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DC400 Digital DC Fuel Quantity Test Set

USER INSTRUCTION MANUAL BARFIELD M/N DC400

*56-101-00800
December 9, 2008*

BARFIELD, INC.



Corporate Headquarters

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ATLANTA, GEORGIA



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P/N 101-00800

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neither a vendor nor supplier of fuel quantity systems or an airframe manufacturer, has no control over calibration figures or procedures. A variant between actual values and those recommended may exist; however, information presented is correct to the best of our knowledge at the time of publication and is presented for reference only.

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Although every effort has been made to provide you, the end user of this equipment, with the most current and accurate information, it may be necessary to revise this literature in the future.

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To insure that you will receive **ALL** revisions when published, the Technical Publications Department of Barfield Instrument Corporation MUST have your name and address on file.

Please complete and mail the OWNER'S WARRANTY REGISTRATION card promptly.

This preaddressed card insures AUTOMATIC UPDATE OF PRINTED MATTER and validation of warranty.

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Changes, when approved, will be published by revisions to the basic manual and distributed to all REGISTERED owners.

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REVISION RECORD

REV.	ECO #	REV. DATE	DESCRIPTION OF CHANGE
A	N/A	Dec. 09, 2008	Initial Release, prepared from Technical Manual 57-101-00800, revised June 24, 1988

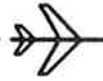
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LIST OF APPROVED REPAIR FACILITIES

The manufacturer of this equipment does not recommend the user to attempt any maintenance or repair. In case of malfunction, contact the manufacturer, to obtain the list of approved repair facilities worldwide, ensuring that this equipment will be serviced using proper procedures and certified instruments. A Return Maintenance Authorization (RMA) number will be assigned during this call, to keep track of the shipment and the service.

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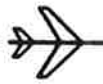
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INTRODUCTION

1. PUBLICATION BREAKDOWN

The publication dealing with the DC-400 DIGITAL DC FUEL QUANTITY TEST SET, P/N 101-00800, establishes the standards of operation and maintenance. The publication has been prepared using the ATA Specification 101 as a guide.

Questions of interpretation shall be submitted in writing to:

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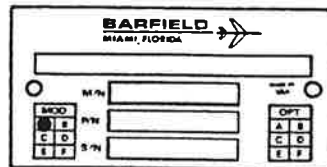
Changes, when approved, will be published as revisions to the basic publication and distributed to all registered owners of the DC-400 DIGITAL DC FUEL QUANTITY TEST SET, hereinafter referred to as the DC-400.

The publication has been developed in modular form, i.e., it consist of one manual for the DC-400 as a whole, and a separate manual (one for each Adapter Module which is dedicated to a specific aircraft or system) to provide complete instructions for testing/troubleshooting of the Fuel Quantity System(s). DC-400 maintenance and calibration is also provided.

The Adapter Module Manuals supplied will be dependent on the Fuel Quantity System(s) to be serviced and will be issued as Chapter 5 of this Manual.

2. IDENTIFICATION/MODIFICATION STATE

- A. The identification label, (Ref. Fig. 1), located on the outside of the carrying case, center front, bottom section, provides the following information:



IDENTIFICATION LABEL

Figure 1

Manufacturer's Name
Designation of Equipment
Equipment Model Number MODEL NO.
Equipment Part Number PART NO.
Equipment Serial Number SERIAL NO.
Equipment Modification State MOD A, B, C, etc.
Equipment Option Status OPTION A, B, C, etc.

The label in Figure 1 denotes Mod "A" has been incorporated.



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B. In addition to the identification label there are three (3) other record forms packaged with the DC-400, they are:

(1) The final acceptance tag, (Ref. Fig. 2), supplies the following information:

Nomenclature
 Model Number TYPE
 Part Number
 Shipping Date DATE
 Serial Number SERIAL NO.
 Final Calibration Technician FINAL TEST
 Final Inspector FINAL INSP.
 Customer Acceptance CUSTOMER ACCEPTANCE

The diagram shows a vertical rectangular tag with a slightly rounded top. At the top left, it is labeled 'T18-A'. The text inside the tag is as follows:

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TESTED OK

TYPE

DATE	SERIAL NO.
FINAL TEST	FINAL INSP.

CUSTOMER ACCEPTANCE

FINAL ACCEPTANCE TAG
 Figure 2

OWNER WARRANTY REGISTRATION

NAME _____ TITLE _____
 COMPANY _____ DEPT _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP _____
 P/N _____ S/N _____ MODEL # _____
 PURCHASED FROM _____ DATE _____
 AIRLINE FIXED BASE OPERATOR O.E.M. AIRCRAFT OWNER
 OTHER _____

Complete this card within 10 days of purchase to insure automatic update of printed matter and validation of warranty.

OW-28 - REV. 11-83

OWNER WARRANTY REGISTRATION CARD
 Figure 3



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- (2) The owner's warranty registration card, (Ref. Fig. 3), a preaddressed card to be completed by the owner and returned to the manufacturer within ten (10) days of purchase to insure automatic update of printed matter and validation of warranty.
- (3) The Limited Warranty Statement Card, (Ref. Fig. 4), sets forth the manufacturer's obligation to the original purchaser.

**LIMITED
ONE YEAR
WARRANTY**

BARFIELD INSTRUMENT CORPORATION warrants to the original purchaser of this unit sold by us and/or our agent, and all the parts thereof, to be free from defects in material or workmanship under normal use and service within the specified ratings and operating conditions.

Its obligation under this warranty is hereby limited to the repair or replacement of this unit, or part thereof, which is returned to us within one year after date of invoice, suitably packaged in the original container or equivalent and which shall prove, after our examination, to be defective under terms of above paragraph.

No other warranty is expressed or implied. We are not liable for consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages so that the preceding limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

This warranty does not include the cost of transportation charges to and from the factory.

The repair or replacement of this unit, or any part thereof, does not void or extend the original warranty.

BARFIELD INSTRUMENT CORPORATION reserves the right to discontinue this unit without notice, or to make modifications in design at any time, without incurring any obligation to make these modifications in units previously sold.

BARFIELD INSTRUMENT CORPORATION
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FORM 991-00001

LIMITED WARRANTY STATEMENT CARD

Figure 4

3. RECERTIFICATION

The Test Set P/N 101-00800 has a one-year recertification requirement. Maintenance required by this unit must be performed by qualified technicians in a shop equipped with the necessary tooling and facilities.

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DESCRIPTION

1. PURPOSE OF MANUAL

- A. This publication contains the description, identification data, operating procedures, servicing, maintenance and recalibration information for the DC-400.

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DC-400 SYSTEM (CANADAIR MODULE)

Figure 1

- B. The manual is published in modular form, i.e., the basic manual provides information to operate and maintain the DC-400 only. Each individual Fuel Quantity System will require its own particular Adapter Module.



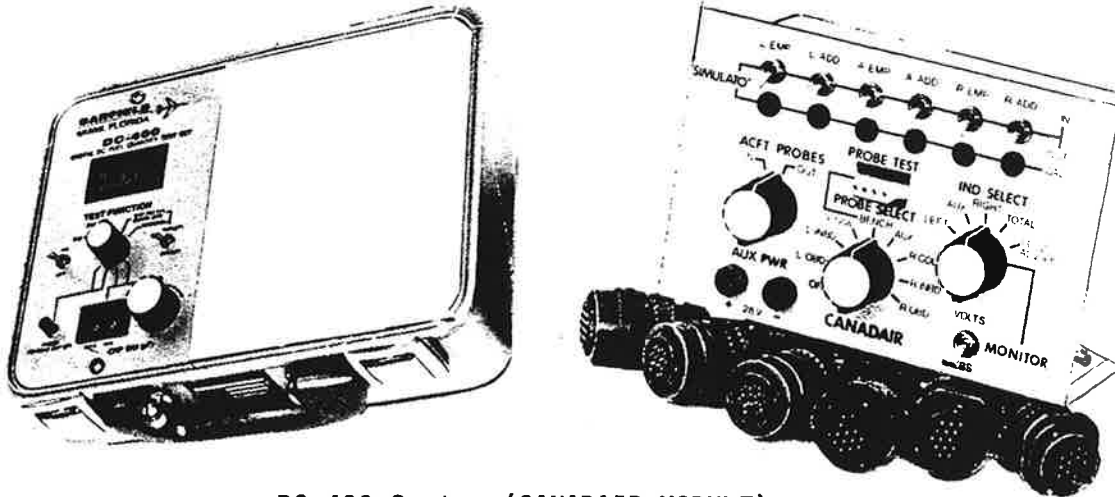
USER MANUAL

Manuals for the Adapter Modules are published separately but as Chapter 5 to this manual. Registered owners of the DC-400 will receive, through automatic distribution, revisions to the basic manual denoting this.

2. GENERAL DESCRIPTION

The DC-400, when interfaced with an Adapter Module, will hereinafter be referred to as the DC-400 System, is specifically designed to meet the requirements for testing "onboard" DC type Fuel Quantity Systems and components without the use of additional external harnesses or test equipment.

3. CHARACTERISTICS (Ref. Fig. 2)



DC-400 System (CANADAIR MODULE)

Figure 2

- A. A self-contained DC type Fuel Quantity System Test Set for "on-board" test/calibration.
- B. Has capability to test all major components and circuitry in the DC type Fuel Quantity Systems.
- C. Has interchangeable interface Adapter Modules dedicated to specific Aircraft/System.
- D. Has capability to bench check DC type Fuel Quantity System components.
- E. Has 3½ digit Liquid Crystal Display (LCD) digital readout.
- F. Power requirement;
 - (1) For normal operation, a self-contained 9V battery (Eveready NO. 522, NEDA MN1604A or equivalent) .
 - (2) For bench test/calibration/recertification functions, a variable 0-9VDC auxiliary power supply is required.



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- (3) For bench test/calibration functions of the amplifier, signal conditioner, or indicator a 28VDC auxiliary power supply is required.
 - G. State of the art low battery drain circuitry.
 - H. Human engineered for maximum ease of operation and maintenance.
 - I. Rugged, compact, portable, light weight, weatherproof all metal carrying case with removable cover.
 - J. Warning signal, LCD digital display readout for low battery condition.
4. PHYSICAL DESCRIPTION OF MAJOR COMPONENTS

A. General

- (1) No additional external wiring harnesses are required for "onboard" test/calibration or troubleshooting DC type Fuel Quantity Systems.
- (2) A wide range of aircraft, systems and their components can be serviced through Adapter Module interfacing.

B. Carrying Case (Ref. Figs. 1 and 2)

- (1) Fabricated from drawn aluminum for maximum strength. Flanges in the lower section serve as securing support mounts for the Adapter Module.
- (2) The case provides; on the left-hand side, space for the DC-400; on the right-hand side, space for the Adapter Module and a well for storage of its integral interconnecting harnesses.
- (3) A switch bracket in the lid automatically moves the ON/OFF switch from the ON position to the OFF position when the lid is closed.

C. Front Panel (Ref. Fig. 3)

<u>NO.</u>	<u>ITEM</u>
------------	-------------

- | | |
|-----|--|
| (1) | ON/OFF switch. |
| (2) | TEST FUNCTION selector switch, four (4) positions. |
| (3) | 3½ digit LCD digital display. |
| (4) | Securing screws, two (2) each. |
| (5) | 200(pF)/1000(pF) range select switch. |
| (6) | CAP SIM(pF) 0-10 trimmer control knob. |
| (7) | CAP SIM(pF) 10'S (tens) thumbwheel switch. |
| (8) | CAP SIM(pF) 100'S (hundreds) thumbwheel switch. |



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- (9) PRESS TO READ CAP(pF) (CAPacitance in picofarads) pushbutton.
- (10) Front Panel.

D. Display Presentation (Ref. Fig. 3 Item 3)

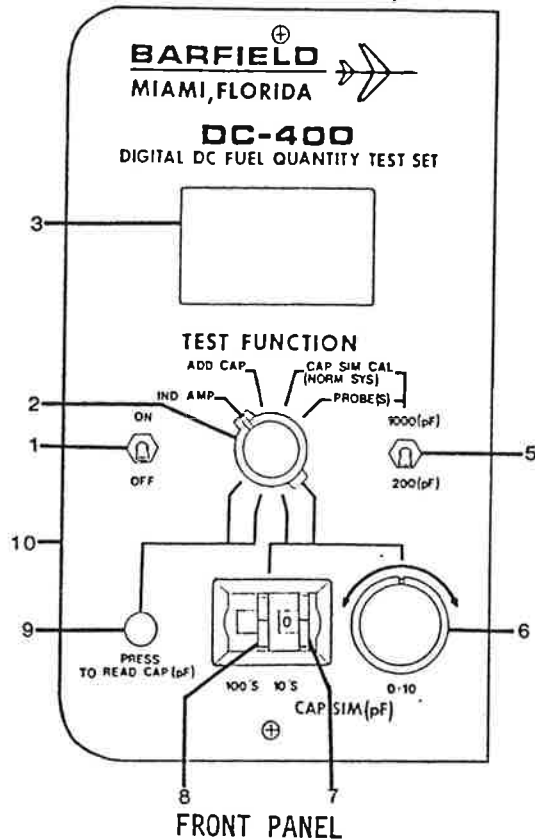


Figure 3

- (1) Through DC-400 System selection and switching arrangements the 3½ digit LCD will display picofarads (pF), volts, siemens (conductance), pounds, millivolts, microamperes (μA, and ohms (Ω). Each of these units will be discussed separately in 1-2, OPERATION, or in the Module Manual.
- (2) In addition to the above, anytime the ON/OFF switch is in the ON position the 9V battery is being monitored. Whenever voltage is below operational requirements, 6.8V, the operator will be signaled by the appearance of the contraction LO BAT in the upper left-hand corner of the LCD digital display.

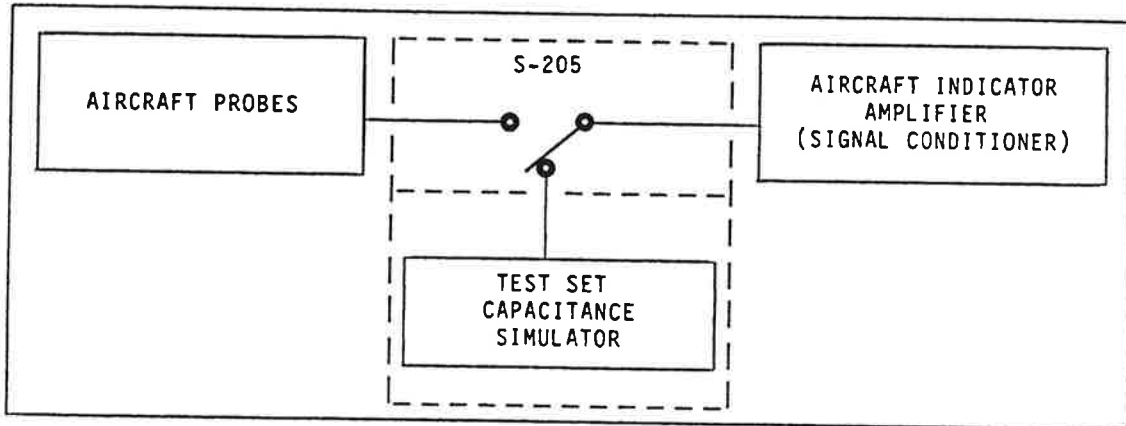
5. SWITCHING FUNCTIONS (Ref. Fig. 3)

- A. The ON/OFF switch (1), in the ON position supplies power for all "on-board" test/calibration functions of the DC-400.



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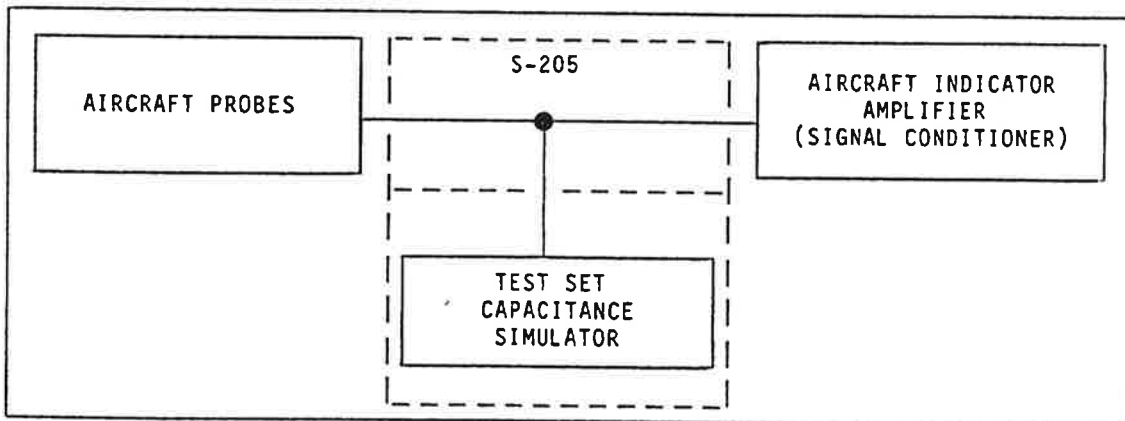
- B. The TEST FUNCTION selector switch (2), permits the operator to select:
- (1) IND AMP (INDicator AMPlifier) position: (Ref. Fig. 4), electrically disconnects the probe(s)/tank unit(s) while simultaneously electrically connecting the amplifier, signal conditioner, indicator to the DC-400's capacitance simulator for empty/full checks/calibration I/A/W (In Accordance With) Aircraft or Fuel Quantity System manufacturer's procedures and specifications;



IND AMP POSITION BLOCK DIAGRAM

Figure 4

- (2) ADD CAP (ADD CAPacitance) position: (Ref. Fig. 5), electrically connects the probe(s)/tank unit(s) and amplifier, signal conditioner, indicator in parallel with the DC-400's capacitance simulator allowing a predetermined amount of capacitance, in picofarads, to be added to that measured from the probe(s)/tank unit(s) to give a total capacitance, in picofarads, necessary to test/calibrate the Fuel Quantity System and components at all levels above that of empty;



ADD CAP POSITION BLOCK DIAGRAM

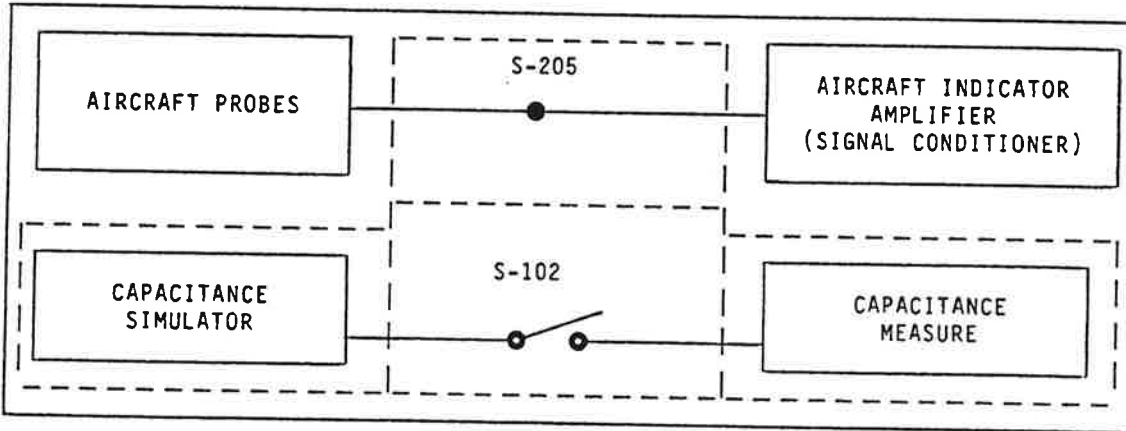
Figure 5



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- (3) CAP SIM CAL (CAPacitance SIMulator CALibration) position: (Ref. Fig. 6), the DC-400 is electrically isolated from the Fuel Quantity System and is in its calibration mode. Selected capacitance, in picofarads, is programmed by controls (6), (7) and (8), with the 200(pF) /1000(pF) range select switch set to the appropriate range. The value programmed will appear on the LCD digital display when the PRESS TO READ CAP(pF) pushbutton switch is depressed.

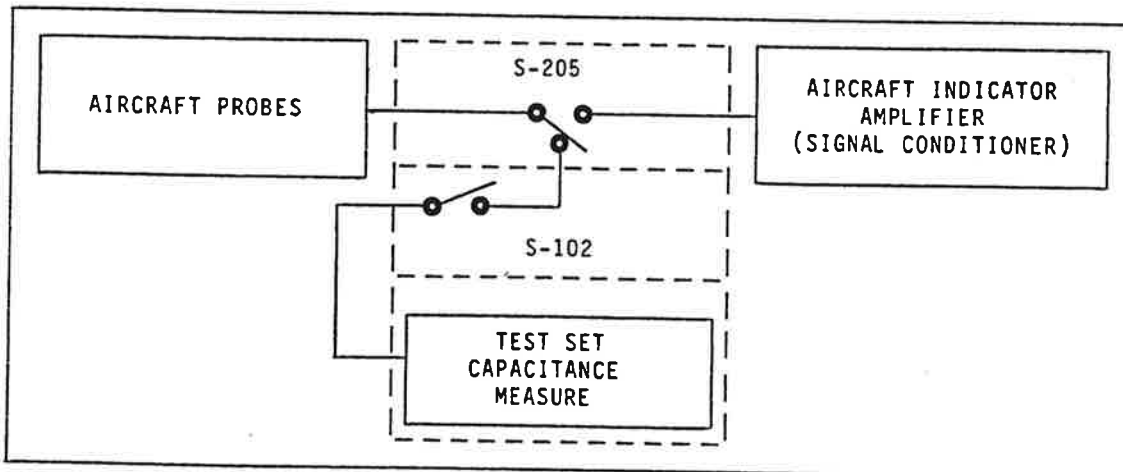
The probe(s)/tank unit(s) are connected to the Fuel Quantity System and components as in normal operation.



CAP SIM CAL POSITION BLOCK DIAGRAM

Figure 6

- (4) PROBE(S) position: (Ref. Fig. 7), the probe(s)/tank unit(s) and Fuel Quantity System power are isolated from the Fuel Quantity System. Probe(s)/tank unit(s) capacitance can be measured, the value(s), in picofarads, will appear on the LCD digital display when the PRESS TO READ CAP(pF) pushbutton switch is depressed.



PROBE(S) POSITION BLOCK DIAGRAM

Figure 7



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- C. The 200(pF)/1000(pF) range select switch (5), permits selection of the 200(pF) range or the 1000(pF) range. The proper picofarad range will be programmed to appear on the LCD digital display when the PRESS TO READ CAP(pF) pushbutton switch is depressed.
- D. The CAP SIM(pF) 0-10 trimmer control knob (6), permits EXACT programming of capacitance value, in picofarads, after the thumbwheel switches have been programmed to an APPROXIMATE capacitance value in picofarads.
- E. The CAP SIM(pF) 10'S and 100'S thumbwheel switches (7) and (8), permit programming the APPROXIMATE capacitance value, in picofarads, to be simulated.
- F. The PRESS TO READ CAP(pF) pushbutton switch (9), when depressed will cause probe(s)/tank unit(s) capacitance value, in picofarads, to be displayed when the TEST FUNCTION selector switch is in the PROBE(S) position.

Or, when the TEST FUNCTION selector switch is in the CAP SIM CAL position, depressing this switch will cause the simulated capacitance value, in picofarads, programmed into the DC-400 System's capacitance simulator to be displayed.

6. ADAPTER MODULE (Ref. Fig. 2)

The Adapter Modules, though not covered in this, the basic manual, are mentioned here to establish the characteristics of the complete testing unit.

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OPERATION

1. GENERAL

The Fuel Quantity Indicating (Gaging) System provides fuel quantity information to the crew. Fuel quantity is monitored by the fuel probe(s), (tank unit[s]) installed in the fuel tank(s), (cell[s]).

A fuel probe, (tank unit) is a capacitor which uses fuel as a dielectric.

The amplifier, signal conditioner, or indicator provides a constant frequency ac signal to the probe(s)/tank unit(s). This signal is applied across the capacitor allowing the capacitive reactance to change proportionately as the quantity of fuel in the tank(s)/cell(s) changes.

This changing signal, is attenuated and rectified in the probe/tank unit. The resulting dc currents are sent to the amplifier, signal conditioner, or indicator where they are buffered and summed for display on the fuel quantity indicator.

For more complete and detailed information for a particular Aircraft or Fuel Quantity System refer to the appropriate Maintenance Manual.

2. PREPARATION FOR USE

A. Battery Installation/Replacement

- (1) Loosen the two (2) captive Adapter Module Front Panel securing screws (one [1] at the right center and one [1] at the left center).

CAUTION: FROM THIS POINT AND UNTIL REINSTALLATION IS COMPLETE ABSOLUTE CARE MUST BE EXERCISED TO PROTECT THE RIBBON CABLE AND THE CONNECTORS FROM DAMAGE.

- (2) Lift the Adapter Module approximately 1cm ($\frac{1}{2}$ in.), enough for the modules front bulkhead to clear its guide. Gently move it toward the open section of the case until the connector assembly is clear of the support bracket. Raise it approximately 8cm (3in.) until the ejector mechanism on the connector can be operated to separate the Module from the DC-400. Remove the unit from the case and set aside from the work area, protecting the front panel and the connector attached to the left-hand side.
- (3) Remove the two (2) DC-400 Front Panel securing screws (one [1] at the top center and one [1] at the bottom center). Lift the unit from the case and place it, inverted, on a clean, cloth-protected surface.
- (4) Place the battery into the battery holder observing polarity, then push fully into holder assuring the terminals SNAP into their clips.
- (5) Installation of the DC-400 System into the carrying case is the exact reverse order of removal.



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3. FUEL QUANTITY SYSTEM TEST/CALIBRATION (Preferred Method, Empty Tanks)

The following is a typical sequence. Operating instructions for specific Aircraft/System and components are found in the appropriate Adapter Module manual, or adapted from the appropriate Aircraft/System manual. Special attention shall be given to **WARNINGS** and **CAUTIONS** therein.

A. Equipment Required (or equivalent)

- (1) DC-400 DC Fuel Quantity Test Set P/N 101-00800.
- (2) Technical Manual P/N 57-101-00800 (supplied with the DC-400).
- (3) DC-400 Adapter Module (Ref. INTRO. Fig. 5).
- (4) Technical Manual for the Adapter Module employed.
- (5) Probe Adapter Cable P/N 101-00813 or P/N 101-00815.

NOTE: Adapters Modules with three (3) pin jacks at the BENCH PROBE TEST position require Probe Adapter Cable P/N 101-00815.

- (6) Latest revision of the appropriate Aircraft/System under test.
- (7) 28VDC Auxiliary Power Supply for bench tests (not supplied).
- (8) Work sheet for recording picofarad values to be used in later computations (not supplied). Reference the appropriate Aircraft Maintenance Manual or the Adapter Module Manual.

B. Precautions

CAUTION: REFER TO THE APPROPRIATE AIRCRAFT MAINTENANCE MANUAL(S) FOR PROPER FUELING/DEFUELING PROCEDURES, OBSERVE ALL SAFETY PRECAUTIONS THEREIN.

- (1) Fuel tanks/cells must be drained of ALL fuel, and PROBE(S)/TANK UNITS DRY, for accurate capacitance measurements.

CAUTION: FUEL QUANTITY SYSTEMS POWER MUST BE OFF BEFORE WIRING HARNESSES OR CONNECTORS ARE DISCONNECTED. POWER MUST REMAIN OFF UNTIL ALL CONNECTIONS ARE MADE AS SPECIFIED AND THE REQUIREMENT FOR POWER CALLED OUT.

- (2) Open appropriate Fuel Quantity System circuit breaker(s).

C. Preliminary

- (1) Gain access to the amplifier, signal conditioner, or indicator whichever is appropriate for the system under test.

Reference the appropriate Aircraft Maintenance Manual for location and accessing procedures.



USER MANUAL

- (2) Locate the DC-400 System conveniently for the procedures that follow. Remove the harness assemblies and arrange for interfacing.

D. Probe(s)/Tank Unit(s) Capacitance Measurement

(1) DC-400 Configuration

- (a) Insure the ON/OFF switch is in the OFF position.
- (b) Rotate the TEST FUNCTION selector to PROBE(S).
- (c) Place the 200(pF)/1000(pF) range select switch to the appropriate range.

- (2) Configure the Adapter Module I/A/W the procedures specified in the Module Manual.

- (3) Interface the DC-400 System to the Aircraft or component as specified in the appropriate manual.

(4) Procedure

- (a) Place the ON/OFF switch ON.
- (b) Rotate the PROBE SELECT switch to the first position above OFF.
- (c) Depress the PRESS TO READ CAP(pF) pushbutton.
- (d) Record the picofarad value (LCD digital display reading) on a work sheet for comparison with manufacturer's specifications.
- (e) Follow the above procedure for each position of the DC-400 System's PROBE SELECT switch.

The probe(s)/tank unit(s) capacitance measurement(s) is/are complete when each probe/tank unit picofarad value has been compared.

Units not meeting these specifications must be replaced with a known serviceable unit and the complete test procedure repeated.

- (f) Place the ON/OFF switch OFF.

E. Amplifier, Signal Conditioner, or Indicator Test/Calibration

(1) DC-400 System Calibration (empty)

- (a) Place the ON/OFF switch ON.
- (b) Rotate the TEST FUNCTION selector to CAP SIM CAL.
- (c) Place the 200(pF)/1000(pF) range select switch to the appropriate range.



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- (d) Set the CAP SIM(pF) 10's and 100's thumbwheels to the APPROXIMATE empty picofarad value specified in the appropriate manual.
 - (e) Depress and hold the PRESS TO READ CAP(pF) pushbutton while adjusting the CAP SIM(pF) 0-10 trimmer control knob to obtain the EXACT empty picofarad value (LCD digital display readout) specified in the appropriate manual.
 - (f) Release the PRESS TO READ CAP (pF) pushbutton.
- (2) Configure the Adapter Module I/A/W the procedures specified in the Module Manual.
 - (3) Interface the DC-400 System to the Aircraft or component as specified in the appropriate manual.
 - (4) Procedure
 - (a) Rotate the TEST FUNCTION selector to IND AMP.
 - (b) Close appropriate Fuel Quantity System circuit breaker(s).

The fuel quantity indicator should indicate empty, if not;
 - (c) Adjust to empty I/A/W manufacturer's specifications.
 - (5) DC-400 System Calibration (full)

Maintain above interface configuration.

 - (a) Rotate the TEST FUNCTION selector to CAP SIM CAL.
 - (b) Place the 200(pF)/1000(pF) range select switch to the appropriate range.
 - (c) Set the CAP SIM(pF) 10's and 100's thumbwheels to the APPROXIMATE full picofarad value specified in the appropriate manual.
 - (d) Depress and hold the PRESS TO READ CAP(pF) pushbutton while adjusting the CAP SIM(pF) 0-10 trimmer control knob to obtain the EXACT full picofarad value (LCD digital display readout) specified in the appropriate manual.
 - (e) Release the PRESS TO READ CAP(pF) pushbutton.
 - (6) Procedure
 - (a) Rotate the TEST FUNCTION selector to IND AMP.

The fuel quantity indicator should indicate full, if not;
 - (b) Adjust to full I/A/W manufacturer's specifications.



USER MANUAL

Refer to the appropriate manual for any further amplifier, signal conditioner, or indicator test. Perform any additional test in the same sequential steps as outlined above.

The amplifier, signal conditioner, or indicator test/calibration is complete when it has been determined the unit(s) meet the manufacturer's specifications.

Units not meeting these specifications must be replaced with a known serviceable unit and the complete test procedure repeated.

The validity of the above test/calibration will have direct results as to the accuracy of the procedures that follow. In addition, with a valid result, from this point any nonvalid test result can be contributed, in most cases, to the Fuel Quantity System's wiring.

Reference the appropriate Maintenance Manual for proper troubleshooting procedures.

This completes the amplifier, signal conditioner, or indicator test/calibration.

- (c) Open appropriate Fuel Quantity System circuit breaker(s).
- (d) Place the DC-400 System's ON/OFF switch OFF.

F. Aircraft System Calibration

(1) DC-400 Configuration

- (a) Rotate the TEST FUNCTION selector to CAP SIM CAL.
- (b) Place the 200(pF)/1000(pF) range select switch to the appropriate range.
- (c) Set the CAP SIM(pF) 10's and 100's thumbwheels to the APPROXIMATE delta empty picofarad value specified in the appropriate manual.

(2) Configure the Adapter Module I/A/W the procedures specified in the Module Manual.

(3) Interface the DC-400 System to the Aircraft or component as detailed in the appropriate manual.

(4) Procedure

- (a) Place the ON/OFF switch ON.
- (b) Depress and hold the PRESS TO READ CAP(pF) pushbutton while adjusting the CAP SIM(pF) 0-10 trimmer control knob to obtain the



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EXACT empty picofarad value (LCD digital display readout) specified in the appropriate manual.

- (c) Release the PRESS TO READ CAP(pF) pushbutton.
- (d) Close appropriate Fuel Quantity System circuit breaker(s).
The fuel quantity indicator should indicate empty, if not;

- (e) Adjust to empty I/A/W manufacturer's specifications.

- (f) Rotate the TEST FUNCTION selector to ADD CAP.

The fuel quantity indicator should indicate full, if not;

- (g) Adjust to full I/A/W manufacturer's specifications.

- (h) Rotate the TEST FUNCTION selector to CAP SIM CAL.

The fuel quantity indicator should indicate empty, if not;

- (i) Adjust to empty I/A/W manufacturer's specifications.

When all adjustment values are within these specifications the fuel quantity system calibration is complete.

- (j) Open appropriate Fuel Quantity System circuit breaker(s).

- (k) Place the ON/OFF switch OFF.

- (l) Disconnect all test equipment and return the aircraft or component to its original configuration.

4. BENCH TEST PROBE(S)/TANK UNIT(S)

A. Preliminary

PROBE ADAPTER CABLE P/N 101-00813 or P/N 101-00815 is required for this procedure. Refer to the Module Manual.

Have available, by part number, the manufacturer's specified picofarad capacitance values for the probe(s)/tank unit(s) to be tested.

Isolate the probe/tank unit to be tested and avoid any physical contact while it is under test.

To read probe/tank unit capacitance in picofarads, depress the PRESS TO READ CAP (pF) pushbutton. The picofarad value will appear on the DC-400 System's LCD digital display.

- (1) DC-400 configuration

- (a) Insure the ON/OFF switch is in the OFF position.



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- (b) Rotate the TEST FUNCTION selector to PROBE(S).
 - (c) Place the 200(pF)/1000(pF) range select switch to the appropriate range.
- (2) Configure the Adapter Module I/A/W the procedures specified in the Module Manual.
 - (3) Interface the DC-400 System's Probe Adapter Cable to the probe/tank unit as specified in the appropriate manual.
 - (4) Procedure
 - (a) Place the ON/OFF switch ON.
 - (b) Depress the PRESS TO READ CAP(pF) pushbutton.
 - (c) Record the probe's/tank unit's picofarad value on a work sheet for comparison with manufacturer's specifications.

The bench test is complete when the probe/tank unit measurement has been made and compared.

Units not meeting specifications must be rejected.

- (d) Place the ON/OFF switch OFF.
- (e) Disconnect all test equipment.

5. BENCH TEST Amplifier, Signal Conditioner, Indicator

A. Preliminary

An auxiliary 28VDC power supply is required for this procedure. Refer to the Module Manual.

Have available, by part number of the unit, all of the manufacturer's specified test, calibration value(s), requirement(s) for the amplifier, signal conditioner, indicator to be tested, calibrated.

B. DC-400 Configuration

- (1) Insure the ON/OFF switch is in the OFF position.
- (2) Rotate the TEST FUNCTION selector to CAP SIM CAL.
- (3) Place the 200(pF)/1000(pF) range select switch to the appropriate range.
- (4) Set the CAP SIM(pF) 10's and 100's thumbwheels to the APPROXIMATE empty picofarad value specified in the appropriate manual.

C. Configure the Adapter Module I/A/W procedures specified in the Module Manual.



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- D. Interface the DC-400 System's AMP harness to the amplifier, signal conditioner, or indicator as specified in the Module Manual.
- E. Insure the 28VDC auxiliary power supply ON/OFF switch is in the OFF position.
- F. Interface the 28VDC auxiliary power supply to the DC-400 System as specified in the Module Manual.

G. Procedure

(1) Empty test/adjust

- (a) Place the DC-400 System's ON/OFF switch ON.
- (b) Depress and hold the PRESS TO READ CAP(pF) pushbutton while adjusting the CAP SIM(pF) 0-10 trimmer control knob to obtain the EXACT empty picofarad value (LCD digital display readout) specified in the appropriate manual.
- (c) Release the PRESS TO READ CAP(pF) pushbutton.
- (d) Rotate the TEST FUNCTION selector to IND AMP.
- (e) Place the 28VDC auxiliary power supply ON/OFF switch ON.

The fuel quantity indicator should indicate empty, if not;

- (f) Adjust to empty I/A/W manufacturer's specifications.

(2) Full test/adjust

- (a) Rotate the TEST FUNCTION selector to CAP SIM CAL.
- (b) Place the 200(pF)/1000(pF) range select switch to the appropriate range.
- (c) Set the CAP SIM(pF) 10's and 100's thumbwheels to the APPROXIMATE full picofarad value specified in the appropriate manual.
- (d) Depress and hold the PRESS TO READ CAP(pF) pushbutton while adjusting the CAP SIM(pF) 0-10 trimmer control knob to obtain the EXACT full picofarad value (LCD digital display readout) specified in the appropriate manual.
- (e) Release the PRESS TO READ CAP(pF) pushbutton.
- (f) Rotate the TEST FUNCTION selector to IND AMP.

The fuel quantity indicator should indicate full, if not;

- (g) Adjust to full I/A/W manufacturer's specifications.



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Refer to appropriate manual for further amplifier, signal conditioner, indicator test. Perform any additional test in the same sequential steps outlined above.

This completes the amplifier, signal conditioner, or indicator bench test when all adjustment values are within manufacturer's specifications.

Units not meeting specifications must be rejected.

- (h) Place the 28VDC auxiliary power supply ON/OFF switch OFF.
- (i) Place the DC-400 System's ON/OFF switch OFF.
- (j) Disconnect all test equipment.

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DC-400 DIGITAL DC
FUEL QUANTITY TEST SET
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SPECIFICATIONS AND CAPABILITIES

1. PHYSICAL DATA

- A. Length - 31.0cm (12.2in.)
- B. Width - 26.4cm (10.4in.)
- C. Height - 13.5cm (5.3in.)
- D. Weight - 3.0Kg (6lbs. 6ozs.)

2. CAPABILITIES

Refer to 1-1 Page 2. Para. 3.

3. PERFORMANCE DATA:

FUNCTION	RANGE	ACCURACY	EXCITATION
Monitor Display	0-1999	± 1 Count	Ratiometric $\left[\frac{E_{in}}{E_{ref}} \times 1000 \right]$
+ 1.000 VDC	Reference Output	± .002 VDC	
Capacitance Measurement	0-199.9 in 0.1pF Increments	± .1% + 1 digit	20V RMS @ 6.0KHz
	0-1000.0 in 1.0pF Increments	± .1% + 1 digit	20V RMS @ 6.0KHz
Capacitance Simulator	0-400pF Infinite Resolution	Adjustable to Capacitance Measurement	

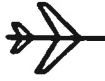
PERFORMANCE DATA

Figure 1

4. LEADING PARTICULARS:

- A. Display: 3½ digit LCD.
- B. Display character height: 1.27cm (½in.).
- C. Temperature operating range: 0° C - 50° C (32° F -122° F).

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SHIPPING

1. RECEIVING

No special unpacking procedures are necessary. It is recommended that the factory shipping container and packing materials be retained should it become necessary, for any reason, to reship the DC-400.

It is also recommended that the DC-400 and its carrying case be carefully inspected for damage. If damaged, immediately notify the carrier and the manufacturer.

2. SHIPPING

Use standard delicate electronic equipment packaging procedures when packing the Adapter for reshipment.

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STORAGE

1. PROCEDURE

- A. Place a four (4) ounce bag of desiccant inside the case.
- B. Close and latch the cover.
- C. Store in a cool dry place.

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