
BLUE_A=0,0x20
LOOP_ENTER=1,0x40
LOOP_EXIT=1,0x80
GATE IDLE UP=1
GATE TIMEOUT=15

[MSG_GATE]
COMPORT=101
BAUD RATE=9600
PARITY=NONE
DATA BITS=8
STOP BITS=1
TERMINATION CHAR=13
HEX CONVERT=0

[KEYPAD]
PORT=-1
BAUD RATE=9600
PARITY=NONE
STOP BITS=1
DATA BITS=8
TERMINATION CHAR=35
```

Table 3 Lane Configuration File Field Definitions

Section	Field	Meaning
SYSTEM	DEBUG ENABLE	1 allows additional debug messages to be printed
	GATE INTERFACE COUNT	Number of interfaces to support (IO_GATE, MSG_GATE)
	ID UNIT COM PORT	Com port to use for RF communication. (0 and 1 for hardware I/F, 100 and up for USB to RS-232 I/F)
	ID UNIT BAUD RATE	Should be set to 38400
	DISPLAY ENABLE	Set to 0 to disable message output to the monitor. Typically should be left at 1.

Section	Field	Meaning
IO_GATE	RED_A	Specify m,n, where m is a 1 to invert the sense of the signal (low is true instead of high is true). N is the bit mask for the particular bit. The system currently only supports 8 bits total. Fields marked _A refer to driver side of light tree, the _B fields refer to the guard side of the light tree.
	RED_B	
	GREEN_A	
	GREEN_B	
	YELLOW_A	
	YELLOW_B	
	BLUE_A	
	BLUE_B	
	WHITE_A	
	WHITE_B	
	ALARM	
	GATE	
	LOOP_ENTER	
	LOOP_OBSTRUCT	
	LOOP_EXIT	
	GATE IDLE UP	Set to a 1 if the gate normally remains open and only closes when someone tries to enter unauthorized.
	GATE TIMEOUT	How long to wait after a user is validated to assume they aren't going to pass.
MSG_GATE	COMPORT	Identifies the comm port to use for sending gate messages. The hardware ports are 0 and 1 and the USB ports start at 100 and go up.
	BAUD RATE	Actual baud rate desired (e.g. 9600)
	PARITY	String containing 'NONE', 'EVEN', 'ODD', 'MARK' or 'SPACE'.
	STOP BITS	1
	DATA BITS	5 to 8
	TERMINATION CHAR	Character to use for termination (typically a carriage return (13).
	HEX CONVERT	1 indicates to treat the ASCII data in the table as a representation of a hex number.

Section	Field	Meaning
KEYPAD	PORT	Identifies the comm port to use for sending gate messages. The hardware ports are 0 and 1 and the USB ports start at 100 and go up.
	BAUD RATE	Actual baud rate desired (e.g. 9600)
	PARITY	String containing 'NONE', 'EVEN', 'ODD', 'MARK' or 'SPACE'.
	STOP BITS	1
	DATA BITS	5 to 8
	TERMINATION CHAR	Character to use for termination (typically a carriage return (13).

4.0 Installation

4.1 Reader

Refer to EG&G Drawings 126764-10, PICS Installation and 126762-10, Assy, PICS Reader Terminal Unit.

CAUTION

This unit is powered by 120 VAC. This voltage can be extremely dangerous and can cause death. Always use an insulated probe when attempting to measure 120 VAC and be extremely careful not to touch places where this voltage is present.

The PICS Reader Terminal Unit is contained in a 16" x 16" x 8" NEMA 4X enclosure. This enclosure may be mounted on a wall by using the tab mounts or pole mounted on a 3 or 4 " pole by using Unistrut cross channels and U-bolts. There are two ¾" conduit entrances in the bottom of the enclosure, the right-hand entrance is for the 120vac power and the left-hand entrance is for the data communications cables (RS-232 three wire and 100BaseT). Liquid tight flexible ¾" conduit is recommended for these connections. Follow NEC and local electrical codes. The AC power is connected to the right hand terminal block on the back panel of the unit. The AC ground wire is connected to the ground terminal in above the AC terminal block. The RS-232 cable should be terminated with a DE-9S female connector and connected to the RS-232 transient protector. The 100BaseT cable should be terminated with a Category 5 RJ-45 connector and connected to the 100BaseT transient protector.

WARNING

Installation of antenna near power lines is extremely dangerous and can result in death. Follow installation instructions packed with antenna.

4.2 Enrollment Station

This description assumes that the Enrollment Station PC has been set up and configured prior to installing the Enrollment Station hardware and software. Place the Enrollment Station RF Interface box in a convenient location for use during PIC enrollment. The location should provide a clear path to the PIC which enrolling users will be holding. Connect the Enrollment Station RF Interface RS-232 9 pin connector to an unused COM port on the PC via a straight through, male to female cable. Connect the Enrollment Station RF Interface AC adaptor to the power input and plug it into an available AC outlet. When the Enrollment Station RF Interface is turned on, the LED should light. When the Enrollment Station sends data to the Enrollment Station RF Interface, the LED will momentarily turn off.

5.0 Specifications

5.1 Reader

Physical

Size:	16x16x8 inches
Weight:	25 lbs
Power:	88 – 132 VAC, 8 Amps

Communication

Access Control System Interface:	RS-232, configurable baud rate, parity, data bits and stop bits
Enrollment Station Interface:	100BaseT Ethernet

Radio

Frequency:	915.00 MHz
TX Power:	0 dBm max (power attenuated for application, typical radiated power less than 1mW)
Modulation:	FSK @ 38.4 Kbps
Harmonic Emissions:	-43 dBc
Antenna:	Decibel Products, DB842H35-SY, 12.4 dBd, 35º/14.5 dBi Gain

5.2 Enrollment Station RF Interface

Physical

Size:	3.6 x 5.75 x 1.289 inches
Weight:	0.45 lbs (7.2 oz.)
Power:	5.775 – 16.5 VDC, 350 mAmps

Communication

Enrollment Station Interface:	RS-232, 38.4 kBaud, no parity, 8 data bits, 1 stop bit

Radio

Frequency:	915.00 MHz
TX Power:	0 dBm max (1mW max.)
Modulation:	FSK @ 38.4 Kbps
Harmonic	-43 dBc

Emissions:	
Antenna:	Linx Technologies, ANT-916-SP, -1 dBi Gain

5.3 PIC

Physical

Size:	2.25 x 3.48 x 0.60 inches
Weight:	3.2 oz.
Power:	Internal Lithium Polymer, nom. 3.7 VDC, 900 mAH. 80 mAmps average current draw (when activated)

Radio

Frequency:	915.00 MHz
TX Power:	0 dBm max (1mW max.)
Modulation:	FSK @ 38.4 Kbps
Harmonic Emissions:	-43 dBc
Antenna:	Linx Technologies, ANT-916-JJB, -1 dBi Gain