

**ACES Analyzer Plus  
Model 1700  
User Manual  
Version 2.07 Firmware**

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## **Warranty**

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The ACES model 1700 Analyzer Plus is warranted to be free of defects in material and workmanship for a period of 60 months (5 years) following the purchase date. Warranty does not cover the Trim TEC Analyzer unless it is properly used, stored, and maintained in accordance with the provisions of this manual. Accessories are warranted for a period of 12 months (1 year). Individual accessories not manufactured or assembled by TEC may be covered by the original manufacturer for longer periods.

The required annual calibration must be complied with to validate the terms of this warranty. Warranty replacement and / or repair will not be honored on any unit which is overdue an annual calibration at the time of the warranty claim. If your calibration is overdue and no warranty claim is being made, you need only have your overdue calibration completed to revalidate your warranty.

Warranty is limited to supplying Purchaser with replacement or repair of any unit or accessory item which, in TEC's opinion, is defective. All repaired or replacement parts will be warranted only for the unexpired period of the basic warranty. All warranty work will be on a return-to-the-factory basis. Shipping cost to the factory will be borne by the Purchaser.

Warranty shall not apply to any product that, in the judgment of TEC, has been subjected to misuse or neglect, or has been repaired or altered outside the TEC factory in any way, which may have impaired its safety, operation, or efficiency, or to any product that has been subjected to accidental damage.

Warranty does not cover any cost incurred by Purchaser as the result of the purchase of TEC products. Nor does Warranty cover cost incurred by Purchaser for labor charges for replacement of parts, adjustments, or repairs or any other work performed by the Purchaser or his agents on, or connected with, TEC-supplied products.

Warranty is expressly in lieu of any and all other warranties or representations, expressed or implied, and of any obligations or liabilities of TEC to the Purchaser arising from the use of said products, and no agreement or understanding varying or extending the same will be binding upon TEC unless in writing, signed by an authorized representative of TEC.

TEC reserves the right to make changes in design or additions to, or improvements in, products at any time without imposing any liability on itself to install the same in any product manufactured or supplied prior thereto.

## **Calibration and Certification**

Your ACES equipment is calibrated and certified effective the date of shipment. TEC requires the unit to be

calibrated by TEC or a TEC authorized repair facility on an annual basis to insure accuracy and currency of installed electronic components. In addition, the vibration sensors, pressure and temperature transducers (if applicable) are also required calibration on an annual basis or when dropped, damaged or suspect of improper operation. The unit will be identified as calibrated by a sticker stating the date of calibration and next due date of calibration. A certificate of calibration will be provided to you to verify compliance to inspectors. A permanent record of your calibration is maintained by TEC. For information about calibration services, contact the TEC Aviation Division at the number listed in front of this manual.

#### **NOTE**

**The annual calibration is required to comply with the terms of the 5 year guarantee. See “Warranty” in this section.**

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## **Introduction**

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Congratulations on your purchase of the ACES Analyzer Plus. This versatile analyzer automates the tasks of fan

trim balance, propeller balance, vibration and acoustic surveys and acts as the controller for the ACES JEDA. Engine specific programs (called procedures) can be loaded from a RAM (procedure) card into the analyzer to automatically configure the analyzer and guide you, step-by-step, through these tasks. The engine procedures are based on the manufacturer's written maintenance directions. The analyzer allows you to print spectra and balance jobs directly to a serial printer for inclusion in aircraft records or as a file copy. Survey spectra can also be transferred directly to a personal computer for storage, trending or manipulation for inspection or troubleshooting purposes using the *Intelli-Trend®* software which is included with the analyzer.

The Analyzer Plus is designed as a light weight, portable unit with accuracy and ease of use as primary design goals. While this manual will explain the functions and features of the analyzer, TEC and it's Aviation Division, ACES Systems, depend on information from our customers to continue the quality, dependability and simplicity associated with our products. We invite you to call our customer support office at (423) 966-5857 EXT. 319 or FAX your comments and suggestions to us at (423) 675-1241. We build our business on your comments and concerns.

## **Notes, Cautions and Warnings**

Throughout this manual you will encounter notes, cautions and warnings. They will be in **BOLD** capital print centered above a short paragraph. The information in the paragraph is defined as follows for each of the three categories:

### **NOTE**

**Information considered essential to emphasize for clarity or to ensure the related procedure is correctly accomplished.**

### **CAUTION**

**Information which, if not heeded, may result in the damage or faulty operation of equipment.**

### **WARNING**

**Information which, if not heeded, may result in damage or destruction of equipment and/or injury to personnel.**

## Conventions

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You should be aware of the following conventions:

1. This manual indicates keystrokes in square brackets and boldface type, just as they appear on the analyzer's front panel. For example, **[ENTER]**, **[CLR]**, **[5]**.
2. The term "select" as used in this manual, means to highlight the item on the current menu by using either the arrow keys or by pressing a corresponding numeric key. A selection by use of the numeric keys is limited to the numbers 1 through 9 range. If the selection is numbered 10 or higher, it must be highlighted by using the arrow keys

## Description

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This section will give you a brief tour of the analyzer. It will describe the various keys and their functions, the input and output ports as well as the standard accessories supplied with the analyzer. Optional accessories will be discussed in the Optional Accessories section.

### The Keypad

The Analyzer Plus keypad consists of 28 function keys.



Beginning at the top left, the **ON/OFF** key, when pressed, turns the analyzer power on or off.



The **LOCAL** key is used in conjunction with earlier versions of the Intelli-Trend software and is not used with normal 1700 functions.



The **SPCL MODES** key is used to access the analyzer's configuration and test menus. These functions are described in the Special Modes section of this manual.



The **RESET** key is used in several instances throughout the manual as a means to quickly return to the opening "Operations Options" menu or "Realtime Analyzer" menu if no procedures are loaded. When pressed, this key produces the same action as turning the analyzer power off and then back on.



The ten numeric keys (**0** through **9**) are used to input numeric values into the analyzer. They will conform to the active screen needs such as selection of a numbered menu item or to set the sensitivity of a vibration



sensor as in 100.0 mv/g. The "0 Print" key serves a dual function. When a numeric input is expected in an active field, pressing this key will produce a 0 character. When a numeric value is not expected, pressing this key will produce a print screen instruction. (See Printing From the Analyzer).



The light bulb icon key is used to control the backlight of the LCD display. Press once to turn the light ON or OFF. (Other backlight control options are covered under SPCL MODES).



The **EXP** key is a multi-function key. When used in conjunction with a spectral display and the **MARK** key, it serves as an **EXPand** key. The key serves as a **EXPonent** key for entering numeric value in scientific notation.



The **CLR** key is used to clear an input from the keypad. The key is also used to reset averaging during vibration and speed acquisition with selected procedures.

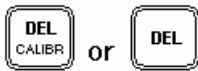


The . **MARK** key is a dual function key. When the screen displays a spectrum, the key is used to **MARK** a position on the horizontal axis as specified by positioning the cursor. With the cursor in position, press the . **MARK** key. A dark bar will be displayed at the top and bottom of

the screen in that position. The cursor is then advanced to a new location to encapsulate a specific range which can then be expanded by pressing the **EXP** key. If the **. MARK** key is pressed in this second position, the first marked position is deleted and replaced by the second. The **. MARK** key is also used to allow fractional numeric value entries as required.



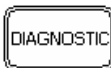
The **+/- HMNC** key is also a dual function key which serves as the harmonic cursor key, allowing you to move the cursor up and down the spectral peaks. When numeric inputs are required, pressing this key prior to numeric input makes the input a positive or negative number. When using the +/- function, highlight the input portion of the screen then press the **[ +/- HMNC]** key and note whether a "+" or a "-" appears in that location. If the desired function is not displayed, simply press the key again to change the sign.



The **DEL CALIBR** key (on some analyzers) is yet another dual function key. When pressed, the key will delete the alpha numeric character displayed and highlighted on the screen. Repeated presses will sequentially delete characters from right to left. The **CALIBR** or calibrate function of the key (if so equipped) is used in the calibration procedure of certain sensors, notably the microphone which is used for acoustic surveys. This function is active only when a survey or spectrum is displayed on the screen.



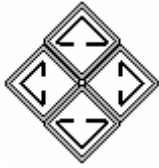
There are two **ENTER** keys, one on either side of the keypad for ease of use. The **ENTER** key is pressed to accept a selection and set that selection into motion. The key is used extensively in survey and balance procedures to "proceed" to the next step. Numeric entries are terminated by pressing this key.



The **DIAGNOSTIC** key gives you access to the real-time analyzer mode. This function give the user some very powerful troubleshooting tools which will be explained further in this manual.



The **NOTEPAD** key allows the user to backup one step in the current running procedure to make corrections or immediate changes.



The four arrow keys, which will be referred to as **UP, DOWN, LEFT** and **RIGHT ARROW**, are used to select, move between or highlight menu items on screen. They are also used in various functions to "toggle" between choices and to increase or decrease screen values.

## The Screen

The Liquid Crystal Display (LCD) screen is how the analyzer communicates with the user. It displays messages, menus, selection lists, graphic illustrations and survey plots. The display is 2.4 inches high by 5 inches long. It is a high-contrast, supertwist, backlit LCD with a 256 x 128 dot-matrix display. It is capable of displaying 32 characters wide and 12 lines of text at one time. The backlight is turned on by pressing the light bulb icon key. The length of time the light remains illuminated and the screen contrast is controlled from the SPECIAL MODES function, Configure Miscellaneous menu.

## Input and Output Ports

**(SAME AS INPUT OUTPUT IMAGE IN CURRENT 1700 MANUAL)**

Figure 1

There are 5 input / output ports on the back panel of the 1700, **2 vibration sensor** inputs (velocity or acceleration), **1 tachometer** input, **1 Battery Charge** input, and **1 DB25 Serial Communications (COMM)** port.

The **Vibration Inputs** are Accelerometer or Velocity Inputs. They are BNC and 4 pin male MS type connectors respectively. The configuration of the sensor input is

determined by the small screw slotted selector switch directly below the VELOCITY input. The slot should be aligned with the black line leading to the input being used at the time. The switch is not labeled.

The **tachometer** input is a 3 pin female \ receptacle MS type connector. It will accept either a raw tachometer speed and reference signal or a TTL level speed signal.

The **Battery Charge** port is used with the battery charger supplied with the analyzer. The MS connector of the charging unit is connected to this port. The charger is then plugged into a 120V/60 Hz outlet when battery charging becomes necessary. The charger may be left connected continuously without causing damage to the battery or to the analyzer. A cap is installed on this connector and should be in place when the unit is not being charged to protect from possible short circuiting as the pins are always powered.

The **COMM** or communications port is a DB25 female connection used for serial communications between the analyzer and a personnel computer or modem. The port may also be used as a serial printer port, or with the inclusion of a Serial-to-Parallel converter, a parallel printer port.

The **PROCEDURE CARD** port on the right side of the Analyzer ( See figure 2 below) is used for loading procedure card programs into the analyzer's internal memory. (For additional information, see "Loading procedures from a procedure card")

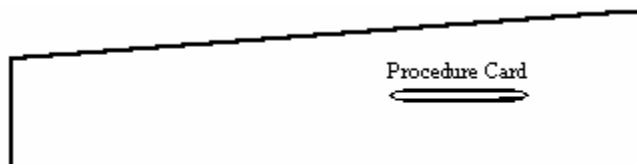


Figure 2

## **ADDITIONAL EQUIPMENT (Included with the Analyzer)**

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### **Battery**

The primary power source for the analyzer is its internal battery. See figure 3 below. It is a camcorder type 12 volt

lead acid battery rated at 2.3 Amp hours. This means that it will supply power at the rate of 2.3 Amps for one hour or at the rate of 1 Amp for 2.3 hours. Typically, the battery will provide power for 8 to 10 hours of continuous analyzer operation while powering a sensor. Obviously, this time is proportionally increased with the use of fewer accessories such as the laser tachometer. A minimum of 2 hours charging time is required for a full charge.

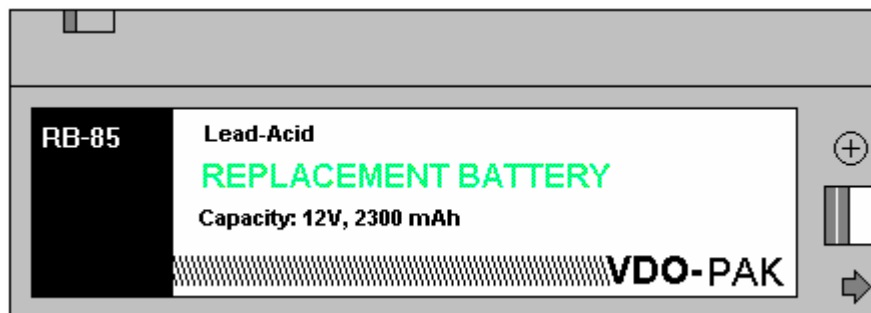


Figure 3.

### Battery Charger

The analyzer battery must be charged periodically. This is accomplished using the supplied battery charger shown in figure 4. The 12 Volt DC battery charger is a standard float type charger commonly used to charge lead acid, camcorder type, batteries. The charger has an input of 120VAC, 60Hz, 16W which is common house current. The output is 12VDC, 800mA. The charger has a three prong (grounded) outlet connector built into the charging unit which plugs directly into a wall outlet. A red LED indicator light built into the charger head (not shown in figure below) indicates when a charge is being supplied. The cord is a standard 16 gage electrical appliance cord and is 6 feet long. The connector is an MS, two pin female, quarter turn lock type constructed of aluminum alloy and coated with olive drab chromate for corrosion protection.

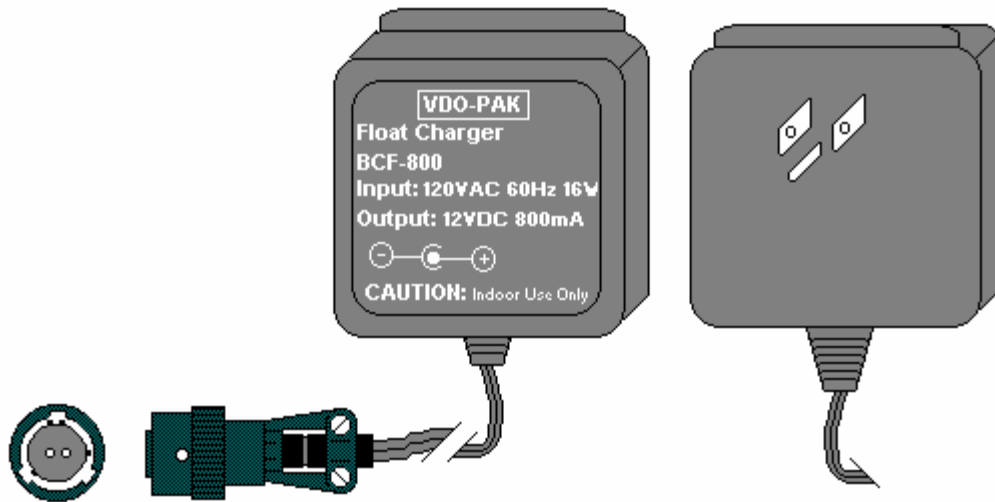


Figure 4-1

The 220 V battery charger ( figure 4B) requires an input of 220VAC, 50Hz to supply an output of 13VDC, 850mA, 11.05VA to the battery. The charger is shipped without a wall outlet connector which allows the end user to attach the appropriate connector for local configuration. The cord is a standard 16 gage electrical appliance cord and is 3 feet long. The analyzer end connector is an MS, two pin female, quarter turn lock type constructed of aluminum alloy and coated with olive drab chromate for corrosion protection.

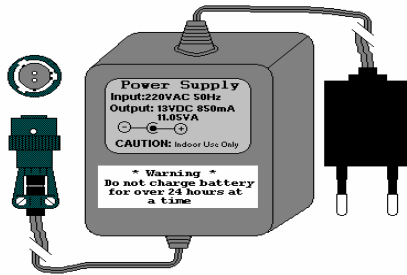


Figure 4B

## WARNING

**When using the 220V battery charger, do not leave the battery attached (on charge) for a period of more than 24 hours. To do so may result in damage to the battery and / or Analyzer.**

### Charging the battery:

1. Place the analyzer near an AC electrical outlet where it can remain for two hours.

2. Remove the protective cap from the BATTERY CHARGE port on the rear of the analyzer and connect the MS connector of the battery charger cord.
3. Plug the charging unit into a 120VAC 60Hz outlet and note that the red indicator light on the charger head illuminates indicating an in progress charge.
4. Leave the unit on the charger for a minimum of two hours. (The 110V model float charger may remain connected continuously without harm to the analyzer, battery or charger.) The red LED indicator light will be blinking when charge is complete.
5. Press the **[ON/OFF]** key to turn the analyzer on. If no procedures have been installed into the analyzer, the screen will display the "ANALYSIS, Realtime Analyzer" banner screen. (See figure 5 below). Just above the banner and in the left uppermost corner of the screen a battery charge indicator bar is displayed. The bar (see Figure 6 below) is divided into ten blocks indicating nominally ten percent of full charge each. The battery charger must be disconnected from the charging port in order to ensure an accurate indication of the battery charge is displayed on this indicating system. The percent of charge display is not continuously updated but periodically updates when new information is displayed on the screen such as when changing menus or after pressing the RESET key.

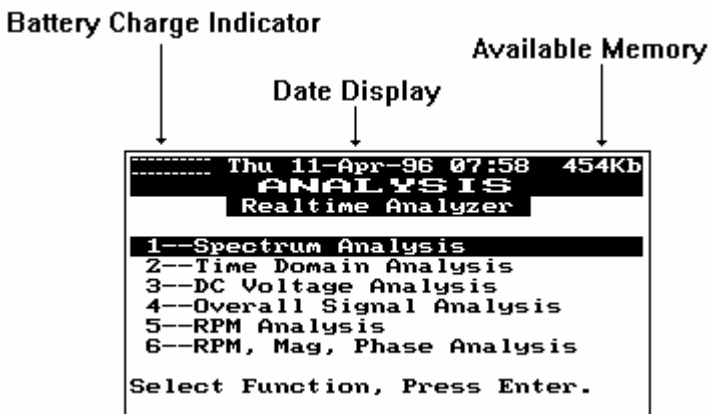


Figure 5

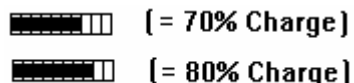


Figure 6

6. When charging is complete, unplug the charger from the AC outlet and disconnect from the analyzer. Replace the protective cap on the analyzer's Batt. Chg. port. Place the charger in a safe place for future use.

## Procedure Cards

Procedure cards are credit-card size solid state devices that transfer procedures and data to the analyzer. Two types of procedure cards are available, RAM and ROM. RAM cards are erasable, reprogrammable, and can be updated. An internal battery maintains the stored information and will provide power to the procedure storage memory for up to 18 months. The battery should be tested periodically and replaced when necessary. A special procedure is required to prevent memory loss during the battery change process. See "**Replacement of the Procedure Card Battery**" in the "**Using the Analyzer Plus**" section of this manual.

The RAM card has a write-protect switch on one end of the card along its edge. The switch will normally be protected by a small tape-like covering to prevent accidental movement.

### CAUTION

**Do not remove the protective tape or otherwise attempt to move the write-protect switch. To do so may result in the loss of all procedures contained on the card and will necessitate returning the card to ACES for reprogramming.**

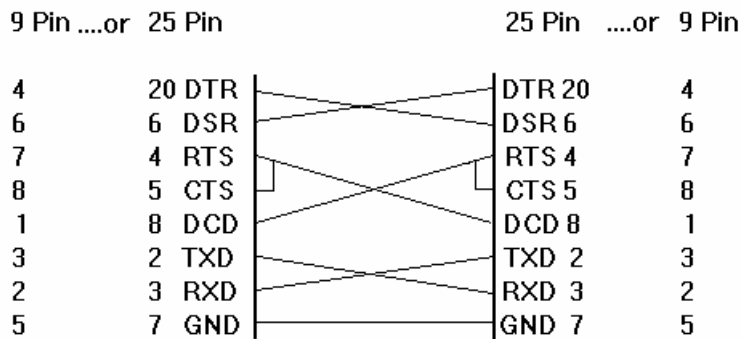
ROM cards carry the same type information as RAM cards, but unlike the RAM cards, cannot be erased, reprogrammed or updated. Both cards are capable of containing one or more programs dependent on program size. The programs are transferred to the analyzer's internal memory to make it engine or aircraft specific. Both RAM and ROM cards contain copyrighted material. They are programmed and sold specifically for use with designated analyzer's. Use of the procedure in analyzers other than the one for which it was purchased is a violation of the licensing agreement. See "Loading a Procedure from a Procedure Card" in the "**Using the Analyzer Plus**" section for additional information.

### NOTE

**Procedure cards should be returned to TEC with the analyzer for the recommended once per year calibration. All procedures on your card will be checked for currency and you will be notified by phone which procedures need updating. The battery in your RAM cards will also be checked and replaced as necessary.**

### **Communications Cable**

Your Analyzer includes a communications cable configured for analyzer use. This cable is a standard type DB25M to DB25F Null Modem cable that can be purchased at most electronic retailers. You may require a 25 to 9 pin adapter depending on the configuration of your computer communication ports. These are also available at electronic retailers. Since both computers and printers are DTE (Data Terminal Equipment) devices, you need a *null modem* to connect them together. A null modem cable switches several signals, as shown in the figure below.



### **ACES Intelli-Trend**

An ACES *Intelli-Trend*® program is included with your purchase of the Analyzer. See “Installing *Intelli-Trend*” in the “Using the Analyzer Plus” section for more information.

### **Carrying Case**

The analyzer carrying case is constructed of expanded ABS plastic. The case is durable and protects its contents from the elements when closed and latched. Care should be exercised not to force the lid open beyond the stops as the hinges may be damaged. Clean the case with a mild soap solution to preserve appearance. The case has a limited lifetime warranty from the original manufacturer.

### **Users Manual**

This users manual is current when you receive it with the Analyzer. It is printed on water and petroleum resistant paper for use in the maintenance environment. The manual is bound with

three snap rings that allow pages to be removed and replaced as information within the manual is updated. ACES Systems will supply you with the most current information to the manual, with directions for posting as changes occur. Refer to the list of effective pages to verify that your manual is current.

## Using the Analyzer Plus

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### Loading a Procedure from a Procedure Card

Programs loaded into the Analyzer's memory will remain there unless they are deleted by the user, or a malfunction, such as a dead battery, causes the memory to be lost. To load or reload a program, proceed as follows:

1. If on, turn power to the Analyzer **OFF** by pressing the **[ON/OFF]** key.
2. Slowly insert the procedure card (ACES sticker up, arrow pointing toward the Analyzer) into the PROCEDURE CARD port on the right side of the analyzer.
3. As the card contacts the pins and alignment mechanism inside the analyzer, some resistance will be felt. When this occurs, continue pushing slowly but firmly for approximately 1/8 inch to seat the card.
4. Turn the analyzer power on by pressing the **[ON/OFF]** key.
5. The screen will display the "CARD FUNCTIONS" banner at the top of the screen. In the lower portion of the screen, "Function: " followed by the name of one of the procedures contained on the card currently in the procedure card slot. (If the procedure card contains more than one procedure, you may scroll through each one by pressing the **[UP ARROW]** or **[DOWN ARROW]** key.)
6. When the desired procedure to load is displayed, press **[ENTER]**. The selected procedure is will be loaded into memory. The screen will return to the "Trim TEC ANALYZER" banner and the "Operation Options" screen with the procedure displayed within the list.
7. To load additional procedures from the same card, press the **[RESET]** key and repeat steps 5 and 6 above.

#### NOTE

**The total number of procedures that can be loaded is a function of procedure size and available memory space. If attempting to load a procedure which is larger than the remaining available space you will**

encounter an error message “PROBLEM NOT ENOUGH SPACE”. If this occurs, you must choose which procedures are required for your immediate needs and which may need at a later time. See the Special Modes section on “MANAGE DATA / REMOVE FUNCTION” if you need to make room in memory for a procedure.

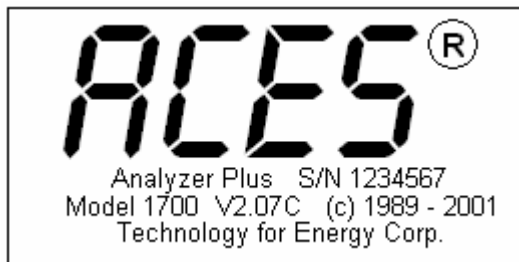
8. When all desired procedures are loaded, turn the analyzer power off by pressing the [ON/OFF] key.
9. Remove the Procedure card from the port, place it in its protective cover and store in a safe place.

### Loading a Procedure from a Personal Computer

If you are loading a procedure into the analyzers internal memory from a personal computer, your analyzer must have ROM version 2.07C or greater. You must also have ACES AvTrend software, vx.xx or higher or ACES 17XX Procedure Loader software installed on the personal computer you are using to accomplish this task. If using the AvTrend or 17XX Procedure Loader software, refer to the user manual and/or help files for that product. If you do not have the required firmware and software described above, contact ACES Systems.

To check your analyzers ROM version do the following:

1. With the analyzer OFF, press and hold the “7” key.
2. Continue to hold the “7” key and press the ON key to turn the analyzer on.
3. Continue holding the “7” key while you read the information from the ACES logo screen shown below. Read the version number, V2.07C in this illustration, following “Model 1700” in the third line of text.



### Accessing Loaded Procedures

When activated, Procedures loaded in the analyzer's memory will control most of its functions. To access these procedures, proceed as follows:

1. Turn the analyzer power on by pressing the **[ON/OFF]** key.
2. The “ACES ANALYZER, Operation Options” banner screen and menu will appear on the screen. In the lower portion of the screen, a numbered list of loaded procedures will be displayed.

#### **NOTE**

**A maximum of six procedures can be displayed on the screen at one time. If seven or more procedures are loaded, they are accessible on the second or continuation screen by pressing the [UP ARROW] or [DOWN ARROW] keys.**

3. To activate a procedure, select the procedure by scrolling the highlight bar using the **[UP ARROW]** or **[DOWN ARROW]** keys until it highlights that procedure. You may also press the numeric key corresponding to the number at the left of the procedure and press **[ENTER]**.

#### **NOTE**

**If the number to the left of the procedure is higher than 9, the procedure must be selected by scrolling the highlight bar to the selection using the [UP ARROW] or [DOWN ARROW] keys.**

4. If the procedure you wish to use is not loaded into memory, refer to “Loading a Procedure from a Procedure Card” in this section.

### **Replacement of the Procedure Card Battery.**

Although the ACES procedure card has a battery life of approximately 18 months, it should be checked periodically and changed when necessary. Please follow the directions below to check the condition of your procedure card battery, and if necessary to change it without losing the information contained on it.

1. Turn the Analyzer **[ON]**.
2. Insert the Procedure Card into the procedure card port on the right side of the Analyzer. (Although installing or removing the card with the analyzer on will normally be contrary to direction, it is necessary for this procedure.)

3. Press **[SPCL MODES]**.

4. From the menu, select "Test System", then press **[ENTER]**.

5. From the menu, select "Measure Card Battery", and press **[ENTER]**.

6. If the measured battery voltage is less than 50%, it is advisable to replace the battery.

If you need to replace the battery, follow the directions below to prevent loss of programs on the card.

1. Obtain a new BR2325 or equivalent battery.

2. With the Analyzer **[ON]**, insert your Procedure Card into the procedure card port.

3. Press **[RESET]**. The Analyzer will enter the CARD FUNCTIONS menu and instruct you to "Select Function To Load."

4. While this screen is displayed, unscrew the battery hold-down screw on the edge of the card. (A triangular shaped screw driver is supplied with the card.)

5. Pull out the battery holder and replace the installed battery with a new one, observing for proper polarity.

6. Reinsert the holder into the card and tighten the screw.

7. Remove the card from the Procedure Card port and press **[RESET]**.

8. Reinsert the Procedure Card into the procedure card port.

9. Press **[SPCL MODES]**.

10. From the menu, select "Test System" and press **[ENTER]**.

11. From the menu, select "Measure Card Battery" and press **[ENTER]**.

12. The battery condition should be at or very near 100%.

13. Press the **[RESET]** button and verify that the CARD FUNCTIONS menu appears and that all



—	Configure Printer	SM7
—	Test System	
—	Measure Card Battery	SM8
—	Measure Internal Battery	SM9
—	Measure Internal Temperature	SM10
—	Exercise Keypad	SM11
—	Test Memory	SM12
—	Check Data Integrity	SM13
—	Manage Data	
—	Remove Function	SM14
—	Erase Stored Data	SM15
—	Erase ALL Memory	SM16
—	Initialize Analyzer	SM17
—	Communicate	
—	Configure Serial Interface	SM18
—	Define Remote Phone Number	SM19
—	Dial Remote Computer	SM20
—	Load Data from Remote	SM21
—	Store Data into Remote	SM22
—	Disconnect from Remote	SM23

```
----- Wed 10-Apr-96 09:46 365Kb
SPECIAL MODES
```

```
1--Configure
2--Test System
3--Manage Data
4--Communicate
```

Select Function, Press Enter.

Figure 7

## CONFIGURE

**SM1 DATE and TIME.** After pressing the **[ENTER]** key, the screen will change to the “SPECIAL MODES Date and Time” screen. (See Figure 8). The Day, Date and current Time will be displayed. As indicated at the bottom of the screen: Press **[EXP]** to change the settings or any other key to exit the screen. If power is lost for an extended period of time, the analyzer will initialize the date to: Mon 01-Jan-96 17:30:00

```
----- Wed 10-Apr-96 09:46 365Kb
SPECIAL MODES
Date and Time
Wed 10-Apr-96 09:50:24
Press EXP to change.
Press any other key to exit.
```

Figure 8

If you choose to change one or more of the settings and press the **[EXP]** key, the screen will present the Day, Month, Year, Hour and Minute in vertical stack. ( See Figure 9). The dark highlight bar will be on one of the five fields. Move the highlight between the fields by pressing the **[UP ARROW]** or **[DOWN ARROW]** keys.

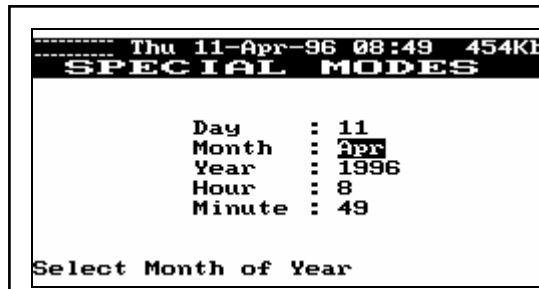


Figure 9

The DAY can be changed in two ways. Either press the **[RIGHT ARROW]** or **[LEFT ARROW]** keys to change the numeric field or enter the desired numeric input from the keypad. The range of numbers is determined by the currently displayed MONTH, either 28,29,30 or 31. The range in February is determined by the year and if that year is a leap year. If you enter a number out of the allowed range, an error message will appear at the bottom of the screen stating: **“Value is above maximum. Reenter”** or **“Value is below minimum. Reenter”**.

The Month field must be selected by pressing the **[RIGHT ARROW]** or **[LEFT ARROW]** until the desired month is displayed. The available input range is Jan to Dec.

The Year field is changed by pressing the **[RIGHT ARROW]** or **[LEFT ARROW]** keys to change the year one year per key press or by entering the year from the numeric key pad. The acceptable input range is 1996 to 2095. If you enter a number out of the allowed range, an error message will appear at the bottom of the screen stating: **“Value is above maximum. Reenter”** or **“Value is below minimum. Reenter”**.

The Hour field is changed by pressing the **[RIGHT ARROW]** or **[LEFT ARROW]** keys to change the hour one hour per key press or by entering the hour from the numeric key pad. The hour field is based on a 24 hour clock and has an acceptable input range is 0 to 23. If

you enter a number out of the allowed range, an error message will appear at the bottom of the screen stating: “**Value is above maximum. Reenter**” or “**Value is below minimum. Reenter**”.

The Minute field is changed by pressing the **[RIGHT ARROW]** or **[LEFT ARROW]** keys to change the minute one minute per key press or by entering the minute from the numeric key pad. The acceptable input range is 0 to 59. If you enter a number out of the allowed range, an error message will appear at the bottom of the screen stating: “**Value is above maximum. Reenter**” or “**Value is below minimum. Reenter**”.

**SM2 Data Acquisition.** After pressing the **[ENTER]** key, the screen will display the “SPECIAL MODES Configuration Data Acquisition” banner. (See Figure 10). In the lower area of the screen five selectable data acquisition settings. To move between fields, press the **[UP ARROW]** or **[DOWN ARROW]** key.

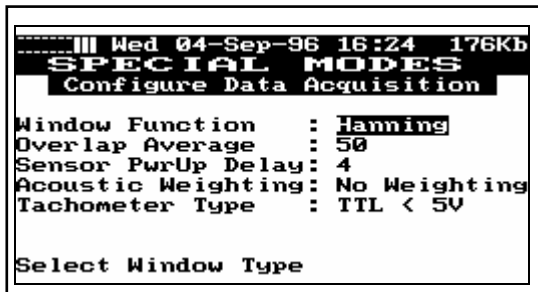


Figure 10

To the right of each configuration item are fields which contain menu selectable choices.

The Window Function has two selections available, Hanning or Uniform, by pressing the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. The default setting is Hanning.

The Overlap Average determines how much of each block of data is averaged with the follow on block of data. The field can be changed 1 percent per key stroke by pressing the **[RIGHT ARROW]** (to increase) or **[LEFT ARROW]** (to decrease) keys or by entering the numeric value from the key pad. The range of input for the field is 0 to 99 percent (%). The default setting is 50%.

The sensor PwrUp Delay is the amount of time required after power is applied for certain vibration sensors to “stabilize” and provide a valid frequency response. This

time is adjustable, in the Sensor PwrUp Delay field, by pressing the **[LEFT ARROW]** (to decrease) or **[RIGHT ARROW]** (to increase) keys. A numeric value can also be entered directly from the key pad. The valid range is from 0 to 1200 seconds. If you enter a number out of the allowed range, an error message will appear at the bottom of the screen stating: **“Value is above maximum. Reenter”**. The default setting is 4 seconds.

The Acoustic Weighting field is selectable by pressing the **[RIGHT ARROW]** or **[LEFT ARROW]** keys. The available selections are: No Weighting, A Weighting, B Weighting or C Weighting. The default setting is No Weighting.

The Tachometer Type field is selectable by pressing the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. The selections are: Unknown and TTL <5V. The default setting is TTL <5V. (TTL of less than 5 volts.)

**SM3 User Units.** After pressing the **[ENTER]** key, the screen will display the “SPECIAL MODES User Units” banner. (See Figure 11). In the lower area of the screen seven selectable user unit settings. To move between fields, press the **[UP ARROW]** or **[DOWN ARROW]** key.

The Plot Format field is selectable by pressing the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. The selections are: Linear, dB, or Log. The default setting is Linear.

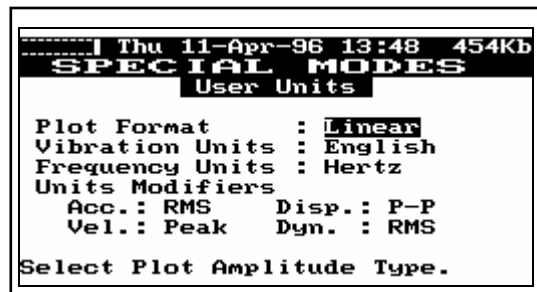


Figure 11

The Vibration Units field is a toggle selection between English or Metric. These are the only available selections. To toggle from one to the other, press the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. The default setting is English.

The Frequency Units field is a toggle selection between Hertz or RPM. These are the only available selections.

To toggle from one to the other, press the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. The default setting is RPM.

**SM4 Max Spectral Lines.** After pressing the **[ENTER]** key, the screen will display the “SPECIAL MODES Max Spectral Lines” banner. (See Figure 12). The number of lines is selected by pressing the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. The available number of lines of resolution to choose from are: 400, 800, 1600, 3200, 6400 and 12800. Press **[ENTER]** to accept the selection. In the lower area of the screen an information note is displayed which says “*Note: Lines must be more than any previously collected data.*” This means that the number of lines you are about to select may not be lower than the highest resolution spectra stored since memory was last cleared. The lower range of selection will automatically be limited by the highest number of lines previously selected and stored to a spectra. Before an initialized analyzer is used to collect spectra, the selection range will be 400 to 12, 800 lines. If a 1600 line spectra, for instance, is subsequently collected and stored, any number of lines lower than 1600 will be disallowed. To reset the analyzer and accept a lower number of lines, you must use the “Erase All Memory” function of the Data Management section in Special Modes. Refer to paragraph **SM16** in this section.

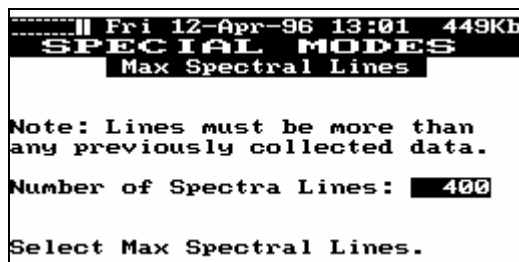


Figure 12

**SM5 dB Reference Levels.** After pressing the **[ENTER]** key, the screen will display the “SPECIAL MODES dB Reference Levels” banner. (See Figure 13). In the lower area of the screen are six fields. Four of those fields are dB reference levels, one each for Acceleration, Velocity, Displacement and Acoustic. The last two fields are toggle fields (Yes or No) for Using dB reference on Acoustic and Vibration. The default is **yes** for acoustic and **no** for vibration.

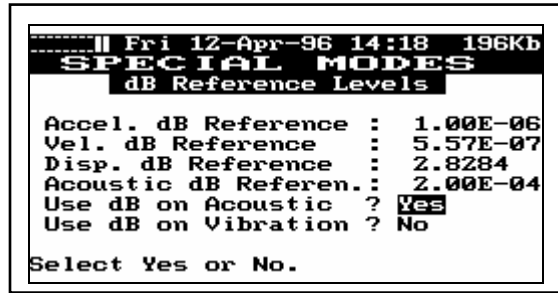


Figure 13

To move between the fields, press the **[UP ARROW]** or **[DOWN ARROW]** keys. To toggle between the Yes / No fields, press the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. For the Accel. field, enter a numeric value (g's) from the keypad. For the Vel. field, enter a numeric value (in/sec) from the key pad. For the Disp. field, enter a numeric value (mils) from the key pad and for the Acoustic field, enter a numeric value ( $\mu$ Bar) from the key pad. Press **[ENTER]** to accept the selections.

**SM6 Miscellaneous.** After pressing the **[ENTER]** key, the screen will display the "SPECIAL MODES Configure Miscellaneous" banner. In the lower area of the screen are five fields. (See Figure 14).

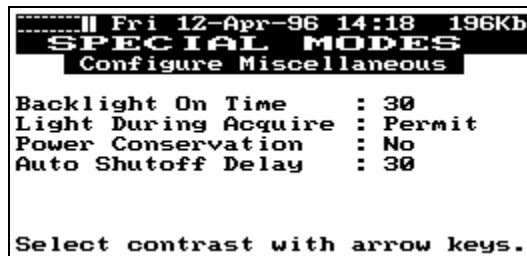


Figure 14

To move between the fields, press the **[UP ARROW]** or **[DOWN ARROW]** keys.

The Backlight On Time, is the amount of time (in seconds) which the backlight of the LCD screen will remain on before automatically extinguishing. The time may be increased or decreased one second per key stroke by pressing the **[RIGHT ARROW]** or **[LEFT ARROW]** keys respectively or entered directly from the numeric key pad. The acceptable range for input is 0 to 300. The default is 30. A setting of 0 will effectively disable the backlight.

The Light During Acquire is a toggle with “Permit” or “Disallow” setting. The purpose is to prevent the LCD backlight power supply from inducing false data (electrical noise) into a survey as it is being collected. The Permit setting allows the LCD backlight to remain on during data acquisition. The Disallow automatically turns the back light off when the ENTER key is pressed to begin taking data. The default is **Permit**. Use the **[RIGHT ARROW]** or **[LEFT ARROW]** keys to toggle the setting.

The Power Conservation is a toggle “Yes” or “No” setting. The purpose is to allow the user to define whether or not the analyzer will leave power on for data acquisition between measurements. Leaving the power on (**No**) will reduce sensor warm up time but consume more battery power.

The “Auto Shutoff Delay” determines how many minutes the analyzer will wait during an inactive period (no key strokes) before automatically shutting down power. The delay time is entered in minutes. The default is 20. The field may be toggled to increase in ten minute increments by pressing the **[RIGHT ARROW]** key or to decrease in ten minute increments by pressing the **[LEFT ARROW]** key. You may also enter a number value directly from the key pad. The valid range is from 10 to 180 minutes. If you enter a number out of the valid range, an error message will appear at the bottom of the screen stating: **“Value is above (or below) maximum (or minimum). Reenter”** If the analyzer sets idle (no keystrokes made) for the preset time, the analyzer will automatically shut off.

When all settings are to your satisfaction, press **[ENTER]** to accept.

**SM7** **Configure Printer.** After pressing the **[ENTER]** key, the screen will display the “SPECIAL MODES Print Configuration” banner. In the lower area of the screen are seven fields. (See Figure 15.)

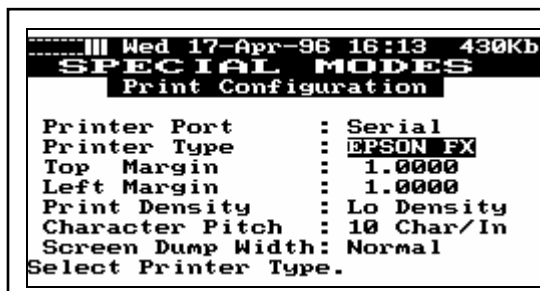


Figure 15

The **Printer Port** field will display “Serial” and cannot be edited by the user.

The **Printer Type** is also a toggle selection, “EPSON FX” or “HP Laser”. The default is EPSON FX.

The **Top Margin** field allows you to specify the top margin of the paper and is entered in inches from the keypad. The default is 1.0.

The **Left Margin** field allows you to specify the left margin of the paper and is entered in inches from the keypad. The default is 0.25.

#### NOTE

**Increasing the Left Margin to greater than the default setting of 0.25 may not allow your printer to print 80 column reports at 10 characters per inch.**

The **Print Density** field is a toggle field, low density or high density. The default is Lo Density. The high density will produce a higher print quality, but will require more memory and time to print.

The **Character Pitch** is a toggle field which allows you to select either 10 characters per inch of printing or 12 characters per inch of printing. The default is 10.

The **Screen Dump Width** is a toggle field with the selections of **Normal** or **Expanded**. The default is Normal. Normal mode prints using exact dot-per-dot representation of the screen. Expanded causes multiple dots to be printed horizontally for each screen dot producing a larger image on the paper. If your printer does not print the complete screen image in Expanded, use the Normal setting.

## TEST SYSTEM

**SM8** From the SPECIAL MODES Test System screen ( See figure 16 below) Select “**1--Measure Card Battery**” and press **[ENTER]**. The screen will display the “SPECIAL MODES Battery Condition Test” screen as shown in figure 17. The approximate percent of full charge will be

indicated on screen in addition to a general message such as (in this case) "Battery is OK". Depending on the condition of the battery, other information messages may also be displayed.

```
----- Wed 26-Jun-96 08:41 248Kb
SPECIAL MODES
Test System

1--Measure Card Battery
2--Measure Internal Battery
3--Measure Internal Temperature
4--Exercise Keypad
5--Test Memory
6--Check Data Integrity

Select Function, Press Enter.
```

Figure 16

```
----- Wed 26-Jun-96 08:41 248Kb
SPECIAL MODES
Battery Condition Test

Battery is approximately 90
percent of full charge.

Battery is OK.

Press any key to continue.
```

Figure 17

If you do not install the procedure card properly, do not install the card at all, or if the battery has been removed from the card, the screen displayed in figure 18 below will appear.

```
----- Wed 26-Jun-96 08:41 248Kb
SPECIAL MODES

PROBLEM

NO CARD or Card Has No Battery

Press any key to continue.
```

Figure 18

Make sure the battery is installed in the card and the card is fully inserted into the procedure card slot . Press any key to exit the "PROBLEM" screen and reinitiate the test as directed above.

**SM9** Select "**2--Measure Internal Battery**" and press **[ENTER]**.The screen will display the "SPECIAL MODES Battery Condition Test" screen as shown in figure 17, above. The approximate percent of full charge will be indicated on screen in addition to a general message

such as (in this case) “Battery is OK”. Depending on the condition of the battery, other messages such as “Bad ADC, Charge, or Charge NOW”, may also be displayed. In the case of either “charge” message, recharge the battery as directed in this manual. If a “Bad ADC” message appears, call ACES for additional information and possible repair.

- SM10** Select “**3--Measure Internal Temperature**” and press **[ENTER]**. The screen will display the screen in figure 19 below.

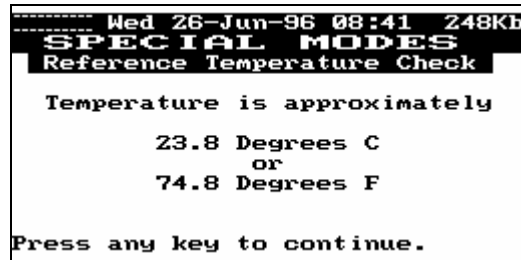


Figure 19

The actual temperature, of course, will vary according to conditions at the current location of the analyzer. The temperature will be displayed in both Centigrade (Degrees C) and in Fahrenheit (Degrees F).

- SM11** Select “**4--Exercise Keypad**” and press **[ENTER]**. The screen in figure 20 below will be displayed.

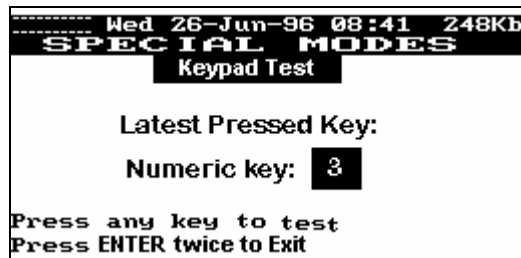


Figure 20

Where the “Numeric key:” appears in the figure, a written out key nomenclature will be displayed. To its immediate right, as in the figure above, the actual key label will be displayed. The **ON/OFF**, **RESET** and backlight keys will all perform their normal functions and should not be expected to be displayed in the Keypad test. As indicated at the bottom of the screen, Press **[ENTER]** twice to Exit the test.

**SM12** Select **"5--Test Memory"** and press **[ENTER]**. The analyzer will display an in-progress information screen saying "Busy Please Stand By Testing RAM" and will count up memory as the test progresses. It should count to the amount of memory installed in your analyzer 512, 1024 or 1536 KB. If the test was successful, the screen in figure 21, below will be displayed. If any other message appears following the test, contact TEC Aviation Division for additional information and possible repair. As indicated at the bottom of the screen, press any key to continue.

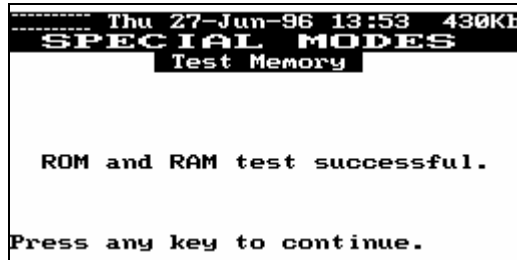


Figure 21

**SM13** Select **"6--Check Data Integrity"** and press **[ENTER]**. If no errors are detected in the stored data the screen, in figure 22 below, will appear. If errors are detected, an information screen will warn of the corrupt data.

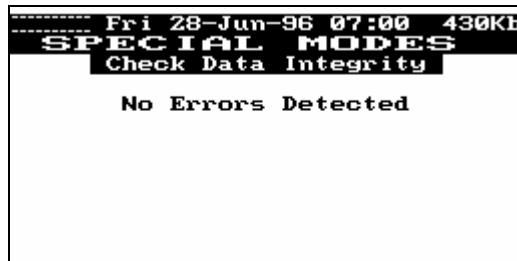


Figure 22

Press **[ENTER]** to exit back to the Test System menu screen.

## MANAGE DATA

**SM14** From the **"SPECIAL MODES Manage Data"** menu screen, (see figure 23 below) select **"1--Remove Function"** and press **[ENTER]**.

```
----- Fri 28-Jun-96 07:11 430Kb
SPECIAL MODES
  Manage Data

1--Remove Function
2--Erase Stored Data
3--Erase ALL Memory
4--Initialize Analyzer

Select function.
```

Figure 23

If no functions were loaded into the analyzer's memory, the screen in figure 24 will be displayed to advise you of this.

```
----- Fri 28-Jun-96 07:07 430Kb
SPECIAL MODES

  PROBLEM

  No functions to remove!

Press any key to continue.
```

Figure 24

If one or more procedures (functions) are loaded into memory, the first of these will be displayed near the bottom of the screen as the first available selection for removal. (See figure 25). If this is the function you wish to remove, simply press **[ENTER]** to continue the process. If there are other procedures loaded and this is not your selection for removal, press the **[UP ARROW]** or **[DOWN ARROW]** keys to move to the next available procedure. Continue pressing the key until the description of the procedure you wish to remove from memory appears, then press **[ENTER]** to proceed.

```
----- Fri 28-Jun-96 07:22 326Kb
SPECIAL MODES
  Remove Function

ALF 502 Vibration v1.00

Select function to remove.
```

Figure 25

After pressing **[ENTER]**, an information screen, (see figure 26 below), will be displayed. Notice that the answer field defaults to **No**. This is intended to prevent

you from removing a function by accident. If the function selected on the previous screen is not the one you wish to remove, or if you aren't sure it is correct, simply press **[ENTER]** while the **No** answer is displayed to return to the "Manage Data" menu screen (figure 23). If you are sure the function you selected for removal in the previous screen is the one you do want to remove, press any **[ARROW]** key to toggle the answer to **Yes**. Press **[ENTER]**. The selected procedure will be removed from memory and the screen will return to the "Manage Data" menu screen (figure 23). If you wish to remove another procedure from memory, repeat the steps as directed above.

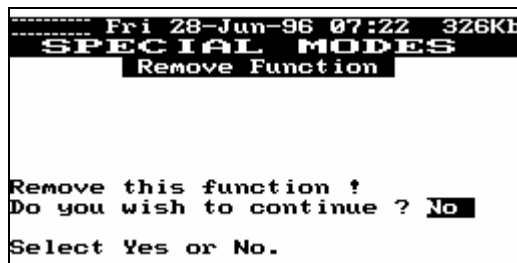


Figure 26

**SM15** Select "**2--Erase Stored Data**" and press **[ENTER]**. The screen in figure 27 below will be displayed. The answer field automatically defaults to **No** to prevent you from accidentally erasing stored data. If you do not wish to continue with the Erase Stored Data function, make sure the **No** is displayed in the answer field and press **[ENTER]**. The screen will return to the "Manage Data" menu screen. If you do want to erase ALL stored data, press any **[ARROW]** key to toggle the answer field to **Yes** and press **[ENTER]**. All stored data will be erased from memory and the screen will return to the "Manage Data" menu screen. Stored Data is the actual information collected by the analyzer and placed into memory. This does not include procedures loaded into memory from a procedure card. Procedures cannot be erased or removed by the "Erase Stored Data" option. See **SM14** above to Remove a Function.

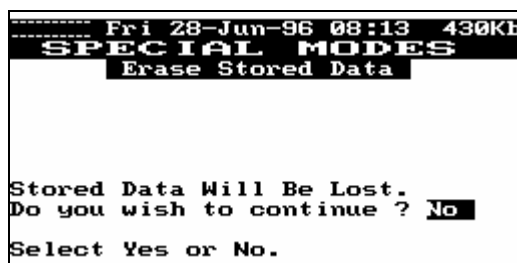


Figure 27

- SM16** Select “**3--Erase ALL Memory**” and press **[ENTER]**. The screen, in figure 28 below, will be displayed. The answer field automatically defaults to **No** to prevent you from accidentally erasing all memory. If you do not wish to continue with the Erase ALL Memory function, make sure the **No** is displayed in the answer field and press **[ENTER]**. The screen will return to the “Manage Data” menu screen. If you do want to erase ALL Memory, which includes data and loaded procedures, press any **[ARROW]** key to toggle the answer field to **Yes** and press **[ENTER]**. All Memory will be erased and the screen will return to the “Manage Data” menu screen. You will now have only the basic analyzer functions available until a procedure is loaded or reloaded into memory.

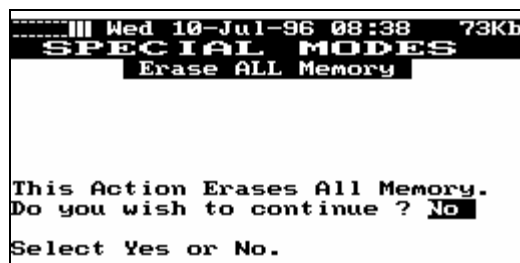


Figure 28

- SM17** Select “**4--Initialize Analyzer**” and press **[ENTER]**. The screen, in figure 29 below, will be displayed. The answer field automatically defaults to **No** to prevent you from accidentally initializing the analyzer. If you do not wish to continue with the Initialize Analyzer function, make sure the **No** is displayed in the answer field and press **[ENTER]**. The screen will return to the “Manage Data” menu screen. If you do want to initialize the analyzer, press any **[ARROW]** key to toggle the answer field to **Yes** and press **[ENTER]**. All Memory will be erased which includes data, loaded procedures and specified operational parameters such as back light time and max number of lines of resolution. and the screen will momentarily go blank. The analyzer will then begin checking memory and will display the real-time results on screen as the check progresses. You will now have only the basic analyzer functions available until a procedure is loaded or reloaded into memory. All user defined parameters are also changed to the default settings.

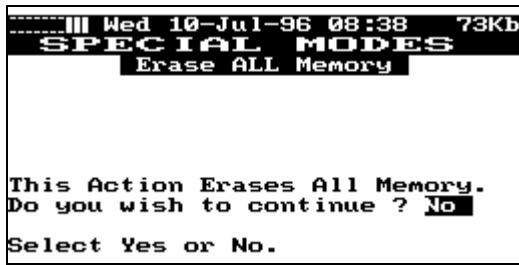


Figure 29

When the memory check is complete, the WARNING screen in figure 30 will be displayed. This screen informs you that all battery backed memory, as described above, has been reinitialized. This means that all settings are now per the analyzer defaults. Press any key other than **[ON/OFF]**, **[RESET]** or the **[Backlight]** key to exit this screen and continue.

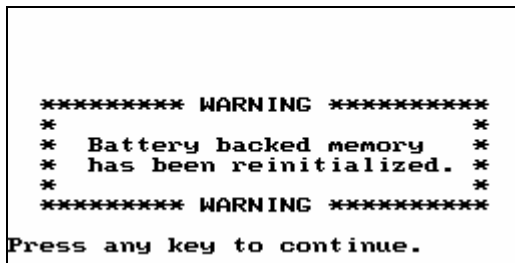


Figure 30

After pressing a key to continue, the ACES logo screen will be displayed momentarily. The next screen will be the **Date and Time** screen as shown in figure 31 below.

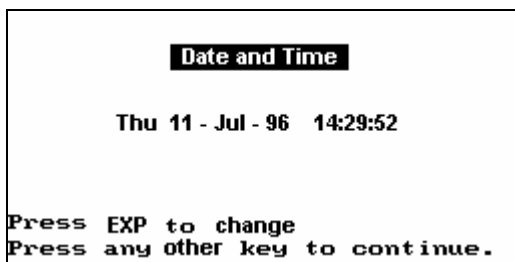


Figure 31

Refer to Special Modes paragraph **SM1** in this section to proceed from this point.

## COMMUNICATE

**SM18** From the COMMUNICATIONS banner menu screen, select **"1--Configure Serial Interface"** and press

**[ENTER]**. The analyzer will display the screen shown in figure 32, below.

```
Wed 17-Jul-96 09:14 430KB
COMMUNICATIONS
Baud      : 9600
Parity    : none
# Data Bits : 8 data
# Stop Bits : 1 stop
Connect Wait : 20
Station ID : 1
Meter ID Code : 1
Select Communications Baud Rate.
```

Figure 32

The screen contains seven user defined or selectable fields. Select the field value you wish to change by pressing the **[UP ARROW]** or **[DOWN ARROW]** key until the dark highlight bar is on the desired field.

The “Baud” field has eight predefined selections 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400. The default setting is 9600. To change the displayed field value, press the **[LEFT ARROW]** or **[RIGHT ARROW]** key until your selection appears in the field.

The “Parity” field has a fixed setting. This field may not be changed by the user and is displayed to inform the user of the required parity for correct communication of the analyzer with remote devices.

The “# Data Bits” field is fixed at 8 data bits. This field may not be changed by the user and is displayed to inform the user of the required parity for correct communication of the analyzer with remote devices.

The “# Stop” Bits” field is fixed at 2 stop bits. This field may not be changed by the user and is displayed to inform the user of the required parity for correct communication of the analyzer with remote devices.

The “Connect Wait” field is user defined and has an acceptable range of 1 to 999 seconds. This field defines the time (in seconds) between the dialing of the host’s number and the first transmission of data. This allows time for a telephone connection to be established and may vary according to local conditions or international connect time required. The default is 20 seconds and should be sufficient for most normal use conditions. This time may be reduced to a much lower number if directly

connected to the host computer. To change the time:  
Enter a new number from the numeric keypad, or press  
the **[RIGHT ARROW]** key to increase or the **[LEFT  
ARROW]** key to decrease the time.

The "Station ID" and "Meter ID" codes are user defined  
numeric fields (1 to 255 in both cases). The default is 1  
and should always be set to one unless you are directed  
to set it to another number for specific program use.  
This information does not affect the communications  
process in any way and is intended for user / owner use  
to identify location, analyzer or operator, for instance, if  
so desired. To change the value: Enter a new number  
from the numeric keypad, or press the **[RIGHT ARROW]**  
key to increase or the **[LEFT ARROW]** key to decrease  
the value.

Press **[ENTER]** to accept when all values in the  
communications screen are correct. The screen will  
return to the main COMMUNICATIONS banner menu  
screen.

**SM19** Select "**2--Define Remote Phone Number**" and press  
**[ENTER]**. The analyzer will display the screen in figure  
33, below.



```
..... Mon 22-Jul-96 14:38 43Kb
COMMUNICATIONS
Modem command string
ATDT
  ABCDEFGHIJKLMNO
  PQRSTUVWXYZ-+*/=
  0123456789()<>[]
  ?.,!@#$/^&_~'""
Accept character with ENTER.
Accept string with BACKUP.
```

Figure 33

Refer to your modem manual for specific settings. The  
analyzer will default to ATDT which is Hayes compatible  
code set to TONE dialing. You should only need to  
change this if your phone is a PULSE dialing system.  
You should complete the string by entering the dialing  
sequence necessary for calling a remote host computer  
which is running a communication program. To  
complete the string, move the dark cursor to the desired  
Alfa or numeric character using the four arrow keys.  
Notice that there is a "blank space" just to the left of the  
"A" character. It is a selection and may be entered in the  
string. As shown at the bottom of the screen, accept the  
selected character by pressing **[ENTER]** . If you make a  
mistake during entry, you may delete the last accepted  
character by pressing the **[DEL]** key or delete the entire

string by pressing **[CLR]**. When completed, accept the entire string by pressing **[BACKUP]**.

- SM20** Select **“3--Dial Remote Computer”** and press **[ENTER]**. The analyzer will initiate the connection by dialing the number specified in the **“Define Remote Phone Number”** procedure as described in **SM19** above. When this action occurs, the analyzer will also display the screen shown in figure 34 below.

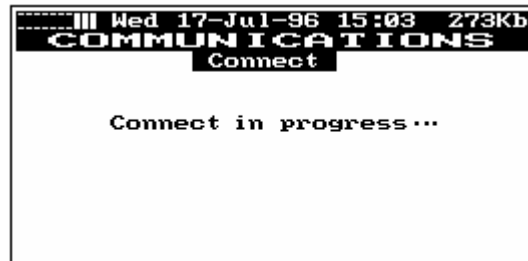


Figure 34

If a connection is not established in a predetermined amount of time, (**“Connect wait time”**, as specified in paragraph **SM18** above), the analyzer will stop the attempt to make a connection and display the information screen shown in figure 35 below. As indicated, press any key to exit the screen and continue operation.



Figure 35

If you are certain a host is available, increase the **“connect wait time”** and retry. You should also verify that the analyzer and remote host modems are configured for the same protocol / speed.

- SM21** **4--Load Data from Remote**  
This function is reserved for future use. It will be utilized to transfer data from a remote PC for testing and / or upgrade of operational capabilities of the analyzer. If you select this function and press **[ENTER]**, the screen shown in figure 36 below will be displayed.

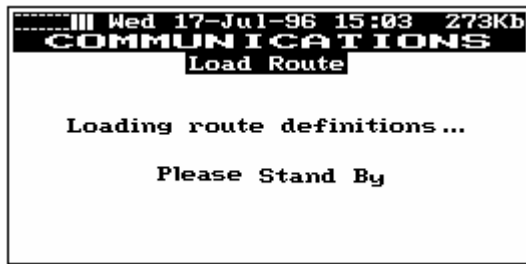


Figure 36

Without the necessary software, no actual communications are taking place. After approximately 40 seconds, the analyzer will sense this and display the screen shown in figure 37 below. Press any key to continue operation.



Figure 37

- SM22** This function is used in conjunction with ACES Trending and Graphics Display software. For a complete description of its use, refer to the manual supplied with the software you intend to utilize.
  
- SM23** Select "**6--Disconnect from Remote**" and press **[ENTER]**. This action will terminate the connection established with a remote computer. If the disconnect was not successful, or a remote connection was not established, an information screen such as the one shown in figure 37, above, will be displayed.

## Using the DIAGNOSTIC MODE

---

The DIAGNOSTIC function is a very powerful mode of the 1700. To access its features, press the **[ON/OFF]** key to turn the analyzer on. Press the **[DIAGNOSTIC]** key. The "ANALYSIS Realtime Analyzer" banner screen shown in figure 38 will be displayed.

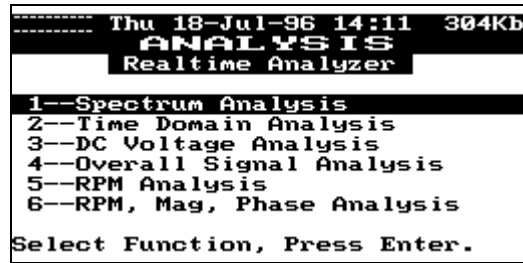


Figure 38

The Realtime Analyzer allows you to specify the parameters of data acquisition, collect and monitor the data in real time, Label and Store the Data, Recall, View and even Convert Spectrum Units on acquired data. The following is a short explanation of all possible features available in realtime analyzer selections as shown in figure 38 above. All the following features are not applicable to each individual analyzer function and therefore are not available. Spectrum Analysis, for instance, is the only Realtime Analyzer function with the “Convert Spectrum Units” feature.

**1--Configure Sensor** This selection allows the user to specify the settings necessary for the type sensor currently in use. Select the option and press **[ENTER]**. The screen in figure 39 below will be displayed.

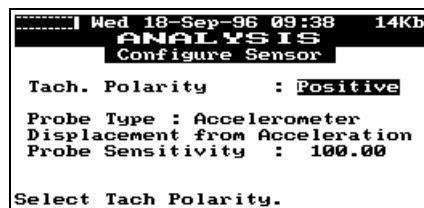


Figure 39

The “Tach. Polarity” field has two possible selections which you may toggle through by pressing the **[LEFT ARROW]** or **[RIGHT ARROW]** keys. The available selections are:

- “Positive” for possessive polarity
- “Negative” for negative polarity

When the desired selection appears in the field, Press the **[DOWN ARROW]** key to move to the next field.

The “Probe Type” field allows you to specify the type of vibration sensor being used and the method by which the vibration signals are to be processed. With the dark

cursor positioned over the Probe Type field, directly to the right of "PROBE TYPE:", use the [RIGHT ARROW] or [LEFT ARROW] keys to scroll through the available probe types. They include:

- ✦ Velocity
- ✦ Displacement
- ✦ TEC - 196
- ✦ Microphone
- ✦ Other AC
- ✦ Accelerometer

When the desired selection appears in the field, Press the **[DOWN ARROW]** key to move to the next field.

The processing method allows you to select how you wish to process the vibration signal being received from the sensor being used. The available selections are:

**Probe Type:** Velocity

- Velocity Probe
- Acceleration from Velocity
- Displacement from Velocity

**Probe Type:** Displacement

- Displacement Probe
- Velocity from Displacement
- Acceleration from Displacement

**Probe Type:**TEC-196

- Velocity from 100mv/g Accel.
- Accelerometer
- Velocity from Acceleration
- Displacement from Acceleration

**Probe Type:**Microphone

- Microphone Probe
- Microphone 1/3 Octave Probe
- Microphone Octave Probe

**Probe Type:** Other AC

- Non Standard Dynamic

**Probe Type:** Accelerometer

- Velocity from 100mv/g Accel.
- Accelerometer
- Velocity from Acceleration
- Displacement from Acceleration

When the desired selection appears in the field, Press the **[DOWN ARROW]** key to move to the next field.

The “Probe Sensitivity” field allows you to set the specific sensitivity for the Probe Type selected. This value must be entered from the numeric key pad. The number may be a whole number, fractional number or combination thereof by using the “. **MARK**” key to enter the decimal point.

When the desired selection appears in the field, Press the [**DOWN ARROW**] key to move to the next field. Press [**ENTER**] to accept all currently displayed settings and return to the Spectrum Analysis menu screen.

**2--Collect Data** This selection allows the user to specify the parameters of interest and then collect data within that range. After selecting this option and pressing the [**ENTER**] key, the screen in figure 40, below, will be displayed.

```
----- Fri 19-Jul-96 10:53 304Kb
          ANALYSIS
          Spectrum Analysis
Min. Frequency : 110.00
Max. Frequency : 2000.0
Lines          : 100
Blocks in Avg  : 2
Averaging      : Expon.
Synchronize    : No
               Press ENTER to Start
Select Yes or No.
```

Figure 40

The dark highlight bar will be over the field which can be edited. If the highlight bar is not over the field you wish to edit, press the [**UP ARROW**] or [**DOWN ARROW**] key until it is over the desired field. When the value of the current field is acceptable, press the [**UP ARROW**] or [**DOWN ARROW**] keys to move to the next field.

The “Min. Frequency :” field is the minimum frequency you wish to monitor. The currently selected frequency units, either Hz or RPM is displayed in the prompt at the bottom of the screen. If the units are not correct, see “User Units” under special modes paragraph **SM3** of the **Special Modes** section of this manual. The Min. Frequency must be entered from the numeric key pad. The valid range is 600 to 1,800,000 RPM or 10 to 30,000 Hz. When the value of the current field is acceptable, press the [**UP ARROW**] or [**DOWN ARROW**] keys to move to the next field.

The “Max. Frequency :” field is the maximum frequency you wish to monitor. The currently selected frequency units, either Hz or RPM is displayed in the prompt at the

bottom of the screen. If the units are not correct, see “User Units” under special modes paragraph **SM3** of the **Special Modes** section of this manual. The Max. Frequency must be entered from the numeric key pad. The valid range is 0 to 999,999 RPM or 0 to 30,000 Hz. When the value of the current field is acceptable, press the **[UP ARROW]** or **[DOWN ARROW]** keys to move to the next field.

The “Lines” field is the number of lines of resolution to be used in the data collection. The maximum selectable resolution is determined by the value set in the Max Spectral Lines field in the Configure section of Special Modes. See paragraph **SM4** of the **Special Modes** section of this manual for more information. To change the lines of resolution, press the **[RIGHT ARROW]** or **[LEFT ARROW]** keys. The available resolutions are: 100, 200, 400, 800, 1600, 3200, 6400, and 12,800 lines.

#### **NOTE**

**While higher resolution offers unparalleled frequency analysis, the collection process is more time consuming and requires more memory.**

When the value of the current field is acceptable, press the **[UP ARROW]** or **[DOWN ARROW]** keys to move to the next field.

The “Blocks in Avg.” field sets the number of data blocks to be included in the averaging process. The field is selectable to **1, 2, 4, 8, 16, 32, 64, and 128**. Press the **[RIGHT ARROW]** key to increase the field value or **[LEFT ARROW]** key to decrease. When the value of the current field is acceptable, press the **[UP ARROW]** or **[DOWN ARROW]** keys to move to the next field.

The “Averaging” field may be set to “Expon.” (Exponential), “Peak” or “Normal”. Press the **[RIGHT ARROW]** or **[LEFT ARROW]** keys to change the selection. When the value of the current field is acceptable, press the **[UP ARROW]** or **[DOWN ARROW]** keys to move to the next field.

The “Synchronize” field allows you to choose vibration data synchronization with the RPM input. Use the **[RIGHT ARROW]** key to toggle the field to “Yes” if you wish to synchronize, or “No” if you do not. Press the **[UP ARROW]** or **[DOWN ARROW]** keys to move to the next field. Press **[ENTER]** to Start the data collection.

**3--Label and Store Data** After data is collected, this option allows you to attach a Label or name to it for reference, and to Store it under that name in the analyzer's memory. After pressing **[ENTER]**, the screen shown in figure 41, below, will be displayed.

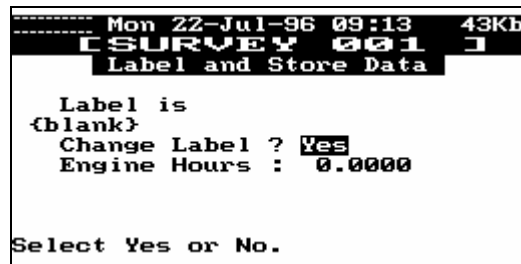


Figure 41

The information line "Label is {blank}" indicates that no previously entered label is in memory. This line will reflect the last alpha numeric label entered by the user and does not require a change unless the user so chooses. The next line "Change Label" prompts you to select "Yes" or "No" in the answer field by pressing the **[RIGHT ARROW]** key to toggle between the two. If you wish to change the label, choose "Yes". If you wish to use the same label (the one currently displayed in the information block), choose "No". When the answer field reflects your desired answer, press the **[DOWN ARROW]** key to move the highlighted bar to the "Engine Hours" field. When the bar is on the engine hours field, you may enter the numeric value of elapsed engine hours from the key pad. When all fields reflect the desired information, press **[ENTER]** to continue. If you chose "Yes" in the answer field for "Change Label", the screen in figure 42 will be displayed.

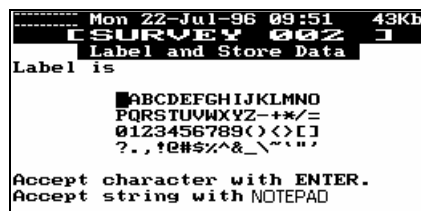
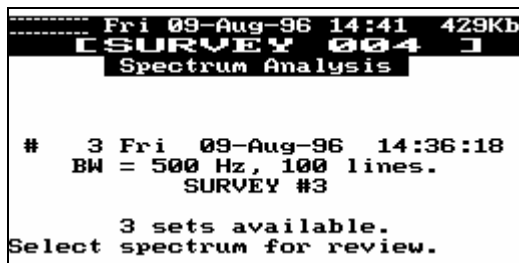


Figure 42

Move the dark cursor to the desired Alfa or numeric character using the four arrow keys. Notice that there is a "blank space" just to the left of the "A" character. It is a selection and may be entered in the string. As shown at the bottom of the screen, accept the selected character by pressing **[ENTER]**. If you make a mistake during entry, you may delete the last accepted character by pressing the **[DEL]** key or delete the entire string by

pressing **[CLR]**. When completed, accept the entire string by pressing **[NOTEPAD]**.

**4--Recall Data** When vibration data is stored in memory, it can be recalled for on screen review or printing by using the Recall Data function. After pressing the **[ENTER]** key, the screen in figure 43 will be displayed. In the first line, the sequence number of the survey, the day, date, and time it was taken is shown. The second line shows BW (for band width) of the frequency and the number of lines of resolution the survey was taken in. The last line shows the label name under which the user stored the survey. If no data is available to recall, an information screen to that effect will be displayed.



```
----- Fri 09-Aug-96 14:41 429Kb
[SURVEY 004 ]
Spectrum Analysis

# 3 Fri 09-Aug-96 14:36:18
  BW = 500 Hz, 100 lines.
    SURVEY #3

3 sets available.
Select spectrum for review.
```

Figure 43

At the bottom of the screen, the total number of data sets currently stored in memory is displayed along with the message “Select spectrum for review.” To select another of the stored spectrum, press the **[UP]**, **[DOWN]**, **[LEFT]** or **[RIGHT ARROW]** keys.

**5--View Data** The View Data function will display the spectrum on screen after pressing the **[ENTER]** key. The displayed spectrum is the most recently recalled, labeled and stored, converted or collected. When viewing is complete, press **[ENTER]** again to exit back to the Analysis menu.

**6--Convert Spectrum Units** This function is for use with vibration spectra only and when selected allows the user to convert the vibration spectrum units of a stored or active data set to Acceleration, Velocity or Displacement, regardless of the units in which the data was collected. First, select the data set you wish to convert using the “Recall Data” function. When the data set has been selected, select the “Convert Spectrum Units” function and press **[ENTER]**. The dark highlight bar will be in place over the Spectrum Units Desired: field and will display one of the three selections as described above. See figure 44. To change the

selection, press the **[RIGHT ARROW]** or **[LEFT ARROW]** key until the desired selection is in the highlighted field and press **[ENTER]**. The spectrum will be displayed in the selected units. Press **[ENTER]** again to exit back to the Spectrum Analysis menu screen.

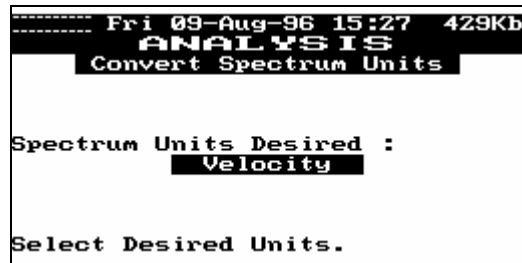


Figure 44

**7--Delete Data** From time to time it becomes necessary to remove old or faulty data sets. This is a good housekeeping practice and is most easily done by the selective deletion of data using the Delete Data function. After selecting the Delete Data menu item, press **[ENTER]**. At the bottom of the screen, the total number of data sets currently stored in memory is displayed along with the message "Select spectrum for deletion." See figure 45 below. To select another of the stored spectrum, press the **[UP]**, **[DOWN]**, **[LEFT]** or **[RIGHT ARROW]** keys.

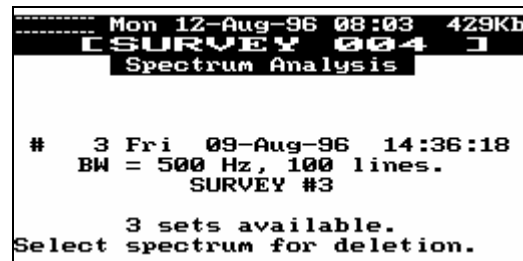


Figure 45

When the spectrum you wish to delete appears, press **[ENTER]**. As a safe guard, the screen in figure 46 will be displayed. The dark highlight bar will cover the answer field which is a toggle selection "Yes" or "No". The default answer is no. If you are sure the selected spectrum is the one you wish to delete, press the **[UP]**, **[DOWN]**, **[LEFT]** or **[RIGHT ARROW]** keys to toggle the answer field to "Yes" and press **[ENTER]**.

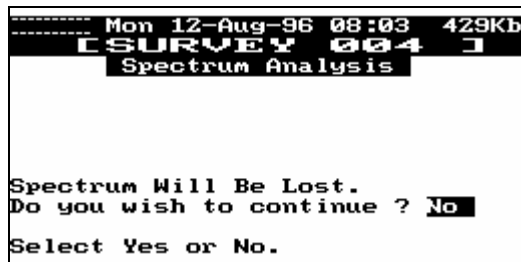


Figure 46

The message “**SPECTRUM DELETED!!**” will appear on screen to inform you that the selected spectrum is no longer in memory. If you are not sure of your selection, do not want to delete it or simply want to recheck the data, leave the answer field reading “**No**” and press **[ENTER]**. The screen will return to the Spectrum Analysis menu screen.

## PRINTING WITH THE 1700 Analyzer Plus

Printing with the 1700 Analyzer Plus is possible with either a serial or, with an optional serial-to-parallel converter, a parallel printer. The analyzer will support Epson FX graphics compatible, or HP Laserjet II and later laser printers from the COMM port. These are the only printers supported by the analyzer and ACES customer support. If you are attempting to use a printer which does not fall into one of these categories, consult your printer manual or the customer support function of the printer manufacturer. Refer to the special modes section of this manual, paragraph **SM7** for printer configuration. An optional Serial-to-Parallel converter and DB25M to Centronix printer cable is necessary to print from the 1700 to a parallel printer. Call your ACES Sales office for details and availability of these items.

The serial cable supplied with the analyzer is a NULL MODEM cable and is intended for communications between the analyzer and a PC for transfer of data.

If running a loaded procedure, it may contain a print function in certain menus. This feature of the procedure will normally be used to print spectra or balance reports to your printer. If you wish to print a screen currently displayed on the analyzer you may do so by using the **[0 PRINT]** key.

### NOTE

**If an active field is expecting a numeric input, the “0 Print” key will function as a numeric key only and will return an “0” when pressed.**

## **ACCESSORIES**

The 1700 is capable of collecting acoustic as well as vibration data. ACES offers the necessary microphone, microphone calibrator and procedure card as an acoustic package. Other available accessories include vibration sensors, sensor mounts, adapters and a complete propeller balancing package containing all items necessary to balance two propellers at the same time.

Many engines and aircraft will require the use of a specific cable or sensor application such as the Canadair Challenger or Cessna Bravo and Excel. These cables are used in collecting fan trim balancing and vibration survey information from installed aircraft vibration monitoring systems. Call ACES Systems for a complete list of available accessories.