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Data Card System

Owner's Manual

C-20 Data Recorder

C-22 Data Card

C-23 Printer

C-24 Data Card Reader

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3	6-29-00	3-11	Changed minimum lift load to average load time.
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		6-1	Added note.
		7-2	Added Initializing troubleshooting.
4	07/19/02	All	Manuals Address Change
5	10/29/07	All	Added explanation of warnings, cautions and notes to section 1. Updated warnings, cautions and notes through out. Deleted references to Apple/ Macintosh software. Updated page number format. Deleted index.

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Section 1
Introduction

This manual describes installation and operation of the ONBOARD SYSTEMS Data Card System.

Please read the procedures and other information given in this manual before attempting to install or operate this system.

Warnings, Cautions & Notes

The following definitions apply to Warnings, Cautions & Notes used in this manual.

Means that if this information is not observed, serious injury, death or immediate loss of flight safety could occur

Means that there is a risk of injury or degradation in performance of equipment if this information is not observed.

Draws the reader's attention to information which may not be directly related to safety, but which is important or unusual.

System Overview

The ONBOARD SYSTEMS Data Card System is a hook-load data recording accessory system designed to complement ONBOARD SYSTEMS E Series hook-load measuring systems. The data card system frees the pilot and ground personnel from the recording task by logging the hook-load weight, date and time, and duration for each lift. Summary totals and averages are also calculated. The recorded information can be printed directly or transferred to your office printer or computer for printing or further processing. The data card system is FAA-approved for installation with E Series hook-load measuring systems.

The system integrates hook-load measurement with computerized data recording. While the measuring system measures the weight of lifts during a job, the *data recorder* displays flight and lift information, and creates a comprehensive record of this data on the credit-card-sized *data card*. A job report can be printed on the C-23 printer, or the *data card reader* can be used to transfer the recorded information to your serial printer, parallel printer, or personal computer for printing or further processing. Optional *user-interface software* for IBM PC 100%-compatible computers allows you to display, print, and save the collected data as ASCII text. Future software will provide data conversion to file formats compatible with a variety of accounting, spreadsheet, data base, and word processing programs.

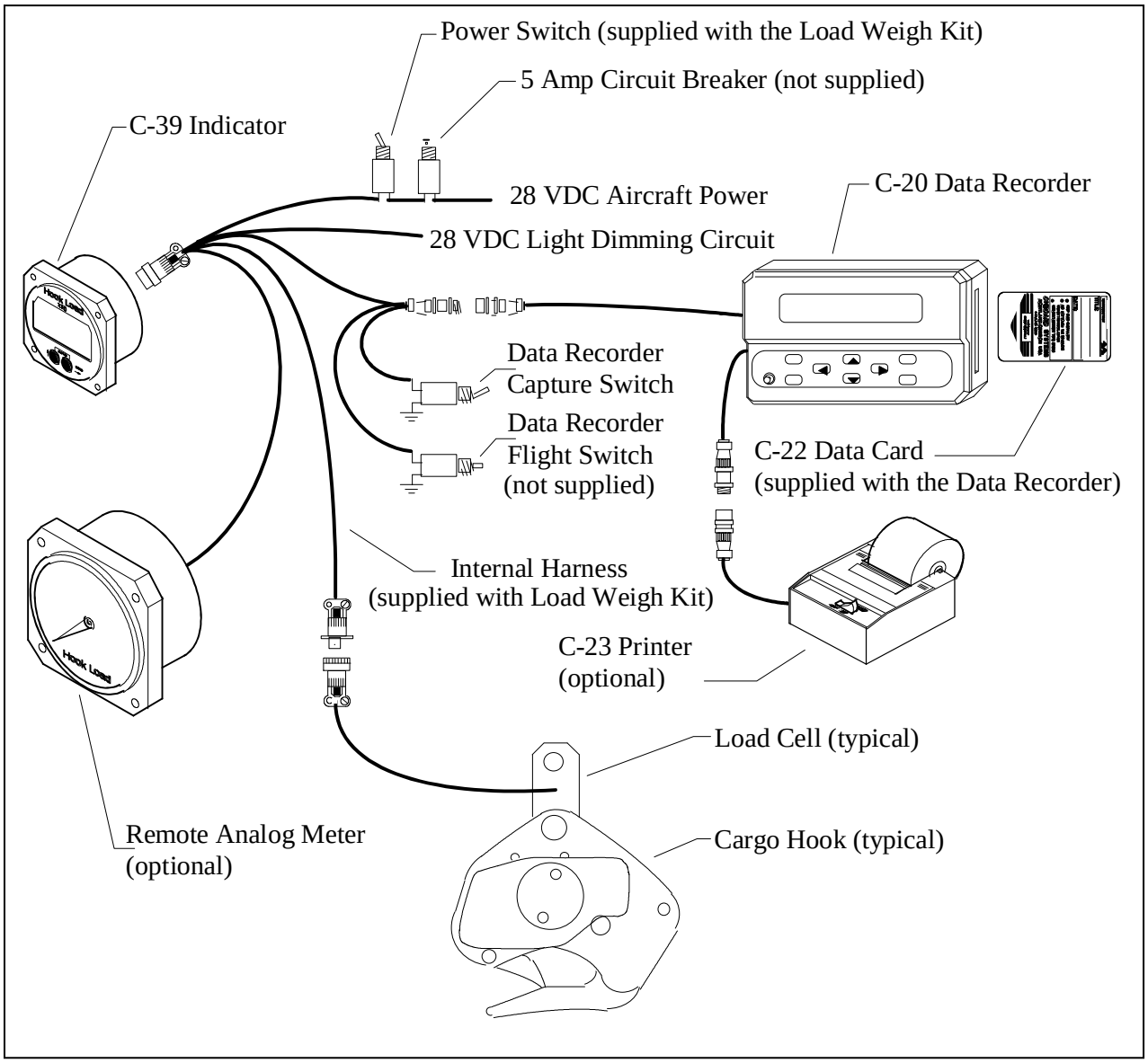
The data card system complements your existing weighing system, providing an additional source of lift data that is rigorously collected throughout the job. However, you should not rely on the accuracy of the data unless you are confident that the system is correctly installed and that the pilot is using the system correctly.

A complete data card system includes a data recorder, one or more data cards, a data card reader, and, optionally, software for your computer. A single data card reader can support many data card systems installed in separate aircraft.

Figure 1-1 shows the data card system components that are installed in the aircraft. Figure 1-2 shows the components that are installed in the office. The data card is the link between the two environments. It carries data collected by the data recorder to the data card reader, where it can be read or printed.

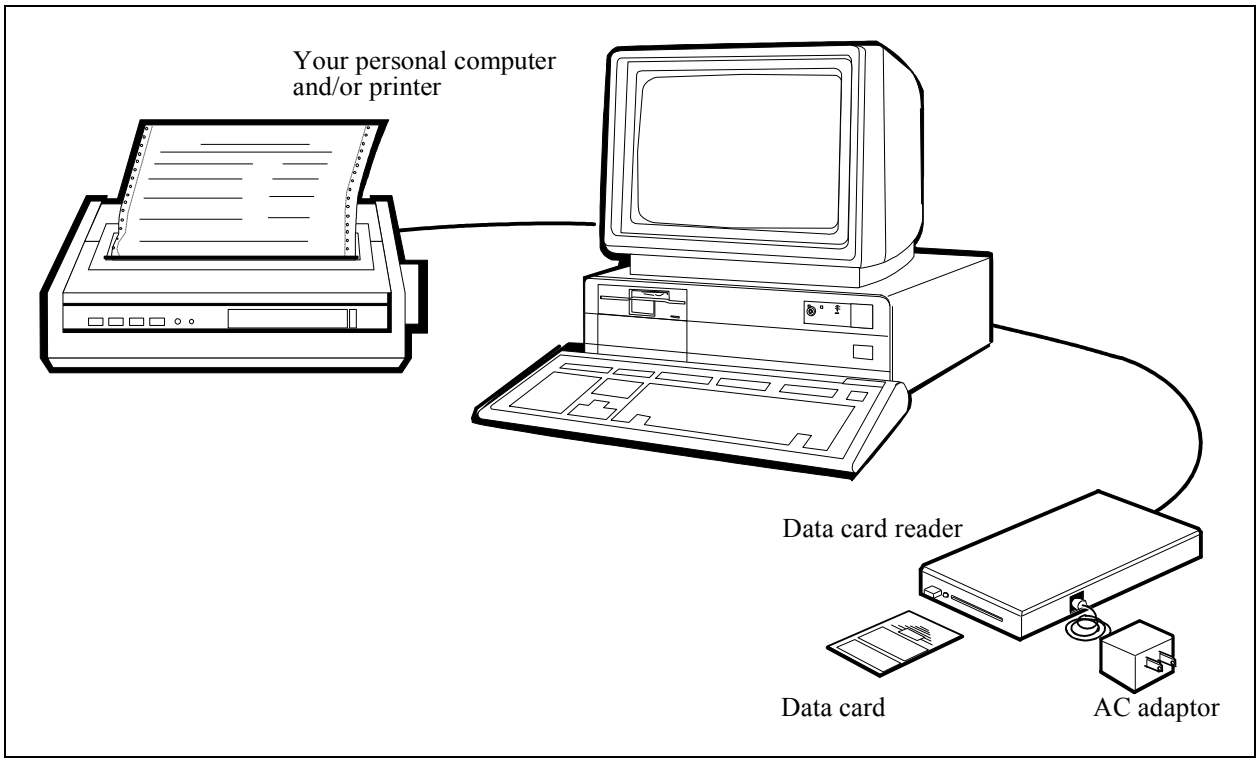
System Overview, continued

Figure 1-1 The data card system's aircraft-based components



System Overview, continued

Figure 1-2 The data card system's office-based components



Bill of Materials

The following items are included with each system, if shortages are found contact the distributor from whom the system was purchased.

P/N	DESCRIPTION	QUANTITY
120-024-02	Owner's Manual	1
210-048-01	C-20 Data Recorder	1
210-100-00	C-23 Data Printer	1*
475-006-00	C-22 Data Card	1
270-019-00	Capture Switch Wire	1
270-022-00	Flight Time Switch Wire	1
235-051-00	Mounting Bracket	1
511-005-00	Knurled Mounting Screw	2

* Optional

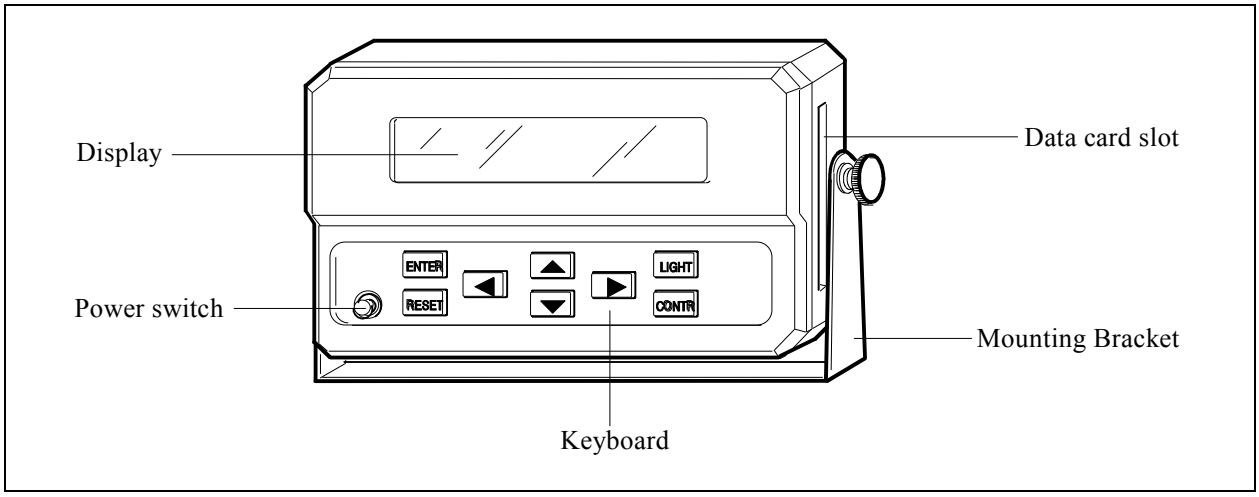
Components

The following paragraphs describe the major components of the data card system in greater detail. These components are the C-20 Data Recorder, the C-23 Printer, the C-22 Data Card, the C-24 Data Card Reader, and the optional interface software.

C-20 Data Recorder

The C-20 Data Recorder is a programmable microprocessor-based device that attaches to an existing connector on the E Series hook-load measuring system in the cockpit. It reads data entered by the pilot and monitors the data from the weighing system. A two-line by 20-character alphanumeric LCD display shows duration information for the current flight, and duration and weight data for the current load in pounds or kilograms. Eight front panel keys let the pilot enter identifying information and change display characteristics. All data is recorded on a data card that plugs into the data recorder. The display shows current flight and lift data and can be used as a copilot remote indicator. Several aircraft can share a single data recorder without extensive reinstallation. Figure 1-3 shows the C-20 Data Recorder.

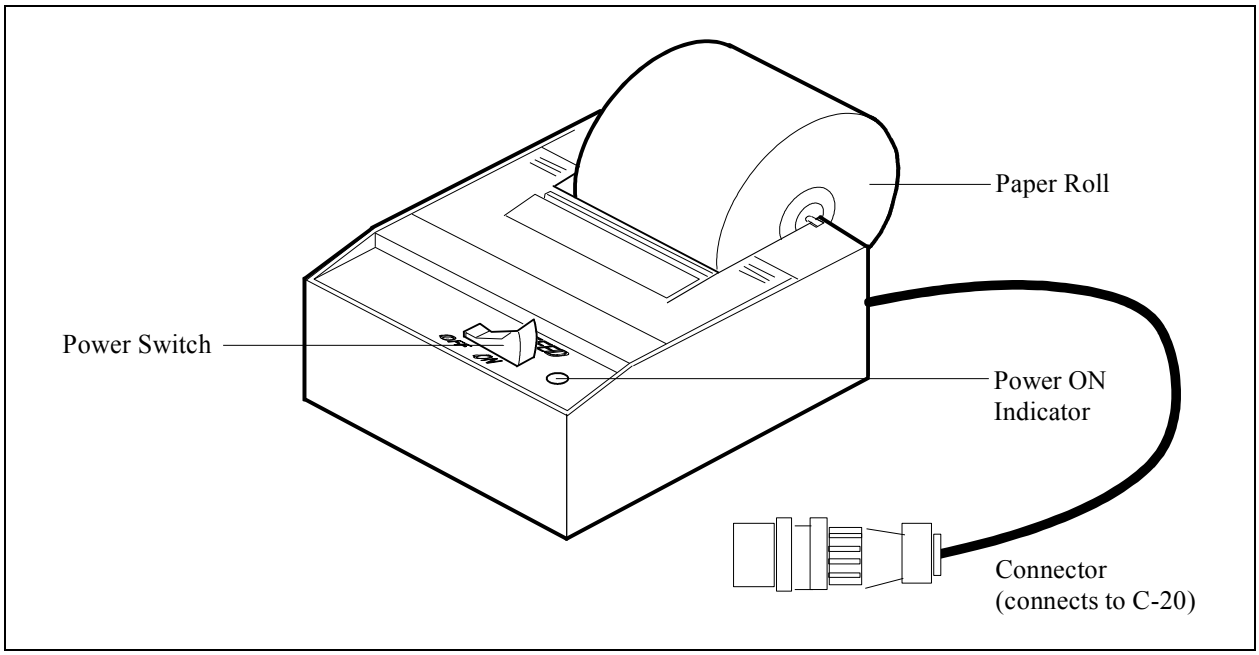
Figure 1-3 C-20 Data Recorder



C-23 Printer

The C-23 Printer is a compact, easy to use, 24-characters per line printer. It is connected directly to the data recorder, making it possible to print reports in the aircraft. Figure 1-4 shows the C-23 Printer.

Figure 1-4 C-23 Printer

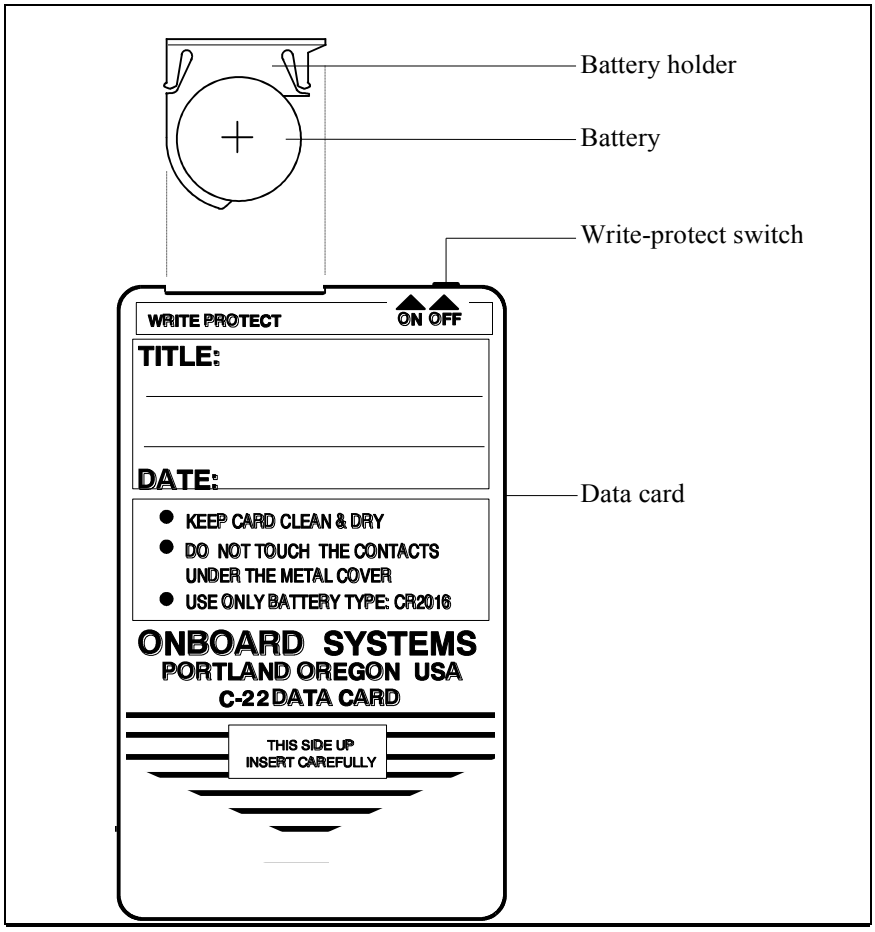


C-22 Data Card

The C-22 Data Card is a compact memory device that is the shape and size of a credit card. It plugs into the data recorder during lift operations where it records hook-load data such as weight of the load, and clock data such as lift start time and duration. The card then transfers the data to an office printer or an IBM-compatible or Macintosh computer via the C-24 Data Card Reader.

When the data card is installed in the data recorder or data card reader, it gets its power from that unit. When the data card is not in use, it is powered by a battery located in one end of the card. A write-protect switch is also available. The data card can be erased at any time using the data recorder or the office computer and reused indefinitely. Two data card memory capacities are available, 8 Kb (kilobytes) and 32 Kb. The 8 Kb card stores 714 entries, and the 32 Kb card stores 2,574 entries. Figure 1-5 shows the data card. Refer to the section, *Using the Data Card*, for more information about the data card.

Figure 1-5 Data card



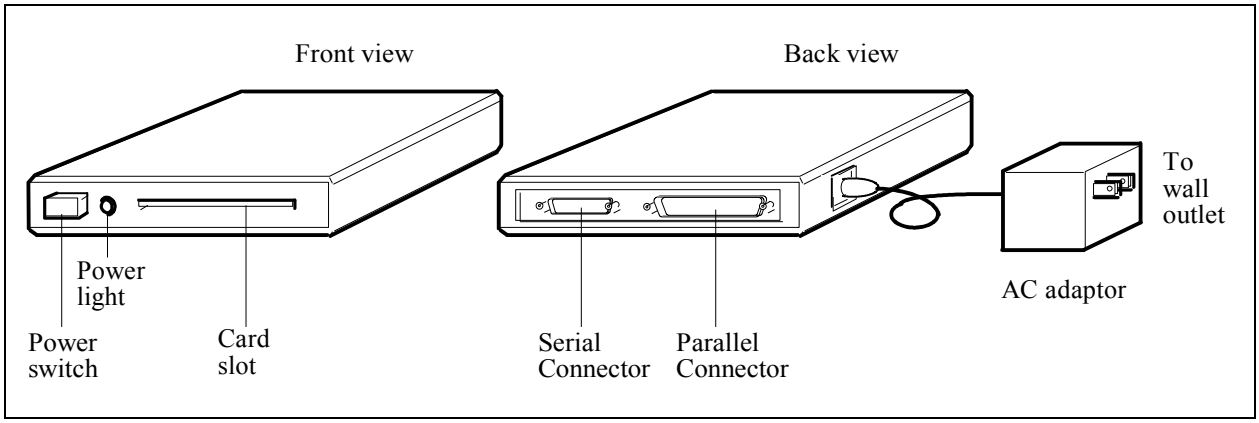
C-24 Data Card Reader

The C-24 Data Card Reader is a compact card reader and serial/parallel interface that connects to a printer or an IBM-compatible or Macintosh computer. To retrieve lift data from the C-22 Data Card, you plug the card into the data card reader. When connected to a printer, the data card reader automatically prints a complete job report including your company data, aircraft and pilot identifiers, customer and location identifiers, number of lifts, time and duration of each lift, weight, and a summary section of totals and averages. When the data card reader is connected to a computer, you use menus to display, print, and save the report information. Figure 1-6 shows the data card reader.

Software

Optional user-interface software for your IBM PC-compatible computer prompts the user to display, print, and save the collected data.

Figure 1-6 Data card reader



Section 2
Installing the Data Card System

This section describes how to install the components of the Data Card System.

Unpacking Inspection

After unpacking the components of your data card system, check each component against the packing list to ensure that you have received the correct configuration. If you find an error, notify the distributor immediately.

Inspect the components for evidence of mishandling or damage. All parts packaged at the factory were carefully tested, inspected, and packed. If damage is evident, do not proceed with installation. Instead, file a claim with the carrier and notify the distributor from whom the components were purchased. Refer to the *Appendix* for more information about returning a system component.

Installing the Data Recorder

The data recorder can be installed either permanently or temporarily. With temporary installation you can easily transfer the data recorder between several aircraft.

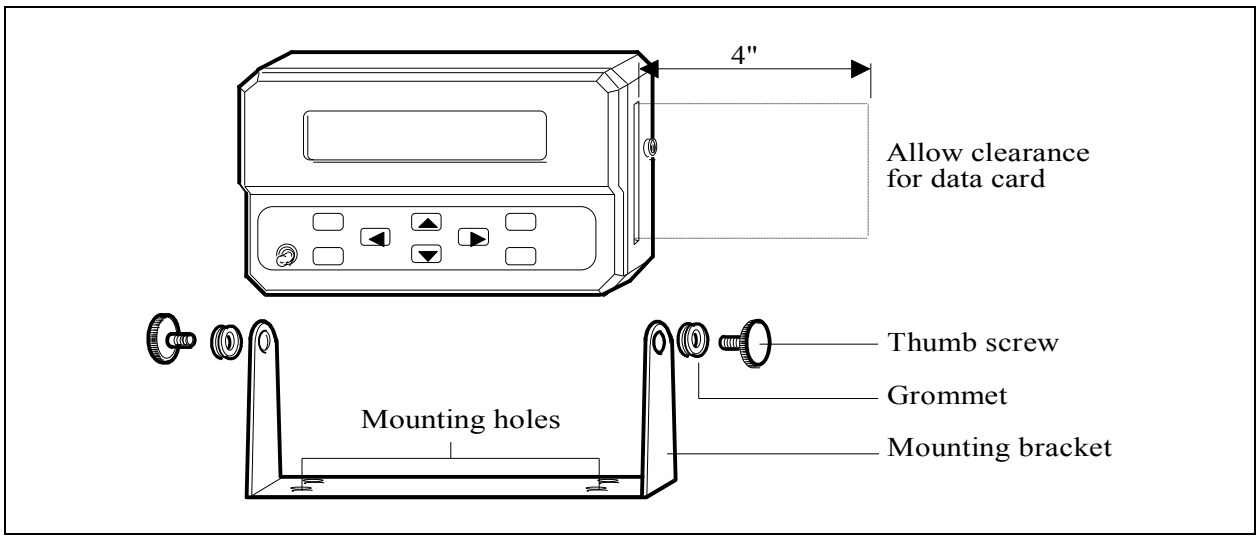
When the optional C-23 printer is used, the circuit breaker must be rated at 5 amp.

Installing the Data Recorder, contiuned

Follow these steps to install the data recorder in the aircraft cockpit. Refer to Figure 2-1, and to Figure 1-1 earlier in this manual.

1. Select an installation location within easy reach of the pilot that allows comfortable viewing during flight. For temporary installation, the data recorder can be secured with a seat belt. Ensure that there is sufficient clearance to insert a data card in the card slot on the right side of the data recorder.
2. Secure the mounting bracket in the selected location.
3. Attach the data recorder to the mounting bracket with the two thumb screws provided.
4. The data recorder has two connectors. The connectors are configured differently to prevent mismatching them. Connect one to the load weigh system's internal harness and the other to the C-23 Printer. Refer to Figure 1-1 earlier in this manual.

Figure 2-1 Installing the data recorder



Installing User-Supplied Switches

The flight-time and load-capture switches give the pilot direct control over the timing of flight and load measurements. The switches are supplied by the user.

Installing the Flight-Time Switch

Installation of the flight-time switch is required. The switch allows the data recorder to register the beginning and end of each flight. You can install the flight-time switch at any available switch, either normally open or normally closed, on the helicopter controls or in another location that is convenient to the pilot. For a typical installation you would install the flight-time switch on the collective so that when the pilot pulls up on the collective, the switch opens (or closes) and flight time begins counting. A six-foot length of red-coated 24-gauge wire is supplied for use in installing the flight-time switch. The wire is equipped with a pin connector on one end.

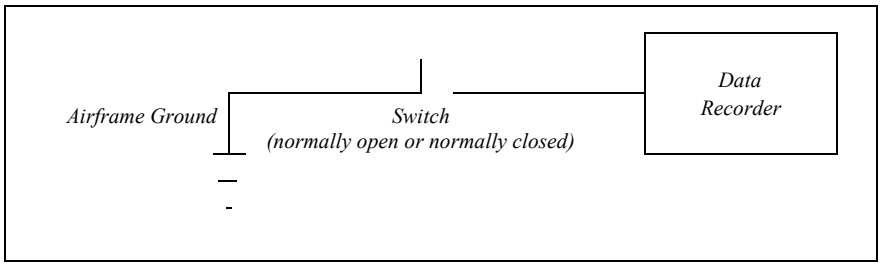
The flight-time switch can be wired several ways. Use this procedure and Figure 2-2 as a guide. Refer back to Figure 1-1 for an overview diagram of the switch location in the system.

1. Disassemble the data recorder connector located in the load weigh internal harness by unscrewing it. Notice that each pin socket is labeled with a number.
2. Insert the pin connector of the supplied wire into Pin Socket #4.

   NOTE

   Be sure the pin socket is the correct one. Once inserted, the pin cannot be removed without the use of a special tool.
3. Reassemble the data recorder connector.
4. Cut the free end of the wire to the desired length.
5. Connect the wire to the selected switch.
6. Connect the other side of the switch to a good airframe ground.
7. Using the data recorder's Setup Data menu, set the flight switch menu item to the appropriate polarity setting based on flight-time switch wiring: Select HIGH if the data recorder is connected to airframe ground during flight, select LOW if the data recorder is disconnected from airframe ground during flight.

Figure 2-2 Flight-time switch wiring guide



Installing a Capture Switch

A capture switch gives the data recorder the capability of registering the weight of a load at the moment the pilot presses the switch. A capture switch is not required; the data recorder automatically takes load readings throughout each lift, discards outlying values, and records an average weight for the lift. Lifts measured automatically and lifts captured with a capture switch can be intermingled. The display and the printouts indicate which load measurements are captured.

If a capture switch is desired, you can use any available normally open switch on the helicopter controls or any other normally open switch. The switch location should be convenient for the pilot to use. A six-foot length of purple-coated 24-gauge wire is supplied for use in installing a capture switch. The wire is equipped with a pin connector on one end.

To install the capture switch, use this procedure and Figure 2-3 as a guide. Refer back to Figure 1-1 for an overview diagram of the switch location in the system.

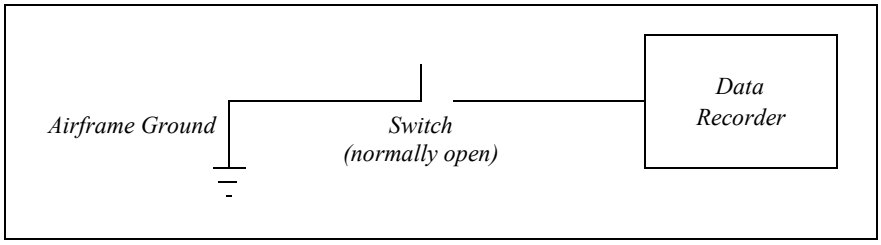
1. Disassemble the data recorder connector located in the load weigh internal harness by unscrewing it. Notice that each pin socket is labeled with a number.
2. Insert the pin connector of the supplied wire into Pin Socket #2.

NOTE

Be sure the pin socket is the correct one. Once inserted, the pin cannot be removed without the use of a special tool.

3. Reassemble the data recorder connector.
4. Cut the free end of the wire to the desired length.
5. Connect the wire to the selected switch.
6. Connect the other side of the switch to a good aircraft ground source.

Figure 2-3 Capture switch wiring guide



Making Electrical Connections

To connect the data recorder, plug the connector on the data recorder into the socket provided on the internal harness of the load weighing system. Refer back to Figure 1-1 for an overview diagram.

Installing the Data Card Reader

The data card reader can either be connected to a standard office serial or parallel printer or to a personal computer for further processing. If connected directly to a printer, all the information from the data card will be printed. If the card reader is connected to a personal computer and the optional software is used you will be able to display, print, or save the collected data as ASCII text.

To a Printer

Follow this procedure to install the C-24 Data Card Reader directly to a printer. Refer back to Figure 1-2 for an overview diagram.

NOTE

To install the data card reader, you need to obtain an appropriate printer cable. The card reader is fitted with two connectors. The 9-pin is the serial port and the 25-pin is the parallel port. Obtain the appropriate cable to connect the card reader port to your printer. Due to the number of cable and connector combinations, a cable is not supplied with the card reader. If you are connecting the card reader to a serial printer do not use a Null Modem cable.

1. Ensure that the power to your printer is off.
2. Connect the printer cable between the data card reader and your printer.
3. Plug the AC adaptor cable into the small round receptacle on the side of the data card reader.
4. Plug the AC adaptor into a wall outlet.
5. Turn on your printer and put it on-line.
6. Turn on the card reader.
7. To print a report, insert the data card to be read gently but firmly into the card slot on the front of the data card reader. The report begins printing. Figure 5-1 shows an example.

To a Personal Computer

Follow this procedure to install the C-24 Data Card Reader to a personal computer. Refer back to Figure 1-2 for an overview diagram.

NOTE

The card reader is connected to the personal computer (PC) by connecting the card reader serial port (9-pin connector) to a PC serial port, through a Null modem cable. Due to the number of connector combinations a cable is not supplied with the card reader.

1. Obtain a Null modem cable with the appropriate connectors.
2. Ensure that the power to your computer is off.
3. Connect the cable between the data card reader serial port and your computer serial port.
4. Plug the AC adaptor cable into the small round receptacle on the side of the data card reader.
5. Plug the AC adaptor into a wall outlet.
6. Turn on your computer.
7. Turn on the card reader.

Installing the Optional Software

Optional user-interface software for IBM PC 100%-compatible computers allows you to display, print, and save the collected data as ASCII text. Future software will provide data conversion to file formats compatible with a variety of accounting, spreadsheet, data base, and word processing programs.

IBM PC and Compatibles

A program called *Hook* is provided on a 3 1/4" diskette. The executable file can be copied to a directory if desired. Insert the diskette into the disk drive and access the program by typing *Hook*.

Section 3
Operating the Data Recorder and Printer

This section describes operation of the C-20 Data Recorder and C-23 Printer. Here are the topics in this section.

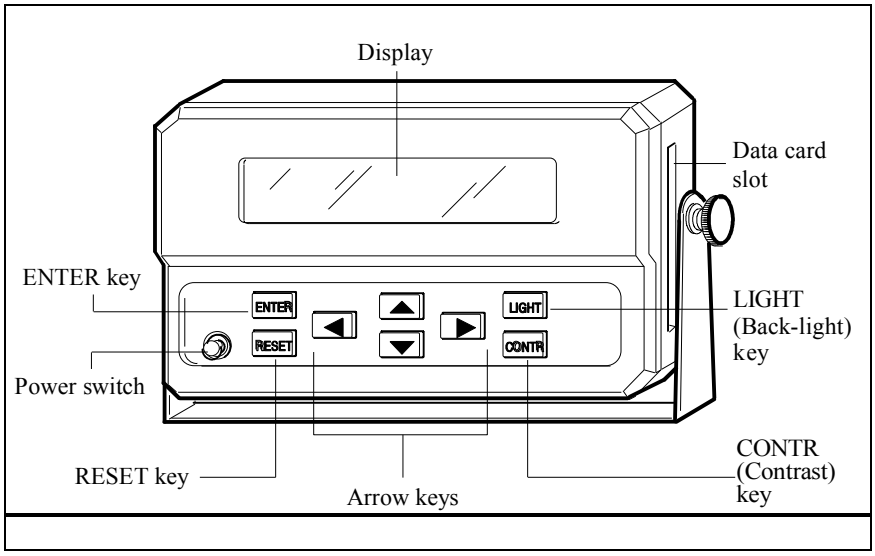
- *About the Front Panel* describes the keys, switches, and display of the front panel.
- *Turning on the Data Recorder* describes how to power up the data recorder.
- *Setting the Display* describes how to set the display contrast and back-lighting to accommodate current lighting conditions and the position of the data recorder.
- *Using the Menus* describes the System Menu and gives general procedures for operating and accessing its submenus.
- *Entering Setup Data* gives detailed procedures and information about the values that can be entered using the Setup Data menu.
- *Entering Company Data* describes the procedure for entering information on the Company Data menu for inclusion in a report header.
- *Managing the Customer List* describes the procedure for entering up to 10 different customers on the Manage Customer List menu.
- *Managing the Location List* describes the procedure for entering up to 10 different locations on the Manage Location List menu.
- *Using the Utilities Menu* describes the screens and procedures available using the Utilities menu.
- *Using the Run Screen* shows the primary screen used during flight operations and describes its displays.
- *Printing a Report* gives detailed procedures and information about using the optional printer and the Print menu.
- *Attention Messages* describes messages that can appear on the front panel display under certain conditions which require pilot attention.

About the Front Panel

The front panel of the data recorder includes the following features, as shown in Figure 3-1.

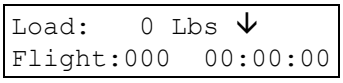
- The *power switch* turns on the data recorder power.
- The 2-line by 20-character *liquid crystal display* (LCD) shows lift data, menu settings, and other information of interest to the pilot.
- The *ENTER key* is used to enter new information, select menu choices, and change menu settings.
- The *RESET key* is used to reset data settings.
- The *LIGHT key* is used to set the display back-lighting level.
- The *CONTR key* is used to set the display contrast level.
- The *Up*, *Down*, *Left,* and *Right arrow keys* are used to scroll through the menus and change menu settings.

Figure 3-1 Data recorder front panel



Turning on the Data Recorder

To turn on the data recorder, press the front panel power switch up. When you turn on the data recorder, a screen similar to the following appears on the display. If, instead, a message appears, refer to *Attention Messages* for more information.



NOTE

The load weigh system must also be powered up because the data recorder and printer power comes through that system. Do not turn on the data recorder or printer until the load weigh system is powered up.

Setting the Display

Depending on ambient light conditions and the position of the data recorder, you may want to change the back-lighting or contrast of the front panel display. The following paragraphs describe these display features and how to change them.

Adjusting the Back-Lighting

The data recorder display includes an electroluminescent back-lighting feature. Back-lighting helps compensate for different ambient lighting conditions.

To change the intensity of the back-lighting, follow these steps.

1. While holding down the LIGHT key on the front panel, press and hold the Up or Down key to step through the contrast levels. Pressing the Up key increases the back-light level; pressing the Down key decreases the back-light level.
2. Release the LIGHT key. The data recorder retains this setting until it is changed.

Adjusting the Display Contrast

The data recorder display is equipped with adjustable contrast control. Setting the contrast adjusts the display to help compensate for different viewing angles.

To change the contrast setting, follow these steps.

1. While holding down the CONTR key on the front panel, press the Up and Down keys to step through the contrast levels. Pressing the Up key decreases the contrast; pressing the Down key increases the contrast.
2. Release the CONTR key. The data recorder retains this setting until it is changed.

Using the Menus

The software functions of the data recorder are grouped into menus that you use to enter and display information.

- The *System Menu* accesses the Setup Data, Customer List, Location List, Company Data, and Utilities menus. Once you enter information in these menus, it is retained until you change it.
- The *Setup Data menu* contains job identification and setup data that are determined by the pilot on-site. Once set, most of the entries, such as date, time, pilot and aircraft rarely need to be reset.
- The *Manage Customer List menu* allows you to enter up to ten different customer names. Different information can be recorded for each customer
- The *Manage Location List menu* allows you to enter up to ten different locations. Different information can be recorded for each customer.
- The *Company Data menu* provides six 20-character lines for the entry of your company name and address or other information you want printed as a report header.
- The *Utilities menu* displays the system version number and remaining data card storage, and allows you to erase a data card.
- The *Print menu* is accessed by pressing ENTER when the Run screen is displayed. The menu allows you to specify full report or summary format, and to select a particular customer for the report.

The selections that appear on these menus are described in detail later in this section.

The following paragraphs describe in general terms how to:

- Use the System Menu to access the Setup Data menu, Customer List Menu, Location List Menu, Company Data menu, and Utilities menu.
- Scroll through a menu
- Change the value of a menu setting
- Exit a menu and return to the Run screen

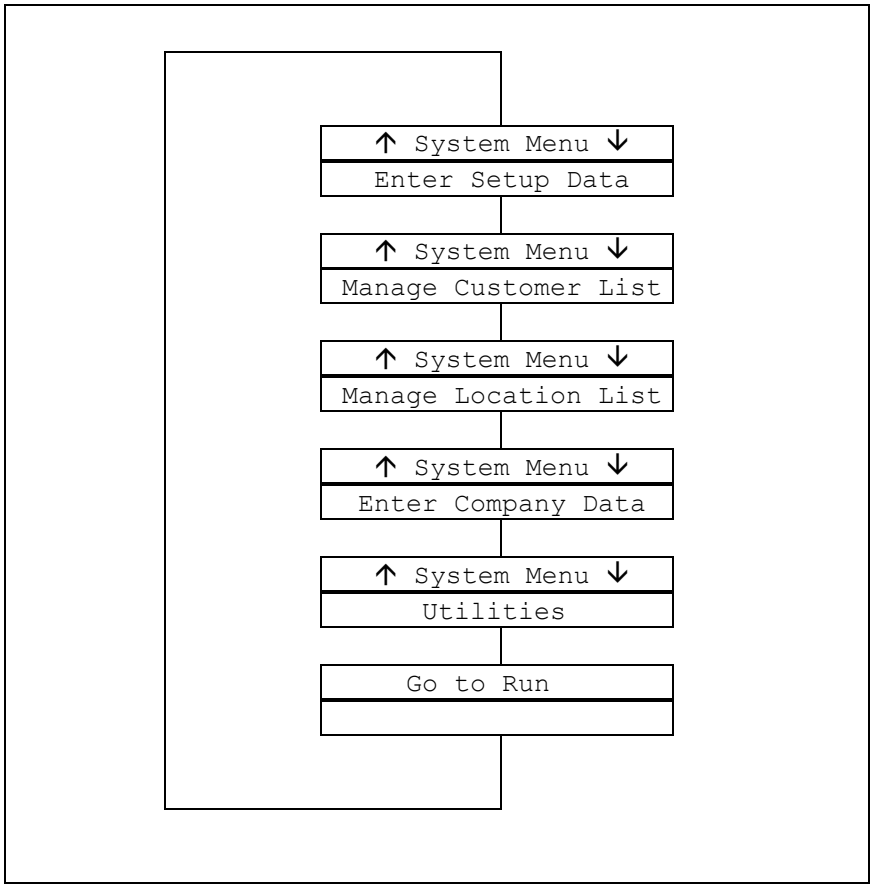
For detailed information on a particular menu setting, refer to the description of that setting later in this section.

Accessing Menus with the System Menu

You use the System Menu to access the Setup Data, Customer List, Location List, Company Data, and Utilities menus. You can access the System Menu whenever the Run screen is displayed. To access a menu, follow these steps.

1. Press the Up *and* Down keys simultaneously to enter the System Menu.
2. Use the Up and Down keys to select the desired menu name. Figure 3-2 shows the screens on the System Menu.
3. Press ENTER to access the selected menu.

Figure 3-2 System Menu loop



Scrolling Through a Menu

To scroll through the selections on a menu without changing any settings, press either the Up key or the Down key. The selections on each menu are arranged in a continuous loop.

Changing a Menu Selection

To change the current setting of a particular menu selection, follow these steps.

1. Access the desired menu.
2. Use the Up and Down keys to scroll through the menu until you see the desired selection.
3. Press the Right or Left key to access entry mode for the menu selection. For alphanumeric and numeric entries, a cursor appears below the first character that you can change.
4. Now enter the desired setting. Use the Left and Right keys to position the cursor under the character, number, or setting you want to enter or change. Then use the Up and Down keys to scroll through the choices.
   - For *alphanumeric* entries such as aircraft identifier or company data, the choices are the characters A-Z, 0-9, space, hyphen, slash, apostrophe, and period.
   - For *numeric* entries such as date or time, the choices are 0-9.
   - For entries that are *alternate choices*, such as English and Metric, you toggle between the choices.
   - Angle brackets are used to show the last choice entered.
5. When the setting is displayed correctly, press ENTER to enter the new setting and return to the current menu. The menu selection that follows the selection you just set is displayed.

Exiting a Menu

To exit a menu and return to the Run screen, follow these steps.

1. Press the Up or Down key to scroll through the menu until the following display appears.

   ```
   Go to Run
   ```

2. Press the ENTER key. The Run screen appears.

Entering Setup Data

The Setup Data menu allows you to view and enter setup data and job information that are determined or verified by the pilot on-site. Some values, such as aircraft and pilot identifiers, help identify the job. Some entries, such as time and date, are used by the data recorder to calculate data such as length of lift. Other settings, such as operating mode, minimum lift load, minimum lift time, flight switch polarity, or units setting, are determined by job conditions or the configuration of your aircraft or weighing system.

Setup Data menu entries include these items.

- Pilot identifier
- Aircraft identifier
- Operating mode, either automatic or manual recording
- Minimum lift load, used during automatic recording
- Minimum lift time, used during automatic recording
- Average time
- Current date
- Current time
- Flight switch polarity
- Units legend, either LB or KG

Descriptions of each menu selection appear on the following pages.

Entering Setup Data, continued

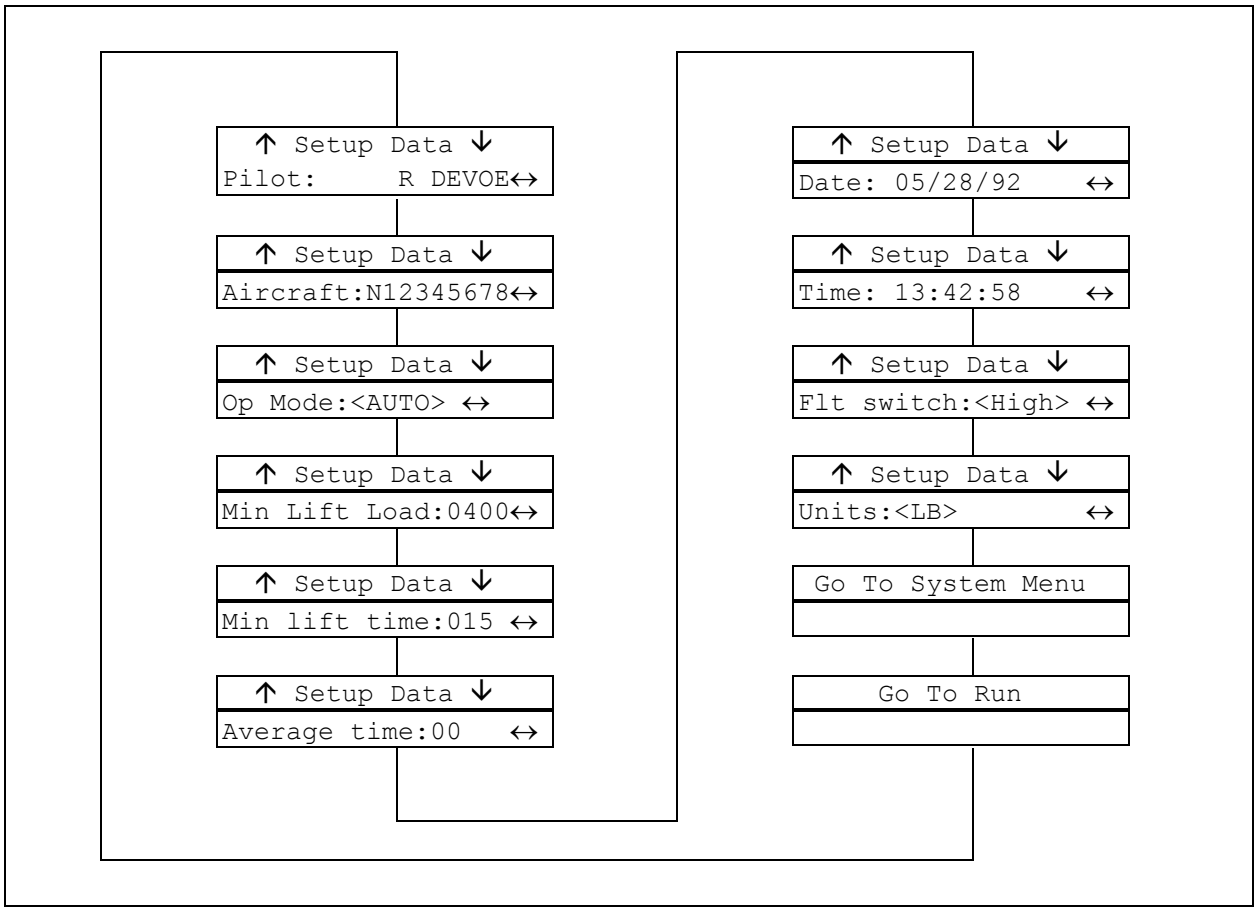
To access the Setup Data menu from the Run screen, follow these steps.

1. Press the Up *and* Down keys simultaneously to access the System Menu.
2. Use the Up and Down keys to display the "Enter Setup Data" selection.

   ```
   ↑ System Menu ↓
   Enter Setup Data
   ```

3. Press ENTER. You can now scroll through the selections in the Setup Data menu loop shown in Figure 3-3.

Figure 3-3 Setup Data menu loop

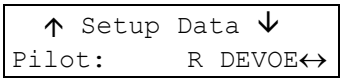


Entering Pilot Identifier

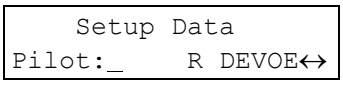
The pilot identifier serves to connect a particular pilot to the job information stored in the data card and printed in the reports. A change of pilots during a job is noted on the reports. The identifier can be any alphanumeric string up to nine characters long.

To enter the pilot identifier, follow these steps.

1. Scroll through the Setup Data menu until you see a screen like this.



2. Press the Right or Left key to place a cursor under the first character that can be changed.



3. Use the Right and Left keys to position the cursor under each character you want to change, and then use the Up and Down keys to scroll through the choices for that character. For example, you might enter this value.

4. When all changes have been made, press ENTER to save the new setting and move to the next menu selection.

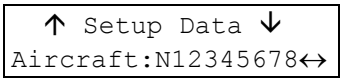
5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

Entering Aircraft Identifier

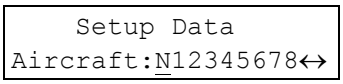
The aircraft identifier serves to connect a particular aircraft to the job data stored in the data card and printed in the reports. Depending on your need, the identifier might be the aircraft's tail number or serial number, or any other alphanumeric string up to nine characters long.

To enter the aircraft identifier, follow these steps.

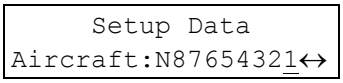
1. Scroll through the Setup Data menu until you see a screen like this.



2. Press the Right or Left key to place a cursor under the first character that can be changed.



3. Use the Right and Left keys to position the cursor under each character you want to change, and then use the Up and Down keys to scroll through the choices for that character. For example, you might enter this value.



4. When all changes have been made, press ENTER to save the new setting and move to the next menu selection.

5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

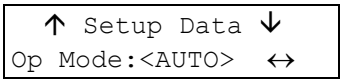
Setting Recording Mode

The recording mode setting allows you to select between automatic and manual recording modes. In automatic mode, the system automatically records any lift that exceeds both the minimum load and minimum lift time set. In manual mode, the system begins recording the lift only when the pilot presses the capture switch.

If manual mode is set, the minimum lift time and average load time information is not needed.

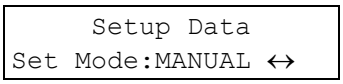
To set the system for automatic or manual recording, follow these steps.

1. Scroll through the Setup Data menu until you see an item like this.



   The angle brackets around the word "AUTO" indicate that in this example the current setting is for automatic recording.

2. Press the Right or Left key to access the following screen.



3. Use the Right or Left key to toggle between the choices until the desired selection is displayed.
4. Press ENTER to save the new setting and move to the next menu selection.
5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

Setting Minimum Lift Load

The minimum lift load setting allows you to specify the minimum weight that determines a valid load. Defining a minimum load prevents the system from recording every small load that is applied to the hook. The minimum lift load setting can be any integer up to four digits long, to a maximum of 9999. There is no scale in this function, entering 0400 means 400 LBs or KGs. The units legend (LB or KG) depends on the units setting.

To change the minimum lift load, follow these steps.

1. Scroll through the Setup Data menu until you see an item like this.

```
  ↑ Setup Data ↓
Min Lift Load:0400↔
```

2. Press the Right or Left key to access the following screen. A cursor appears under the first digit. The display also indicates the units setting that is in effect.

```
     Setup Data
Min Load (LB):0400↔
```

3. Use the Right and Left keys to position the cursor under each digit you want to change, and then use the Up and Down keys to scroll through the setting choices for that digit.

```
     Setup Data
Min Load (LB):0250↔
```

4. When all changes have been made, press ENTER to save the new setting and move to the next menu item.

5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

Setting Minimum Lift Time

The minimum lift time setting allows you to specify the length of time in seconds that a load must be carried to be recorded as a valid load. Defining a minimum time prevents the system from recording a quick tug on the hook as a valid load. The minimum lift time setting can be any integer up to three digits long, to a maximum of 999 seconds.

If manual recording mode is set, this menu item does not appear.

To change the minimum lift time, follow these steps.

1. Scroll through the Setup Data menu until you see an item like this.

   ```
   ↑ Setup Data ↓
   Min Lift Time:015 ↔
   ```

   This example indicates a minimum lift time of fifteen seconds.

2. Press the Right or Left key to access the following screen. A cursor appears under the first digit.

   ```
        Setup Data
   Min Time (sec):015↔
   ```

3. Use the Right and Left keys to position the cursor under each digit you want to change, and then use the Up and Down keys to scroll through the setting choices for that digit.

   ```
        Setup Data
   Min Time (sec):010↔
   ```

4. When all changes have been made, press ENTER to save the new setting.

5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

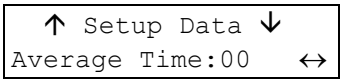
Setting the Average Time

The average time setting allows you to specify the length of time in seconds that a load is averaged during a lift. If the average time is zero, the load is averaged from the time the load exceeds the minimum lift time and lift load until the load is reduced by 75%. The average time setting can be any integer up to two digits long, to a maximum of 99 seconds.

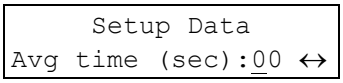
If manual recording mode is set, this menu item does not appear.

To change the average time setting, follow these steps.

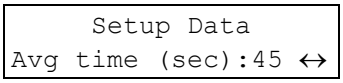
1. Scroll through the Setup Data menu until you see the average time entry. The time reads in seconds.



2. Press the Right or Left key to place a cursor under the first character that can be changed.



3. Use the Right and Left keys to position the cursor under each digit you want to change, and then use the Up and Down keys to scroll through the choices for that digit.



4. When all changes have been made, press ENTER to save the new setting and move to the next menu selection.

5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

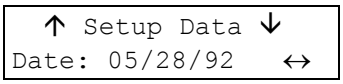
Entering the Date

The date setting helps identify job data and is printed at the top of the job report. The date is updated by the data recorder clock, which is powered by an internal lithium battery. Once set, the correct date should remain in the system as long as the battery is good.

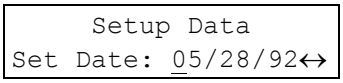
Check the data occasionally to ensure that it is correct. For information on changing the battery, read *Changing the Data Recorder Battery* at the end of this section.

To change the date setting, follow these steps.

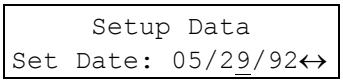
1. Scroll through the Setup Data menu until you see the date entry. The format of the date is MM/DD/YY.



2. Press the Right or Left key to place a cursor under the first character that can be changed.



3. Use the Right and Left keys to position the cursor under each digit you want to change, and then use the Up and Down keys to scroll through the choices for that digit.



4. When all changes have been made, press ENTER to save the new setting and move to the next menu selection.

5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

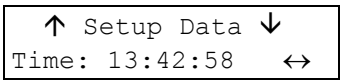
Entering the Time

The time setting is used to identify the job data. The start time and duration of each lift is printed in the reports. The time is controlled by the data recorder clock. Once set, the correct time should remain in the system as long as the battery is good.

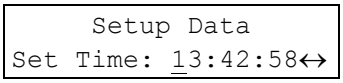
Check the time occasionally to ensure that it is correct. For information on changing the battery, read *Changing the Data Recorder Battery* at the end of this section.

To change the time setting, follow these steps.

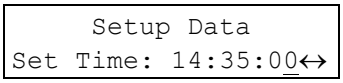
1. Scroll through the Setup Data menu until you see the time entry. The format of the time display is HH:MM:SS using a 24-hour clock.



2. Press the Right or Left key to place a cursor under the first character that can be changed.



3. Use the Right and Left keys to position the cursor under each digit you want to change then use the Up and Down keys to scroll through the choices for that digit.



4. When all changes have been made, press ENTER to save the new setting and move to the next menu selection.

5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

Specifying Flight-Time Switch Polarity

You set flight-time switch polarity to specify the type of connection used by the flight-time switch wiring. The correct setting depend on how this user-supplied switch is installed. There are two menu settings: High specifies that the switch connects the data recorder to an airframe ground source during flight; Low specifies that the switch disconnects the data recorder from airframe ground during flight.

Follow these steps to specify the flight-time switch polarity.

1. Scroll through the Setup Data menu until you see an item like this.

   ```
     ↑ Setup Data ↓
   Flt switch:<HIGH> ↔
   ```

   The angle brackets around the High selection in this example indicate that when the aircraft is in flight, the flight-time wire of the data recorder is connected by the switch to airframe ground. When the aircraft is on the ground, the switch disconnects the wire from airframe ground.

2. Press the Right or Left key to access the following screen.

   ```
        Setup Data
   Polarity:LOW     ↔
   ```

3. Use the Right or Left key to toggle between High and Low until the desired selection is displayed. Select Low if the flight time counts when the flight-time wire is disconnected from airframe ground.

4. Press ENTER to save the new setting and move to the next menu item.

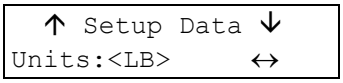
5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

Setting the Units Legend

The units legend setting allows you to set the data recorder screens and report printouts to list values using either pounds (LB) or kilograms (KG). The data recorder should be set to match the output of your C-39 indicator. The C-39 indicator's output scale can be changed by the operator.

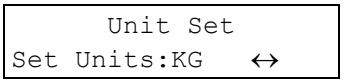
Follow these steps to set the units of measurement display.

1. Scroll through the Setup Data menu until you see this item.



   The angle brackets around the legend "LB" in this example indicate that load weight measurements will display the legend for pounds.

2. Press the Right or Left key to access the following screen.



3. Use the Right or Left key to toggle between the LB and KG until the desired selection is displayed.

4. Press ENTER to save the new setting and move to the next menu item.

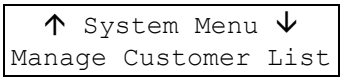
5. If you are finished making changes in the Setup Data menu, use the Up or Down key to scroll to the Go To System Menu selection or the Go To Run selection. Press ENTER to display the selected screen.

Managing the Customer List

The customer list links job data to a particular customer. When work is performed for several customers, a separate job report can be generated for each customer. The customer names can be any alphanumeric string up to nine characters long. Up to ten customers can be entered and this information will be stored until it is changed.

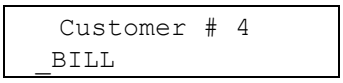
To enter or edit customer names, follow these steps.

1. Scroll through the System Menu until you see this screen:

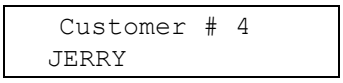


2. Press ENTER and use the Up and Down arrow keys to scroll to the customer that needs to be changed or added.

3. Press the Right or Left key to place a cursor under the first character that can be changed.



4. Use the Right and Left keys to position the cursor under each character you want to change, and then use the Up and Down keys to scroll through the choices for that character. For example, you might enter this value.



5. When all changes have been made, press ENTER to save the new setting and then use the Up and Down keys to scroll to the next customer.

Managing the Customer List, continued

6. If you are finished making changes in the Customer List menu, select the desired customer by using the up and down arrow keys until the correct customer appears and then press ENTER to get back to the System Menu.

NOTE

Be sure that when you exit out of the Manage Customer List menu, the correct customer has been selected. The flight information will be recorded for the customer last selected. To verify customer or change to another customer, follow the procedures on the following page.

To access the Customer List menu from the Run screen, follow these steps.

1. If accessing during flight, press the Up or Down arrow key to end the turn.

NOTE

If the turn is not ended and a new customer is selected, the last lift will be added to the new customer. Press the Up or Down key to end the turn.

2. Press the Up and Down arrow keys simultaneously to access the System Menu. You should see Manage Customer List on the screen, press ENTER.

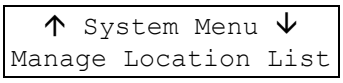
3. Follow the guidelines on the previous page to select, add or change customers.

Managing the Location List

The location list helps to further describe work done for a particular customer on the job report. The locations can be changed at any time between lifts, and the lifts corresponding to each location are indicated on the report. The locations can be any alphanumeric string up to nine characters long. Up to ten different locations can be entered and will remain stored until they are changed.

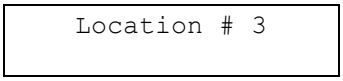
To enter or edit locations, follow these steps.

1. Scroll through the System menu until you see this screen:



2. Press ENTER and use the Up or Down arrow keys to scroll to the location that needs to be changed or added.

3. Press the Right or Left key to place a cursor under the first character that can be changed.



4. Use the Right and Left keys to position the cursor under each character you want to change, and then use the Up and Down keys to scroll through the choices for that character. For example, you might enter this value.

5. When all changes have been made, press ENTER to save the new setting and then use the Up and Down arrow keys to scroll to the next location.

Managing the Location List, continued

6. If you are finished making changes in the Location List menu, select the desired location by using the up and down arrow keys until the correct location appears and then press ENTER to get back to the System Menu.

NOTE

Be sure that when you exit out of the Manage Location List menu, the correct location has been selected. The flight information will be recorded for the location last selected. To verify location or change to another location, follow the procedures on the following page.

To access the Location List menu from the Run screen, follow these steps.

1. If accessing during flight, press the Up or Down arrow key to end the turn.

NOTE

If the turn is not ended and a new location is selected, the last lift will be added to the new location. Press the Up or Down key to end the turn.

2. Press the Up and Down arrow keys simultaneously to access the System Menu. Use the Up or Down arrow keys to scroll to Manage Location List and then press ENTER.

3. Follow the guidelines on the previous page to add or change locations.

Entering Company Data

The Company Data menu allows you to enter standard information about your company, such as name, address, and phone number. This information is printed in the header at the top of all reports. Six lines of 20 characters each are available. Entering data on these lines is optional.

To access the Company Data menu from the Run screen, follow these steps.

1. Press the Up *and* Down keys simultaneously to access the System Menu.
2. Use the Up and Down keys to display the Company Data selection.

```
↑ System Menu ↓
Enter Company Data
```

3. Press ENTER. You can now scroll through the lines in the Company Data menu loop. Figure 3-4 shows the Company Data menu loop with example entries for the fictional company Rotor-to-Order.

To enter company data, follow these steps.

1. Access the Company Data menu as described above. A display like this appears.

```
↑ Company Data:1 ↓
```

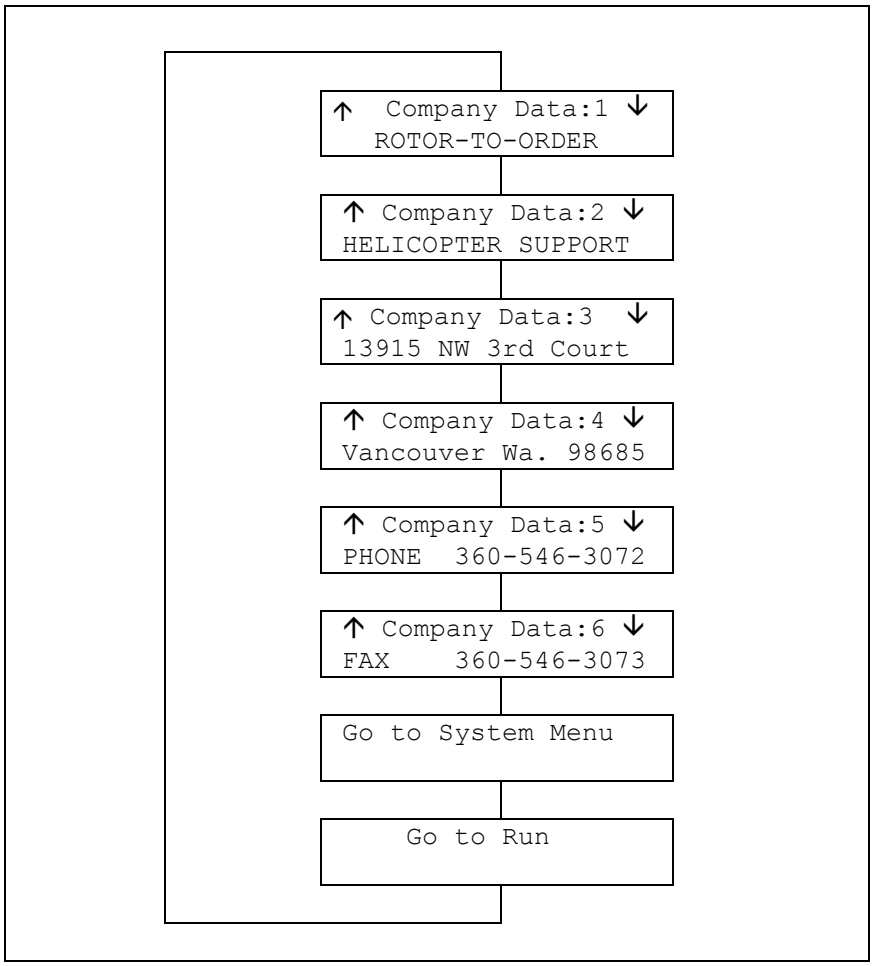
2. Press the Right or Left key to access the following screen. A cursor appears in the first position on the second line of the display.

```
Enter Company Data:1
_
```

3. Use the Up and Down keys to scroll through the character choices — A-Z, 0-9, space, hyphen, slash, apostrophe, and period. When the desired character is displayed, use the Right and Left keys to place the cursor under the next position where you want to change or enter a character.
4. When all changes have been made to the first line of company data, press ENTER to save the new setting and move to the next line.
5. Edit Lines 2 through 6 as you did for Line 1.
6. When you are finished, return to the System Menu or the Run screen by pressing ENTER when the appropriate choice is displayed.

Entering Company Data, continued

Figure 3-4 Company Data menu loop



Using the Utilities Menu

The Utilities menu displays the system version number and remaining data card storage, and allows you to erase a data card.

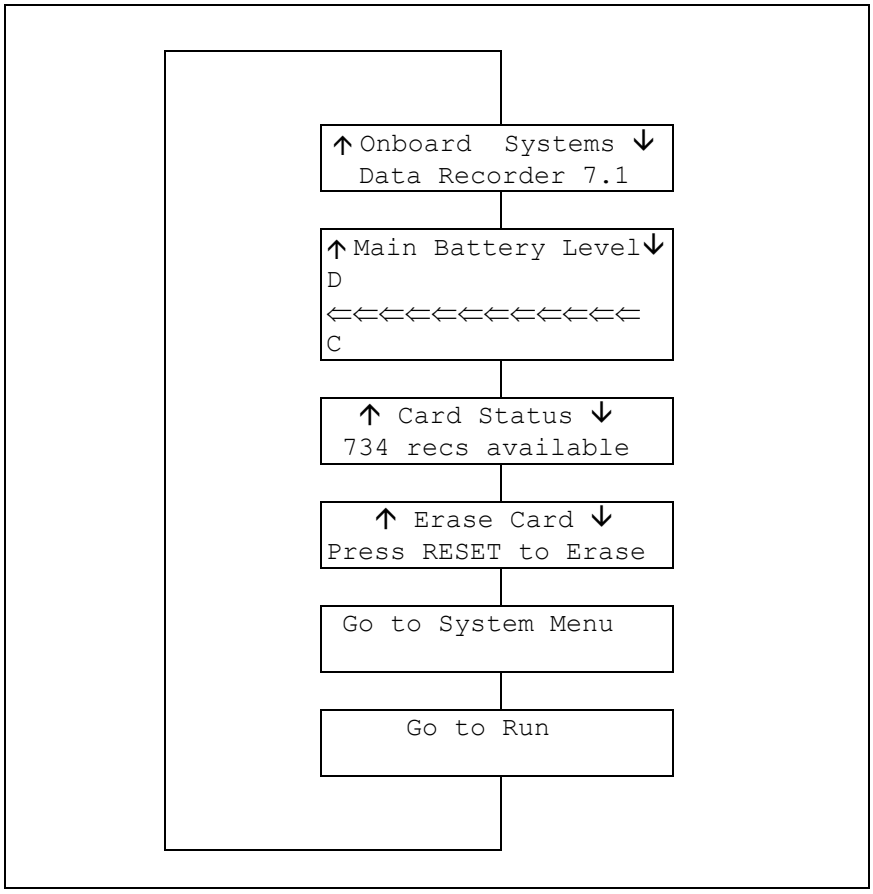
To access the Utilities menu from the Run screen, follow these steps.

1. Press the Up *and* Down keys simultaneously to access the System Menu.
2. Use the Up and Down keys to display the Utilities selection.

```
↑ System Menu ↓
   Utilities
```

3. Press ENTER. You can now scroll through the lines in the Utilities menu loop, shown in the example in Figure 3-5.

Figure 3-5 Utilities menu loop



Viewing the Software Version Number

The first screen in the Utilities menu displays the version number of the data recorder software.

To view the version number, follow these steps.

1. Scroll through the Utilities menu until you see a screen similar to this example.

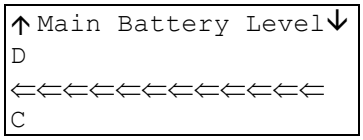
2. Press the Down key to move to the next menu screen, or press the Up key to get the Go to Run screen.

Viewing the Data Recorder Battery Level

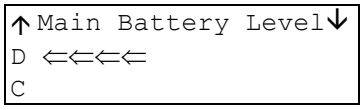
The next screen in the Utilities menu displays a bar chart of the charge level in the data recorder's internal lithium battery. If the battery level is low, follow the instructions for *Replacing the Data Recorder Battery* at the end of this section.

To view the battery level of the data recorder, follow these steps.

1. Scroll through the Utilities menu until you see this screen.



The "D" stands for "discharged" and the "C" stands for "charged." Thus the battery that generated the preceding display is charged near capacity. The battery that generated the following display is nearly discharged and should be replaced. See *Changing the Data Recorder Battery* in this Section.



2. Press the Up or Down key to move to other screens in the menu loop.

Viewing the Data Card Status

The data card status shows how many entries can still be stored on the data card. An entry is any item of information that is stored on the card, such as customer identifier, product identifier, and lift information. An 8 Kb card can hold 714 entries; a 32 Kb card can hold 2,574 entries.

To view the card status, follow these steps.

1. Scroll through the Utilities menu until you see this screen.

   ```
   ↑ Card Status ↓
   534 recs available
   ```

   The number of available entries decreases as you store more lift information and resets to the maximum when you erase the card.

   If no card is installed, this message appears instead.

   ```
   ↑ Card Status ↓
   No Card Installed
   ```

2. Press the Up or Down key to move to other screens in the menu loop.

Erasing the Data Card

Erasing a data card deletes all lift information from the card. Information that has been set using the Setup Data, Customer List, Location List, and Company Data menus is not erased. Use the appropriate menu to change this information, if desired.

To erase the data card status, follow these steps.

1. Scroll through the Utilities menu until you see this screen.

   ```
     ↑ Clear Card ↓
   Press RESET To Clear
   ```

   If no card is installed, the following message appears instead.

   ```
     ↑ Clear Card ↓
    No Card Installed
   ```

   Insert the card you want to erase and reselect the Clear Card menu choice.

2. Press RESET to continue with the erasure sequence. Press any key other key than RESET to move to the next screen on the Utilities Menu without erasing the card.

   If you press RESET, the following display asks you to confirm erasure.

   ```
   Erase All Card Data?
     ENTER To Confirm
   ```

4. Press the ENTER key to erase the data card, or press any key other than ENTER to escape from the erase sequence without erasing the card. The next screen on the Utilities Menu is displayed.

Using the Run Screen

The Run screen is the screen that appears when you turn on the data recorder. It is displayed during normal operation and data recording. The Run screen must be displayed to record lift data. If a screen other than the Run screen appears on power up, refer to *Attention Messages* at the end of this section for more information.

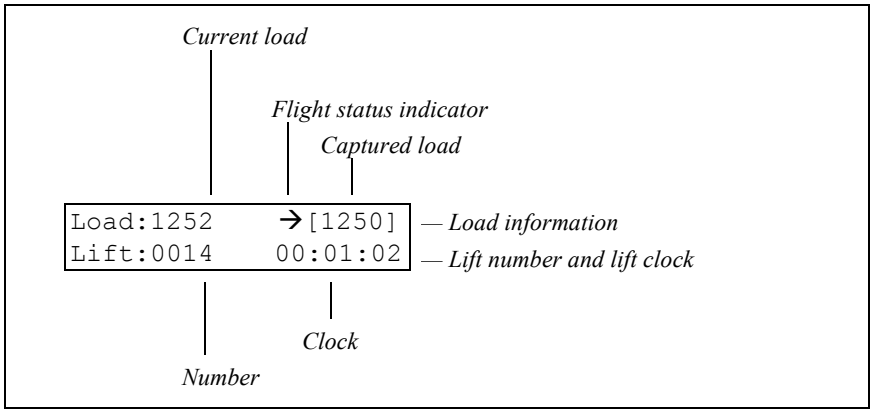
Several types of information can be displayed on the Run screen, as described in the following paragraphs.

During a Lift

Figure 3-6 shows an example of the Run screen as it appears during lift operations. The first line of the Run screen shows the weight of the load, the flight status indicator, and any load weight captured using the optional capture switch. The flight status indicator appears as follows:

- ↓ Ground indicator. The flight has not yet begun, or the flight has ended.
- ↑ Flight indicator. The aircraft is in flight but is not performing a lift. Flight time is accruing.
- → Lift indicator. A load is being carried. Turn time and flight time are accruing. The indicator and lift information appear when lift load and time minimums are exceeded.
- ← Turn indicator. The load has been dropped and the aircraft is returning for another load. Turn time and flight time are accruing. Turn time is the time from the beginning of one lift to the beginning of the next lift.

Figure 3-6 Run screen with lift information

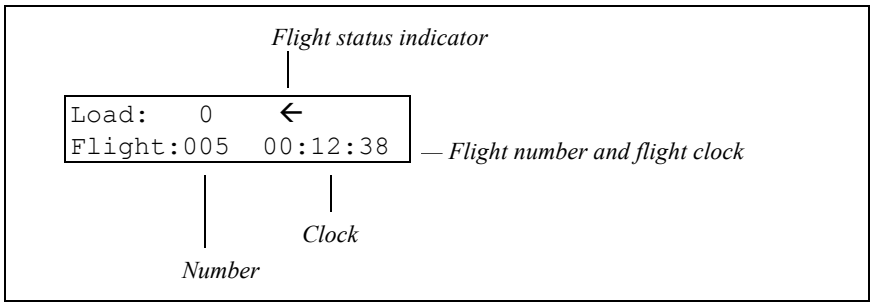


During a Flight

The Run screen displays flight information when the aircraft is in flight but no load is on the hook, or when you have requested flight information by pressing Right or Left. Figure 3-7 shows an example of the Run screen displaying flight information.

When no load is on the hook, the second line of the Run screen automatically shows the sequence number and duration of the flight. When a load is on the hook, the second line automatically shows the sequence number and duration of the current lift. To view the flight number and clock when lift information is displayed, press Right or Left until the display appears.

Figure 3-7 Run screen with flight information



Viewing Customer Totals

You can also use the Run screen to display flight and lift totals for a particular customer. This feature allows you to display summary customer data in the cockpit when a printer is not available. Two screens of customer information are available; one shows the number of flights and total flight time, the other shows the number of lifts and total load.

To view the customer totals:

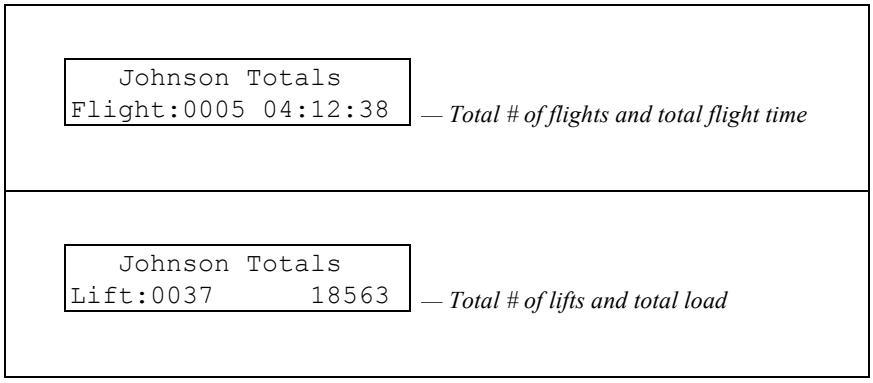
1. If needed, use the Manage Customer List menu to set the customer identifier to the name of the customer whose data you want to view.
2. Return to the Run screen, then press the Right or Left key one or more times until the desired data is displayed.

NOTE

If you begin a lift when a customer totals screen is displayed, the lift data Run screen automatically appears. The current customer identifier setting is used to identify the lift.

Figure 3-8 shows examples of the customer totals Run screens.

Figure 3-8 Run screens with customer totals



Recording a Lift

This procedure describes the steps you follow to record a lift.

1. Turn on the power to the weighing system and then the data recorder.
2. Use the Setup Data and Company Data menus to change any menu settings, as needed.
3. Ensure that the Run screen is displayed. See Figure 3-9a.

```
Load:    0     ↓
Flight:000   00:00:00
```

4. Use the zero control on the weighing system indicator to zero the load readings both on the indicator and the data recorder.
5. Insert a data card into the data recorder.

NOTE

You can use the data recorder as a remote indicator without the data card. However, no lift information is recorded.

6. Begin the flight or turn on the flight time switch to begin accruing flight time. The flight counter increments and the ground indicator ↓ changes to the flight indicator ↑. See Figure 3-9b.

```
Load:    0     ↑
Flight:001   00:00:01
```

7. Begin a lift. In automatic mode, when both the minimum lift time and minimum lift load are exceeded, the system records a lift. On the Run screen, the load weight registers and the lift indicator → appears. The lift data line appears, the lift counter increments, and the lift clock begins counting. See Figure 3-9c.

   The system displays and records the full duration of the lift, even if a minimum lift time is set. For example, if the minimum lift time is five seconds, the display looks something like this when the lift indicator first appears.

```
Load:1251    →<1251>
Lift:0001    00:00:05
```

Recording a Lift, continued

During manual operations, the pilot must press the capture switch to begin recording a lift. During automatic operations, if the pilot presses the capture switch at any time during the lift, the data recorder captures the weight of the load that is measured at the moment the switch is pressed and applies that weight to the entire lift. See Figure 3-9d. The measurement can be recaptured at any time during the lift; only the last value is saved. The captured load weight appears next to the current load display.

```
Load:1250     →[1250]
Lift:0001   00:01:02
```

If a capture switch is not used during automatic recording, the average weight of the load during the lift is recorded.

8. For both automatic and manual recording, flight information and the turn indicator ← appear when the load is reduced by 75%.

```
Load: 312     ←[1250]
Flight:001  00:04:13
```

For example, if the load weighs 1000 pounds, lift timing ends when the system registers 250 pounds. Turn time accrues until the next load is picked up or the flight ends. See Figure 3-9e.

9. Repeat Step 7 for all the lifts you want to record on this flight.

10. Landing the aircraft ends the current flight. There is a 20-second delay before the ground indicator appears.

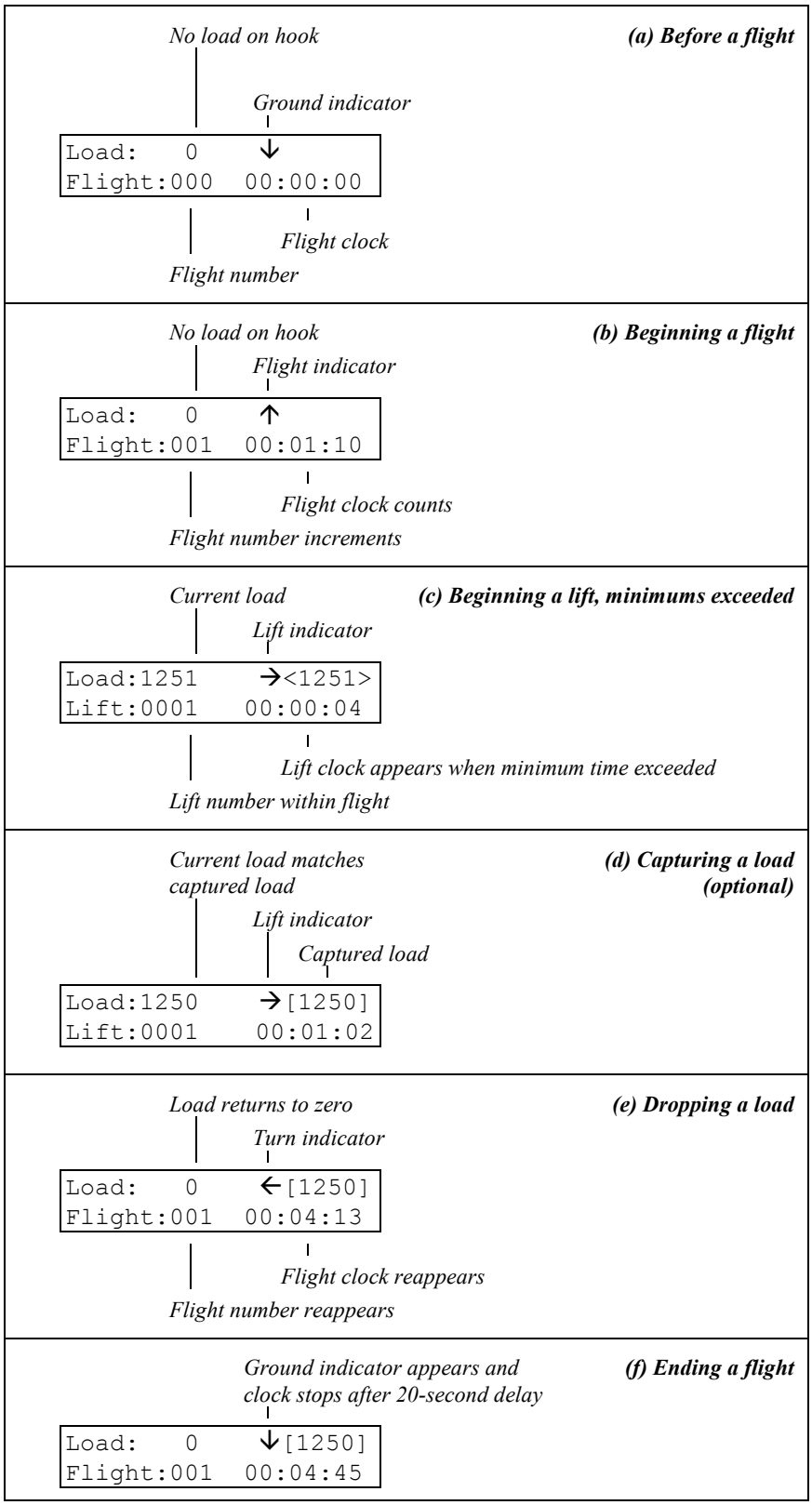
    Changing new customer information ends the current flight and begins a new flight. This can be done at any time during a flight.

11. To begin recording lift data on another data card while in flight, remove the existing card at the end of a lift and continue with Step 5.

NOTE

Do not remove the data card until the lift is complete. If the card is removed before the end of the lift, the lift is not recorded. Removing the old data card ends the current flight. Inserting the new data card begins a new flight.

Figure 3-9 Recording a lift



Using the Optional Printer

The following paragraphs describe how to use the C-23 Printer. They describe how to turn on the printer, print a self-test, install paper, install a ribbon, clear a printer jam, and how to print and read a lift report from a data card.

Turning on the Printer

The C-23 Printer should be turned on after the load weigh system is powered up. The power switch has three positions. The OFF position is all the way to the left, the ON position is in the center, and the PAPER FEED position is all the way to the right. To turn the printer on, follow these steps.

1. Turn on the printer by pushing the POWER switch down on the right side. Now release the switch and it will remain in the center ON position.
2. The power LED should now be lit and a READY message should have been printed.
3. When turning the printer off, wait at least 3 seconds before turning the printer back on.

Printing a Self-Test

The print head and ribbon can be tested *only after inserting paper. Do not print without paper*. To print a self-test follow these steps.

1. Make sure the printer is in the OFF position.
2. Depress power switch until it reaches PAPER FEED position.
3. Hold the switch in the PAPER FEED position until the LED light goes on and the printer starts to operate. Release switch.
4. To stop the printer during the self-test or at any other time, turn the power switch to the OFF position and wait 3 seconds to turn it back on.

Installing the Paper

The C-23 printer uses a 2.25-inch roll paper, available as Part Number 215-051-00. To install a roll of paper in the printer compartment, follow these steps.

1. Press the power switch to the OFF position.
2. There are small grooves embossed on the printer cover, push down on the grooves using both your index fingers. The printer cover will tilt up, then lift the lid completely off.
3. Unroll several inches of the paper. Cut a straight edge on the paper roll if it is jagged. This will facilitate the entry of the paper into the printer.

Installing the Paper, continued

4. Slide the paper through the slot connecting the paper compartment and the printer compartment. You can slide it in about one-quarter inch before it stops.

5. Press the power switch to the ON position and wait for a few seconds.

6. While holding the paper in place, press the power switch to the PAPER FEED position. The printer will activate, and a rubber roller will pull the paper into the printer compartment. Hold the switch in the PAPER FEED position until the paper emerges from the top of the printer mechanism. When an inch of paper has emerged from the top of the printer, release the PAPER FEED button.

7. Now pull the paper through the printer, until several inches are exposed.

8. Replace the printer cover by sliding the paper through the slot in the printer cover. Push the back of the printer cover down and into place. Press the front of the printer cover down to lock in place.

9. Put the paper roll holder into the paper roll and place the holder onto the grooves near the back of the printer. Turn the paper roll so as to take up any slack in the paper feeding to the printer. Make sure the roll of paper moves freely. If it does not move freely, the paper will jam and will possibly damage the printer mechanism.

Installing the Cartridge Ribbon

When printing becomes faint or difficult to see, the cartridge should be replaced. The ribbon is available as Part Number 212-006-00. To install a cartridge ribbon in the printer, follow these steps.

1. Press the power switch into the OFF position.

2. Remove the printer cover following the procedures above.

3. Push down on the right side of the ribbon cartridge (marked "PUSH") and remove the cartridge.

4. Install the new cartridge. Be sure the ink cartridge is inserted firmly to prevent weak or irregular printing. The cartridge must be properly seated and aligned for best printing.

5. Turn the cartridge "knob" (marked be an arrow) clockwise to stretch the ribbon.

6. Replace the cover following the procedures above.

7. Replace the paper.

Installing the Cartridge Ribbon, continued

You may also insert the ribbon cartridge if there is already paper in the printer. Follow the steps above. Slide the cartridge over the paper and into the printer compartment. Be sure the paper goes between the ribbon cartridge and the ink ribbon.

NOTE

If ribbon ink gets on the printer case, wipe it off immediately. Once it dries, it is difficult to remove.

Clearing a Paper Jam

If paper jams in the C-23 Printer, follow these steps to clear the jam.

1. Press the power switch into the OFF position.
2. Remove the printer cover following the procedures on the previous page.
3. To remove the paper roll, lift the paper roll away from the printer housing. With a pair of scissors cut the paper feeding to the printer. Try to make the cut as square as possible to facilitate the next reloading of the paper. Now pull the remaining paper through the printer mechanism. Be sure to pull the paper from the front (paper cutter side).

   ⚠ CAUTION

   Never pull the paper backwards from the printer.

4. Carefully clear the jam, and replace the printer cover.

Printing a Report

The C-23 Printer can print a report whenever and as often as needed. Printing a report does not erase or change the information stored in the data card.

A full report or a summary can be printed for either a single customer or all customers. Table 3-1 shows the possible types of report selections.

Follow these steps to print a lift report from a data card.

1. Insert the data card that contains the data to be printed.
2. Press the ENTER button while the Run screen is displayed. The print format selection screen appears.

```
    Print Format
Format: <Summary> ↔
```

3. Use the Right or Left keys to select Summary to print summary information about the lifts, or select Report to print a full lift report.
4. Press ENTER to enter your selection and display the next screen, the customer selection screen.

```
  Select Customer
Select:HAYES ENT ↔
```

5. Press the Right or Left key to loop through the list of customer with data stored on the card until the desired name is displayed, or display ALL to print data for all customers.
6. Press ENTER to enter your selection and print the report.

Table 3-1 Reports types and their screen selections

Report type	FORMAT screen	CUSTOMER ID screen
Full report, all customers	REPORT	ALL
Full report, one customer	REPORT	<customer>
Summary, all customers	SUMMARY	ALL
Summary, one customer,	SUMMARY	<customer>

Reading a Report

The information printed in a data recorder report or summary depends on the options you select when you request the report. All reports show sections that contain company data and summary flight statistics. A full report includes sections with detailed lift logs by customer.

The various report sections contain the following information.

- The *report header* contains the information stored in Lines 1 – 6 of the Company Data menu.
- The *customer header* lists information stored in the Setup menu, including customer identification and location, and aircraft and pilot identification.
- The *date* is the date the information was stored.
- The *flight detail* includes a header with flight number, start time, end time and duration; lift detail for each lift, including lift number, load, start time, load and time minimum designator, and turn time; and an end-of-flight footer.
- The *flight summary* supplies the number of flights and lifts for the customer, and totals and averages for flight time, weight, and turn time.
- The *codes for minimum settings* are automatically assigned by the system whenever a lift is performed with a different combination of minimum load and minimum lift time. These codes are designated by letters, starting with A, that appear next to the start time in the lift detail. An asterisk * indicates the weight of a load that was captured.
- The *report footer* shows the model number and manufacturer information for the printer.

Figure 3-11 is an example of a full report from a data card storing information about two customers; Figure 3-12 is a summary for one of those customers. Table 3-2 shows which report sections are printed on a report and a summary.

Figure 3-10 An example full report

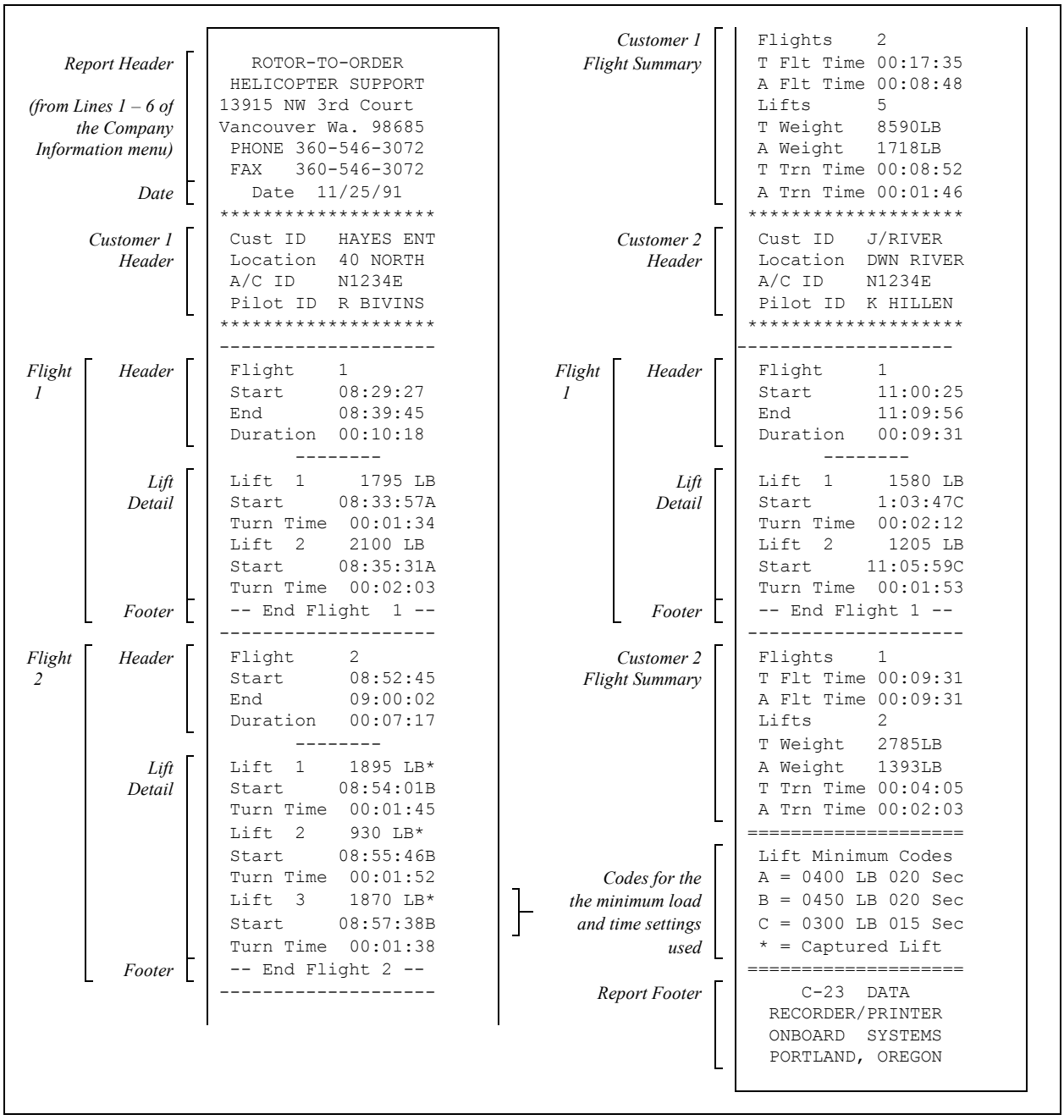


Figure 3-11 An example summary for Customer 1

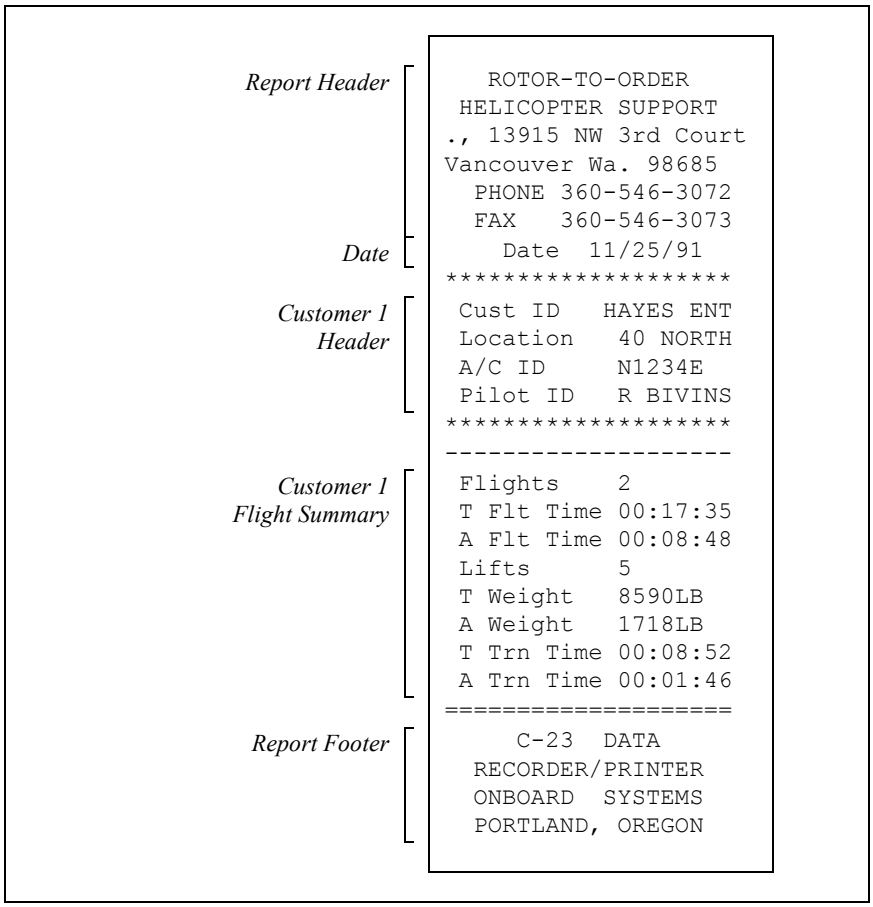


Table 3-2 Sections printed on a report or a summary

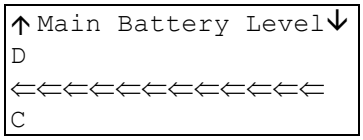
Report section	REPORT	SUMMARY
Report header	X	X
Date	X	X
Customer header	X	X
Flight information	X	
Flight summary	X	X
Codes for minimum settings	X	
Report footer	X	X

Changing the Data Recorder Battery

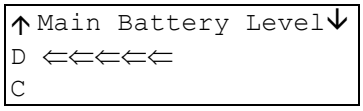
When the data recorder is turned on, it is powered by the aircraft electrical system. When the data recorder is turned off or is disconnected, its internal memory is maintained by a lithium battery inside the data recorder. Each data recorder is shipped from the factory with a battery in place. Figure 3-13 shows the position of the battery.

You can check the battery power level by viewing the Main Battery Level item on the Utilities menu. This item shows the level of charge in the data recorder battery.

If the battery power is high, the screen appears something like this. ("D" stands for "discharged" and "C" stands for "charged.")



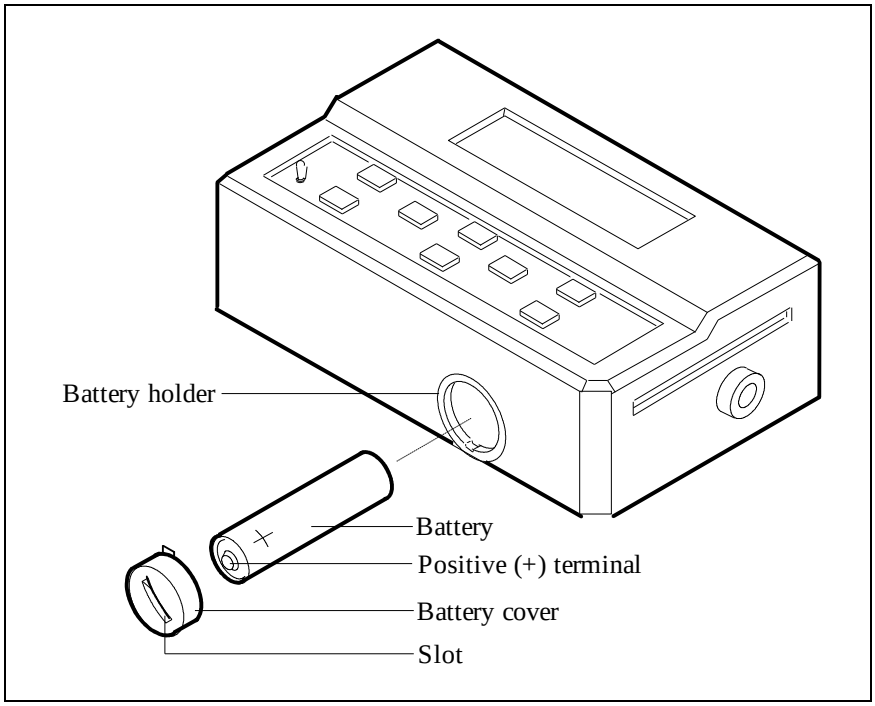
If the battery power is low, the screen looks more like this and the battery should be replaced.



For more information on accessing the Utilities menu to view the data recorder battery level, read *Using the Utilities Menu* and *Viewing the Data Recorder Battery Level* earlier in this section.

Changing the Data Recorder Battery, continued

Figure 3-12 C-20 Data recorder battery



To change the C-20 Data Recorder battery, use this procedure.

1. Remove the battery cover by placing a dime or other small coin in the battery cover slot and turning one quarter-turn counterclockwise.
2. Let the old battery slide out into your hand.
3. Insert a new battery into the battery holder, positive end down, as shown. Use a lithium AA 3.6V battery, available as Part Number 470-002-00.
4. Replace the battery cover and tighten it by turning it one quarter-turn clockwise.

Attention Messages

The data recorder displays certain messages when an action other than normal operation is required.

System Conditions

System condition messages indicate a situation with data card system hardware that requires pilot attention.

```
 No data from hook
Flight:  1  00:00:10
```

The data card system is not receiving information from the C-39 indicator. There are four possible causes for this condition.

1. The load cell is not connected to the internal wiring harness.
2. There is no power to the indicator, but there is power going to the data recorder.
3. The C-39 indicator is in some other mode than run.
4. The transmitting circuits in the C-39 indicator are defective. The indicator and data recorder should be returned to the factory for inspection and service.

```
Card write protected
Cannot save new data
```

The write-protect switch on the data card is in the ON position. Move the switch to the OFF position. Refer to the section, *Using the Data Card*, for a detailed description of the data card.

```
  Card is >80% full
   Ready new card
```

The data on the data card is nearing the memory capacity of the card. If the job is almost complete, continue with normal operation; data for approximately 40 more lifts can be stored. Install a new card if it is likely that you will exceed the card capacity.

```
     Card full
Cannot save new data
```

The data card cannot save additional data and the system is no longer collecting data. Replace the card with one that is not full or see *Erasing the Data Card* earlier in this section to erase the card.

```
Replace card battery
while card installed
```

The battery in the data card is low. Replace the battery as described in the section, Using the Data Card. Unless the card is installed in a powered-up data recorder or data card reader during battery replacement, any data on the card is lost.

Card Status Messages

These messages are generated by functions on the Utilities menu if you attempt to perform the operation when no card is installed.

```
   Card Status
 No Card Installed
```

The card status function normally displays the number of entries available on the card. Install a card to find out this information.

```
    Erase Card
 No Card Installed
```

Install the card you want to erase.

Section 4
Using the Data Card

The C-22 Data Card stores the data that is generated by the weighing system and the data recorder clock. This section describes the data card and its use. Here are the topics in this section.

- *Inserting the Data Card* shows how to insert the data card into the data recorder or data card reader.
- *Setting the Write-Protect Switch* describes how to protect the data card from accidental erasure.
- *Replacing the Data Card Battery* describes how to replace the battery in the data card.
- *Erasing the Data Card* describes how to erase information that is stored on the data card.
- *Memory Capacity of the Data Card* describes the type and amount of information that is stored on the data card.

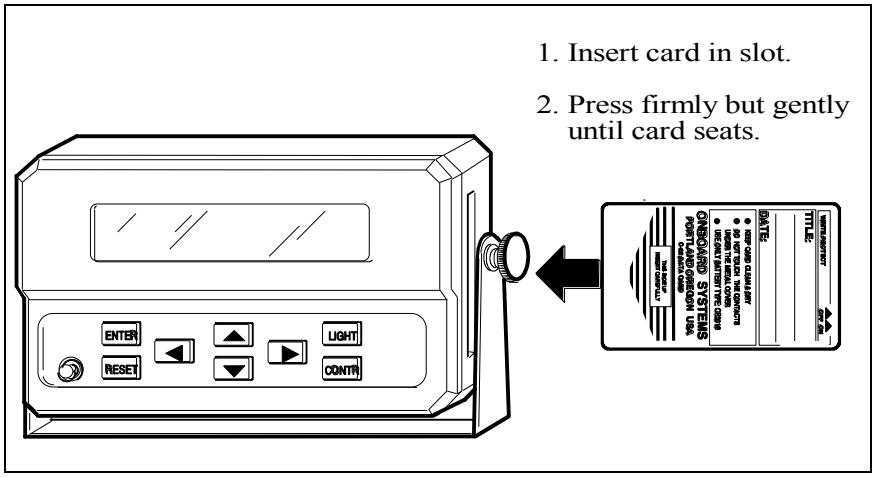
Inserting the Data Card

To record data, the write-protect switch on the edge of the card must be in the OFF position. If no data card is installed, the data recorder displays the current job information, but the information is not saved.

To insert the data card refer to Figure 4-1 and follow these steps.

1. Hold the data card so that the large striped arrow is visible and the arrow is pointing toward the card slot on the right side of the data recorder.
2. Gently guide the card straight into the slot. Do not force the card.
3. Press firmly but gently until the card seats. If a display other than the Run screen appears, refer to the *Attention Messages* at the end of the section *Operating the Data Recorder*.

Figure 4-1 Inserting the data card



Setting the Write-Protect Switch

The data card has a write-protect switch that you can use to help prevent accidental erasure or addition of data. The switch is located on one end of the card, and is marked on the label of the card.

To write-protect the card, move the switch to the ON position. To allow data changes on the card, move the switch to the OFF position.

Replacing the Data Card Battery

When the data card is installed in the data recorder or data card reader, it gets its power from that unit. When the data card is not in use, it is powered by a battery located in one end of the card next to the write-protect switch.

Each data card is shipped from the factory with a battery in place. If the battery power is low, the following message appears on the data recorder display when you insert the data card.

```
Replace card battery
while card installed
```

If this message appears, change the data card battery immediately as described in this procedure.

1. If the data card contains data you want to retain, be sure that you change the battery within 10 minutes, or the data on the card may be lost.
2. Carefully slide the battery holder out of the card using a small screwdriver or your thumbnail. Refer to figure 1-5.
3. Remove the old battery from the battery holder and replace it with a new battery. Use only CR2016-type batteries, which can be ordered as Part Number 470-003-00.
4. Gently slide the battery holder back into the data card until it is firmly in place.

Erasing the Data Card

Once you are finished with the data collected on a card, you can use the data recorder to erase the card and reuse it indefinitely. To erase a card, the write-protect switch on the card must be in the OFF position.

Erasing a data card deletes lift information from the card. Information that has been set using the Setup Data and Company Data menus is not deleted from the card. Use the appropriate menu to change this information, if desired.

To erase a data card using the data recorder, follow these steps.

1. Insert the card you want to erase into the data card slot on the side of the data recorder.
2. When the Run screen is displayed, press the Up and Down arrow keys simultaneously to enter the System Menu.
3. Use the Up or Down arrow key to move to the Utilities menu selection.

   ```
   ↑ System Menu ↓
      Utilities
   ```

4. Press ENTER.
5. Use the Up or Down arrow key to move to the selection for erasing a data card.

   ```
     ↑ Clear Card ↓
   Press RESET To Clear
   ```

6. Press RESET to continue with the erasure sequence. Press any key other key than RESET to move to the next screen on the Utilities Menu without erasing the card.

   If you press RESET, the following display asks you to confirm erasure.

   ```
   Erase All Card Data?
     ENTER To Confirm
   ```

7. Press the ENTER key to erase the data card, or press any key other than ENTER to escape from the erase sequence and move to the next screen on the Utilities Menu without erasing the card.

   If you press ENTER, the card is erased, and the next screen on the Utilities Menu is displayed.

Memory Capacity of the Data Card

Data cards are available in two memory capacities, 8 Kb and 32 Kb. The 8 Kb card holds 714 data entries. The 32 Kb card holds 2,574 data entries. Data entries can be any of the following values.

- Data entered using the Setup Data menu including customer, location, pilot, and aircraft identifiers; and minimum lift time and load.
- Information entered using the Company Data menu.
- Data collected from the weighing system and from the data recorder clock, including weight of a load, flight start time and duration, and lift start time and duration.

The data recorder and data card reader use this information to compute averages and totals and generate reports.

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Section 5
Operating the Data Card Reader

This section describes how to operate the C-24 Data Card Reader.

Using a Serial or Parallel Printer

You can print reports directly from a data card when the data card reader is connected to a standard office serial or parallel printer.

Connecting the Printer

Connect the data card reader to the printer as described in the section *Installing the System*.

Operating the Printer

To print a report on the printer, follow these steps.

1. Ensure that the printer power is on and that it is on line.
2. Ensure that the data card reader power is on.
3. Insert the data card to be read gently but firmly into the card slot on the front of the data card reader. The report begins printing. Figure 5-1 shows an example.

NOTE

It may be necessary to adjust the settings on the printer for the reader to print the report properly. Try toggeling the settings for "Carriage Return" and/or "Line Feed".

Using an IBM PC-Compatible Computer

You can display, print, and save data card information when the data card reader is connected to a personal computer

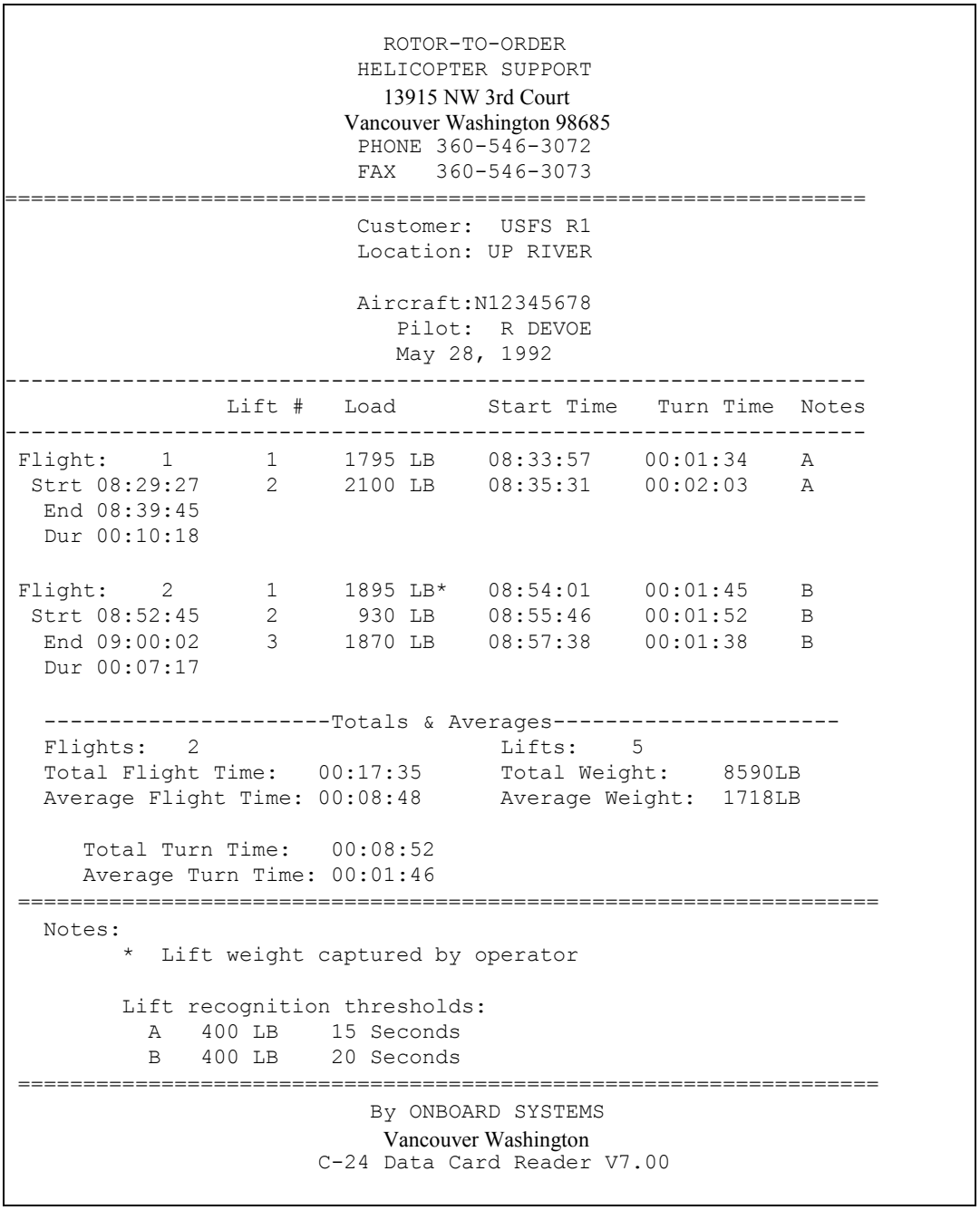
Connecting the Computer

Connect the data card reader to the computer as described in Section 2, *Installing the Data Card Reader*.

See Section 6, *Using the Optional Software*, for instructions on loading and using the software.

Reading the Printed Report

Figure 5-1 Typical customer report



```
                          ROTOR-TO-ORDER
                        HELICOPTER SUPPORT
                          13915 NW 3rd Court
                        Vancouver Washington 98685
                         PHONE 360-546-3072
                         FAX   360-546-3073
=====================================================================
                         Customer:  USFS R1
                         Location: UP RIVER

                         Aircraft:N12345678
                            Pilot:  R DEVOE
                            May 28, 1992
---------------------------------------------------------------------
                Lift #   Load       Start Time   Turn Time  Notes
---------------------------------------------------------------------
Flight:    1       1     1795 LB    08:33:57    00:01:34    A
 Strt 08:29:27     2     2100 LB    08:35:31    00:02:03    A
  End 08:39:45
  Dur 00:10:18

Flight:    2       1     1895 LB*   08:54:01    00:01:45    B
 Strt 08:52:45     2      930 LB    08:55:46    00:01:52    B
  End 09:00:02     3     1870 LB    08:57:38    00:01:38    B
  Dur 00:07:17

  ----------------------Totals & Averages----------------------
  Flights:   2                      Lifts:    5
  Total Flight Time:   00:17:35     Total Weight:    8590LB
  Average Flight Time: 00:08:48     Average Weight:  1718LB

     Total Turn Time:   00:08:52
     Average Turn Time: 00:01:46
=====================================================================
  Notes:
       *  Lift weight captured by operator

       Lift recognition thresholds:
         A   400 LB    15 Seconds
         B   400 LB    20 Seconds
=====================================================================
                          By ONBOARD SYSTEMS
                          Vancouver Washington
                      C-24 Data Card Reader V7.00
```

Report header

Customer header

Flight 1 detail

Flight 2 detail

Flight summary

Notes

Report footer

The data card reader uses the following rules in printing a report.

- If the customer changes, a new report is generated with a new header and setup data information. The lift count and summary data calculations are restarted.
- If the aircraft identifier changes, a banner line is printed showing the identifier change, and the lift count and summary data calculations are restarted.
- If the location, pilot, or date changes, a banner line is printed showing the change.
- The notes shown at the bottom of each customer report explain the load and lift time minimums in effect during each lift.

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Section 6
Using the Optional Software

This section describes how to load and use the optional software.

IBM PC-Compatible

Loading the Software

With the computer at the system prompt do the following:

1. Ensure that the data card reader power is on. Insert the data card to be read gently but firmly into the card slot on the front of the data card reader.
2. Insert the program into your computer drive.
3. Type the path to the drive followed by Hook (i.e. B:\Hook).
4. The screen should look like this:

Hook Load Measuring System

Communications Established
Port: 1

Press F1: display card data
F2: clear card data
F3: alter report head
F4: enter setup data
Esc: return to DOS

Onboard Systems, Portland OR
V8.01

5. The program should come up saying *Communications Established*. If the program says *No reader present*, check to make sure the card reader is on and the system is correctly cabled. See Section 2, *Installing the Data Card Reader*, for early installation.

Loading the Software, continued

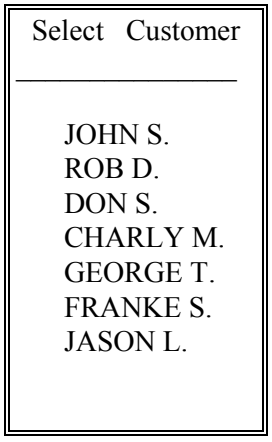
NOTE

This software can read four four different serial ports. To access a given port type "Hook [num]." Num is the serial port number(1-4), the default is port 1.

From this main menu, you can choose any of the following commands, as described in detail below.

Main Menu F1: Display Card Data

Pressing F1 from the main menu will allow you to view the information on the inserted data card. If more than one customer is on the data card a screen will display all the customers.



Select the desired customer by using the up or down arrow keys on your computer, and then press Enter.

Main Menu F1: Display Card Data, continued

After a customer has been selected the screen will display the information below.

Flight	Start	Duration	Lift	Load(Lb)	Start Time	Turn Time	Notes
			**** Location: Lot 41		****		
			**** Date: July 6, 1993		****		
			**** Pilot: R Devoe		****		
	**** Aircraft: N12345678					****	
1	11:36:08	00:31:24	1	597	11:36:31	00:00:18	A
			2	597	11:36:49	00:00:17	A
			3	599	11:37:06	00:00:18	A
			4	597	11:37:24	00:00:18	A
			5	599	11:37:42	00:00:18	A
			6	598	11:38:00	00:00:18	A
			7	598	11:38:18	00:00:17	A
			8	598	11:38:35	00:00:18	A
			9	599	11:38:53	00:00:17	A
			10	597	11:39:10	00:00:18	A
			11	599	11:39:28	00:00:18	A
			12	599	11:39:46	00:00:18	A
			13	599	11:40:04	00:00:17	A
			14	597	11:40:21	00:00:18	A
			15	597	11:40:39	00:00:18	A
			16	597	11:40:57	00:00:17	A
			17	598	11:41:14	00:00:18	A
PgUp:Prev	**PgDn:Next**	**F1:Customer**	**F2:Location**		**F4:Info**	**F5:File**	**F6:Print**

Located at the bottom of the screen are commands to do a variety of things.

Display Card Data PgUp and PgDn

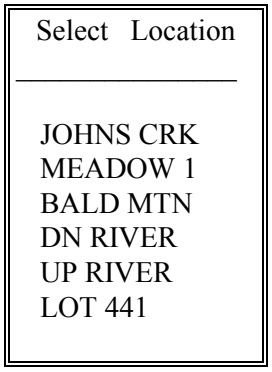
You can view the pages of flight data by using the PgUp and PgDn keys on the keyboard. Press PgUp to see the previous page and PgDn to see the next page.

Display Card Data F1: Customer

Pressing F1 will allow you to select another customer and view the flight information without having to go back to the main menu.

Display Card Data
F2: Location

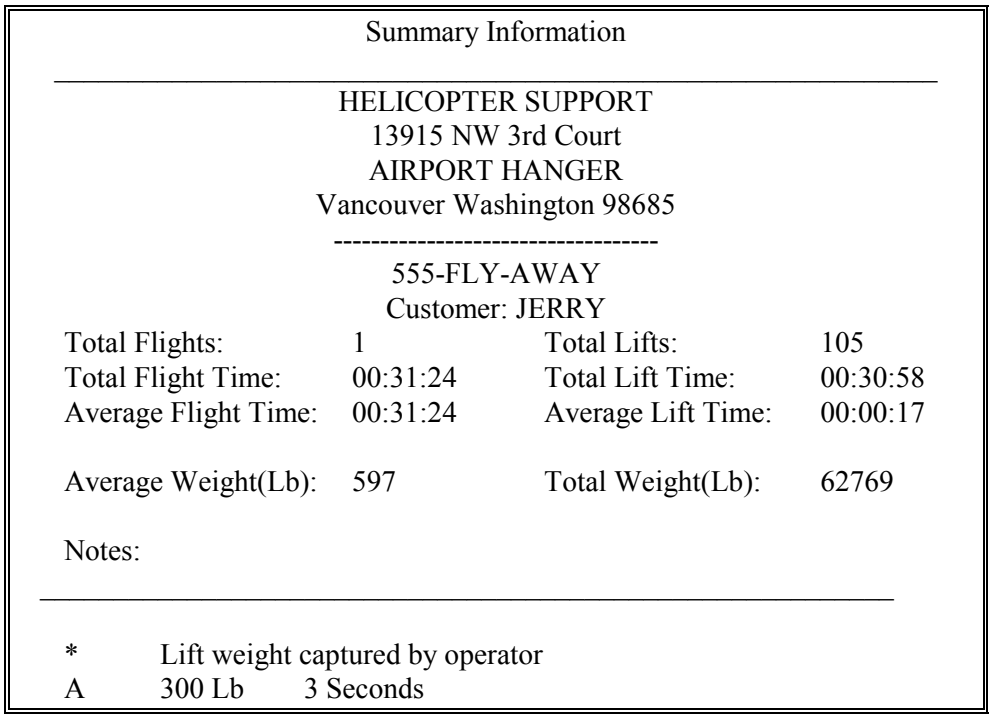
If a customer has flown in more than one location, pressing F2 will allow you to select a different location.



Select the desired location by using the up or down arrow keys on your computer, and then press Enter to view the flight information for that selected location.

Display Card Data
F4: Info

If you want to quickly view total flights, average lift time, or something related, press F4 and this summary information will be displayed.



Display Card Data
F5: File

If you would like to save the flight information for the customer selected on a disk or on the hard drive of your computer, press F5. You will be given the following screen, asking whether you would like to save the complete flight information or a summary of the information (summary information is pictured above).

```
Report Type
 F1: Complete
 F2: Summary
```

Press F1 or F2 and then type the directory or file you want the data saved in.

Display Card Data
F6: Prnt

Pressing F6 will allow you to print the complete flight information or a summary. If you press F6, you will be given the same window as F5, asking for the report type, complete or summary.

Main Menu F2: Clear Card Data

F2 allows you to erase all the information on the data card. Pressing F2 will give the following window, asking if you really want to clear the data card. Press either Y or N and press Enter.

```
All data in this card will
be lost, are you sure you
want to clear this card?

(Y)es or (N)o: _
```

Main Menu F3:
Alter Report Head

F3 allows you to change the heading on your report. Pressing F3 will give the following window with your own heading that was previously entered in the data recorder:

```
Select line to change:
Lines will be centered on reports.

F1:  "HELICOPTER SUPPORT    "
F2:  "13915 NW 3rd Court    "
F3:  "AIRPORT HANGER        "
F4:  " Vancouver Wa. 98685  "
F5:  "-----------------------------------"
F6:  "   555-FLY-AWAY       "
```

Select the line you would like to change by pressing the appropriate Function key. Once a line is selected, you'll get an edit window where you can than edit a line.

```
      "13915 NW 3rd Court "

ESC: Return/no change        <CR>: Accept change
            INS: toggle insert/overtype
      DEL: delete character          BS: backspace
            LEFT/RIGHT: move cursor
```

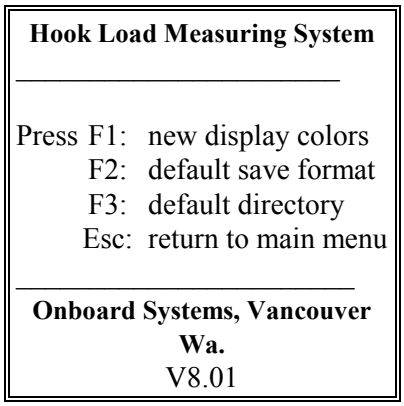
Follow the directions on the screen to change the lines and press the escape key when you are finished.

NOTE

This procedure does not change the data on the data card. It only changes the way files are saved or printed.

Main Menu F4:
Enter Setup Data

F4 will allow you to change the program display colors, and change default saving and directory commands. If F4 is selected the following menu will appear.

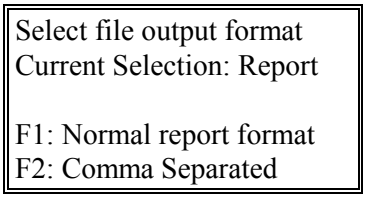


Enter Setup Data
F1: New Display Colors

Six different color combinations are available. Each time F1 is pressed the display color will be changed. Keep pressing F1 until the color you like is displayed. Once you've selected the display color, you may exit out and that color will remain until it is changed again.

Enter Setup Data
F2: Default Save Format

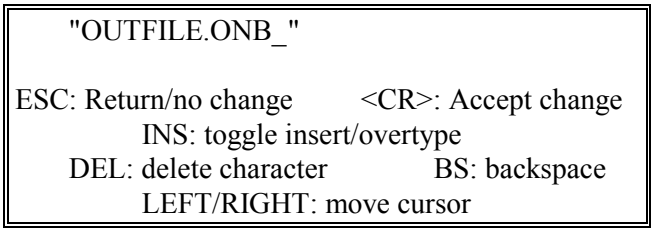
The information on the data card can be saved on a disk or in a directory. See *F5: File* in this section for saving procedures. The default save format function allows you to choose if you want your flight information to be saved in a normal report format or comma separated. Pressing F2 will give the following window, asking you to select a format.



Press F1 if you want the data to be saved in normal report format. Press F2 if you want your data separated by a comma only.

Enter Setup Data
F3: Default Directory

This function allows you to change the directory you would like your data to be saved in. Press F3 and the following window will appear.



Follow the directions on the screen and type in a directory, or edit the one that was already listed. When you are finished editing or adding, press the escape key to exit back to the Enter Setup Data menu. Press the escape key again to get back to the main menu.

Section 7
Maintaining the System

This section describes the maintenance procedures you should observe to obtain maximum life and accuracy from the data card system. It also includes some trouble-shooting hints should problems occur with the system.

Data Recorder Care

The data recorder does not require periodic maintenance.

Follow these guidelines in caring for the data recorder.

- Keep the data recorder warm and dry to extend its useful life. During wet or cold weather, remove the unit from the aircraft, or cover it to reduce the possibility of water absorption.
- Avoid extreme temperature changes. Although the data recorder is water resistant, highly variable conditions may cause moisture entry because of a reduction of internal pressure.
- If the data recorder battery needs changing, use the proper replacement, as described in *Replacing the Data Recorder Battery.*

NOTE

Do not open the data recorder. Opening the data recorder voids its warranty. The battery is the only user-replaceable part.

Cable and Connector Maintenance

Follow these guidelines for cable and connector maintenance.

- Check cables and connectors periodically for signs of wear. Replace cables that have worn through the foil shield.
- Attempt to identify and correct the causes of cable wear including bending, shearing, and sawing.
- Cover and protect the connectors when not in use to prevent corrosion and mechanical damage to the pins.

Troubleshooting

This topic lists problems you may encounter when using the Data Card System, and describes possible solutions.

Power is on but the data recorder display does not show a readout. The unit appears to be dead.

1. Use the CONTR key with the Up and Down keys to adjust the display contrast. The Up key decreases the contrast, and the Down key increases the contrast. If no response,
2. Check the fuse or circuit breaker between the positive battery wire and the data recorder. Replace the fuse if it is faulty.
3. Check the entire power cable for damage, corrosion or a faulty connection. Clean or replace wiring if problems are found.
4. If there is no response to these solutions, refer to the *Appendix* for instructions for returning the unit to the factory.

Numbers appear on the display but they do not change with weight or when a key is pressed.

This problem is caused by a momentary burst or lapse of electrical power, causing a break in the flow of the program in the data recorder.

1. The problem can usually be reversed by shutting off the data recorder power switch for several seconds.
2. As a long term solution, ensure that all electrical wiring is secure and free of corrosion, and install an electrical filter.

Initializing

Press and hold the Up and Down Keys while turning on the power to the unit. Once the display is activated you may release the keys. The display will tell that it is "Initializing" and instruct you to wait. This process erases all operator installed data and re-enters factory defaults.

Section 8
Installation Authorization

The Date Card System installation is authorized by the Federal Aviation Administration (FAA) for use with all Onboard Systems Electronic Load Weigh Systems.

FAA Letter of Authorization

U.S. Department
of Transportation
**Federal Aviation
Administration**

**Transport Airplane Directorate
Aircraft Certification Service**

1601 Lind Avenue S.W.
Renton, Washington 98055-4056

March 22, 1990

Onboard Systems
11212 NW St. Helens Rd.
Portland, OR 97231

Gentlemen:

This is in response to your letter dated March 15, 1990, concerning the disposition of your proposed helicopter cargo hook Data Logger System. From your letter, we understand that your Data Logger will provide a continuous record of the load (weight) carried on a cargo hook, when connected to the output plug predestined into your helicopter electronic cargo hook load system display units, previously approved by our office.

We agree with your position that a portable Data Logger System such as that defined in your letter will not adversely impact aircraft safety. Accordingly, we do not deem it necessary that you obtain formal FAA approval for the manufacture and sale of your unit.

If we may be of further assistance, please do not hesitate to contact us.

Sincerely,

Original Signed by
David G. Hmeil

David G. Hmeil
Manager, Aircraft Modification Branch
Seattle Aircraft Certification Office

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Appendix

This appendix contains the following information for the Data Card System.

- Specifications
- Ordering information
- Limited warranty
- Return instructions

Specifications

The tables in this section give the specifications for the data card system components.

Physical Specifications

Table A-1 shows the physical specifications for the data card system components.

Table A-1 Physical specifications

Component	Height	Width	Depth	Weight
C-20 Data Recorder	3.25 in 8.3 cm	5.50 in 14.0 cm	2.20 in 5.6 cm	1.0 lb 455 g
C-23 Printer	2.0 in 5.1 cm	4.0 in 10.2 cm	4.5 in 11.4 cm	12 oz 340 g
C-22 Data Card	0.09 in 2.3 mm	2.12 in 5.4 cm	3.40 in 8.6 cm	1 oz 28 g
C-24 Data Card Reader	1.20 in 3.1 cm	4.40 in 11.2 cm	7.80 in 19.8 cm	12 oz 340 g

Electrical Specifications

Table A-2 shows the electrical specifications for the data recorder and the optional printer.

Table A-2 Data recorder electrical specifications

Characteristic	Specification
Operating voltage	18 – 30 Vdc
Current consumption C-20 Data Recorder C-23 Printer	 250 mA 1.5 A
Storage temperature	-40° – 158°F (-40° – 70°C)
Operating temperature C-20 Data Recorder C-23 Printer	 -5° - 158°F (-20° - 70°C) 41° - 104°F (5° - 40°C)

Tables A-3, A-4 and A-5 show the connector pinouts of the Data Recorder and the Load Weigh System components.

Table A-3 Data Recorder Pin Out

Connector to Internal Harness		
Pin	**Color**	**Function**
1	Black	Ground
2	Blue	Capture SW
3	Red	Power
4	Brown	Flight SW
5	Shield	Shield
7	Green	Clock
9	White	Data

Connector to C-23 Printer		
Pin	**Color**	**Function**
1	Black	Ground, Aircraft
2	Blue	+5V
4	Red	+28V, Aircraft
5	Shield	Shield
6	White	RxD
8	Green	TxD
9	Brown	Ground, C-20

Table A-4 C-39 Indicator Pin Out

210-095-00 Indicator	
Pin Letter	Function
A	+ 28 VDC In
B	- Load Cell Signal
C	+ Load Cell Signal
D	+ Load Cell Excitation
E	Load Cell Common
F	Analog Out Common
G	+ Analog Out
H	Hook Open
J	Data Recorder Clock
K	Data Recorder Data
L	Shield
M	Back Light Common
N	Back Light Source 28 VDC
P	Aircraft Ground
R	Not Used

Table A-5 Load Cell Pin Out

Pin Letter	Wire Color
A	Red
B	Green
C	White
D	Black
E	Shield

Ordering Information

Order additional data card system components, accessories, and supplies by quantity and the part number shown in Table A-6. All items can be ordered separately.

Table A-6 Ordering information

Description		Part number
Hardware components	C-20 Data Recorder	210-048-01
	C-23 Printer	210-100-00
	C-22 Data Card, 8 Kb, 740 entries	475-006-00
	C-22 Data Card, 32 Kb, 2,600 entries	475-007-00
	C-24 Data Card Reader	210-050-00
Software components	Software, IBM PC and 100%-compatibles	100-025-00
Accessories	Data Card System Owner's Manual	120-024-02
	Capture switch wire	270-019-00
	Flight-time switch wire	270-022-00
	AC adaptor for C-24 Data Card Reader	442-007-00
Supplies	Roll paper for C-23 Printer	215-051-00
	Cartridge ribbon for C-23 Printer	212-006-00
	Battery for C-22 Data Card	470-003-00
	Battery for C-20 Data Recorder clock	470-002-00

Limited Warranty

ONBOARD SYSTEMS Data Card System components are warranted to be free from defects in workmanship and materials for a period of one year from the date of purchase. The components are warranted to function as intended when properly installed and used for their intended purpose. Parts which prove to be defective are repaired or replaced free of charge FOB factory at the manufacturer's option if the following conditions have been met.

- No repairs have been attempted by other than Onboard Systems personnel.
- The system or component is returned properly packaged, insured, with transportation charges prepaid.
- After examination, Onboard Systems personnel are satisfied that the defects were not caused by abuse, and that the components were not subjected to conditions that violate system specifications.

The following are specifically excluded from this warranty.

- Software
- Cables

This warranty covers only the original purchaser. In no event shall Onboard Systems be liable for indirect, special, incidental or consequential damage resulting from the use of this product, even if Onboard Systems has been advised of the possibility of such damage. Each user must satisfy himself that the system is suited to his needs and is performing according to his requirements.

Instructions for Returning Equipment to the Factory

If an Onboard Systems product must be returned to the factory for any reason (including returns, service, repairs, overhaul, etc) obtain an RMA number before shipping your return.

An RMA number is required for all equipment returns.

- To obtain an RMA, please use one of the listed methods.
    - Contact Technical Support by phone or e-mail (Techhelp@OnboardSystems.com).
    - Generate an RMA number at our website: http://www.onboardsystems.com/rma.php
- After you have obtained the RMA number, please be sure to:
    - Package the component carefully to ensure safe transit.
    - Write the RMA number on the outside of the box or on the mailing label.
    - Include the RMA number and reason for the return on your purchase or work order.
    - Include your name, address, phone and fax number and email (as applicable).
    - Return the components freight, cartage, insurance and customs prepaid to:

      Onboard Systems
      13915 NW 3rd Court
      Vancouver, Washington 98685
      USA
      Phone: 360-546-3072