Central Puget Sound
Regional Fare Coordination System

On-Board Equipment Operations Manual – King County Metro and Sound Transit

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1 Introduction

These are instructions for transit operators (bus drivers) and their supervisors who use the on-board equipment installed as components of the Regional Fare Coordination System (RFCS). The RFCS is an integrated system of hardware and software that allows Automated Fare Collection (AFC) using contactless fare cards, or smart cards. These cards are similar to debit cards and can be loaded with the products of multiple transit agencies in the Puget Sound region.

The on-board equipment includes:

- Driver Display Unit (DDU) – mounted just to the front and to the right side of the driver's seat, within easy reach and visibility of the driver
- On-Board Fare Transaction Processor (OBFTP) – installed near the front exit, where riders present their cards; for convenience, called a "Card Reader" in this manual
- Radio Control Unit (RCU) – accessed from the DDU
- Wireless data transfer system – through which the on-board equipment sends information to and receives data from the computer at the base.

1.1 Introducing the RFCS

The RFCS is an integrated system of hardware and software that allows automated fare collection using contactless fare cards, or smart cards. These cards are similar to debit cards and can be loaded with the products of multiple transit agencies in the Puget Sound region.

A passenger presents a smart card to the Card Reader in order to travel with various public transportation providers on all modes of public transport including train, bus, and ferry services.

These transactions pass from the device to a central computer known as the Data Acquisition Computer (DAC) via the wireless data transfer system. This information is referred to as usage data (UD). It includes payments for journeys, runs/routes, and shift details and is recorded to the DAC.

The DAC also sends information referred to as configuration data (CD) to the on-board equipment. The CD includes information such as timetables, fare schedules, and device settings.

When the term "a predetermined time" is used, such as the screen reverting to another screen after a predetermined time of no action, this time can be changed by CD.

Drivers for King County Metro (KCM) also use the DDU to interact with KCM's radio system.

2 Overview

The Card Reader is located at the front door of the bus, enabling passengers to present their fare cards as they enter or exit. It has a message display screen and a set of three light indicators, (red, green, and yellow). Passengers present their cards to the Card Reader, it beeps once, a green light flashes once, and a message displays on the screen to confirm the successful completion of a transaction. Other sequences of beeps, lights, and messages provide card status error warnings or notification of unsuccessfully attempted transactions.

A series of screens on the DDU provide information relating to automated and manual fare collection and radio control. The DDU also provides a method of logging on and off the system, methods for selecting trips, and transmitting data to and receiving data from the DAC. Hotkeys located around the DDU display screen enable you to input a range of commands relevant to the various screen displays.

UD, which includes payments for journeys, runs/routes, and shift details and CD, which includes information such as timetables, fare schedules, and device settings, are automatically exchanged between the Card Reader and the DAC on power up and after logoff if the bus is within range of base. UD is uploaded from the Card Reader to the DAC. UD includes details of the transactions performed, logon and trip start details, and maintenance diagnostics information.

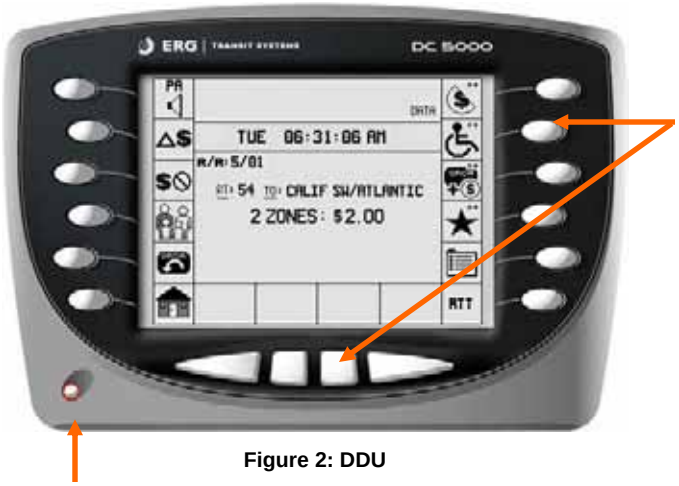
CD is downloaded from the DAC independently to both the DDU and OBFTP. CD determines many features of the on-board equipment, including timeout, information relating to lost or stolen fare cards, fare structures, authorized operators, passwords, run schedules, and trip times.

2.1 Device Layout

Figure 1 shows a fare card being presented to the Card Reader.

Figure 1: Card Reader

The DDU interactive interface is shown in Figure 2.



Pressing a hotkey operates a function corresponding to the screen icon next to the hotkey. The icon and function differ depending on which screen is being viewed at the time.

Figure 2: DDU

Note: The **Power On/Off** hotkey located at the bottom left side of the device is not activated.

2.2 DDU Home Screen

The **DDU Home** screen consists of several windows.

2.2.1 DDU Home Screen Windows

The **DDU Home** screen is shown in Figure 3.

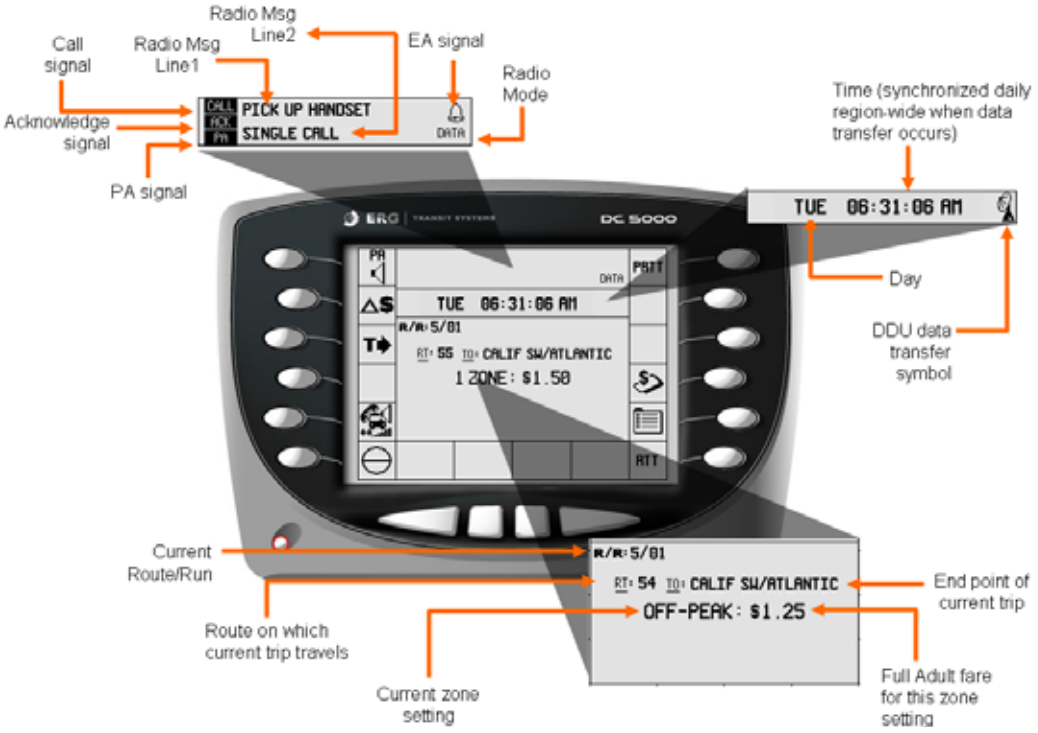


Figure 3: DDU Home Screen

2.2.2 DDU Home Screen Off-Trip Hotkeys

The RCU, Public Address (PA), and logoff functions are available before starting a trip (see Figure 4).

Figure 4: DDU Home Off-Trip Hotkeys

The **Back** key prompts the device to navigate to the previous screen. In this example, it is the **Enter Operator ID** screen.

2.2.3 DDU Home Screen On-Trip Hotkeys

The hotkeys shown in Figure 5 are available when an operator is logged on and on a trip. The AFC hotkeys used on trip are **Change Fareset**, **Next Trip**, **Go to Fare** screen, and **Go to Options** screen. Because these hotkeys are not functional when off trip, the associated icons are not displayed until the trip starts. Hotkeys have no functionality when adjacent icon boxes are blank.

Figure 5: DDU Home On-Trip Hotkeys

2.3 Fares Screen Hotkeys

The hotkeys shown in Figure 6 are available on the **Fares** screen.

Figure 6: Fares Screen Hotkeys

Each time a counter hotkey is pressed, an event written as UD records the counter type and timestamp, and the DDU beeps a tone to acknowledge that the count was recorded. If a hotkey without a function is pressed, the DDU beeps three times

2.4 Options Screen Hotkeys

The hotkeys shown in Figure 7 are available on the **Options** screen.

Figure 7: Options Screen Hotkeys

2.5 Screen Icon Definitions

Table 1 contains a complete list with pictures and the names of all the icons on the on-board equipment, and a definition of each one.

Table 1: DDU Icons and Definitions

Icon	Definition
	Go to Fares Screen
	Go to Options Screen
	Cancel current operation and return to relevant main screen
	Go to Home screen

Icon	Definition
	Go to Event Log screen
	Start Next Trip (Go to Start Next Trip Confirm screen)
	Set Fareset (Go to Select Fareset screen)
	Log Off (Go to Log Off Confirm screen)
	Go Back to previous screen (from Off-Trip Home screen)
	Public Address System Off (Press to turn PA on/off)
	Send Request To Talk
	Send Priority Request To Talk
	Select Trip (Go To Select Trip screen) [for next trip in the sequence use Next Trip key]
	Fare override for next fare card transaction only.
	Group Fare Transaction
	Reverse Last Transaction
	Special Survey counter (agency defined)
	Cash Upgrade (Fare card counter). To count each passenger who uses a fare card but also has to supplement the fare with a cash payment.
	Wheelchair boarding counter. To count each wheelchair passenger.
	Cash Fare Underpayment counter. To count any passenger who did not have cash but was still allowed to travel.
	1. Select Role (Go to Select Role screen) 2. Select Role screen ID icon

Icon	Definition
△R	Select Route/Run (KCM) (Go to Select Run screen)
	Go to DDU Settings screen
	Go to Card Reader Settings screen
	Go to Radio System Settings screen
NO	1. Confirm Start Next Trip (cancel operation) 2. Confirm Log Off (cancel operation)
YES	1. Start Next Trip (acknowledge operation) 2. Confirm Log Off (acknowledge operation)
OK	Confirm operation (various operations)
← XXXX	Clear All Characters
XXXX ←	Clear Last Character (rightmost)
ACK	Acknowledge highlighted item on event log list
ACK ALL	Acknowledge all unacknowledged items on event log list
CLR	1. De-select highlighted item on list 2. Remove acknowledged item from event log list
CLR ALL	Remove all acknowledged items from event log list
	Up Arrow (Used for selection from lists such as on Select Trip screen)
	Down Arrow (Used for selection from lists such as on Select Trip screen)
	Select Maintenance Role

Icon	Definition
	Select Vehicle Operator Role
	Adjust Brightness (DDU or Card Reader depending on which settings screen is current)
	Adjust Contrast (DDU or Card Reader depending on which settings screen is current)
	Adjust Device Volume (DDU or Card Reader depending on which settings screen is current)
	Adjust Broadcast Volume (for announcements outside the bus)
	Adjust Call Box Volume
	Adjust Handset Volume
	Adjust Public Address System Volume
	Change Password (Supervisor function).
	View Audit Registers list (Supervisor function).
	View Configuration Data Files list (Supervisor function).
	View Trip History (Supervisor function).

2.6 Automatic Timeouts

Automatic timeouts occur when the operator accesses a lower-level screen and the screen remains inactive for a predetermined period of time.

2.6.1 Operator Inactivity Timeout

While in a lower-level (child) screen that has a **Cancel** hotkey (example: **Group Fare** screen), if there is no activity on the DDU before the predetermined operator inactivity timeout occurs, the operation automatically cancels and reverts to the parent screen (see Figure 8).

- To return to a parent screen prior to timeout, press the **Cancel** hotkey on the selected screen.

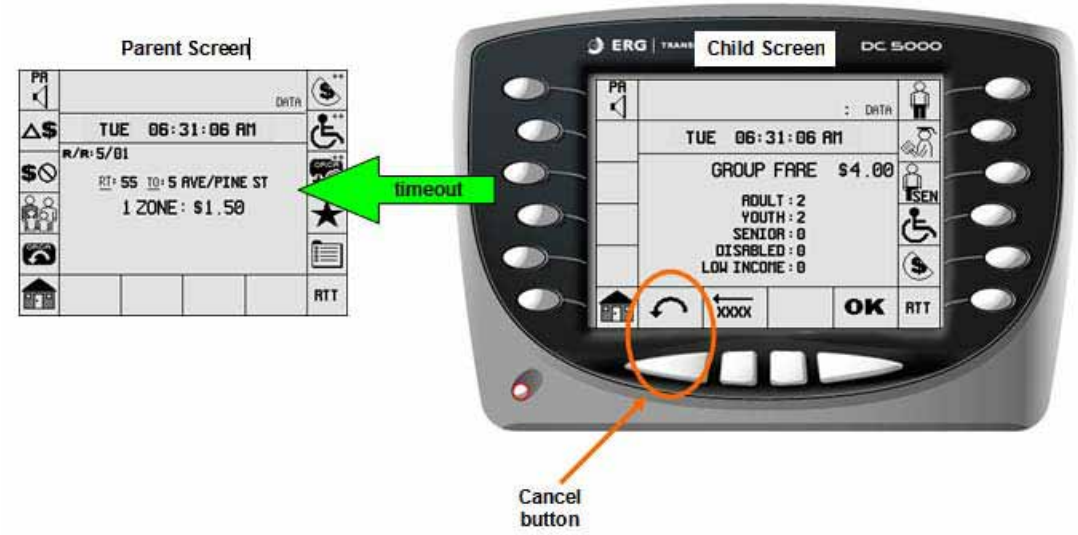


Figure 8: Operator Inactivity Timeout

2.6.2 Auto Logoff and Auto Power Down Timeout

The Auto Logoff timeout automatically logs the driver off the on-board equipment after a predetermined period of time after turning the bus ignition switch off.

Initiating a logoff also automatically initiates an attempt to transfer data.

The Auto Power Down timeout is a function that ensures that this now-unattended bus does not draw excessive power from the batteries.

At a predetermined time after Auto Logoff, and the subsequent attempts to transfer data, the on-board equipment automatically powers down. Although this allows time for data transfer to occur, power down occurs regardless of whether data has been successfully transferred or not.

If the data has not successfully transferred, there is no indication of this when the on-board equipment is powered up (when the bus ignition switch is next switched to "run"). However, power up also initiates a data transfer where the UD from the previous operating session uploads and any new CD is downloaded.

If the data transfer fails, the operator is alerted by the **Connection Failed** screen on the DDU (see Figure 9).

Figure 9: Connection Failed Screen

2.7 Card Reader

During normal operations, the Card Reader can be in various modes. These include:

- In Service
- Out of Service
- Tagging a Fare Card

2.7.1 Card Reader In Service

The Card Reader is ready for passenger use when the **In Service** screen is displayed.

As shown in Figure 10, the top line on the Card Reader **In Service** screen displays the current time. The bottom line displays the type of service.

Figure 10: Card Reader In Service Screen

2.7.2 Card Reader Out of Service

During some operations, such as setting up for another trip or run, the Card Reader goes out of service as shown in Figure 11. The Card Reader **Out of Service** screen is displayed, and all lights remain on. Passengers cannot use the Card Reader when it is out of service.

Figure 11: Card Reader Out of Service Screen

Note: Depending on Agency policy, if the Card Reader is out of service because it is faulty, the passenger might be required to pay by cash into the fare box or might be allowed to travel free of charge.

2.7.3 Tagging the Fare Card

To tag the fare card, the passenger holds the card close to the target area indicated by the One Regional Card for All (ORCA) logo on the Card Reader (see Figure 12).

Tag the card by placing it close to the ORCA logo

Figure 12: Tagging the Fare Card

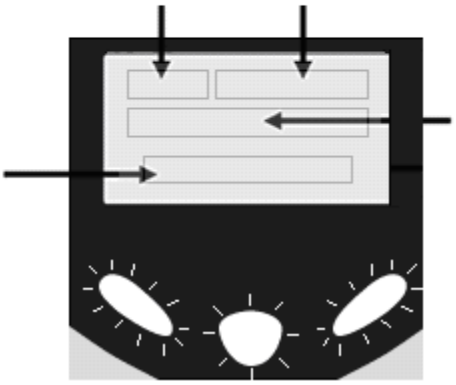
The Card Reader checks the validity of the card and then verifies if there is a product on the card that is valid for this service or if there is sufficient value in the card e-purse to pay the fare.

If the card is valid, the fare is processed and both the Card Reader and DDU display the results of the transaction.

On the Card Reader, the top line displays the fare charged, pass used, or combination of both. The bottom line displays the balance remaining in the e-purse on the passenger's fare card. There might also be a display in the middle indicating an alert. (See Figure 13.)

- OWE: If underpayment transaction, e.g., $0.25 (amount owing)
- XFER: If transfer transaction, e.g., + $0.50 (amount of upgrade)
- PASS: If pass & e-purse transaction, e.g.: + $1.75 (amount paid from e-purse)
- PAID: If e-purse only transaction, e.g., $1.25 (amount paid from e-purse)

E-Purse Balance



Alert Field

- Revalue message: ADDED VALUE
- E-Purse threshold reached: LOW VALUE
- Pass Expiration warning: EXPIRY FEB/15

Figure 13: Card Reader Fields

The example shown in Figure 14 shows the Card Reader displaying the amount paid ($1.25) in the top information field, a warning of low e-purse value in the central field, and a balance of $0.50 in the e-purse balance field.

Figure 14: Sample Card Reader Screen Display

After a short pause, the Card Reader and DDU displays return to the normal **In Service** screens. However, the next passenger does not have to wait for the Card Reader to return to the normal **In Service** screen before tagging the fare card.

2.8 Error Screens

The DDU might display the following error condition screens.

2.8.1 DDU Out of Service Screen

The DDU **Out of Service** screen is displayed when a serious error occurs that prevents the DDU from being used (see Figure 15). Such errors would normally be detected at startup.

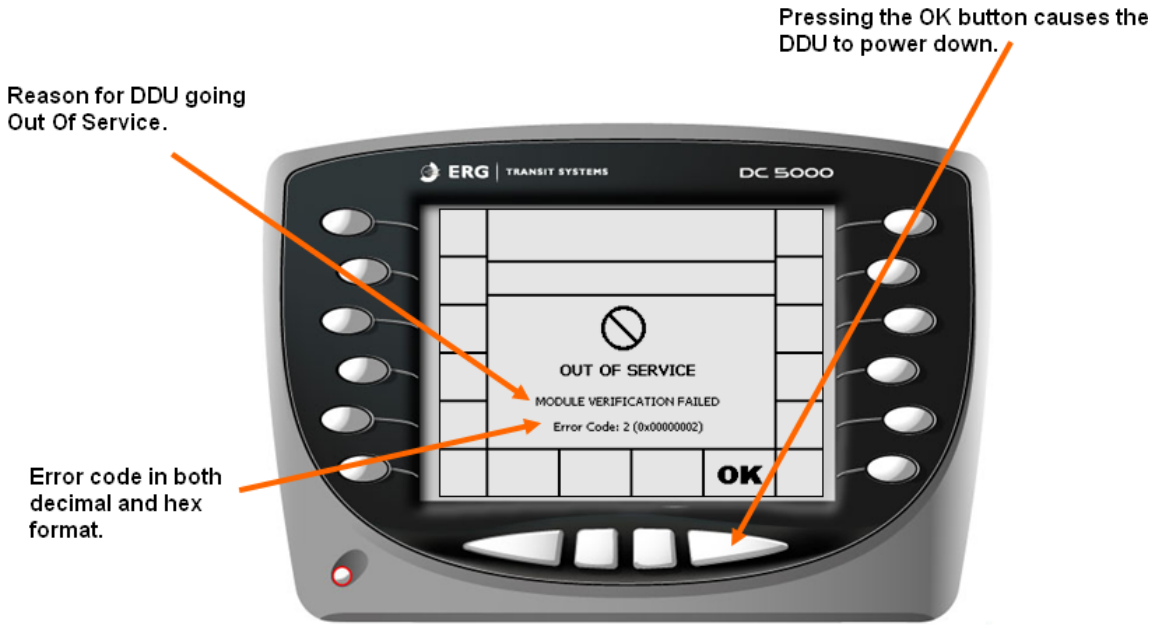


Figure 15: Out of Service Screen

2.8.2 DDU Incomplete CD Screen

The **DDU Incomplete CD** screen in Figure 16 is displayed when the DDU completes an attempt to connect to the DAC, successfully or otherwise, and detects that it has not received current critical CD. The DDU is not allowed to go into service without its critical CD.

- The operator can press **OK** to try the DAC connection again.
- Pressing the **Configure DDU**  hotkey leads to configuration screens as per initial configuration at installation. The maintenance staff selects **Device Configuration** mode to correct information that might have been entered incorrectly at installation.

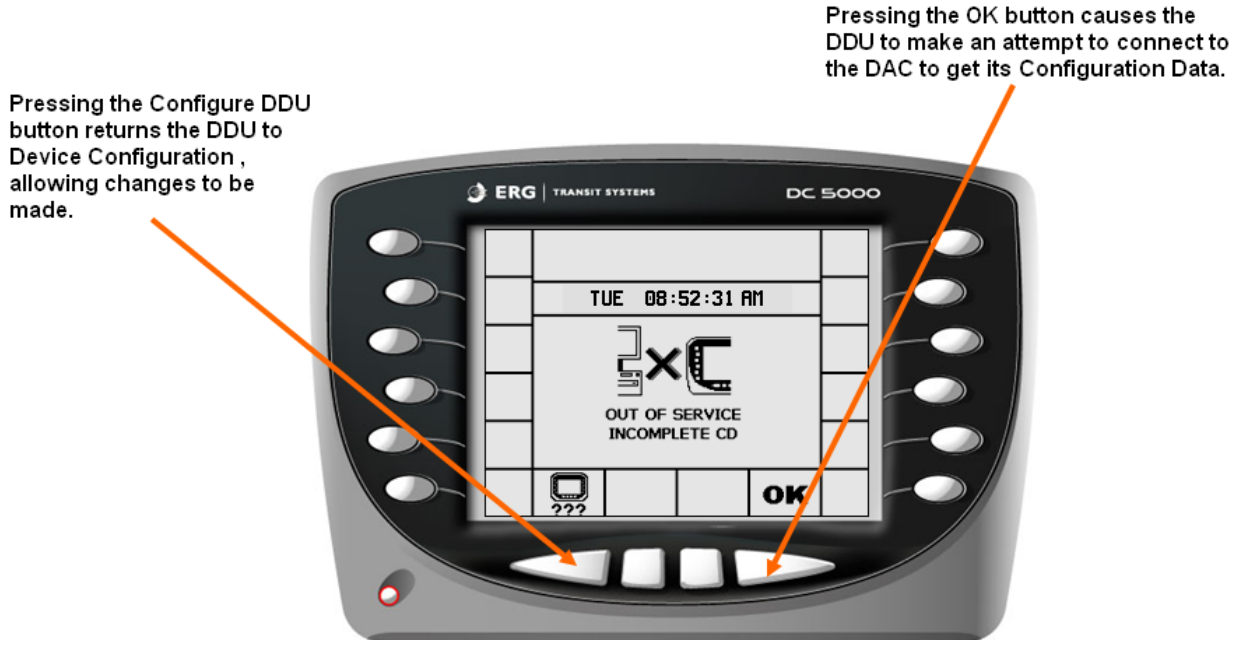


Figure 16: Incomplete CD Screen

2.8.3 Card Reader Incomplete CD Screen

The **OBFTP Options Menu** screen is displayed on the DDU when the Card Reader completes an attempt to connect to the DAC, successfully or otherwise, and detects that it has not received current CD. (See Figure 17.) The Card Reader is not allowed to go into service without its CD. The operator can:

- Press the **Return**  hotkey to try the DAC connection again.
- Press the **Dormant OBFTP**  hotkey.

  Pressing the **Dormant OBFTP** hotkey causes the Card Reader to disconnect from the DDU, allowing the DDU to go into service without the Card Reader and should only be used as a last resort if this condition cannot be resolved any other way.
- Press the **Configure OBFTP**  hotkey.

  Pressing the **Configure OBFTP**  hotkey leads to configuration screens as per initial configuration at installation, a maintenance function. The maintenance staff selects **Device Configuration** mode to correct information that might have been entered incorrectly at installation.

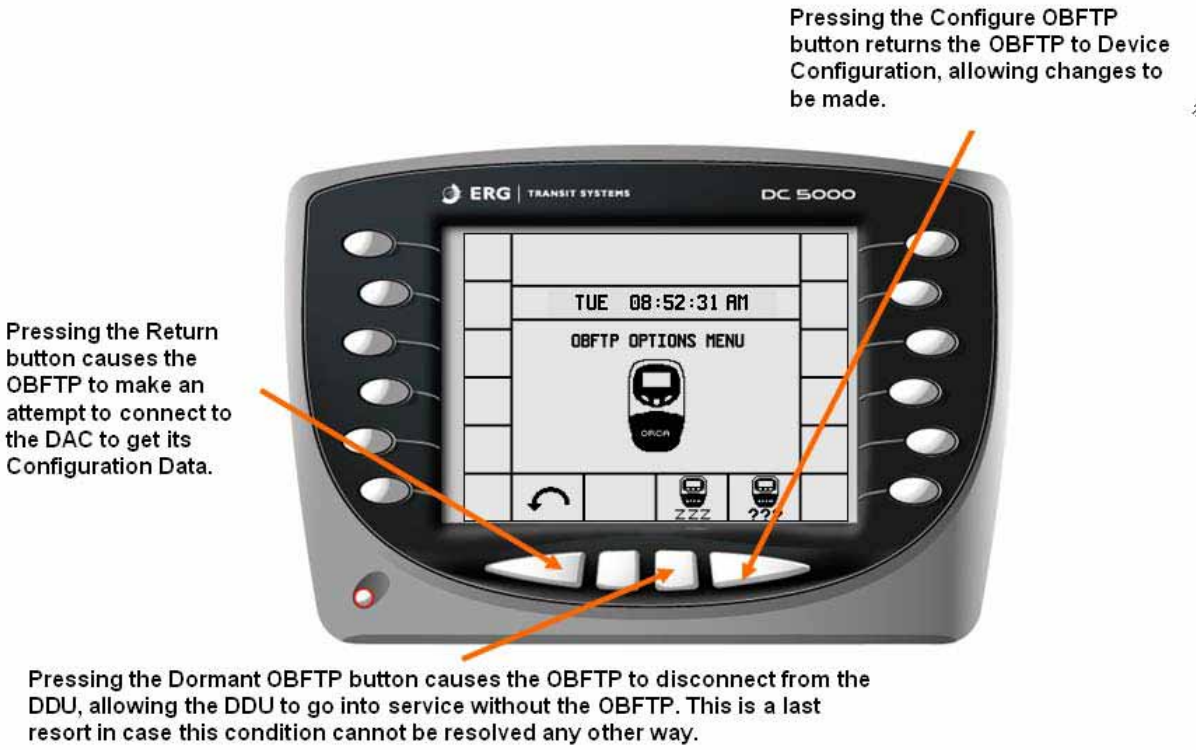


Figure 17: OBFTP Incomplete CD Screen

Note: Operating in **Dormant** mode and therefore going into service without the Card Reader does not allow fare cards to be used. This decision must follow current Agency policy.

2.8.4 OBFTP Memory Full Screen

The **OBFTP Memory Full** screen in Figure 18 is displayed on the DDU when the Card Reader detects a UD Memory Full condition. This can happen at logon or whenever new UD is generated, such as a passenger tagging on. The Card Reader is not allowed to go into service or stay in service if this condition is detected. The operator can:

- Press the **Return**  hotkey to try the DAC connection again.
- Press the **Dormant OBFTP**  hotkey.

  Pressing the **Dormant OBFTP** hotkey causes the Card Reader to disconnect from the DDU, allowing the DDU to go into service without the Card Reader and should only be used as a last resort if this condition cannot be resolved any other way.
- Press the **Configure OBFTP**  hotkey.

  Pressing the **Configure OBFTP**  hotkey leads to configuration screens as per initial configuration at installation, a maintenance function. The maintenance staff

selects **Device Configuration** mode to correct information that might have been entered incorrectly at installation.

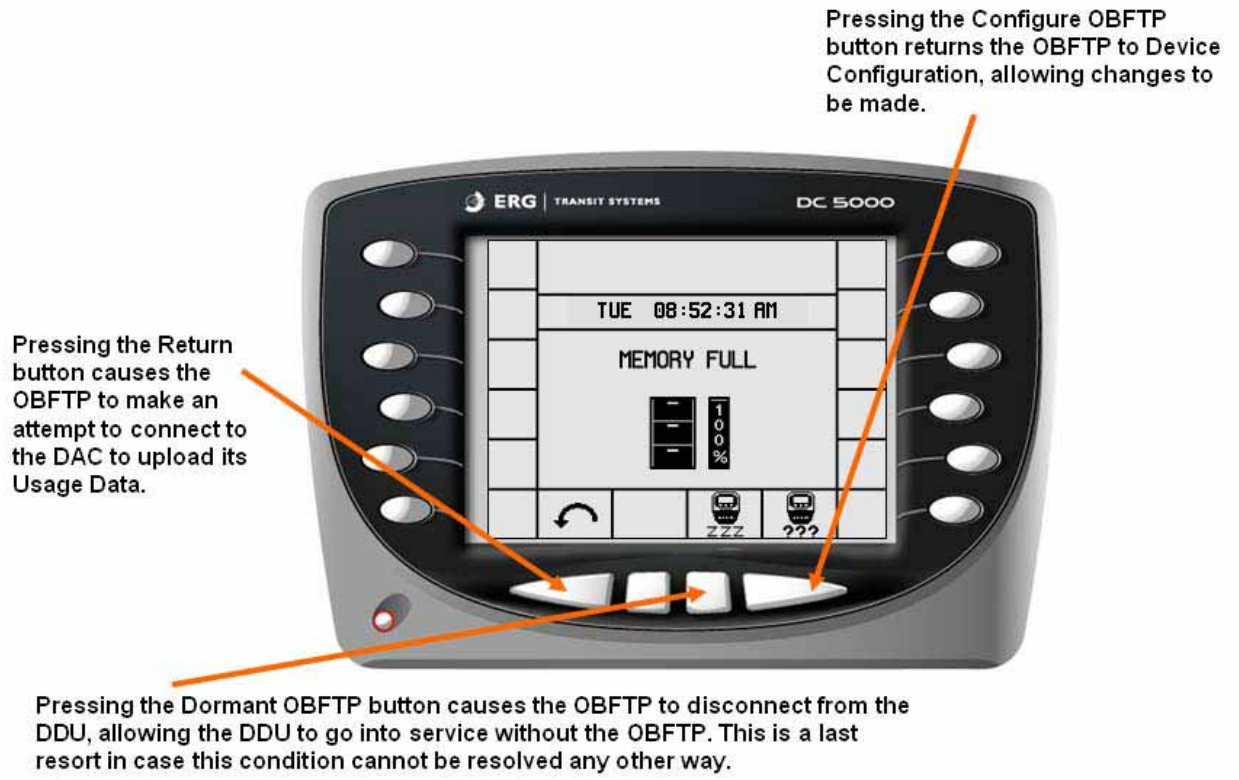


Figure 18: OBFTP Memory Full Screen

Note: Operating in **Dormant** mode and therefore going into service without the Card Reader does not allow fare cards to be used. This decision must follow current Agency policy, including procedures when this error occurs during a trip.

3 Startup

1. Switch the master switch on.

   The **Startup** screen is displayed on the DDU and Card Reader (see Figure 19).

Figure 19: OBE Startup Screens

2. Wait for timeout.

3.1 Potential Logon Failures

3.1.1 DAC Connection Failure

If transfer fails, the **DAC Connection Failed** screen is displayed, as shown in Figure 20.

- Press **OK** to display the **Logon** screen and continue.

Figure 20: DAC Connection Failed Screen

3.1.2 Logon Failure

If logon fails, the **Logon Failed** screen is displayed, as shown in Figure 21.

- Press **OK** to acknowledge the error and display the **Logon** screen to continue.

Figure 21: Logon Failed Screen

3.1.3 Card Blocked Failure

The **Card Blocked** screen shown in Figure 22 is displayed after a predetermined number of logon attempts are made. A supervisor can unblock the card.

- Press **OK** to return to the **Password** screen and continue.

Figure 22: Card Blocked Screen

3.1.4 Radio Logon Failure

If radio connection fails during startup, **Your Logon Failed** appears at the top of the DDU screen (see Figure 23). The DDU automatically continues to attempt radio connection at regular intervals.

If radio logon is unsuccessful, ACK will flash continuously and the logon failed message will be displayed until the RCU establishes connection.

DDU will automatically resend log on information to the coordinator at regular intervals until connection is established. If logon is invalid (such as too many retries) default values will be used to log on to radio system (operator id=4, route=444, run=44, radio channel=4)

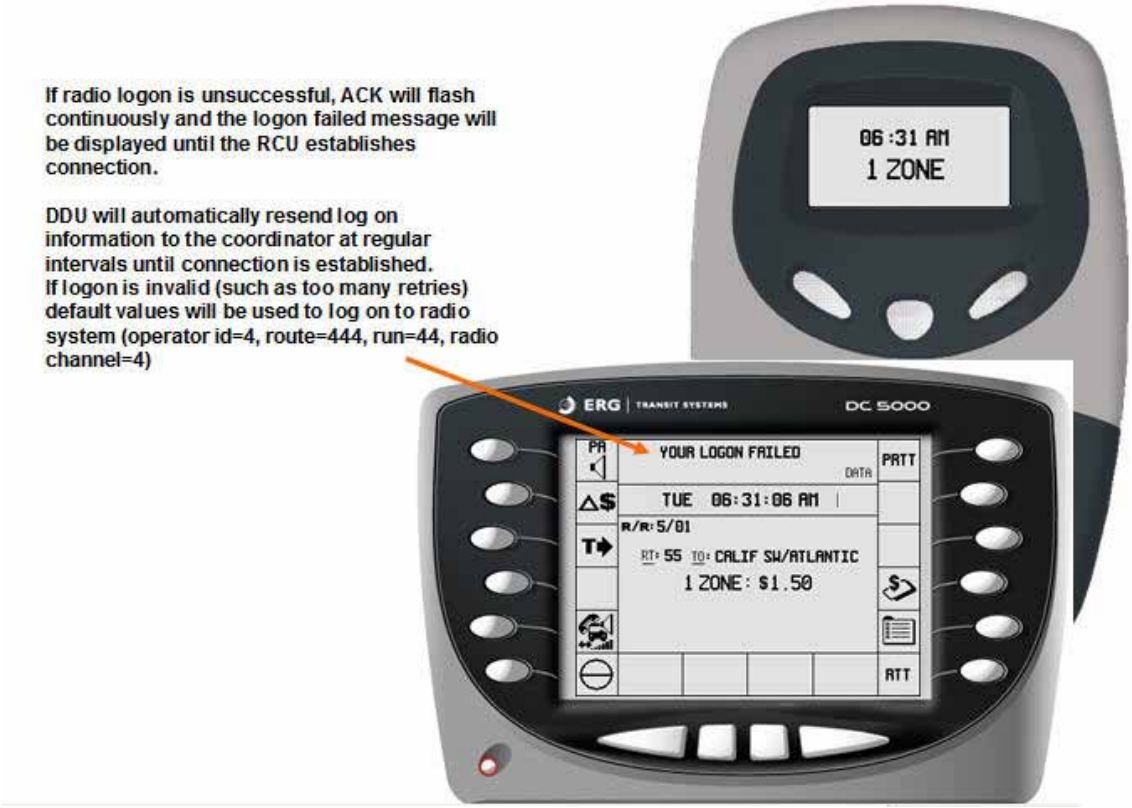


Figure 23: Radio Connection Failure Screen

3.2 DDU and Card Reader Data Transfer

The DDU and Card Reader data transfers with the DAC are independent of each other, though some of the CD payloads may be the same.

Both the Card Reader and DDU data transfers occur when the DDU or Card Reader is off-shift.

The **AFC** window displays the progress of the Card Reader data transfer with the DAC.

The Card Reader **Data Transfer Connecting** screen is displayed (see Figure 24).

Figure 24: Card Reader Data Transfer Screen

If the DDU is also performing a data transfer, the antenna symbol flashes in the **Time** window while the DDU data transfer is occurring (see Figure 25).

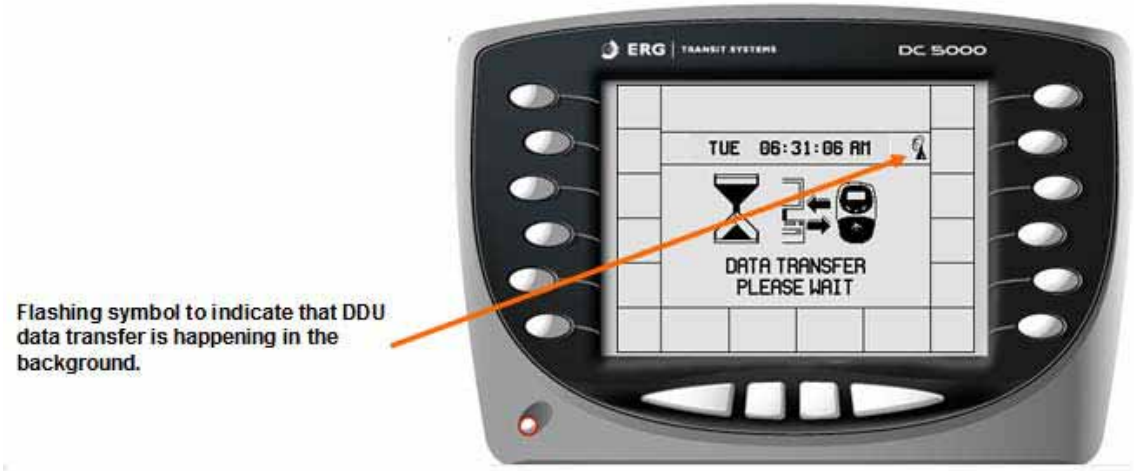


Figure 25: DDU Data Transfer Connecting Screen

If the Card Reader has completed data transfer, but the DDU data transfer is ongoing or the DDU is performing an application upgrade, the **AFC** window displays the DDU **Data Transfer Connecting** screen instead of the normal **Logon** screen.

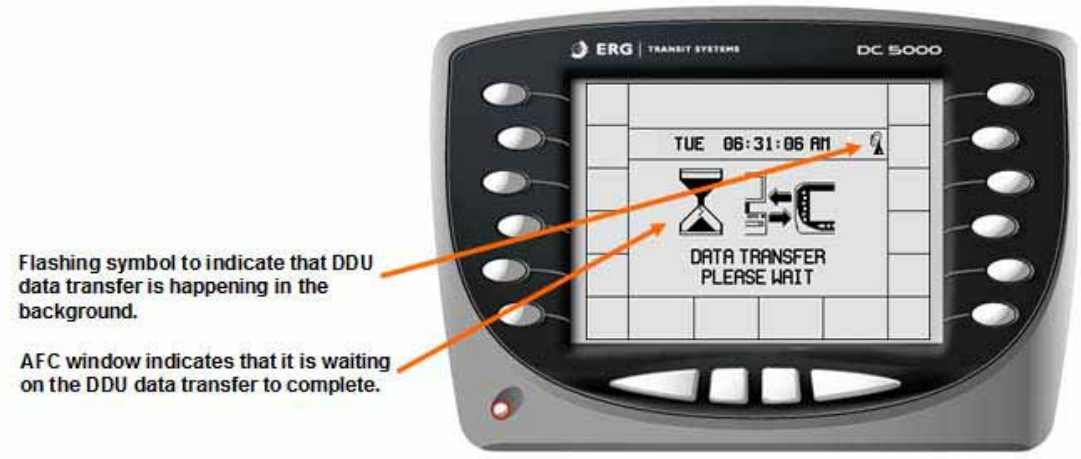


Figure 26: DDU Application Upgrade Screen

When the device has connected to the DAC, the DDU **Data Transfer Progress** screen is displayed until the data transfer completes or times out.

When the DDU transfer/upgrade has completed, the flashing antenna symbol disappears and the AFC application shows the **Logon** screen.

3.3 Logging On Manually

- To log on to the RFCS manually, enter information in the sequence of screens shown in Figure 27.

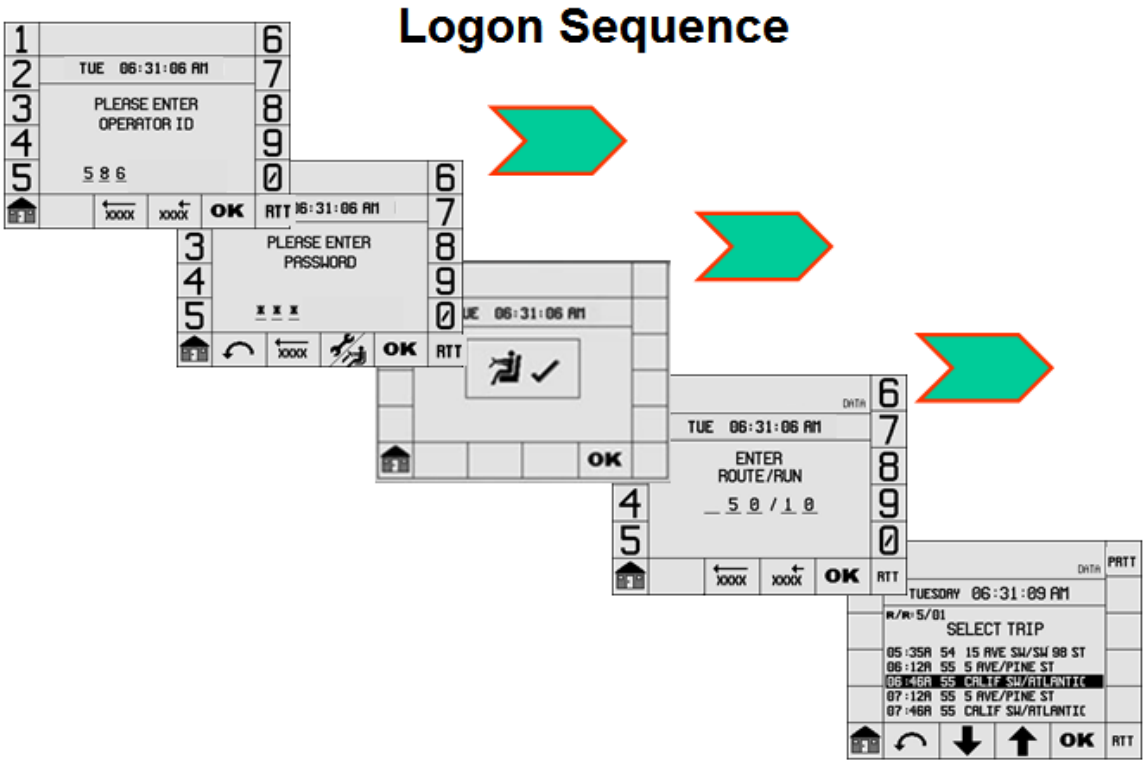


Figure 27: Sequence of Screens for Logging On

The **Enter Operator ID** screen is displayed on the DDU and the Card Reader goes out of service.

As shown in Figure 28, when the DDU and Card Reader have finished conducting self-tests, the **Operator ID** screen is displayed on the DDU, the **Out Of Service** screen is displayed on the Card Reader, and all lights remain on.

3.3.1 Entering Operator ID

1. Use the numbered hotkeys to enter your Operator ID (see Figure 28).
   - To clear entries, use the **Clear** hotkeys.

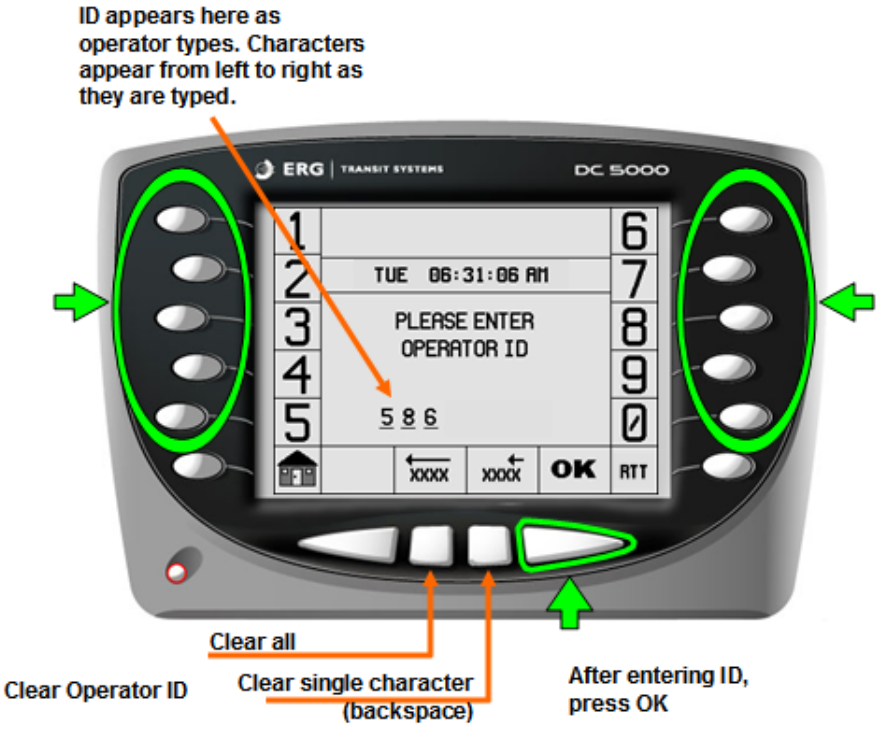


Figure 28: DDU Operator ID Screen

2. Press **OK** to register your Operator ID.

   When the bus is at a base, the equipment attempts to transfer data with the DAC. After a predetermined time, the **Enter Operator ID** screen disappears and the data transfer screen is displayed. If logon occurs away from a base, such as for road relief, no data exchange can take place and the Operator ID can be entered immediately.

   After a predetermined period of time, the Card Reader and DDU attempt to transfer data to and receive data from the DAC.

   If successful, the **Data Transfer Connecting** screen is displayed. Wait for the data transfer to occur or time out.

Figure 29: DDU Data Transfer Screen

Note: Whenever the Card Reader displays the **Out of Service** screen while the DDU is performing an operation, all three lights (red, green, and yellow) remain on.

If the Card Reader fails to connect to the DAC, the **Connection Failed** screen is displayed (see Figure 30). This screen indicates that the latest data has not been received.

Figure 30: DDU Connection Failed Screen

3. Press **OK** to cancel the screen so that you can proceed with the logon.

   The **Enter Operator ID** screen is displayed again.

3.3.2 Entering Operator Password

The **Enter Password** screen is displayed.

1. Press the number hotkeys to enter your password. Your password appears as asterisks (*) as it is entered. (See Figure 31.)

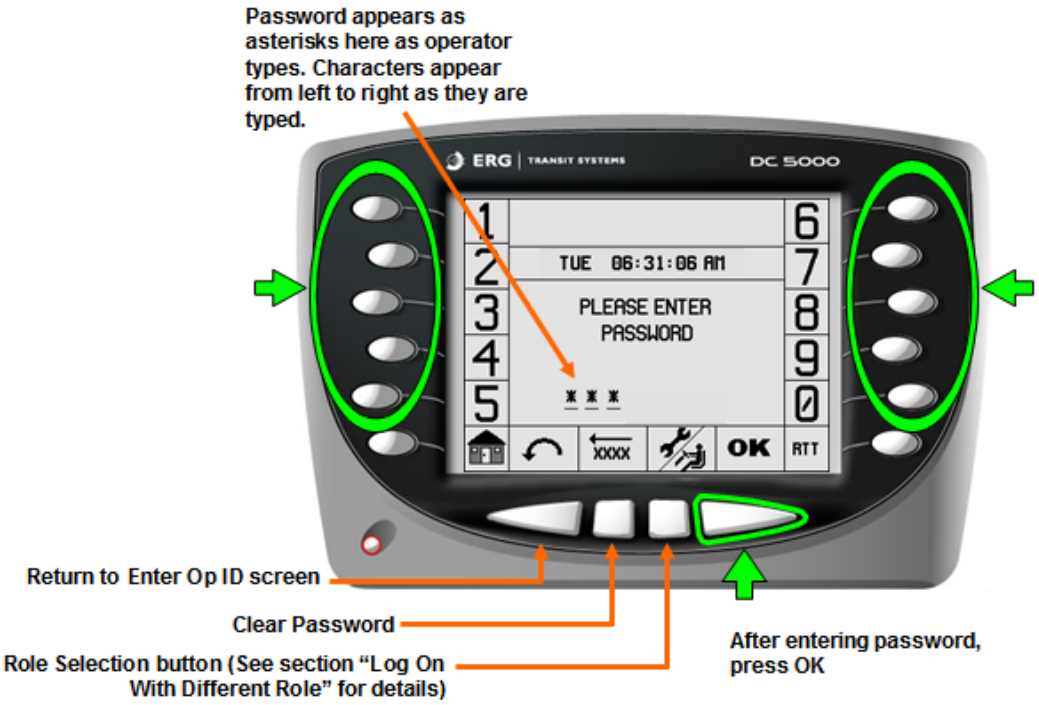


Figure 31: Operator Enter Password Screen

2. Press **OK**.

   The Operator ID and password are checked against a list of operators in the CD stored in the Card Reader.

   If the ID and password are valid, the **Logon Success** screen is displayed (see Figure 32). The Card Reader beeps once and the green light flashes once.

3. Press **OK** (or wait for timeout) to continue.

Figure 32: Logon Success Screen

Note: There is no retry limit for manual logon. It performs a default radio logon after a CD-defined number of failed logon attempts.

Following successful logon, the **Enter Route/Run** screen is displayed.

4. Enter the route/run number, and then press **OK** (see Figure 33).

Figure 33: Enter Route/Run Screen

- If the input is incorrect, the device does not accept the input and the field is cleared automatically.

Once a valid route/run combination is entered, the **Select Trip** screen is displayed (see Figure 34).

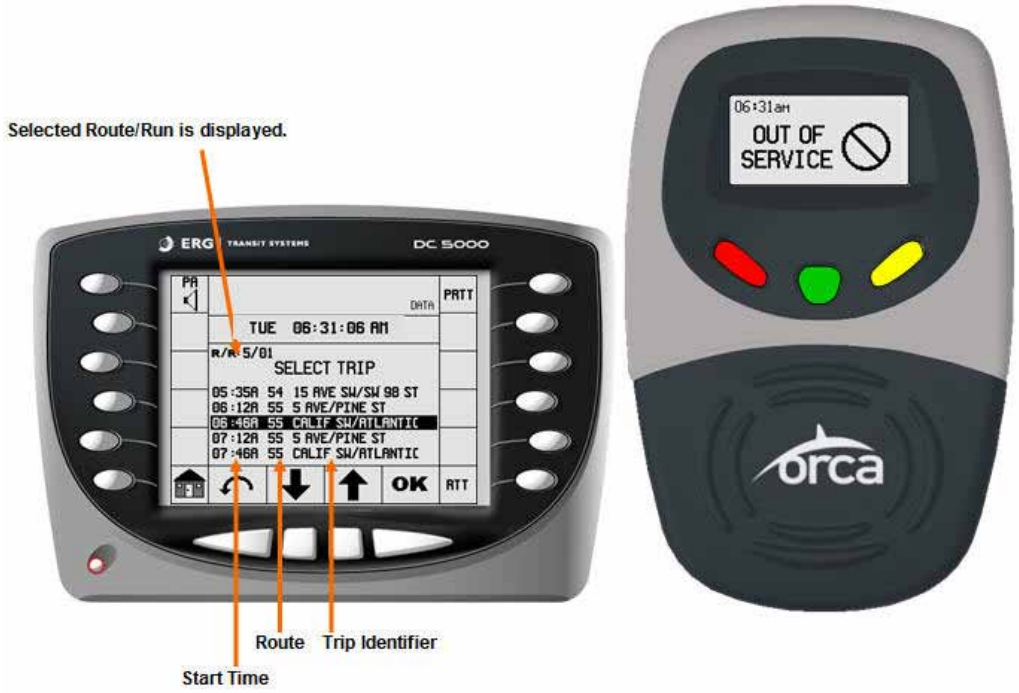


Figure 34: Select Trip Screen

5. Scroll to select a trip, and then press **OK** (see Figure 35).

Figure 35: Selecting a Trip

The **Home** screen is displayed (see Figure 36).

Figure 36: Home Screen

3.4 Logging On with a Card

The Agency can choose whether its operators log on either manually or with a card. This section describes a sequence in which an operator card is used to log on.

Following startup and after the DDU and Card Reader have finished conducting self-tests, the **Out Of Service** screen is displayed on the Card Reader and all lights remain on.

Note: Whenever the Card Reader displays the **Out of Service** screen, all three lights (red, green, and yellow) remain on.

Wait for data to be transferred to and from the DAC. During the exchange, the DDU screen appears as it does in Figure 37.

Figure 37: Data Transfer Screen

Then the DDU **Password** screen is displayed, and the Card Reader remains out of service.

3.4.1 Entering Operator Password

1. Press the number hotkeys to enter your password (see Figure 38).

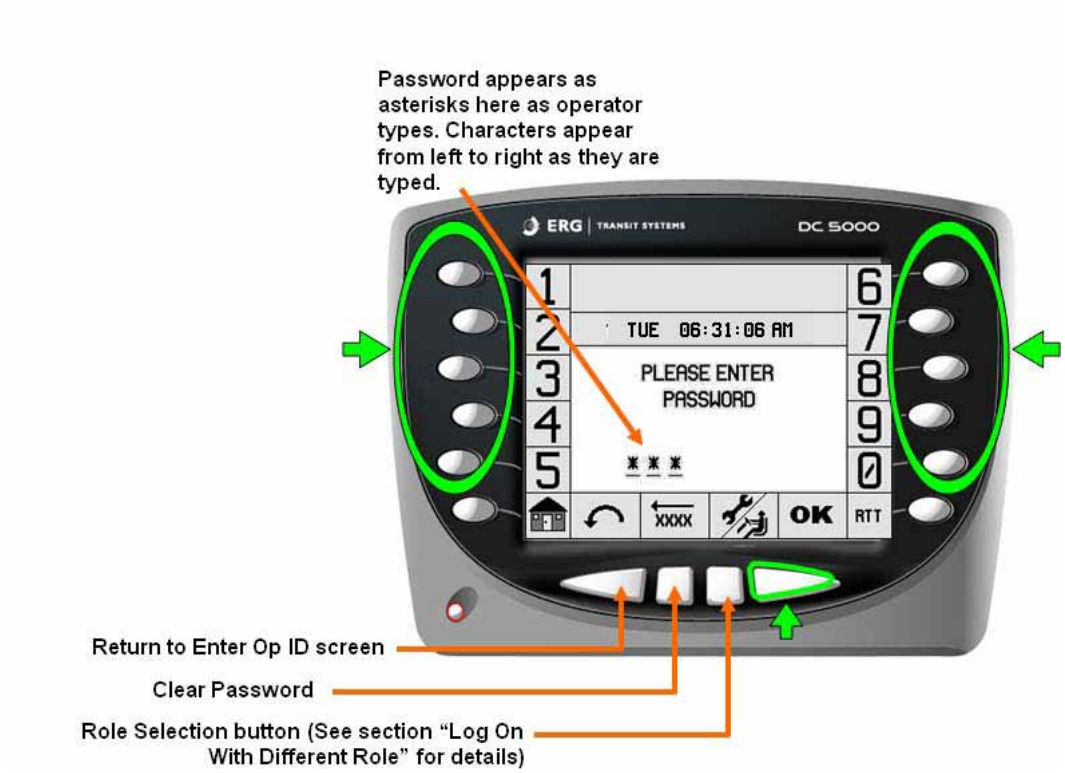


Figure 38: Operator Enter Password Screen

2. Press **OK.**

   The **Present Operator Card** screen is displayed (see Figure 39).

Figure 39: Present Operator Card Screen

3.4.2 Presenting Operator Card

1. Present your operator card to the Card Reader.

   The entered password is checked against the password on the card.

   If logon is successful, the **Logon Success** screen, as shown in Figure 40, is displayed.
2. Press **OK** to continue.

Figure 40: Logon Success Screen

The Operator ID (from the Operator card) and the password are checked against a list of operators in the CD stored in the Card Reader.

If the ID and password are valid, the **Logon Success** screens will show on both the DDU and the Card Reader (see Figure 41).

Figure 41: Logon Success Screens—DDU and Card Reader

3. Press **OK** (or wait for timeout) to continue.

Note: There is no retry limit for manual logon. It performs a default radio logon after a CD-defined number of failed logon attempts.

3.5 Entering a Route/Run

Following a successful logon, the **Enter Route/Run** screen is displayed (see Figure 42).

Figure 42: Enter Route/Run Screen

1. Enter the **Route/Run number**.
2. Press **OK**.

3.6 Clearing a Route/Run

To clear a route/run, press the **Clear All** or **Clear** hotkeys.

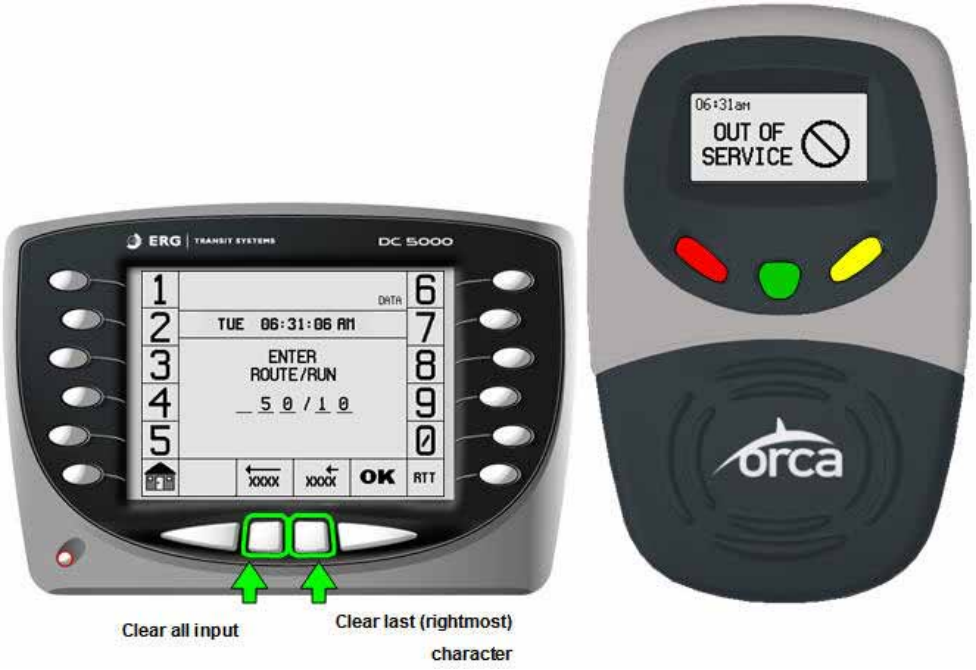


Figure 43: Clearing a Route/Run

3.7 Selecting a Trip

The **Select Trip** screen is displayed. Only trips that make up the selected route/run are displayed. The trip with the start time closest to the current time is highlighted (see Figure 44).

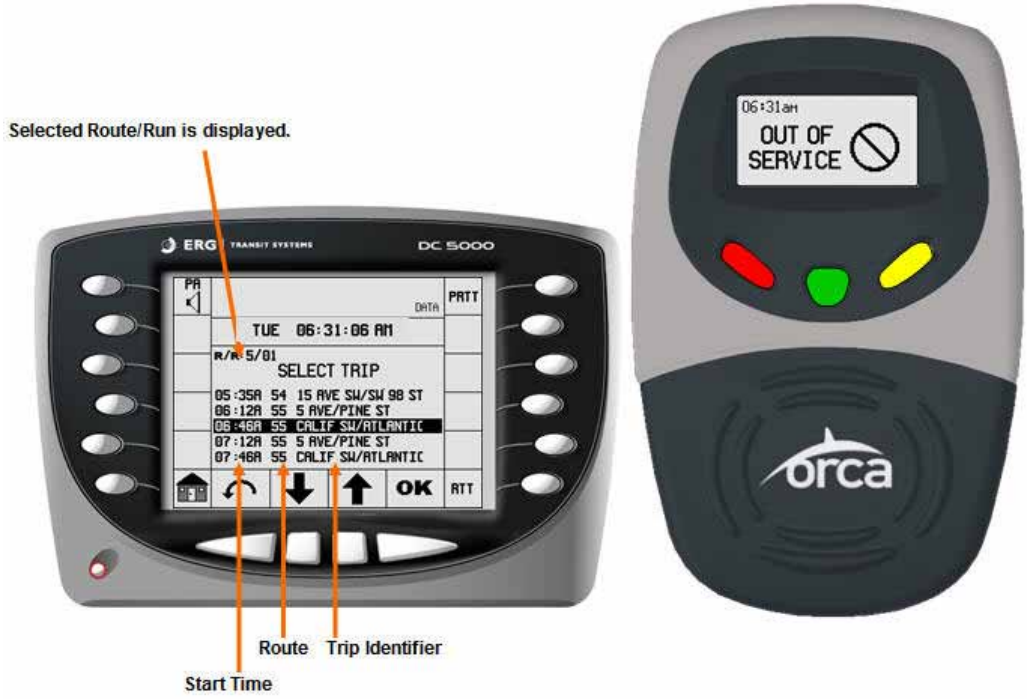


Figure 44: Select Trip Screen

- Scroll to select the trip, and then press **OK**.

Figure 45: Scrolling to Select the Required Trip

The **Fares** screen is displayed.

Figure 46: Fares Screen

The **ACK** indicator flashes when logon information is sent to the coordinator via the radio system. The sign disappears when the coordinator acknowledges receipt of the signal.

If the radio logon is unsuccessful, the **ACK** indicator flashes continuously.

If the logon is invalid (such as too many retries), default values (route=444, run=44, radio channel=4 operator ID =4) are used to log on to the radio system.

Note: Radio Fallback Channel is part of CD and so is automatically supplied with logon data to the RCU.

3.8 Logging Off

This section describes the procedures followed when the operator returns the bus to the base at the end of a shift.

1. If currently not on the **Home** screen, press the **Home** hotkey.

Figure 47: Fares Screen with Home Hotkey

The **Home** screen is displayed.

2. Press the **Log Off** hotkey.

Figure 48: Home Screen with Logoff Hotkey Indicated

The DDU **Confirm Log Off** screen is displayed. The Card Reader goes out of service.

3. Press **YES** to confirm logoff.

Figure 49: Logoff Screen

End Trip and End Shift records are created in UD. The Card Reader is out of service.

The **Enter Operator ID** screen is displayed (see Figure 50).

Figure 50: Enter Operator ID Screen

After configured timeout, the Card Reader and DDU attempt to transfer data to the DAC.

The **Data Transfer Connecting** screen is displayed.

Figure 51: Data Transfer Screen

Note: If either the Card Reader or DDU is in the process of performing a data transfer when the Auto Power Down timeout occurs, the device does not power down until after the transfer is successfully completed.

The operator does not have to wait for data transfer before switching the vehicle master switch off.

4. Switch the master switch off.

   The DDU and Card Reader shut down following a predefined timeout period.

4 Trip and Run Settings

Figure 52 details the flow of activity from startup to changing a trip, run, and routes to switch off.

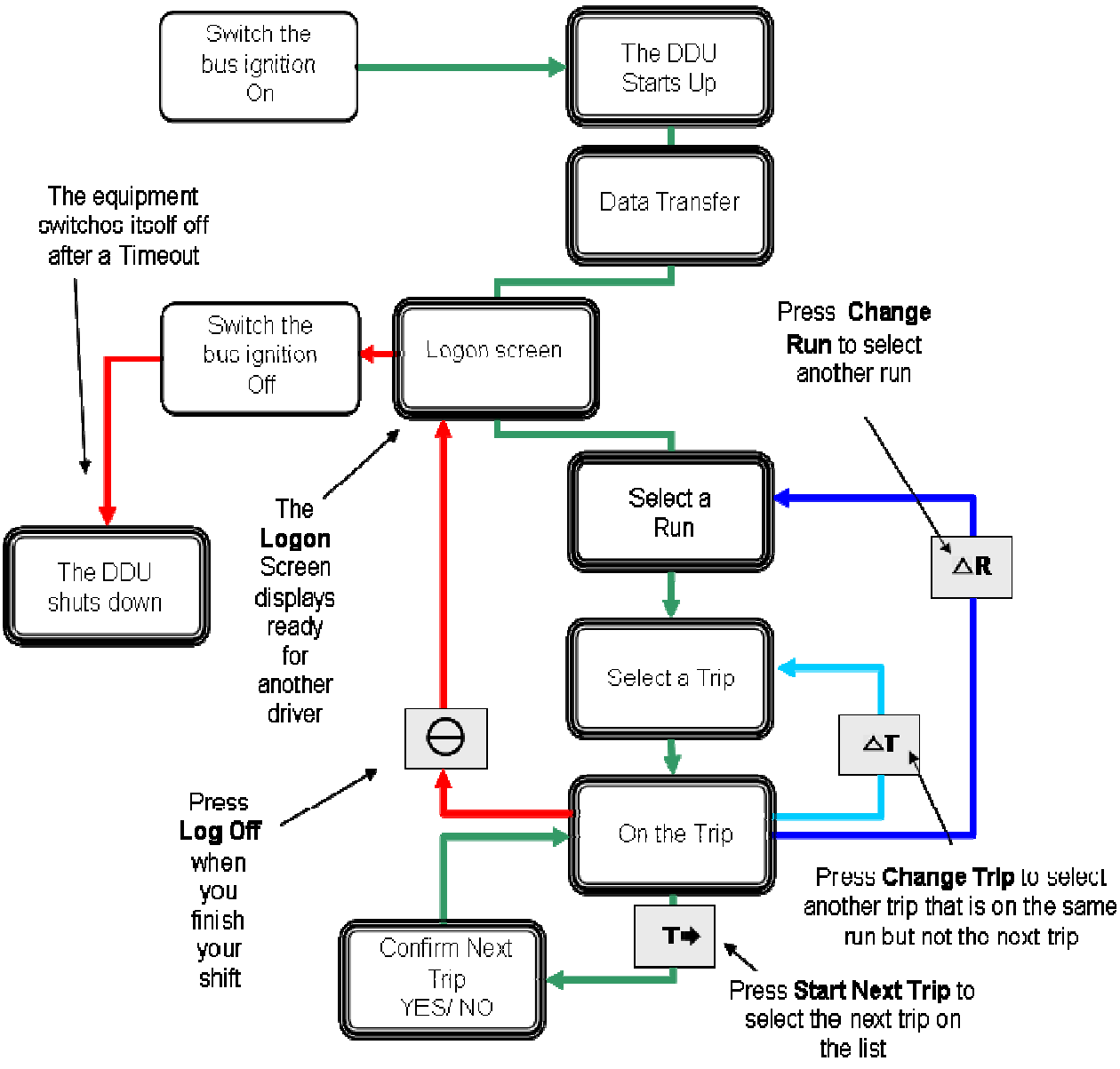


Figure 52: Main DDU Functions

4.1 Starting the Next Trip

After you log on and select a route/run, you normally select the first trip in the sequence. From that point on in normal operation, you only need to press the **Start Next Trip** hotkey to set up for the next trip in sequence from the list of trips.

Note: The scenarios described are intended only as examples to illustrate the setting of fareset parameters. Actual times and trip parameters may differ.

1. At the **Fares** screen or **Options** screen, press the **Home** hotkey.

Figure 53: Home Hotkey

The **Home** screen is displayed.

2. Press **Start Next Trip** hotkey.

Figure 54: Start Next Trip Hotkey

The **Start Next Trip** screen is displayed and the Card Reader goes out of service.

3. Press the **YES** hotkey.

Figure 55: Start Next Trip Screen

The current trip is ended without logging you off. The Card Reader goes back in service and the next trip is displayed. A Start Trip record is made and is ready to be uploaded as UD when the vehicle returns to base.

If the trip has a different default fareset, the DDU and Card Reader display the new zone and fareset.

Note: All counters are reset to zero at the start of each trip.

Figure 56: DDU and Card Reader Displays for Ride Free Area

Note: When the last trip on the run is started, the **Last Trip** symbol appears and indicates that there are no more trips in this route/run (see Figure 57).

Pressing the **Start Next Trip** hotkey while on the last trip only causes an invalid beep.

Figure 57: Last Trip Indication

4.2 Changing a Trip

In normal operation, you only need to press the **Start Next Trip** hotkey to select the next trip in sequence from the trip list. If required, you can select a different trip from the list.

Example screens in this procedure follow a scenario in which the operator started on trip 1, but had considerable delays and had to skip trip 2 and go straight to trip 3.

1. At the **Fares** screen or **Home** screen, press the **Options** hotkey.

Figure 58: The Fares Screen with Options Hotkey Indicated

The **Options** screen is displayed.

2. Press the **Change Trip** hotkey.

Figure 59: The Options Screen with Change Trip Hotkey Indicated

The **Select Trip** screen is displayed, with the start time closest to the current time selected. The Card Reader goes out of service.

3. Press the **Up Arrow** or **Down Arrow** hotkeys to select the required trip.

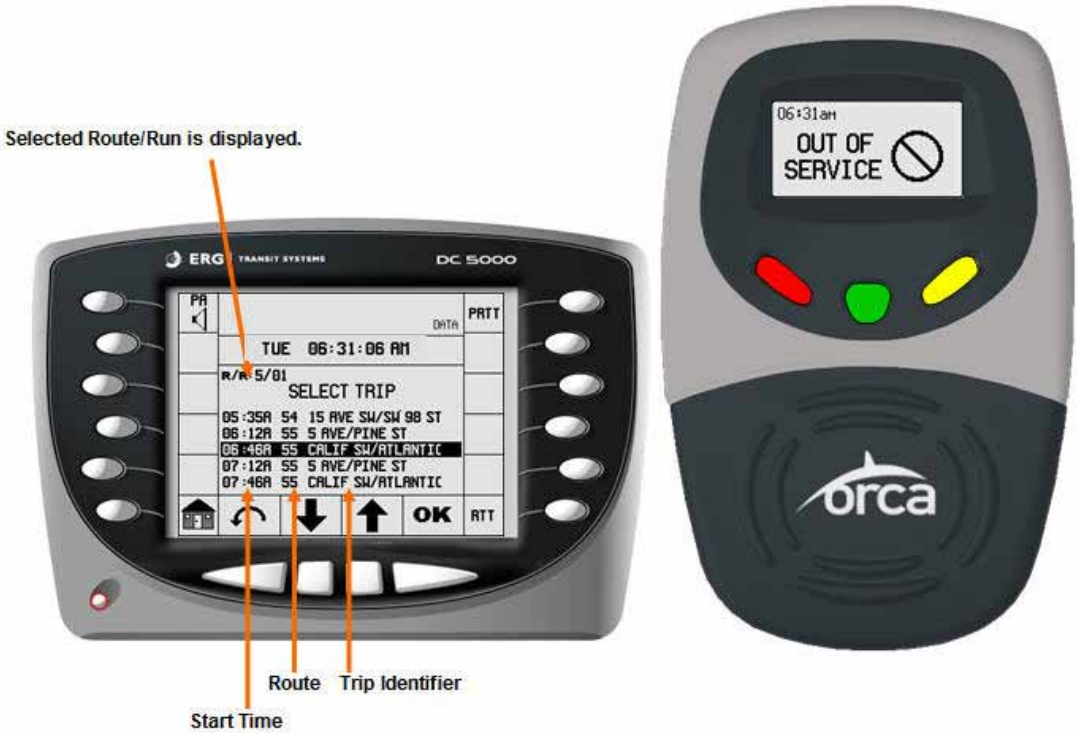


Figure 60: Select Trip Screen Content

4. When the trip is selected, press **OK**.

Figure 61: Select Trip Screen with Scroll and OK Hotkeys Indicated

The **Home** screen is displayed.

The current Trip is ended without logging the operator off.

New trip data is displayed in the **AFC** window and the Card Reader goes back in service.

If the trip has a different default fareset, the DDU and Card Reader display new zone and fareset.

New trip data is sent to non-AFC systems.

The Start Trip record is logged in UD.

4.3 Changing a Route/Run

This procedure describes a scenario in which an operator is already logged on and set up for a trip and has to change to a different route/run.

1. At the **Fares** screen or **Home** screen, press the **Options** hotkey.

Figure 62: Fares Screen with Options Hotkey Indicated

The **Options** screen is displayed.

2. Press the **Change Route/Run** hotkey.

Figure 63: Options Screen with Change Route/Run (▲R) Hotkey Indicated

The **Enter Route/Run** screen is displayed. The Card Reader goes out of service.

Figure 64: Enter Route/Run Screen with Clear Hotkeys Indicated

3. Press the **Clear All** hotkey.

   The entry field is cleared, ready for new data to be entered.
4. Enter the new route/run number, and then press **OK**.

Figure 65: Enter Route/Run Screen with Numeric Hotkeys and OK Hotkeys Indicated

The **Select Trip** screen is displayed with the start time closest to current time selected.

Figure 66: Select Trip Screen with Next Trip Highlighted

5. Scroll to select the required trip number, and then press **OK**.

   The **Fares** screen is displayed.

   The current trip and route/run ends without logging the operator off.

   New trip data displays in the **AFC** window and Card Reader goes back in service.

   If new trip has a different default fareset, DDU and Card Reader display new zone and fareset.

   The Start Trip record is logged in UD.

Figure 67: Fares Screen Showing 2 Zones

4.4 Zone Displays

Figure 68 shows examples of DDU and Card Reader displays for the various KCM zones. When operating Sound Transit (ST) routes, only ST zone and faresets are available.

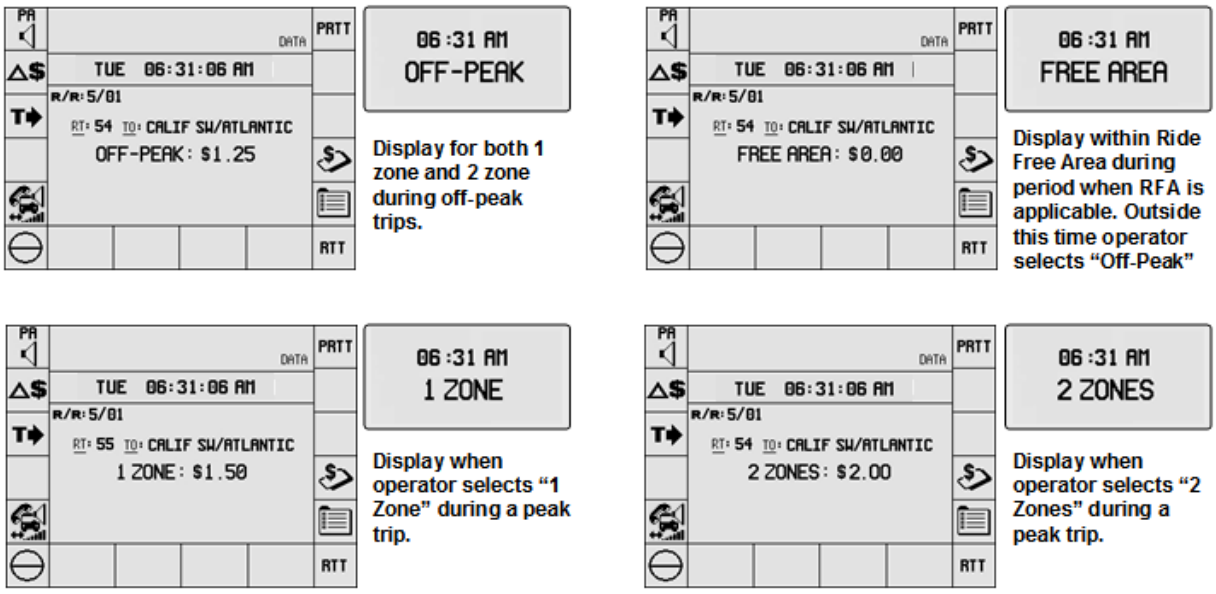


Figure 68: Zone Displays

4.5 Changing the Operator (Road Relief)

This scenario describes a road relief mid-shift. For example, an operator might become ill and another operator has to continue the shift on the same vehicle. This scenario assumes the operators are logging on manually.

1. At the **Options** screen or **Fares** screen, press the **Home** hotkey.

Figure 69: Fares Screen with Home Hotkey Indicated

The **Home** screen is displayed.

2. Press the **Log Off** hotkey.

Figure 70: Home Screen with Log Off Hotkey Indicated

The **Confirm Log Off** screen displays and the Card Reader goes out of service.

3. Press **YES** to confirm logoff.

Figure 71: Logoff Screen with Yes Hotkey Indicated

The **Enter Operator ID** screen is displayed, ready for next operator to log on. The radio system remains logged on.

Figure 72: Enter Operator ID Screen

End Trip and End Shift records are created in UD.

4. The next operator enters his or her ID and then presses **OK**.

   The **Enter Password** screen is displayed as shown in Figure 73.

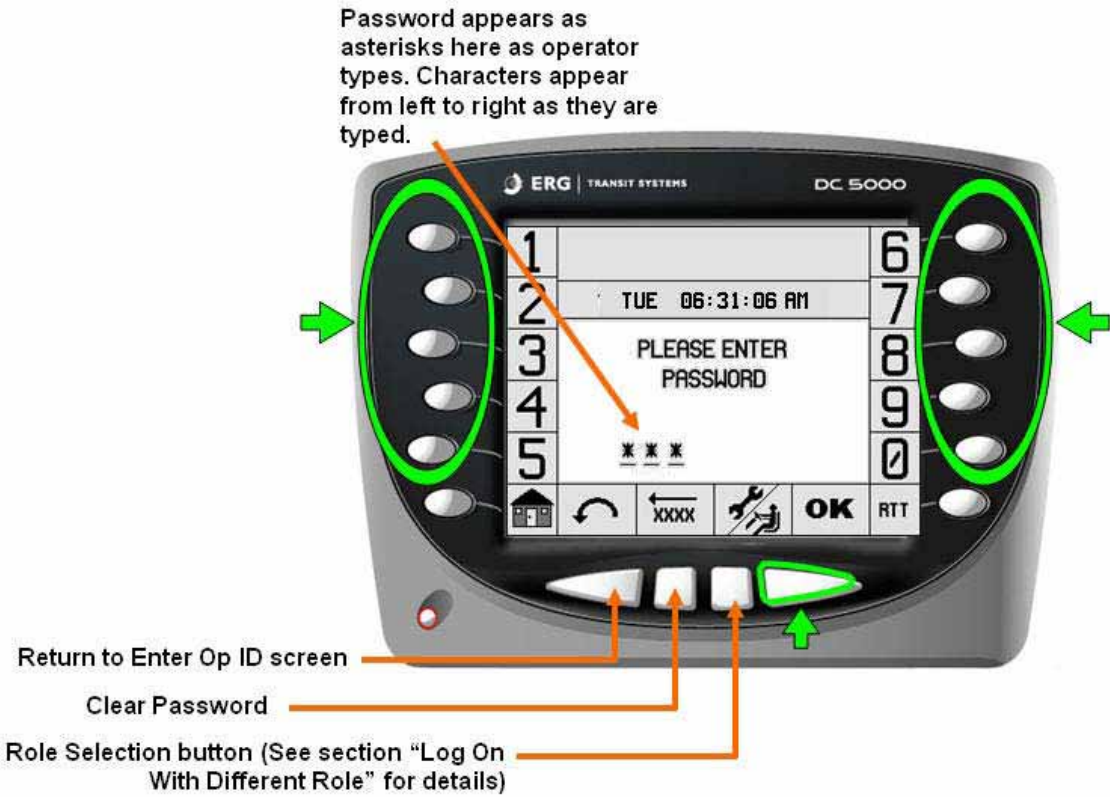


Figure 73: Enter Password Screen

5. The next operator enters his or her password and then presses **OK**.

   The **Logon Success** screen is displayed.

6. Press **OK** (or wait for timeout) to continue.

Figure 74: Logon Success Screen (Card Reader Out of Service)

The **Enter Route/Run** screen is displayed, with route/run from previous logon shown.

Figure 75: Enter Route/Run Screen (with Card Reader Out of Service)

7. If necessary, enter new route/run numbers, and then press **OK**.

Note: The previous route/run is retained in memory and displayed. This allows quick road relief where the next operator is continuing the same route/run. The memory is cleared if the Card Reader is turned off.

The **Select Trip** screen is displayed with start time closest to current time highlighted.

8. If necessary, scroll to select a different trip and then press **OK**.

Figure 76: Select Trip Screen

The **Home** screen is displayed with new trip data displayed in the **AFC** window. The Card Reader goes back into service.

If the new trip has a different default fareset, DDU and Card Reader display new zone and fareset. Start Shift and Start Trip records are logged in UD.

Figure 77: Home Screen Showing 2 Zone Fareset

Note: The new operator logon information, trip parameters, and radio fallback channel is automatically sent to the RCU.

In the unlikely event that the bus is within range of a base during road relief, the equipment attempts to transfer data when the driver logs off. However, there is a delay before this attempt to transfer which allows a new driver to log on and bypass the data transfer attempt.

4.6 Other Scenarios

This section describes how to set up a trip that is not on the normal schedule of routes/runs. Logon procedure is the same as for normal route/run services.

4.6.1 Special Event Service

This example uses a series of runs for a special event that does not follow a standard set of stops (such as Run 8, shuttle from S Kirkland Park and Ride to Qwest Field – Seahawks game).

Note: Screens assume route/run/trip selections as part of logon procedure.

At the **Enter Route/Run** screen:

1. Enter the specific route and run.

Figure 78: Enter Route/Run Screen

2. When the route/run numbers are correct, press **OK**.
3. At the **Select Trip** screen, select a generic trip and then press **OK**.

Figure 79: Select Trip Screen

The **Fareset** screen is displayed.

CD definition can include factors such as:

- A special route number for each route to Qwest Field (for example: 730 to 735)
- A set number of runs for each bus running the special route (for example: 01 to 11 on route 732)

Note: Special runs with only a single trip can be run multiple times by using the **Select Trip** hotkey, as shown in Figure 81. Each time the trip is started, a Start Trip event is recorded in UD so the related fare transactions can be identified. See Sections 4.1 Starting the Next Trip and 4.2 Changing a Trip for details.

Figure 80: Example of Fares Screen for Special Service

Figure 81: Example of Select Fareset Screen for Special Service

4.6.2 Unscheduled Route and Run

This example uses an unscheduled run on an unscheduled route (such as an emergency shuttle).

Note: Screens assume route/run/trip selections as part of logon procedure.

At the **Enter Route/Run** screen, as shown in Figure 82:

1. Enter a generic route and generic run number

   CD definition can include factors such as the following:

   - Some spare route numbers (for example: 900 - 999)
   - Some “spare” run numbers (for example: 95-99) for each “spare” route

Figure 82: Enter Route/Run Screen for Unscheduled Route/Run

2. When the route/run number is correct, press **OK**.

Figure 83: Select Trip Screen for Unscheduled Route/Run

The **Select Trip** screen is displayed, as shown in Figure 83.

3. Press **OK** to select the generic trip number.

The **Fares** screen is displayed.

Figure 84: Fares Screen for Unscheduled Route/Run (Showing Default Fareset)

Figure 85: Select Fareset Screen for Unscheduled Route/Run (Showing Multiple Options)

Note: In this case, unlike Special Event Service, there is a choice of faresets.

5 Valid Fare Transactions

Valid fare transactions include full fare payment with cash, card pass, and card e-purse and display on the Card Reader shown in Figure 86

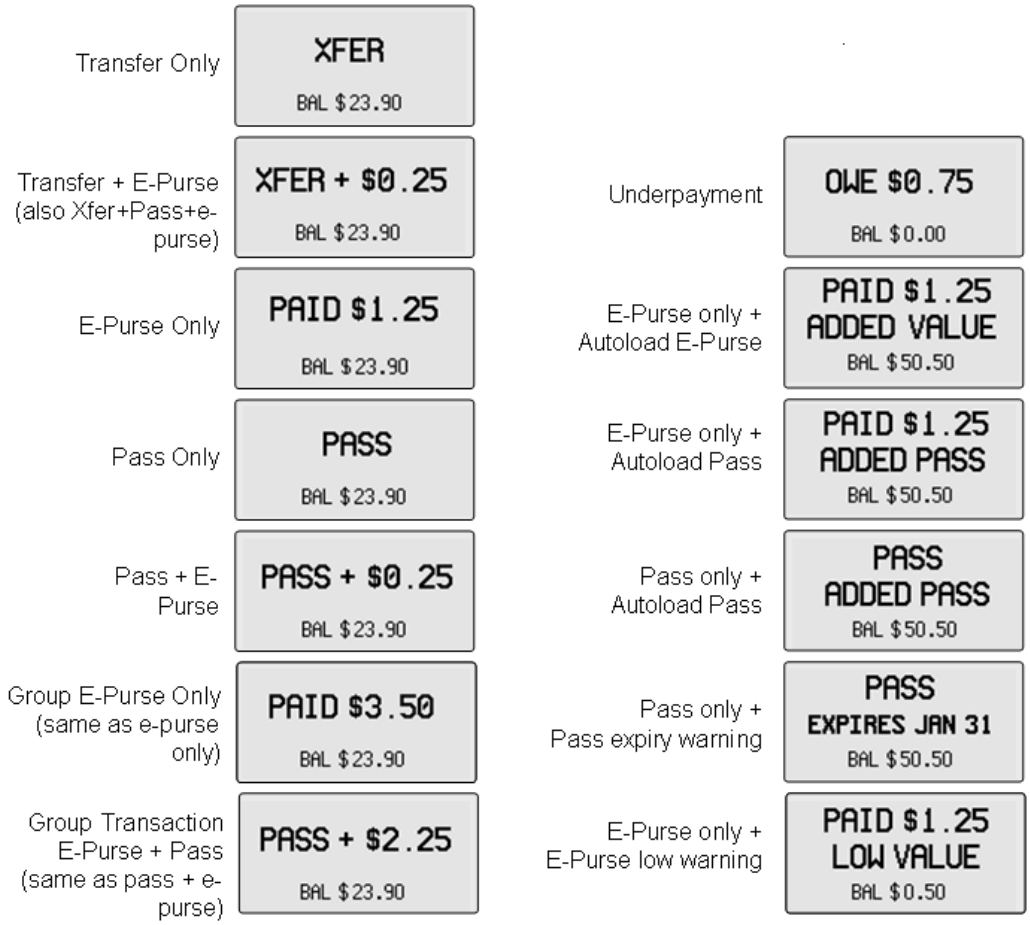


Figure 86: Valid Fare Transactions Displays

5.1 Full Fare Transaction

During a full fare transaction, no change occurs to the DDU screen. The Card Reader displays:

- The fare charged
- The pass used, or a combination of pass and additional fare charged

In addition:

- The green light flashes once.
- One beep is heard.

Note: Only the Card Reader gives audio tones acknowledging fare transactions.

In the example in Figure 87, the full fare of $1.25 was deducted from the card's e-purse and $23.90 remains in the e-purse after the transaction.

Figure 87: Full Fare Transaction

5.2 Full Fare with a Warning

The warnings shown in Figure 88 appear on the Card Reader to alert the passenger of a low e-purse value or of pending pass expiration.

Figure 88: Full Fare Warnings

5.3 Full Fare Automatic Revalue Transaction

The Automatic Revalue information shown in Figure 89 is displayed on the Card Reader.

Figure 89: Full Fare Auto Revalue Displays

5.4 Reduced Fare Transactions

Fare card transactions for Youth, Senior, and Disabled passes cause a message to appear on the DDU, indicating both the passenger type and a pass as the chosen method of payment.

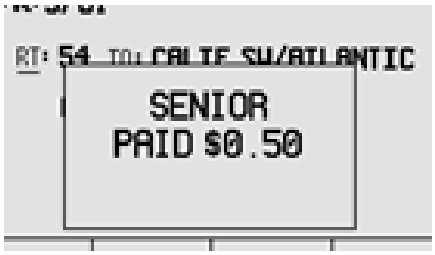
The Card Reader flashes the green light once and beeps once.

5.5 Discount E-Purse Transaction

Figure 90 shows the message displayed when a Youth fare card is used and the fare is deducted from the e-purse.

Figure 90: Discount E-Purse Transaction

The following messages display on the DDU for Senior and Disabled passengers whose fares are deducted from the e-purse on their smart cards.

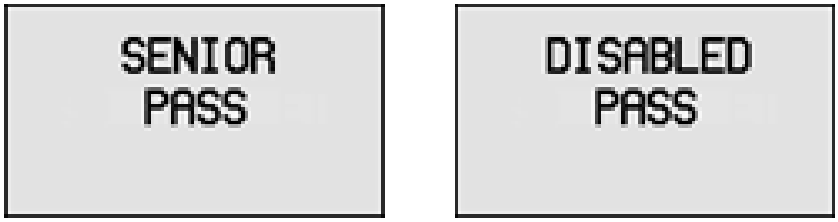


5.6 Discount Pass Transaction

Figure 91 shows the messages displayed when a Youth fare card is used and a valid pass is found on the card.

Figure 91: Discount Pass Transaction

The following messages display on the DDU for passengers boarding with Senior and Disabled passes:



5.7 Discount Pass and E-Purse Transaction

Figure 92 shows the messages displayed when a Youth fare card is used, a valid pass is found on the card, an purse amount is found on the card, and a combination of pass and e-purse are applied to the fare.

Figure 92: Discount Pass and E-Purse Transaction

The following messages appear on the DDU for Senior and Disabled passengers when a valid pass is found on the card, an e-purse amount is found on the card, and a combination of pass and e-purse are applied to the fare.

SENIOR PASS + $0.25	DISABLED PASS + $0.25

5.8 Discount with Personal Card Attendant (PCA) Transaction

If the **With PCA** message appears on the display as shown in Figure 93, the passenger's card is set up to allow travel with a Personal Care Attendant (PCA). The PCA travels free with the disabled passenger.

Figure 93: Discount with PCA Transaction

5.9 Discount Transfer Transaction

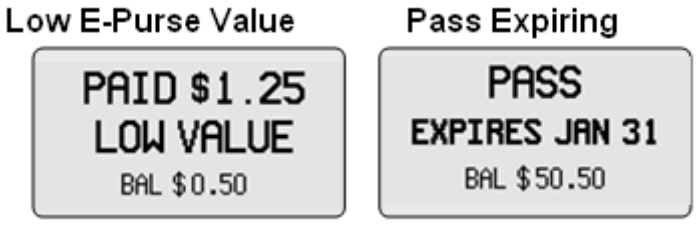
Figure 94 shows the messages displayed on the Card Reader for a discount transfer transaction.

Figure 94: Discount Transfer Transaction

Note: There is no DDU message for any sort of transfer.

5.10 Discount Warning Transaction

The following messages appear on the Card Reader to inform passengers that the card has a low e-purse value or will soon be expiring.



Note: Pass expiration and low e-purse value warnings do not occur if the card is configured for automatic revalue of the pass or e-purse.

5.11 Discount Fare Automatic Revalue Transaction

If the passenger card is set up to be revalued automatically, the passenger is informed of that transaction with the following messages on the Card Reader. The message on the DDU is the same as for other discount transactions.

Figure 95: Discount Auto Revalue Transaction

The following message appears on the Card Reader in the event of added e-purse value.


PAID $0.25
ADDED VALUE
BAL $50.50

6 Invalid Transactions

The DDU and Card Reader both display a message identifying any invalid transaction. The red light on the Card Reader flashes once and it beeps five high tones.

The following sections explain the invalid transaction messages and any action the operator might need to take. In each section, the image to the left is the message that appears on the DDU. The image on the right is the message that appears on the Card Reader.

Note: The message leaves the screen within a predetermined amount of time.

6.1 Pass Back Violation

The **Pass Back** message shown in Figure 96 indicates that the passenger has tagged a fare card more than once on the Card Reader. This rule is intended to stop passengers with a discount card from paying for other passengers who are not eligible for a discount.

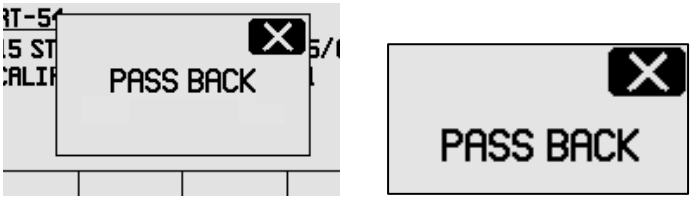


Figure 96: Pass Back Message

Ask the passenger if he or she wants to pay for a Group Fare.

- If NO, then ask the other passengers to either:
  - Use their own fare cards; or
  - Pay cash into the fare box.
- If YES, then perform a reversal to undo the transaction (see Section 7.3 Reversing a Transaction) and deduct a Group Fare from the fare card (see Section 7.2 Group Fare Transaction).

6.2 Card Expired

In this situation, the fare card expiration date has been reached and a replacement card is required (see Figure 97). The passenger must pay cash into the fare box.

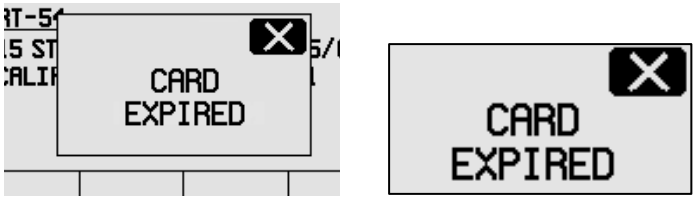


Figure 97: Card Expired Message

6.3 Insufficient Funds

The card does not contain a valid pass and the e-purse is $0.00 (see Figure 98). The passenger must pay cash into the fare box.

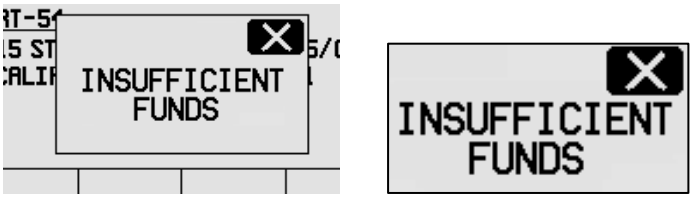


Figure 98: Insufficient Funds Message

Note: E-purse underpayment is described in Section 7.1 Passenger Owes Money (Fare Underpayment).

6.4 Card Blocked

The card has been marked as lost or stolen (see Figure 99). The passenger must request that the card be unblocked by customer service.

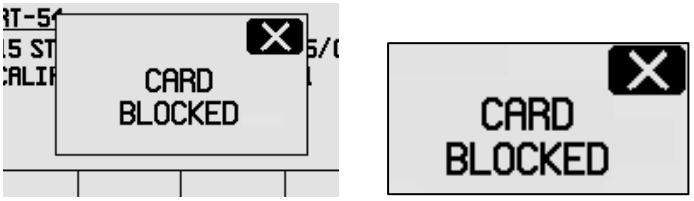


Figure 99: Card Blocked Message

6.5 Invalid Card

The message in Figure 100 appears when the card is invalid for the RFCS.

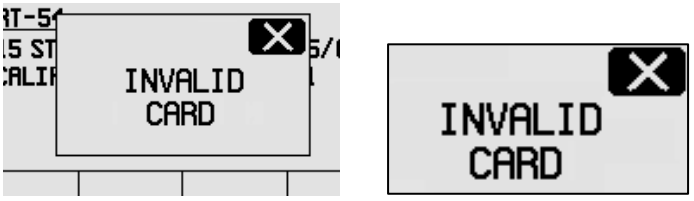


Figure 100: Invalid Card Message

6.6 Incomplete Transaction

The message in Figure 101 appears when a passenger presents a fare card to the Card Reader, but removes it before the transaction is completed.

The DDU message displays, the red light on the Card Reader flashes several times, and the Card Reader beeps five times.

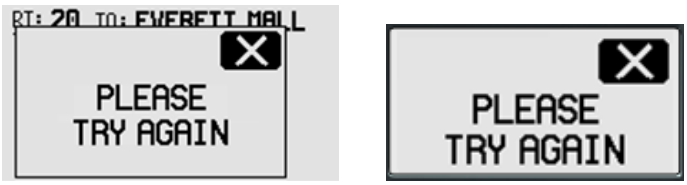


Figure 101: Incomplete Transaction Message

The passenger must present his or her card again, because the fare was not processed.

7 Unique Fare Transactions

7.1 Passenger Owes Money (Fare Underpayment)

This message appears when a passenger presents a fare card with an e-purse that has a value greater than $0.00, but is insufficient to pay the required fare. For example, the fare is $1.00, but there is only $0.50 in the e-purse.

This situation also applies if the payment is partially by pass. For example, the fare is $0.75 and a $0.50 pass is present, but there is only $0.10 in the e-purse.

The DDU displays a message showing the amount to be paid and a **Press OK** prompt. The Card Reader displays the amount to be paid. (See Figure 102.)

- Press **OK** to clear the error message and the Card Reader display.

Figure 102: E-Purse Underpayment Message

The DDU message is removed from the screen, and the Card Reader display returns to normal, ready for the next transaction.

7.2 Group Fare Transaction

If the passenger wants to pay for more than one person with a single fare card, the cardholder must tell the operator BEFORE tagging the card to the Card Reader. This notification is required because the operator must set up the group fare (that is, tell the Card Reader how many passengers of each type whose fares are being paid).

If the passenger presents the card before the operator has set up the group fare, a single passenger fare is charged. The operator has to reverse the single passenger fare FIRST, and then set up the group fare. (See Section 7.3 Reversing a Transaction.)

The passenger cannot present the card more than once in an attempt to pay for other passengers. If the passenger presents the card more than once, a pass back transaction is signaled (See Section 6 Invalid Transactions for details).

In the following example, the operator is setting up a fare for two Adult passengers and two Youth passengers on a local service.

1. At the **Options** screen or **Home** screen, press the **Fares** hotkey.

Figure 103: Home Screen with Fares Hotkey Indicated

The **Fares** screen is displayed.

2. Press the **Group Fare** hotkey.

Figure 104: Fares Screen with Group Fare Hotkey Indicated

The **Group Fare** screen is displayed (see Figure 105).

Figure 105: Group Fare Screen

3. Press passenger type hotkeys to add passengers to the group fare.

   The accumulated passenger count and accumulated group fare are updated with each key press.

4. When the group fare is correct, press **OK**.

   Group Fare Present Card screens display on DDU and Card Reader (see Figure 106).

Figure 106: Group Fare Present Card Screens

The back/cancel hotkey will cancel the transaction.

The audio and LED signals are the same as for a full fare transaction.

The DDU and Card Reader return to the default zone and fare settings for this trip.

If the cardholder's fare is covered by a valid pass, all other fares are deducted from the e-purse.

The passenger presents the fare card to the Card Reader.

The total group fare is deducted from the card's e-purse.

Note: If a valid pass is found on the card, it is used for the cardholder's fare, and the fare for the rest of the passengers in the group is deducted from the e-purse as shown.

7.3 Reversing a Transaction

You can reverse the fare after a passenger has tagged a fare card on the Card Reader.

You do not need to reverse the fare immediately. If other passengers are waiting to board, you can allow them to tag their cards on the Card Reader and then reverse the appropriate passenger's fare afterwards. However, the fare must be reversed within a predetermined time.

1. From the **Fares** screen, press the **Reverse Transaction** hotkey.

Figure 107: Fares Screen with Reverse Transaction Hotkey Indicated

The **Reverse Transaction Present Card** screen is displayed on the DDU and the Card Reader. The Card Reader is ready to reverse the fare.

- To cancel the Reverse Transaction operation before the passenger presents his or her fare card, press the **Cancel** hotkey to return to the **Fares** screen.

Figure 108: Reverse Transaction Present Card Screen

2. The passenger presents his or her fare card to the Card Reader.

   A DDU message displays the amount that was restored to the card (see Figure 109). The Card Reader screen displays the amount that was restored and the new balance. The green light on the Card Reader flashes once and the Card Reader beeps once.

Figure 109: Reverse Transaction Screen

The DDU display returns to the **Fares Screen**, and the Card Reader returns to the **In Service** screen, ready for the next transaction.

7.4 Changing a Fareset

This operation changes the current fareset, so that all subsequent transactions are charged a different fare. For example, these changes occur on a 2-zone route when the vehicle crosses the zone boundary to 1 zone. The fareset also needs changing when entering and leaving the Ride-Free Area (RFA).

To change a fare for just one transaction, refer to Section 7.7 Overriding a Fare.

During peak hours, the fareset can be changed between RFA, 1 Zone, and 2 Zones.

If the route/run does not include the RFA, the fareset changes are only between 1 Zone and 2 Zones.

It is also possible to change from these Peak faresets to Off-Peak faresets.

This would be necessary, for example, if delays meant that your bus entered the Off-Peak time during the middle of a normally Peak time trip. Passengers would be expecting to pay Off-Peak rates.

The faresets in the Off-Peak scenario can change between the RFA and the Off-Peak fare.

During the Off-Peak period, all routes/runs that are outside the RFA are the same Off-Peak fare. Fareset changes between zones are therefore not required.

In the Off-Peak scenario, it is also possible to change from Off-Peak faresets to the Peak time faresets.

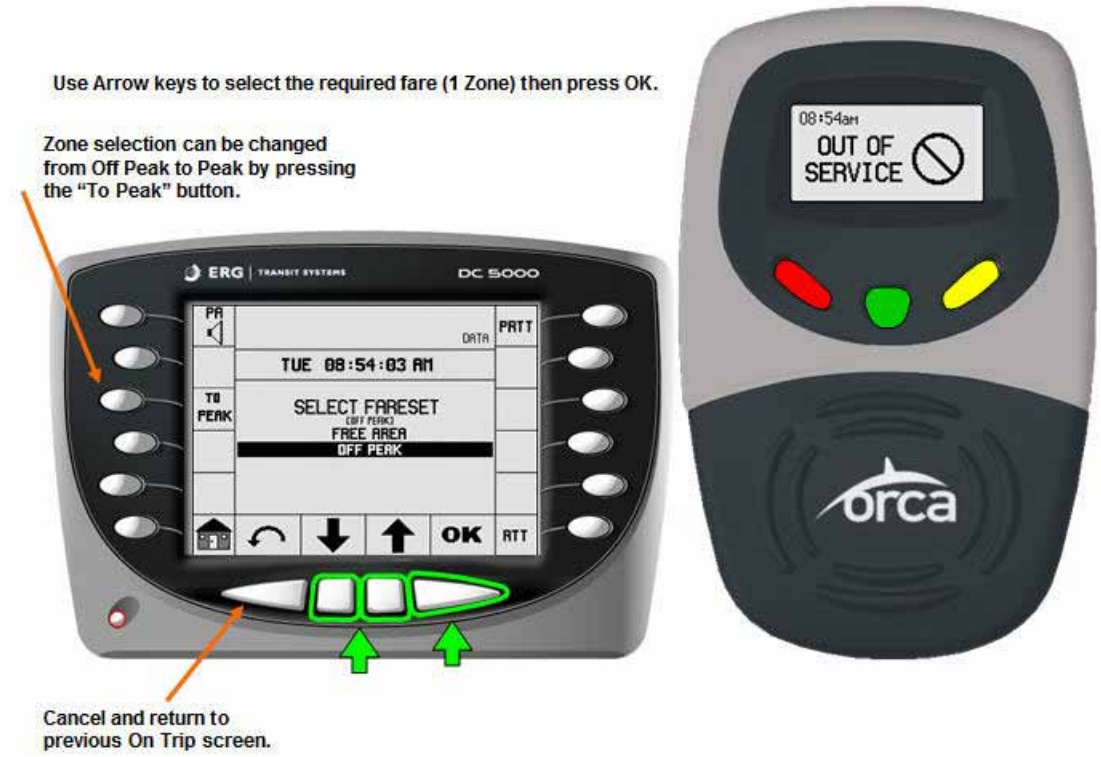


Figure 110: Change Fareset Screen

7.5 Changing a Fareset during a Peak Period

The current fareset for the trip displays on both the DDU and Card Reader.

1. Press the **Select Fareset** hotkey.

Figure 111: Select Fareset Hotkey

The **Select Fareset** screen is displayed.

Note: On entering the **Select Fareset** screen, the fareset that is already current is the default selection. In this example, it is 2 Zones.

2. Press the **Up Arrow** or **Down Arrow** hotkeys to select the required fareset (1 Zone).

Figure 112: Select Fareset Screen

3. Press **OK**.

   The fareset is now set to 1 Zone (see Figure 113).

Figure 113: One Zone Fareset Screen

7.6 Changing to an Off-Peak Fareset During Peak Period

The current fareset for the trip displays on both the DDU and Card Reader.

1. Press the **Select Fareset** hotkey.

Figure 114: Home Screen with Select Fareset (▲$) Hotkey Indicated

The **Select Fareset** screen is displayed.

Note: On entering the Select Fareset screen, the fareset that is already current is the default selection. In this example, it is 2 Zones.

2. Press the **To Off-Peak** hotkey.

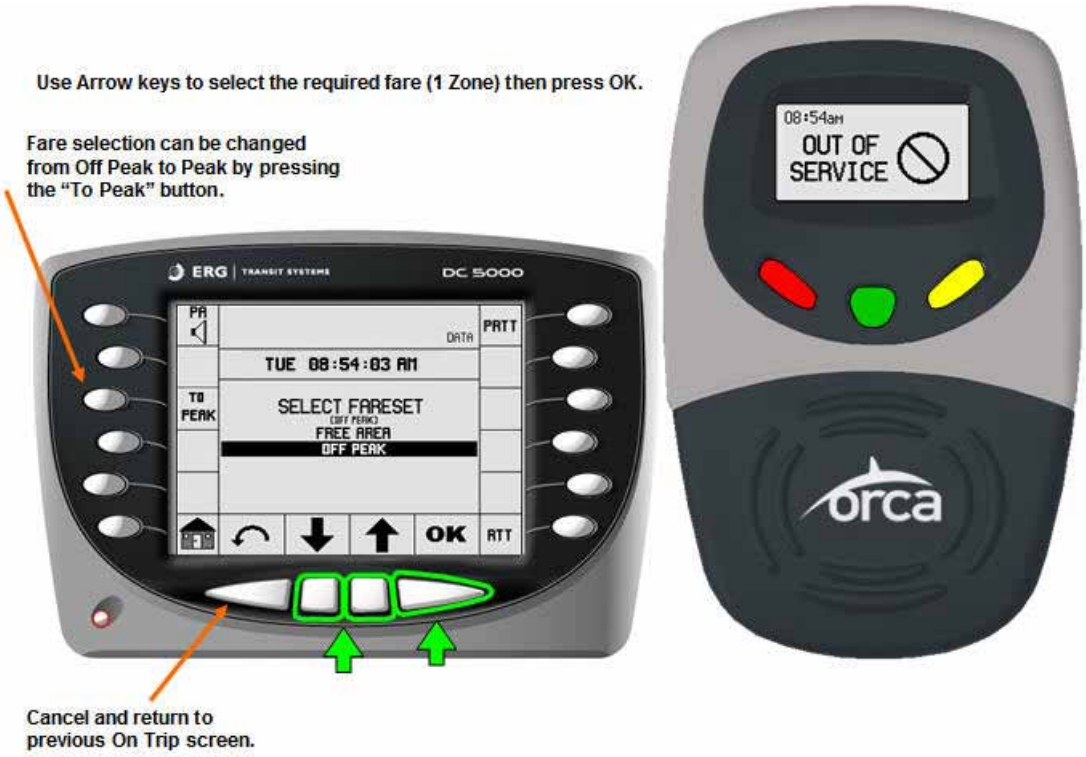


Figure 115: Select Off-Peak Fareset Screen

In this scenario, the default fareset (Off Peak) is required and is already highlighted.

3. Press **OK**.

The DDU and Card Reader now display the new default Off-Peak fare and fareset, as shown in Figure 116: DDU and Card Reader Showing Default Off-Peak Fare and Fareset.

Figure 116: DDU and Card Reader Showing Default Off-Peak Fare and Fareset

7.7 Overriding a Fare

This operation overrides the current fare for the next transaction only. It is typically used when a passenger is traveling only one zone, but the current fareset for the trip is two zones.

For the situation in which every subsequent transaction is charged a different fare, refer to Section 7.4 Changing a Fareset.

When a passenger requests a 1 Zone override:

1. On either the **Options** or **Home** screen, press the **Fares** hotkey.

Figure 117: Home Screen with Fares Hotkey Indicated

The **Fare screen** is displayed.

2. Press the **Fare Override** hotkey.

Figure 118: Fares Override Hotkey

The Override fareset is displayed on the Card Reader; the Override fareset and fare are shown on the DDU.

Figure 119: DDU and Card Reader Showing Off-Peak Fare and Fareset

3. Passenger presents his or her fare card to the Card Reader.

   The transaction is displayed on the DDU and the Card Reader screens as per normal transaction rules. For a normal full fare transaction, there is no DDU message, and the default fareset is displayed. The Card Reader displays the Override fare charged.

   On completion of the transaction, the Card Reader display returns to the current fare for this trip.

8 Radio Operation

When possible, the radio system operates in **Data** mode. In some situations, such as poor reception, it can switch to **Voice** mode to allow only voice radio communication to continue.

Table 2: Audible Indicators

Indicator	Usage
Long continuous tone	Initial startup or requesting logon
Five second continuous tone	Group or All Call Alert. The coordinator is going to broadcast information.
Five mid-length beeps	Driver Single Call. The coordinator needs to speak with the operator on the handset.
Three short beeps	Entering invalid information to the Automatic Passenger Count (APC) Radio Interface (ARI) Pressed invalid/currently inactive hotkey Group call has ended Not responded to a Driver Single Call within one minute
1½ second tone on the PA speaker	The MDT is entering or exiting the PA mode.
Two long beeps	When the system is switching in or out of Data mode
One short beep	Good hotkey press

8.1.1 Radio Data Mode

During normal operation, the radio system is in **Data** mode.

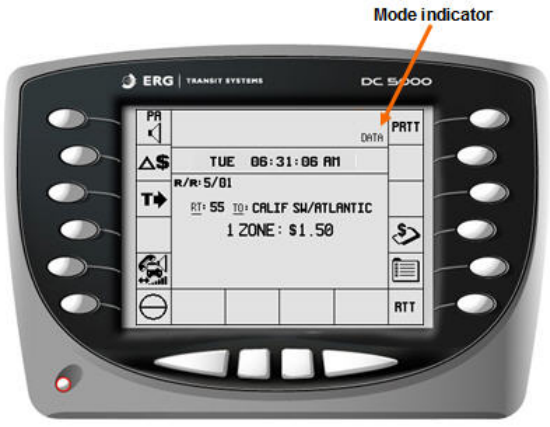


Figure 120: Radio Data Mode Indicator

The radio system remains in **Data** mode during normal operation.

If reception is bad, the DDU beeps two times and the radio link reverts to **Voice** mode.

8.1.2 Radio Voice Mode

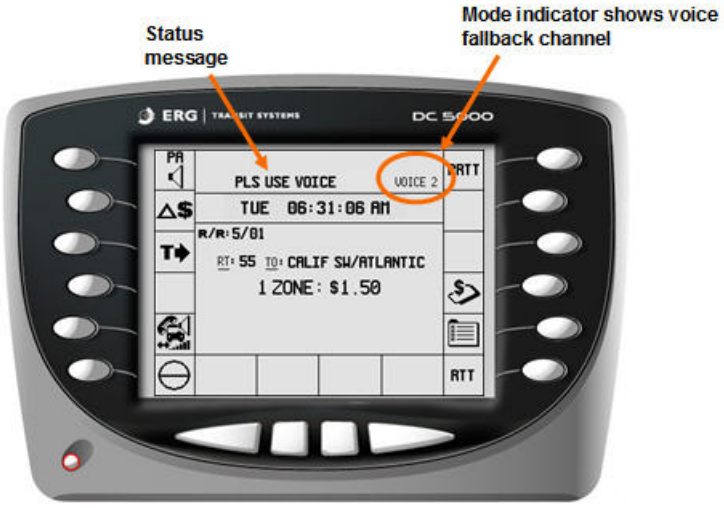


Figure 121: Radio Voice Mode Indicator

Request to Talk (RTT) and **Priority Request to Talk** (**PRTT)** hotkeys are inoperable while in **Voice** mode. Pressing them only causes an invalid tone of three short beeps.

Figure 122: Request to Talk (RTT) and Priority Request to Talk (PRTT) Hotkeys

When possible, the system switches back to **Data** mode.

8.1.3 Radio Single Call

The coordinator initiates a call to this vehicle only.

Five mid-length beeps sound. Calls not answered within 60 seconds are cancelled.

- Pick up the handset and follow the procedures for answering calls.

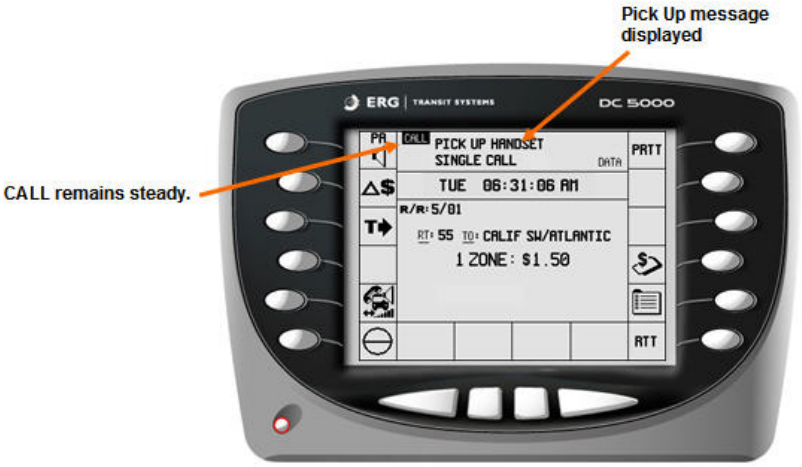


Figure 123: Radio Single Call Display

When the coordinator hangs up, all call indicators are cleared and three beeps sound.

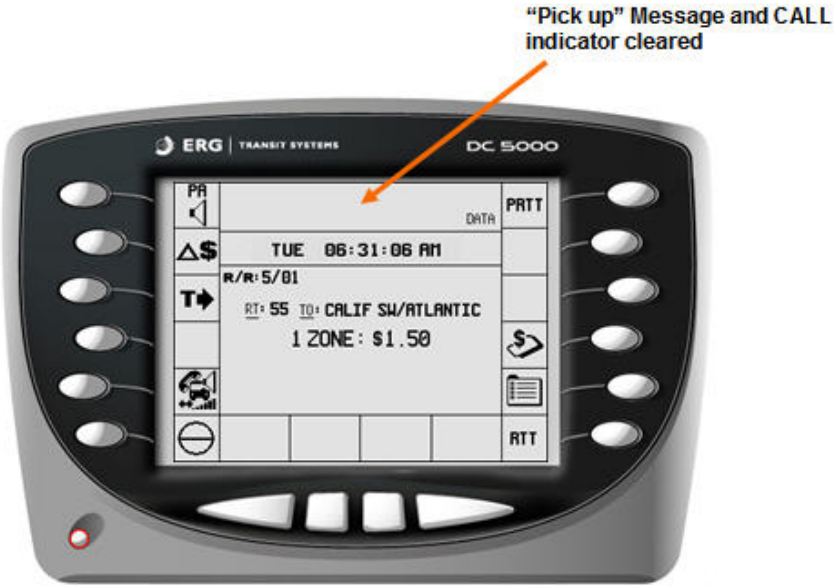


Figure 124: Radio Single Call Ended

8.1.4 Radio Group/All Call

The coordinator initiates a call to a group of vehicles including this one. A five-second continuous beep sounds.

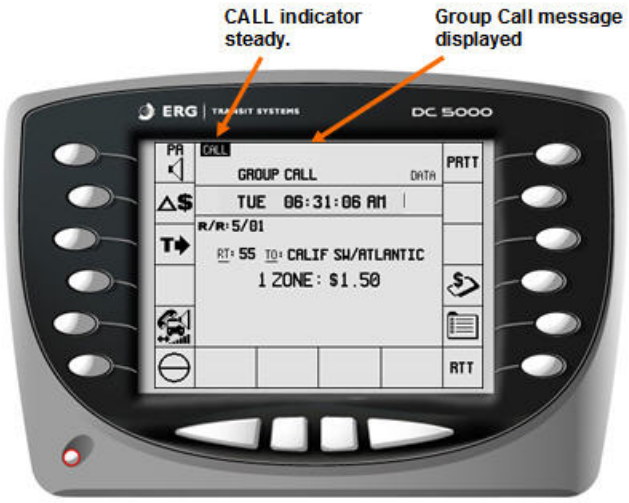


Figure 125: Radio Group Call

The coordinator can be heard making an announcement via the handset.

When the coordinator hangs up, all call indicators are cancelled and three beeps sound.

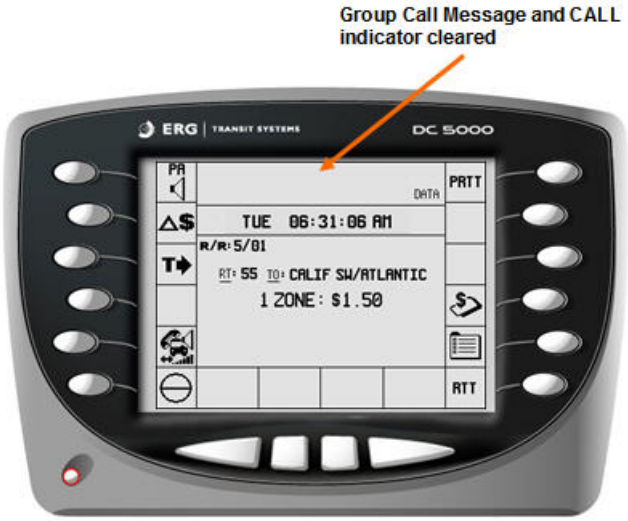


Figure 126: Radio Group Call Ended

8.1.5 Radio RTT/PRTT

RTT and PRTT calls are initiated by the operator in order to speak with the coordinator.

1. Press the **Home** hotkey.

Note: Although the **RTT** hotkey is available on most DDU screens, the **PRTT** hotkey is available on the **Home** screen and on various other screens.

The **Home** screen is displayed.

2. Press the **PRTT** hotkey.

Figure 127: PRTT Hotkey

The **ACK** indicator flashes, indicating that the request was sent to the coordinator.

Figure 128: Acknowledge PRTT RTT Call

The coordinator acknowledges the request to talk.

The **ACK** indicator stops flashing and remains steady. The request goes into a queue.

When the request is at the head of queue, the coordinator initiates a call to operator.

The **ACK** indicator is cleared. The **CALL** indicator displays and the **Single Call** and **Pickup Handset** messages display. Five beeps sound.

3. Pick up the handset and follow standard procedure for answering calls.

   When the coordinator hangs up, all call indicators are cancelled and three beeps sound.

8.1.6 Emergency Alarm

1. Press the **EA** switch.

   The bell symbol indicator on the **Radio** window flashes to indicate acknowledgment of the EA by the coordinator. This symbol can appear on any screen currently displayed.

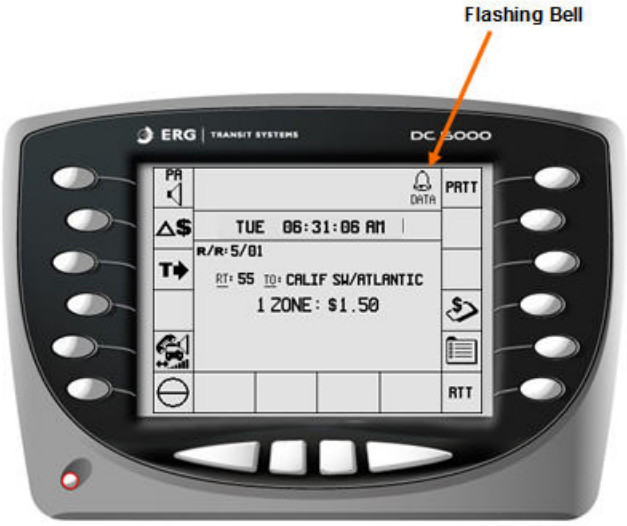


Figure 129: Emergency Alarm

2. When it is safe to talk, press the **Home Screen** hotkey.

   The **Home** screen is displayed.

Figure 130: Home Screen with PRTT Hotkey Indicated

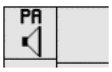
3. Press the **PRTT** hotkey and follow the procedure described in Section 8.1.5 Radio RTT/PRTT.

8.1.7 Using the Public Address (PA)

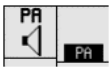
Public Address (PA) is available on the majority of screens. It is not available on screens used only briefly, such as the **Enter Password** screen.

The PA symbol displayed in the **Radio** window indicates that the PA is switched on.

If no PA symbol displays in the **Radio** window, the PA is switched off.



PA is switched off.



PA is switched on.

1. Press the **PA** hotkey to switch the PA on.

Figure 131: Public Address Hotkey

The PA symbol appears and one short beep sounds on PA system. The microphone is enabled.

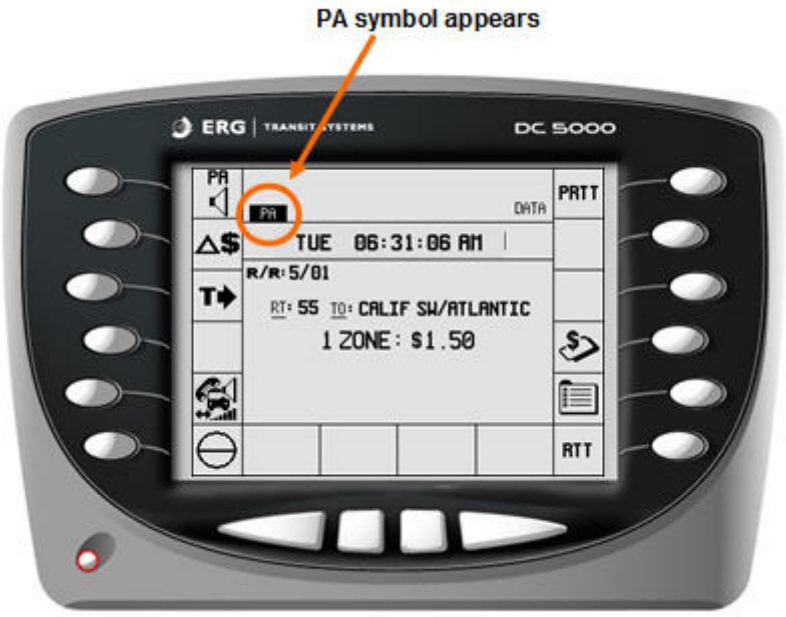


Figure 132: Public Address On Screen

2. Use the microphone to address the passengers.

Note: Receiving a call from the coordinator temporarily switches the PA off. The PA automatically switches on again when the call process is completed.

3. With the PA symbol displayed, press the **PA** hotkey to switch the PA off.

Figure 133: Turn Public Address Off Hotkey

The PA symbol disappears, and the microphone is disabled.

8.1.8 Coordinator PA Call

1. The coordinator initiates the PA call.

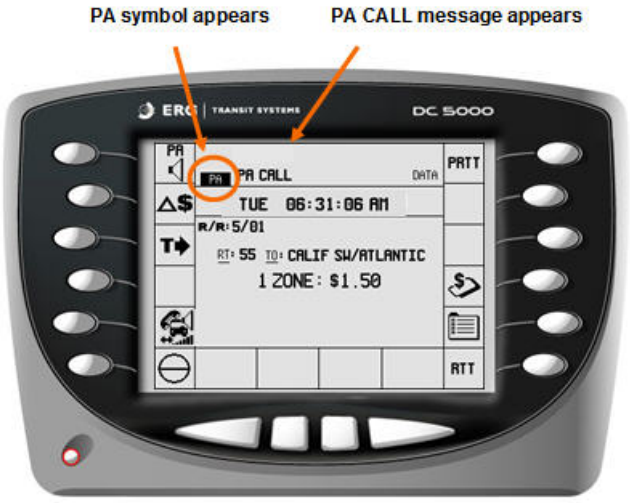


Figure 134: Coordinator Public Address Call Screen

2. The operator can adjust the broadcast volume while the coordinator addresses the passengers. This must be done through the **Options** screen. Refer to Section 9.4 Adjusting PA, Broadcast, Call Box, and Handset Volume for details.
3. The coordinator ends the PA call.

   Removal of the PA symbol and **PA CALL** message indicates that the PA is switched off.

8.1.9 Turning the PA Off

- Turn the PA off by pressing the **PA** hotkey on either the **Options** screen or the **Home** screen.

Figure 135: Turn PA Off Hotkey

The PA symbol disappears, indicating that the PA is off.

9 Device Settings

This section describes how to view and acknowledge events in the Event Log, adjust brightness, contrast, and volume for the DDU and Card Reader, and adjust the PA, broadcast, callbox, and handset volume.

9.1 Viewing the Event Log

The DDU records error and status messages in an event log. This procedure describes how to view, acknowledge, and clear events in the Event Log for the current logon session.

Note: When logged on as an operator, only the events/errors from the current logon session can be viewed.

When an error or status event is received by the DDU, the event icon 🔔 flashes on and off to the left of the Day/Time. The icon flashes until an operator acknowledges the event.

If all events in the log are acknowledged, but have not been cleared, the event icon 🔔 remains on screen, but does not flash on and off.

To view the Event Log:

1. At either the **Home** screen or the **Fares** screen, press the **Options** hotkey.

   The **Options** screen is displayed.

Figure 136: Even Log Hotkey

2. Press the **Event Log** hotkey.

   The **Event Log** screen is displayed. The event list is sorted in chronological order, with the most recent event highlighted at the top of the list.

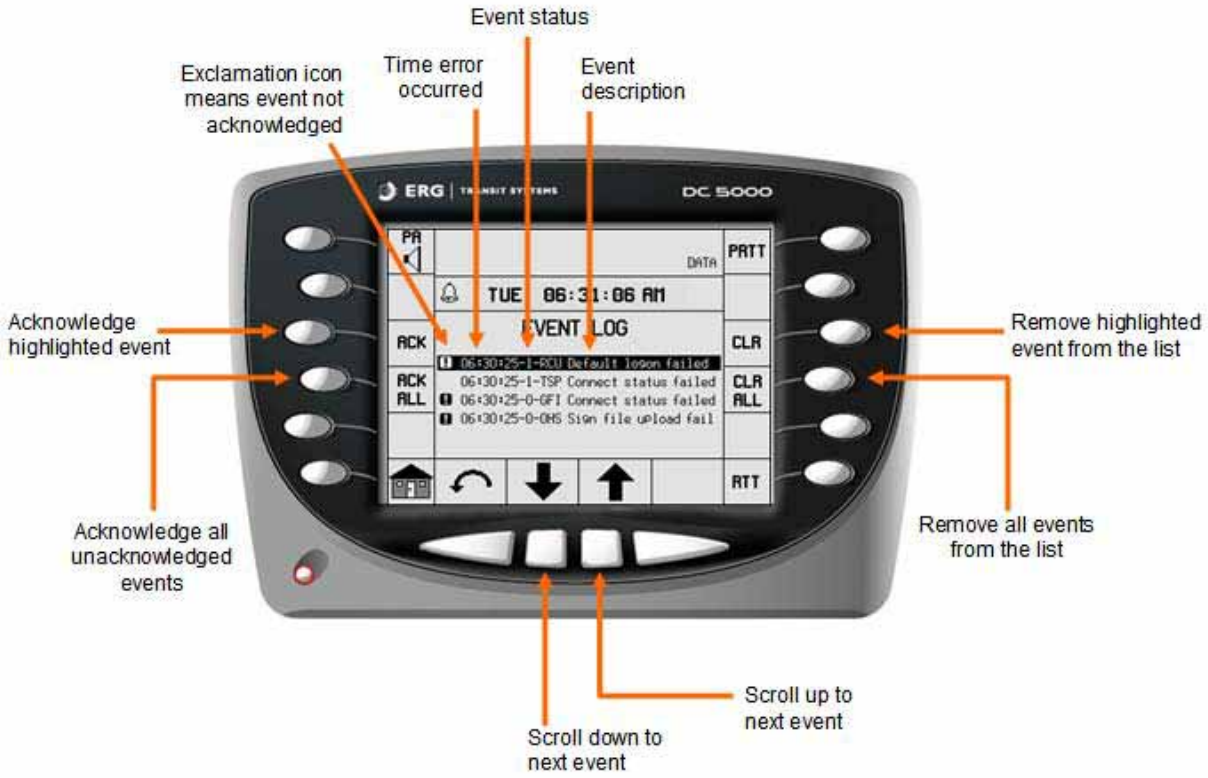


Figure 137: Event Log Screen

- To acknowledge an event, scroll to select the event, and then press the **ACK** hotkey.

Figure 138: Acknowledge Event Screen

The event is acknowledged and the exclamation icon is removed.

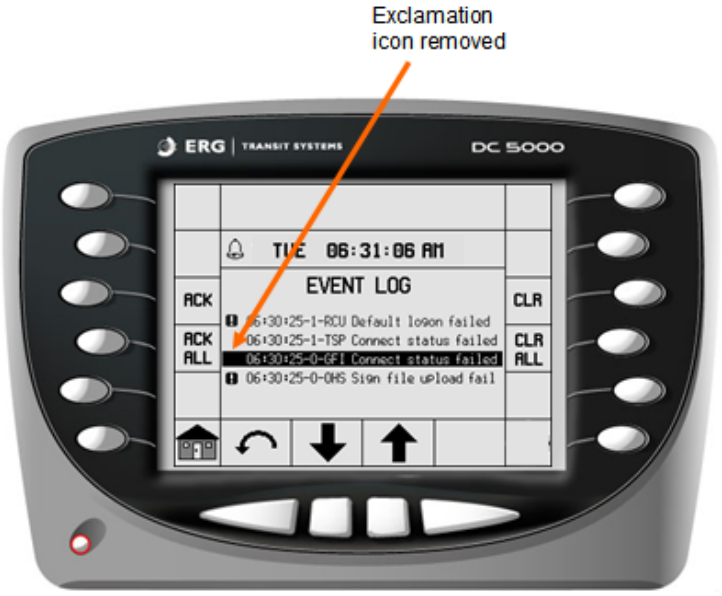


Figure 139: Acknowledged Event

- To clear an acknowledged event, press the scroll hotkeys to highlight the event, and then press the **CLR** hotkey.

Figure 140: Clear Acknowledged Event

The acknowledged event is removed from the list and the next item is highlighted.

- To acknowledge all events on the screen, press the **ACK ALL** hotkey.

Figure 141: Acknowledge All Events

All exclamation icons are removed from the **Event Log** shown on the DDU screen.

Note: To acknowledge more events, use the scroll hotkeys to bring the remaining unacknowledged events onto the screen then press the **ACK ALL** hotkey again.

o To clear all acknowledged events, press the **CLR ALL** hotkey.

Figure 142: Clear All Acknowledged Events

All acknowledged events are deleted from the **Event Log**.

3. To exit the **Event Log,** press the **Back**  hotkey.

The display returns to the **Options** screen.

4. Press the **Fares** hotkey or **Home** hotkey to access the required screen.

Figure 143: Options Screen with Home and Fares Hotkeys Indicated

9.2 Adjusting Brightness, Contrast, and Volume — DDU

When you log on to the on-board equipment, the DDU and Card Reader are set to predefined brightness, contrast, and volume. You can adjust the brightness, contrast, and volume of the DDU and Card Reader within predefined maximum and minimum limits. For example, the DDU volume can be set quieter, but cannot be turned off. When you log off, the settings revert to the standard settings.

To adjust the brightness of the DDU:

1. Go the **Options** screen.

Figure 144: Home Screen with Options Hotkey Indicated

The **Options** screen is displayed.

2. Press the **DDU Control** hotkey.

Figure 145: DDU Control Hotkey

The **DDU Settings** screen is displayed, and the Card Reader remains in service.

3. Press the **Brightness Control** hotkey.

   The **DDU Brightness Control** screen is displayed.

Figure 146: DDU Brightness Control Screen

4. Use the adjustment hotkeys to increase or decrease the brightness.

Figure 147: Adjustment Hotkeys

5. When the desired setting is reached, press **OK**.

   The DDU returns to the **DDU Settings** screen.
6. Press the **Back** hotkey to return to the **Fares** screen.

Figure 148: Back (or Return) Hotkey

The display reverts to the **Fares** screen.

Figure 149 shows a summary of how to adjust brightness, contrast, and volume settings on the DDU.

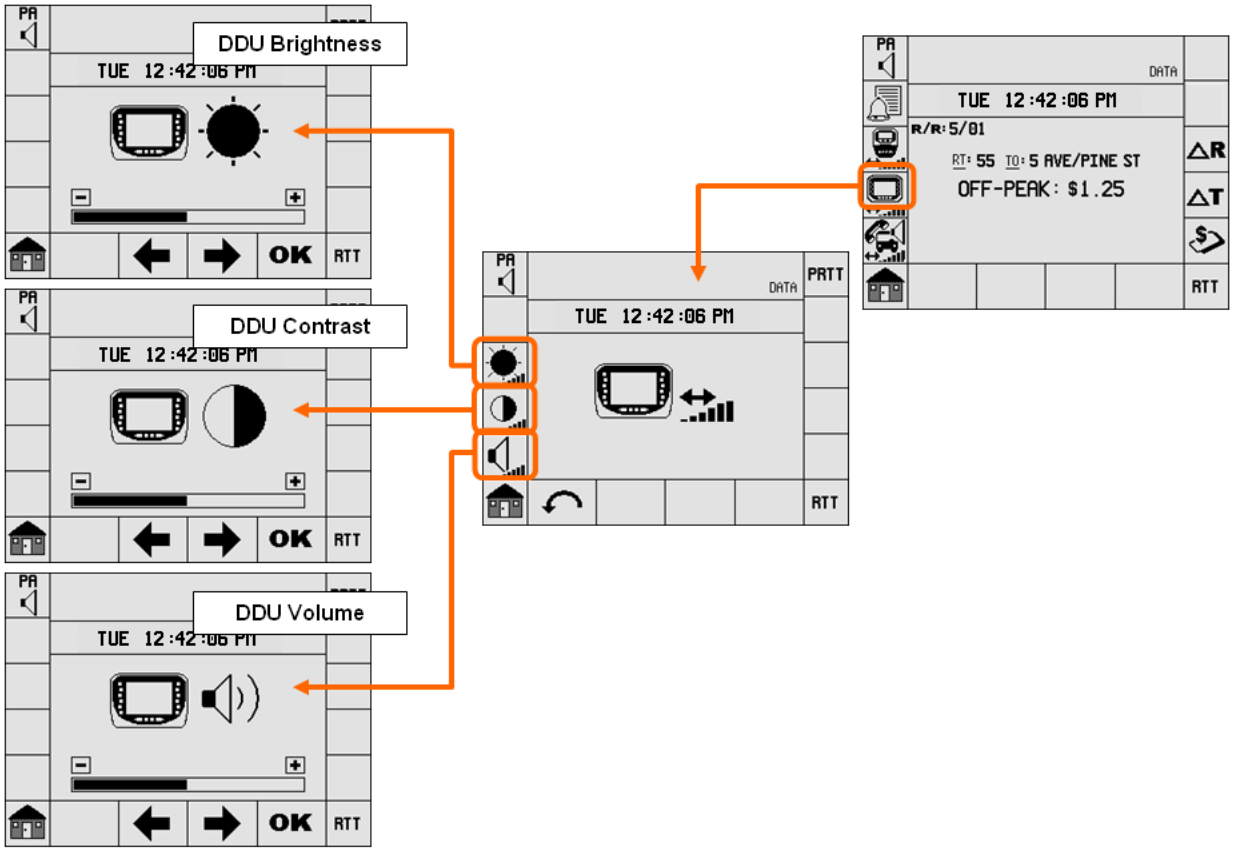


Figure 149: DDU Setting Screens

9.3 Adjusting Brightness, Contrast, and Volume — Card Reader

- To adjust Card Reader settings, press the **Card Reader Settings** hotkey on the **Options** screen.

Figure 150: Card Reader Control Hotkey

Figure 151 shows a summary of how to adjust brightness, contrast, and volume settings on the Card Reader.

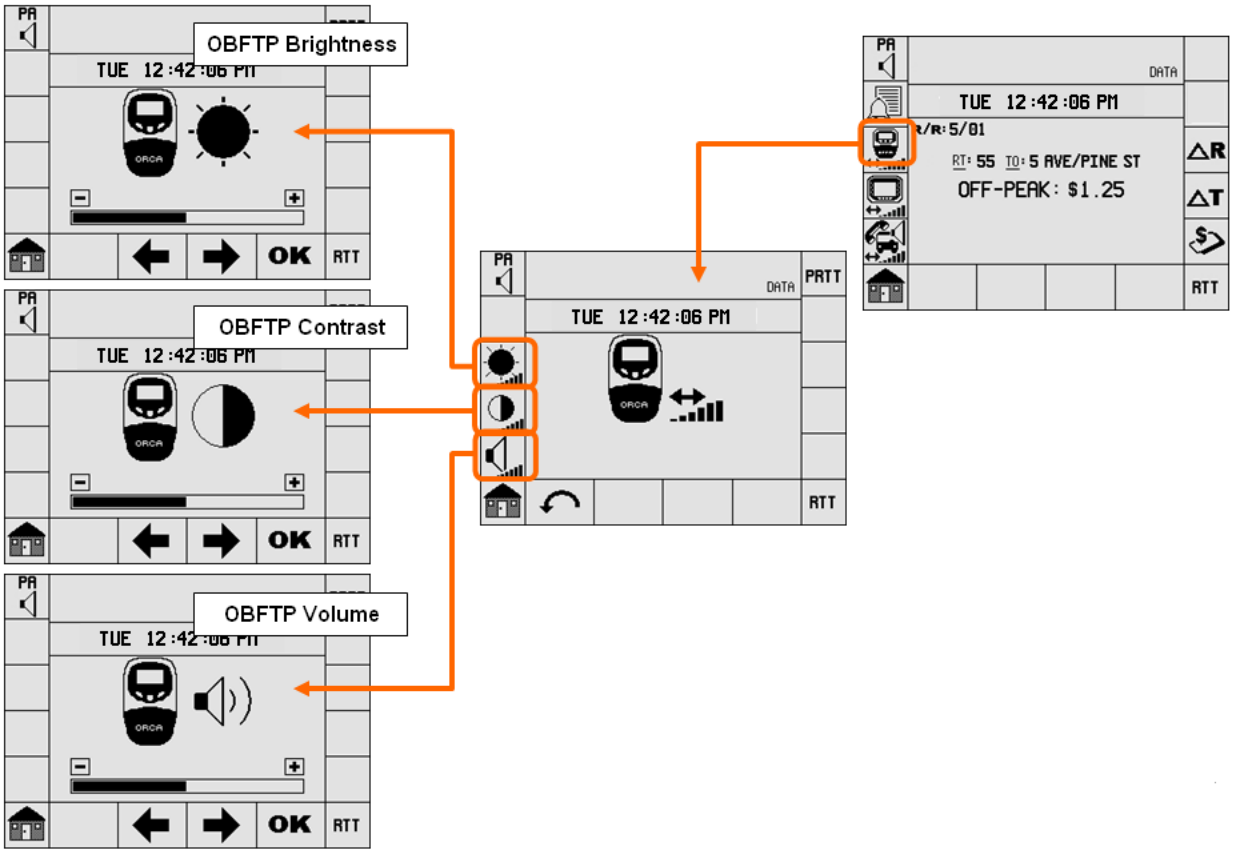


Figure 151: Card Reader Settings Screens

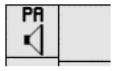
9.4 Adjusting PA, Broadcast, Call Box, and Handset Volume

The radio system volume (PA, broadcast, call box, or handset) can be adjusted only while the specific system is in use. For example, the handset volume is adjustable only while the handset is in use.

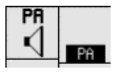
9.4.1 Adjusting the PA Volume

PA volume can only be adjusted while the PA is in use. This screen is only displayed if the PA is in use.

The **PA** hotkey is available on the majority of screens.



PA is switched off.



PA is switched on.

1. At the **Home** screen or **Fares** screen, press the **Options** hotkey.

Figure 152: Adjust Radio Settings Hotkey

The **Adjust Radio Settings** screen is displayed.

2. On the **Adjust Radio Settings** screen, press the **Adjust PA Volume** hotkey.

   The **Adjust PA Volume** screen is displayed.

Figure 153: Adjust PA Volume Screen

3. While speaking on microphone, press the **Decrease Volume** or **Increase Volume** hotkeys to adjust the PA volume.
4. After adjusting the volume, press the **OK** hotkey once.

   The display returns to the previous screen.

9.4.2 Adjusting Other Radio System Volumes

Access the various screens to adjust the volumes for each system.

- The handset volume can be adjusted only when in a call or in **Voice** mode and the handset is off the hook.
- The callbox volume can be adjusted only when in a call or in **Voice** mode and the handset is on the hook.
- The broadcast volume can be accessed only when in a PA call.

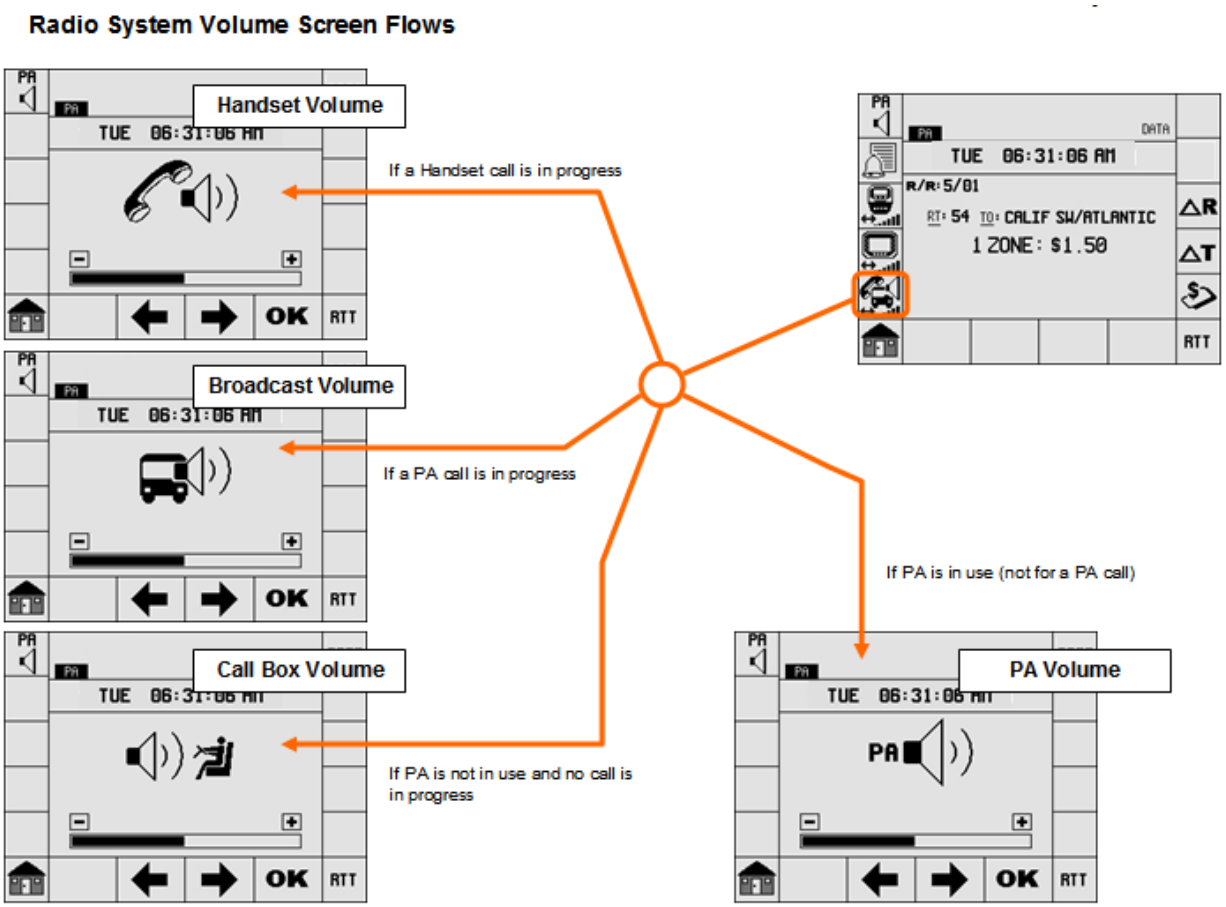


Figure 154: Radio System Volumes Screenflows

10 Supervisor Functions

This section describes the functions available when logged on as a supervisor. The supervisor functions shown in Figure 155 are:

- Changing DDU Settings
- Viewing the Audit Register (AR) Listing
- Viewing the CD Listing
- Changing an Operator's Password
- Changing Card Reader Settings
- Viewing the Trip History

Figure 155: Supervisor Screen

10.1 Accessing Supervisor Mode – Manual Logon

If your default role is **Supervisor**, follow the login instructions in Section 3.3 Logging On Manually.

10.2 Accessing Supervisor Mode – Card Logon

If your default role is **Supervisor**, follow the logon instructions in Section 3.4 Logging On with a Card.

10.3 Logging on with a Different Role – Manual Logon

A User ID can have one or more roles allocated, with one designated role as the default. When you log on, the default role is set and determines whether to allow logon in **Operator**, **Supervisor**, or **Maintenance** mode. If your User ID defaults to a role other than **Supervisor**, you need to select the **Supervisor** role when you log in. Follow the login instructions in Section 3.3 Logging On Manually.

1. Enter your ID and password, and then press the **Select Role** hotkey.

Figure 156: Select Role Hotkey

2. Press the required role hotkey: **Operator**, **Supervisor**, or **Maintenance**.

Figure 157: Select Role Screen

The **Logon Success** screen is displayed.

3. Press **OK**.

The Card Reader displays the green light and gives one beep to indicate that you are now logged on in the selected role.

If logon fails, the **Logon Failed** screen is displayed on the on-board equipment. The Card Reader beeps three times and shows the red light.

If the card presented is not valid for the role, the **Invalid Role** screen is displayed, the Card Reader beeps three times, and the red light stays on.

10.4 Logging on with a Different Role – Card Logon

A User ID can have one or more roles allocated, with one designated role as the default. When you log on, the default role is set and determines whether to allow logon in **Operator**, **Supervisor**, or **Maintenance** mode. If your User ID defaults to a role other than **Supervisor**, you need to select the **Supervisor** role when you log in. Follow the login instructions in Section 3.4 Logging On with a Card.

1. Enter your password, and then press the **Select Role** hotkey.

Figure 158: Select Role Hotkey

2. Press the required role hotkey: **Operator**, **Supervisor**, or **Maintenance**.

Figure 159: Select Role Screen

3. Present your operator card to the Card Reader.

   The entered password is checked against the password on the card.

   If logon is successful, the **Logon Success** screen is displayed.

4. Press **OK** to continue.

   Operator ID and password are checked against a list of operators in the CD stored in the Card Reader.

   If ID and password pairing is valid, the **Logon Success** screen is displayed.

5. Press **OK** (or wait for timeout) to continue.

   The Card Reader displays the green light and gives one beep to indicate that you are now logged on in the selected role.

   If logon fails, the **Logon Failed** screen is displayed on the on-board equipment. The Card Reader beeps three times and shows the red light.

   If the card presented is not valid for the role, the **Invalid Role** screen is displayed, the Card Reader beeps three times, and the red light stays on.

10.5 Adjusting DDU Settings

- Press the **DDU Device Settings** hotkey.

Figure 160: DDU Device Control Hotkey

The **DDU Settings** screen is displayed.

Adjusting DDU device settings is the same procedure as when logged on as an operator. See Section 9.2 Adjusting Brightness, Contrast, and Volume — DDU for details.

10.6 Adjusting Card Reader Settings

- Press the **OBFTP Device Settings** hotkey.

Figure 161: OBFTP Device Control Hotkey

The **OBFTP Device Settings** screen is displayed.

Adjusting device settings is the same procedure as when logged on as an operator. See Section 9.3 Adjusting Brightness, Contrast, and Volume — Card Reader.

10.7 Viewing the Audit Register

1. Press the **Go to AR Listing** hotkey to display the **Audit Register** files.
2. Press the **Scroll Down** and **Scroll Up** hotkeys to view all the files.

Figure 162: Audit Register Screen

3. Press the **Back** hotkey to return to the **Supervisor** screen.

Figure 163: Audit Register Back Hotkey

10.8 Viewing the CD

1. Press the **Go to CD Listing** hotkey to display the **Configuration Data** files.

Figure 164: Supervisor CD List Hotkey

There are different CD files for the DDU and the Card Reader, so there are separate hotkeys to display the DDU CD list and the Card Reader CD list.

2. Select the **DDU CD list** or **Card Reader CD list** hotkey.

Figure 165: DDU CD List, Card Reader CD List Hotkeys

The **CD Listing** screen appears.

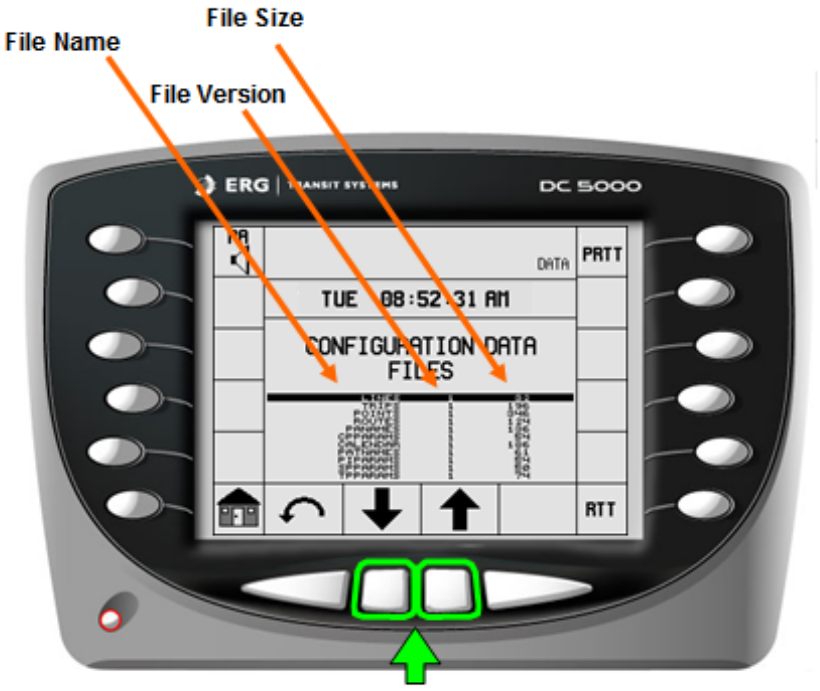


Figure 166: CD Files Screen

3. Press the **Down Arrow** and **Up Arrow** hotkeys to view all the files.

4. Press the **Cancel**  hotkey to return to the **Supervisor** screen.

10.9 Changing an Operator Card Password

This procedure explains how a supervisor can change an operator card's password. This might be required if the password is forgotten, for example.

Note: Only a supervisor can change passwords.

1. At the **Supervisor** screen, press the **Change Password** hotkey.

Figure 167: Supervisor Screen with Change Password Hotkey

The **Enter New Password** screen is displayed.

2. Press the number hotkeys to create a new password.
3. Press **OK**.

Figure 168: Supervisor Enter New Password Screen

The **Present Operator Card** screen is displayed.

Figure 169: Present Operator Card Screen

4. Present the operator card requiring the new password to the Card Reader.

   The new password is then loaded onto the operator card, and the **Change Password Success** screen is displayed.

5. At the **Change Password Success** screen, press **OK**.

Figure 170: Supervisor Change Password Success Screen

   The display returns to the **Supervisor** screen.

   If the change password operation fails, the **Change Password Failed** screen is displayed, as shown in Figure 171.

6. Pressing **OK** returns the display to **Enter New Password** screen.

Figure 171: Change Password Failed Screen

7. Pressing **Back** returns you to the **Supervisor** screen.

Note: If the card is not presented within the timeout period, the change password operation is cancelled and the display returns to the **Supervisor** screen.

10.10 Viewing the Trip History

1. At the **Supervisor** screen, press the **View Trip History** hotkey.

Figure 172: Supervisor View Trip History Hotkey

The **Trip Details** screen is displayed, with a list of the last five trips performed in chronological order with the most recent trip at the top of the list.

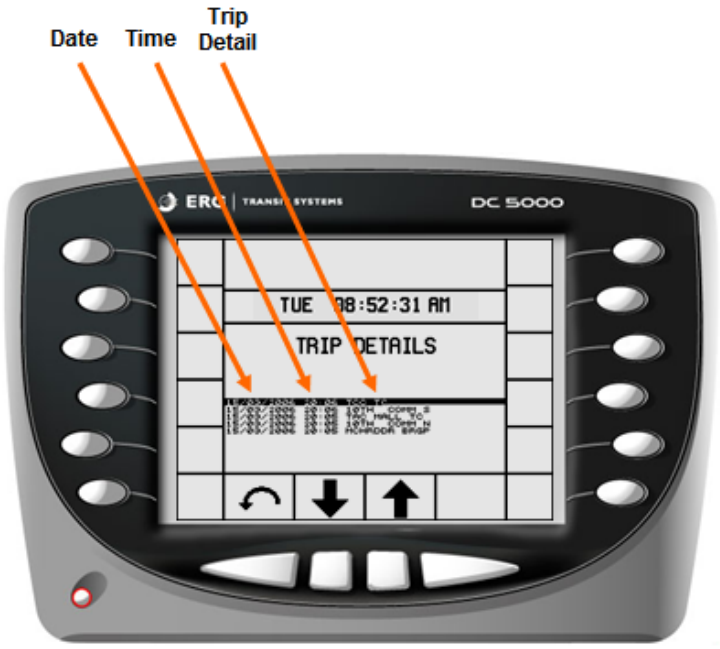


Figure 173: Trip Details Screen

2. Press Back  to return the display to the **Supervisor** screen.

10.11 Logging Off Supervisor Mode

- Press the **Logoff** hotkey to exit **Supervisor** mode.

Figure 174: Supervisor Logoff Hotkey

The **Password** screen is then ready for the next operator to log on.

10.12 Working in Training Mode

Logging on to the on-board equipment with a User ID associated to the **Training** mode allows you to practice all the functions of the DDU and Card Reader without entering real data into the AFC system. All UD generated is training UD and does not go through the usual cash reconciliation processing. The standard logon procedure is used, but with a User ID reserved for **Training** mode login.

Because you can read/write only to training cards during this time, training fare cards are also required to emulate a passenger fare transaction.

After following the standard manual or operator card logon procedure, the DDU screen prompts you to enter the date and the time. This capability is provided only when **Training** mode is enabled to help with the task of testing the correct activation of future activation CD sets and the validity of service data on specific dates/times.

- To enter a date other than the actual date, use the number hotkeys and press **OK**.

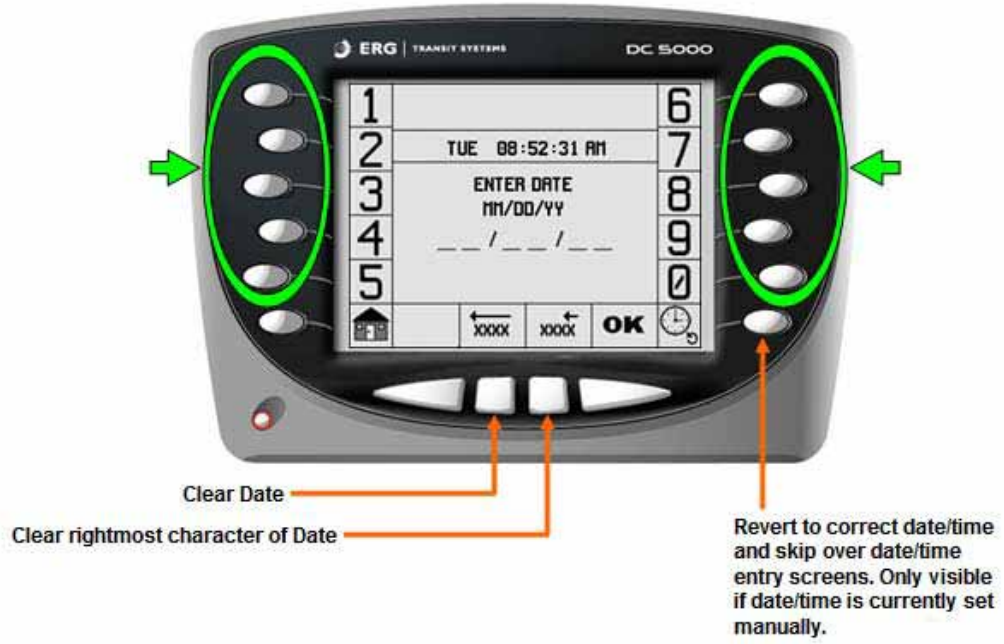


Figure 175: Training Mode Enter Date Screen

Note: To leave the currently set date unchanged, press the **OK** hotkey without entering a date.

The **Time** screen is displayed.

- To enter a time other than the actual time, use the number hotkeys and press **OK**.

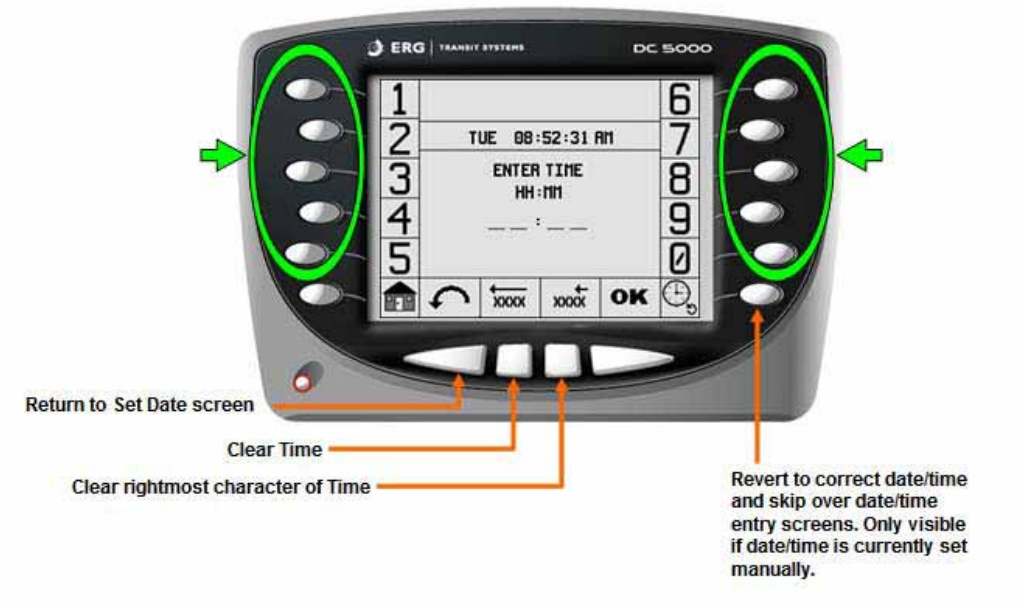


Figure 176: Training Mode Enter Time Screen

Note: To leave the currently set time unchanged, press the **OK** hotkey without entering a time.

The DDU prompts you to enter a route/run and select a trip as per the standard logon procedure as described in Sections 3.5 Entering a Route/Run, and 3.7 Selecting a Trip.

While in **Training** mode, all display screens have the **Training** icon displayed.

Figure 177: Training Mode Icon

Logging off from **Training** mode is the same procedure described in Section 3.8 Logging Off.

Appendix A Acronyms, Abbreviations, and Terms

A.1 Acronyms and Abbreviations

Table 3 contains acronyms and abbreviations that are specific to ERG Transit Systems (USA), Inc. (ERG). In general, industry-standard acronyms and abbreviations are not defined in this table.

Table 3: Acronyms and Abbreviations

Acronym or Abbreviation	Definition
ACK	acknowledgement signal
AFC	Automated Fare Collection
APC	Automatic Passenger Count
AR	Audit Register
ARI	APC Radio Interface
CD	Configuration Data
DAC	Data Acquisition Computer
DDU	Driver Display Unit
EA	Emergency Alarm
ERG	ERG Transit Systems (USA), Inc.
ESB	ERG Service Bureau
FTP	Fare Transaction Processor
KCM	King County Metro
OBFTP	On-Board Fare Transaction Processor
ORCA	One Regional Card for All
PA	Public Address
PCA	Personal Care Attendant
PRTT	Priority Request to Talk
RCU	Radio Control Unit
RFA	Ride-Free Area
RFCS	Regional Fare Coordination System
RRFP	Regional Reduced Fare Permit
RTT	Request to Talk
ST	Sound Transit
UD	Usage Data

A.2 Terms

Table 4 contains the terms that are specific to ERG. In general, industry-standard terms are not defined in this table.

Table 4: Terms

Term	Definition
Audit Register (AR)	Counters that maintain numerical statistics, such as the number of passengers for each Regional Reduced Fare Permit (RRFP) group or the number of device power-ups. This information can be put into a UD record.
card	Refers to a contactless smart card. The medium used by a cardholder to store applications.
cardholder	Someone who is in possession of a smart card.
configuration data (CD)	A generic term for data that is sent to a device or host to configure its functionality.
contactless	Refers to a smart card or card reader in which the two do not have to come into contact; information is transferred via radio frequency over a short distance.
Data Acquisition Computer (DAC)	A central computer that collects the data from on-board, portable, and stand-alone FTPs or other designated RFCS equipment for transfer to the Clearinghouse and provide the relevant Agency with duplicates of the data files transferred to the Clearinghouse.
Driver Display Unit (DDU)	The component of the RFCS equipment installed on buses with which the operator interacts to control and monitor the fare collection process as well as other non-RFCS systems installed on the vehicle.
e-purse	An electronic representation of the monetary value on a smart card.
fare card	A nondisposable smart card for transit use.
fareset	A default value for a fare. Faresets are based primarily on zone.
hotkey	Programmable function key with LCD legend or icon.
multi-ride product	A prepaid product that provides the cardholder with the right to travel for a specific number of journeys. For example, a ten-ride product, which offers the cardholder ten journeys. See also e-purse and period pass.
On-Board Fare Transaction Processor (OBFTP)	The component of the RFCS equipment that is fitted on buses and interacts with smart cards. It processes passenger fares and provides a visual and audible interface to indicate the status of the transaction. It may interact with specialized smart cards such as an operator logon card or maintenance card.
operator	The Agency staff member, ESB staff member, or any authorized person using the RFCS equipment.
operator card	A nondisposable smart card, with the operator application installed, for transit employee device access for operations, management, and maintenance.
pass	A card product that permits unlimited journeys by the cardholder on a specific transit operator within a specific time period.
pass back	A validation condition that occurs if a smart card is presented again at the same device within a configured time, and the ticket was issued from a Period product. The term originates with the concept of a cardholder “passing back” a smart card out of a bus window to allow another person to use the card for fare payment.
product	A form of contract between the product issuer and cardholder. A generic term for the collection of specific product types, i.e., multi-ride, period, and e-purse products.

Term	Definition
Regional Fare Coordination System (RFCS)	All systems, equipment, and work to be provided to (a) transportation Agencies under the Contract and (b) other providers of public transportation within the region as may be added to the RFCS either by a contract amendment or by separate contract with the contractor and approved by the Agencies. Said work includes but is not limited to the collection and processing of data related to the transit fares and other fees for government services provided by the Agencies or other providers of public transportation within the region.
revalue	Revalue of a card comprises the following operations: • Initial valuation of a fare card with a pass, multi-ride product, or stored value • Addition of a new pass, multi-ride product, or stored value to a fare card • Extension of the period of time for which a pass is valid • Addition of further rides to a multi-ride product
smart card	A card with an embedded computer chip. A smart card is the same size as a credit or debit card.
timeout	A period of inactivity that results in a device reverting to the previous screen or logging off the operator.
usage data (UD)	A generic term for data that is generated when a transaction or event occurs. For example, a transaction record is a type of usage data.

Appendix B Lists of Tables and Figures

B.1 List of Tables

B.2 List of Figures

Appendix C References

The following materials are to be used in conjunction with or are referenced by this document.

[1] Contract 229944 (April 29, 2003) Division III: Equipment Specifications.

[2] SEA-01314 KCM DDU Operations Screenflows

[3] SEA-01429 DDU Screen Flow Workshop - Regional Decisions

[4] SEA-01047 Driver Display Unit (DR 103A) - Hardware Specification

[5] SEA-01048 Driver Display Unit (DR 103B) - Functional Specification

[6] SEA-00241 Radio Control Unit (DR 103.06)

[7] SEA-01117 On-Board Equipment Maintenance Manual – Standard

Appendix D Document History

Revision	Revision Date	Reason for Issue	Author
4.1	3 Oct. 2007	Phase 2 revisions	Leigh Alexander
4.2	9 Mar 2008	Phase 2 revisions	Carlos Stelmach
4.3	11 Mar 2008	Edit for submission	Tricia Spicer Bekey
5.0	17 Mar 2008	Release to Customer - Release 1 Trng - ERG Submits [SEA300580]	Rose Fallaw
5.1	14 Apr 2008	Revised in response to review comments. Note that deleted figures are not retained in the interests of keeping the file size manageable. Some figures were resized to improve legibility.	Leigh Alexander
5.2	18 Apr 2008	Updates for peer review	Carlos Stelmach
5.3	23 Apr 2008	Edit for submission	Tricia Spicer Bekey
5.4	23 Apr 2008	Responses to additional Agency comments	Stelmach & Alexander
5.5	24 Apr 2008	Edit for submission	Tricia Spicer Bekey
6.0	25 Apr 2008	Release to Customer-Release 1 Trng - ERG ReSubmits [SEA300620]	Rose Fallaw
6.1	2 June 2008	Edit for submission [SEA300640-10]; replaced “purse” with “e-purse” throughout	Leigh Alexander
7.0	2 June 2008	Release to Customer – Release 1 Training – ERG resubmits [SEA300640-10]	Rose Fallaw

Index

Note: Entries in this index are cross-referenced by section number.