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OPERATION MANUAL

DATATRAC 650
ARINC 629 DATABUS ANALYZER

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MANUAL: DATATRAC 650 ARINC 629 Databus Analyzer Operation

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ELECTROSTATIC DISCHARGE GENERAL WARNINGS FOR ALL EQUIPMENT

CAUTION: THIS EQUIPMENT MAY CONTAIN ELECTROSTATIC DISCHARGE (ESD) SENSITIVE COMPONENTS. TO PREVENT ESD SENSITIVE EQUIPMENT FROM POSSIBLE DAMAGE, OBSERVE THE FOLLOWING PRECAUTIONS WHEN HANDLING ANY ESD SENSITIVE COMPONENTS, OR UNITS CONTAINING ESD SENSITIVE COMPONENTS:

a.　　Maintenance or service personnel must be grounded though a conductive wrist strap, or a similar grounding device, using a 1 MΩ series resistor for equipment protection against static discharge, and personal protection against electrical shock.

b.　　All tools must be grounded (including soldering tools) that may come into contact with the equipment. Hand contact will provide sufficient grounding for tools that are not otherwise grounded, provided the operator is grounded through an acceptable grounding device such as a wrist strap.

c.　　Maintenance or service of the unit must be done at a grounded, ESD workstation.

d.　　Before maintenance or service of the equipment, disconnect all power sources, signal sources, and loads connected to the unit.

e.　　If maintenance or service must be performed with power applied, take precautions against accidental disconnection of equipment components. Specifically, do not remove integrated circuits or printed circuit boards from equipment while the equipment has power applied.

f.　　All ESD sensitive components are shipped in protective tubes or electrically conductive foam. The components should be stored using the original container/package when not being used or tested. If the original storage material is not available, use similar or equivalent protective storage material.

g.　　When ESD sensitive components are removed from a unit, the components must be placed on a conductive surface, or in an electrically conductive container.

h.　　When in storage or not being repaired, all printed circuits boards must be kept in electrically conductive bags, or other electrically conductive containers.

i.　　Do not unnecessarily pick up, hold, or directly carry ESD sensitive devices.

Failure to comply with these precautions may cause permanent damage to ESD sensitive devices. This damage can cause devices to fail immediately, or at a later time without apparent cause.

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1.0 FEATURES OF THE DATATRAC 650

The DATATRAC 650 is an ARINC 629 databus analyzer that can be configured with up to three independent transceiver channels. Basic receive and transmit functions are implemented along with a general record mode and a breakpoint mode for troubleshooting. An RS-232 port is standard for downloading real time or recorded data and also for uploading changes to the label/word definition database. An optional IEEE 488 board is available and permits remote control of all DATATRAC 650 functions. All operational aspects of the DATATRAC 650 are described in this reference manual.

1.1 PHYSICAL CONFIGURATION

1.1.1 GENERAL

The DATATRAC 650 is packaged in an aluminum enclosure complete with handle, front and rear panels, and an internal card cage consisting of mother board and plug-in application boards. An acrylic front cover is also provided as a standard feature.

1.1.2 FRONT PANEL DESCRIPTION

The front panel configuration shown in Figure 1 contains an LCD display, a keyboard area, display contrast control, and the databus connectors.

LCD Display

The liquid crystal display (LCD) provides 16 lines x 40 characters in the character mode. It can also be operated in a graphics mode to display time plots of data, with a resolution of 240 dots by 128 dots. The contrast control for the display is located to the lower right of the display.

Keyboard

Four key areas are located to the right of the display. The first is a vertical column of four function keys (RCV, XMT, RCD, and BRK). The next key area consists of a 4 x 4 hexadecimal keypad for general data entry. The third key area consists of the six keys to the far right. Four buttons contain up, down, left, and right arrows which are used for various utility functions dependent on mode. Generally, the up/down keys are used to increment vertically through data lists. The left and right buttons are used to move the cursor laterally and sequence through setup options. Located below the arrow keys are the clear (CLR) and enter (ENT) buttons. The horizontal row of keys above the keypad contain general function keys. F1 and F2 are soft keys employed for various functions dependent on mode. A help key allows the user to call help screens appropriate to any setup line where the cursor is located. The gold key to the right enables the sublegends containing ASCII characters.

Databus Connectors

The MIL C 26500 connectors located on the front panel are dedicated to the
ARINC 629 channels. Channel 1 is the standard option. Channel 2 and Channel 3
are optional. Each contain the five signals defined for the SIM to Current Mode
Coupler interface.
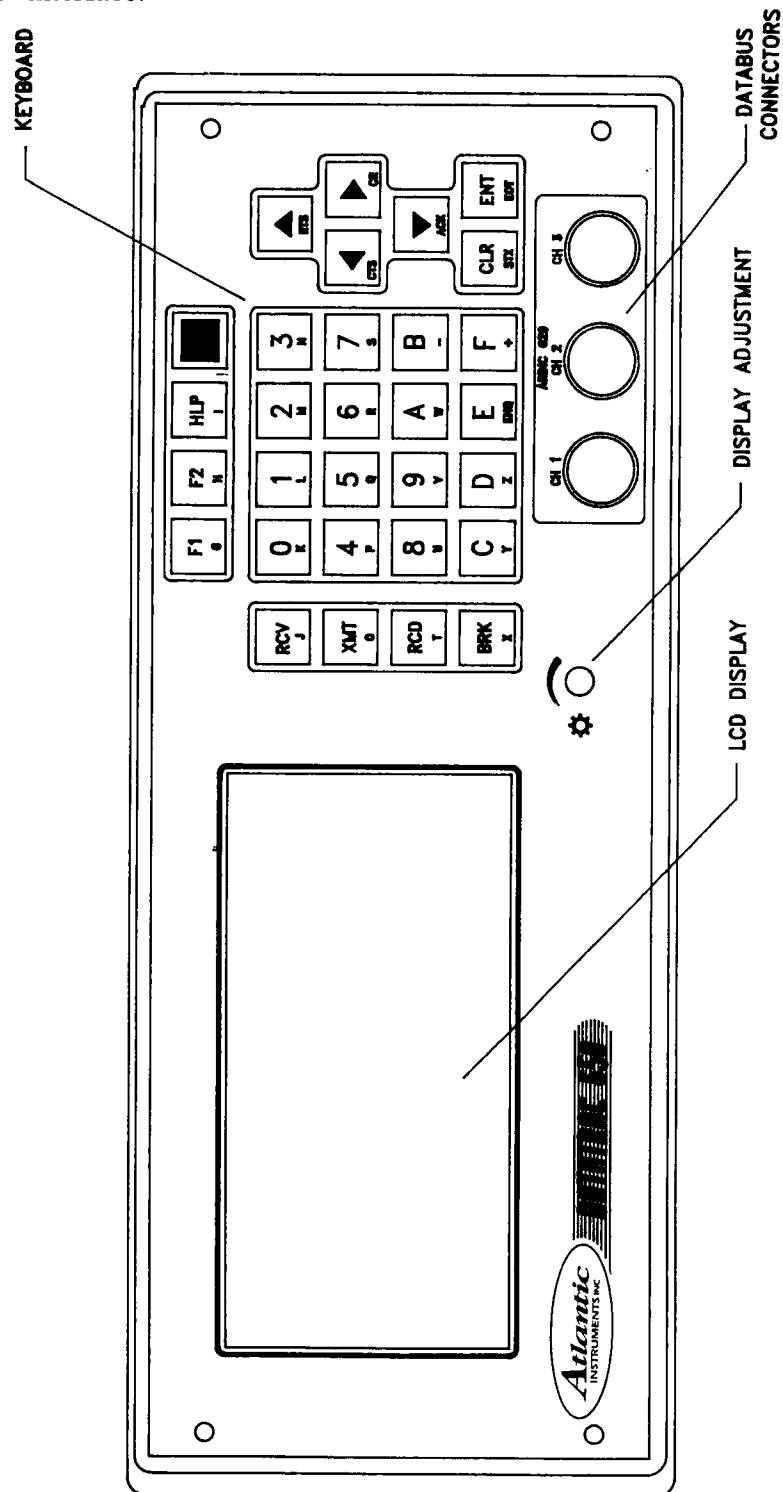
DATATRAC 650 FRONT PANEL
FIGURE 1

1.1.3   REAR PANEL DESCRIPTION

The rear panel shown in Figure 2 contains the main power switch, power connector for DC power, power connector for AC power, the fuse holders, RS-232 connector, IEEE 488 connector, a DAC port connector, the C Mode signal connector, and the unit serial number tag.

<u>Power Switch</u>

A master power switch applies power to the display and all electronic circuits. The 'O' indicates the OFF position and the '1' indicates the ON position.

<u>DC Power Input</u>

The red and black banana jacks can be used to apply 28 VDC power to the DATATRAC unit. The range of this input is 18 VDC to 36 VDC. The power source should be capable of supplying up to 4 Amperes of current.

<u>AC Power Input</u>

AC power can be applied to the three prong connector. The range of this input is 105 to 250 VAC, at 47Hz to 400 Hz.

<u>Fuse</u>

Two power input fuses (DC and AC) are located on the rear panel. These fuses are 5 amp fast-blow type. The fuses should be checked after any failure of the unit to power up properly.

<u>RS-232 Connector</u>

An RS-232 connector is located on the rear panel and can be configured by the operator to output received or recorded data. Appendix A contains detailed information on interfacing this output to other RS-232 devices.

<u>DAC Connector</u>

A BNC connector is located on the rear panel and provides a DAC (digital to analog convertor) channel that can be configured by the operator to output converted data or a trigger pulse (refer to section 3.1.5 for more detail). The inner conductor is the signal side; the outer conductor is connected to ground.

<u>IEEE 488</u>

The IEEE-488 connector is located on the rear panel and provides an interface to the optional IEEE-488 card in the DATATRAC 650. Refer to the DATATRAC 600/650 IEEE-488 Controller Option User's Manual for detailed information.

C Mode Connector

A 15 pin D connector is located on the rear panel and contains the necessary signal interfaces for operating the ARINC 629 channels in the synchronized C Mode. Pin assignments are as follows:

ARINC 629 Ch. 1	MAFS	- 1
	MIFS	- 3
	CMDP	- 2
ARINC 629 Ch. 2	MAFS	- 4
	MIFS	- 6
	CMDP	- 5
ARINC 629 Ch. 3	MAFS	- 7
	MIFS	- 9
	CMDP	- 8

SERIAL TAG

The serial tag located on the rear panel provides the unit part number, serial number and revision status information. This tag must remain attached to the unit and referred to when reporting problems to BFGoodrich Aerospace JcAir Test Systems.

1.1.4   INTERNAL ARCHITECTURE

Internally, the unit contains a card cage, battery, and rear panel assembly. The mother board for the card cage contains the front panel pushbuttons, the LCD display, and databus interface connectors in addition to connectors for the following plug in boards:

- Power supply
- CPU/memory
- ARINC 629 Tranceiver Ch. 1
- ARINC 629 Tranceiver Ch. 2
- ARINC 629 Tranceiver Ch. 3
- IEEE 488 interface
- Future memory expansion board

The internal configuration is illustrated in Figure 3.
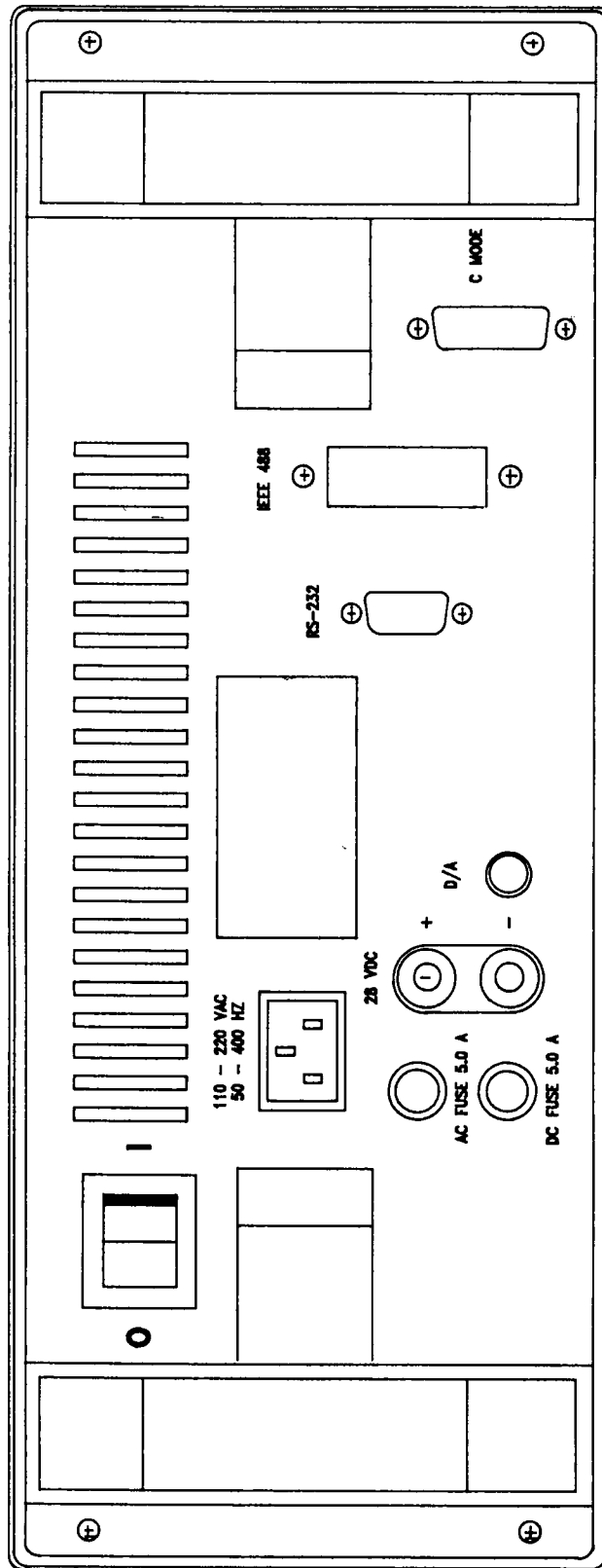
DATATRAC 650 REAR PANEL
FIGURE 2

D/A JACK (BNC)
RS232 CONNECTOR
IEEE-488 CONNECTOR

28 VDC PWR JACKS
FUSES
AC SOCKET
POWER SWITCH

REAR INTERCONNECT BD.
FRAME
BATTERY

A9, OPTIONAL
MEM. EXPANSION BD.
A8, IEEE-488 BD.
A7, CH. 3 ARINC 629 BD.
A6, CH. 2 ARINC 629 BD.
A5, CH. 1 ARINC 629 BD.
A3, CPU BD.
A2, PWR SUPPLY BD.

ARINC 629 DATABUS CONNECTORS (MIL-C-26500)
DISPLAY ADJUSTMENT
FRONT PANEL
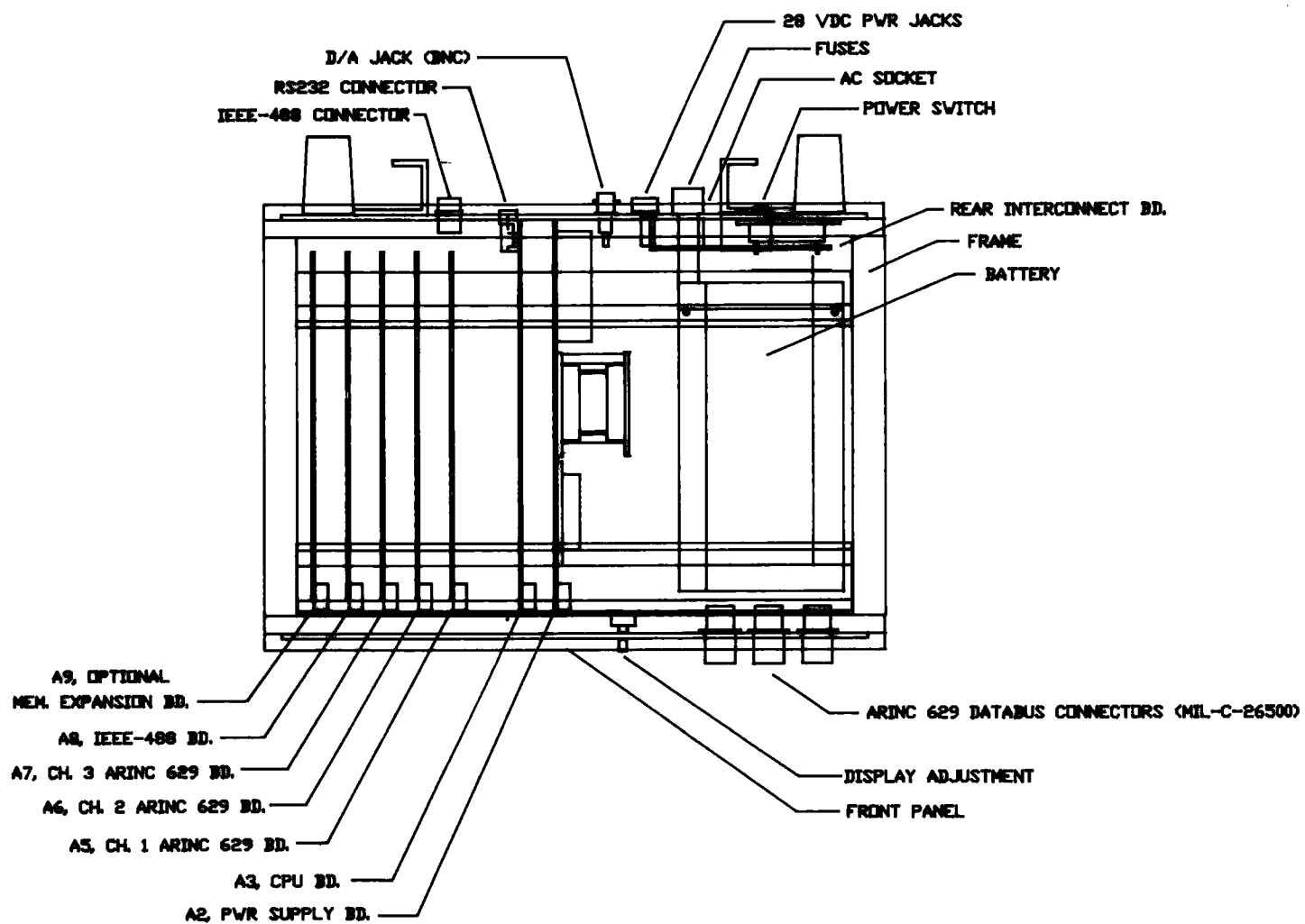
DATATRAC 650 INTERNAL CONFIGURATION
FIGURE 3

1.2 INTERNAL BATTERY POWER

In addition to the external AC adapter, the DATATRAC 650 unit may also be operated from the internal battery. The battery is a 6.5 Amp-Hr sealed lead acid battery. A fully charged battery will normally provide over 4 hours of operation. This battery is also used to retain RAM memory for an indefinite period (approximately 2 months shelf life on RAM memory backup). RAM memory will be retained even when the battery has discharged below the level required to operate the unit.

The internal battery can be recharged with the application of either DC or AC power. Recharging will occur ONLY while the power switch is in the OFF position. The charge function employs three levels for rapid and efficient charging. The lower maintenance level may be left on indefinitely.

NOTE: Although it is recommended that only one power source be connected to the DATATRAC 650 at a time (excluding the internal battery), the unit contains circuitry that will prevent internal damage in this situation. The circuitry will select the strongest power source from which to operate.

1.3 WARRANTY AND SERVICE POLICY

All BFGoodrich Aerospace JcAir Test Systems products are warranted against defects in material and workmanship for a period of one (1) year from the date of original purchase. BFGoodrich Aerospace JcAir Test Systems's limit of liability shall be to repair or replace the product, at their discretion.

Domestic Customers . . . . . One way freight charges will be paid by Bfgoodrich Aerospace JcAir Test Systems for equipment which is returned for warranty repair. If the item is shipped to BFGoodrich Aerospace JcAir Test Systems with collect freight charges, it will be returned freight collect. If the unit is shipped to BFGoodrich Aerospace JcAir Test Systems with freight charges prepaid, it will be returned to the customer freight prepaid.

International Customers. . . One way domestic (Continental United States) freight charges will be paid by BFGoodrich Aerospace JcAir Test Systems on equipment returned to BFGoodrich Aerospace JcAir Test Systems.

This warranty shall not apply to any products which have been subjected to misuse, contamination, negligence or accident.

2.0   UNPACKING AND INSPECTION

The DATATRAC 650 has been carefully packed to survive all normal shipping and handling conditions. It is important that the customer immediately inspect the received shipment to ensure that all items are present and undamaged.

Contents:
1. DATATRAC 650 unit
2. 9 VDC/1 Amp AC adapter (110 VAC or 220 VAC)
3. Reference Manual
4. RSREAD PC Software Program Disk (contained inside the manual)

2.1   GENERAL POWER ON PROCEDURES

External power (DC or AC) can be applied or the unit can be operated on the internal battery. If a unit fails to operate properly on power up, the fuses located on the rear panel should be checked.

After turning the power switch to the ON position, the following screen will appear on the display (a reminder: the contrast control may be adjusted at any time to optimize the viewing of the display).

```
                    ** DATATRAC 650 **
                 S/W Version XXX - - (Date)

                   System Configuration:

                 3 ARINC 629 RCV/XMT Ports
                  1 IEEE-488 Interface Port




                 Press ENT to continue
                 Press F1 to program flash memory.

             (Copr. 1995 Atlantic Instruments, Inc.)
```
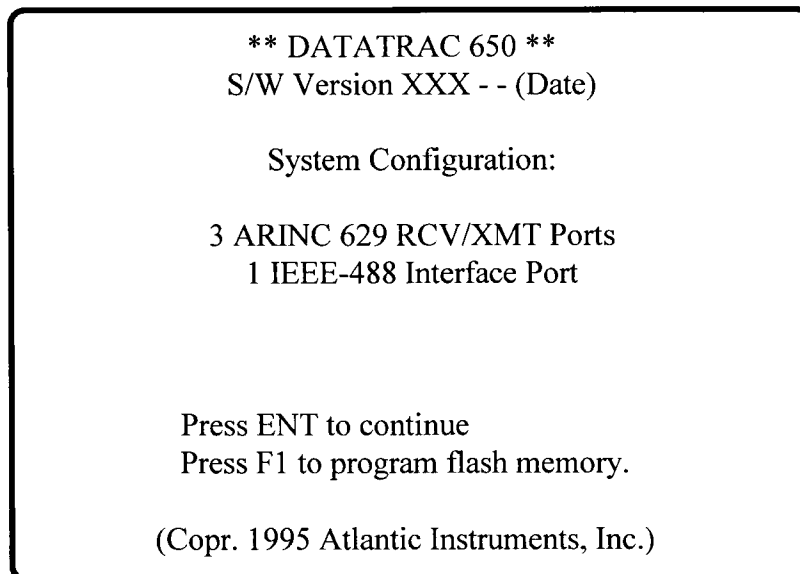
The version number of the current software package contained in the DATATRAC 650 unit is always displayed on the power on menu. This information may be useful when reporting problems experienced in the field. At this point the user may wish to re-initialize the unit by pressing CLR and then 0 or CLR and then A. DATATRAC units always retain previously used values as defaults for all function setup options. These may be replaced with an initialized set of values. CLR 0 completely re-initializes the unit with the exception of setup tables that have been placed in the five designated locations in RAM. CLR A re-initializes these as well. This initialization can only be performed from the power up screen.

(Software version information is presented along with a summary of the installed card configuration. Note: In this case, that the full complement of ARINC 629 channels are present along with the IEEE-488 card.)

Pressing the ENT key will produce the following mode selection screen.

```
            * ARINC 629 Functions Selection Menu *


            RCV :  Receive Data
            XMT:  Transmit Data
            RCD :  Record Data
            BRK :  Break on Receive Data
              E :  IEEE-488 Setup



              Select function:  RCV



              Press ENT to continue
```

The user selects functions by pressing the appropriate function key (or E for IEEE-488 Setup) and then "entering" his selection by pressing ENT. Operation of the various modes is described in the following sections.

3.0   RECEIVE MODE

The following section describes the setup and operation of the DATATRAC 650 receive mode. Data from up to three independent ARINC 629 buses may be received and displayed.

3.1   RECEIVE SETUP MENUS

The DATATRAC 650 provides various features for examining labels present on the received buses and then displaying all or selected data in a number of formats. Setup menus also allow the user to reconfigure the display "windows", change monitor sensitivities, and download received digital words to an RS-232C or a DAC port.

3.1.1   PRIMARY RECEIVE SETUP MENU

After selection of receive mode, the following receive setup screen appears. Most of the setup lines are self explanatory. The user makes selections in most cases by placing the cursor on the desired line using the up/down arrows, and then presses the right arrow to cycle through all available options for that parameter. Where numerical data is the requested setup option, this is usually entered from the hex keypad.

```
+-------------------------------------------------+
|           * ARINC 629 RECEIVER SETUP *          |
|                                                 |
|                  Channel: 1                     |
|                                                 |
|    On/Off:: ON              Interval: INST      |
|  Setup Mode: KEY        RCV Download: NONE       |
|  Select Lbls: ALL        Display Lines: 12       |
|  Data Format: ENG         Bus Monitor: 4         |
|                                                 |
|        < >  To step through options             |
|        v ^  To move to next/previous line        |
|        HLP  To see explanation of options        |
|                                                 |
|          Press ENT to continue or any           |
|          function key to change functions       |
+-------------------------------------------------+
```

Help screens are available for every setup line option by placing the cursor on that line and then pressing the HELP key. When all options are appropriately set, the operator "enters" these selections by pressing the ENT key. The following paragraphs provide detailed information on the setup options for the above menu.

a. <u>Channel</u>

Options: 1, 2, or 3 (if installed)

Channels 1, 2, or 3 can be selected for setup on the first line. Once a channel has been selected, all other parameter selections on the above screen will apply only to that channel.

Help Screen:

```
┌─────────────────────────────────────────────────┐
│                                                  │
│        * ARINC 629 RECEIVER HELP SCREEN *        │
│                                                  │
│              Channel Selection:                  │
│                                                  │
│           -1 - To select channel 1               │
│            2 - To select channel 2               │
│            3 - To select channel 3               │
│                                                  │
│                                                  │
│                                                  │
│         Press ENT to return to setup screen      │
│                                                  │
└─────────────────────────────────────────────────┘
```

b. <u>On/Off</u>

Options: ON, OFF

Each channel's receive function can be turned on or off. Turning a channel off will free up lines on the display screen.

Help Screen:

```
┌─────────────────────────────────────────────────┐
│                                                  │
│        * ARINC 629 RECEIVER HELP SCREEN *        │
│                                                  │
│          Receiver Channel On/Off Option:         │
│                                                  │
│            ON - To enable the channel for        │
│                   receiving data.                │
│                                                  │
│            OFF - To disable the channel.         │
│                                                  │
│                                                  │
│                                                  │
│         Press ENT to return to setup screen      │
│                                                  │
└─────────────────────────────────────────────────┘
```

c. <u>Setup Mode</u>

Options: KEY, RECALL, STORE

The receiver setup method selection line allows any of the following options: Keyboard Entry (KEY), Recall Setup Table (RECALL), Store Setup Table (STORE). Up to 5 tables of predefined setup information may be contained in battery backed RAM and 250 tables from EEPROM. Each table will contain ARINC 629 bus parameters (TI, TG, SG, CID, etc.) as well as receive mode label selections and transmit tables. The 5 tables in RAM can be created by storing current setups entered by the keyboard. The 250 EEPROM tables are downloaded from a PC on the RS-232 port.

Help Screen: –

```
╭─────────────────────────────────────────────╮
│        * ARINC 629 RECEIVER HELP SCREEN *     │
│                                               │
│           Receiver Setup Mode Options:        │
│                                               │
│        KEY  -  To enter the receiver setup    │
│                options from the keyboard.     │
│     RECALL  -  To load setup table from       │
│                memory.                        │
│      STORE  -  To save setup table to         │
│                memory.                        │
│                                               │
│                                               │
│          Press ENT to return to setup screen  │
╰─────────────────────────────────────────────╯
```
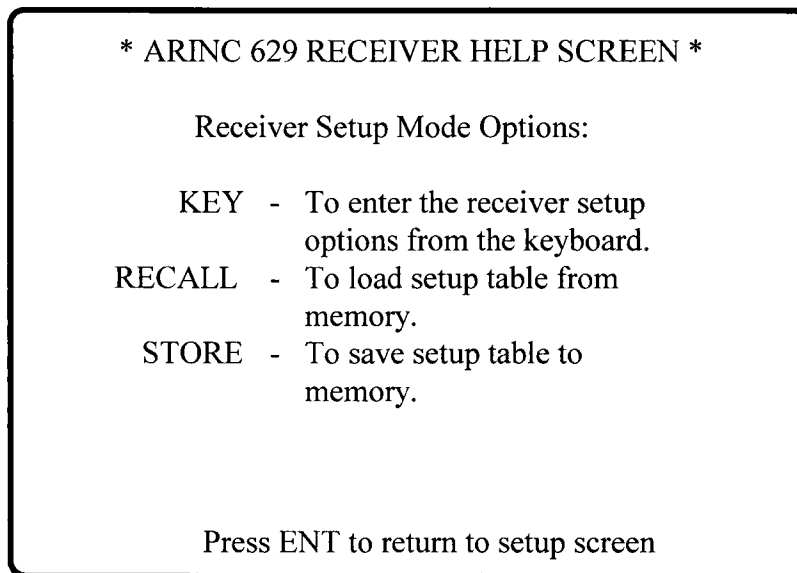
d. <u>Select Lbls</u>

Options: ALL, SEL, EDIT

The options for the Select Lbls line are ALL, SEL, and EDIT referring to the display of all received information, the display of selected words, or the editing of the list of selected words. If ALL is selected, a screen will indicate the word strings presently active on the ARINC 629 bus and allow selection of the data to be received.

Help Screen:

```
┌─────────────────────────────────────────────┐
│                                               │
│      * ARINC 629 RECEIVER HELP SCREEN *       │
│                                               │
│      Receive Select Labels Selections:        │
│                                               │
│      ALL - Display all incoming labels        │
│              for current channel.             │
│                                               │
│      SEL - Display previously selected        │
│              labels/data for current channel. │
│                                               │
│    EDIT-- Setup/edit selected labels.         │
│                                               │
│                                               │
│      Press ENT to return to setup screen      │
│                                               │
└─────────────────────────────────────────────┘
```

e. Data Format

Options: ENG, HEXM, HEXL, BINM, BINL, USER, EDIT, GRAPH

The format of display data (i.e. engineering units (including ASCII), hex, binary, etc.) can be selected on this screen or simply cycled to the desired format using the right arrow key while viewing data.

Help Screen:

```
┌─────────────────────────────────────────────┐
│                                               │
│  * A629 DATA DISPLAY FORMAT HELP SCREEN *     │
│                                               │
│         ENG  - Engineering units              │
│        HEXM - Hexadecimal - MSB first         │
│        HEXL - Hexadecimal - LSB first         │
│        BINM - Binary - MSB first              │
│        BINL - Binary - LSB first              │
│        USER - Apply previously defined        │
│                  user format                  │
│        EDIT - Define/edit new data format     │
│       GRAPH - Realtime graphic plot of data   │
│                                               │
│                                               │
│       Press ENT to return to setup screen     │
│                                               │
└─────────────────────────────────────────────┘
```

f. Interval

Options: INST, MIN, MAX

The update interval of data is indicated on data display screens and selected here to be instantaneous (INST), the minimum value encountered (MIN) or the maximum value encountered (MAX). This can be very useful, for instance, in trapping data dropouts.

Help Screen:

```
* ARINC 629 RECEIVER HELP SCREEN *

       Receive Interval Format Selections:

       INST - To display instantaneous
                  interval in msec
       MIN - To display minimum interval
       MAX - To display maximum interval

       The MIN & MAX values are reset when
       data is cleared by pressing CLR key
       or exitting the realtime display mode.

       Press ENT to return to setup screen
```

g. RCV Download

Options: NONE, RS232, DAC

ARINC 629 receive data can be downloaded realtime either to a PC via the RS-232C port, or as analog data on the DAC port.

Help Screen:

```
* ARINC 629 RECEIVER HELP SCREEN *

       Receive Data Download Selections:

       NONE - Data Download is disabled.

       DAC - Realtime digital to analog
                 conversion of one data word.

       RS232 - Realtime download of received
                  data on RS-232 port.

       Press ENT to return to setup screen
```

h. Display Lines

Options: 2-12 depending on number of channels active

The DATATRAC will normally window displays evenly when more than one channel of information is displayed, but the user may adjust this to suit with the display lines option.

Help Screen:

```
* ARINC 629 RECEIVER HELP SCREEN *

Display Line Count Selection:

Selects the number of data lines to
display for this channel.  This parameter
permits the channel display window sizes
to be tailored to accomodate special
viewing requirements.  The total number
of lines cannot exceed 12, 4, or 2 for
1, 2 , or 3 channels active, respectively.

Press ENT to return to setup screen
```

i. Bus Monitor

Options: OFF, 2 , 4, 8, 16, 32, 64

The bus monitor is a sensitivity selection for a flag that appears when data ceases to be received. The selection made indicates the number of normal intervals that must pass before the data will be flagged as missing (with the presence of an asterisk, '*').

Help Screen:

```
* ARINC 629 RECEIVER HELP SCREEN *

Bus Activity Monitor Selection:

Specifies the time period, in multiples
of most recent receive rate, that the
unit waits before flagging a label as
overdue.  An * appears next to the last
rate value when a label is overdue.

Press ENT to return to setup screen
```

3.1.2 ARINC 629 DATABUS PARAMETER SETUP MENU

After entering receive setup menu information, the next screen displayed to the operator is the ARINC 629 parameter menu shown below.

```
*  ARINC 629 CHANNEL SETUP  *


                    Channel:  1
                        CID:  01
          Transmit Interval (TI):  64.0 msec
             Terminal Gap (TG):  128 usec
      Synchronization Gap (SG):  16 usec
              XPP/RPP Setup:  AUTO


        0-9  To enter CID, TI, TG
        < >  To step through options
        v ^  To move to next/previous line
      HELP  To see Help for each line


      Press ENT to continue or any
      function key to change function
```

If these were previously setup in transmit mode or setup from a table, the user simply passes through this screen to the screens associated with receive label selection.

a. Channel

Options: 1, 2, or 3 (if installed)

Help Screen:

```
*  ARINC 629 CHANNEL SETUP HELP SCREEN  *

            Channel Selection:

          1 - To select channel 1
          2 - To select channel 2
          3 - To select channel 3




          Press ENT to return to setup screen
```

b. <u>CID</u>

Options: 00 to 15

Help Screen:

```
* ARINC 629 CHANNEL SETUP HELP SCREEN *

        Channel ID (CID) Selection:

        Enter a value between 00 and 15.
        The CID is a four bit extension of the
        12 bit label and is used to identify
        originators of like labels on the bus.




        Press ENT to return to setup screen
```

c: <u>Transmit Interval (TI)</u>

Options: Direct entry of value between 0.5 and 64.0 msec

Help Screen:

```
* ARINC 629 CHANNEL SETUP HELP SCREEN *

        Transmit Interval (TI):

        Use the numeric keys 0-9 to enter a
        time value between 00.5 & 64.0 msec.
        For a given channel, the TI commences
        with transmission; the terminal must
        wait the full duration of TI before it
        can transmit again.  The TI ranges from
        0.5 to 64 msec, corresponding to 1000 to
        128000 bit times at a 2Mbit rate.

        Press ENT to return to setup screen
```

d: <u>Transmit Gap (TG)</u>

Options: Direct entry of value between 001 and 128 usec

Help Screen:

```
┌─────────────────────────────────────────────┐
│     * ARINC 629 CHANNEL SETUP HELP SCREEN *   │
│                                               │
│            Transmit Gap (TG):                 │
│                                               │
│      Use the numeric keys 0-9 to enter a      │
│      time value between 001 and 128 usec.     │
│      The TG is normally equal to between 4 us and │
│      128 us. -It is equal to the terminal     │
│      number plus one.                         │
│                                               │
│                                               │
│        Press ENT to return to setup screen    │
└─────────────────────────────────────────────┘
```

e. <u>Synchronization Gap (SG)</u>

Options: 16, 32, 64, 127 usec

The synchronizaiton gap is set on a system wide basis and controls the transition from periodic to aperiodic mode.

Help Screen:

```
┌─────────────────────────────────────────────┐
│     * ARINC 629 CHANNEL SETUP HELP SCREEN *   │
│                                               │
│         Synchronization Gap (SG):             │
│                                               │
│       Use the right arrow key to cycle        │
│       the options of 16, 32, 64 or 127.       │
│       The SG is set system wide and is equal  │
│       to 16, 32 ,64 or 127 usec.  Use of the  │
│       SG by the DATAC constitutes a tran-     │
│       sition to aperiodic mode of operation.  │
│                                               │
│                                               │
│        Press ENT to return to setup screen    │
└─────────────────────────────────────────────┘
```

f. <u>XPP/RPP Setup</u>

Options: AUTO, EDIT

The user may select AUTO mode in which case the DATATRAC 650 automatically configures the XPP and RPP/MPP personality PROM memories to perform the selected transmit and receive functions. This setup line provisions for a future option of manual editing of these personality PROM memories.

Help Screen:

```
* ARINC 629 CHANNEL SETUP HELP SCREEN *

           XPP/RPP Setup:

   AUTO - The DATATRAC automatically
          configures the XPP, and RPP
          RAM on the ARINC 629 board.

   EDIT - The user manually enters the
          values for the XPP, RPP, and MPP
          RAM.

        Press ENT to return to setup screen
```

3.1.3   RECEIVER SELECT LABEL SETUP MENU

If EDIT (rather than ALL or SEL) had been selected from the receive mode setup menu, the user would be prompted to enter up to 32 CID-Label-Word Position choices on the following screen:

```
* ARINC 629 RCV SELECT LABEL SETUP *

Format:  X-XXX-XXX  (CID-Label-Word Pos)

        Channel: 1

_ _ __   _ _ __   _ _ __   _ _ __
_ _ __   _ _ __   _ _ __   _ _ __
_ _ __   _ _ __   _ _ __   _ _ __
_ _ __   _ _ __   _ _ __   _ _ __
_ _ __   _ _ __   _ _ __   _ _ __
_ _ __   _ _ __   _ _ __   _ _ __
_ _ __   _ _ __   _ _ __   _ _ __
_ _ __   _ _ __   _ _ __   _ _ __

        Press ENT to continue
```

By selecting particular orders of words, it is possible to display two words next to one another in order to more conveniently compare their values.

3.1.4   USER DEFINED DATA FORMAT SETUP

In the normal display of realtime data in engineering units, scaling characteristics and units are available from a prestored database. USER mode allows the user to create custom scaling definitions for up to 16 labels and have these retained in battery backed RAM. Subsequently, when USER format is selected rather than ENG format, the entered scaling will overlay the standard database. The user can define particular labels to be hex, BCD, 2's complement binary, etc. It is even possible to identify embedded discretes and have these displayed separately. The next two setup menus illustrate the BCD and binary format cases. Initially, only the first five setup lines are displayed to the user. After the format is specified, the additional setup options appropriate to the format are then displayed. From the main Receiver Setup page, set the Data Format Selection to EDIT by pressing the left or right arrow keys. Press ENTER.

BCD Setup Screen:

```
┌─────────────────────────────────────────────┐
│            * USER DEFINED DATA FORMAT *       │
│                                               │
│              Format Number:  00               │
│                       CID:  XX               │
│                     Label:  001              │
│             Word Position:  001              │
│                    Format:  BCD              │
│                      Name:  DAT1             │
│           Full Sense Value:  99999           │
│         Number of Digits (1-8):  5           │
│       Number of Discretes (0-8):  0          │
│                     Range:  1234560          │
│                     Units:  NM               │
│                                               │
│          Press ENT to return to setup screen  │
└─────────────────────────────────────────────┘
```

Format number is a value between 00 and 15 to be entered by the user. It serves as an index to the sixteen format definitions. The CID, label, and word position identify the particular word for which a new format is being defined. The format line allows the following options to be selected with the right arrow:

HEXM
BNR-UNSIGNED
BFPN
UNIQ
WORD-2
BNR-SIGNED
BCD
BINM

The Full Scale Value specifies what value is displayed when all data bits are set. For a positive number, the full scale value will be one resolution point less than the specified full scale value.

Beyond the MSD, all remaining digits are packed contiguously with 4 bits per digit. If the number of digits is set to less than 6, the remainder of the field is packed with zeros on the right. The position of the decimal point is specified by the range parameter. The > key is used at the range line to adjust the magnitude of the number. The choices for range are the following:

            1234560
            123456.
            12345.6
            1234.56
            123.456   –
            12.3456
            1.23456
            .123456

If the number of digits is less than 6, the undefined digits are set to 0.
A 0 in the range indicates a dummy place holder and not a decoded digit.

Discretes can be defined beginning with bit 1 as the first discrete. If, for instance, three discretes are desired, entering a 3 for this parameter would decode bits 1, 2, and 3 and display these as binary digits. The Units parameter allows the user to specify a three character string to either indicate the units of the decoded value, or to simply identify the format definition.

In addition to the binary (0 and 1 pattern) formats for the least significant bit first and most significant bit first cases, the following scaled binary formats may be selected:

BNR-SIGNED   -   This is the standard 2's complement encoding for
                        plus and minus data with decimal scaling and units
                        assigned to the word.

BNR-UNSIGNED -   The full data word range from all 0's to all 1's is
                        interpreted and displayed as posivite data values.
                        Decimal scaling and units are assigned to the word.

BFPN   -   This is the binary floating point format. Two
                        sixteen bit words are assigned to a single parameter
                        with ranges allocated as follows:

MSW				LSW	
15	14 7	6 0	15		0
S	MSB e LSB	MSB f LSB	MSB	f	LSB

where: S = Sign Bit
e = biased exponent=exponent + 127
f = fraction
MSW = Most Significant Word
LSW = Least Signifcant Word

The BNR-SIGNED Setup Screen:

```
* USER DEFINED DATA FORMAT *

            Format Number:  00
                      CID:  XX
                    Label:  001
            Word Position:  001
                   Format:  BNR-SIGNED
                     Name:  DATS
          Full Scale Value:  4
     Number of Bits (1-31):  15
   Number of Discretes (0-8):  0
                    Range:  1234560
                    Units:  NM

       Press ENT to return to setup screen
```

Full Scale Value specifies the magnitude (+ and -) of the decoded value. The full scale values are discrete values that are predefined in the DATATRAC. They include all the full scale values commonly used. The > key is used to step through the options until the desired full scale value is displayed. The choices currently defined are (in order they are stored):

4	8	32	64	128	180	256
512	1024	2048	4096	8192	16384	32768
131072	360	65536	262144	16	50	6
4864	5047	3.541	3.494	6.936	3.639	2.812
1.650	2.750	2.000	2.140	71.43	48.93	4135
10.0	9606	2.5	3.57	24.88	3.424	2.271
4.430	3843	4599	4.991	5.090	0289	0502
162	1.10	90.0	35.0	180.355	17029.5	1749
3178.16	9.008	15.0	4095	255	9.99999	

The number of bits specifies the number of significant bits (excluding the sign bit) to utilize in the decode. The sign bit is always bit 16, and the most significant bit is bit 15.

3.1.5 RECEIVE DATA DAC OUTPUT

Received digital words may be converted to DC and output with user applied scaling changes and offsets. DAC download works only for SELECT mode, ALL mode will not download data to the DAC. When DAC download is specified in the receive setup screen, the following additional menu associated with this conversion is presented to the user.

```
+---------------------------------------------------+
|                                                   |
|           * ARINC 629 DAC OUTPUT SETUP *          |
|                                                   |
|      Channel:  1           Data Offset:  +00%     |
|      CID-LBL-WP:  2            Scaling:  1         |
|                                                   |
|                        _                          |
|                                                   |
|                                                   |
|           < >   To step through options           |
|           ^ v   To move to next/previous line     |
|           HELP  To see explanation of options     |
|                                                   |
|                                                   |
|               Press ENT to continue               |
+---------------------------------------------------+
```

The channel, CID, label and word position entries identify the digital word to be converted to DC. An offset value between +/-99% may be entered and will move the zero point of the 16 bit word appropriately within the +/-5 volt output range. A 50% entry, for example, would mean that a word value of zero would be output as +2.5 volts.

The digital word can also be scaled be factors of 1, 2, 4, 8, 16, 32, 64 and 128 so that the +/-5 volt range represents a magnification (about the specified zero point).

3.2 RECEIVE DATA DISPLAY

3.2.1 ALL LABELS MODE

If the ALL label selection was entered in the receive setup menu, the entire contents of the DATAC bus would be presented to the user as shown below.

```
■ - - - - - - - - A629 RCV CHANNEL 1 (ALL) - - - - - - -
           Total CID-Labels Received = 0020

        < 1-001:LabelName1 >      1-002:LabelName2
        < 1-001:LabelName3 >      1-002:LabelName4
          1-001:LabelName5     -→ 1-002:LabelName6
          1-001:LabelName7        1-002:LabelName8
        < 1-001:LabelName9 >    < 1-002:LabelName10 >
          1-001:LabelName11       1-002:LabelName12
          1-001:LabelName13       1-002:LabelName14
          1-001:LabelName15       1-002:LabelName16
          1-001:LabelName17       1-002:LabelName18
        < 1-001:LabelName19 >     1-002:LabelName20

   RCV Stat:  NO ERRORS
```

The above screen represents the case of one active DATAC channel and may contain up to 20 CID-Label combinations. Additional wordstrings may be viewed by scrolling with the up/down keys. The user may move the display arrow symbol to select various labels with the right/left pushbutton arrows. With the cursor under a particular word, the user may press the F1 key to "bracket" a label causing the entire wordstring contents along with the receive rate to be displayed after the ENT key is pressed.

The case of two DATAC channels active is shown below:

```
■ - - - - - - - -A629 RCV CHANNEL 1 (ALL) - - - - - - -
          Total CID-Labels Received = 0020
     < 1-001:LabelName1 >        1-002:LabelName2
     < 1-001:LabelName3 >        1-002:LabelName4
       1-001:LabelName5          1-002:LabelName6
       1-FF1:LabelName7          1-FF2:LabelName8


 RCV  Stat: NO ERRORS
■ - - - - - - - -A629 RCV CHANNEL 2 (ALL) - - - - - - -
          Total CID-Labels Received = 0020
     < 1-001:LabelName1 >        1-002:LabelName2
     < 1-001:LabelName3 >        1-002:LabelName4
       1-001:LabelName5          1-002:LabelName6
       0-FF4:LabelName7          0-FF6:LabelName8


 RCV  Stat: NO ERRORS
```

The case of three received channels is illustrated below:

```
■ - - - - - - - -A629 RCV CHANNEL 1 (ALL) - - - - - - -
          Total CID-Labels Received = 0020
     < 1-001:LabelName1 >        1-002:LabelName2
     < 1-003:LabelName3 >        1-004:LabelName4
 RCV  Stat: NO ERRORS
■ - - - - - - - -A629 RCV CHANNEL 2 (ALL) - - - - - - -
          Total CID-Labels Received = 0020
     < 1-001:LabelName1 >        1-002:LabelName2
       1-003:LabelName3        < 2-001:LabelName4 >
 RCV  Stat: NO ERRORS
■ - - - - - - - -A629 RCV CHANNEL 3 (ALL) - - - - - - -
          Total CID-Labels Received = 0010
       2-FE8 :LabelName1          2-FE9 :LabelName2
       2-FEA:LabelName3           1-FEA:LabelName4
 RCV  Stat: NO ERRORS
```

Possible keystokes and options for these two menus are as follows:

CLR : Clear out old labels/Error flags
 F1 : Select/Deselect label (toggle) - Brackets (< . . >) are placed
        around a label when it is selected. Up to 32 labels per channel
        may be selected.
HELP : Display Help menu
 ENT : Go to Data Display Screen

```
      →  :  Move cursor to next label
      v  :  Move cursor down to next row
      ←  :  Move cursor to previous label
      ^  :  Move cursor up to previous row
  1,2,3  :  Change active channel (where keystrokes apply)
```

The current status of the DATAC terminals internal status register is decoded and displayed on the bottom line of each channel's window. The format is hexadecimal most significant bit first. Status definitions are as follows:

```
MSB 15 - String Error
     14 - TXE - Transmitter Enable
     13 - XERF - Transmitter Error Flag
     12 - \
     11 - > Transmit Monitor Error (Encoded)
     10 - /
      9 - PAM Error (TI, C-Mode)
      8 - PAM Error (TG, SG)
      7 - No Bus Acknowledge, Read
      6 - No Bus Acknowledge, Write
      5 - RERF - Receive Error Flag
      4 - Parity Error
      3 - Short String Error
      2 - \
      1 - / Operating Mode
LSB   0 - Impersonation Error
```

Pressing the help button from the above screen will cause this information to be displayed to the user as follows:

```
           * ARINC 629 RECEIVER HELP SCREEN *
  Keystrokes:
       1, 2, 3 - Select active channel
           F1 - Select/Deselect label (toggle)
          ^,v - Scroll label list
          <,> - Scroll select arrow
          CLR - Clear old Labels/Error flags
          ENT - Go to Data Display Screen
  Symbols:
        <label> - Label is selected for data
            → - Select label cursor


               Press ENT to continue
```

3.2.2 REAL TIME RECEIVED DATA DISPLAY SCREENS

After selecting labels for display, the user is immediately presented with the following word count screen. The DATATRAC obtains the correct word count to display received data correctly for the selected labels. This count is obtained from the internal database and normally the user simply passes through this screen. It is possible to alter the word count, however, and the user can step through all selected labels to review the word counts.

```
        * ARINC 629 RCV WORD COUNT SETUP *

              Channel:    1
    Word Str Index: 001          Word Count: 008
              Label: FF6         Label Name: ADIFF6




                    Press ENT to continue
```

A number of real time data display screens follow which demonstrate cases of different data display formats (selected by cycling the right arrow) and different numbers of channels.

One channel active, binary format - MSB first

```
■ - - - - - - - - - RCV CHANNEL 1 (ALL) - - - - - - - - ■
C-Lbl-WP    16--------BinM--------1   Name     msec
    CID=1   Lbl=001                   . . . .   0010
1-001-001   0000 0000 0000 0000      . . . .   0010
1-001-002   1111 1111 1101 1010      . . . .   0010
    CID=1   Lbl=002                   . . . .
1-002-001   1010 0101 1111 1100      . . . .   0010
1-002-002   1111 1100 0001 0000      . . . .   0010
1-002-003   0000 0000 0111 0111      . . . .   0010
    CID=1   Lbl=003                   . . . .
1-003-001   1110 0101 0000 0100      . . . .   0010
1-003-002   0000 0000 0100 0111      . . . .   0010
1-003-003   0110 1000 1100 1011      . . . .   0010
RCV Stat:  NO ERRORS
```

One channel active, binary format - LSB first

```
■ - - - - - - - - - - RCV CHANNEL 1 (ALL) - - - - - - - - -
C-Lbl-WP    0--------BinL--------15    Name    msec
   CID=1    Lbl=001                     . . . .  *0010
1-001-001    0000 0000 0000 0000        . . . .  *0010
1-001-002    1000 1100 0110 0001        . . . .  *0010
   CID=1    Lbl=002                     . . . .  *0010
1-002-001    0000 0000 0000 0000        . . . .  *0010
1-002-002    0000 0000 0000 0000        . . . .  *0010
1-002-003    0000 0000 0000 0000        . . . .  *0010
   CID=1    Lbl=003                     . . . .  *0010
1-003-001    1111 1111 1111 1111        . . . .  *0010
1-003-002    1H11 1111 1111 1111        . . . .  *0010
1-003-003    1111 1111 1111 1111        . . . .  *0010
RCV Stat:  C0  20
```

One channel active, hex format - MSB first

```
■ - - - - - - - - - - RCV CHANNEL 1 (ALL) - - - - - - - - -
C-Lbl-WP    15--------HexM---------0    Name    msec
   CID=1    Lbl=001                     . . . .  0010
1-001-001      00   00                  . . . .  0010
1-001-002      11   22                  . . . .  0010
   CID=1    Lbl=002                     . . . .  0010
1-001-001      00   00                  . . . .  0010
1-001-002      00   00                  . . . .  0010
1-001-003      FE   10                  . . . .  0010
   CID=1    Lbl=003                     . . . .  0010
1-003-001      1C   02                  . . . .  0010
1-003-002      00   00                  . . . .  0010
1-003-003      11   11                  . . . .  0010
RCV Stat:  NO ERRORS
```

One channel active, engineering format

```
┌──────────────────────────────────────────┐
│ ■ - - - - - - - - - - RCV CHANNEL 1 (ALL) - - - - - - - - - │
│ C-Lbl-WP    1---------ENG ------------  Name    msec │
│     CID=0   Lbl=100                      . . . .   0005 │
│ 0-100-001        +12345.6 FPM           . . . .   0005 │
│ 0-100-002        +12345.6  Deg          . . . .   0005 │
│     CID=1   Lbl=002                      . . . .   0010 │
│ 1-002-001        'TE'                    . . . .   0010 │
│ 1-002-002        'ST'                    . . . .   0010 │
│ 1-002-003        'P'                     . . . .   0010 │
│     CID=1   Lbl=003                      . . . .   0010 │
│ 1-003-001        +00.0000 %             . . . .   0010 │
│ 1-003-002      ⁻ +12.3456 %             . . . .   0010 │
│ 1-003-003        +123.456 MHz           . . . .   0010 │
│ RCV Stat:  NO ERRORS │
└──────────────────────────────────────────┘
```

Two channels active, binary format - MSB first

```
┌──────────────────────────────────────────┐
│ ■ - - - - - - - - - - RCV CHANNEL 1 (ALL) - - - - - - - - - │
│ C-Lbl-WP    16--------BinM--------1  Name    msec │
│     CID=1   Lbl=001                      . . . .   0010 │
│ 1-001-001   0000 0000 0000 0000         . . . .   0010 │
│ 1-001-002   0000 0000 0000 0000         . . . .   0010 │
│ 1-001-003   0000 0000 0000 0000         . . . .   0010 │
│ │
│ RCV Stat:  NO ERRORS │
│ ■ - - - - - - - - - - RCV CHANNEL 2 (ALL) - - - - - - - - - │
│ C-Lbl-WP    16--------BinM--------1  Name    msec │
│     CID=1   Lbl=001                      . . . .   0010 │
│ 1-001-001   0000 0000 0000 0000         . . . .   0010 │
│ 1-001-002   0110 0010 0001 0000         . . . .   0010 │
│ 1-001-003   0001 1000 0000 0110         . . . .   0010 │
│ │
│ RCV Stat:  NO ERRORS │
└──────────────────────────────────────────┘
```

Three channels active, various formats

```
■ - - - - - - - - - RCV CHANNEL 1 (ALL) - - - - - - - - - S2
  C-Lbl-WP    16--------BinM--------1    Name     msec
      CID=1   Lbl=001                    . . . .   0010
  1-001-001   0011 0100 1100 0000        . . . .   0010
  RCV  Stat: NO ERRORS
■ - - - - - - - - - - RCV CHANNEL 2 (ALL) - - - - - - - - - S4
  C-Lbl-WP    16--------HexM---------1    Name     msec
      CID=0   Lbl=100                    . . . .   0005
  1-001-001        00    1A              . . . .   0005
  RCV  Stat: NO ERRORS
■ - - - - - - - - - - RCV CHANNEL 3 (ALL) - - - - - - - - - S8
  C-Lbl-WP    1---------ENG ------------  Name     msec
      CID=2   Lbl=FE8                    . . . .   0005
  2-FE8-001          +179.00 Deg         . . . .   0005
  RCV  Stat: NO ERRORS
```

Note in the above display the appearance of the S2, S4 and S8 messages in the header line of each window area. In normal operation, the data update rate for the display will be real time with each newly received word presented. An adaptive controller, however, senses when an excessive amount of very high speed data is being received and overloading the DATATRAC's ability to compute update rates correctly. In this case, the receiver processor notifies the display processor that every second, fourth, or eighth sample will be transferred and this information is in turn displayed to the user as the S2, S4, or S8 message. This will not involve any real loss of capability since it only occurs when data is being received at high update rates where there is very little change between samples. The user can also reduce the amount of information in the display which will return the system to real time.

Pressing the HELP key from any of the above real time data screens will produce the following help menu.

```
┌─────────────────────────────────────────────────┐
│                                                 │
│      * ARINC 629 REALTIME REV HELP SCREEN *     │
│                                                 │
│  ■   Symbol at header indicates                 │
│      current active channel.                    │
│                                                 │
│                * KEY DIFINITIONS *              │
│      1 , 2  Change the active RCV channel.      │
│        ^ v  Scrolls data in active channel.     │
│          >  Steps through data formats in       │
│             active channel.                     │
│      ENT   Holds (freezes) data in              │
│            active channel.  Toggle to release.  │
│      CLR   Clears receive buffer of active      │
│            channel.                             │
│                                                 │
│                                                 │
│             Press ENT to continue               │
└─────────────────────────────────────────────────┘
```

The "freeze" option is a convenient way to view data with noise or jitter.

3.2.3 RECEIVE MODE GRAPHIC PLOTS

Another format available to the user involves a strip chart like time plot of data values as shown on the following screens:

One trace active:

```
TR1
CH1   _ _ _ _ _ _ _ _ _ _ _ _ _ _
L0010
W001  _ _ _ _ _ _ _ _ _ _ _ _ _ _
x1
+00%  _ _ _ _ _ _ _ _ _ _ _ _ _ _
_____
TR2
CH0   _ _ _ _ _ _ _ _ _ _ _ _ _ _

      _ _ _ _ _ _ _ _ _ _ _ _ _ _

      _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

Two traces active:

```
TR1
CH1   _ _ _ _ _ _ _ _ _ _ _ _ _ _
L0010
W001  _ _ _ _ _ _ _ _ _ _ _ _ _ _
x1
+00%  _ _ _ _ _ _ _ _ _ _ _ _ _ _
_____
TR2
CH1   _ _ _ _ _ _ _ _ _ _ _ _ _ _
L0010
W001  _ _ _ _ _ _ _ _ _ _ _ _ _ _
x1
+00%  _ _ _ _ _ _ _ _ _ _ _ _ _ _
```
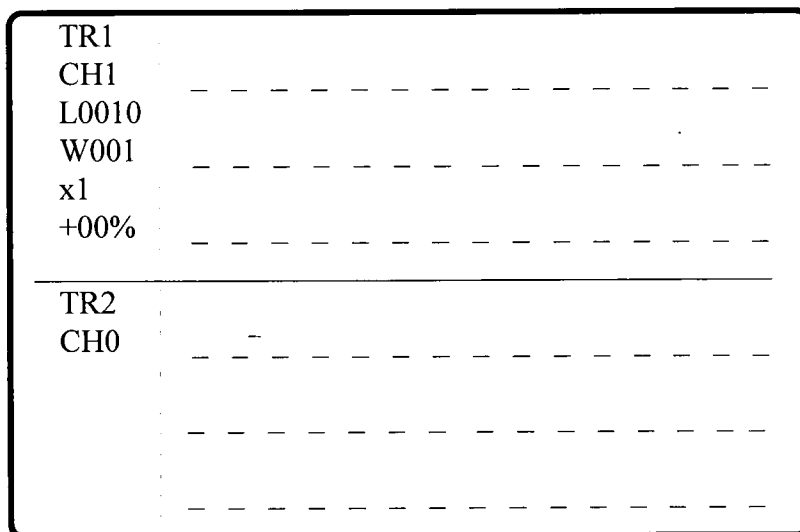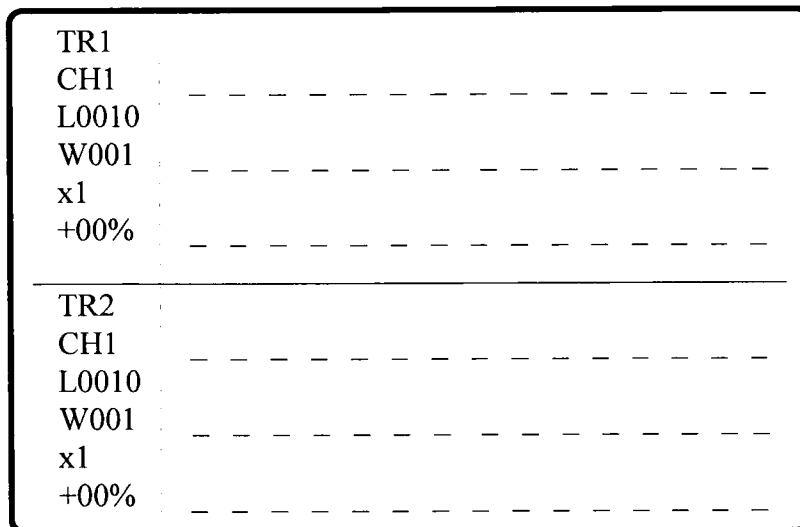
This format must be selected from the setup screen. It can be used to view one or two words from different channels. In addition to the user option of selecting different CID-Label-Word positions, the user can vary the magnification of the data between 1 and 128 times and shift the zero offset freely.

Graphic plots are a powerful development or troubleshooting feature. Occasional data transients are more easily observed and knowledge of their shape and frequency may help identify their source. Oscillation frequencies buried in noisy data can also be more easily identified with graphic plots.

4.0 TRANSMIT MODE

A variety of data transmission options are available to the user and described in this section. After pressing the transmit key, the initial setup menu below appears.

```
* ARINC 629 TRANSMITTER SETUP *


Channel:  1                Setup Mode:  KEY
On/Off:  ON                Data Format:  ENG




        < >  To step through options
        ^ v  To move to next/previous line
        HLP  To see explanation of options

           Press ENT to continue or any
         function key to change functions
```

The setup mode involves the following options:

KEYBOARD   - Enter transmsit words from the keyboard.
RECALL SETUP   - Select from 250 transmit setup tables stored in Flash PROM or 5 transmit setup tables stored in battery backed RAM.
STORE SETUP   - Load a keyboard entered setup into RAM.
COUPLER TEST   - Perform a coupler test using user-defined transmit data.

4.1 STATIC TRANSMIT DATA KEYBOARD ENTRY AND DISPLAY

Selection of the Keyboard function first causes the following DATAC bus parameter setup/review screen.

```
┌─────────────────────────────────────────────────┐
│              * ARINC 629 CHANNEL SETUP *          │
│                                                   │
│                          Channel:  1              │
│                               CID:  00            │
│              Transmit Interval (TI):  05.0 msec   │
│                 Terminal Gap (TG):  032 usec      │
│         Synchronization Gap (SG):  16 usec        │
│                     XPP/RPP Setup:  AUTO  .        │
│                                                   │
│            0-9  To enter CID, TI, TG              │
│            < >  To step through options          │
│            ^ v  To move to next/previous line    │
│           HELP  To see help menu for each line    │
│                                                   │
│            Press ENT to continue or any           │
│            function key to change functions       │
└─────────────────────────────────────────────────┘
```

The user may enter data or move to the next screen if these parameters had been previously entered. A complete description of all setup options has been provided in Section 3.1.2.

Keyboard data entry involves the definition of one or more wordstrings and then the scheduling of wordstring transmissions. Wordstring data is entered on the following screen.

```
┌─────────────────────────────────────────────────┐
│ - - - - - - ARINC 629 XMT WORD STRING SETUP - - - - - │
│              Channel:  1                          │
│    Word Str Index:  001          Word Count: 014  │
│              Label:  FE8         Label Name:  ADIFE8│
│ - - - - DATA ENTRY - - - - - - Format: HEXM - - - - - - - │
│    WP          15-----HexM-----1      Data Name   │
│    001             00  00             SSW         │
│    002             00  00             PVW         │
│    003             00  00             ASW1        │
│    004             00  00             AD1         │
│    005             00  00             SD2         │
│    006             00  00             ASLS        │
│    007             00  00             AIPS        │
│                                                   │
│            Press F1 to move to data header,       │
│          ENT to continue to Message Scheduler.    │
└─────────────────────────────────────────────────┘
```

Wordstrings are assigned a sequential index number, and then the label and the number of words are entered. A descriptive name associated with that label will be displayed to the user. Pressing F1 moves the cursor to the data entry header line. At this point, the user may press the right arrow to select any of the standard data formats (engineering, hex, binary, etc.). Pressing F1 again moves the cursor to the data field where the up/down and right/left arrows move the cursor as needed to edit the list of default values. The units and word names are obtained from the scale table data base with the DATATRAC 650. Once a particular word string is set up, pressing F1 moves control to the upper half of the screen where the next index/label/word count can be set up. When all word strings have been setup, pressing ENT transfers control to the scheduler screen described later.

4.2 DYNAMIC DATA SETUP

In the previous section, the setup of static words was described. Another option available to the user is dynamic data where the user selects levels between +/- full scale and time segments between 0 and 999.999 seconds to created a variety of patterns. Up to ten words may be defined as dynamic types. To enter the dynamic setup screen, the user presses F2 when the cursor is in the data entry area of the static transmit setup screen (see previous section). The setup screen shown below then appears.

```
* DYNAMIC DATA TRANSMIT SETUP *

Setup Number:  0          Word String Index:  001
XMT Channel:  1                      Label:  FE8
XMT On/Off:  OFF            Word Positon:  001

                      TR | ←— T2 —→|
                                        A2
          _____  ___/‾‾‾‾‾\___
         A1 | ←— T1 —→|         TF |


        A1:   -1.000         A2:     +1.000
   T1 (sec):  001.000    T2 (sec):  001.000
   TR (sec):  000.000    TF (sec):  000.000
```
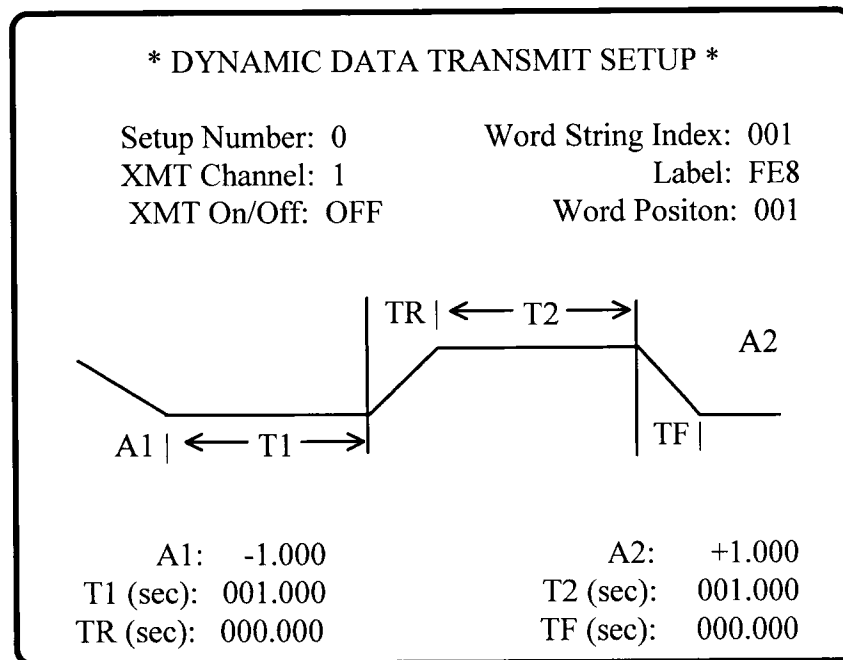
While in this screen, the user can define as many as ten dynamic words identified by wordstring index and word position.

4.3 COUPLER TEST

The Coupler Test mode allows the DATATRAC 650 to perform a health test of current mode Couplers attached to the ARINC 629 Data Bus.

To perform the coupler test, the coupler must be connected to a 629 data bus. The user first selects the Coupler option for the Setup Mode in the top-level transmitter setup screen. The normal transmit setup steps are then followed, i.e. 629 channel setup, word string setup, and message schedule setup. The actual setup parameters are unimportant. In Coupler Test Mode, after the message schedule setup, the DATATRAC will go to the following screen.

```
*  ARINC 629 COUPLER TEST *


Channel 1 result = Two Good Channels




Press ENT to continue
```

The result of the test will be either "Two Good Channels", "One Good Channel", or "No Good Channels". Upon exiting this screen, the DATATRAC returns to the transmitter setup menu, and defaults back to KEY for the setup mode.

4.4 TRANSMIT MESSAGE SCHEDULER

After defining a series of wordstrings and assigning them a sequence number, they are entered into the following scheduler matrix by their sequence number.

```
*  ARINC 629 XMT MESSAGE SCHEDULE *

Channel:  1             Schedule Type:  BLOCK

         X00    X01    X02    X03    X04    X05
  Y00    001    002    003    004
  Y01    001    002    003
  Y02    001    002
  Y03
  Y04
  Y05

Press F2 to return to label setup,
Press ENT to save and exit
```

The user defines the method of scheduling (block or independent) and the channel on which to output the data. After "entering" the completed transmit setup, the display returns to the transmit setup screen or the real time data display screen if receive mode has been previously set up.

4.5 STORING TRANSMIT SETUP TABLES

The currently entered and active setup of wordstrings and their schedule matrix can be entered into one of the five available tables located in battery backed RAM. The following setup screen called from the initial transmit mode menu permits the assignment of a table index and descriptor.

```
* RCV/XMT TABLE STORE SETUP *


        Setup Index: 1
          Channel: 1
        Descriptor: Nameabcd




        Press F1 to store table,
        Press ENT to continue.
```

4.6 RECALLING TRANSMIT TABLES

A main transmit menu option involves the recalling of stored transmit setups rather than entering this data from the keyboard. Tables are reviewed and selected from the following screen that presents the five RAM tables in the first five locations followed by the remaining EEPROM stored 250 tables. The list may be scrolled to place the selected table at the top, and then loaded with the F1 key.

```
          * RCV/XMT TABLE RECALL SELECTION *

    Selected Index:  001          Channel:  1

    Setup      Default
    Index      Channel      Descriptor      Type
     001         1          ADIRS001        RAM
     002         1          ADIRS002        RAM
     003         1          AFDS0001        RAM
     004         1          AFDS0002        RAM
     005         1          AIM00001        RAM
     006         1          AVM0001         ROM
     007         1          AVM0002         ROM

          Press F1 to load selected table,
              Press ENT to continue
```

5.0   RECORD MODE

This mode allows the DATATRAC 650 to function as a general purpose data recorder storing information in the 120 Kbytes of available RAM for later review or download on the RS-232 port.

5.1   RECORD MODE SETUP MENU

The initial setup menu for record mode is shown below.

```
*************************************
*        * ARINC 629 DATA RECORD SETUP *

          Channel:  1
          Function:  RECORD
       Rcd Interval:  0050



          < >  To step through options
          ^ v  To move to next/previous line
          HLP  To see explanation of options

             Press ENT to continue or any
             function key to change functions
*************************************
```

The operator is able to select a sample interval between 2 msec and 10 seconds. Record functions are listed in the following help screen.

```
*************************************
*        * ARINC 629 DATA RECORD SETUP *

       RECORD  -  The memory is cleared and new
                  data is acquired.
       REVIEW  -  Directly goes to display the
                  data previously acquired.
          DAC  -  Ports the data in the buffer
                  to the D-to-A converter.
        RS232  -  Ports the data in the buffer
                  to the RS232 port.

             Press ENT to return to setup screen
*************************************
```

If the record function is selected, the following setup screen will be presented for the user to enter up to 32 words (identified by CID-Label-Word Position) to be recorded.

```
* ARINC 629 RCD / BRK SELECT LABEL SETUP *

Format:  X-XXX-XXX  (CID-Label-Word Pos)

Channel: 1

-___-___  -___-___  -___-___  -___-___
-___-___  -___-___  -___-___  -___-___
-___-___  -___-___  -___-___  -___-___
-___-___  -___-___  -___-___  -___-___
-___-___  =___-___  -___-___  -___-___
-___-___  -___-___  -___-___  -___-___
-___-___  -___-___  -___-___  -___-___
-___-___  -___-___  -___-___  -___-___

Press ENT to continue
```

After entering the desired words to be recorded, the user presses the ENT key to begin recording. The A629 channel setup and word count setup screens are presented before the user reaches the record screen.

5.2   RECORDED DATA DISPLAY

While data is being recorded, the user is able to review the selected data words in real time on the following screen. Record count progress is shown on the screen, and the user may temporarily halt recording be toggling the F1 key. Again, as with all data display screens, the display format may be changed with the right arrow key.

```
* ARINC 629 RECORDING *

Record Count:  12345
Rcd Interval:  0050

Ch     CID-Lbl-WP - - - - - - - - - -Eng - - - - - - Name
 1       1-001-001        00    00        . . . .
 1       1-001-002        +12345.6 FPM     . . . .
 1       1-002-001        +12345.6 FPM     . . . .
 1       1-002-004        +12345.6 Deg     . . . .


STAT1:  NONE      STAT2:  NONE      STAT3: NONE
       Press F1 to toggle RECORD/STOP status
       Press ENT to STOP RECORD & review data
```

The user can stop recording at any time and review data by pressing ENT, whereupon the following data display will be available.

```
■ - - - - - - - ARINC 629 RECORD DATA SELECT - - - - - -
        Channel: 1                    Display: NUMERIC
CID-LBL-WP: 1-001-001                 Count: 00000


    - - - - - - - ARINC 629 RECORD DATA REVIEW - - - - - -
    Count        - - - - - - - - - - - -Eng - - - - - - - -      Name
    00000        10101010        +12345.6 FPM          . . . .
    00001        10101010        +12345.6 FPM          . . . .
    00002        10101010        +12345.6 FPM          . . . .
    00003        10101010        +12345.6 FPM          . . . .
    00004        10101010        +12345.6 FPM          . . . .
    00005        10101010        +12345.6 FPM          . . . .
    00006        10101010        +12345.6 FPM          . . . .
    00007        10101010        +12345.6 FPM          . . . .

          Press ENT to toggle SELECT/REVIEW
```
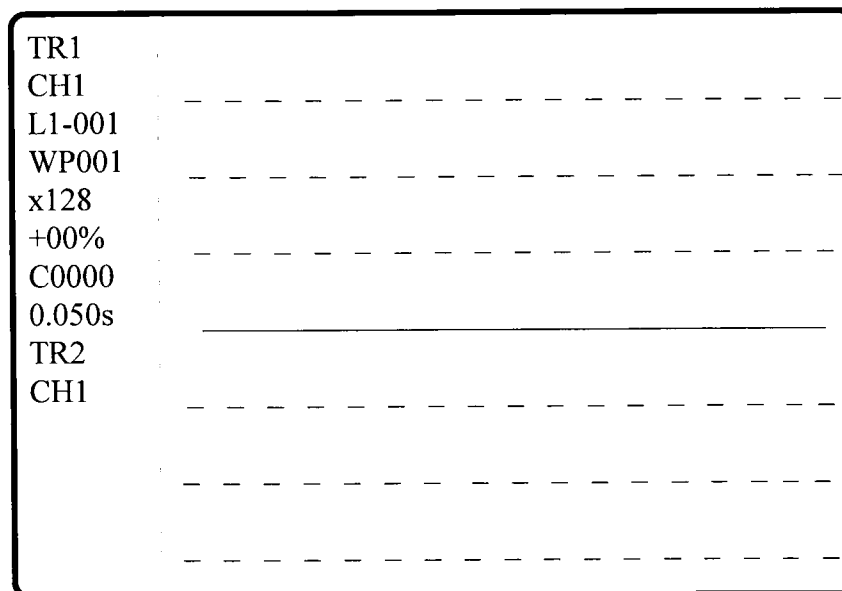
All recorded words can be selected for review, and the data can be cycled through all the standard formats.
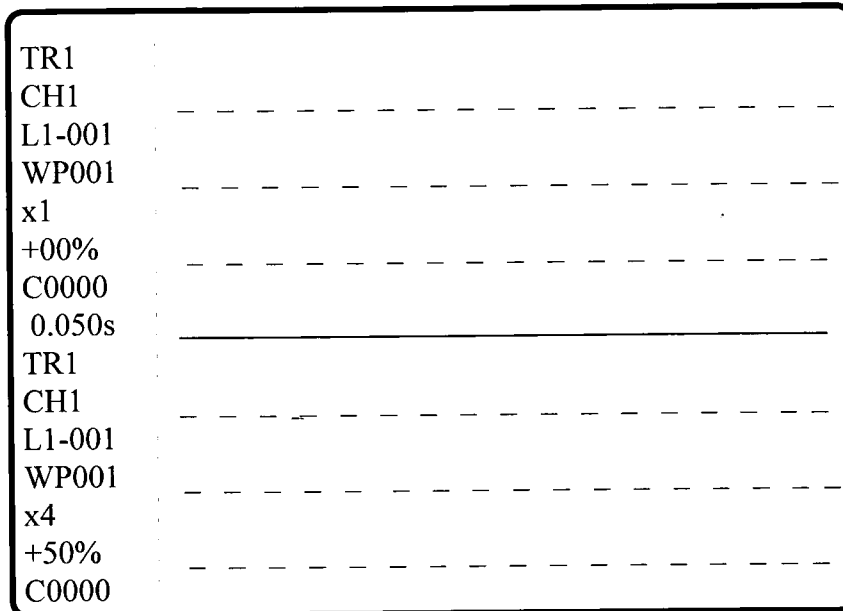
5.3   RECORDED DATA GRAPHIC PLOTS

In addition to numeric display formats, it is possible for the user to review one or two data words simultaneously as graphic time plots.

One trace active:

```
TR1
CH1
L1-001    _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
WP001
x128      _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
+00%
C0000     _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
0.050s    _____
TR2
CH1       _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

          _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

          _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

Two traces active:

```
TR1
CH1
L1-001  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
WP001
x1      _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
+00%
C0000   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
 0.050s _____
TR1
CH1
L1-001  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
WP001
x4      _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
+50%
C0000   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

The recorded data may be scrolled horizontally to see any time segment, and scales and offsets adjusted (1 to 128 magnification and +/- full scale offset adjustment). The traces are moved horizontally by placing the cursor on the count line (C0000) and pressing "F" (forward), "B" (back) or by entering a count value.

5.4   RECORDED DATA DOWNLOAD

Recorded data words may be output on the DAC port or files may be downloaded on the RS-232 port to a PC. The RSREAD program provided by BFGoodrich Aerospace JcAir Test Systems and resident on the PC supports this download (See Appendix A). The following setup screens and status screens are associated with these output functions.

```
            * ARINC 629 DAC OUTPUT SETUP *


        Channel:  1              Data Offset:  +00
     CID-LBL-WP:  1-001-001           Scaling:  1



          < >  To step through options
          ^ v  To move to next/previous line
         HELP  To see help screen for each line




         Press F1 to begin DAC download
        ENT to return to RECORD setup menu
```

RS-232 Download of Recorded Data:

```
* RS 232 DOWNLOAD *


Make sure the RS232 port is connected
properly and that the RS232 receive port
is ready to accept data.  Press ENT to
begin download or any other key to abort
the transfer . . .
```

RS-232 Download Status Screen:

```
* RS 232 DOWNLOAD *

TRANSMITTING . . . Please wait while the
data is being downloaded on the RS232.


Records remaining to transmit:  00000




Press CLR to abort download
```

6.0 BREAKPOINT MODE

Breakpoint mode represents a powerful tool allowing the user to monitor avionics equipment for intermittent faults. Multilevel label and dataword combinations may be programmed, and a moving history window may be defined to save both pre and post condition data.

6.1 BREAKPOINT CONDITION SETUP

The setup menu for the breakpoint mode is:

```
┌─────────────────────────────────────────────────────┐
│                                                       │
│      * BREAKPOINT MODE/TRIGGER PULSE SETUP *          │
│                                                       │
│       Function: BREAK        Time Stamp: OFF          │
│      Brk Sequence: A            History: SEL          │
│      Brk Position: --*--       Event Cnt: 01          │
│                                                       │
│   A> Ch: 1     CID: 1      Label: 001     Cond: /GT/  │
│       WP: 001        Data: XXXX 111X XXXX XXXX        │
│                      Bit: 16       9 8             1   │
│   B> Ch: 1     CID: 1      Label: 002     Cond: EQ    │
│       WP: 001        Data: 1000 XXXX XXXX XXXX        │
│                      Bit: 16       9 8             1   │
│                                                       │
│        Data = 0, 1, or X (D-Don't care)              │
│              Press ENT to continue                    │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Setup options for each of the lines are explained in the following help screens that are available from the respective setup lines. The data value is entered as 0 and 1 patterns or as an X for "don't care" bits. Pressing ENT causes incoming data to be monitored for the programmed conditions. The data that is saved as a part of the history window is the 32 selected CID-label-word positon combinations defined as a part of the Receive Select Mode, as well as the trigger. After the above setup screen is "entered", the RCD/BREAK select label setup appears with any previously setup words appearing as defaults. The user can then modifiy this data list as desired before beginning the breakpoint monitor process.

Function Help Screen:

```
*****************************************
*  * BREAK MODE / TRIGGER HELP SCREEN *  *
*                                        *
*  Function Selections:                  *
*    BREAK   -  To setup a break condition and  *
*               save history data.       *
*    REVIEW  -  To review previously     *
*               collected history data.  *
*    TRIGGER -  To setup a condition for a  *
*               trigger pulse output on received data.  *
*    RS232   -  Enable RS-232 history data  *
*               download.                 *
*                                         *
*               -                         *
*                                         *
*          Press ENT to return to setup screen  *
*****************************************
```

Break Sequence Help Screen:

```
*****************************************
*  * BREAK MODE / TRIGGER HELP SCREEN *  *
*                                        *
*  Break Sequence Selections:            *
*                                        *
*        A    -  Break only on condition A  *
*        B    -  Break only on condition B  *
*      A or B -  Break on either condition A  *
*               or condition B           *
*    A then B -  Break on condition B after  *
*               condition A has occurred  *
*                                        *
*                                        *
*          Press ENT to return to setup screen  *
*****************************************
```

Break Position Help Screen:

```
*****************************************
*  * BREAK MODE / TRIGGER HELP SCREEN *  *
*                                        *
*           Break Position Selections:   *
*  * - - - - :  Beginning of memory      *
*  - * - - - :  First quarter of memory  *
*  - - * - - :  Middle of memory         *
*  - - - * - :  Third quarter of memory  *
*  - - - - * :  End of memory            *
*                                        *
*  This defines the relative location    *
*  of the break condition in the history *
*  memory.                               *
*                                        *
*          Press ENT to return to setup screen  *
*****************************************
```
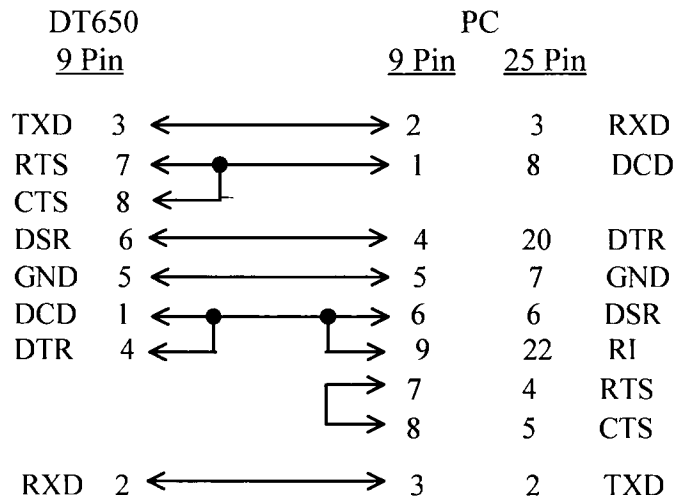
APPENDIX A

RS-232 INTERFACE DEFINITION

RS-232 INTERFACE DEFINITION

<u>RS232 Cable Schematic</u>

The schematic for wiring an RS232 cable is shown below. The DATATRAC 650's RS232 interface uses a 9-pin female sub-D high density connector. The schematic shows the wiring to both a standard 9-pin sub-D (as found on some PC AT's) and a 25-pin sub-D. Each signal's acronym is listed next to the pin.

```
        DT650                        PC
        9 Pin                 9 Pin    25 Pin

   TXD   3  <----------->  2        3      RXD
   RTS   7  <---+------->  1        8      DCD
   CTS   8  <---+
   DSR   6  <----------->  4       20      DTR
   GND   5  <----------->  5        7      GND
   DCD   1  <---+-----+->  6        6      DSR
   DTR   4  <---+     +->  9       22      RI
                      +->  7        4      RTS
                      +->  8        5      CTS

   RXD   2  <----------->  3        2      TXD
```

The PC's DTR (Data Terminal Ready) line is a modem output line that can be used to temporarily disable the DATATRAC 650 download. Setting this pin high will enable the download, while clearing it will disable it. The download will resume uninterrupted after a disable then a re-enable of the DTR line. This is useful if the receiving computer cannot keep up with the download and must periodically freeze it to process the data. Refer to the computer's serial port documentation for information on toggling this bit. Note that for real time data download, freezing the DATATRAC 650 download will necessarily cause data to be missed. Record and Break data downloads are unaffected by periodic DTR disables.

To give the receiving computer time to initiate the download freeze and thus avoid loss of data due to an overflow, the DATATRAC transmits data bytes on every other byte position in the serial stream. Therefore, even though the baud rate is 9600, only 4800 useful bits are transmitted per second.

<u>RS232 Download Program</u>

A program is provided on diskette for IBM PC or compatible that can be used for reading the data downloaded by the DATATRAC over the RS-232 interface. The program called RSREAD, reads the stream of bytes and assembles them to produce an ASCII test file with the data organized in table fashion. The output file can then be printed out or used as an input file to some other data processing program.

A-2

The program is invoked by typing RSREAD. It will first initialize the COM1 serial port on the PC to the proper baud rate, parity, etc. The main menu will then appear as follows:

```
DATATRAC 400/600 RS-232 Download Program, Version 2.02
        Copyright 1991, 1993, Atlantic Instruments, Inc.


        (1)  Real Time Receive Data Download
        (2)  Recorded Data Download
        (3)  Break-history Data Download
        (4)  BITE Screens Download
        (5)  Real Time File Transfer Download
        (6)  File Transfer Buffer Download
        (9)  Exit DOS



        Enter selection: __
```

The RSREAD Version 2.02 supports ARINC 429 data download from DATATRAC 400, 400H and 600 units, also ARINC 629 data downloaded from DATATRAC 600, 650 and 650H units.

There are four general types of data download covered in this document and two types specific to the Williamsburg Protocol Analyzer which are covered in the manual for that product. The four general download modes are: real time download of received data, download of recorded data, download of break history data, and the download of BITE screens. For any selection, the program will return and ask for an output file name. After the user provides a file name, the program asks whether ARINC 429 or ARINC 629 data is being downloaded. At this point the program begins "listening" over the COM1 port for data. It is at this time that the DATATRAC download should be initiated. At any time during the download, the operator can press any key on the computer's keyboard to terminate the download. Note that the DATATRAC will continue downloading data even through the computer is no longer recording it.

A-3

Real time Data Download

Due to timing restrictions involving the real time download, the program will buffer all the data being downloaded in the computer's RAM before accessing the disk. The program is capable of buffering up to 1000 label records. When the buffer becomes full or the operator aborts the data collection, the program will write the data to the file and return to the main menu. The following are examples of ARINC 429 and ARINC 629 real time data downloads.

ARINC 429

Datatrac 400 Receive Data Download (Date   )

Count	Chan	Lbl	SDI	32-Hex Data-1			Time Stamp
00000	1	123	1	E6	B7	59 CA	296736
00001	1	123	1	67	09	41 CA	296858
00002	1	123	1	67	5B	29 CA	296936
00003	1	123	1	E7	AD	59 CA	297036
00004	1	123	1	E7	FE	F9 CA	297136
00005	1	123	1	68	50	E1 CA	297236

ARINC 629

Datatrac 600 Receive Data Download (Date   )

Count	Chan	Lbl	CID	Pos	16-Hex Data-1		Time Stamp
00000	1	123	1	001	50	FF	313442
00001	1	123	1	001	50	DF	313492
00002	1	123	1	001	50	BF	313542
00003	1	123	1	001	50	9F	313592
00004	1	123	1	001	50	7F	313642
00005	1	123	1	001	50	5F	313692

The count is just an index to the record and is generated by the program for bookkeeping. It is not transmitted by the DATATRAC. The data is presented in hexadecimal format. The time stamp marks the relative time that the label was received. The timer count is a count down timer that begins at 999999 msec and is decremented each millisecond. Observe in the ARINC 429 example that the transmit interval for the labels was 100 msec.

A-4

Record Data Download

As with the real time download, the program asks the user for a file name and whether the download involves ARINC 429 or ARINC 629 data. Since downloading of recorded data is not a real time event, the program can perform the disk access while data is being received. Therefore, the program will continue collecting data until either the user aborts the acquisition or the DATATRAC completes the download. While the data is being downloaded, the program will display the number of records collected so far. Examples follow for ARINC 429 and ARINC 629 recorded data downloads.

ARINC 429

Datatrac 400 Recorded Data Download (Date   )

Record Interval = 0050   Number of Samples = 4

Count	Chan	Lbl	SDI	32-Hex Data-1
0000	1	100	0	. . . .
0000	1	130	1	. . . .
0000	2	210	0	. . . .
0001	1	100	0	00 00 00 02
0001	1	130	1	90 00 01 1A
0001	2	210	0	11 99 00 11
0002	1	100	0	. . . .
0002	1	130	1	. . . .
0002	2	210	0	. . . .
0003	1	100	0	00 00 00 02
0003	1	130	1	90 00 23 EA
0003	2	210	0	45 D4 6F EE

ARINC 629

Datatrac 600 Receive Data Download (Date   )

Record Interval = 0050   Number of Samples = 53

Count	Chan	Lbl	CID	Pos	16-Hex Data-1
0000	1	123	1	001	00 00
0001	1	123	1	001	11 34
0002	1	123	1	001	34 23
0003	1	123	1	001	12 6F
0004	1	123	1	001	D3 46
0005	1	123	1	001	26 C3

The record interval is displayed in milliseconds. The number of samples tell how many sample counts were recorded. The count is the sample number for that line. Note in the ARINC 429 example that there are three labels per sample. The dots (. . . .) indicate that no data was received for that label during that sample interval.

A-5

Break History Data Download

As with recorded data download, the program can perform the disk access while break history data is being received. Therefore, the program will continue collecting data until either the user aborts the acquisition or the DATATRAC completes the download. While data is being downloaded, the program will display the number of records collected so far. The following is a sample of the ASCII output file generated (with time stamp downloaded) for the ARINC 429 and ARINC 629 cases.

```
ARINC 429

Datatrac 400 Break History Data Download  (        Date        )

Number of Samples = 1541                Trigger Location = 4

Count   Chan  Lbl   SDI   32-Hex  Data-1  Time Stamp
0000     0    210    0    11 99 00 11     618306
0001     0    100    0    00 00 00 02     618309
0002     0    130    1    90 00 01 1A     618405
0003     0    210    0    11 99 00 11     618406
0004     1    100    0    00 00 00 02     618409 **TRIGGER**
0005     1    130    1    90 00 01 1A     618505
```

```
ARINC 629

Datatrac 600 Break History Data Download  (        Date        )

Number of Samples = 34                  Trigger Location = 11

Count  Chan  Lbl   CID   Pos   16-Hex  Data-1  Time Stamp
0000    1    123    1    001    C5     BB      066066
0001    1    123    1    001    C5     E5      066131
0002    1    123    1    001    C6     0F      066195
0003    1    123    1    001    C6     39      066259
0004    1    123    1    001    C6     63      066323
0005    1    123    1    001    C6     8D      066387 **TRIGGER**
0006    1    123    1    001    C6     B7      066451
```

The data is presented in hexadecimal format. The time stamp marks the relative time that the label was received.

BITE Screen Download

The BITE download is an ARINC 429 function only. The program requests a file name before beginning the download. As with recorded data and break data downloads, the program can perform the disk access while the BITE screens are being received. Therefore, the program will continue collecting data until either the user aborts the acquisition or the DATATRAC completes the download. The following is a sample of the ASCII output file generated.

```
ARINC 429

Datatrac 400 BITE Screens Download  (       Date       )

Screen 001              ‾
                        EFIS BITE TEST

< PREVIOUS FLIGHT LEGS

< LAST FLIGHT LEG

< GROUND TEST

< LRU IDENT


< RETURN
```

and so forth until all recorded screens are downloaded.

APPENDIX B

DATATRAC 650 TECHNICAL SPECIFICATIONS

DATATRAC 650

Databus Test Equipment

MECHANICAL

Size: .... 5.7 inches H, 14.25 inches W, 12 inches D

Weight: .... 24 lbs.

Construction: .... All aluminum, high strength enclosure with mother board and 8 card slot architecture

Display: .... High contrast, twisted nematic LCD; 240 x 128 dot graphics or 16 line x 40 character format; front brightness control

ENVIRONMENTAL

Temperature: .... 0 to 50°C Operating; -10 to 60°C Storage

EMI: .... Class A computing device per FCC Part 15

POWER: .... 18-36 VDC—20 Watts 105-250 VAC, 47-400 Hz—20 Watts or rechargeable internal battery (providing typically 6-8 hours of operation)

REFERENCES: .... ARINC 629-2 Multi-Transmitter Data Bus

RECEIVE MODE

Ports: .... 1 Standard, 2nd and 3rd, optional

Bus Frequency: .... 2 MHz

Input Electrical Characteristic: Doublet as specified for SIM input in Boeing D227W201 Universal Data Sheet

Word Update: .... 1 msec to 10 sec, update rate displayed as instantaneous, minimum or maximum value

Display Format: .... Prestored engineering units, hex, binary, user, ASCII, and graphic plots

Wordstrings Receivable: 4096

Words Selectable: .... 255 Words per wordstrings, 32 wordstrings

Bus Activity Monitor: .... Monitors loss of individual words; sensitivity selectable

Real-time Download/
Conversion: .... RS-232C or 12 bit DAC port

---

ASSOCIATED PRODUCTS

RSREAD: PC program for downloading real-time receive, record, or breakpoint history data via RS-232C port. Also used to upload configuration and transmit table data from a PC to the DATATRAC

PCMGR-600™: PC program allowing complete user modification of the DATATRAC 650 configuration. Label and word definitions database can be edited and up to 250 setup tables can be created for upload to the DATATRAC.

TRANSMIT MODE

Ports: .... 1 Standard, 2nd and 3rd, optional

Bus Frequency: .... 2 MHz

Output Electrical Characteristic: Doublet as specified for SIM output in Boeing D227W201 Universal Data Sheet.

Transmit Interval: .... 0.5 to 64 msec, selectable

Synchronization Gap: .... 16, 32, 64, 127 usec, selectable

Terminal Gap: .... 1 to 128 usec, selectable

Synchronization: .... C Mode communication provisions with external terminals

Display Format: .... Prestored engineering units, hex, binary, user and ASCII

Maximum Words Per Wordstring: 256

Maximum Wordstrings: .... 31 x 31

Dynamic Transmit: .... Repeat pattern of ramps and flat segments. Levels programmable between ± full scale and segment times of 0 to 999.999 sec.

BREAKPOINT OPERATION

Label Sequence: .... A, B, A or B, A then B

Data Conditions: .... EQ, NEQ, OR, GT, LT, /GT/, /LT/

Event Count: .... 1 to 99 before break

History: .... Up to 40,960 words in a programmable window about the breakpoint. Optional time stamp

Trigger Pulse: .... 5 V, 20 usec

RECORD OPERATION

Channels: .... Up to 32 words from any combination of ports and received wordstrings

Sample Interval: .... 1 msec to 10 sec, selectable

Record Capacity: .... 120 Kbytes standard configuration; 16 Mbytes with memory expansion card

Playback Options: .... Graphic plots, data lists, DAC download, RS-232C download

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Specifications and product availability subject to change without notice.

APPENDIX C

PCMGR-600 PROGRAM DESCRIPTION

PCMGR-600 PROGRAM DESCRIPTION

Introduction

PCMGR-600 is a software program which executes on IBM PC's and compatibles. The PCMGR-600 program was developed to give the DATATRAC 600, 650, 650H user the capability of customizing the DATATRAC's firmware to meet special requirements. Three aspects of the DATATRAC's firmware can be customized, namely, 429 transmit data tables, 429/629 system setup tables, and 429/629 engineering format scaling definitions. The output of PCMGR-600 is two 256KByte binary files containing the user-defined data as well as other code and data required by the DATATRAC. The operator can then download the files to Flash Memory in the DATATRAC 600/650/650H over the RS-232 port.

ARINC 429 Transmit Data Tables

The DATATRAC 600 has the capability of invoking previously defined data tables for transmitting on the ARINC 429 bus. Typical applications might include routine test procedures where multiple transmit tables are repeatedly used. Instead of the operator entering the label and data from the keypad each time, the operator can call up different data tables by name which have the data pre-stored. This feature is particularly useful if the data tables are numerous or extensive as it greatly minimizes testing time and the chance for data entry errors.

ARINC 429 AND 629 System Setup Tables

Some procedures may require fairly complex DATATRAC 600/650/650H system setups to accomplish a desired test. There may be, for example, several dynamic transmit label defintions as well as some user defined formats that are needed for a particular test. Similar to the transmit tables, the DATATRAC provides for calling up pre-defined system setups in lieu of setting all the parameters from the keypad. Each system setup specifies the state of the receivers (including selected labels), transmitters (including dynamic labels), user-defined formats, recorder, break mode functions, and BITE functions.

ARINC 429 and 629 Scaling Formats

When the ARINC data is displayed in engineering units on the DATATRAC (ENG format), a scaling table is referenced for the given word. Actually two data bases exist. For ARINC 429 operation, a scale table contains all the format definitions from the 429-13 specification. For ARINC 629 operation, a scale table has been defined based on various Boeing ICD documents for the B777. There may be applications however, where the users will want to specify their own non-standard scaling for a particular label/equipment ID (CID) combination. PCMGR-600 provides the capability for editing the standard tables to either modify existing label formats or add new equipment ID's to a particular label definition.

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