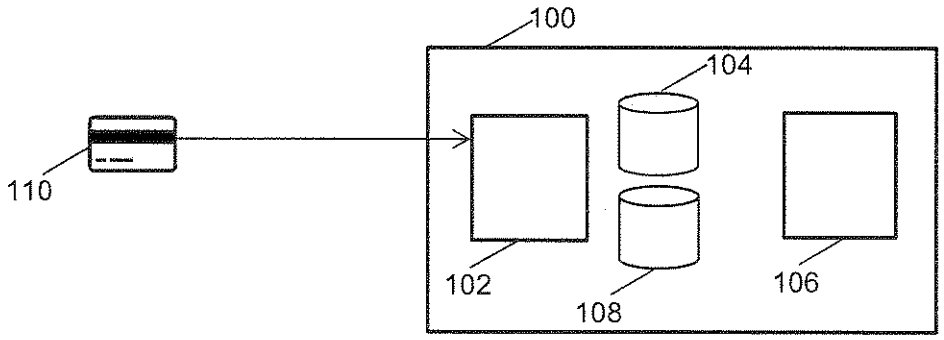

Figure 1

Payment network	BIN (IIN) ranges
American Express	34, 37
MasterCard	5
China UnionPay	62
Diners Club International	300-305, 309, 36, 38-39, 54, 55,6011, 644-649, 65
JCB	3528-3589
Visa	4

Table 1

PAN.id v1.0

[Date]

PAN.id S.N.: 12345

User ID: John Smith

Card Forensic Report

Card information source: Magstripe

PAN: 5123 1234 1289 5566

Expiration Date: 06/18

Service code: 123

Cardholder Name: Jane Doe

Card Brand / payment network: MasterCard

Issuer Information: Bank of America

Card information source: Chip

PAN: 4150 6735 9034 1804

Expiration Date: 02/17

Service code: 456

Cardholder Name: Paul Wong

Card Brand / payment network: Visa

Issuer Information: Citibank

Figure 2

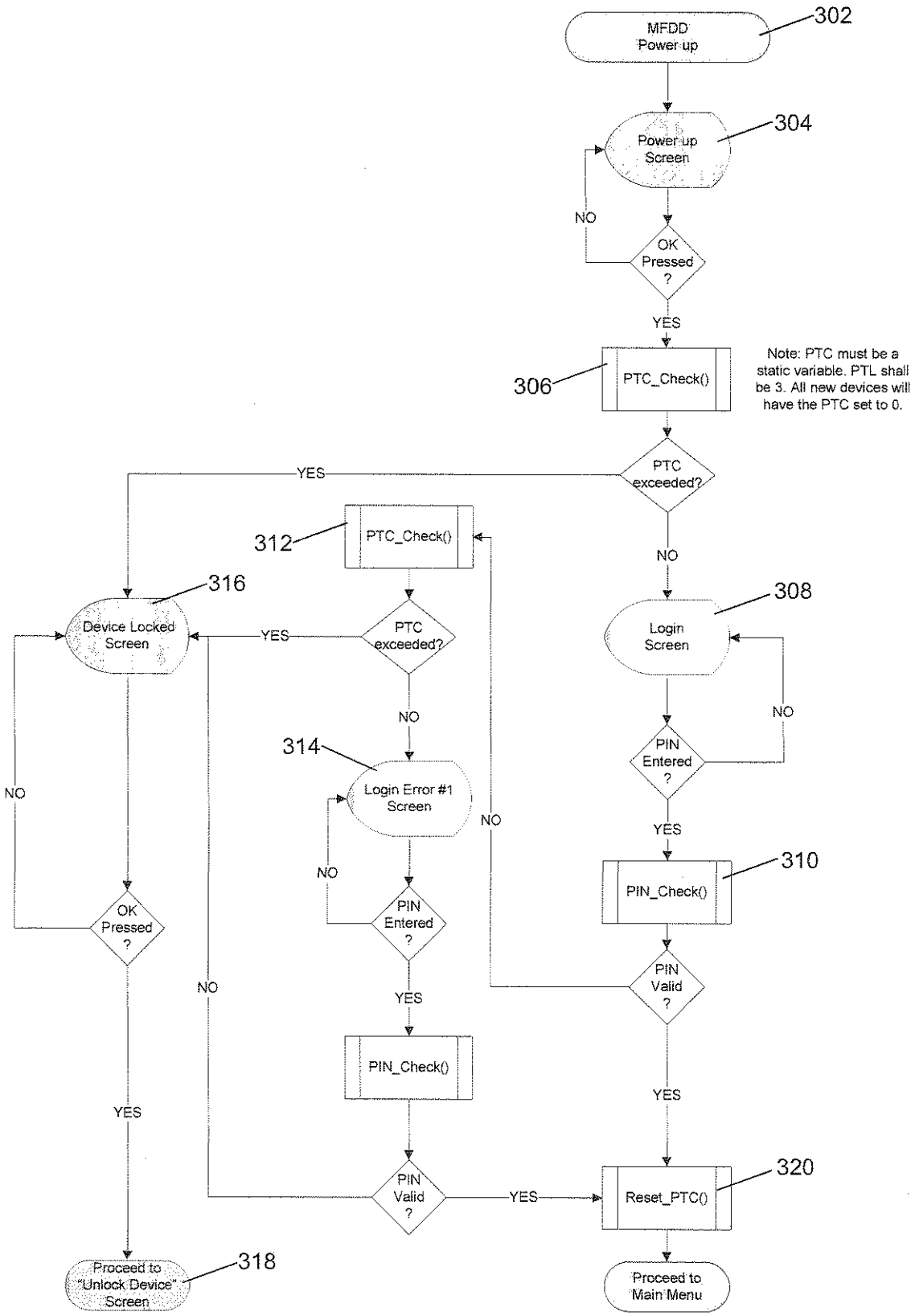
MFDD Power up
302
Power up Screen
304
NO
OK Pressed ?
YES
306
PTC_Check()
Note: PTC must be a static variable. PTL shall be 3. All new devices will have the PTC set to 0.
PTC exceeded?
YES
NO
312
PTC_Check()
316
Device Locked Screen
YES
PTC exceeded?
308
Login Screen
NO
NO
314
Login Error #1 Screen
PIN Entered ?
NO
NO
YES
310
PIN_Check()
NO
OK Pressed ?
PIN Entered ?
PIN Valid ?
NO
YES
PIN_Check()
YES
YES
PIN Valid ?
YES
320
Reset_PTC()
Proceed to "Unlock Device" Screen
318
Proceed to Main Menu

Figure 3A

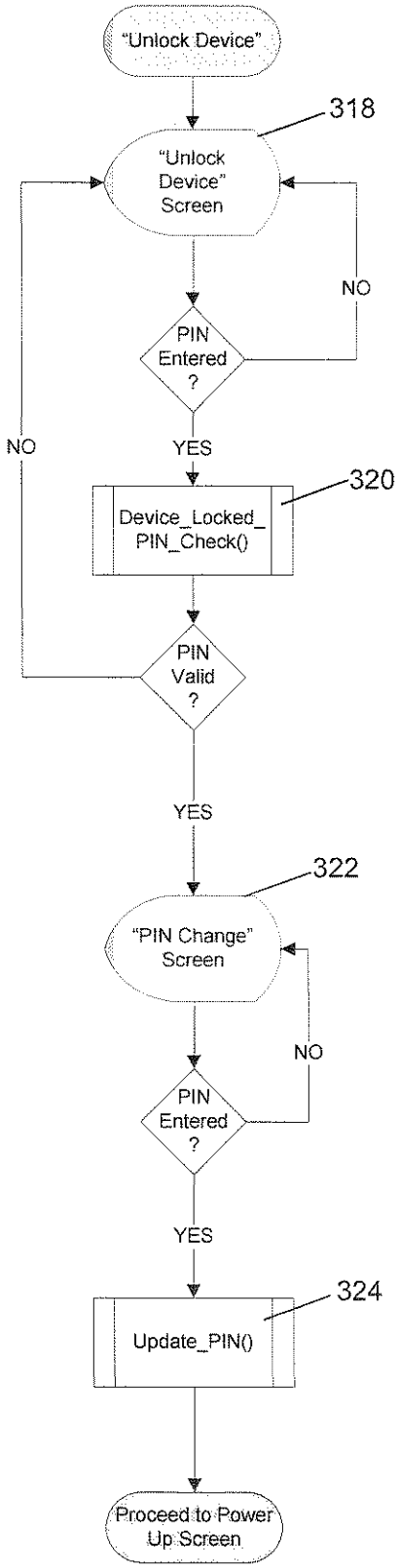
"Unlock Device"
318
"Unlock Device" Screen
NO
PIN Entered ?
NO
YES
320
Device_Locked_ PIN_Check()
PIN Valid ?
YES
322
"PIN Change" Screen
NO
PIN Entered ?
YES
324
Update_PIN()
Proceed to Power Up Screen

Figure 3B

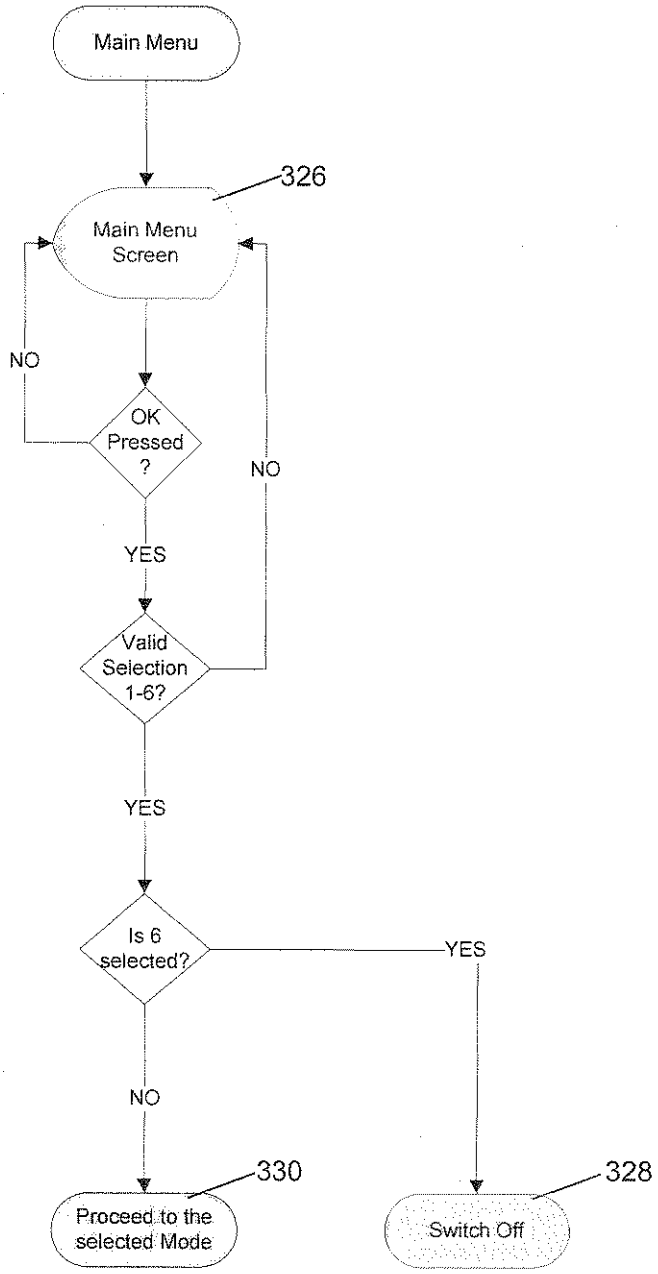
Main Menu
326
Main Menu Screen
NO
OK Pressed ?
NO
YES
Valid Selection 1-6?
YES
Is 6 selected?
YES
NO
330
Proceed to the selected Mode
328
Switch Off

Figure 3C

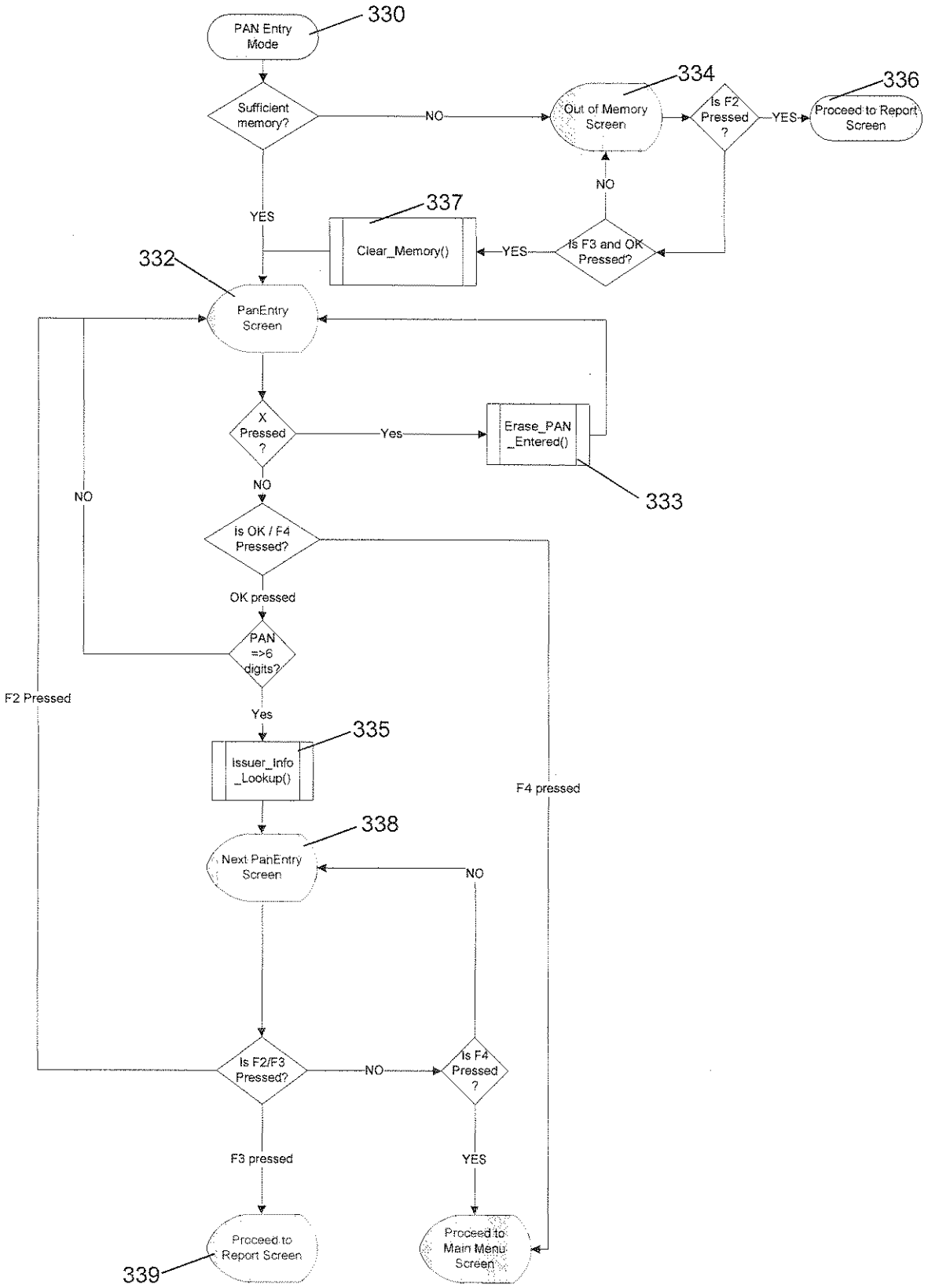
PAN Entry Mode
330
Sufficient memory?
NO
Out of Memory Screen
334
Is F2 Pressed ?
YES
Proceed to Report Screen
336
NO
YES
337
Clear_Memory()
YES
Is F3 and OK Pressed?
332
PanEntry Screen
X Pressed ?
Yes
Erase_PAN _Entered()
333
NO
NO
is OK / F4 Pressed?
OK pressed
PAN =>6 digits?
F2 Pressed
Yes
335
Issuer_Info _Lookup()
F4 pressed
338
Next PanEntry Screen
NO
Is F2/F3 Pressed?
NO
Is F4 Pressed ?
F3 pressed
YES
Proceed to Report Screen
339
Proceed to Main Menu Screen

Figure 3D

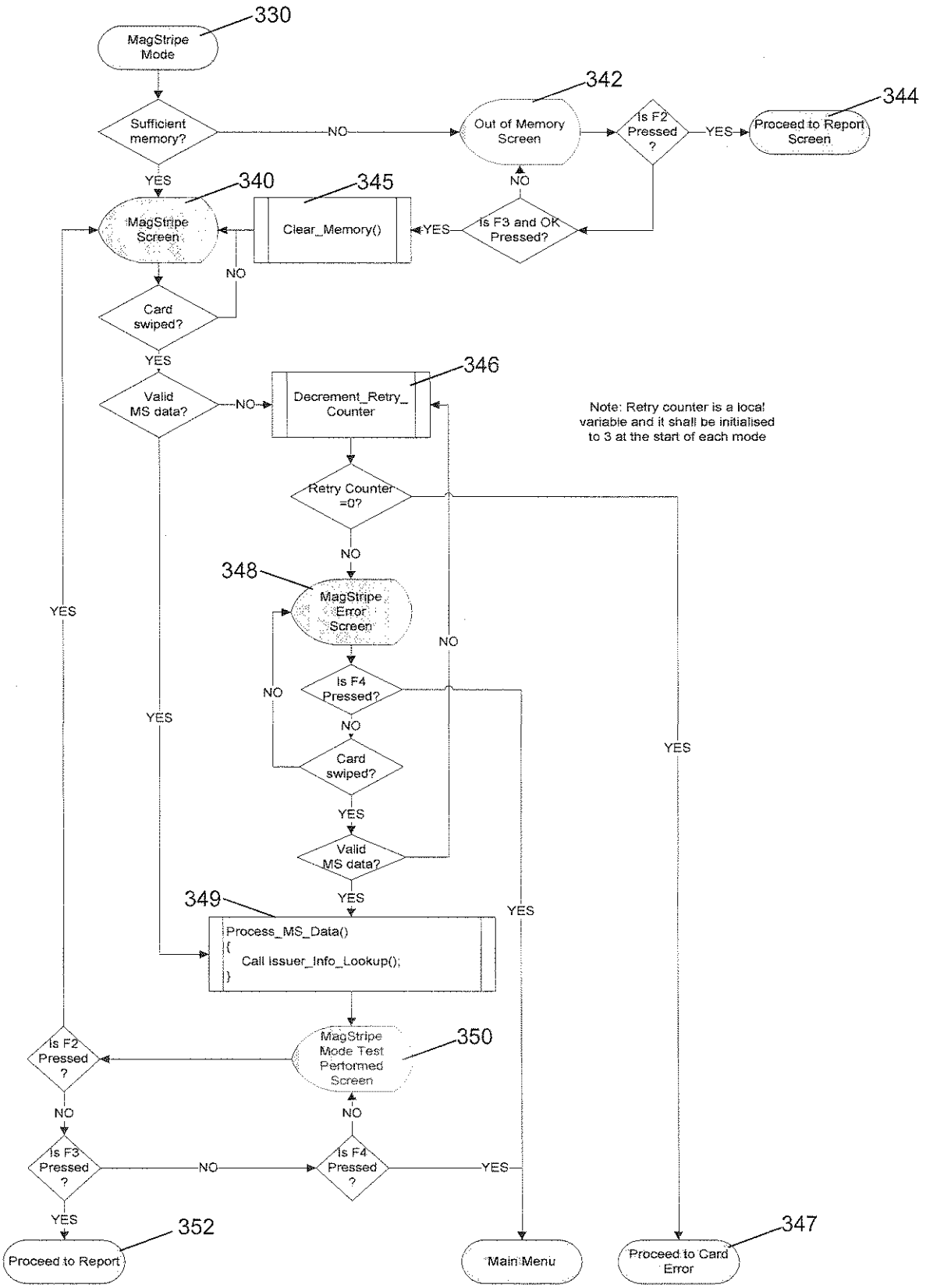
330
MagStripe Mode
Sufficient memory?
NO
342
Out of Memory Screen
Is F2 Pressed ?
YES
344
Proceed to Report Screen
YES
NO
340
MagStripe Screen
345
Clear_Memory()
YES
Is F3 and OK Pressed?
NO
Card swiped?
YES
Valid MS data?
NO
346
Decrement_Retry_ Counter
Note: Retry counter is a local variable and it shall be initialised to 3 at the start of each mode
Retry Counter =0?
NO
348
MagStripe Error Screen
YES
NO
Is F4 Pressed?
NO
YES
Card swiped?
YES
Valid MS data?
YES
NO
YES
349
Process_MS_Data()
{
Call issuer_Info_Lookup();
}
YES
Is F2 Pressed ?
MagStripe Mode Test Performed Screen
350
NO
NO
Is F3 Pressed ?
NO
Is F4 Pressed ?
YES
YES
352
Proceed to Report
Main Menu
Proceed to Card Error
347

Figure 3E

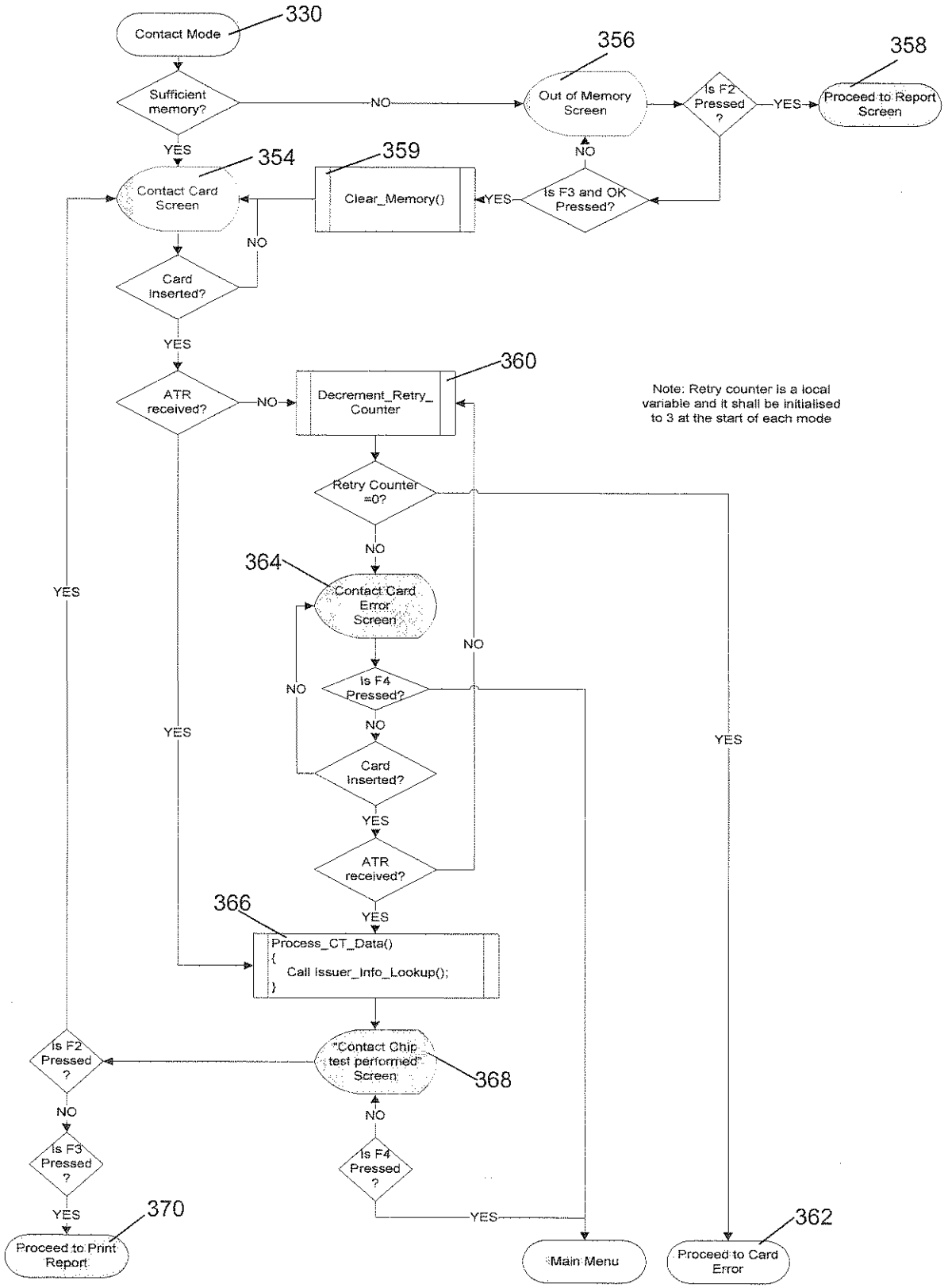
Contact Mode
330
Sufficient memory?
NO
Out of Memory Screen
356
Is F2 Pressed ?
YES
Proceed to Report Screen
358
YES
NO
Contact Card Screen
354
Clear_Memory()
359
YES
Is F3 and OK Pressed?
NO
Card Inserted?
YES
ATR received?
NO
Decrement_Retry_ Counter
360
Note: Retry counter is a local variable and it shall be initialised to 3 at the start of each mode
Retry Counter =0?
NO
364
Contact Card Error Screen
YES
NO
Is F4 Pressed?
NO
YES
YES
Card Inserted?
YES
ATR received?
YES
366
Process_CT_Data()
{
Call Issuer_Info_Lookup();
}
Is F2 Pressed ?
"Contact Chip test performed" Screen
368
NO
Is F3 Pressed ?
NO
Is F4 Pressed ?
YES
YES
370
Proceed to Print Report
Main Menu
Proceed to Card Error
362

Figure 3F

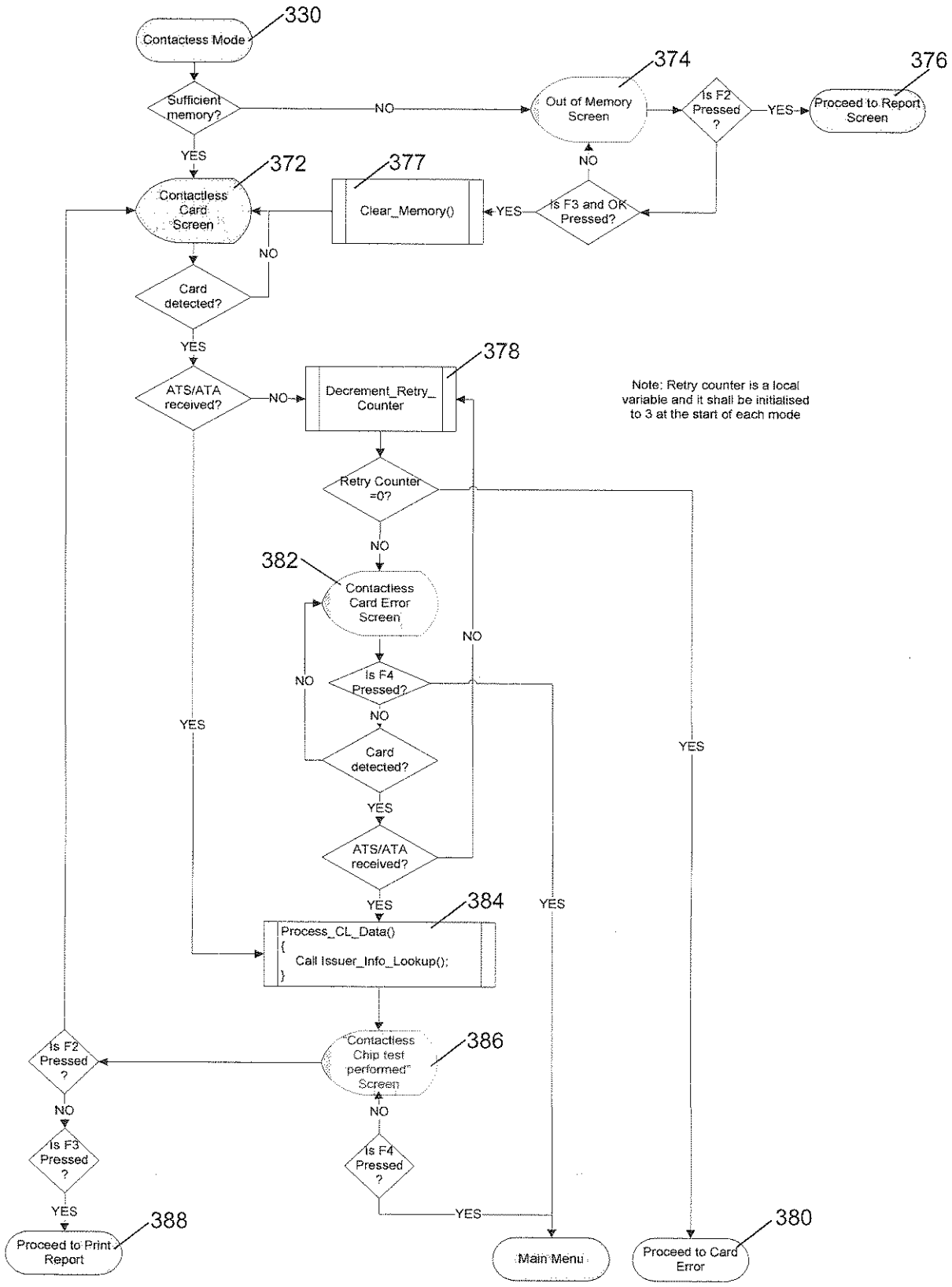
Contactless Mode
330
Sufficient memory?
NO
Out of Memory Screen
374
Is F2 Pressed ?
YES
Proceed to Report Screen
376
YES
NO
Contactless Card Screen
372
Clear_Memory()
377
YES
Is F3 and OK Pressed?
NO
Card detected?
YES
ATS/ATA received?
NO
Decrement_Retry_ Counter
378
Note: Retry counter is a local variable and it shall be initialised to 3 at the start of each mode
Retry Counter =0?
NO
382
Contactless Card Error Screen
NO
Is F4 Pressed?
NO
YES
Card detected?
YES
ATS/ATA received?
YES
YES
YES
384
Process_CL_Data()
{
Call Issuer_Info_Lookup();
}
Contactless Chip test performed" Screen
386
Is F2 Pressed ?
NO
Is F3 Pressed ?
YES
Is F4 Pressed ?
NO
YES
Proceed to Print Report
388
Main Menu
Proceed to Card Error
380

Figure 3G

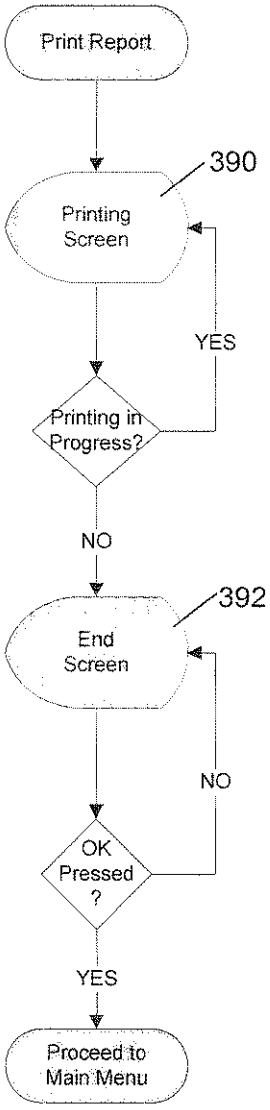
Print Report
390
Printing Screen
YES
Printing in Progress?
NO
392
End Screen
NO
OK Pressed ?
YES
Proceed to Main Menu

Figure 3H

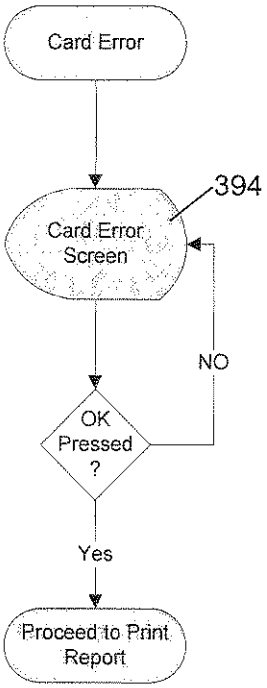

Figure 3I

Use Case Name	New Device
Trigger	MFDD (i.e. device 100) is switched on
Precondition	The MFDD is powered and the user switch on the device.
Basic Path	1. The user switches on the MFDD device and press "OK" button 2. The MFDD device checks PIN Try Counter (PTC) by calling the PTC_Check() function 3. PTC for all new device is set to 0, proceed to the Device Locked Screen
Postcondition	Device Locked Screen is displayed
Exception Paths	The user may abandon the operation at any time.

Figure 4A

Use Case Name	Power Up
Trigger	MFDD is switched on
Precondition	The MFDD is powered and the user switches on the device.
Basic Path	1. The user switches on the MFDD device and press "OK" button 2. PTC_Check() is called to check the PTC 3. If the PTC is not 0, proceed to the Login Screen 4. Else if the PIN Try Counter is 0, proceed to the Device Locked Screen
Postcondition	Login Screen or Device Locked Screen is displayed
Exception Paths	The user may abandon the operation at any time.

Figure 4B

Use Case Name	Login
Trigger	User presses "OK" in the "Power Up" state
Precondition	The user enters the PIN
Basic Path	1. The user enters the PIN 2. PIN_Checked() is called to verify the user PIN 3. If entered PIN is correct, then proceed to Main Menu 4. If entered PIN is incorrect, then call PTC_check() to check if PTC is zero 5. If PTC is not zero, proceed to Login Error Screen and go to step 2 6. If PTC is zero, proceed to Device Locked Screen
Postcondition	Main Menu or Device Locked Screen is displayed
Exception Paths	The user may abandon the operation at any time.

Figure 4C

Use Case Name	Device Locked
Trigger	PTC is 0 in the "Power Up" state
Precondition	The user enters the PIN
Basic Path	The user contacts Helpdesk and presses OK to proceed to the Unlock Device Menu
Postcondition	Unlock Device Screen is displayed
Exception Paths	The user may abandon the operation at any time.

Figure 4D

Use Case Name	Unlock Device
Trigger	PTC is 0 in the "Power Up" state
Precondition	The user enters the correct PIN
Basic Path	1. The user contacts Helpdesk and presses OK to proceed to the Unlock Device Screen 2. User enters the Device PIN provided by Helpdesk 3. Device_Locked_PIN_Checked() is called 4. If the Device PIN is correct, then go to PIN Change screen 5. Else if the Device PIN is incorrect, then go to Unlock Device Screen 6. User enters the New PIN in the PIN Change screen, Update_PIN() is called to update the user PIN 7. When PIN update is done, proceed to the Power Up screen
Postcondition	Power Up Screen is displayed
Exception Paths	The user may abandon the operation at any time.

Figure 4E

Use Case Name	Main Menu
Trigger	The user selects the Main Menu
Precondition	The user enters the PIN
Basic Path	1. The user enters a 1-6 selection and press OK 2. If 1 is entered, then proceed to PAN Entry Mode Screen 3. Else if 2 is entered, then proceed to MagStripe Mode Screen 4. Else if 3 is entered, then proceed to Contact Mode Screen 5. Else if 4 is entered, then proceed to Contactless Mode Screen 6. Else if 5 is entered, then proceed to Print Report 7. Else if 6 is entered, then proceed to Power Off 8. Else proceed to Invalid Selection Mode
Postcondition	"Main Menu" Screen, "MagStripe Mode" Screen, "Contact Mode" Screen, "Contactless Mode" Screen, "Invalid Selection" Screen,
Exception Paths	The user may abandon the operation at any time.

Figure 4F

Use Case Name	Invalid Selection
Trigger	Invalid Selection is entered
Precondition	The user enters a selection
Basic Path	1. The user enters a 1-6 selection and press OK 2. If 1 is entered, then proceed to PAN Entry Mode Screen 3. Else if 2 is entered, then proceed to MagStripe Mode Screen 4. Else if 3 is entered, then proceed to Contact Mode Screen 5. Else if 4 is entered, then proceed to Contactless Mode Screen 6. Else if 5 is entered, then proceed to Print Report 7. Else if 6 is entered, then proceed to Power Off 8. Else proceed to Invalid Selection Mode
Postcondition	"Main Menu" Screen, "MagStripe Mode" Screen, "Contact Mode" Screen, "Contactless Mode" Screen, "Invalid Selection" Screen,
Exception Paths	The user may abandon the operation at any time.

Figure 4G

Use Case Name	PAN Entry Mode
Trigger	User selection
Precondition	User selects PAN Entry Mode test
Basic Path	1. The User enters the PAN 6-19 digits and Press OK to proceed to Issuer_Info_Lookup() 2. Print Report screen (e.g. Figure 5L) is displayed when the lookup operation is done 3. The User presses OK to print the report, 4. Printing In Progress Screen (e.g. Figure 5ZA) is displayed while printing is in progress 5. When printing is finished, End Screen(e.g. Figure 5ZB) is displayed 6. The user presses OK to return to the Main Menu
Postcondition	End or Main Menu screen is displayed

Exception Paths	The user may abandon the operation at any time.
Other	Receipt printing requirements: • Mandatory Receipt Information, • PAN Entry Mode if PAN entry is found, • PAN Entry if PAN Entry is not found

Figure 4H

Use Case Name	MagStripe Mode
Trigger	User selection
Precondition	User selects MagStripe Mode test
Basic Path	1. The User swipes the card 2. If MS data read is ok, then proceed to Process_MS_Data() a. Call Issuer_Info_Lookup() b. Call Card_Surface_check() c. Call MS_Consistency_Check(); 3. Else if retry counter is not 0, then proceed to MagStripe Error Screen and go to 1 4. Else proceed to Card Error Screen N.B.: "Card_Surface_check()" and "MS_Consistency_Check()" involves checking if the MagStripe data is consistent with the data indicated on the suspected fraudulent payment card
Postcondition	End or Main Menu screen is displayed
Exception Paths	The user may abandon the operation at any time.
Other	Receipt printing requirements: • Mandatory Receipt Information, • MagStripe mode, • Process_MS_Data() *[see pseudocode]*, • MS_Consistency_Check()

Figure 4I

Use Case Name	Contact Chip Mode
Trigger	User selection
Precondition	User selects Contact Chip Mode test
Basic Path	1. The User Insert the card 2. If no ATR and Retry Counter is not zero, then go to Contact Card Error Screen

	3. Else if Retry Counter is zero go to Card Error Screen 4. Else call Process_CT_Data() 5. Go to Contact Chip Test Performed screen 6. If OK is pressed, go to Print Report Screen 7. Else if X is pressed got to Main Screen 8. Else go to 5
Postcondition	End or Main Menu screen is displayed
Exception Paths	The user may abandon the operation at any time.
Other	Receipt printing requirements: • Mandatory Receipt Information, • Contact Chip mode, • Sub Process_CT_Data *[see pseudocode],* • Sub MS_Consistency_Check()

Figure 4J

Use Case Name	Contactless Chip Mode
Trigger	User selection
Precondition	User selects Contactless Chip Mode test
Basic Path	1. The User Insert the card 2. If no ATS/Answer To ATA and Retry Counter is not zero, then go to Contact Card Error Screen 3. Else if Retry Counter is zero go to Card Error Screen 4. Else call Process_CL_Data() 5. Go to Contactless Chip Test Performed screen 6. If OK is pressed, go to Print Report Screen 7. Else if X is pressed got to Main Screen 8. Else go to 5
Postcondition	End or Main Menu screen is displayed
Exception Paths	The user may abandon the operation at any time.
Other	Receipt printing requirements: • Mandatory Receipt Information, • Contactless Chip mode, • Sub Process_CL_Data *[see pseudocode],* • Sub MS_Consistency_Check()

Figure 4K

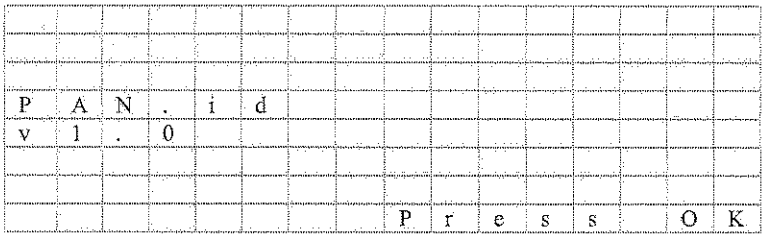

Figure 5A

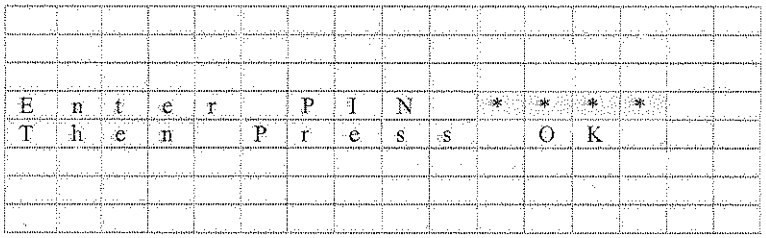

Figure 5B

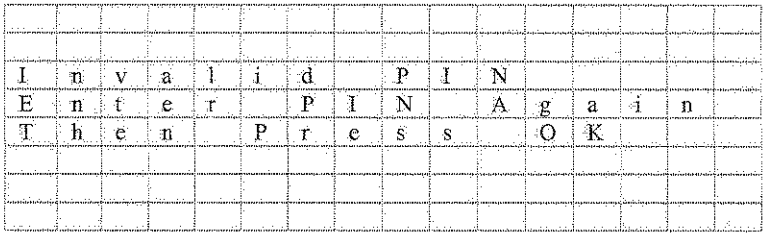

Figure 5C

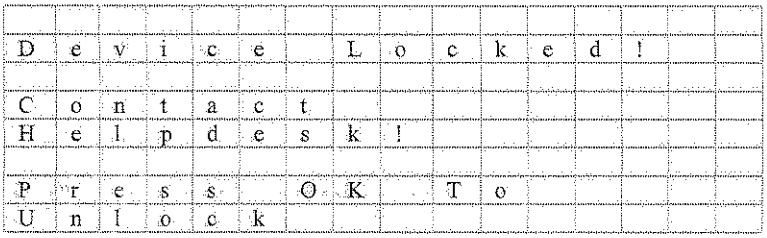

Figure 5D

```
Device Locked!

RND:

Enter PIN To
Unlock: **** *
Press OK
```

Figure 5E

```
Enter New PIN:
**** *
Press OK
```

Figure 5F

```
Repeat New PIN:
**** *
Press OK
```

Figure 5G

```
Repeat New PIN:
**** *
Press OK
Enter Again
PIN Not Match!
```

Figure 5H

```
1 - PAN Entry
2 - MagStripe
3 - Contact
4 - Contactless
5 - Report
6 - Switch Off
Enter 1 - 6:
Then Press OK
```

Figure 5I

```
Enter PAN:

Press OK or
  X - To Re-enter
F4 - Main Menu
```

Figure 5J

```
F2 - Next PAN
F3 - Report
F4 - Main Menu
```

Figure 5K

```
Card Forensic
Report
Card Information
Source:

PAN:

Expiration Date:

Service code:
Cardholder name:

Card Brand:

Issuer
Information:

F2 - Print Report
F3 - Export Report
F4 - Main menu
```

Figure 5L

```
Out of memory!

F2 - Export Report
F3 - Clear Memory

OK - To Proceed
```

Figure 5M

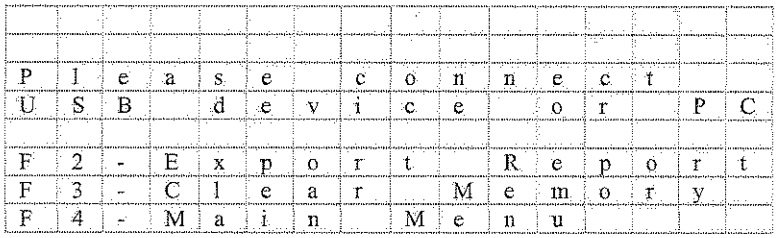

Figure 5N

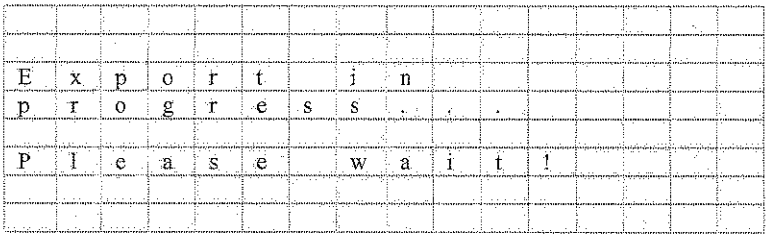

Figure 5O

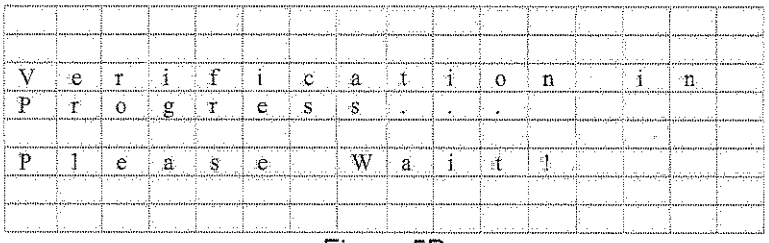

Figure 5P

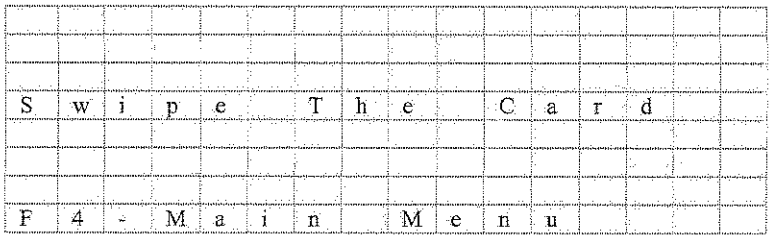

Figure 5Q

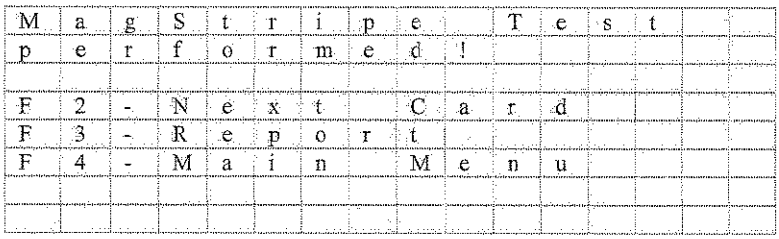

Figure 5R

C	a	r	d		E	r	r	o	r	!					
S	w	i	p	e		T	h	e		C	a	r	d		
A	g	a	i	n											

Figure 5S

C	a	r	d		E	r	r	o	r	!					
P	r	e	s	s		O	K								

Figure 5T

I	n	s	e	r	t		T	h	e		C	a	r	d	
F	4	-	M	a	i	n		M	e	n	u				

Figure 5U

C	o	n	t	a	c	t		C	h	i	p				
T	e	s	t		p	e	r	f	o	r	m	e	d	!	
F	2	-	N	e	x	t		C	a	r	d				
F	3	-	R	e	p	o	r	t							
F	4	-	M	a	i	n		M	e	n	u				

Figure 5V

C	a	r	d		E	r	r	o	r	!					
R	e	m	o	v	e		T	h	e		C	a	r	d	
A	n	d													
I	n	s	e	r	t		T	h	e		C	a	r	d	
A	g	a	i	n											

Figure 5W

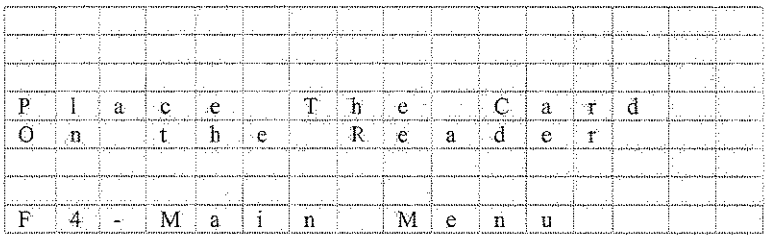

Figure 5X

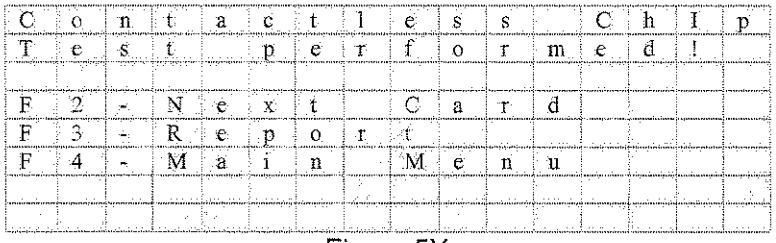

Figure 5Y

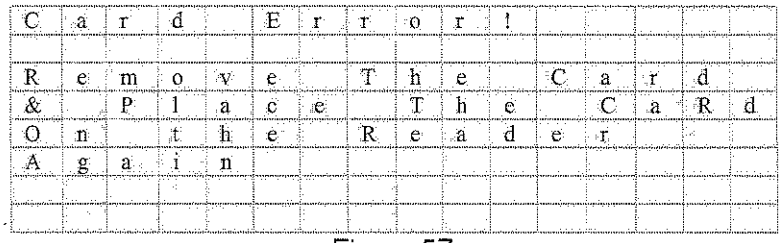

Figure 5Z

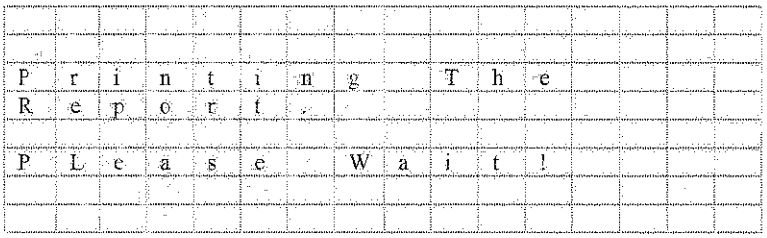

Figure 5ZA

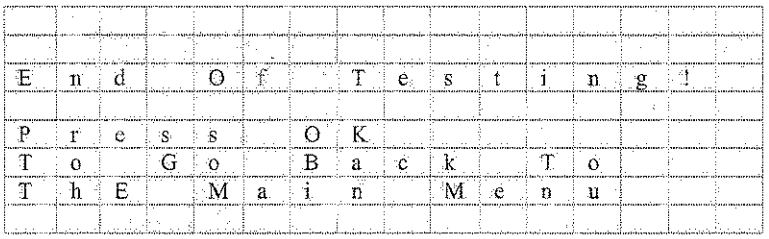

Figure 5ZB