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TITLE: ECS SPECIFICATIONS FOR EJ BROOKS SEAL

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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

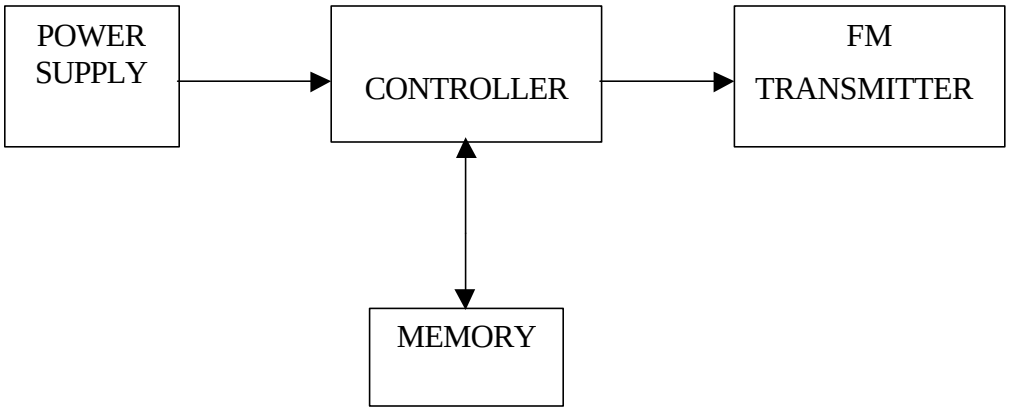

Figure 1. Simplified ECS Block Diagram

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 433.92MHz RF transmitter, which transmits 433.92MHz 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 433.92MHz 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	433.92MHz±200KHz	
2	Output Power	-10dBm @ 50Ω	
3	Spurious Harmonics	>= -28dBc	
4	Frequency Deviation	>32KHz±1KHz	
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:

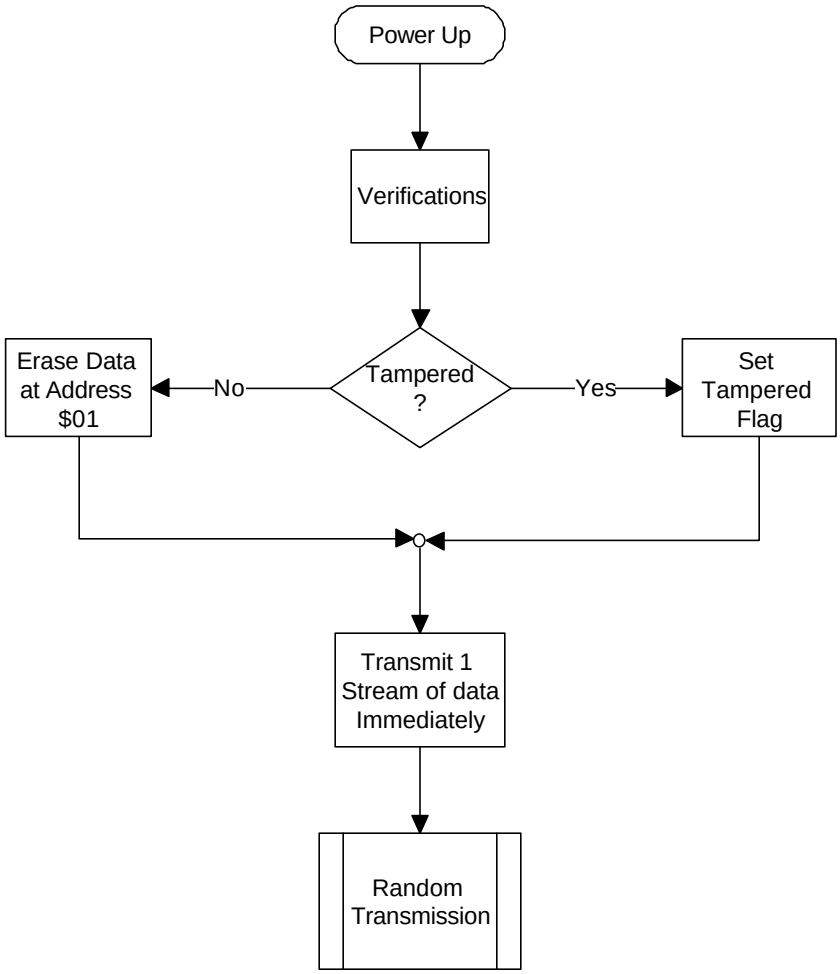

Figure 2: Power Up Sequence

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

ANNEX A - SECURITY VERIFICATION CIRCUITRY