FCC ID PER PART 15.231
User Manual

FOR

P-SERV TECHNOLOGIES PTE LTD.

Blk1093, Lower Delta Road,
#07-05/08 Tiong Bahru Industrial Estate
Singapore 169204

<div style="border:1px solid">

FCC ID: OZAES315V1

</div>

April 24, 2000

This Report Concerns:	Equipment Type:
☒ Original Report	Electronic Container Seal Transmitter (315 MHz), ITE

Test Engineer:	Thomas Huang
Test Date:	April 14, 2000
Reviewed By:	John Y. Chan - Director, Compliance Engineering
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street, Suite 2 Sunnyvale, CA 94086 (408) 732-9162

TABLE OF CONTENTS

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *P-SERV TECHNOLOGIES PTE LTD.,* model ES315V1 or the "EUT" as referred to in this report is a 315MHz RF transmitter which is a part of the Electronic Container Seal (ECS) designed to be used by all shippers, aimed to improve the efficiency of port operation. The EUT transmits 315MHz FM signal. The EUT output impedance shall be 50Ù.

The EUT measures 2.0" L x 1.0" W x 4.0" H.

1.2 Objective

This Type approval report is prepared on behalf of *P-SERV TECHNOLOGIES PTE LTD.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules, Part 15, sec 231 for conducted and radiated margin.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Suite 2, Sunnyvale, California, USA.

Test sites at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-674 and R-657. The test sites has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program

(NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1993, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Data
HP	Spectrum Analyzer	8568B	2610A02165	12/6/00
HP	Spectrum Analyzer	8593B	2919A00242	12/20/00
HP	Amplifier	8349B	2644A02662	12/20/00
HP	Quasi-Peak Adapter	85650A	917059	12/6/00
HP	Amplifier	8447E	1937A01046	12/6/00
A.H. System	Horn Antenna	SAS0200/571	261	12/27/00
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/00
Com-Power	Biconical Antenna	AB-100	14012	11/2/00
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/00
Com-Power	LISN	LI-200	12208	12/20/00
Com-Power	LISN	LI-200	12005	12/20/00
BACL	Data Entry Software	DES1	0001	12/20/00

1.7 Equipment Under Test (EUT)

Manufacturer	Description	Model	Serial Number	FCC ID
P-SERV TECHNOLOGIES PTE LTD.	315MHz transmitter	ES315V1	N/A	OZAES315V1

1.8 Support Equipment

Not Applicable.

1.9 EUT Configuration Details and List

Not Applicable.

1.10 External I/O Cabling

Not Applicable.

# 2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing in a typical fashion (as normally used in a typical application).

The final qualification test was performed with the EUT operating at normal mode.

2.2 Block Diagram

Appendix A contains a copy of the EUT's block diagram as reference.

2.3 Test Setup Block Diagram
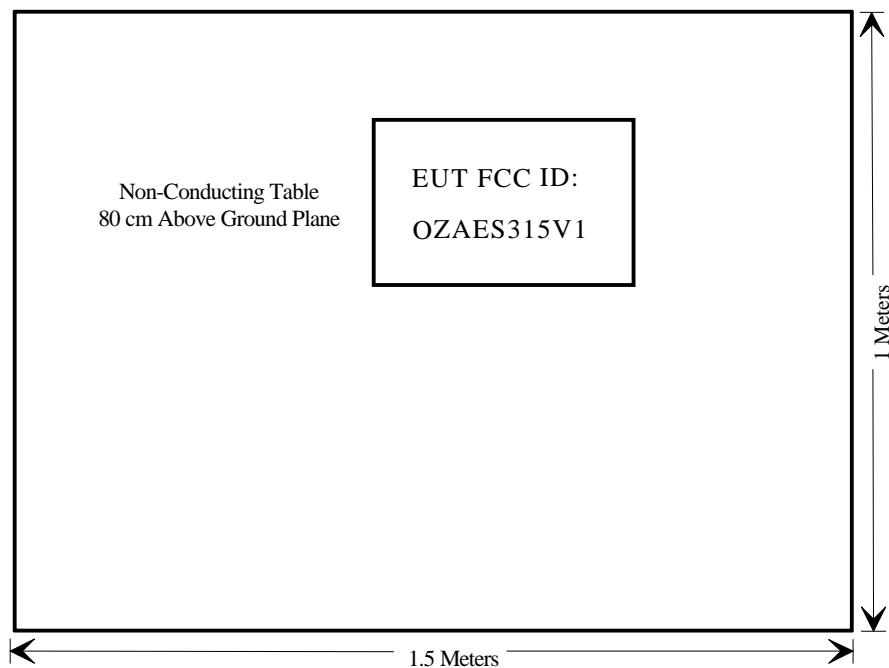
2.4 Equipment Modifications

No modifications were necessary for the EUT to comply.

Appendix A – USER MANUAL

FCC Part 15 warning:

Changes or modifications to unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

ECS Operator Instruction

(Version 2.0)

P-SERV TECHNOLOGIES PTE LTD
Tel: (65)2761788
Fax: (65)2701788

ECS System 2.0 Operator Instruction

Firstly, the user needs to copy the subdirectory (A:\ECSConf) from A drive to C drive. This is important because the two files (ecs.pas and laneconf) in the subdirectory transferred over will enable the system to run smoothly.

While running the application file (seal2.0.exe), the system is initialized to be having no printer. This means that the system will not print the new seal information which has just been downloaded, it only save these information in the file (this is exactly what happened when the user clicks "NO" button). Should the user decide to print it (only when the printer is connected to the computer), he simply needs to click "YES" button on the dialog box. The system will then print it concurrently and save the new seal information in the file. In both cases, the Save function will only be executed if the status of the sensors changes from positive to negative state. Furthermore, the system allows the user to execute one of the two buttons on the "Select Printer" function throughout the entire operation of the application.

The system will set up a subdirectory "c:\SealDir" automatically for the seal information files. Users could view them from the "VIEW" button on the dialog box and the subsequent steps are as per version 1.0. Under the PRINT icon in the VIEW function, users are prompted three times with the "Paper Out" message if their printer is not ready to print. If the hiccup in the printer is corrected within these three tries, printing will resume as normal. Otherwise, the PRINT command will not be executed.

How does one configure an installed lane? Users could configure it using the method described in version 1.0. However the new system would warn users to set up at least one lane if all lanes are uninstalled. This is because there is no reason for the system to be run if there were zero lanes to be installed.

Once the user loses the file – "laneconf", the new system will poll a dialog box prompting the user to configure the installed lane when running the system. However, only a valid user can do it. During testing, the valid user's name is "ecs" and the password is "pserv".

For further queries on the system, please do not hesitate to contact me.

10/3/99
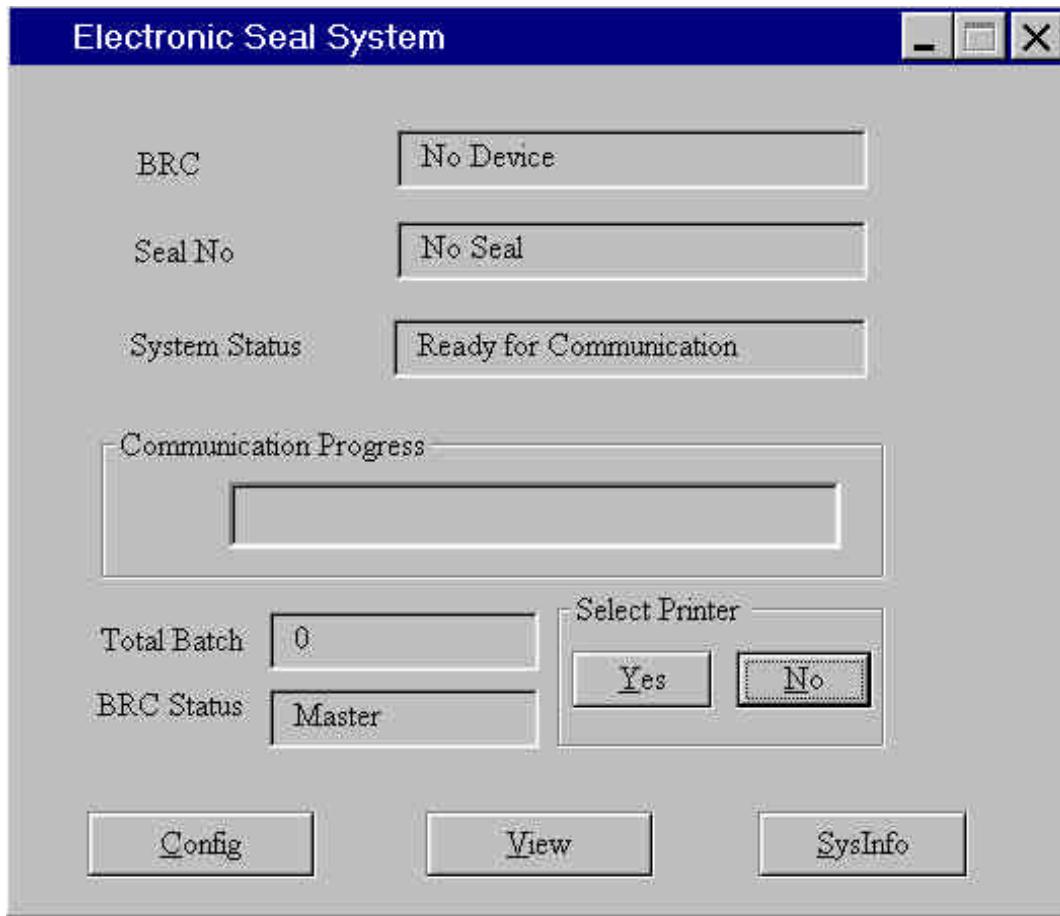
Figure 1. ECS System Main Dialog

No Device: No another Computer to connect with this one.
No Seal : The system have not receive the new seal information to print or save.
Ready for communication: The system are waiting for the communication, and display the system what are doing.
Total Batch: Display the times that the system receive the seal information on the day.
BRC Status: Display Which computer is working.

Button 'No': Not to select printer to printing the seal.
Button 'Yes': To select to printing the seal automatically only the system have new seal.
Button 'Config': To config the lane and valid user.
Button 'View': To view the seal information in the file.
Button 'SysInfo': To display the information of lane.

Input Password To View or Config
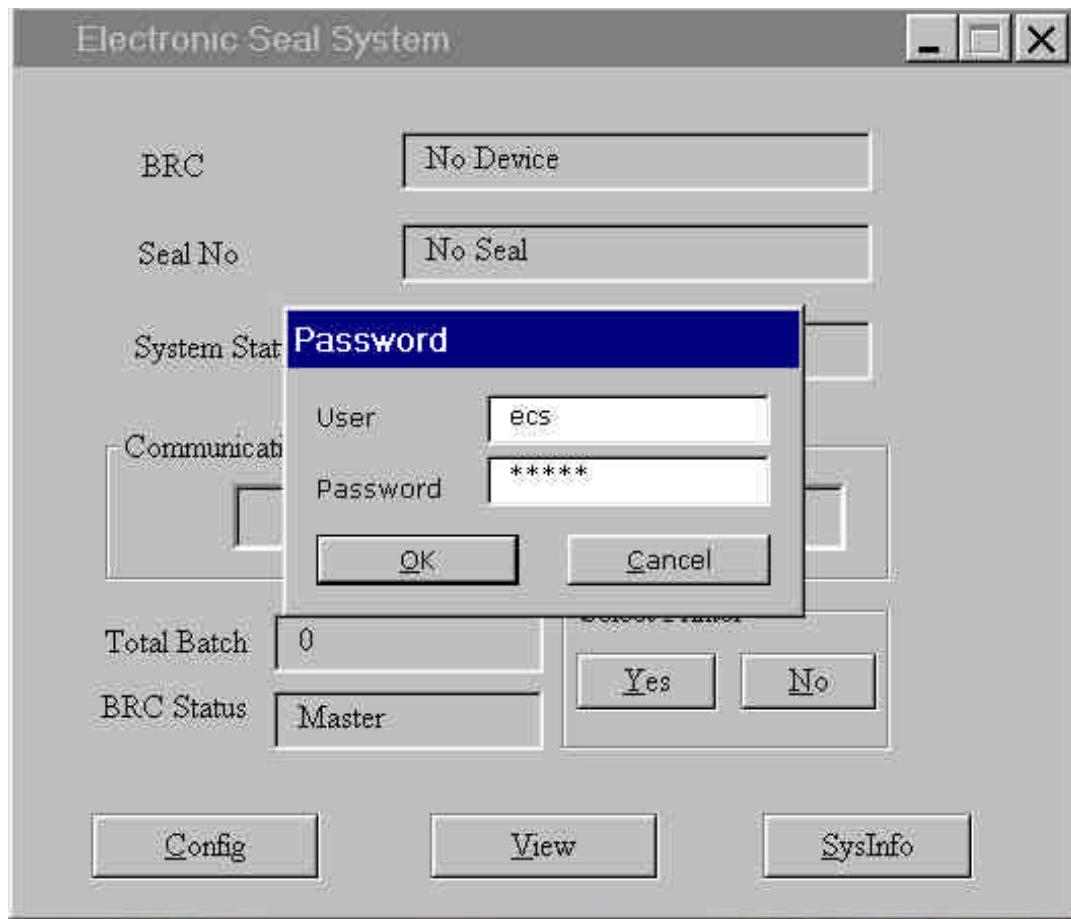
Figure 2: Password Dialog

"Passpord Dialog" is for valid user to view the seal information in the file or configure the installed lane or not and change the valid the user. During testing, valid user'name (for the supervisor) is "ecs" and the password is "pserv".
Only the name of supervisor can view and configure. And the other users can only view the seal information in file but can't configure.

Configure Dialog
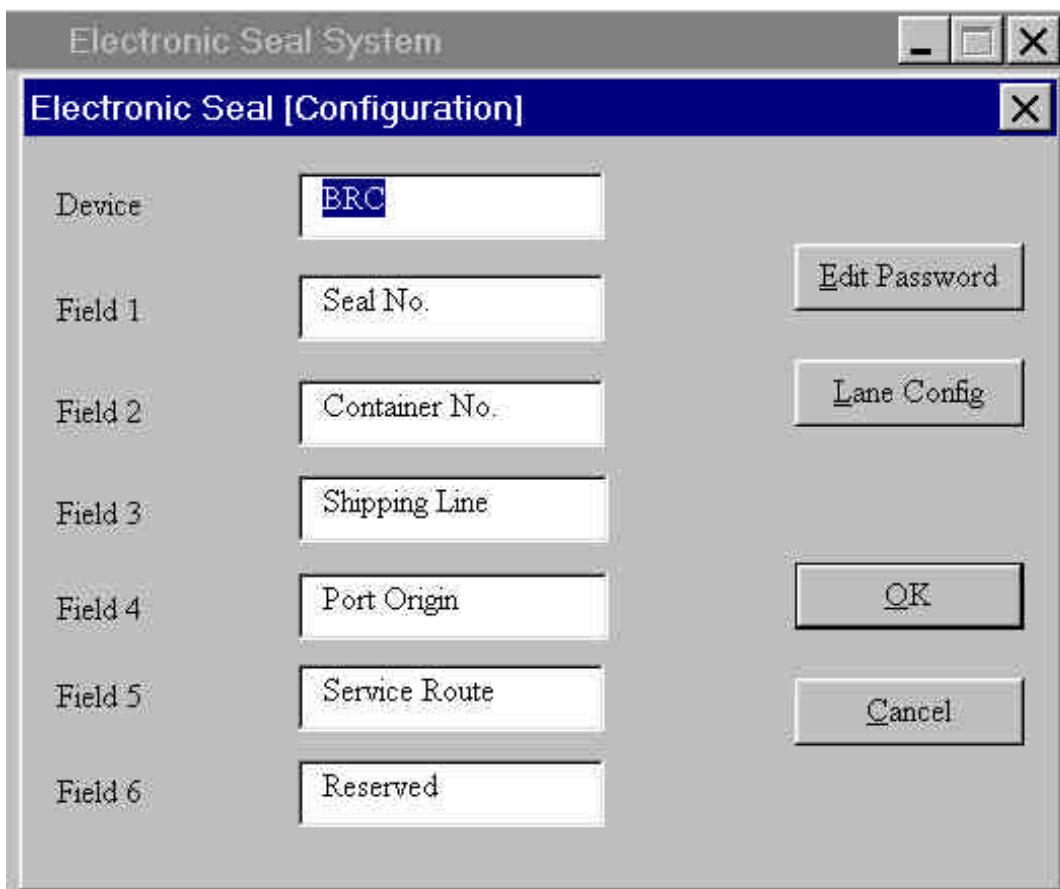
Figure 3: Configure Dialog

It is seal information for supervisor to edit on this dialog.

Button " Edit Password" : to edit the valid user.
Button "Lane Conf": to set the lane which is installed and which is not installed.
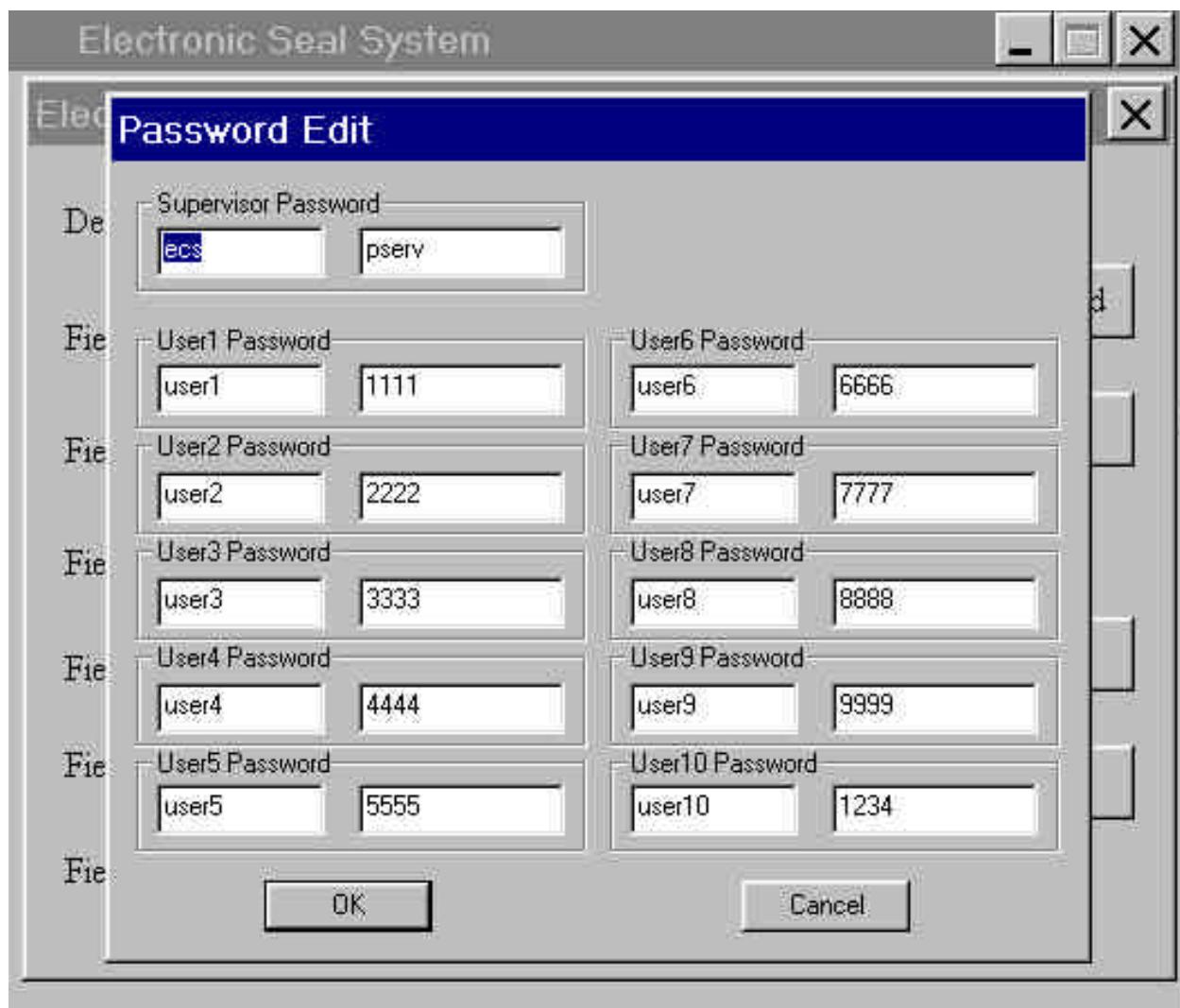
Figure 4: Edit Password dialog

These are the information of valid users. And user can change it.
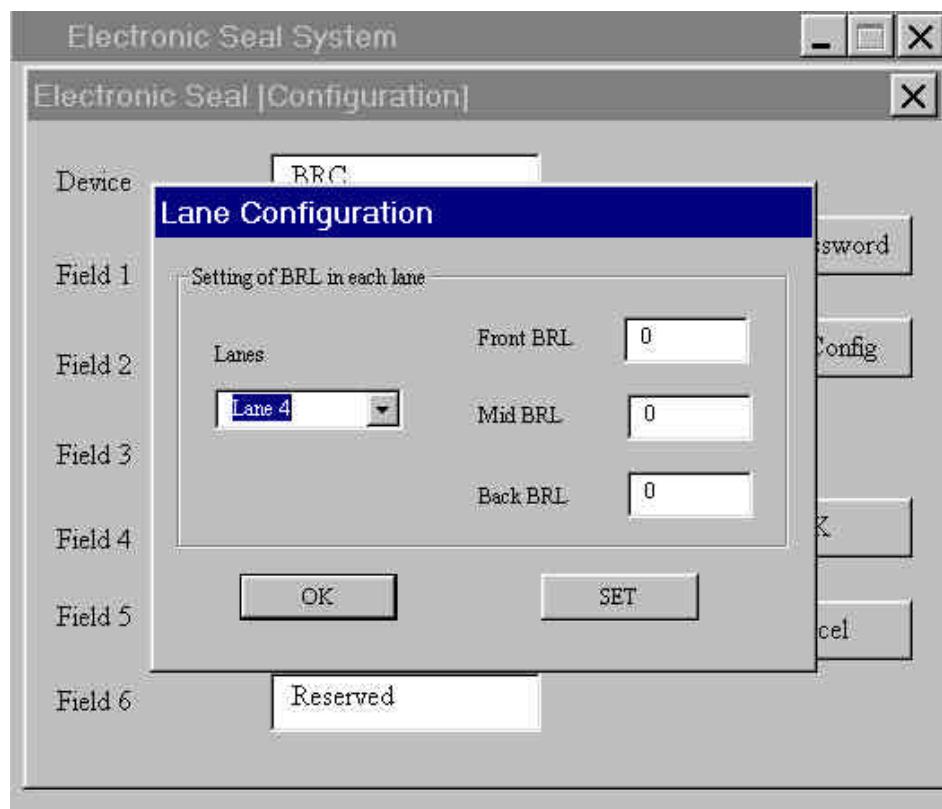
Figure 5_1: Lane_Config Dialog

The information means no BRL is installed on the lane 4 on the dialog. And user can edit it and click the button 'SET'. The valid address for BRL IS 1 OR 2 OR 3. Normally, we set Front BRL as 1, Mid BRL as 2, Back BRL as 3. Please refer to the next dialog
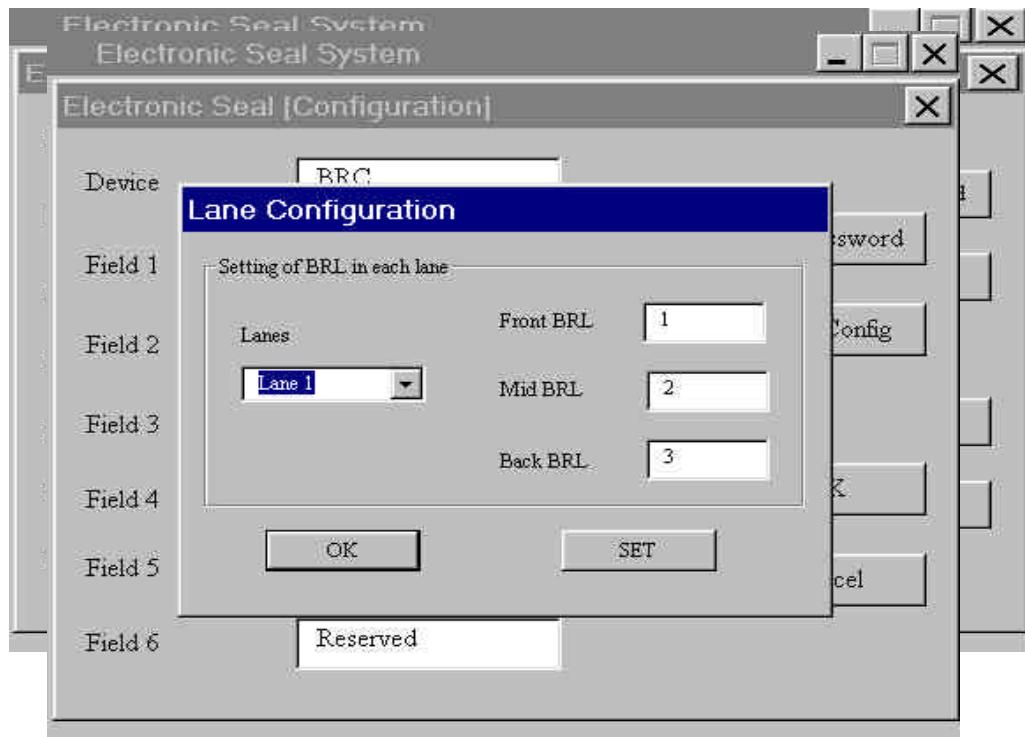

Figure 5_2: Warning On Lane_Config Dialog

"Warnig dialog" is warning the user don't set the installing information on the lane 3
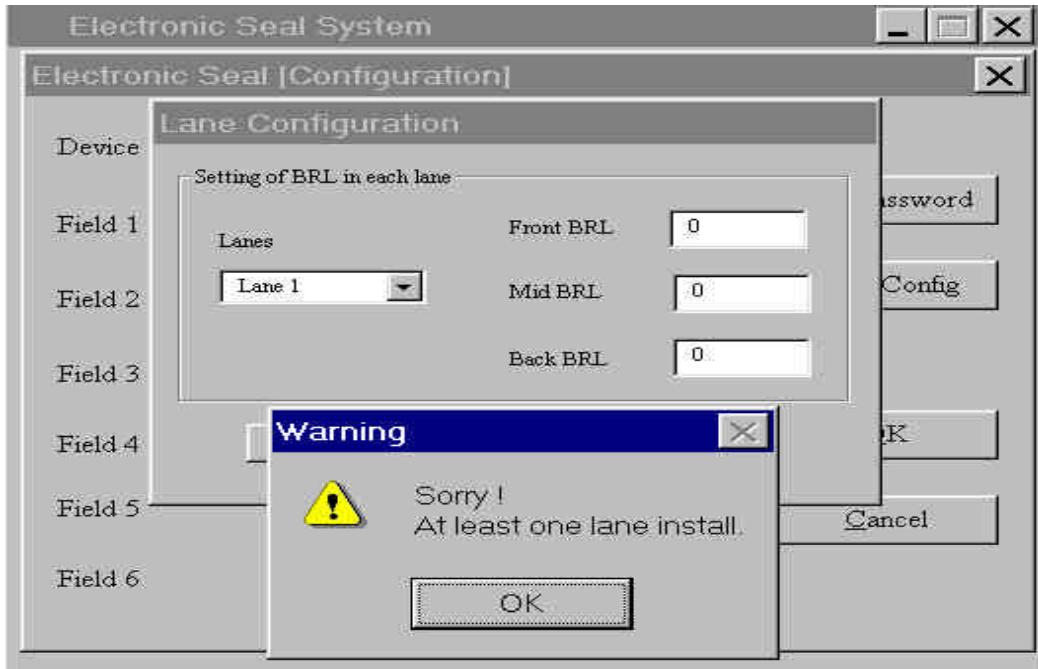
Figure 5_3: Warning On Lane_Config Dialog

"Warning Dailog" is warning user to set up at least one lane if all lane are uninstalled. Because it is no reason for the system to be run if there is zero lanes to be installed.
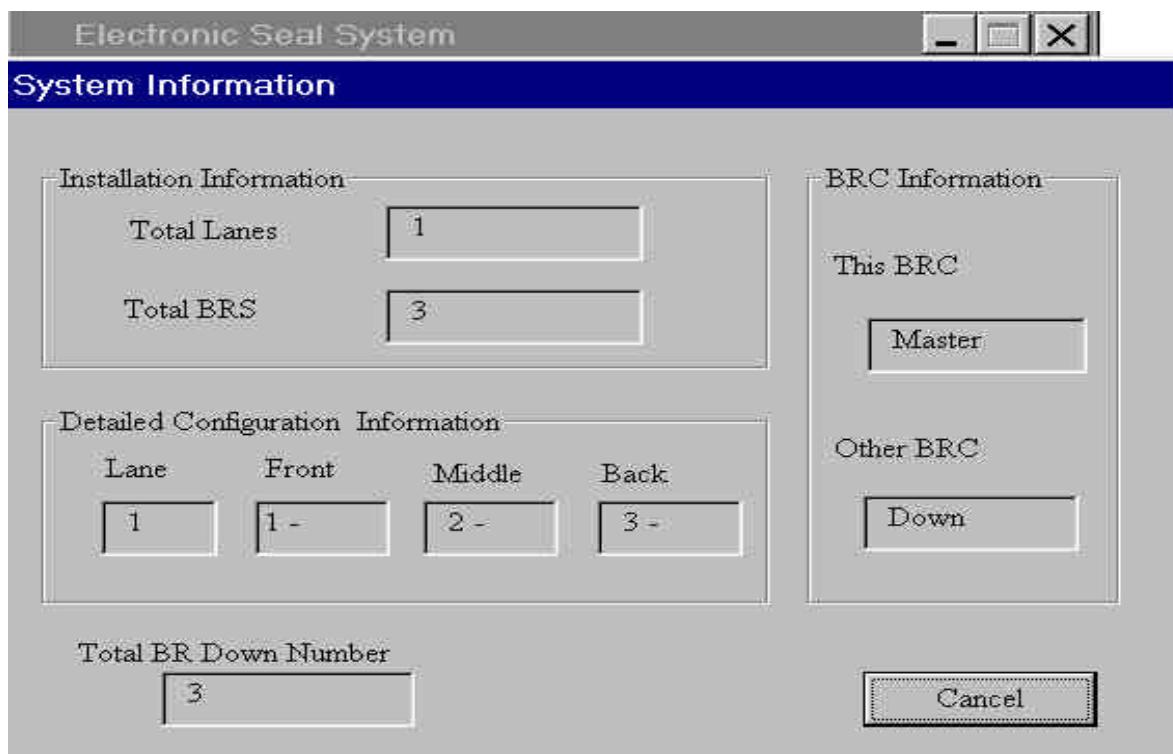
Figure 6_1 System information Dialog
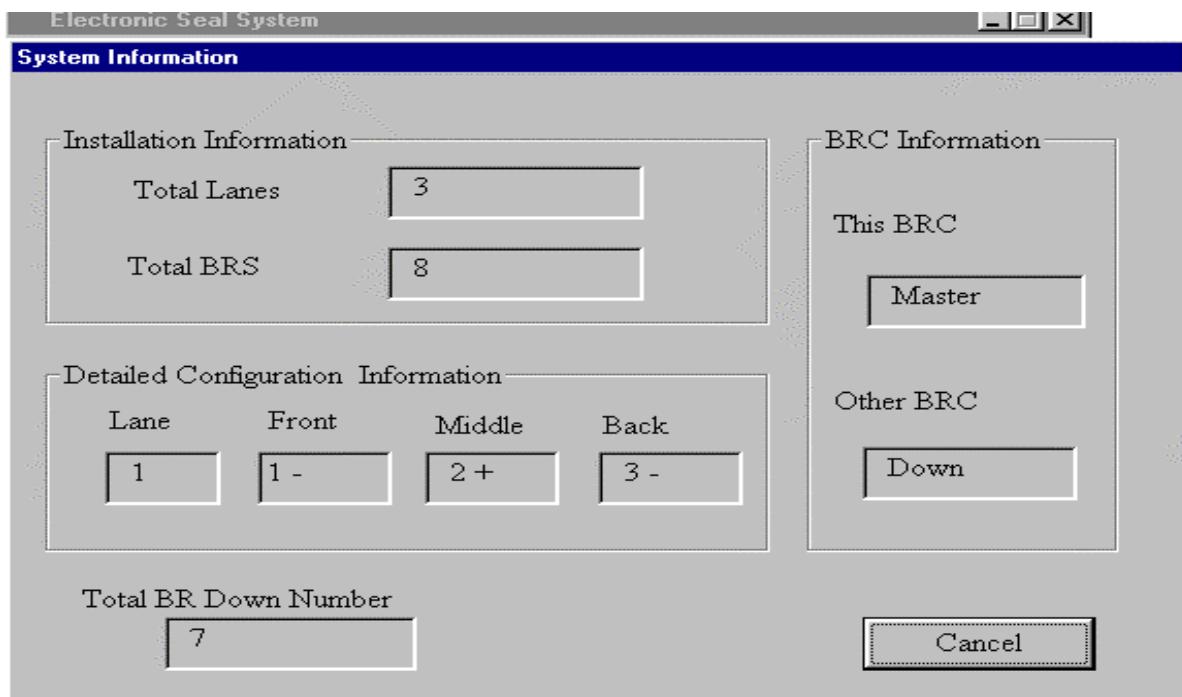
Figure 6_2 System information Dialog

Both Figure 6_1 and Figure 6_2 are to display system information, difference is no BR working on the Figure 6_1. And only the Middle BR on the Lane 1 is working well.

Total Lane: means how many lanes are intalled
Total BRC: means how many BRs are intalled. If three BR are installed on the lane , and Number of Total Lane is 2, then number of Total BRC is 6. The plus signal on the "Detailed Configation Information" function means the BR is working, the minus signal means not working.
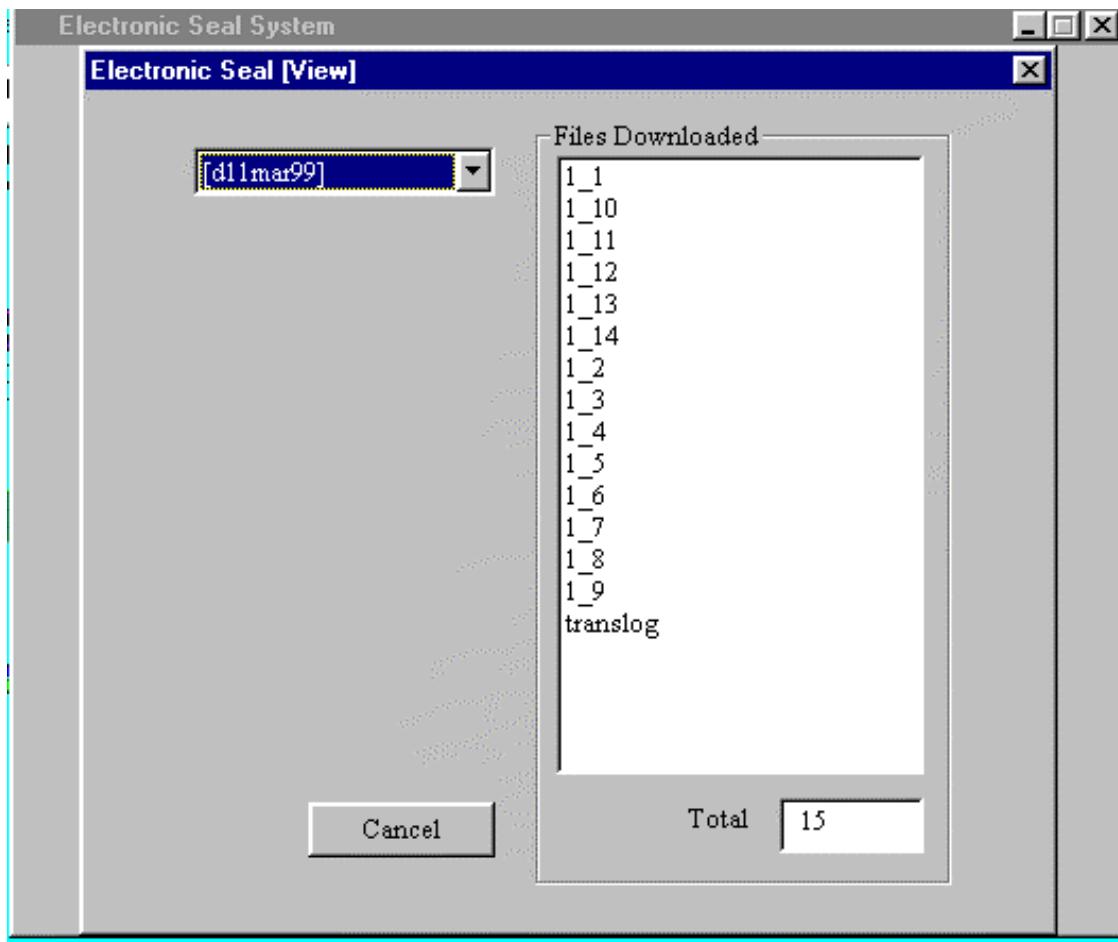
Figure 7 View Dialog

This is the file name of seal received on 11, march,99. Double click the file To view the matched seal information (except for the file name of Translog) See Figure 7_1 Seal information Dialog.
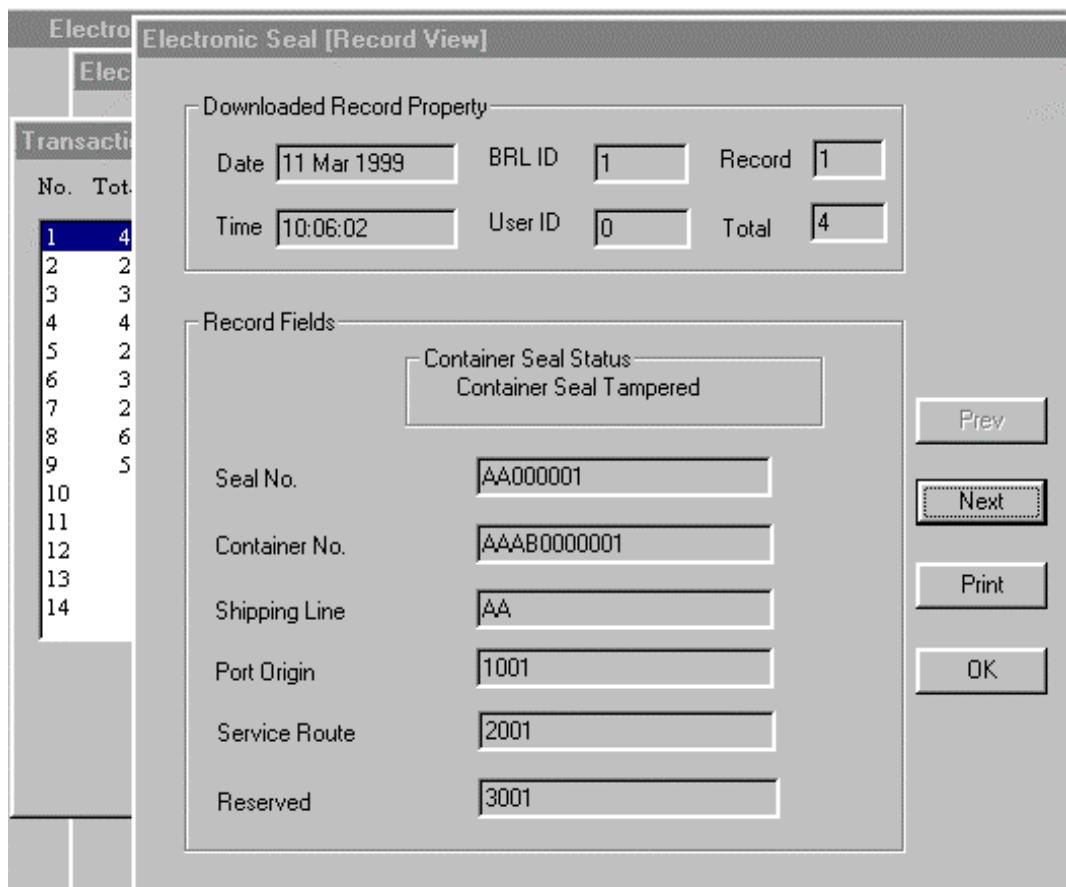
Figure 7_1 Seal information Dialog

The file name of Translog is for the general information on the subdirectory of the day. Double click the file name to view.(See Figure 7_2 Seal general information. And double click the line to view the seal information, it is the same as Figure 7_1.)
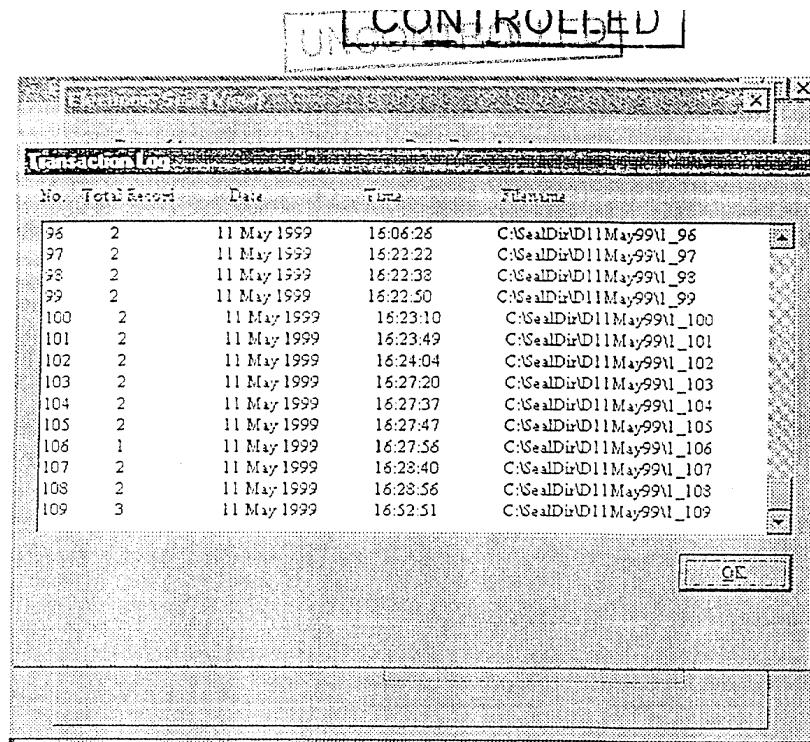
Figure 7_2 Seal general information

Print the seal information in the file.

Click the button of "Print" on the Figure 7_1 Seal information Dialog to print the seal information. (See Figure 8_1 and Figure 8_2 Print Seal Dialog on the next page.)

User are prompted three times with the "paper Out" message if their printer is not ready to print. If the hiccup in the printer is corrected within these tries, printing will resume as normal. Otherwise, the Print command will not be executed.

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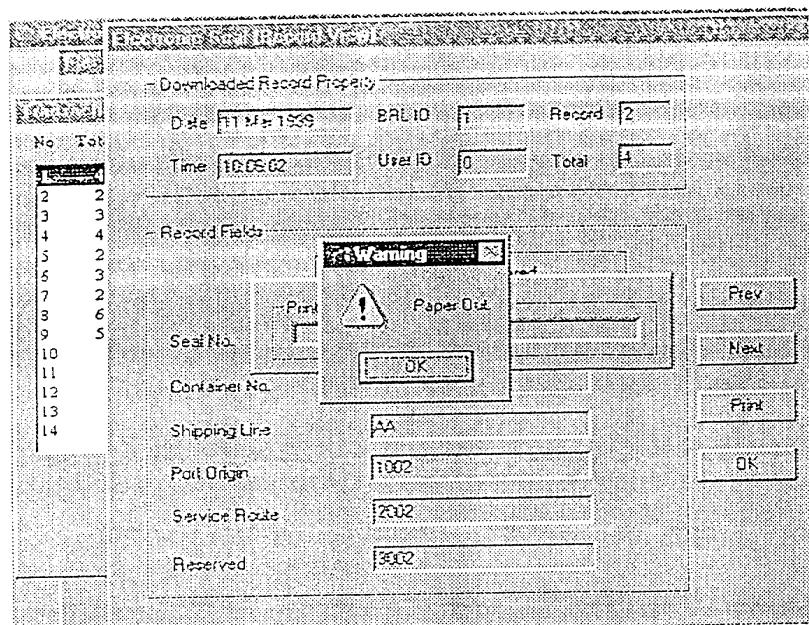
Figure 8_1 Print Seal Dialog
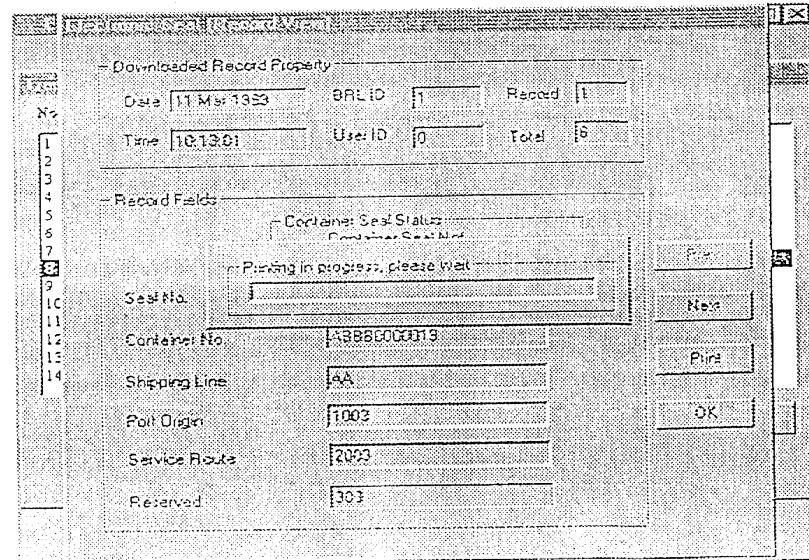
Figure 8_2 Print Seal Dialog

CONTROLLED DOCUMENT COVER PAGE

DOC NO: **00-002-00000094**	EFFECTIVE DATE: 24 January 2000	REV: A NO. OF PAGES: 12 (including this page)

**TITLE: ECS SPECIFICATIONS
          FOR EJ BROOKS SEAL**

COPY NO:

1. Office Copy
2.Softcopy Filename: P:\ECS\DOC_CON\EJ315\ECSSPEC.DOC

PREPARED BY: Huang Li Gang   Design Engineer
                    Name   Designation   Signature

APPROVED BY: Zhao Long   Hardware Design Manager
                    Name   Designation   Signature

Revision Record			
REV	**DATE**	**CHANGED BY**	**REASON FOR CHANGE**
A	24/01/00	Huang LG	Initial Format Release

Electronics Container Seal Specifications

1.0   INTRODUCTION

1.0.1   Electronic Container Seal (ECS) is designed to be used by all shippers, aimed to improve the efficiency of port operation.

1.0.2   ECS shall be incorporation into present seal.

1.1   Power Up Sequence

1.1.1   Once the shipping operator completes the stuffing of goods into the container, the operator will lock the container with an ECS.

1.1.2   Shipping administrator will provide all information to Port Authority for clearance purpose; this shall include the ECS's seal number, Container Number, Shipping Line and etc.

1.1.3   When the container reaches the Gate entrance, a Base Reader will read the ECS's data electronically.

1.1.4   The read number will then be sent to the Authority's system for verification.

1.1.5   Upon successful verification, the container will be allowed to proceed to its next level of work. If it fails, the necessary personnel will be notified.

1.2   Power Up Sequence

1.2.1   The scope of this report shall be restricted to only the specifications of the Electronic Container Seal (ECS) of RFID project.

1.2.2   By no means it serves to provide reader with an understanding of the entire RFID project.

1.2.3   It serves to provide reader with an understanding of the specifications of the ECS.

1.2.4   It starts by providing reader an overview of the system, outlining the necessary modules.

1.2.5   Transmission specifications were highlighted next to provide reader with some knowledge on the requirement of the transmitter.

1.2.6   The controller specifications, which include the Power-up Sequence, the Security Verification, Data Transmission, EEPROM Interface and Transmission Format, were presented for reader to understand the operation of the controller.

1.2.7   It ends with a brief outline of the electrical characteristics of the ECS.

2.0   SYSTEM OVERVIEW
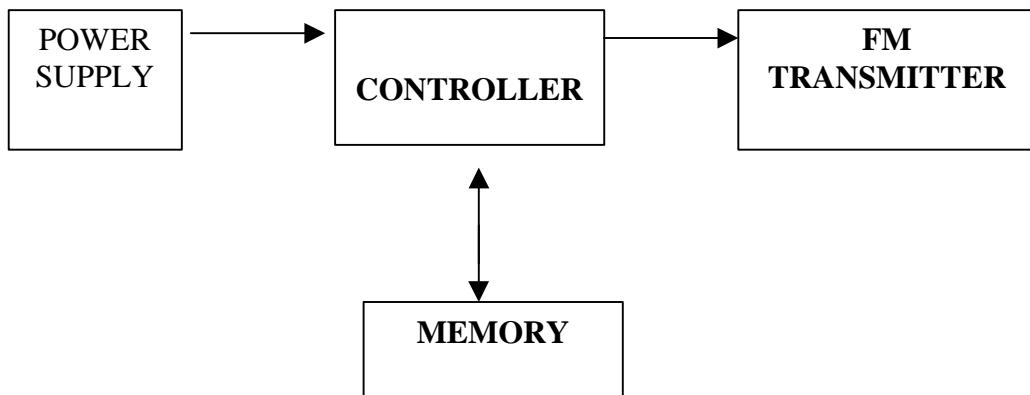
Figure 1. Simplified ECS Block Diagram

2.0.1   The ECS consists of the blocks as shown above.
2.0.2   The controller provides the interface to the Memory. With the ECS's information stored in the memory, the controller will encode the number into FSK data before sending them to the transmitter to be modulated.
2.0.3   The memory provides storage space for the ECS's information.
2.0.4   The Transmitter is responsible for modulating the FSK data into FM signal.
2.0.5   The power supply shall come from a 3-Volt battery.

2.1   Power Up Sequence

2.1.1   The system shall be powered by external 3-volt battery.
2.1.2   The capacity of the battery shall be at least 1AH.
2.1.3   The shelf life with the battery shall be 1 year and the operating life will be 3 months.

2.2   Controller

2.2.1   It is the brain of the system.
2.2.2   Performing the necessary security verifications and ensure that the ECS is not tampered.
2.2.3   Providing the interface to Memory, capable of reading and writing data into the memory.
2.2.4   Encode data from memory into FSK format before sending them to the transmitter.

2.3   Memory

2.3.1   It is a non-volatile memory large enough to sore the ECS data.
2.3.2   It shall allow random read and write to its address.

2.4   FM Transmitter

2.4.1   This module is responsible to transmit the seal number to the Base Reader.
2.4.2   Its responsible is to module the FSK data into FM signal before sending it over the air.

3.0   RF TRANSMISSION SPECIFICATIONS

3.0.1   The ECS sends its seal number to the Base Reader via Radio Frequency (RF).

3.0.2   The ECS has a 315MHzMHz RF transmitter, which transmits 315MHz FM signal.

3.0.3   It receives data from the Controller. The data from the Controller is FSK encoded and the amplitude shall be 0 to VCC.

3.0.4   The FSK data shall then be frequency modulated into 315MHz FM signal.

3.0.5   The Oscillator shall use a SAW Resonator type circuit.

3.0.6   The transmitter output impedance shall be 50Ω.

3.0.7   When no transmission is required, the power to it shall be switched off.

3.0.8   All Specifications must meet the FCC Standard Part 15 and Europe Standard ETSI T-ETS 300 200.

3.1   Transmitter Technical Specifications

3.1.1   The followings are the specifications for the transmitter

S/N	PARAMETER	SPECIFICATIONS	REMARK
1	Carrier Frequency	315MHz±200KHz	
2	Output Power	-10dBm @ 50Ω	
3	Spurious Harmonics	>= -28dBc	
4	Frequency Deviation	>32KHz±1KHz	40KHz±1KHz in phase 2
5	Max. Data Baud Rate	16.384Kbps	
6	Output Impedance	Better than 13dBm into a 50Ω load	
7	Temperature Stability	±50ppm at operating temperature	
8	Modulation Mode	Frequency Modulation	

Table1: RF Transmitter Specification

4.0   Controller Specifications

4.0.1 The controller is the "Brain" of the Electronic Container Seal (ECS), responsible to verify the condition of the seal, read the data from the memory, encode the read data into its Frequency-shift-keying format and send the FSK data to the Transmitter for modulation before being transmitted.

4.1   Power Up Sequence

4.1.1   An ECS can only be powered once. Subsequent power up will be regarded as tampered and tamper code will be sent in addition to the stored data.

4.1.2   The power up sequence of the controller shall be as follow:

```
              ┌─────────────┐
             (  Power Up    )
              └──────┬──────┘
                     │
                     ▼
              ┌─────────────┐
              │Verifications│
              └──────┬──────┘
                     │
                     ▼
┌───────────┐      ╱◆╲        ┌───────────┐
│Erase Data │◄─No─ Tampered ─Yes─►│   Set     │
│at Address │      ╲ ? ╱        │ Tampered  │
│   $01     │       ◆          │   Flag    │
└─────┬─────┘                  └─────┬─────┘
      │                              │
      └──────────────►○◄─────────────┘
                     │
                     ▼
              ┌─────────────┐
              │ Transmit 1  │
              │Stream of data│
              │ Immediately │
              └──────┬──────┘
                     │
                     ▼
            ║┌─────────────┐║
            ║│   Random    │║
            ║│Transmission │║
            ║└─────────────┘║
```
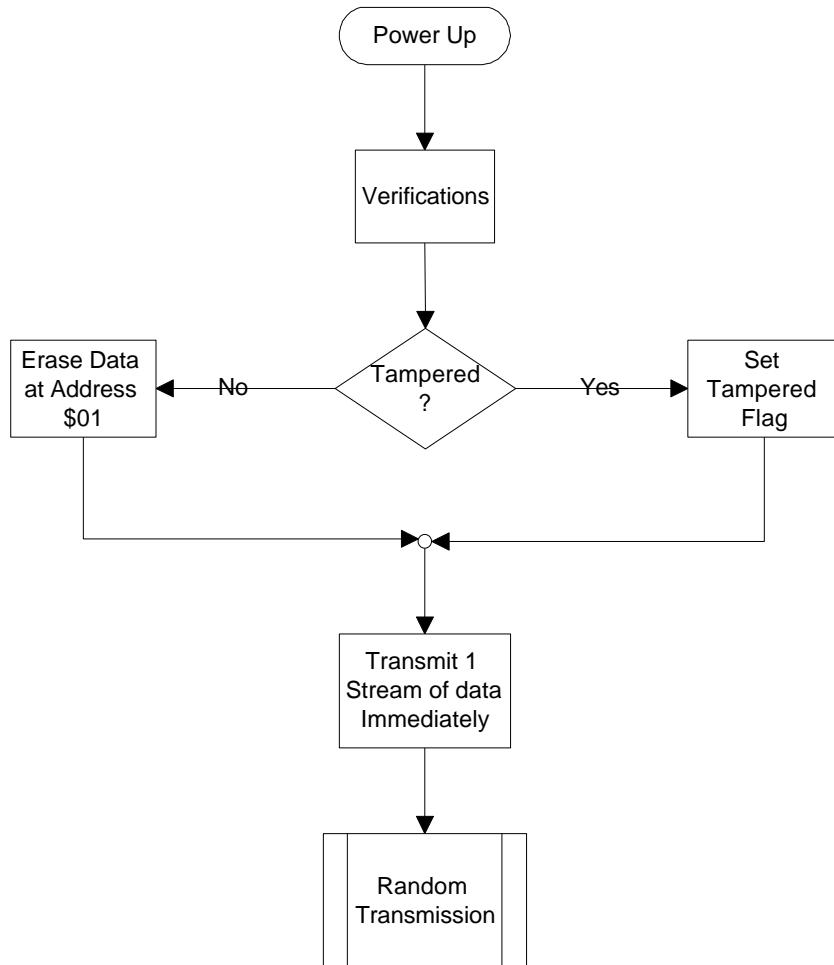
Figure 2: Power Up Sequence

THE BRIEF DESCRIPTION FOR THE ESEAL(315MHZ)

```
┌──────────┐      ┌──────────────┐      ┌──────────────┐
│  POWER   │─────▶│  CONTROLLER  │─────▶│      FM      │
│  SUPPLY  │      │              │      │ TRANSMITTER  │
└──────────┘      └──────┬───────┘      └──────────────┘
                         │
                         ▼
                  ┌──────────────┐
                  │    MEMORY    │
                  └──────────────┘
```
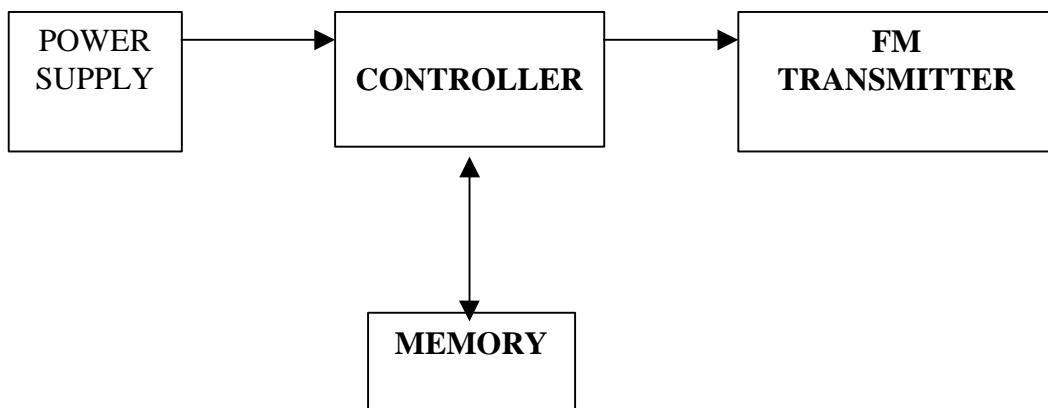
Figure 1. Simplified Eseal(315MHz) Block Diagram

2.0.1 The Eseal(315MHz) consists of the blocks as shown above.

2.0.2 The controller provides the interface to the Memory. With the ECS's information stored in the memory, the controller will encode the number into FSK data before sending them to the transmitter to be modulated.

2.0.3 The memory provides storage space for the ECS's information.

2.0.4 The Transmitter is responsible for modulating the FSK data into FM signal.

2.0.5 The power supply shall come from a 3-Volt battery.

3.0.1 The Eseal sends its seal number to the Base Reader via Radio Frequency (RF).

3.0.2 The Eseal has a 315MHz RF transmitter, which transmits 315MHz FM signal. Once powered up (ie. insertionn of the Bolt), after 30seconds, there will be a transmission. Subseqence transmission will be at least 10seconds later but not more than 20seconds.

3.0.3 It receives data from the Controller. The data from the Controller is FSK encoded and the amplitude shall be 0 to VCC.

3.0.4 The FSK data shall then be frequency modulated into 315MHzFM signal.

3.0.5 The Oscillator shall use a SAW Resonator type circuit.

3.0.6 The transmitter output impedance shall be 50Ω.

3.0.7 When no transmission is required, the power to it shall be switched off.

Transmitter Technical Specifications

3.1.1 The followings are the specifications for the transmitter

S/N	PARAMETER	SPECIFICATIONS	REMARK
1	Carrier Frequency	315MHz	
2	Output Power	-10dBm @ 50Ω	
3	Spurious Harmonics	>= -28dBc	
4	Frequency Deviation	>32KHz±1KHz	40KHz±1KHz in phase 2
5	Max. Data Baud Rate	16.384Kbps	
6	Output Impedance	Better than 13dBm into a 50Ω load	
7	Temperature Stability	±50ppm at operating temperature	
8	Modulation Mode	Frequency Modulation	

Table1: RF Transmitter Specification

5.0 Operating Conditions

Parameter	Min	Max	Unit
Operating Voltage	2.7	3.3	V
Operating Current @ 3V		3.75	mA
Standby Current @ 3V		100	µA
Operating Temperature	-40	85	°C
Storage Temperature	-50	125	°C

Appendix B – AGENCY AUTHORIZATION LETTER

17 April 2000

Federal Communications Commission
7435 Oakland Mills Road
Columbia, Maryland, 21046

Sir/Madam,

Reg: FCC grand for **Eseal(315MHz)**

This letter is an authorization to accept Bay Area Compliance Lab. Corporation as an
agent for **P-SERV TECHNOLOGIES PTE LTD**, Blk 1093 Lower Delta Road #07-05/08
Tiong Bahru Industrial Estate Singapore 169204, to sign applications before the
Commission on our behalf, to make representations to you on our behalf, and to receive
and exchange data between our company and the commission in connection with
certification of the following **P-SERV TECHNOLOGIES PTE LTD's** products:

	Description	Model number
1)	**Eseal (315MHz)**	**ES315V1**

Under FCC docket number 20780 and general docket number 80-284 pursuant to part 15,
FCC rules and regulations.

Sincerely,

Tan Yam Seng
Senior Hardware Design Engineer