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LOGIC ANALYZER OPERATOR'S MANUAL

Tektronix®
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Please check for change information at the rear of this manual.

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Tektronix
COMMITTED TO EXCELLENCE

Tektronix, Inc.
P.O. BOX 500
Beaverton, Oregon 97077

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OPERATOR'S SAFETY SUMMARY

The general safety information in this summary is for both operators and service personnel. Specific cautions and warnings are found throughout the manual where they apply but may not appear in this summary.

Terms In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

Terms as Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

Symbols as Marked on Equipment


DANGER — High voltage.


Protective ground (earth) terminal.


ATTENTION — refer to manual.

Grounding the Product

This product is intended to operate from a power source that that does not apply more than 250 V rms between the supply conductors or between either supply conductor and ground. This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Danger Arising From Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

Use the Proper Power Cord

Use only the power cord and connector specified for this product, and be sure it is in good condition.

Refer to the Operating Instructions section of this manual for information on power cords and connectors.

Use the Proper Fuse

To avoid fire hazard, use only a fuse of correct type, voltage rating, and current rating as specified in the parts list for this product.

Refer fuse replacement to qualified service personnel.

Battery Replacement

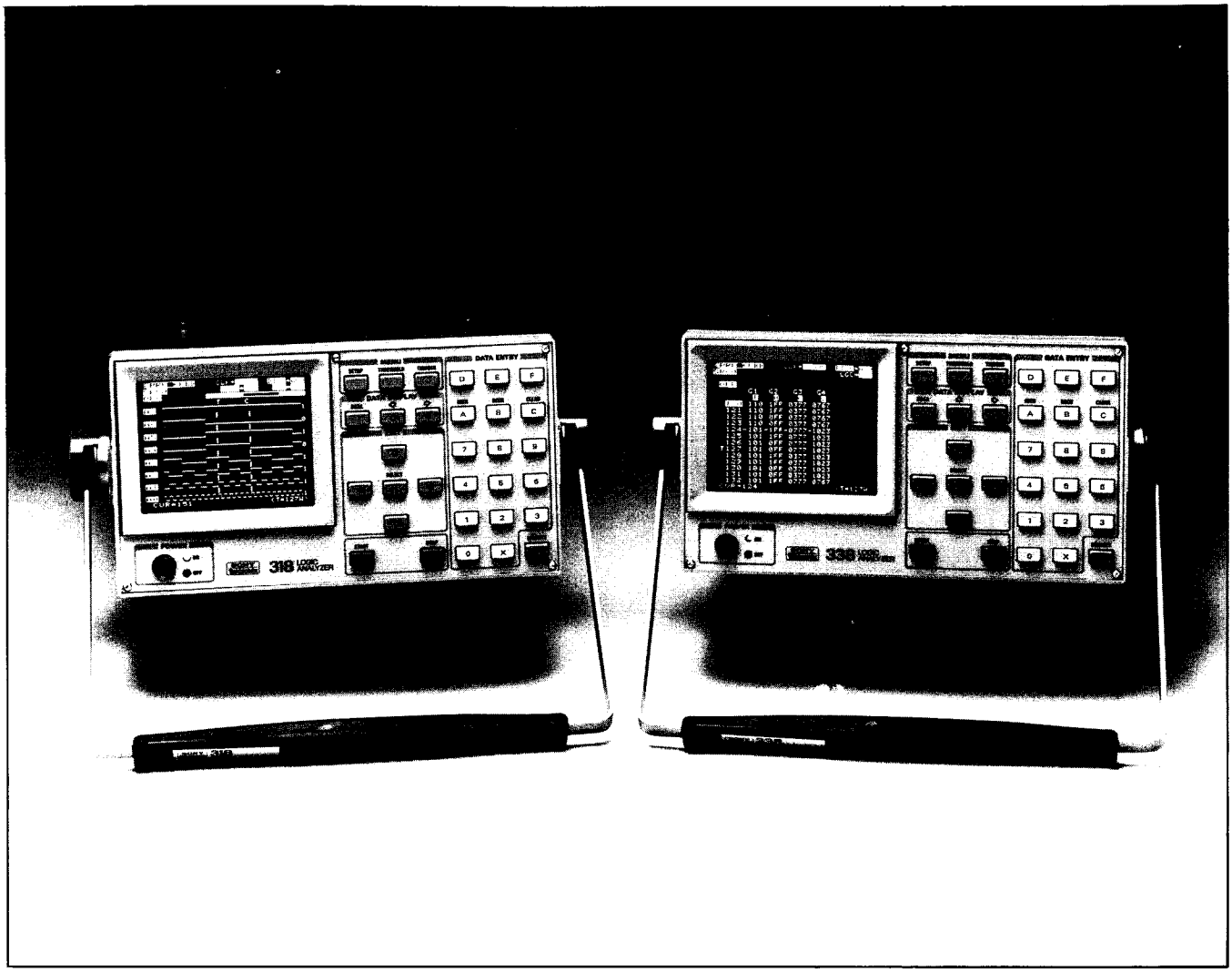
Refer battery replacement to qualified service personnel.

Do Not Operate Without Covers

To avoid personal injury, do not operate this product without covers or panels installed.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.



4433-01

318 and 338 Logic Analyzers.

GENERAL INFORMATION

INTRODUCTION

This manual will help you operate both the Sony/Tektronix 318 Logic Analyzer and the Sony/Tektronix 338 Logic Analyzer. The procedures and descriptions contained herein apply to both instruments. Unless otherwise specified, all screen displays have been developed from the 338 (with optional serial analysis, RS-232C interface, and non-volatile memory).

DESCRIPTION

The Sony/Tektronix 318 and 338 are keyboard-controlled, multifunctional, portable logic analyzers. Each can operate as a parallel timing analyzer or a parallel state analyzer, and each is provided with composite video output. Serial state analysis, RS-232C interface, and non-volatile memory are available as a single option.

MODES OF OPERATION

When used as a parallel timing analyzer, the 318 provides a 16-channel-wide input, 50 MHz (maximum) clock speed, and 256 bits/channel memory for data. Glitches are captured on all 16 channels. The 338 provides a 32-channel-wide input, 20 MHz (maximum) clock speed, and 256 bits/channel memory for data. Glitches are captured on eight channels. Three word recognizers can be specified on all channels and used in several different triggering sequences. The digital delay counts up to 65,000 clock cycles. In the 318, data before or after the occurrence of a specified trigger sequence can be acquired and stored at sample intervals ranging from 20 ns to 500 ms with two clock and trigger qualifiers. In the 338, data before or after the occurrence of a specified trigger sequence can be acquired and stored at sample intervals ranging from 50 ns to 500 ms with four clock and trigger qualifiers. The stored data can be displayed on the CRT screen in a timing or state format.

A composite video output for hard-copy units or video terminals is provided. This feature allows documentation of test results and operating parameters.

As a serial state analyzer, the 318/338 acquires serial data in five, six, seven, eight, or nine bits/character in asynchronous or synchronous timing. Two continuous word recognizers provide triggering upon recognition of preset words. The digital delay counts up to 65,000 words. Data before or after the occurrence of a specified trigger sequence can be acquired and stored at baud rates ranging from 50 to 19.2K baud. The stored data is displayed on the CRT screen in binary, octal, decimal, hexadecimal, ASCII, or EBCDIC format.

The RS-232C interface port allows the 318/338 to be linked with terminal equipment through an asynchronous, full-duplex MODEM. In remote control mode, the 318/338 can receive all control commands, memory control commands, or reference memory data from the terminal equipment instead of the keyboard. It can send the CRT display information or memory data to the terminal equipment via the RS-232C port.

The non-volatile memory can retain three setups and one set of reference or acquired data for about five years. Each memory area is selectable for the use of parallel or serial information. The current setup of the instrument is stored by keyboard control or control commands from the terminal. The stored setup information is recalled in the same manner. The data can be stored and recalled only by the 318/338 keyboard.

All functional parameters and operation of the instrument are programmable from the front panel or over the RS-232C port.

CONFIGURATIONS

The Sony/Tektronix 318/338 is available in the following configurations:

- 318 Logic Analyzer
- 338 Logic Analyzer
- 318S1 Logic Analyzer (with serial analysis, RS-232C interface, and non-volatile memory)
- 338S1 Logic Analyzer (with serial analysis, RS-232C interface, and non-volatile memory)
- 318F1 Logic Analyzer (with field-installed serial analysis, RS-232C interface, and non-volatile memory)
- 338F1 Logic Analyzer (with field-installed serial analysis, RS-232C interface, and non-volatile memory)

RELATED DOCUMENTS

In addition to this operator's manual, the *318/338 Logic Analyzer Reference Guide* and the *318/338 Logic Analyzer Workbook* will also help you understand and operate your 318/338.

STANDARD AND OPTIONAL ACCESSORIES

Standard Accessories:

016-0697-00	Accessory Pouch
070-4433-00	*318/338 Logic Analyzer Operator's Manual*
070-4435-00	*318/338 Logic Analyzer Reference Guide*
062-7061-00	*318/338 Logic Analyzer Workbook*
010-6107-03	P6107 Probe (1 probe with 318/338) (2 probes with 318S1/338S1)
010-6451-07	P6451 Probe (2 probes with 318) (4 probes with 338)
161-0104-00	Power Cord

Options:

A1-A5	Power Cords

Optional Accessories:

070-4434-00	*318/338 Logic Analyzer Service Manual*
067-1159-00	Service Maintenance Kit
012-0530-00	Null Modem Cable

OPERATOR'S CHECKOUT PROCEDURE

INSTALLATION

Installation consists of selecting the appropriate operating voltage, connecting the 318/338 to a power input source, and connecting the probe(s), as required, to the 318/338 and the circuit under test.

POWER REQUIREMENTS

The 318/338 operates from a nominal 115 or 230 V, 48 to 440 Hz, single-phase power input source. Before connecting the instrument to a power source, verify that the line-voltage indicator on the back of the instrument is displaying the correct nominal voltage for the power input source to be used.

CAUTION

If the line-voltage indicator shows the wrong voltage for the power input source to be used, refer the instrument to qualified service personnel.

POWER CORD

This equipment has a 3-wire power cord with a 3-contact plug for connection to the power source and to protective ground. The plug protective-ground contact connects (through the power cord protective-grounding conductor) to the accessible metal parts of the equipment. For electrical-shock protection, insert this plug into a power input source socket that has a securely grounded protective-ground contact.

The power cord is detachable. When not in use it should be stored in the accessory pouch.

Instruments are usually factory equipped with a 115 V power cord unless otherwise ordered. For more information on power cords, contact your Tektronix representative or your local Tektronix Field Office.

REPACKING FOR SHIPMENT

If the instrument is to be shipped to a Tektronix Field Service Center for service or repair, attach a tag showing the owner's name and address, the instrument's serial number, and a description of the service required.

Use the original packaging. If it is unavailable or not fit for use, contact your local Tektronix Field Office to obtain new packaging.

DIAGNOSTICS

The 318/338 has internal diagnostics to help verify proper instrument performance. Some of the diagnostics occur automatically whenever the 318/338 is powered on. Other diagnostics require that probes be properly attached to test points or require an operator at the keyboard. Any error found during correct operation of the diagnostics means that an instrument failure has occurred, has been detected, and that service is required. If an error occurs, refer your instrument to qualified service personnel.

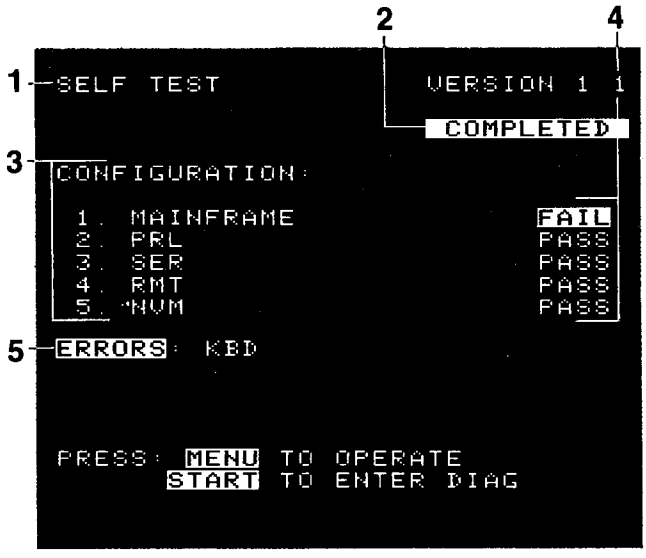
POWER-UP SELF TEST

When you press the POWER switch, the internal diagnostic tests run automatically. These tests check out the major hardware components and operating firmware.

During the first phase of self test, the 318/338 tests the major blocks of system RAMs and ROMs. After RAM/ROM tests, the 318/338 is initialized. After several seconds, the display shows a configuration listing (see 3 in Figure 2-1). At the top of the screen (1 in Figure 2-1), the message SELF TEST VERSION X.X appears. On the next line (2 in Figure 2-1), the message IN PROGRESS appears.

Each listed menu is tested and then given a PASS or FAIL notation. (See 4 in Figure 2-1.) If errors are detected, error messages also appear. (See 5 in Figure 2-1.) PASS means that the test was successful; FAIL means that the test was unsuccessful.

When all tests are finished, the message COMPLETED appears on the screen. (See 2 in Figure 2-1.) A prompt message then appears at the bottom of the screen.



4433-02

Figure 2-1. Failure in the power-up Self Test.

If no errors are found during self test, the screen will look like Figure 2-2. You may now enter any menu and begin operation. If errors occurred during self test, the screen will look like Figure 2-1. If the errors that occurred do not affect the operations you want to perform, press a MENU key. If you want to enter the Diagnostics menu, press START.

NOTE

If neither of the displays shown in Figure 2-1 or Figure 2-2 appears on the screen after several seconds, system errors have been detected.

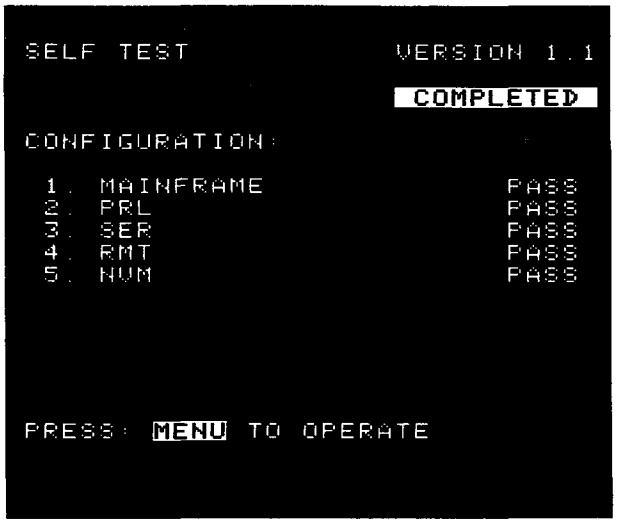


Figure 2-2. Successful completion of the power-up Self Test.

DIAGNOSTICS MENU

The Diagnostics menu offers more levels of diagnostics. The Diagnostics menu is only accessible when the power-up tests show that a hardware component has failed. To enter the Diagnostics menu, press START.

To access the Diagnostics menu when no errors have been detected by the power-up tests, induce a power-up failure from the keyboard by holding down any key (except STOP) from the time the 318/338 is turned on to the time the power-up self tests are completed.

When first entered, the screen should look like Figure 2-3. To begin testing, press a data entry key equal to a menu number. Press X to return to Diagnostics menu. Press any MENU key to leave the Diagnostics menu and begin operation.

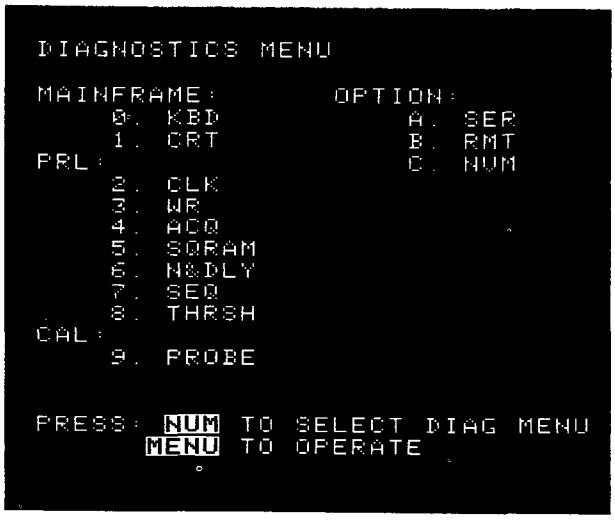


Figure 2-3. Diagnostics menu: first display.

USER-CHANGEABLE FIELDS FOR EACH TEST'S DISPLAY

LOOP and DISP(lay) are the user-changeable fields in each test (except KBD, CRT, CLK, T/H, and N & DLY). Some tests have more fields, such as the ALL or SINGLE SELECTION field and the DATA ENTRY field. Refer to Figures 2-4 and 2-5 while reading the following paragraphs.

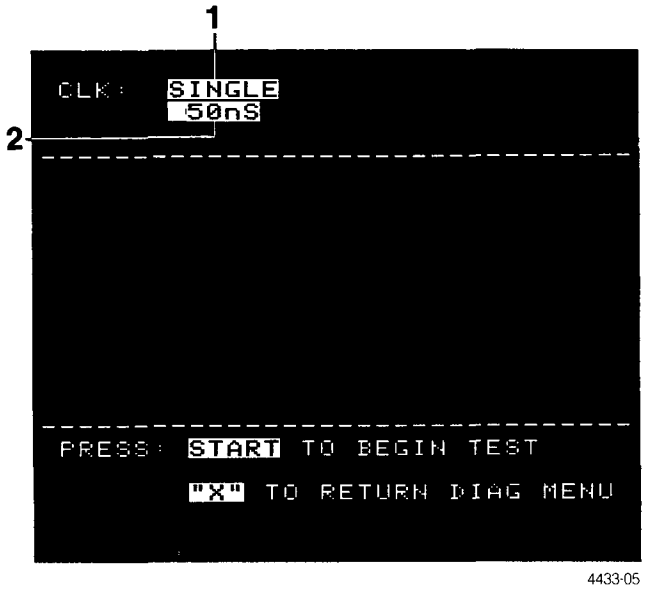


Figure 2-4. Display sample with ALL/SINGLE and data entry fields.

1 ALL OR SINGLE — Only some tests have this field. You may select either ALL or SINGLE. ALL causes all available conditions to be tested. SINGLE causes a selected conditon to be tested. When the field is set to SINGLE, the DATA ENTRY field appears on the line below. During tests, the field may not be changed. If you wish to change fields, do so after pressing STOP.

2 DATA ENTRY — Only some tests have this field. The tests are performed with the condition of the selected item or entered data. The field may not be changed during tests. If you wish to change fields, do so after pressing STOP.

3 LOOP — You can set this field to OFF, I/O, ERROR, or TEST by pressing SELECT. When the field is set to I/O, the looping feature allows only I/O instructions to be run repeatedly. The I/O address will appear on the screen. When the field is set to ERROR, the looping feature allows the tests in which an error is detected to be run repeatedly. When the field is set to TEST, the looping feature allows one test or sequence of tests to be run continuously. When the field is set to OFF, the looping feature is not available and one test or sequence of tests runs once.

When the field is set to I/O or ERROR, the prompt message START TO ADVANCE appears at the bottom of the screen. If START is pressed during LOOP tests, the current loop of tests stops and the next loop of tests is started. You can change fields during tests.

Use this feature for catching intermittent faults or for circuit tracing with an oscilloscope.

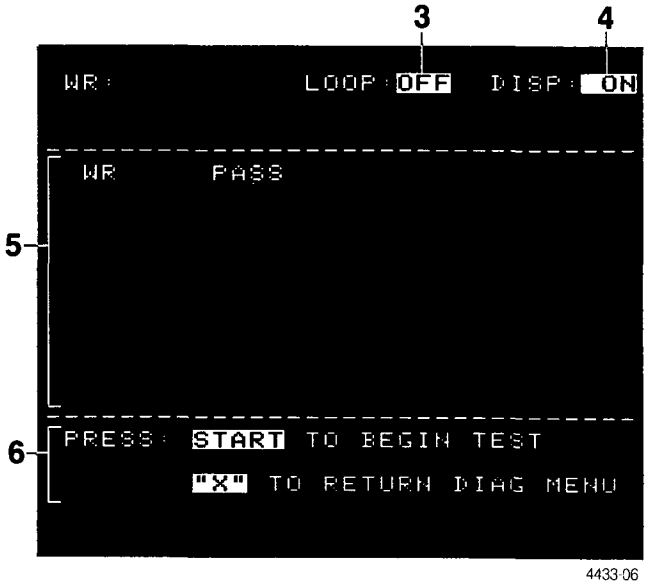


Figure 2-5. Display sample with LOOP and DISP fields.

4 DISP(lay) — This field may be set to ON or OFF. When the field is set to ON, test results appear within the status area on the screen. When the field is set to OFF, no test results appear. You can change fields during tests.

5 DISPLAY AREA FOR RESULTS — This area is used to display test results. You cannot move the cursor into the area between the dotted lines. If the DISP field is set to OFF, no test results will appear here other than results of the I/O LOOP test.

6 PROMPT MESSAGES — Press START to begin and to advance tests (except for KDB test). STOP TO CANCEL TEST will appear under tests instead of START TO BEGIN TEST. Press X to return to the Diagnostics menu for all tests except KBD. Press STOP to cancel tests. For KBD test, press STOP to cancel test and return to the Diagnostics menu.

DIAGNOSTIC TEST DESCRIPTIONS

KBD TEST — To enter the keyboard test, press 0 while in the Diagnostics menu. The screen display simulates the keyboard. When any key is hit, its position on the screen blinks. If the corresponding screen position does not blink, the key is open. If a screen position blinks without a key being hit, that key is short. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details. Figure 2-6 illustrates the KBD test.

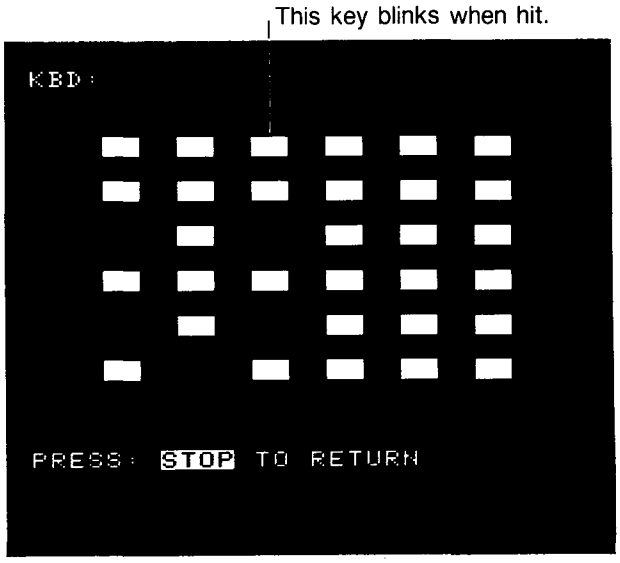


Figure 2-6. Display for KBD tests.

CRT TEST — To enter this test, press 1 while in the Diagnostics menu. This test is for the focus check and the CRT rotation check. First, the cross-hatch pattern appears on the screen. Press START; the display will change continuously. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

Figures 2-7, 2-8, 2-9, and 2-10 illustrate the CRT tests.

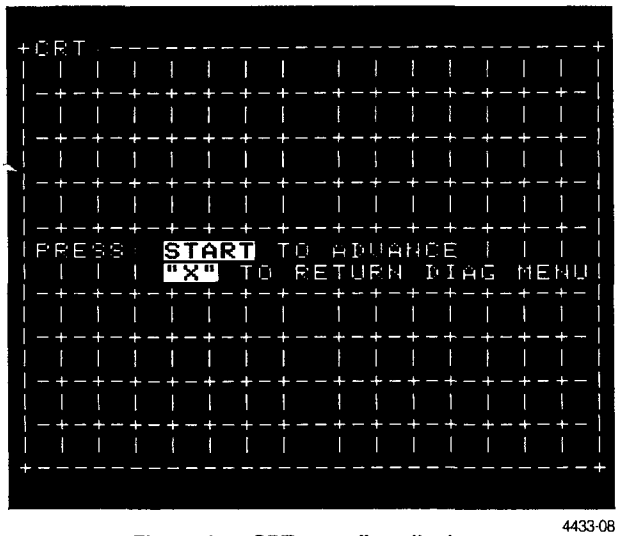
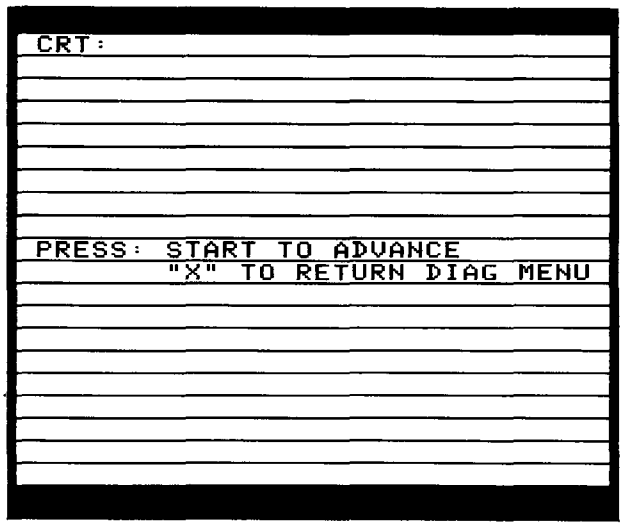


Figure 2-7. CRT test: first display.

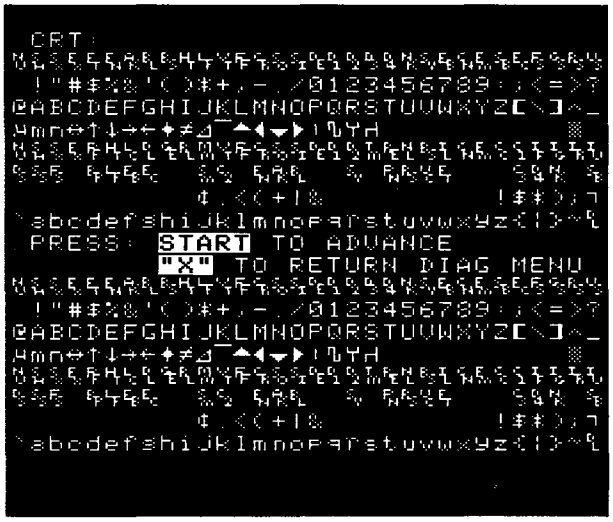


4433-09

Figure 2-8. CRT test: second display.

4433-10

Figure 2-9. CRT test: third display.



4433-11

Figure 2-10. CRT test: fourth display.

CLK TEST — To enter this test, press 2 while in the Diagnostics menu. This test is for time base. It is not a verification test. You should probe with an oscilloscope. Neither PASS nor FAIL will appear on the screen. If ALL is selected, the value of the clock interval will appear on the screen. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: To begin test, press START. First, select ALL (default) or SINGLE by pressing SELECT. If you select ALL, press START; the value of the clock from 20 nS to 1 S will appear on the screen sequentially. Next, probe the time base with an oscilloscope to verify the clock interval. If you select SINGLE, the DATA ENTRY field will appear on the next line. You can change the value in this field by pressing INCR or DECR. But in this case, even if START is pressed, nothing will appear on the screen. These fields are not accessible during testing.

Figure 2-11 illustrates the CLK test.

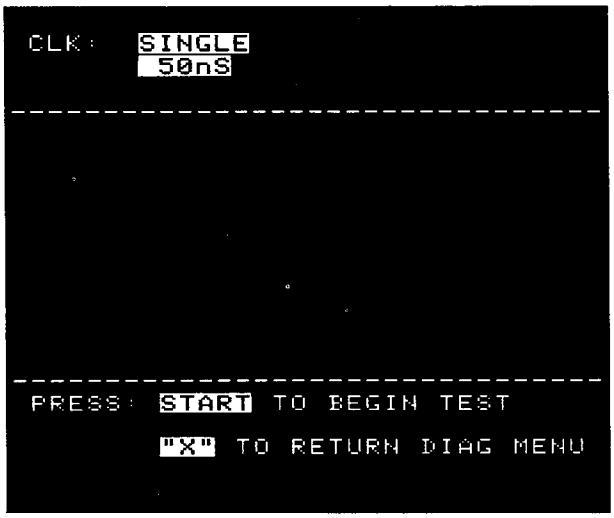


Figure 2-11. Display for CLK tests.

WR TEST — To enter this test, press 3 while in the Diagnostics menu. This test is for the word-recognizer RAM. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Press START to begin test. The LOOP test and DISP ON/OFF functions are available here. The LOOP test has four features: OFF, I/O, ERROR, and TEST. You can select these features by pressing SELECT even during testing. DISP can also be selected during testing. If DISP is set to OFF, no results will appear on the screen other than results of the I/O LOOP test. To exit this test, press X after the test finishes or after pressing STOP. If errors are detected in the test and DISP is ON, some of the following error codes will appear on the screen.

Error codes: 20, 21, 22, 23 (Refer to *Appendix B* for details.)

Figure 2-12 illustrates the WR test.

ACQ TEST — To enter this test, press 4 while in the Diagnostics menu. This test is for acquisition RAM. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Press START to begin test. The LOOP test and DISP ON/OFF functions are available here. The LOOP test has four features: OFF, I/O, ERROR, and TEST. You can select these features by pressing SELECT even during testing. DISP can also be selected during testing. If DISP is set to

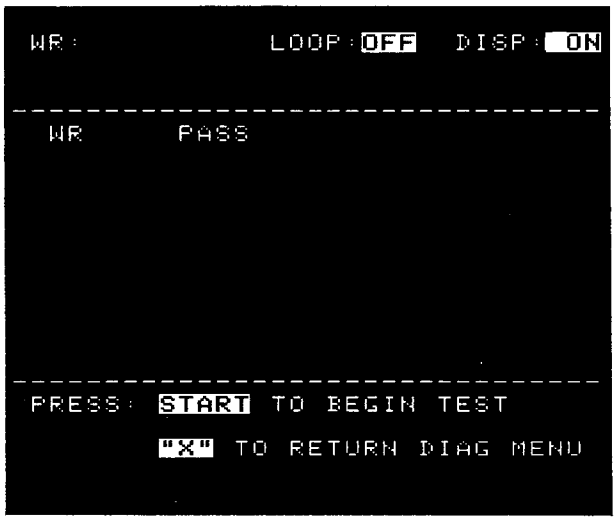


Figure 2-12. Display for word recognizer's RAM tests.

OFF, no results will appear on the screen other than results of the I/O LOOP test. To exit this menu, press the X after the test finishes or after pressing STOP.

If errors are detected in the test and DISP is ON, some of the following error codes will appear on the screen.

Error codes: 30, 31, 32, 33 (Refer to *Appendix B* for details.)

Figure 2-13 illustrates the ACQ test.

Figure 2-13. Display for acquisition's RAM tests.

SQRAM TEST — To enter this test, press 5 while in the Diagnostics menu. This test is for the trigger sequencer RAM. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Press START to begin test. The LOOP test and DISP ON/OFF functions are available here. The LOOP test has four features: OFF, I/O, ERROR, and TEST. These can be selected by pressing SELECT even during testing. DISP can also be selected during testing. If DISP is set to OFF, no results will appear on the screen other than results of the I/O LOOP test. To exit this menu, press X after the test finishes or after pressing STOP. If errors are detected in the test and DISP is ON, some of the following error codes will appear on the screen.

Error codes: 40, 41 (Refer to *Appendix B* for details.)

Figure 2-14 illustrates the SQRAM test.

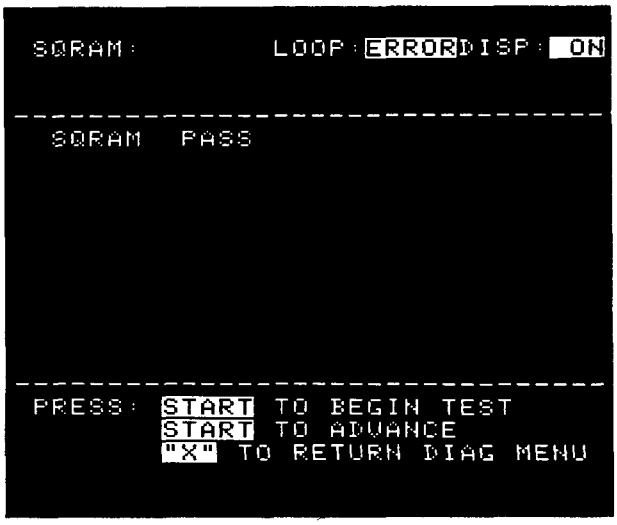


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Figure 2-14. Display for trigger sequencer's RAM tests.

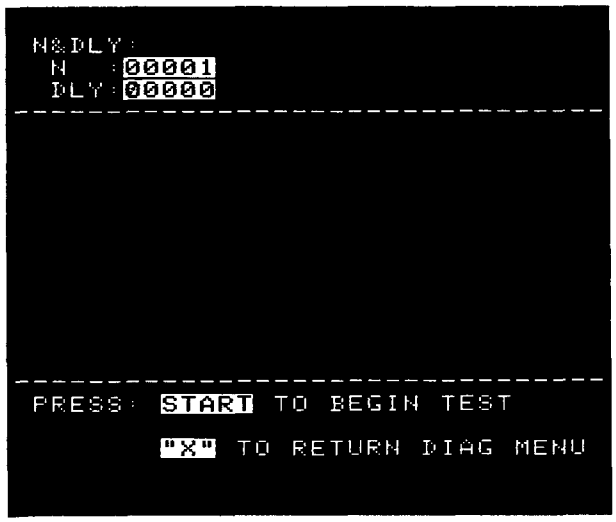
N&DLY TEST — To enter this test, press 6 while in the Diagnostics menu. This test verifies that the N and DELAY counter will run continuously. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Press START to begin test. First, set the counter values in the N and DELAY fields. (Default: N = 1; DELAY = 0.) Next, press START. This is not a verification test, so you should probe the LOAD N signal or the LOAD DL signal (refer to the *318/338Service Manual*) with an oscilloscope to verify these counters. To exit this test, press X after pressing STOP.

NOTE

In the case of N = 0 (or DLY = 0), the N counter (or the DELAY counter) will not run at all. This status is correct.

Figure 2-15 illustrates the N&DLY test.



4433-16

Figure 2-15. Display for N counter or DLY counter tests.

SEQ TEST — To enter this test, press 7 while in the Diagnostics menu. This is an overall test for parallel acquisition components. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Press START to begin test. The LOOP test and DISP ON/OFF functions are available here. The LOOP test has four features: OFF, I/O, ERROR, and TEST. These can be selected by pressing SELECT even during testing. DISP can also be selected during testing. If DISP is OFF, no results will appear on the screen other than results of the I/O LOOP test. To exit this test, press the X after the test finishes or after pressing STOP. If errors are detected and DISP is ON, some of the following error codes will appear on the screen.

Error codes: 50, 51, 52, 53 (Refer to *Appendix B* for details.)

Figure 2-16 illustrates the SEQ test.

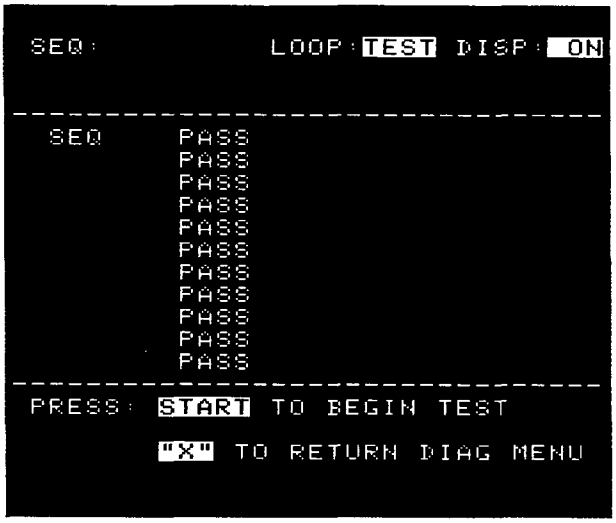


Figure 2-16. Display for overall tests on parallel acquisition.

THRSH TEST — To enter this test, press 8 while in the Diagnostics menu. This test verifies that the sawtooth wave or constant threshold level signal will be generated. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: When you select ALL (default) and press START, the sawtooth wave will be generated. The value will then appear on the screen.

If SINGLE is selected, then DATA ENTRY field will appear on the screen as in Figure 2-17. You then set the value to be observed and press START. In this case, the constant threshold level will be generated and nothing will appear on the screen. This is not a verification test, so you should probe the signal with an oscilloscope to verify the threshold level. To exit this test, press X after pressing STOP.

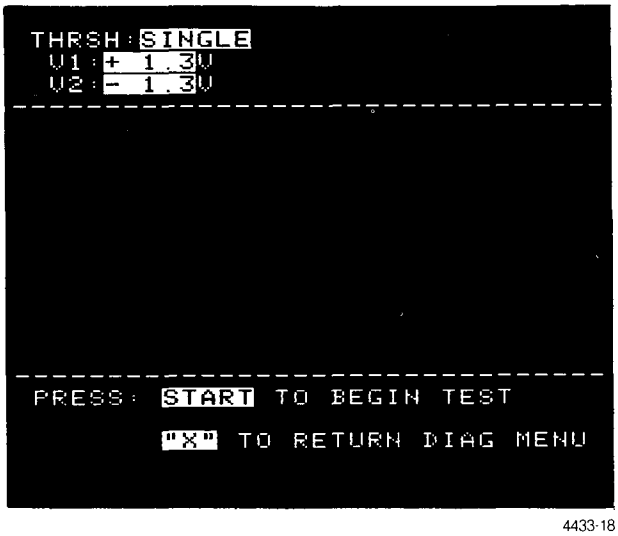


Figure 2-17. Display for threshold tests.

Figure 2-17 illustrates the THRSH test.

EXTERNAL CLOCK PROBE COMPENSATION — To enter this menu, press 9 while in the Diagnostics menu. This test calibrates the P6107 probe by means of the built-in pattern generator on the right side panel. First, set up probes as in Figure 2-18. The signals to be used are specified to CH6 and G (ground).

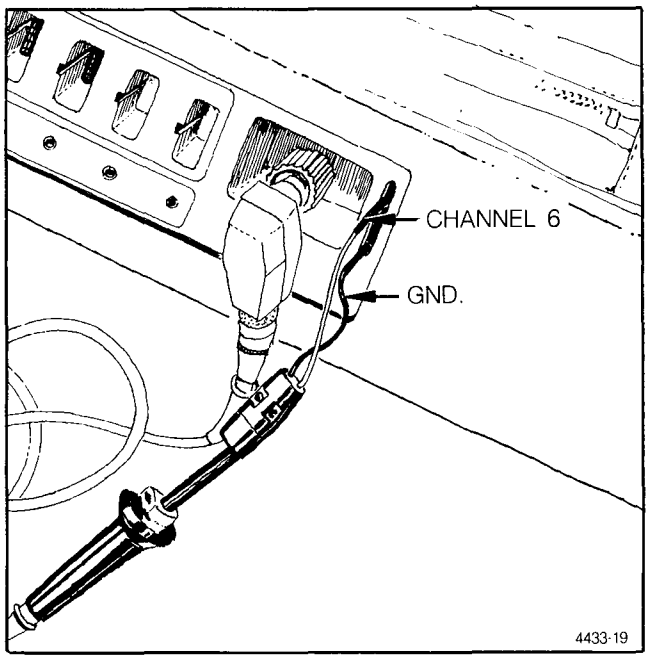


Figure 2-18. Setup of probe compensation.

operation: Press START when you are ready. After a while, one of the following status messages will appear on the screen.

UNDER: means undershooting
OVER: means overshooting
FIT: means just compensated

Adjust probe compensation through the hole in the compensation box corresponding to the status message. If FIT appears on the screen, probe compensation is adjusted.

The 318/338 will run continuously until STOP is pressed. The other keys are disabled during probe compensation. To exit this menu, press X after pressing STOP.

Figure 2-19 illustrates probe compensation display.

NOTE

If your setup does not match Figure 2-18, the point of adjustment may not be fixed.

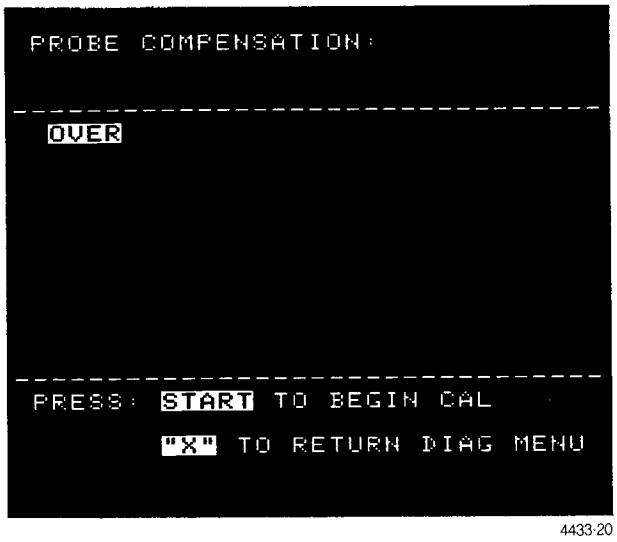


Figure 2-19. Display for probe compensation.

SER TEST — This test is only available with the serial, RS-232, and non-volatile memory option. To enter the test, press A while in the Diagnostics menu. This test is for the SIO used by the serial mode. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Your setup should match that in Figure 2-20 before you begin the test. To begin, press START. The LOOP test and DISP ON/OFF functions are available here. The LOOP test has four features: OFF, I/O, ERROR, and TEST. These can be selected by pressing SELECT even during testing. DISP can also be selected during testing. If DISP is OFF, no results will appear on the screen other than results of the I/O LOOP test. To exit this menu, press X after the test finishes or after pressing STOP. If errors are detected and DISP is ON, some of the following error codes will appear on the screen.

Error codes : B4, B5, B6, B7, B8, B9, BA, BB, BC, BD, BE, BF, C0, C1, C2, C3 (Refer to *Appendix B* for details.)

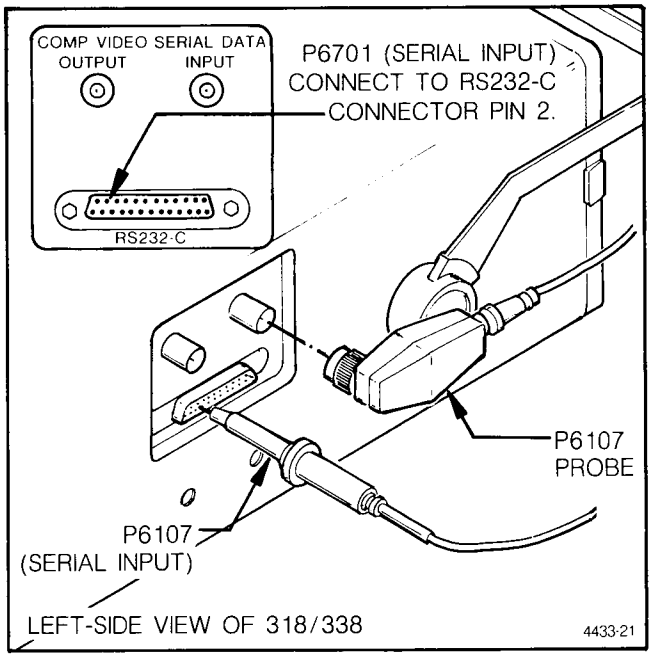


Figure 2-20. Setup for serial tests.

Figure 2-21 illustrates the serial SIO test.

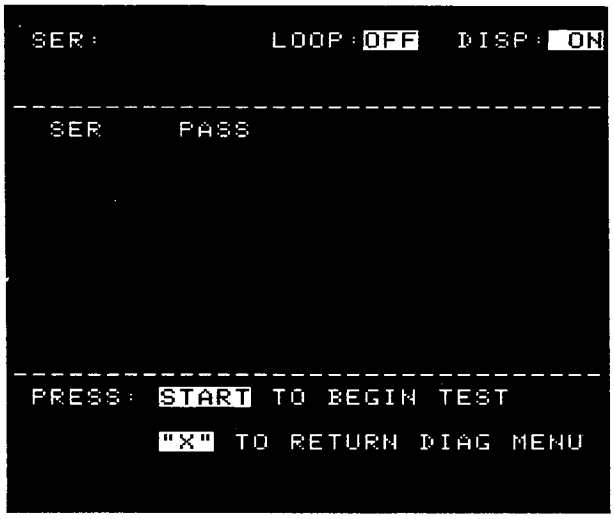


Figure 2-21. Display for serial tests.

RMT TEST — This test is available only with the serial, RS-232, and non-volatile memory option. To enter, press B while in the Diagnostics menu. This test is for the SIO used by the remote mode. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Your setup should match that in Figure 2-22 before you begin the test. To begin test, press START. The LOOP test and DISP ON/OFF functions are available here. The LOOP test has four features: OFF, I/O, ERROR, and TEST. These can be selected by pressing SELECT even during testing. DISP can also be selected during testing. If DISP is OFF, no results will appear on the screen other than results of the I/O LOOP test. To exit this test, press X after the test finishes or after pressing STOP. If errors are detected and DISP is ON, some of the following error codes will appear on the screen.

Error codes : 96, 97, 98, 99, 9A, 9B, 9C, 9D, 9E, 9F, A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, AA, AB, AC, AD, AE, AF, B0, B1, B2 (Refer to *Appendix B* for details.)

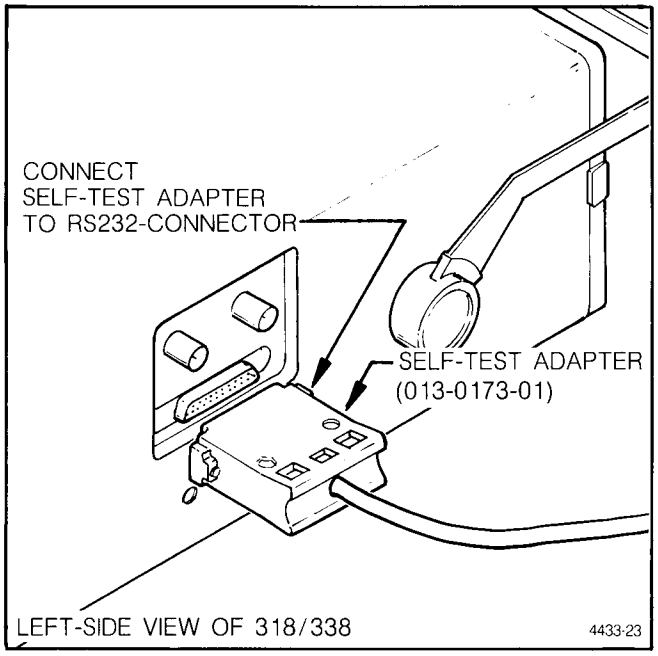


Figure 2-22. Setup for remote tests.

NOTE

This test may take up to 40 seconds to complete.

Figure 2-23 illustrates the remote SIO test.

NVM TEST — This test is only available with the serial, RS-232, and non-volatile memory option. To enter, press C while in the Diagnostics menu. This is the non-volatile memory test. Refer to the Diagnostics menu or to the trouble-shooting tree in the *318/338 Service Manual* for details.

operation: Press START to begin test. The LOOP test and DISP ON/OFF functions are available here. The LOOP test has four features: OFF, I/O, ERROR, and TEST. These can be selected by pressing SELECT even during testing. DISP can also be selected during testing. If DISP is OFF, no results will appear on the screen other than results of the I/O LOOP test. To exit this menu, press X after the test finishes or after pressing STOP. If errors are detected and DISP is ON, some of the following error codes will appear on the screen.

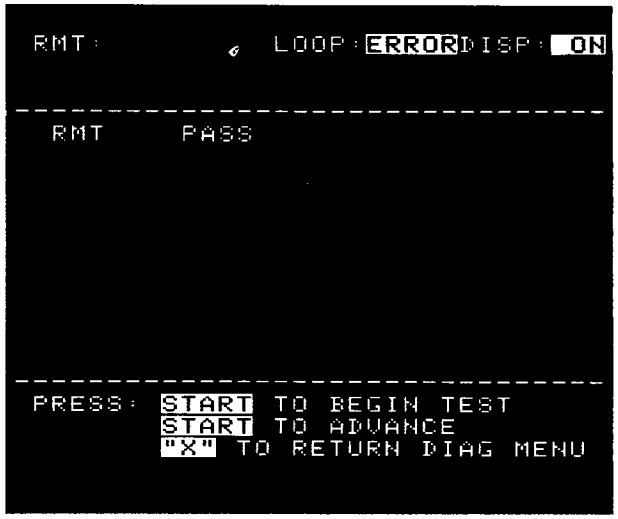


Figure 2-23. Display for remote tests.

Error codes: C8, C9, CA, CB, CC, CD, CE, CF, D0, D1, D2, D3 (Refer to *Appendix B* for details.)

NOTE

NVM test will empty all NVM memory previously saved.

Figure 2-24 illustrates the NVM test.

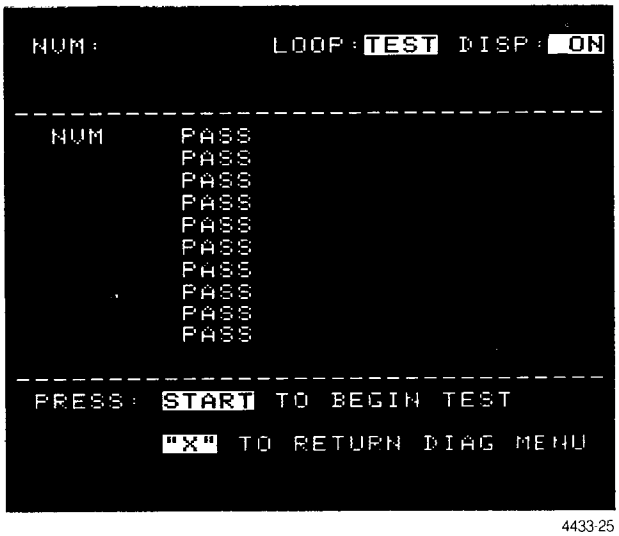


Figure 2-24. Display for non-volatile memory tests.

OPERATOR'S FAMILIARIZATION

INTRODUCTION

The 318/338 is a menu-driven system. This means that all operations are set up by means of menus displayed on the monitor screen. There are three menus for setting up parallel data acquisition, three menus for setting up serial data acquisition, two menus for displaying data, one menu for remote operation, and one menu for non-volatile memory operation. The following paragraphs briefly describe the general operation and characteristics of the 318/338 menus; subsequent paragraphs describe the menus themselves and how they affect the overall operation of the 318/338.

MENU CHARACTERISTICS

There are certain characteristics and terms common to all menus. The following paragraphs discuss these common characteristics and their implications.

POWER-UP CONFIGURATION DISPLAY

When the 318/338 is first powered up, it lists the configuration of the 318/338 and identifies option modules. It then shows the results of the self test.

MENUS AND SUBMENUS

Each 318/338 menu is displayed on the monitor screen when you press its associated MENU key on the keyboard.

Some of the menus are comprised of several parts called submenus. These submenus are individual screen displays which may be selected only after the menu is entered. For example, the parallel State Table menu has two submenus: one for searching for data and one for comparing data. To display either of these submenus, you must first enter the parallel State Table menu.

MENU DEFAULT DISPLAYS

On system power-up, the 318/338 assigns each menu default operating parameters. When you enter the menu, the menu and its default parameters appear on the screen. This initial menu display is called the menu's default display. If no changes are made to the menu's default display, the 318/338 will use the default parameters during the various operations.

MENU FIELDS AND THE EDIT CURSOR

When a menu is displayed on the 318/338 screen, the menu's changeable parameters appear as reverse-video fields. Before making any changes in a specific field, you must first move the blinking edit cursor to that field. The edit cursor moves from field to field, in any direction. It is controlled by these EDIT keys:

↑, ↓, ← and → They move the cursor one space up, down, left, or right.

Once the edit cursor is located in a specific field, you can change the field value. The common keys used in making field changes are:

- Data Entry keys - used in fields that have a string of numeric values.
- SELECT key - used in fields with predetermined values.
- INCR and DECR keys - used in fields that have specific incrementing or decrementing numerical values.
- CLEAR key - used in fields that allow a reset to zero.

NOTE

In some fields you must press the EXECUTE key after making any changes with the SELECT key. In these cases, an error message will appear when you try to move the edit cursor to another field after pressing the SELECT key. Pressing SELECT again will abort EXECUTE.

ERROR MESSAGE AND ACQUISITION STATUS READOUT

The 318/338 has a comprehensive set of error and acquisition status messages. These messages appear on the bottom line of the screen: the error message is at the left of the screen and is displayed in blinking, highlighted video; acquisition status is at the right hand of the screen and is displayed in blinking video.

A complete listing of error and acquisition status messages can be found in *Appendix A* of this manual.

MAJOR MODE SELECTION FIELD

The major mode (PRL/SER/KBD/RMT/NVM) selection field appears in the top left corner of the screen (except when displaying the RS-232 Setup menu or the Non-Volatile Memory Setup menu). After making any changes in this field, you must press the EXECUTE key to access the selected mode.

DUAL-MACHINE SYSTEM

Even on acquiring data (on waiting for trigger or in REPEAT mode), the 318/338 can accept any keys in any fields except for those those that generate the message: PRESS STOP. It may be useful for you to change the delay value or sample clock while looking at continuously acquiring data without pressing the STOP key.

MENU FUNCTIONS

SETUP MENU

The Setup menu (parallel) serves two functions. First, it is used to specify the acquisition mode (SINGLE, REPEAT, RPT UNTIL ACQ = REF, RPT UNTIL ACQ ≠ REF) that will be used during acquisition.

The second function of the Setup menu is to determine the way in which acquisition channels are organized for display. It organizes the channels into logical groups. This information is then used by the Trigger menu for organizing the word recognizer channels, and by the State Table menu for organizing the data display. This channel organization is independent of the order in which channels are connected to the system under test. The organization only affects the display, not the actual acquisition. Changes can be made to the data display after the data has been acquired.

The Setup menu (serial) also serves the following functions: communication mode (ASYNC/SYNC) selection, baud rate selection, input polarity selection, bits/word selection, and parity selection.

THRESHOLD MENU

The function of the Threshold menu is to determine probe input thresholds (including data lines and the external clock line).

TRIGGER MENU

The Trigger menu sets up the major acquisition parameters. First, it specifies which trigger mode (INT, EXT, or INT OR EXT) will be used during acquisition. Then it specifies the acquisition clock (external or internal) and trigger position (BEGIN, CENTER, END, or DELAY), and enables clock or trigger qualifier lines. The Trigger menu also controls all word recognition, triggering parameters, and glitch triggering. The Trigger menu (serial) also controls SYNC WORD and HUNT WORD in synchronous mode.

STATE TABLE MENU

The State Table menu has two submenus: SRCH (search) and CMPR (compare). The SRCH (search) function is used for searching through ACQ (acquisition) or REF (reference) memory for a specific data word or a word including a glitch. It will show the number of occurrences of the specific data in the memory and it will also show the relative position of the memory cursor to these data. The CMPR (compare) function is used in conjunction with REF (reference) memory. REF memory is filled with a copy of ACQ memory when EXECUTE is pressed (edit cursor in the ACQ→REF field). The CMPR displays then show differences between REF memory contents and any later ACQ memory contents within the CMPR WDO (window). The channel organization of the parallel state display is controlled by the Setup menu.

TIMING DIAGRAM MENU (PARALLEL ONLY)

The Timing Diagram menu (parallel) has two submenus: SRCH (search) and ΔT (delta time). The search function is the same as in the parallel State Table menu for displayed data or data on that page. The ΔT (delta time) function makes a timing measurement between two given locations (ΔT and C) in the waveform display.

CHARACTER MENU (SERIAL ONLY)

The Character menu (serial) has two submenus: SRCH (search) and CMPR (compare). These are the same as described for the State Table menu. This display shows 256 bytes of data on one screen in either ASCII or EBCDIC format.

REMOTE (RMT) MENU

The purpose of external communication is to allow the user to store reference memories; to retrieve acquisition, reference, and glitch memories; to store and retrieve setups outside the 318/338; and to be able to control the 318/338 from an external controller. You can select BAUD RATE and ECHO in the RMT mode.

NON-VOLATILE (NVM) MENU

The values of setup parameters and acquisition or reference memory can be stored in NVM memory. This means that once the parameters and memory are saved, they will not change (in the NVM) when the 318/338 is powered off and back on again.

PARALLEL ANALYZER MODE

SETUP MENU

The Setup menu is designed to support the data acquisition operation. It has two major functions:

- ACQuisition MODE - specifies the acquisition mode: SINGLE, REPEAT, or COMPARE (RPT UNTIL ACQ = REF; RPT UNTIL ACQ ≠ REF).
- GROUP Format - specifies the group format used by the State Table and Trigger menus.

NOTE

The Setup menu does not affect the Timing Diagram display.

MENU DEFAULT DISPLAY

When the 318/338 is powered up, the Setup menu assumes default operating values. It organizes the data acquisition channels into logical display groups. These display groups are then reflected in the Trigger and State Table menus. Press SETUP to view the Setup menu. Figure 4-1 illustrates a typical default display of the Setup menu.

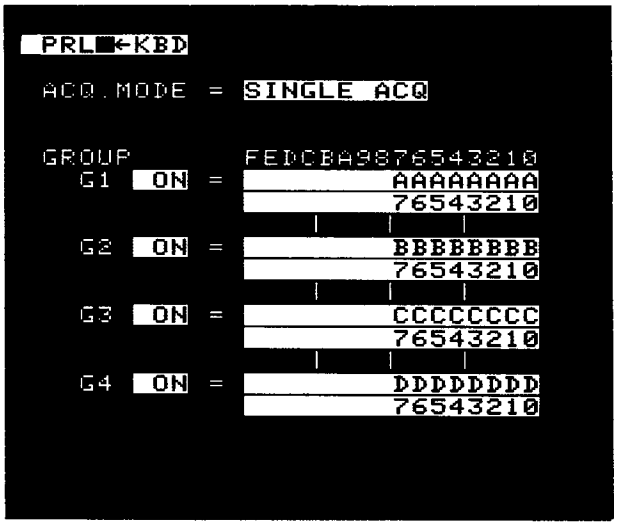


Figure 4-1. Default display of the Setup menu.

DEFAULT OPERATION

The power-up default values of the Setup menu support immediate data acquisition. You can leave the menu in its default configuration and, without making any changes, acquire and display data in a manner suitable to most TTL functions.

Figure 4-2 shows how the menu default values affect the way data is used by the Trigger and State Table menus.

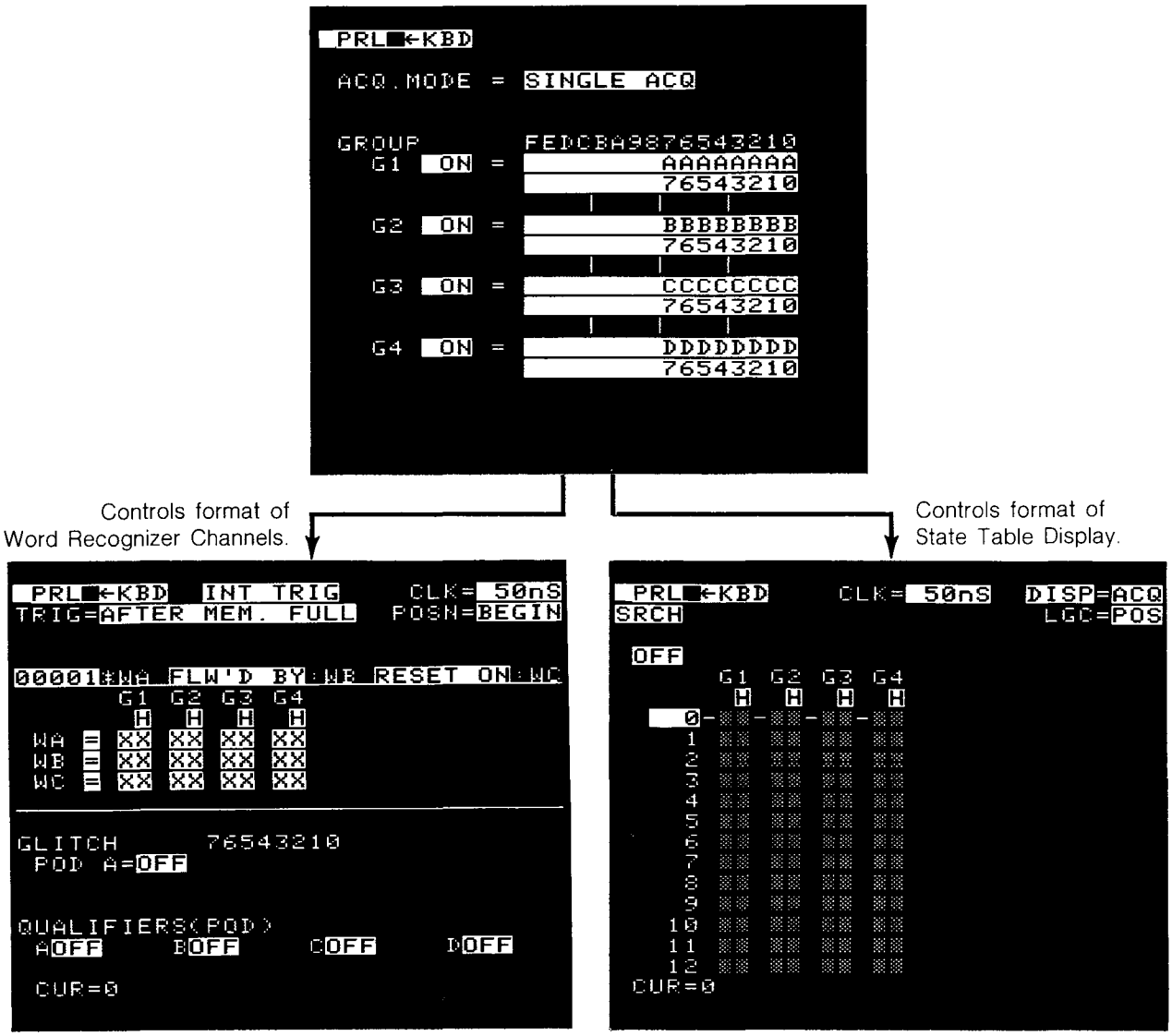


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Figure 4-2. The Setup menu's effect on data display.

MENU FIELDS AND VALUES

You can use the Setup menu at any time to change the way in which data is displayed. You can reorganize channel groups and set new acquisition modes without acquiring new data.

Figure 4-3 illustrates the Setup menu and its fields. The selectable fields appear on the screen in reverse video. The edit cursor can be moved from field to field in any direction and is controlled by the four directional cursor keys. Refer to the numbered callouts in Figure 4-3 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

(1) ACQ. MODE (ACQUISITION MODE) FIELD

The ACQ. MODE field is used for specifying the acquisition mode that controls 318/338 acquisition. Press START to begin acquisition. The 318/338 uses a dual-machine system, so that even if an acquisition is started, other operations are not restricted. There are four acquisition modes which may be selected in this field:

- SINGLE ACQ - Press START to cause the 318/338 to make a single acquisition in this mode.
- REPEAT ACQ - Press START to cause the 318/338 to repeatedly acquire data until STOP is pressed.

- RPT UNTIL ACQ = REF - Press START to cause the 318/338 to repeatedly acquire data until the contents of acquisition memory (except for invalid data) matches the contents of reference memory within the WDO (window) area.
- RPT UNTIL ACQ ≠ REF - Press START to cause the 318/338 to repeatedly acquire data until the contents of acquisition memory (except for invalid data) does not match the contents of reference memory within the WDO (window) area.

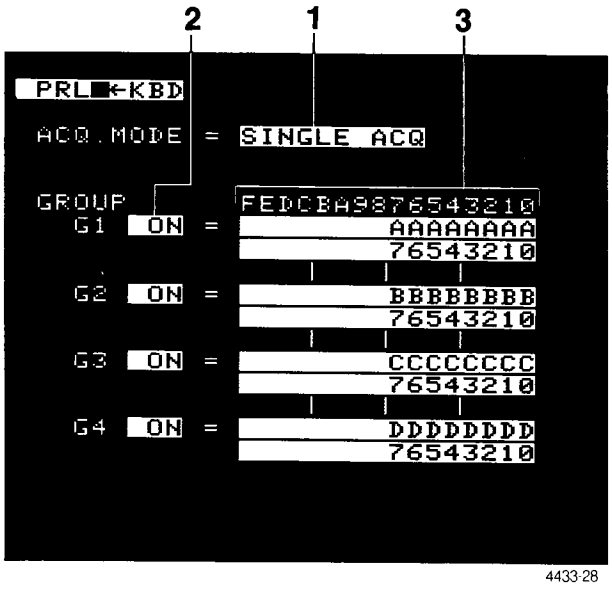

Figure 4-3. Setup menu and its reverse-video fields.

(2) GROUP: G1, G2, G3, and G4

Groups are used to divide the channels into logical display blocks (e.g., address, data, control lines, etc.). There are four groups called G1, G2, G3, and G4; these can be turned on or off independently.

[To turn the groups on or off:]

1. Move the edit cursor to the ON/OFF field of the groups you want to change.

   ON

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

ON
OFF

NOTE

Once OFF is selected, the previous group setting disappears. This clears the group setting.

(3) GROUP ENTRY FIELD

There are two parts to this entry field: the upper one is the probe pod field which is used for assigning pods (A and B for the 318; A, B, C, and D for the 338) to groups, and the lower one is the probe channel field which is used to rearrange the order of channels. With this field, you can manipulate the way channels are grouped regardless of the order in which channels were connected to the system under test.

In default, each pod's channels are organized in a 7-0 sequence, where 7 is the most significant bit (MSB) and 0 is the least significant bit (LSB). You may change this channel sequence order to fit any application. You may reorder the bit significance, split channels between four groups, or set channels to don't care (X) display status. Manipulate the probe pod field by using the data entry keys (A and B for the 318; A-D for the 338) and the X (don't care) key. Manipulate the probe channel field by using the data entry keys 0-7 and the X (don't care) key.

After making any changes, you must press EXECUTE to acquire the new assignment. The only restriction when using this field is that no duplicated entries are allowed.

To delete part of an assignment, press X (don't care). After pressing EXECUTE, the Xs and blanks will be deleted, and newly entered probe pods and probe channels will be right adjusted.

NOTE

Changing the number of channels assigned to a group may cause any previously entered word recognizer values to be set to X (don't care). (See the parallel Trigger Menu *section of this manual.)*

[To set pods and channels:]

1. Move the edit cursor to the upper part of the GROUP entry field:

   G1 ON =

2. Press the data entry keys to enter pods and channels you want to add. For example, A1A2B1B2.

The 318/338 enters the pods and channels at the edit cursor location.

```
G1 ON = AABB
        1212
```

3. Press EXECUTE to set the values.

```
G1 ON = AABB
        1212
```

NOTE

Once channel ordering has been changed, you must press EXECUTE before the cursor can be moved to the GROUP ON/OFF fields.

THRESHOLD MENU

The Threshold menu specifies the input thresholds used by the probes to determine high and low logic states.

It has two major functions:

- THRESHOLD LEVEL - determines threshold level in variable field.
- INPUT - determines probe threshold level by selecting fixed or variable level.

NOTE

The Threshold menu does not affect any other menus. It only affects the 318/338 hardware after data acquisition is started.

DEFAULT DISPLAY

Figure 4-4 illustrates the Threshold menu power-up default values.

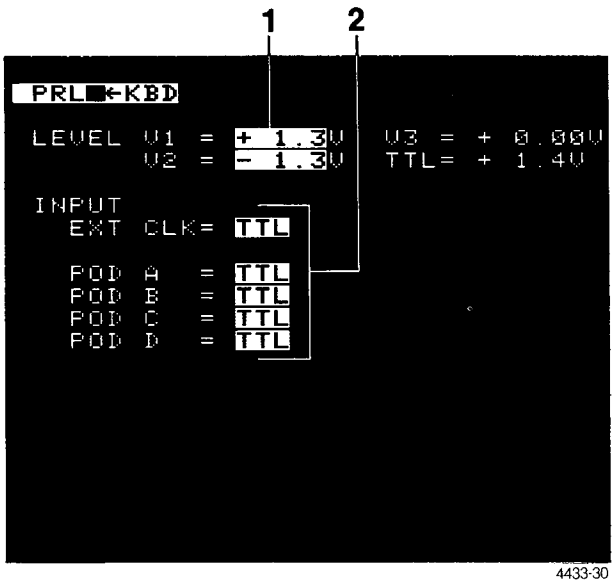

Figure 4-4. Default Threshold menu and its reverse-video fields.

DEFAULT OPERATION

The power-up default values of the Threshold menu set all the probes to a TTL threshold level and set V1 (variable #1) and V2 (variable #2) to +1.3 V and −1.3 V, respectively, in order to set V3 (variable #3) to +0.0 V.

MENU FIELDS AND VALUES

The following paragraphs describe how to use the Threshold menu.

The selectable fields appear on the screen in reverse video. The edit cursor can be moved from field to field in any direction, and is controlled by the four directional cursor keys. Refer to the numbered callouts in Figure 4-4 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

(1) THRESHOLD LEVEL FIELD

The Threshold LEVEL field is used for setting the variable threshold field (V1, V2, and V3). The settings for this field range from −10.0 V to +10.0 V for V1 and V2. The voltage level may be changed using the INCR and DECR keys, or the data entry keys. The polarity (+ or −) may be changed by using the SELECT key.

[To increase or decrease the variable voltage level:]

Case 1:

1. Move the edit cursor to voltage field V1 or V2.

   V1 = + 1.3 V

2. Press INCR to increase the voltage, or DECR to decrease the voltage. The 318/338 displays increasing or decreasing voltage values in 0.1 V increments between −10.0 V and +10.0 V for V1 and V2.

Case 2:

1. Move the edit cursor to voltage field V1 or V2.

   V1 = + 1.3 V

2. Press a data entry key (from 0 to 9). If you want to change polarity, move the edit cursor to the leftmost position of the field and press SELECT.

NOTE

V3 will be incremented or decremented between −10.0 V to +10.0 V when V1 or V2 is incremented or decremented. The value of V3 is:

$$V3 = (V1 + V2) / 2$$

To reset the V1 or V2 value, press C (clear).

(2) PROBE INPUT SELECTION FIELD

The external clock (EXT CLK) probe and each data acquisition probe (PODs A and B for the 318; PODs A, B, C, and D for the 338) has a threshold level. If this level is set to TTL, the probe has a TTL threshold. If set to V1, the probe has a V1 threshold which is determined in the LEVEL V1 field. These voltage levels are used to determine high (1) and low (0) states of incoming data.

[To change thresholds:]

1. Move the edit cursor to the probe INPUT selection field you want to change.

   POD A = TTL

2. Press SELECT until the desired value appears in the field. The 318/338 displays optional values in this order:

   TTL
   V1
   V2
   V3

TRIGGER MENU

The Trigger menu is used for setting up data acquisition and storage conditions. It determines when to stop storing data into acquisition memory; this, in turn, determines which data may be displayed in the State Table or Timing Diagram menus.

The Trigger menu controls the following:

- Trigger source - determines which trigger source is used during the acquisition.
- Trigger mode - determines which trigger mode is used during the acquisition.
- Clock - determines the clock rate used to sample incoming data or external clock edge.
- Qualifier - determines which clock qualifier lines (if any) and/or trigger qualifier lines (if any) are enabled during acquisition.
- Word Recognition - determines the word recognition values for the trigger, and establishes the trigger's position relative to memory.

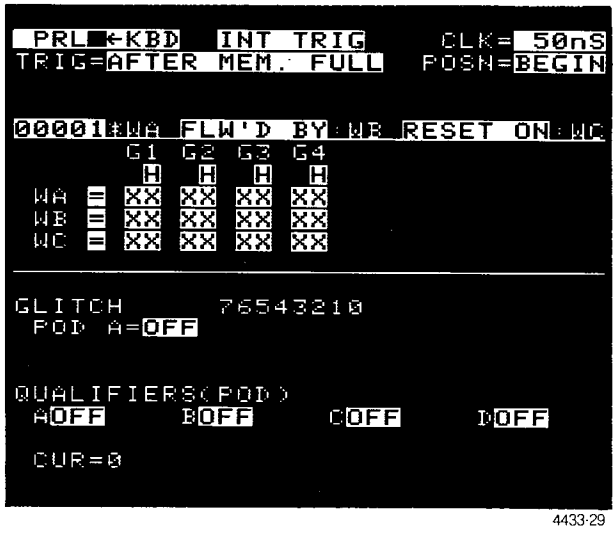

Figure 4-5. Default display of the Trigger menu.

The rest of this section describes how to set up and use the Trigger menu.

DEFAULT DISPLAY

Figure 4-5 illustrates the Trigger menu's power-up default values.

DEFAULT OPERATION

If no changes are made to the Trigger menu, the 318/338 will acquire data using an asynchronous (internal) clock rate of 50 ns. It will generate a trigger event on the second data word stored and position that trigger at the beginning of memory.

NOTE

For more detailed information on the acquisition start and stop process, refer to the Start and Stop *section of this manual.*

MENU FIELDS AND VALUES

The following paragraphs describe how to use the Trigger menu to set up clock and trigger parameters. They discuss each menu field and explain its optional values.

Figure 4-6 illustrates the Trigger menu and its fields. The edit cursor can be moved from field to field in any direction, and is controlled by the four directional cursor keys.

Refer to the numbered callouts in Figure 4-6 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

(1) TRIGGER SOURCE SELECTION FIELD

This field is used to select the trigger source: INT TRIG (internal trigger) which is generated by the internal word recognizer, EXT TRIG (external trigger) which comes from the external trigger input jack on the 318/338 right-side panel, or INT OR EXT.

[To select a trigger source:]

1. Move the edit cursor to the trigger source selection field.

   INT TRIG

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional trigger source values as:

INT TRIG
EXT TRIG
INT OR EXT

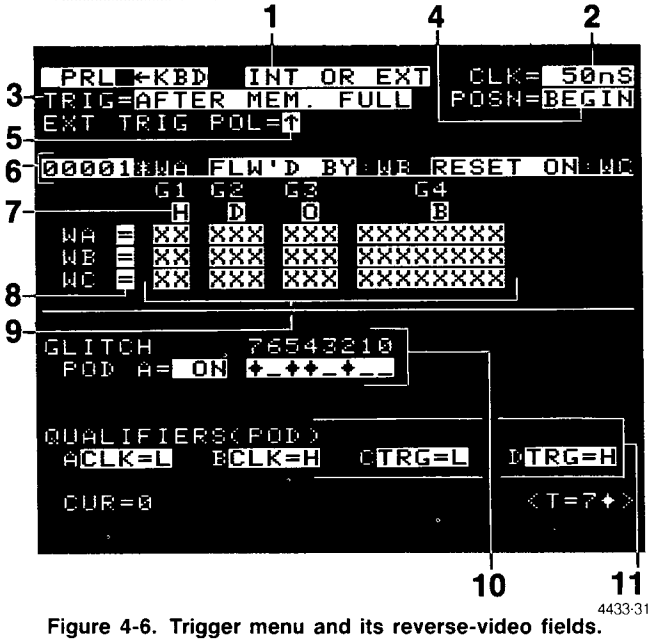

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Figure 4-6. Trigger menu and its reverse-video fields.

NOTE

If INT TRIG mode is selected, the EXT TRIG POL field will disappear. If EXT TRIG mode is selected, the internal trigger event setting field and the GLITCH field will disappear. If the selected trigger source is INT OR EXT, data will be triggered by the trigger that comes first.

(2) CLK (CLOCK) FIELD

The CLK field is used to specify the rate at which incoming data is sampled and stored in memory. The 318 may be set to the internal (asynchronous) clock at intervals ranging from 500 ms to 20 ns, or it may be set to an external (synchronous) clock. The 338 may be set to the internal (asynchronous) clock at intervals ranging from 500 ms to 50 ns, or it may be set to an external (synchronous) clock.

In default, the CLK field is set to the 318/338 internal clock at 50 ns sampling intervals. The internal sampling interval for the 318/338 may be increased or decreased by using the INCR or DECR key.

[To increase or decrease the internal sampling intervals:]

1. Move the edit cursor to the CLK field.

   CLK = 50 nS

2. Press INCR to increase the interval value; press DECR to decrease the interval value. The 318 displays increasing or decreasing values in a 1-2-5 sequence between the range of 500 ms and 20 ns. The 338 displays increasing or decreasing values in a 1-2-5 sequence between the range of 500 ms and 50 ns.

In addition to the internal clock, the 318/338 may be run synchronously with an external clock source. The external clock is supplied by the External Clock Probe. The available external clock values include:

- EXT↑ - sets the 318/338 to the rising edge of the External Clock Probe.
- EXT↓ - sets the 318/338 to the falling edge of the External Clock Probe.

(3) TRIGGER MODE SELECTION FIELD

This field is used to select the trigger mode: AFTER MEM. FULL (after memory is full), in which the 318/338 does not allow triggering until acquisition memory is filled, or IMMEDIATELY, in which the 318/338 triggers on the occurrence of the first trigger condition.

[To select a trigger mode:]

1. Move the edit cursor to the trigger mode selection field.

   TRIG = AFTER MEM. FULL

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional trigger mode values as:

   AFTER MEM. FULL
   IMMEDIATELY

(4) TRIGGER POSN (POSITION) FIELD

Once a trigger has occurred, the trigger POSN (position) field determines when the resulting stop/store is generated. It does this by establishing the trigger's position relative to acquisition memory.

There are four trigger positions that may be selected with this field, including:

- BEGIN - where the trigger is positioned at word 7 at the beginning of memory. Words 0-6 are data that preceded the trigger; words 8-255 are data that followed the trigger.
- CENTER - where the trigger is positioned at word 127 at the center of memory. Words 0-126 are data that preceded the trigger; words 128-255 are data that followed the trigger.
- END - where the trigger is positioned at word 247 at the end of memory. Words 0-246 are data that preceded the

trigger; words 248-255 are data that followed the trigger.

- DELAY - where the trigger is delayed up to 65,000 clock cycles. The trigger's position in memory is determined by: 250 - (delay count). With the delay count set at 250, the trigger is positioned at the beginning of memory.

In default, the trigger POSN field is set to BEGIN. It may also be set to any of the other available values by pressing the SELECT key.

[To select the trigger's position in memory:]

1. Move the edit cursor to the newly created field below the DELAY value.

   POSN = DELAY

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

BEGIN
CENTER
END
DELAY

If DELAY is selected, a new field appears. This field is used for specifying the number of cycles the trigger will be delayed. You may specify a delay of up to 65,000 clock cycles.

NOTE

If the DELAY field is set to 1, the trigger position will be word 249. A delay of 3 is equivalent to the END trigger position, a delay of 123 is equivalent to the CENTER trigger position, and a delay of 243 is equivalent to the BEGIN trigger position.

[To specify a trigger delay:]

1. Move the edit cursor to the newly created field below the DELAY value.

   POSN = DELAY
   00000

2. Use the data entry keys to enter the delay value. For example, 200.

   POSN = DELAY
   00200

[To increase or decrease the delay value:]

1. Move the edit cursor to the field.

   POSN = DELAY
   00200

2. Press INCR to increase the delay value; press DECR to decrease the delay value. For example, press DECR.

   POSN = DELAY
   00199

NOTE

If you try to enter a value larger than 65,000, the 318/338 will automatically display the maximum value of 65,000. Press C to clear this field.

(5) EXT TRIG POL (EXTERNAL TRIGGER POLARITY) FIELD

This field specifies the external trigger polarity. The external trigger is supplied by the External Trigger Input Jack on the right side panel of the 318/338. This setting is valid only when the trigger mode is set to EXT TRIG or INT OR EXT.

The available external trigger polarity values include:

↑ - sets the 318/338 to the rising edge of the External Trigger Input Jack.

↓ - sets the 318/338 to the falling edge of the External Trigger Input Jack.

[To select the external trigger polarity:]

1. Move the edit cursor to the EXT TRIG POL field.
   EXT TRIG POL = ↑

2. Press SELECT until the desired value appears in the field.

(6) TRIGGER SEQUENCE AND TRIGGER WORD SETTING FIELDS

The three fields located in the fifth line of the display are used for setting up the 318/338 trigger event. Each of these fields represents a separate event trigger, and all or part of them may be used to specify a trigger event. For this discussion, the three fields and their corresponding word recognizers will be referred to as:

EVENT A - 00001 * WA
EVENT B - FLWD BY: WB
EVENT C - RESET ON: WC

Event A, designated by WA, may be used independently for a simple one-word trigger, or it may be used in conjunction with the event counters to provide yet another trigger condition. This field sets up a counter condition which specifies the number of times an event must be recognized before a trigger can occur.

In default, the WA occurrence field is set to a value of 1. This means that the trigger is generated on the first occurrence of word recognition. Using the data entry keys and the INCR/DECR keys, you may also set this field to any count value up to 65,000.

[To enter a count value:]

1. Move the edit cursor to the WA occurrence field.

   00001 * WA

2. Use the data entry keys to enter the desired count value. For example, 20.

   00020 * WA

[To increase or decrease the count value:]

1. Move the edit cursor to the field.

   00020 * WA

2. Press INCR to increase the count value; press DECR to decrease the count value. For example, press INCR.

   00021 * WA

NOTE

If you try to enter a value larger than 65,000, the 318/338 will automatically display the maximum value of 65,000. Press C to clear this field.

Event B, designated by WB, may be used to set one of the four following conditions:

- FLW'D BY (followed by) - a trigger occurs if Event B is recognized after Event A is recognized. There can be any number of states between the two events.
- THEN - a trigger occurs if Event B is recognized immediately after Event A is recognized. These two events must occur consecutively. Otherwise, a RESET occurs and Event A is looked for.
- OR - a trigger occurs if either Event A or Event B is recognized.
- OFF - Event B is not used in this selection.

[To select a condition for Event B:]

1. Move the edit cursor to the WB field.

   FLW'D BY: WB

2. Press SELECT until the desired value appears in the field.

The 318/338 displays the optional values in this order:

FLW'D BY
THEN
OR
OFF

Event C, designated by WC, may be used to set one of the five, following conditions:

- RESET ON - a trigger reset condition on Event C. This means that the trigger will reset to the beginning of a sequence every time Event C is recognized before the trigger occurs.
- FLW'D BY (followed by) - a trigger occurs if Event C is recognized after Event A and/or Event B is recognized. There can be any number of states between the two events.
- THEN - a trigger occurs if Event C is recognized immediately after Event B is recognized. These two or three events must occur consecutively. Otherwise, a RESET occurs.
- OR - a trigger occurs if either Event C or Event A and/or Event B is recognized.
- OFF - Event C is not used in this selection.

[To select a condition for Event C:]

1. Move the edit cursor to the WC field.

   RESET ON: WC

2. Press SELECT until the desired value appears in the field.

The 318/338 displays the optional values in this order:

RESET ON
FLW'D BY
THEN
OR
OFF

NOTE

If WA = WB = WC, then Events B and C are ignored until Event A is satisfied; Event B will take precedence over Event C. In this case, Event C will only be recognized after Events A and B have been satisfied. Note also that Xs (don't cares) in separate parts of the word will satisfy this condition, e.g., WA = AXX2, WB = X5XX, and WC = XXFX. An input value of A5F2 would not reset in this example (i.e., A then C; RESET on C), but would trigger after two samples.

See Tables 4-1 and 4-2 for detailed illustrations of trigger event sequences.

Table 4-1
TRIGGER EVENT SEQUENCES

Event A: WA
Event B: WB
Event C: WB

N * (Event A) **@ WA ≠ WB ≠ WC**

Event C / Event B	RESET ON	FLW'D BY	THEN	OR	OFF
FLW'D BY	A trigger occurs when Event B is recognized after nth occurrence of Event A. RESET would reset the trigger counter every time Event C was recognized.	A trigger occurs when Event C is recognized after Event B occurred after nth occurrence of Event A.	A trigger occurs when Event C is recognized immediately after Event B occurred after nth occurrence of Event A.	A trigger occurs when Event B or Event C is recognized after nth occurrence of Event A.	A trigger occurs when Event B is recognized after nth occurrence of Event A.
THEN	A trigger occurs when Event B is recognized immediately after nth occurrence of Event A. RESET would reset the trigger counter every time Event C was recognized.	A trigger occurs when Event C is recognized after Event B occurred immediately after nth occurrence of Event A.	A trigger occurs when Event C is recognized immediately after Event B occurred immediately after nth occurrence of Event A.	A trigger occurs when Event B or C is recognized immediately after nth occurrence of Event A.	A trigger occurs when Event B is recognized immediately after nth occurrence of Event A.
OR	A trigger occurs on nth occurrence of Event A or B. RESET would reset the trigger counter every time Event C was recognized.	A trigger occurs when Event C is recognized after an occurrence of Event B or nth occurrence of Event A.	A trigger occurs when Event C is recognized immediately after an occurrence of Event B or nth occurrence of Event A.	A trigger occurs on nth occurrence of Event A or an occurrence of Event B or C.	A trigger occurs on nth occurrence of Event A or B.
OFF	A trigger occurs when nth Event A is recognized. RESET would reset the trigger counter every time Event C was recognized.	A trigger occurs when Event C is recognized after nth occurrence of Event A.	A trigger occurs when Event C is recognized immediately after nth occurrence of Event A.	A trigger occurs on nth occurrence of Event A or C.	A trigger occurs when nth Event A is recognized.

Table 4-2
TRIGGER EVENT SEQUENCES (SPECIAL CASE)

WA : ON means 00001–65000 * WA
WA : OFF means 00000 * WA
WB,WC : ON means FLW'D BY or THEN

Trigger word condition WA	WB	WC	Special case	Description
OFF	OFF	OFF		A trigger will not occur.
ON	ON	OFF	WA=WB (all 'X')	Coming word is treated as WA until trigger counter is full; once the counter sets full, the coming word is treated as WB.
ON	OFF	ON	WA=WC (all 'X')	Coming word is treated as WA until trigger counter is full; once the counter sets full, the coming word is treated as WC.
ON	ON	ON	WA=WB=WC (all 'X')	Coming word is treated as WA until trigger counter is full; once the counter sets full, the coming word is treated as WB, WC.
OFF	OFF	RESET ON		A trigger will not occur.
ON	OFF	RESET ON	WA=WC (all 'X')	Coming word is treated as WA until trigger counter is full; once the counter sets full, the coming word is treated as WC.
OFF	ON	RESET ON	WB=WC (all 'X')	If WA = OFF, then WC should be OFF. Therefore, a trigger occurs on WB only.
ON	ON	RESET ON	WA=WB=WC (all 'X')	Coming word is treated as WA until trigger counter is full; once the counter sets full, the coming word is treated as WB. (WC is always ineffective in this case.)
ON	OR	OFF	WA=WB (all 'X')	Coming word is treated as WB. (WB has priority over WA in this case.)
ON	OR	ON	WA=WB=WC (all 'X')	A trigger occurs on WB and WC. (WA is ineffective.)
OFF	OR	RESET ON	WB=WC (all 'X')	A trigger occurs on WB only. (WC is ineffective.)
ON	OR	RESET ON	WA=WB=WC (all 'X')	A trigger occurs on WB only.
ON	OFF	OR	WA=WC (all 'X')	A trigger occurs on WC only.
ON	ON	OR	WA=WB=WC (all 'X')	A trigger occurs on WB and WC.

(7) RADIX FIELD

Each channel group with channels assigned to it in the Setup menu has a radix field. If the group is set to OFF in the Setup menu, the corresponding group name (G1 through G4) disappears in the Trigger menu. This field determines the radix used when displaying the data channels in the Trigger and State Table menus.

In default, all channel groups are set to hexadecimal radix. You may also set any group to either octal, decimal, or binary radix.

NOTE

The 338 will not accept radix settings that would cause data to overflow the screen area.

[To select a radix value:]

1. Move the edit cursor to the radix field you want to change.

   H

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

H (hexadecimal)
D (decimal)
O (octal)
B (binary)

NOTE

After you have entered X (don't care) in some trigger word (in binary format, for instance), you may change this format to decimal. This will cause the trigger field to be filled with all question (?) marks, which means conversion cannot be performed. You can see the same trigger word when you change back to binary format again.

NOTE

The value in the field will be converted as the radix is changed. This feature can be used to perform radix conversions such as decimal to hexadecimal.

(8) TRIGGER WORD EQUAL/NOT EQUAL SELECTION FIELD

This field is used to select the trigger word equal or not equal function. For example, ≠ Event A shows that a trigger occurs when any word other than Event A is recognized.

[To select this field:]

1. Move the edit cursor to the field.

   =

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

=
≠
CUR

NOTE

If you want to enter a word which has already been acquired in the buffer, select CUR; then press the data scroll keys (←↑, →↓) until the desired word appears in the field. Press EXECUTE to enter the word in the field. You may not press any keys other than SELECT and EXECUTE when CUR is selected in this field.

(9) PROGRAMMING THE WORD RECOGNITION CHANNELS

Each event trigger (WA, WB, and WC) has corresponding word recognizer channel fields. If all three events are turned on, the channel fields appear on the screen in a format similar to Figure 4-7. The number of available word recognizer channels is determined by the Setup menu. The identifier (G1 and G2 for the 318; G1 through G4 for the 338) above each channel field indicates the column's related channel group.

NOTE

If you change the number of channels assigned to a group in the Setup menu, affected word recognizer channels may be automatically set to don't care (X) in the Trigger menu.

[To enter values on the word recognizer channels:]

1. Move the edit cursor to the channel field you want to program.

   XX

2. Use the data entry keys to enter the desired channel value (in the specified radix). For example, F.

The 318/338 enters the value at the cursor location, then shifts the edit cursor one space to the right.

FX

By using the above procedures you can continue to enter all desired word values. Any channels set to don't care (X) are ignored during word recognition.

NOTE

If you try to enter a number larger than the maximum value, the 318/338 will automatically display the maximum value (which depends on the number of channels).

(10) GLITCH FIELDS

The 318/338 provides both word (WA, WB, and WC) and glitch triggers for internal triggering. These two internal triggers may be used separately or may be combined in an OR sequence.

In default, WA, WB, and WC are set to X (don't care), while GLITCH is turned off. Thus, the 318/338 generates a trigger event on the second data word recognized.

GLITCH ON/OFF FIELD

This field is used to turn eight channel glitches (POD A or B for the 318; POD A for the 338) on or off at once.

[To turn glitches on or off:]

1. Move the edit cursor to the ON/OFF field of the glitches you want to change.

   ON

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

ON
OFF

NOTE

Once OFF is selected, the previous glitch setting will disappear. This is, in effect, a clear function for the glitch setting.

GLITCH ENTRY FIELD

This field is used to turn each channel glitch on or off. The numbers 7-0 identify pod channels.

[To turn glitches on or off:]

1. Move the edit cursor to the field you want to change.
2. Press SELECT until the desired values appear in the field.

The 318/338 displays optional values in this order:

— (glitch trigger off)
◇ (glitch trigger on)

(11) QUALIFIERS FIELD

These fields are used for setting up the 318/338 clock and internal trigger qualifier lines that are installed in each POD.

In default, the clock and trigger qualifiers are set to OFF. You may enable any or all of the qualifiers during acquisition. If enabled, the 318/338 clocks in data or triggers only when the qualifier conditions are true. The conditions of the qualifier lines are ANDed.

NOTE

The trigger qualifier is used for internal trigger source only. So, if you set the trigger source to EXT TRIG, the qualifier field (if already set to TRG=H or TRG=L) is automatically set to OFF.

[To select the qualifiers:]

1. Move the edit cursor to the field you want to change.

   A OFF

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

(INT TRIG or INT OR EXT mode)	(EXT TRIG mode)
OFF	OFF
CLK = L	CLK = L
CLK = H	CLK = H
TRG = L	
TRG = H	

STATE TABLE MENU

The 318/338 provides two menus for viewing acquired data: State Table and Timing Diagram. This section describes the State Table menu and its display capabilities.

The State Table menu provides access to 318/338 acquisition and reference memories.

SUBMENU SELECTIONS

In default, the 318/338 displays the Timing Diagram menu the first time the DATA key is pressed; when DATA is pressed a second time, the State Table menu appears.

The State Table menu consists of two submenu displays. They include:

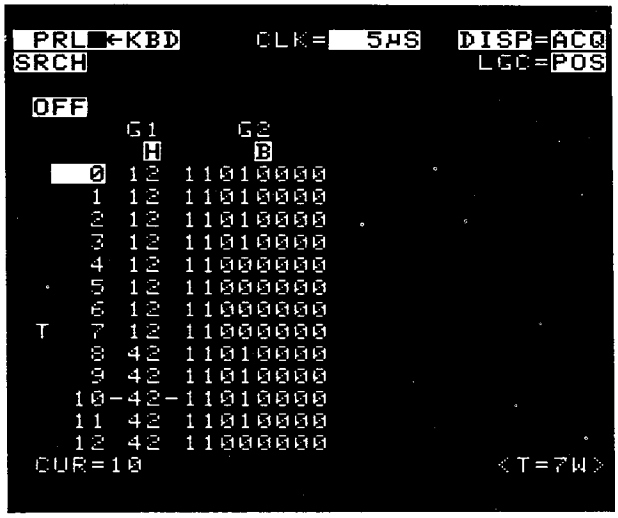
- SRCH (search) - used for quick location of a specific data word or a data word that includes glitches in data memory (ACQ or REF), and to show the number of occurrences of the data word in data memory.
- CMPR (compare) - used to show differences between REF memory contents and ACQ memory contents (except for invalid data), and to show the number of differences within the compare window.

Only one submenu appears on the 318/338 screen at any one time. Select submenus by entering the submenu selection field directly below the major mode selection field (PRL ← KBD).

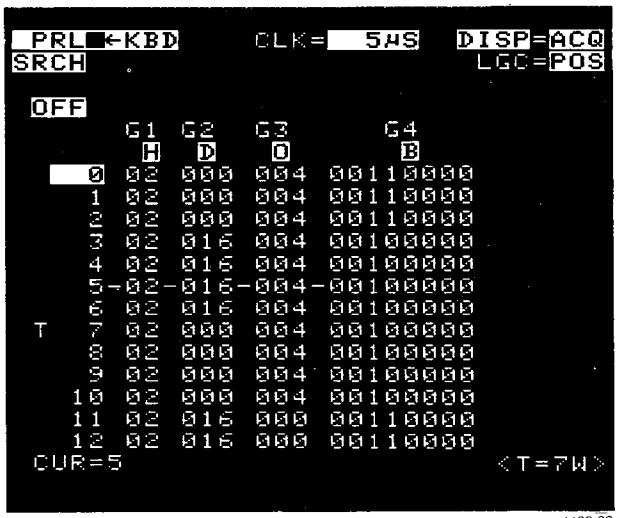
SRCH (SEARCH) SUBMENU DISPLAY

Figure 4-7 illustrates two typical SRCH submenu displays: one for the 318 and one for the 338. In the 318 example, the menu is displaying 16 channels of acquired data; G1 and G2 are assigned 8 channels each. In the 338 example, the menu is displaying 32 channels of acquired data; G1, G2, G3, and G4 are assigned 8 channels each.

318



338



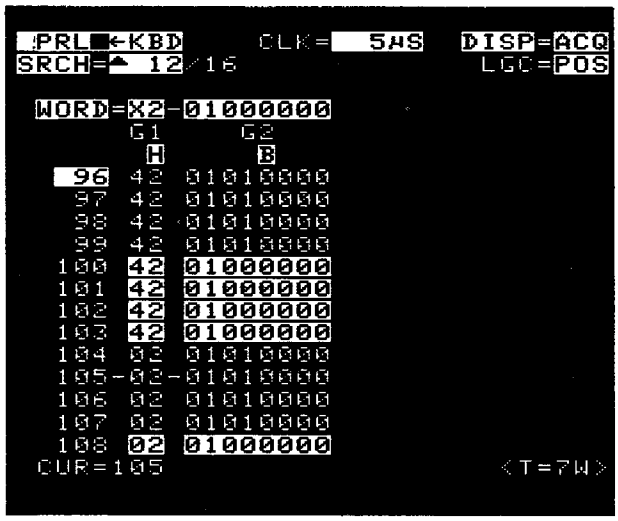
4433-33

Figure 4-7. Display of the State Table's SRCH submenu.

DISPLAY EXAMPLES

The basic elements of the search display are always the same. The displayed data, however, can vary greatly in content and format.

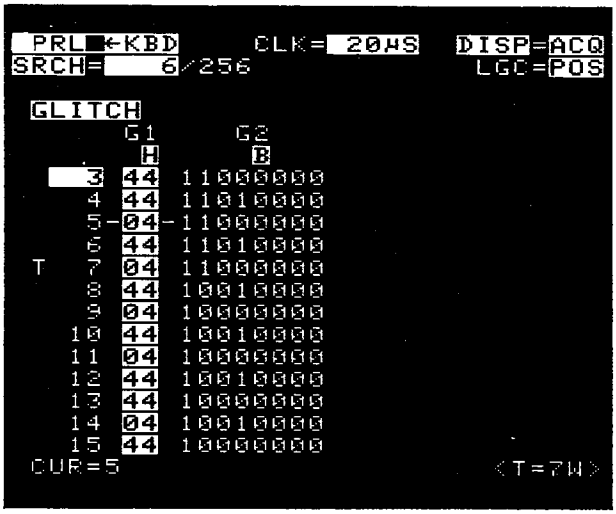
- SRCH WORD - lets you enter a specific word to be searched for in data memory (ACQ or REF), and gives you the number of matching words in data memory. Figure 4-8 illustrates how the SRCH WORD appears in the State Table menu.



4433-34

Figure 4-8. Search word display of the State Table menu.

- SRCH GLITCH - gives you the number of words that include at least one glitch, and highlights the data in reverse video. Figure 4-9 illustrates how the SRCH GLITCH appears in the State Table menu.



4433-35

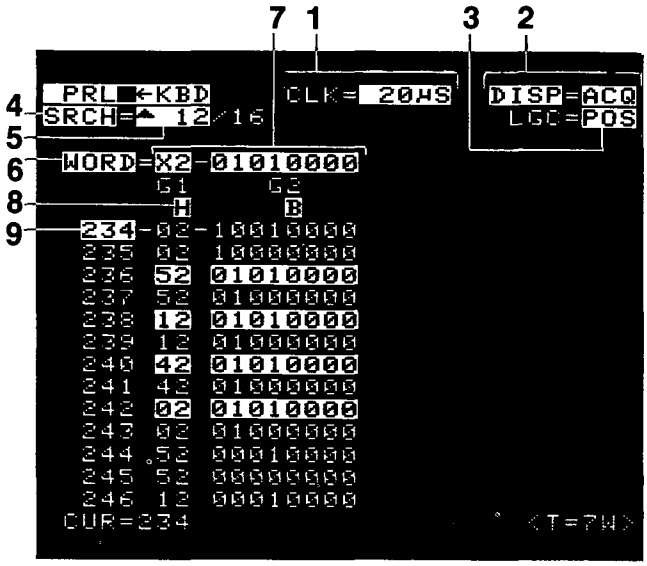
Figure 4-9. Search glitch display of the State Table menu.

SRCH SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the SRCH submenu display. They discuss the submenu fields and their optional values, and explain how to scroll through the display.

Figure 4-10 illustrates the SRCH submenu display and its fields. The fields, which appear on the screen (not in the data

area) in reverse video, are selectable fields. The edit cursor can be moved from field to field in any direction and is controlled by the four directional cursor keys. Refer to the numbered callouts in Figure 4-10 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.



4433-36

Figure 4-10. State Table's SRCH submenu and its fields.

(1) CLK/DELAY FIELD

If you select CLK in the first field, selectable clock settings will appear in the second field. With DELAY in the first field, the second field is used for entering the delay value. Refer to the *Trigger Menu* (parallel) section for CLK and DELAY values.

[To select CLK/DELAY:]

1. Move the edit cursor to the first field:

   CLK

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   CLK
   DELAY

   NOTE

   DELAY is selectable in this field only when the trigger position (POSN) has been set to DELAY in the Trigger menu.

[To increase or decrease the sampling intervals:]

1. Move the edit cursor to the second field (with the first field set to CLK).

   CLK = 50nS

2. Press INCR to increase the interval value; press DECR to decrease the interval value. (Refer to the *Trigger Menu* (parallel) section for values.)

[To specify a trigger delay:]

1. Move the edit cursor to the second field (with the first field set to DELAY).

   DELAY = 00000

2. Use the data entry keys to enter the delay value. For example, 200.

   DELAY = 00200

[To increase or decrease the delay value:]

1. Move the edit cursor to the second field.

   DELAY = 00200

2. Press INCR to increase the delay value; press DECR to decrease the delay value. For example, press DECR.

   DELAY = 00199

   NOTE

   If you try to enter a number larger than 65,000, the 318/338 will automatically display the maximum value of 65,000.

(2) DISPLAY DATA SWITCHING FIELD

This field has two capabilities: switching display data (ACQ or REF memory) and transferring ACQ memory contents to REF memory. The first field lets you select between the two. If you select DISP in the first field, you can change displayed data by the second field selection.

In default, DISP = ACQ is selected, which means current displayed data is ACQ memory contents.

[To select the first field:]

1. Move the edit cursor to the first field:

   DISP

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   DISP
   ACQ → REF

When ACQ → REF is selected, this field will blink and you will not be able to leave it until you press EXECUTE or SELECT. Pressing EXECUTE causes ACQ memory to be written to REF memory.

[To change display data:]

1. Move the edit cursor to the second field (with the first field set to DISP).

   DISP = ACQ

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   ACQ
   REF

DISP = REF provides the same display format as that used in DISP = ACQ.

(3) DISPLAY DATA LOGIC POLARITY SELECTION FIELD

This field determines the logic polarity for acquired data only, not for the search word. In default, this field is set to POS (positive) logic polarity. This means that acquired data is displayed as high (1) if it is above the probe input voltage threshold, and low (0) if it is below the threshold level.

[To select a logic polarity value:]

1. Move the edit cursor to the LGC field.

   POS

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   POS
   NEG

(4) SUBMENU SELECTION FIELD

This field is used to select the submenu displays.

[To change submenu displays:]

1. Move the edit cursor to the submenu selection field.

   SRCH

2. Press SELECT until the desired submenu appears.

   The 318/338 displays submenu values in this order:

   SRCH
   CMPR

As each submenu value appears in the field, the 318/338 automatically changes the submenu display format.

(5) SEARCH WORD COUNTER

This counter value (numerator) shows the number of data matched with the search word between line 0 and the current memory cursor position. The denominator indicates the total number of words in memory that match the search word. If the cursor line is between matched data, an up or down arrow (↑ or ↓) will appear at the beginning of this field. You can increase or decrease this number by using the INCR or DECR keys, and the next or last occurrence of the search word will come to the current cursor position.

[To increase or decrease the search word counter:]

1. Move the edit cursor to the search word counter field.

   SRCH = 3/47

2. Press INCR to increase the counter value; press DECR to decrease the value.

In this case, if you press INCR, the search word counter is set at 4 and the next occurrence of the search word will come to the current cursor position.

(6) SEARCH MODE SELECTION FIELD

This field is used to select the search mode: OFF, SRCH WORD, or SRCH GLITCH.

[To select this field:]

1. Move the edit cursor to the field.

   OFF

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   OFF
   WORD
   GLITCH

(7) SEARCH WORD FIELD

This field is used for entering a specific data word called the search word. The word entered in the search word field may be any combination of data and don't care (X) values. The group columns and radices used in the search word field are formatted to match the columns in the data display.

[To search for a specific data word:]

1. After selecting SRCH WORD, move the edit cursor to the field and position it on the channels you want to specify.

   WORD = XX - XXXXXXXX

2. Use the data entry keys to specify channel values, or press X (don't care) to ignore channels during the search. For example, enter 2.

   The 318/338 enters a 2 at the cursor location, then shifts the cursor one space to the right.

   WORD = 2X - XXXXXXXX

Immediately after entering the data, the 318/338 starts to search and then shows the number of the specific data in memory.

3. Continue entering the rest of the data value and note the search word counter for changes.

(8) RADIX FIELD

This field is affected by the grouping field in the Setup menu and by the radix field in the Trigger menu. Refer to *Radix Field* in the *Trigger Menu* (parallel) section.

(9) LINE NUMBER FIELD AND DISPLAY SCROLLING

The submenu displays up to 13 data words at any one time. The line number fields on the left side of the display indicate which acquisition memory locations are being shown. If the number of the line number field (highlighted in reverse video) is changed, the display changes to show the new memory location.

NOTE

The cursor line is allowed to wrap around from the beginning to the end of the data (and vice versa).

NOTE

When the cursor line is moved through memory in the State Table, its movement is automatically reflected in the Timing Diagram menu. Therefore, you can always switch between the two menu displays and view the same cursor position.

One method of moving through memory is provided by the DATA DISPLAY keys. These keys can be used at any time and in any field.

[To scroll through memory:]

1. Press ←↑ or →↓ and hold it until the data is scrolling along with the cursor line.

The 318/338 scrolls the memory display up or down the screen.

A second method for moving through memory is provided by the line number field. This field lets you move forward or backward across the screen.

[To change the line number:]

1. Move the edit cursor to the line number field you want to change.

   100

2. Use the data entry keys to enter the line number you want to display. For example, 200.

The 318/338 displays line number 200 and then updates the rest of the line numbers following that position.

200
201
202
203
:
:
:
:
212

CMPR (COMPARE) SUBMENU DISPLAY

Figure 4-11 illustrates two typical CMPR submenu displays: one for the 318 and one for the 338. In the 318 example, the

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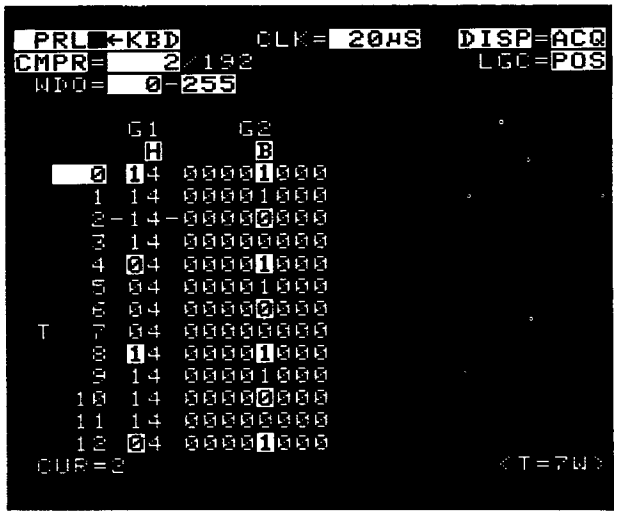
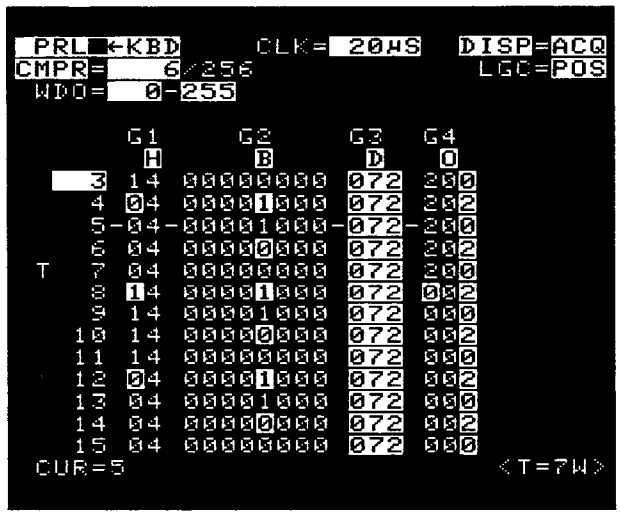


338



4433-37

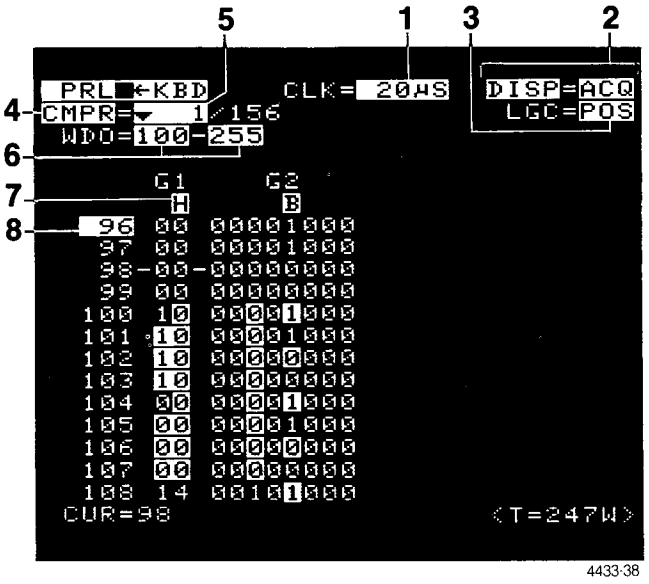
Figure 4-11. Display of the State Table's CMPR submenu.

submenu is displaying 16 channels of acquired data; G1 and G2 are assigned 8 channels each. In the 338 example, the submenu is displaying 32 channels of acquired data; G1, G2, G3, and G4 are assigned 8 channels each.

CMPR SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the CMPR submenu displays. They discuss the submenu fields and their optional values, and explain how to scroll the display.

Figure 4-12 illustrates the CMPR submenu display and its fields. Only the fields labeled (5) and (6) are discussed here, since they are different from the SRCH submenu fields. For information on how to manipulate fields (1)-(4) and (7) and (8), refer to the *SRCH Submenu Fields and Values* part of this section.



4433-38

Figure 4-12. State Table's CMPR submenu and its fields.

(5) COMPARE COUNTER

The denominator value shows the number of locations that do not match; the numerator shows which unequal comparison the cursor is near. For example, if the cursor line is between reverse-video (unmatched) data, an up or down arrow (↑ or ↓) will appear at the beginning of this field. You can increase or decrease this number to get to the next, or last, unmatched data by using the INCR or DECR key, and the next, or last, unmatched data will come to the current cursor position.

[To increase or decrease the compare counter:]

1. Move the edit cursor to the field.

   CMPR = 5/126

2. Press INCR to increase the counter value; press DECR to decrease the value.

In this case, if you press INCR, the counter value will be 6, and the next unmatched data will come to the current cursor position.

(6) COMPARE WINDOW FIELD

This field determines the size of the window in comparision with REF memory. The 318/338 only compares those lines (within the limits) that contain valid data in both acquisition and reference memory. If either memory has invalid data in lines that the other does not, these lines are ignored. (For a discussion of valid and invalid data, refer to the *Start and Stop* section.)

[To specify the compare limits:]

1. Move the edit cursor to the compare window field.

   WDO = 0 - 255

2. Use the data entry keys to enter the beginning sequence of the compare limit. For example, 200.

   WDO = 200 - 255

When entering the compare limits, the first value must be a number less than or equal to the second value.

NOTE

If you try to enter a number larger than 255, the 318/338 will automatically display the maximum value of 255.

TIMING DIAGRAM MENU

The 318/338 provides two menus for displaying acquired data: Timing Diagram and State Table. This section discusses the Timing Diagram menu and its display capabilities.

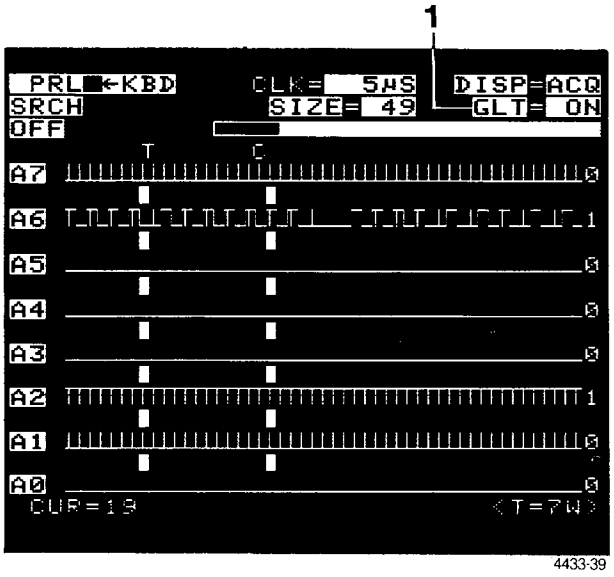
The Timing Diagram menu provides access to three memories:

- Acquisition Memory - contains the most recently acquired data.
- Reference Memory - contains the acquired data to be compared with ACQ memory contents.
- Glitch Memory - contains glitch information.

NOTE

The 318/338 always acquires glitches along with data, whether or not glitch recognition is specified in the Trigger menu.

The Timing Diagram menu presents the data and glitch information in a logic-waveform format. Up to eight channels are displayed, with data and glitches appearing in horizontal trace lines. See Figure 4-13. Note that GLT (glitch) in field (1) has been turned ON. Note also that the width of both the trigger cursor and the memory cursor is one sample period and that the glitches are narrower.



4433-39

Figure 4-13. Timing Diagram menu's glitch memory display.

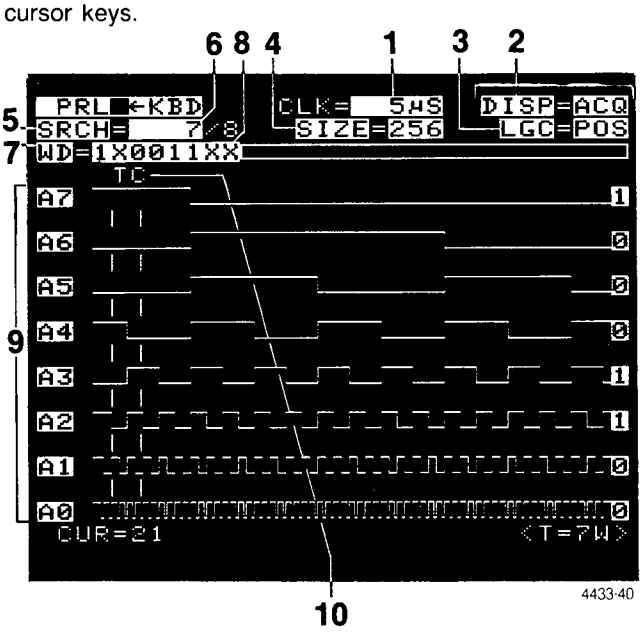
The Timing Diagram menu can be used to view the entire memory contents of the displayed channels, or it can be used to magnify a specific area of interest. In addition, its memory cursor is tied to the State Table, so you can switch back and forth between the two menus and see the same area of memory.

The following parts of this section describe how to read, change, and use the Timing Diagram menu display.

SRCH SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the SRCH submenu display. They discuss the submenu fields and their optional values, and show how to scroll the display.

Figure 4-14 illustrates the SRCH submenu display and its fields. The fields that appear on the screen in reverse video are selectable fields. The edit cursor moves from field to field in any direction, and is controlled by the four directional cursor keys.



4433-40

Figure 4-14. Timing Diagram's SRCH submenu and its fields.

Refer to the numbered callouts in Figure 4-14 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use. Only fields (4) through (10) are discussed here. The fields labeled (1) through (3) are exactly the same as the fields labeled (1) through (3) in the State Table's SRCH submenu.

(4) MAGNIFICATION AND PAGING FIELD

This field is used for changing the display magnification (SIZE) or selecting pages with which you can define any channels in any order. In default, SIZE = 256 and PAGE = 1.

[To select the first field:]

1. Move the edit cursor to the first field.

   SIZE

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   SIZE
   PAGE

The SIZE field is used to increase the resolution of the displayed waveforms. In default, the SIZE field is set to the lowest magnification level (256). At this level, the entire memory contents (256 locations) of each channel trace are shown. You can quickly see how much data was acquired and identify where the major data transitions occurred.

NOTE

At the SIZE 256 level, the waveform may be compressed and glitch data may not appear even if glitch data has been acquired. By increasing the magnification levels, you can see less memory contents at a higher waveform resolution. When magnification is increased, the memory cursor (C) remains fixed, and as much surrounding data is shown as the magnification level allows. The display magnifies 1(196), 2(98) and 4(49).

[To change the magnification of the waveform display:]

1. Move the edit cursor to the SIZE field:

   SIZE = 256

2. Press INCR or DECR until the desired magnification value appears in the field.

   Optional values are: 256, 196, 98, 49.

These numbers show the number of bits you are looking at on the screen. The bar at the top of the data display is a representation of data memory. The dark area indicates the portion of data memory showing in the display.

The PAGE field is used to select the page to which you have already assigned any channels in any order. A current pod and channel ordering is assigned to the page you have selected.

[To select the PAGE field:]

1. With the edit cursor in the SIZE field, press SELECT.
2. Move the edit cursor to the field:

   PAGE = 1

3. Press INCR or DECR until the desired page appears in the field.

   The 318 displays optional values: 1, 2. The 338 displays optional values: 1, 2, 3, 4.

(5) SUBMENU SELECTION FIELD

This field is used to select the submenu displays.

[To change submenu displays:]

1. Move the edit cursor to the submenu selection field.

   SRCH

2. Press SELECT until the desired submenu appears. Optional values are:

   ΔT
   SRCH

(6) SEARCH WORD COUNTER

This counter value (numerator) shows the number of data matched with the search word between line 0 and the current memory cursor position. The denominator indicates the total number of words in memory that match the search word. If the memory cursor line is between matched data, a right or left arrow (→ or ←) will appear at the head of this field. You can increase or decrease this number by using the INCR or DECR key, and the memory cursor will skip to the next or last occurrence of the search word.

[To increase or decrease the search word counter:]

1. Move the edit cursor to the search word counter field:

   SRCH = 1/16

2. Press INCR to increase the counter value; press DECR to decrease the value.

In this case, if you press INCR, the search word counter is 2; the memory cursor line then skips to the next occurrence of the search word. The memory cursor word, running down the right side of the menu, will be displayed in reverse video.

(7) SEARCH MODE SELECTION FIELD

This field is used to select search mode OFF, SRCH WD, or SRCH GLITCH.

[To select this field:]

1. Move the edit cursor to the field:

   OFF

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   OFF
   WD (word)
   GLITCH

NOTE

The search will be performed for the selected pods and channels (eight channels maximum) on the screen.

(8) SEARCH WORD FIELD

This field is used for entering a specific data word called the search word (eight bits maximum). The word entered in the search word field may be any combination of data and don't care (X) values. Entries made in this field must be in binary. The leftmost bit of this field corresponds to the topmost displayed channel trace, while the rightmost bit corresponds to the bottom channel trace.

To search for a specific data word, refer to *Search Word Field* in the *State Table Menu* section.

(9) POD AND CHANNEL FIELDS

The pod and channel fields, located on the left side of the menu, identify which data channels are being displayed. Up to eight channel traces can be displayed at one time. You may use the pod and channel fields to display any channel traces, in any order. When changes are made to the pod and channel fields, the 318/338 immediately updates the associated trace display.

[To enter a specific pod and channel:]

1. Move the edit cursor to the leftmost position of this field:

   A 7

2. Use the data entry keys (A or B for the 318; A, B, C, or D for the 338) to enter the desired pod name. For example B.

   The 318/338 enters the pod name into the field, and the edit cursor moves to the right.

   B 7

3. Use the data entry keys to enter the desired channel number (0-7). For example, 0.

   The 318/338 enters the channel number into the field.

   B 0

NOTE

If you enter X (don't care) in either the first or second position, the corresponding channel trace will disappear. You may use X (don't care) as a clear key.

(10) TRIGGER (T), CURSOR (C), AND SCROLLING

These are two vertical lines running through the waveform display: T (trigger) and C (cursor) lines. The T line indicates the trigger's position in memory. If the trigger is not in memory, this line will not appear. The C line indicates the memory cursor's location. The CUR readout at the bottom left corner of the screen indicates the cursor's State Table line number. The binary value of the cursor location appears at the right end of each channel trace.

The C line is allowed to wrap around from the beginning to the end of data and vice versa.

NOTE

If the C line comes to the T line, the T line will be hidden. To allow you to find the T line in this case, a blinking underscore appears under the C character.

SCROLLING THE DISPLAY

You can move the memory cursor left or right across the display. If the cursor reaches the edge of the display, the waveforms will scroll and the cursor will remain at the edge of the screen until the end of memory is reached.

NOTE

The memory cursor moves simultaneously in the Timing Diagram and State Table menus. Therefore, you can always switch between the two menu displays and view the same cursor position.

[To move the cursor across the display:]

1) Press the ←↑ or →↓ DATA DISPLAY key.

As the cursor is moved through memory, the CUR readout at the bottom of the menu changes to reflect the new cursor position.

ΔT (DELTA TIME) SUBMENU DISPLAY

Figure 4-15 illustrates a typical ΔT submenu display. In this example, eight channels of POD A are being displayed;the SIZE is 196 bits.

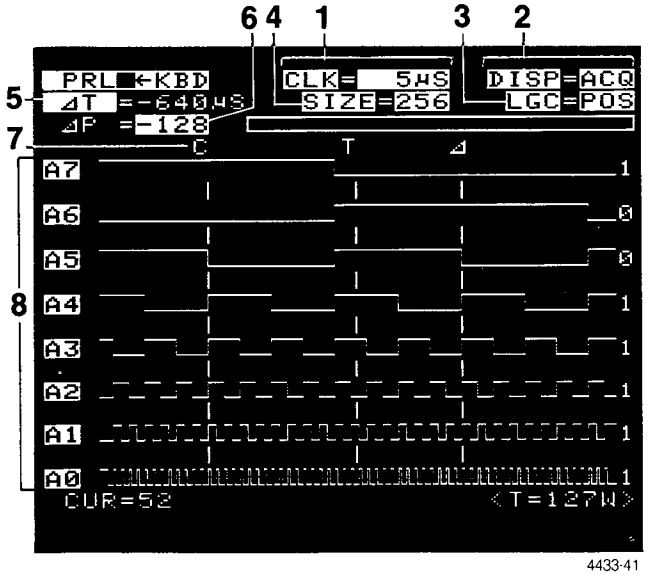


Figure 4-15. Timing Diagram's ΔT submenu and its fields.

ΔT SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the ΔT submenu display. They discuss the submenu fields

and their optional values, and explain how to scroll the display. Figure 4-15 illustrates the ΔT submenu display and its fields.

Only the fields labeled (5), (6), and (7) are discussed here, since they are different from the SRCH submenu fields. For information on how to manipulate fields labeled (1)-(4) and (8), refer to *SRCH Submenu Fields and Values* in this section.

(5) SUBMENU SELECTION FIELD

This field is used to select the submenu displays. Refer to *Submenu Selection Field* earlier in this section.

When the ΔT submenu is selected, the value directly to the right of the submenu selection field shows the elapsed time between two locations of the delta (Δ) line and the memory cursor (C) line.

NOTE

This value depends on the clock interval. If the clock interval is set to external clock, the UNDEF (undefined) message will appear in this field. This value will hold until the next acquisition is started; that is, the value will not change, even if the clock interval is changed during the current acquisition.

NOTE

The use of a qualifier during an acquisition will invalidate the use of a delta time value.

(6) DELTA LINE POSITION FIELD

This field is used for moving the delta (Δ) line by using the INCR or DECR keys. This value, called delta position (ΔP), shows the number of clocks between the delta (Δ) line and the memory cursor (C) line. The sign (+ or −) indicates whether the delta line precedes (+) or follows (−) the cursor line.

[To move the delta (Δ) line:]

1. Move the edit cursor to the delta (Δ) line position field.

   ΔP = +100

2. Press INCR to increase the value; press DECR to decrease the value.

In this case, if you press DECR, the value will be +99 and the delta (Δ) line will move to the right one step.

NOTE

This numeral can be from +255 (max.) to −255 (min.), depending on the memory cursor (C) line position. This value changes when either the delta (Δ) line or the memory cursor (C) line is moved.

[To clear this numeral:]

1. Move the edit cursor to the field:

   ΔP= +100

2. Press C key to clear the value.

The 318/338 will clear this numeral (ΔP= + 0), which means the delta (Δ) line moves to the cursor (C) line position.

NOTE

The delta (Δ) line is also allowed to wrap around from the beginning to the end of data and vice versa.

(7) TRIGGER (T), CURSOR (C), DELTA CURSOR (Δ) AND SCROLLING

There are three lines running through the waveform display: T (trigger), C (cursor) and Δ (delta cursor). The same T line and C line appear in the SRCH submenu. The Δ line indicates the delta cursor's location. This is controlled by the delta line position field.

NOTE

If the Δ line comes to the T line, the T line will be hidden. A blinking underscore appears under the Δ character in this case. If the Δ line comes to the C line, the Δ line will be hidden. A blinking underscore will appear under the C line. When all three lines (T, C, and Δ) appear in the same place, the C line has the highest priority; second priority is the Δ line.

NOTE

The DATA DISPLAY keys (←↑, →↓) move the memory cursor (C) line. The INCR/DECR keys move the delta (Δ) line. The edit cursor must be in the ΔP field.

SERIAL ANALYZER MODE

SETUP MENU

The Setup menu is designed to support the data acquisition operation. As shown in Figure 5-1, it has six functions.

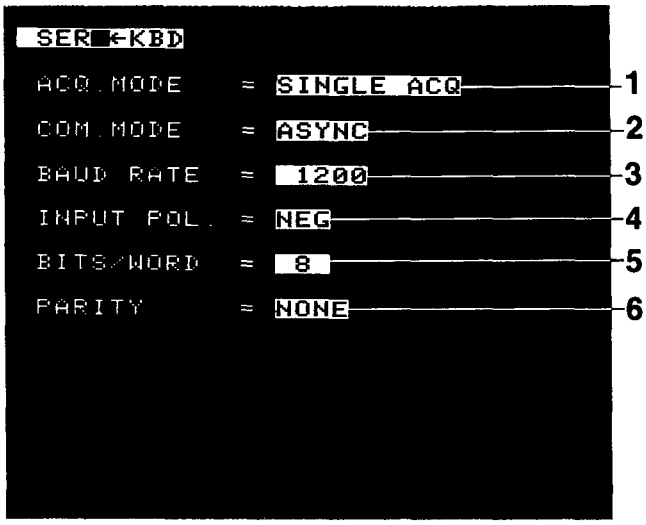


Figure 5-1. Default Setup menu and its reverse-video fields.

- ACQuisition MODE - specifies the acquisition mode: SINGLE, REPEAT, RPT UNTIL ACQ = REF, RPT UNTIL ACQ ≠ REF.
- COMmunication MODE - specifies the communication mode: ASYNC or SYNC.
- BAUD RATE - specifies the baud rate : ASYNC baud rate may be selected with internal or external clock (up to 19.2K baud); SYNC baud rate may be selected for external clock (up to 19.2K baud) rising or falling edge.
- INPUT POLarity - specifies the input polarity : POSitive or NEGative.
- BITS/WORD - specifies the bits per word (including parity bit, if selected): 5, 6, 7, 8, or 9 (5 cannot be selected with parity; 9 cannot be selected without parity).
- PARITY - specifies the parity: NONE, ODD, or EVEN.

DEFAULT OPERATION

The power-up default values of the Setup menu support immediate data acquisition. If each default parameter is matched to incoming data, you can acquire data without making any changes.

MENU FIELDS AND VALUES

Figure 5-1 illustrates the serial Setup menu and its fields. The selectable fields appear on the screen in reverse video. The edit cursor can be moved from field to field in any direction, and is controlled by the four directional cursor keys.

Refer to the numbered callouts in Figure 5-1 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

(1) ACQ.MODE (ACQUISITION MODE) FIELD

The ACQ. MODE field is used for specifying the acquisition mode that controls 318/338 acquisition operations. Press START to begin acquisition. Once an acquisition is started, other operations are not affected.

There are four acquisition modes that may be selected with this field:

- SINGLE ACQ - Press START to cause the 318/338 to make a single acquisition in this mode.
- REPEAT ACQ - Press START to cause the 318/338 to repeatedly acquire data until STOP is pressed.
- RPT UNTIL ACQ = REF - In this mode, press START to cause the 318/338 to repeatedly acquire data until the contents of acquisition memory matches the contents of reference memory within the WDO (window) area that is set in the State Table CMPR submenu. (Invalid data areas are not compared.)
- RPT UNTIL ACQ ≠ REF - In this mode, press START to cause the 318/338 to repeatedly acquire data until the contents of acquisition memory does not match the contents of reference memory within the WDO (window) area that is set in the State Table CMPR submenu. (Invalid data areas are not compared.)

NOTE

In REPEAT ACQ mode, the trigger (except for the HUNT WORD) can be changed and used as the trigger for the next restart.

If REF memory contents are all invalid data, acquisition may be repeated until STOP is pressed in compare acquisition mode (ACQ=REF, ACQ≠REF).

(2) COM.MODE (COMMUNICATION MODE) FIELD

The COM.MODE field is used for specifying the communication mode that controls the 318/338 acquisition operation.

- ASYNC - Asynchronous timing mode. In this mode, characters are received one at a time with each character framed by a start bit and at least one stop bit.
- SYNC - Synchronous timing mode; used with SYNC WORD. In this mode, characters are received in contiguous blocks (one following the other in a character string). Each block is preceded by at least one synchronizing character and, depending on the communications protocol, may be framed by special control characters (SYNC WORD and HUNT WORD). Bit-timing synchronization is provided by a separate clock line.

NOTE

After three consecutive MARK characters ('FF') are received, the 318/338 breaks synchronization and hunts for the SYNC WORD (called HUNT mode).

[To select a COM.MODE:]

1. Move the edit cursor to the COM.MODE selection field.

ASYNC

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

ASYNC
SYNC

NOTE

If ASYNC mode is selected, the BAUD RATE field will be changed to display an asynchronous baud-rate item, and the SYNC WORD and HUNT WORD fields will disappear in the Trigger menu. If SYNC mode is selected, the BAUD RATE field will be changed to display external clock slope (↑, ↓), and the SYNC WORD and HUNT WORD fields will appear in the Trigger menu.

When starting an acquisition after changing setups, a framing error may occur in ASYNC mode.

In SYNC mode, the 318/338 looks for a SYNC character after SLOW CLOCK.

(3) BAUD RATE FIELD

This field is used to select the rate and source of data transfer timing. In ASYNC mode, either internal or external clock can be selected. In SYNC mode, only the external clock can be selected. The maximum external clock rate is 19.2K Hz for ASYNC or SYNC.

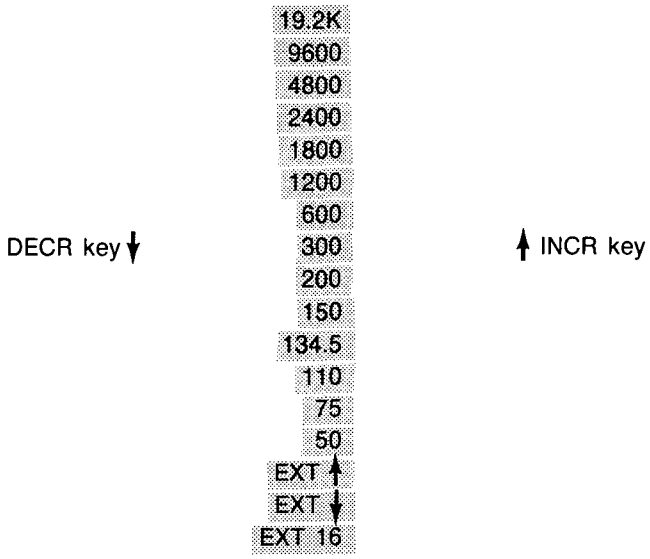
[To increase or decrease the baud rate:]

1. Move the edit cursor to the BAUD RATE field.

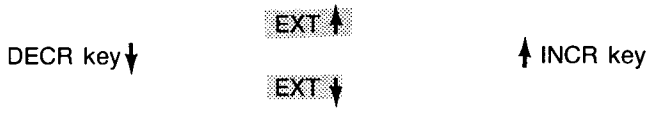
1200

2. Press INCR to increase the baud-rate value; press DECR to decrease the baud-rate value.

The 318/338 displays optional values as follows.



Async baud rate



Sync baud rate

The available external clock values are:

- EXT ↑ - sets the 318/338 to the rising edge of the External Clock Probe.
- EXT ↓ - sets the 318/338 to the falling edge of the External Clock Probe.
- EXT16 - sets the 318/338 to the rising edge of the External Clock Probe, and the clock scaling factor to X 16 (ASYNC only).

(4) INPUT POL. (POLARITY) FIELD

This field specifies input polarity for incoming data. The digital equivalent of the input voltage is either a 1 or a 0, depending on the threshold level.

- POS - sets the 318/338 to read voltages above the threshold as 1, and voltages below the threshold as 0 (positive logic).
- NEG - sets the 318/338 to read voltages above the threshold as 0, and voltages below the threshold as 1 (negative logic).

[To select the input polarity:]

1. Move the edit cursor to the INPUT POL. field.

   INPUT POL. = POS

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

POS
NEG

(5) BITS/WORD FIELD

This field is used to select the bits-per-word; the parity bit, if used, is included in this count. You can select from 5 to 9. All except 5 may be selected with parity. You cannot select 9 without parity.

NOTE

If 5 is selected, the PARITY field will display NONE in regular video. If 9 is selected with NONE parity, the 318/338 will automatically change the parity to EVEN.

[To increase or decrease the bits/word:]

1. Move the edit cursor to the BITS/WORD field.

   BITS/WORD = 8

2. Press INCR to increase the BITS/WORD; press DECR to decrease the BITS/WORD.

The 318/338 displays optional values as follows.

DECR key ↓ 9 8 7 6 5 ↑ INCR key

NOTE

Changing the BITS/WORD value causes the following changes: The trigger and search words are set to all Xs (don't cares). Unused bits of the HUNT word are set to 0. (See the Trigger Menu *or* State Table Menu *sections of this manual.)*

(6) PARITY FIELD

The parity field is used to specify a received-data parity-error-detection mode or to turn off the parity-error-detection feature. Parity can not be selected with 5 bits/word.

- NONE - turns off the parity-error-detection feature.
- EVEN - selects the even parity-error-detection feature.
- ODD - selects the odd parity-error-detection feature.

NOTE

If 5 bits/word is selected, parity is automatically set to NONE. If 9 bits/word is selected, parity can only be set to EVEN or ODD.

[To select the parity:]

1. Move the edit cursor to the PARITY field.

   PARITY = NONE

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values as:

NONE
EVEN
ODD

NOTE

Changing the PARITY value causes the following changes: The Trigger and Search words are set to all Xs (don't cares). Unused bits of the HUNT WORD are set to 0.

THRESHOLD MENU

The Threshold menu specifies the input thresholds used by the probes to determine high and low logic states. It has two major functions:

- THRESHOLD LEVEL - determines threshold level in variable field.
- INPUT - determines probe threshold level by selecting fixed or variable level.

NOTE

The Threshold menu does not affect any other menus. It only affects the 318/338 hardware during acquisition.

DEFAULT DISPLAY

Figure 5-2 illustrates power-up default values of the Threshold menu.

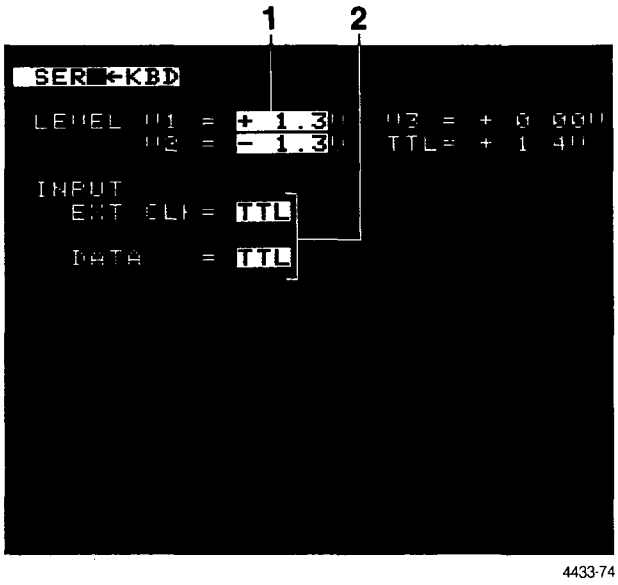


Figure 5-2. Default Threshold menu and its reverse-video fields.

DEFAULT OPERATION

The power-up default values of the Threshold menu (see Figure 5-2) set all the probes to a TTL threshold level and set V1 (variable #1) and V2 (variable #2) to +1.3 V and −1.3 V, respectively, in order to set V3 (variable #3) to +0.00V.

MENU FIELDS AND VALUES

The following paragraphs describe how to use the Threshold menu.

Figure 5-2 illustrates the menu and its fields. The selectable fields appear on the screen in reverse video. The edit cursor can be moved from field to field in any direction, and is controlled by the four directional cursor keys.

Refer to the numbered callouts in Figure 5-2 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

(1) THRESHOLD LEVEL FIELD

The Threshold LEVEL field is used for setting the variable threshold field (V1, V2, and V3). The settings for this field range between −10.0V and +10.0V for V1 and V2.

[To increase or decrease the variable voltage level:]

1. Move the edit cursor to voltage field V1 or V2.

   V1 = + 1.3 V

2. Press INCR to increase the voltage; press DECR to decrease the voltage.

The 318/338 displays increasing or decreasing voltage values in 0.1 V increments between the range of −10.0 V and +10.0 V for V1 and V2. Voltage levels can also be changed by directly entering values 0-9.

NOTE

V3 is automatically incremented or decremented between −10.00 V and +10.00 V when V1 or V2 is incremented or decremented. The value of V3 is: V3 = (V1 + V2) / 2. To reset the V1 or V2 value, press C (clear).

[To select the sign of the voltage :]

1. Move the edit cursor to the sign of voltage field V1 or V2.

   V1 = + 1.3 V

2. Press SELECT until the desired sign appears in the field.

The 318/338 displays optional values in this order:

+1.3 V
−1.3 V

[To enter values on the variable voltage level:]

1. Move the edit cursor to the LEVEL field.

V1 = + 1.3 V

2. Use the data entry keys to enter the voltage value. For example: 5.3.

V1 = + 5.3 V

(2) PROBE INPUT SELECTION FIELD

The external clock (EXT CLK) probe and each data acquisition (DATA) probe has a threshold level. If this level is set to TTL, the probe has a TTL threshold. If set to V1, the probe has a V1 threshold that is determined in the LEVEL V1 field. These voltage levels are used to determine high (1) and low (0) states of incoming data.

[To change thresholds:]

1. Move the edit cursor to the probe INPUT selection field you want to change.

DATA = TTL

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

TTL
V1
V2
V3

TRIGGER MENU

The Trigger menu is used for setting up data acquisition and storage conditions. It determines which data is stored in acquisition memory; this, in turn, determines which data may be displayed in the State Table or Character Display menus.

The Trigger menu is used to control the following:

- Trigger Source - determines which type of trigger source (INT, EXT, or INT OR EXT) is used during acquisition.
- Trigger Mode - determines trigger mode (AFTER MEM. FULL, IMMEDIATELY).
- Word Recognition - TRIG WORD determines the word recognition values for the trigger; TRIG POSN establishes the trigger's position relative to memory.
- SYNC WORD - determines the word(s) used to synchronize the data. This field is displayed only when SYNC mode has been selected in the Setup menu.
- HUNT WORD - determines the HUNT word recognition. When the HUNT WORD is recognized, the data ceases to be synchronized until the next SYNC WORD(s). This field is displayed only when SYNC mode has been selected in the Setup menu.

The following paragraphs describe how to set up and use the Trigger menu.

DEFAULT DISPLAY

Figure 5-3 illustrates the Trigger menu's power-up default values. You may view it on the screen by accessing the serial Trigger menu after power-up.

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Figure 5-3. Default display of the Trigger menu.

DEFAULT OPERATION

If no changes are made to the Trigger menu, the 318/338 will acquire data using an asynchronous baud rate of 1200. It will generate a trigger event on the 258th (256+2) data word stored and position that trigger at the beginning of memory if serial protocol variables agree with data being received.

NOTE

For more detailed information about the acquisition start and stop process, refer to the Start and Stop *section of this manual.*

MENU FIELDS AND VALUES

The following paragraphs describe how to use the Trigger menu to set up trigger parameters. They discuss each menu field and explain its optional values.

Figure 5-4 illustrates the Trigger menu and its fields. The edit cursor can be moved from field to field in any direction, and is controlled by the four directional cursor keys. Refer to the numbered callouts in Figure 5-4 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

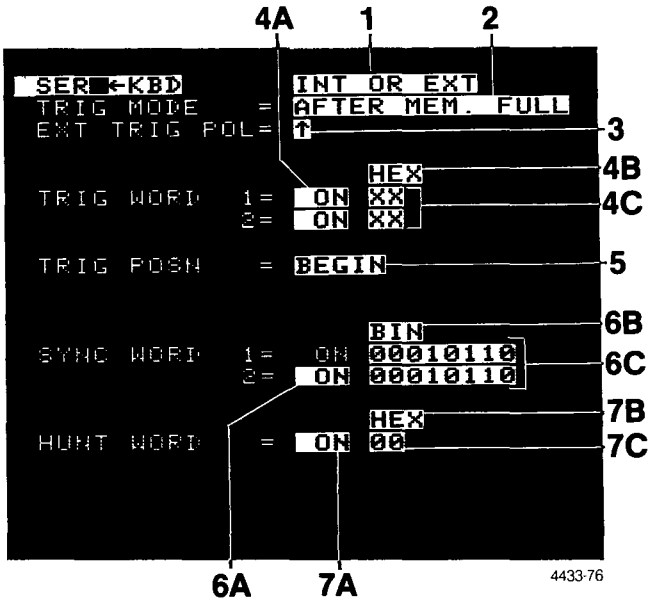


Figure 5-4. Trigger menu and its reverse-video fields.

(1) TRIGGER SOURCE SELECTION FIELD

This field is used to select the trigger source: INT TRIG (internal trigger), which is generated by the internal word recognizer; EXT TRIG (external trigger), which comes from the External Trigger Input Jack on the 318/338 right side panel; or INT OR EXT.

[To select a trigger source :]

1. Move the edit cursor to the trigger source selection field.

   INT TRIG

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional trigger source values as:

INT TRIG
EXT TRIG
INT OR EXT

NOTE

If INT TRIG source is selected, the EXT TRIG POL field will disappear. If EXT TRIG source is selected, the internal trigger field will disappear.

When the selected trigger source is INT OR EXT, data will be triggered by the trigger that comes first. If both triggers come at the same time, data will be triggered by the external trigger.

(2) TRIGGER MODE FIELD

This field is used to specify the trigger mode.

- AFTER MEM. FULL - The trigger selected in the trigger source selection field will come into effect after memory is full (256-word buffer).
- IMMEDIATELY - The trigger selected in the trigger source selection field will come into effect immediately.

[To select a trigger mode :]

1. Move the edit cursor to the trigger mode selection field.

   AFTER MEM. FULL

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional trigger mode values as:

AFTER MEM. FULL
IMMEDIATELY

(3) EXT TRIG POL (EXTERNAL TRIGGER POLARITY) FIELD

This field specifies the external trigger polarity. The external trigger is supplied by the External Trigger Input Jack on the right side panel. This setting is valid only when the trigger source is set to EXT TRIG or INT OR EXT.

The available external trigger polarity values include :

- ↑ - sets the 318/338 to the rising edge of the External Trigger Input Jack.
- ↓ - sets the 318/338 to the falling edge of the External Trigger Input Jack.

[To select the external trigger polarity :]

1. Move the edit cursor to the EXT TRIG POL field.

EXT TRIG POL = ↑

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

↑
↓

NOTE

If the external trigger comes during a search for the SYNC WORD, the trigger will occur when data is synchronized.

(4) INTERNAL TRIGGER WORD FIELDS

[A] WORD ON/OFF FIELDS

These fields are used to turn on or off internal trigger words. Selecting ON will cause a word value to appear in a selected format; selecting OFF will cause a word value to disappear. If both words are turned on, two consecutive words will be used to trigger the 318/338. If one word is turned on and the other is turned off, the word turned on will be used to trigger the 318/338. If both words are turned off, no words will be used to trigger the 318/338.

[To turn on or off the internal trigger word:]

1. Move the edit cursor to the ON/OFF field of the internal trigger you want to change.

ON

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

ON
OFF

[B] WORD FORMAT FIELD

This field determines the format used to display the internal trigger word. In default, it is set to a hexadecimal (HEX) format. If the format is changed, trigger words will be changed.

[To select a format value :]

1. Move the edit cursor to the format field.

HEX

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

HEX (hexadecimal)
DEC (decimal)
OCT (octal)
BIN (binary)

NOTE

After entering X (don't care) in a trigger word (in binary format, for instance), changing the format to decimal will cause the trigger field to be filled with all question marks (?). This means that the conversion cannot be performed. The trigger word is unchanged, it just cannot be displayed in decimal. You can see the same trigger word when you change back to binary format.

[C] WORD RECOGNITION FIELDS

Each trigger has a corresponding word recognizer field. If a trigger is turned on, this field will appear on the screen in reverse video. The BITS/WORD and PARITY are determined in the Setup menu; changing them will cause the trigger words to be set to all Xs (don't cares). These words do not include parity bits, if selected.

[To enter values on the word recognizer :]

1. Move the edit cursor to the field you want to change.

XX

2. Use the data entry keys to enter the desired value (in the specified format base). For example: F.

The 318/338 accepts the entered value at the cursor location, then shifts the edit cursor one space to the right.

FX

By using the above procedures you can continue to enter all desired word values. Any bits set to X (don't care) are ignored during word recognition.

NOTE

In SYNC mode, with 5 bits/word, NONE parity, INT OR EXT mode, two consecutive internal triggers, and a baud rate of 19.2K, this setup causes overrun errors.

TRIG WORD 1 = ON (all don't care)
2 = ON (any data pattern)

NOTE

This setup will not cause overrun errors.

TRIG WORD 1 = OFF
2 = ON (any data pattern)

(5) TRIG POSN (TRIGGER POSITION) FIELD

Once a trigger has occurred, the TRIG POSN field determines when the resulting stop/store is generated. It does this by establishing the trigger's position relative to acquisition memory.

There are four trigger positions that may be selected with this field:

- BEGIN - the trigger is positioned at word 7 at the beginning of memory. Words 0-6 are data that preceded the trigger; words 8-255 are data that followed the trigger.
- CENTER - the trigger is positioned at word 127 at the center of memory. Words 0-126 are data that preceded the trigger; words 128-255 are data that followed the trigger.
- END - the trigger is positioned at word 247 at the end of memory. Words 0-246 are data that preceded the trigger; words 248-255 are data that followed the trigger.
- DELAY - the trigger is delayed up to 65,000 word cycles. The trigger's position in memory is 250 - (delay).

In default, the TRIG POSN field is set to BEGIN. You may also set it to any of the other available values by using the SELECT key.

[To select the trigger's position in memory :]

1. Move the edit cursor to the TRIG POSN field.

TRIG POSN = BEGIN

2. Press SELECT until the desired value appears in the field.

The 318/338 displays optional values in this order:

BEGIN
CENTER
END
DELAY

If DELAY is selected in this field, a new field appears. This field is used for specifying the number of cycles the trigger will be delayed. You may specify a delay of up to 65,000 word cycles.

NOTE

The 318/338 trigger position = 250 – (delay count). Accordingly, if the DELAY field is set to 1, the trigger position will be word 249. A delay of 3 is equivalent to the END trigger position; a delay of 123 is equivalent to the CENTER trigger position; a delay of 243 is equivalent to the BEGIN trigger position.

[To specify a trigger delay:]

1. Move the edit cursor to the newly created field below the DELAY value.

POSN = DELAY
00000

2. Use the data entry keys to enter the delay value. For example, 200.

POSN = DELAY
00200

[To increase or decrease the delay value :]

1. Move the edit cursor to the field.

POSN = DELAY
00200

2. Press INCR to increase the delay value; press DECR to decrease the delay value. For example, press DECR.

POSN = DELAY
00199

NOTE

If you try to enter a value larger than 65,000, the 318/338 will automatically display the maximum value of 65,000.

To reset the delay counter value, press C (clear).

(6) SYNC WORD FIELDS

These fields appear when SYNC mode has been selected in the Setup menu, and disappear when ASYNC mode has been selected.

[A] WORD ON/OFF FIELD

This field is used to turn on or off SYNC WORD 2. OFF will cause the word value to disappear, and ON will cause the word value to reappear in the selected format. The SYNC WORD 1 field is always ON (displayed in normal video).

[To turn on or off SYNC WORD 2 :]

Refer to *Internal Trigger Word Fields (ON/OFF)* earlier in this section.

[B] WORD FORMAT FIELD

Refer to *Internal Trigger Word Fields (Format)* earlier in this section.

NOTE

When entering the TRIGGER menu from another menu, SYNC WORD may be displayed in BIN format.

[C] SYNC WORD RECOGNITION FIELDS

Either one SYNC WORD (MONO-SYNC) or two SYNC WORDs (BI-SYNC) can be selected. The SYNC WORD pattern must be 8 bits (MONO-SYNC mode) or 16 bits (BI-SYNC mode), independent of the word length (including parity bit). So, a SYNC pattern is recognized, regardless of character boundaries.

The following illustration shows how to set the SYNC WORD pattern.

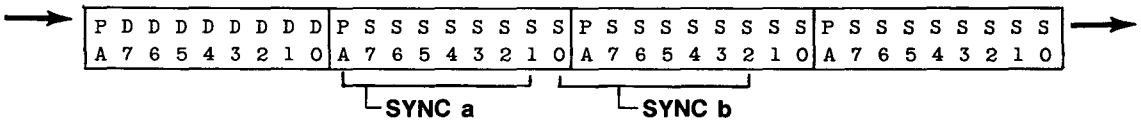
If SYNC WORD 2 is OFF, set 'SYNC a' in SYNC 1 fields. If SYNC WORD 2 is ON, set 'SYNC b' and 'SYNC a' in SYNC 1 and SYNC 2 fields, respectively.

NOTE

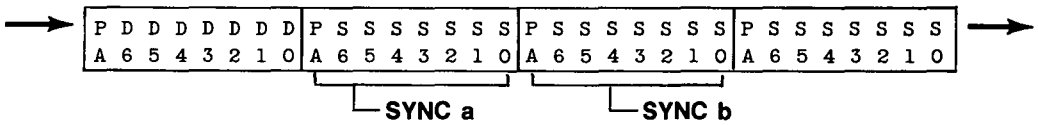
The SYNC pattern followed by a message block may not be loaded into acquisition memory.

D : Data bit
S : SYNC WORD bit
P : Parity bit

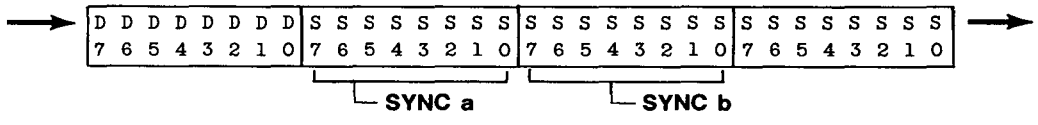
1. 9 bits/word (includes parity bit)



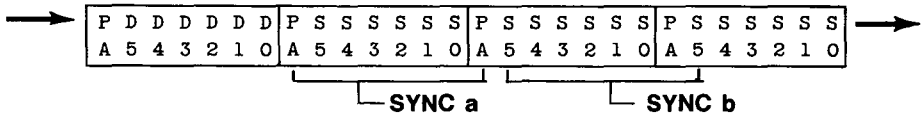
2. 8 bits/word (includes parity bit)



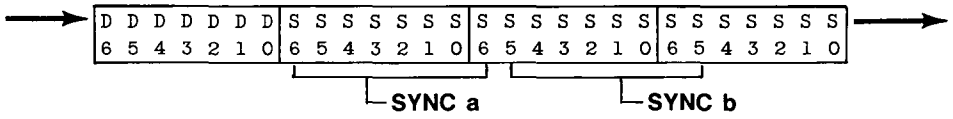
3. 8 bits/word (excludes parity bit)



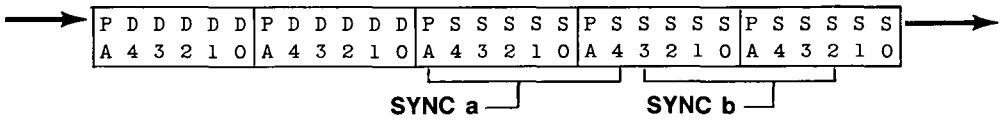
4. 7 bits/word (includes parity bit)



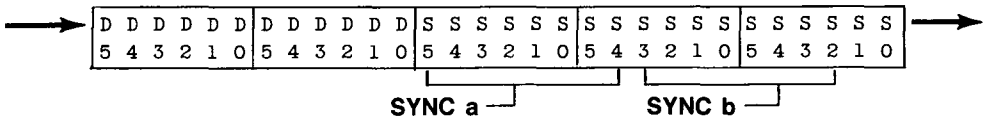
5. 7 bits/word (excludes parity bit)



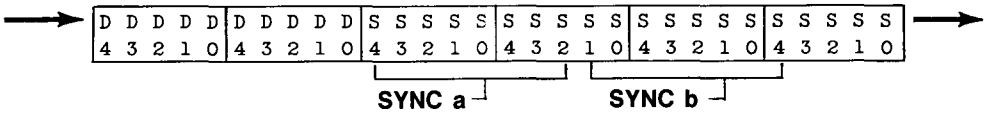
6. 6 bits/word (includes parity bit)



7. 6 bits/word (excludes parity bit)



8. 5 bits/word (excludes parity bit)



[To enter values in SYNC WORD recognition :]

Refer to *Internal Trigger Word Fields (Recognition)* earlier in this section.

NOTE

These words will not accept X (don't care).

(7) HUNT WORD FIELDS

These fields are displayed in synchronous timing mode only.

[A] WORD ON/OFF FIELD

This field is used to turn the HUNT WORD on or off. ON will cause the word value to appear in the selected format, and OFF will cause the word value to disappear.

[To turn the HUNT WORD on or off :]

Refer to *Internal Trigger Word Fields (ON/OFF)* earlier in this section.

[B] WORD FORMAT FIELD

Refer to *Internal Trigger Word Fields (Format)* earlier in this section.

[C] HUNT WORD RECOGNITION FIELD

If HUNT WORD is turned on, this field will appear on the screen in the selected format. The word (excluding parity bit, if selected), will not accept X (don't care). Unused bits that disappear are set to 0.

[To enter values for HUNT WORD recognition:]

Refer to *Internal Trigger Word Fields (Recognition)* earlier in this section.

NOTE

If acquired data equals the HUNT WORD (SYNC mode, HUNT WORD ON), the 318/338 will enter HUNT mode. If the external trigger comes in HUNT mode, the trigger will be recognized at the next valid character or when data is synchronized again.

When the HUNT WORD is ON in MONO-SYNC mode, for some specific word sequences the incorrect synchronization may occur soon after entering HUNT mode.

It will not occur in BI-SYNC mode.

STATE TABLE MENU

The 318/338 provides two menus for viewing acquired data: State Table and Character. This section describes the State Table menu and its display capabilities.

The State Table menu provides access to 318/338 acquisition and reference memories.

SUBMENU SELECTIONS

In default, the 318/338 displays the Character menu the first time the DATA key is pressed. The State Table menu appears when the DATA key is pressed again. The 318/338 displays either the Character menu or State Table menu, depending on which was last used.

The State Table menu consists of two submenu displays. They are:

- SRCH (search) - allows quick location of a specific data word or a data word with errors (parity, framing, or overrun errors) in data memory (ACQ or REF), and shows the number of occurrences of these data words in data memory.
- CMPR (compare) - shows differences between REF memory contents and ACQ memory contents, and shows the number of differences within the compare window. (Invalid data areas are not compared.) Only one submenu appears on the screen at a time. You may select between submenus by entering the submenu selection field directly below the major mode selection field.

SRCH SUBMENU DISPLAY

Figure 5-5 illustrates a typical SRCH submenu display.

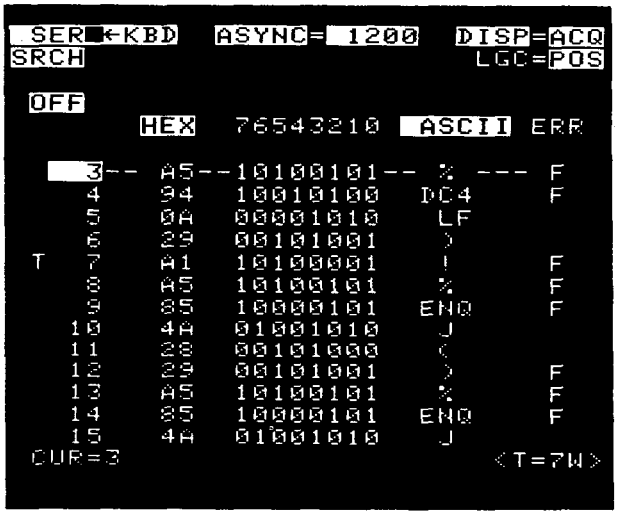


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Figure 5-5. Display of the State Table's SRCH submenu.

SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the SRCH submenu display. They discuss the submenu fields and their optional values, and show how to scroll the display.

Figure 5-6 illustrates the SRCH submenu display and its fields. The fields, which appear on the screen (not in the data area) in reverse video, are selectable fields. The edit cursor can be moved from field to field in any direction, and is controlled by the four directional cursor keys. Refer to the numbered callouts in Figure 5-6 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

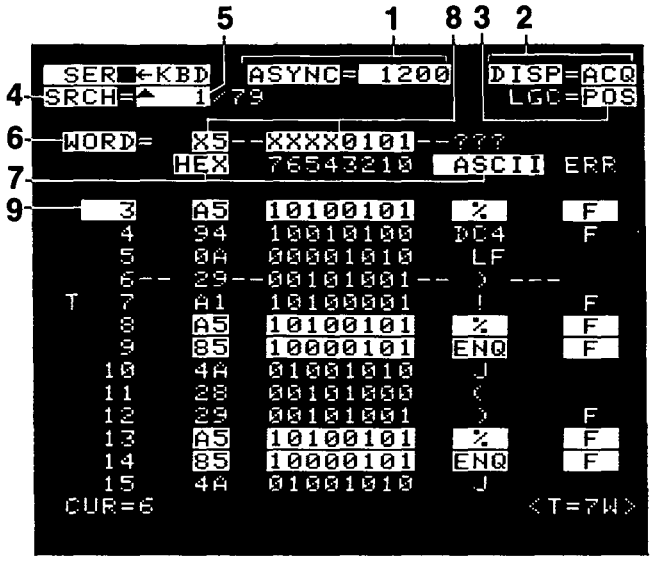

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Figure 5-6. State Table's SRCH submenu and its reverse-video fields.

(1) ASYNC(SYNC)/DELAY FIELD

With ASYNC selected in the Setup menu and DELAY selected in the Trigger menu, either ASYNC or DELAY may be selected in this field. (When you select SYNC mode in the Setup menu, this field consists of SYNC and DELAY.) If you select ASYNC in the leftmost part of the field, the ASYNC-baud-rate selection field will appear in the rightmost part of the field; otherwise, DELAY is in the leftmost part of the field and the rightmost part of the field is used for entering the delay value. Refer to the Setup menu for baud rate and to the Trigger menu for DELAY value.

In default, ASYNC is displayed and the value is set to 1200 (baud rate).

[To select ASYNC (SYNC)/DELAY:]

1. With TRIG POSN set to DELAY in the Trigger menu, move the edit cursor to the leftmost part of the field:

   ASYNC (SYNC, if SYNC mode is selected).

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   ASYNC (SYNC, if SYNC mode is selected)
   DELAY

[To increase or decrease the baud rate:]

1. Move the edit cursor to the rightmost part of the field (leftmost part of the field set to ASYNC).

   ASYNC = 1200

2. Press INCR to increase the baud rate; press DECR to decrease the baud rate.

   Refer to the Setup menu for values.)

[To specify a Trigger delay:]

1. Move the edit cursor to the rightmost part of the field (leftmost part of the field set to DELAY).

   DELAY = 00000

2. Use the data entry keys to enter the delay value. For example, 200.

   DELAY = 00200

[To increase or decrease the delay value:]

1. Move the edit cursor to the rightmost part of the field.

   DELAY = 00200

2. Press INCR to increase the delay value; press DECR to decrease the delay value. For example, press DECR.

   DELAY = 00199

NOTE

If you try to enter a number larger than 65,000, the 318/338 will automatically display the maximam value of 65,000. To reset the value, press C (clear).

(2) DISPLAY DATA SWITCHING FIELD

This field has two different functions: switching display data (ACQ or REF memory) and transferring ACQ memory contents to REF memory. The leftmost part of the field allows you to select between these functions. If you select DISP in the leftmost part of the field, you can change displayed data by changing the value in the rightmost part of the field.

In default, DISP = ACQ is selected, which means that current displayed data is ACQ memory contents.

[To select the first field:]

1. Move the edit cursor to the leftmost part of the field:

   DISP

2. Press SELECT until the desired value appears.

   The 318/338 displays optional values in this order:

   DISP
   ACQ→REF

When ACQ→REF is selected, the field will blink, which means you must press EXECUTE to transfer ACQ memory contents to REF memory. During the transfer, the 318/338 will display a message (ACQ→REF) in the bottom left corner of the screen. DISP is re-displayed automatically after the transition.

[To change display data:]

1. Move the edit cursor to the rightmost part of the field (leftmost part of the field set to DISP).

   DISP = ACQ

2. Press SELECT until the desired value appears.

   The 318/338 displays optional values in this order:

   ACQ
   REF

DISP = REF provides the same display format as that used in DISP = ACQ.

(3) DISPLAY DATA LOGIC POLARITY SELECTION FIELD

This field determines the logic polarity for displaying acquired data only, not for the search word. In default, this field is set to POS (positive) logic polarity. This means that acquired data is displayed as high (1) if it is read high (determined by input polarity), and low (0) if it is read low (determined by input polarity).

[To select a logic polarity value:]

1. Move the edit cursor to the field.

   POS

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   POS
   NEG

NOTE

The logic polarity will have no effect on the Trigger Word, SYNC WORD, or HUNT WORD.

(4) SUBMENU SELECTION FIELD

This field is used to select the submenu displays.

[To change submenu displays:]

1. Move the edit cursor to the submenu selection field.

   SRCH

2. Press SELECT until the desired submenu appears.

   Values are displayed in this order:

   SRCH
   CMPR

As each submenu value appears in the field, the 318/338 automatically changes the submenu display format.

(5) SEARCH WORD COUNTER

This counter value (numerator) shows the number of data matched with the search word between line 0 and the current memory cursor position. The denominator indicates the total number of words in memory that match the search word. If the cursor line is between matched data, an up or down arrow (↑ or ↓) will appear at the head of this field. You can increase or decrease this number to get to the next or last unmatched data by using the INCR or DECR keys, and the next or last occurrence of the search word will come to the current cursor position.

[To increase or decrease the search word counter:]

1. Move the edit cursor to the search word counter field.

   SRCH = 2/32

2. Press INCR to increase the counter value; press DECR to decrease the value.

In this case, if you press INCR, the search word counter becomes 3 and the next occurrence of the search word will come to the current cursor position.

(6) SEARCH MODE SELECTION FIELD

This field is used to select the search mode: OFF, WORD, or ERROR.

[To select this field:]

1. Move the edit cursor to the field.

   OFF

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   OFF
   WORD
   ERROR

NOTE

When you press SELECT in this field, the field value is changed and its search function is performed automatically.

(7) RADIX FIELD

This fields determines the format used to display acquired data and the search word (see next field).

[To select the format (leftmost part of the field):]

1. Move the edit cursor to the leftmost part of the field.

   HEX

2. Press SELECT until the desired value appears.

   The 318/338 displays optional values in this order:

   HEX
   DEC
   OCT

[To select the format (rightmost part of the field):]

1. Move the edit cursor to the field.

   ASCII

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   ASCII
   EBCDIC

NOTE

If the word length (excluding parity bit) is 8 bits, the MSB may be ignored in ASCII format. If the word length is less than 7 bits (8 bits), unused bits may be set to 0 in ASCII (EBCDIC) format.

Refer to Tables 5-1 and 5-2 for Hex-ASCII and Hex-EBCDIC conversion charts.

Table 5-1
HEX-ASCII CONVERSION CHART

1st HEX DIGIT	2nd HEX DIGIT 0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2	SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	¦	}	~	DEL

Table 5-2
HEX-EBCDIC CONVERSION CHART

1st HEX DIGIT	2nd HEX DIGIT 0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	PF	HT	LC	DEL	GE	RLF	SMM	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	TM	RES	NL	BS	IL	CAN	EM	CC	CU1	IFS	IGS	IRS	IUS
2	DS	SOS	FS		BYP	LF	ETB	ESC			SM	CU2		ENQ	ACK	BEL
3			SYN		PN	RS	UC	EOT				CU3	DC4	NAK		SUB
4	SP										¢	.	<	(	+	|
5	&										!	$	*	)	;	¬
6	-	/									¦	,	%	_	>	?
7										\	:	#	@	'	=	"
8		a	b	c	d	e	f	g	h	i						
9		j	k	l	m	n	o	p	q	r						
A		~	s	t	u	v	w	x	y	z						
B																
C	{	A	B	C	D	E	F	G	H	I			⌐		⌙	
D	}	J	K	L	M	N	O	P	Q	R						
E	\		S	T	U	V	W	X	Y	Z			⌐			
F	0	1	2	3	4	5	6	7	8	9						

(8) SEARCH WORD FIELD

This field is used for entering a specific data word called the search word.

The word entered into the search word field may be any combination of data and don't care (X) values. The radices used in the search word field are formatted to match the columns in the data display.

[To search for a specific data word:]

1. Move the edit cursor to the field and the position you want to specify.

   WORD = XX - XXXXXXXX

2. Use the data entry keys to specify the values, or use X (don't care) to ignore bit values during the search. For example, enter 2.

   The 318/338 accepts a 2 at the cursor location, then shifts the cursor one space to the right.

   WORD = 2X - 0010XXXX

   NOTE

   If one formatted word is changed, other formatted words will change.

Immediately after entering the search word, the 318/338 starts to search and then shows the number of the specific data words in memory.

3. Continue entering the rest of the data value.

   NOTE

   Changing the bits/word or parity in the Setup menu will cause the search word to be set to all Xs (don't cares). The search word does not include the parity bit.

(9) LINE NUMBER FIELD AND DISPLAY SCROLLING

The submenu displays up to 13 data words at a time. The line number fields on the left side of the display indicate which acquisition memory locations are being shown. If the number of the line number field (highlighted in reverse video) is changed, the display changes to show the new memory location.

NOTE

When the cursor line is moved through memory in the State Table, its movement is automatically reflected in the Character menu. Therefore, you can always switch between the two menu displays and view the same cursor position.

One method of moving through memory is to use the DATA DISPLAY scroll keys. These keys can be used at any time and in any field.

[To scroll through memory:]

1. Press ←↑ or →↓ and hold it down until the data is scrolling along with the cursor line.

The 318/338 scrolls the memory display up or down the screen.

A second method for moving through memory is provided by the line number field. This field lets you move forward or backward on the screen.

[To change the line number:]

1. Move the edit cursor to the line number field you want to change.

   100

2. Use the data entry keys to enter the line number you want to display. For example, 200.

   The 318/338 displays line number 200 and then updates the rest of the line numbers following that position.

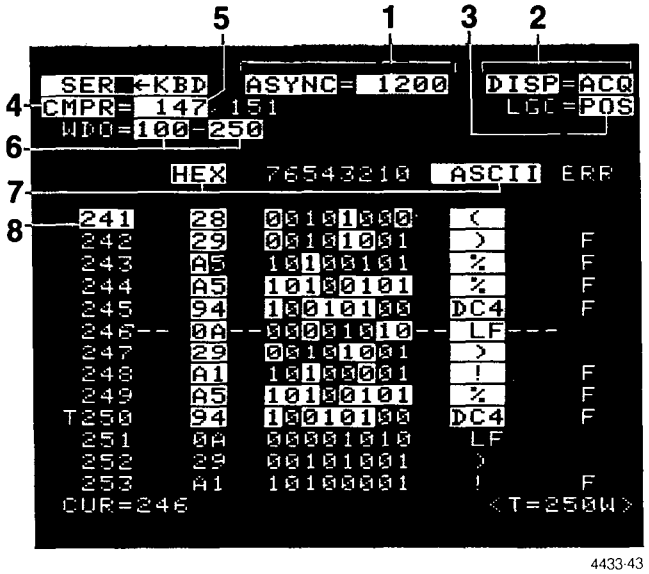
   200
   201
   202
   203
   :
   :
   :
   :
   212

   NOTE

   To reset the line number, press C (clear).

CMPR (COMPARE) SUBMENU DISPLAY

Figure 5-7 illustrates a typical CMPR submenu display.



4433-43

Figure 5-7. State Table's CMPR submenu and its reverse-video fields.

CMPR SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the CMPR submenu displays. They discuss the submenu fields and their optional values, and show how to scroll the display.

Figure 5-7 illustrates the CMPR submenu display and its fields. Only the fields labeled (5) and (6) are discussed here, since they are different from the SRCH submenu fields. For information on how to manipulate fields labeled (1)-(4) and (7) and (8), refer to the *SRCH Submenu Fields and Values* part of this section.

(5) COMPARE COUNTER

This counter value (numerator) shows the number of data words that include unmatched bits in comparision with REF memory. The denominator indicates the total number of data words that include unmatched bits within the compare window. If the cursor line is between unmatched data, an up or down arrow (↑ or ↓) will appear at the head of this field. You can increase or decrease this number by pressing INCR or DECR, and the next or last unmatched data will come to the current cursor position.

[To increase or decrease the compare counter:]

1. Move the edit cursor to the numerator field.

   CMPR = 6/194

2. Press INCR to increase the counter value; press DECR to decrease the value.

In this case, if you press INCR, the counter value will be 7, and the next data in reverse video will come to the current cursor position.

(6) COMPARE WINDOW FIELD

This field determines the size of the window in comparision with REF memory.

The 318/338 only compares those lines (within the limits) that contain valid data in both ACQ and REF memories. If either memory has invalid data in lines that the other does not, these lines are ignored.

(For a discussion of valid and invalid data, see the *START and STOP* section of this manual.)

[To specify the compare limits:]

1. Move the edit cursor to the compare window field.

   WDO = 0 - 255

2. Use the data entry keys to enter the beginning sequence of the compare limit. For example, 200.

   The 318/338 enters the values into the field.

   WDO = 200 - 255

When entering the compare limits, keep in mind that the first value must be a number less than or equal to the second value.

NOTE

If you try to enter a number larger than 255, the 318/338 will automatically generate the maximum value of 255. To reset the value, press C (clear).

CHARACTER MENU

The 318/338 provides two menus for viewing acquired data: Character and State Table. This section discusses the Character menu and its display capabilities.

The Character menu provides access to 318/338 ACQ and REF memories.

The Character menu presents data in a character format (ASCII or EBCDIC), and all of the acquisition data (256 words) is displayed on the screen at one time. In addition, you can switch back and forth between the Character and State Table menus and see the same area of memory. The remainder of this section describes how to read, change, and use the Character menu display.

SUBMENU SELECTIONS

In default, the 318/338 will display the Character menu after the DATA key has been pressed. When you press the DATA key, the 318/338 will display either the Character menu or the State Table menu, depending on which was last used.

The Character menu is composed of two submenu displays. They are:

- SRCH (search) - allows quick location of a specific data word or a data word with errors (parity, framing, or overrun errors) in data memory (ACQ or REF), and shows the number of occurrences of these data words in memory.

- CMPR (compare) - used to show the differences between REF memory contents and ACQ memory contents, and to show the number of differences within the compare window. (Invalid data areas are not compared.)

Only one submenu appears on the 318/338 screen at a time. Select between submenus by entering the submenu selection field directly below the major mode selection field (SER←KBD).

SRCH SUBMENU DISPLAY

Figure 5-8 illustrates a typical SRCH submenu display.

4433-44

Figure 5-8. Display of Character's SRCH submenu.

SRCH SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the SRCH submenu display. They discuss the submenu fields and their optional values, and show how to scroll the display.

Figure 5-9 illustrates the SRCH submenu display and its fields. The fields, which appear on the screen (not on the data area) in reverse video, are designated selectable fields. The edit cursor can be moved from field to field in any direction, and is controlled by the four directional cursor keys. Refer to the numbered callouts in Figure 5-9 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

4433-45

Figure 5-9. Character's SRCH submenu and its reverse-video fields.

(1) ASYNC(SYNC)/DELAY FIELD

Refer to the *State Table Menu* section.

(2) DISPLAY DATA SWITCHING FIELD

Refer to the *State Table Menu* section.

(3) DISPLAY DATA LOGIC POLARITY SELECTION FIELD

Refer to the *State Table Menu* section.

(4) SUBMENU SELECTION FIELD

This field is used to select the submenu display.

[To change submenu displays:]

1. Move the edit cursor to the submenu selection field.

   SRCH

2. Press SELECT until the desired submenu appears.

   The 318/338 displays the submenu values in this order:

   SRCH
   CMPR

As each submenu value appears in the field, the 318/338 automatically changes the submenu display format.

(5) SEARCH WORD COUNTER

Refer to the *State Table Menu* section.

(6) SEARCH MODE SELECTION FIELD

Refer to the *State Table Menu* section.

(7) RADIX FIELD

This field determines the format used to display the CUR (memory cursor) line data and the search word (see next field).

[To select the format (HEX field):]

1. Move the edit cursor to the field.

   HEX

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   HEX
   DEC
   OCT

The ASCII field determines the format used to display CUR line data, the search word, and acquired data.

[To select the format (ASCII field):]

1. Move the edit cursor to the field.

   ASCII

2. Press SELECT until the desired value appears in the field.

   The 318/338 displays optional values in this order:

   ASCII
   EBCDIC

NOTE

If word length (excluding parity bit) is 8 bits, the MSB will be ignored in ASCII format. If word length is less than 7 (8), unused bits will be set to 0 in ASCII (EBCDIC) format.

(8) SEARCH WORD FIELD

Refer to the *State Table Menu* section.

CMPR SUBMENU DISPLAY

Figure 5-10 illustrates a typical CMPR submenu display.

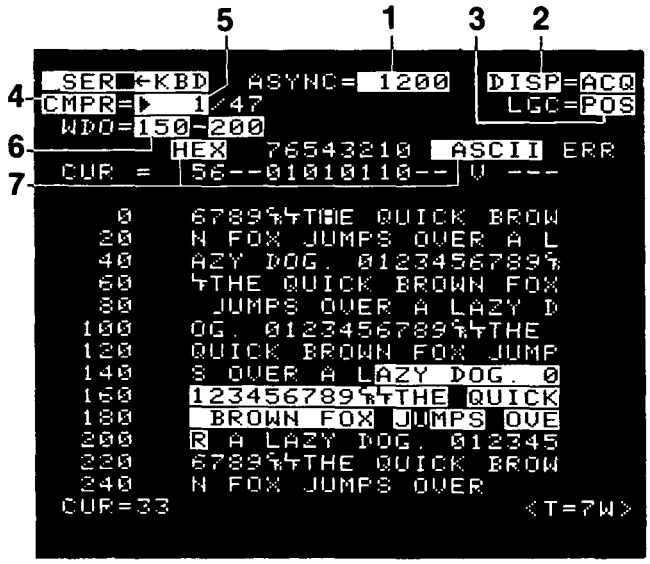
CMPR SUBMENU FIELDS AND VALUES

The following paragraphs describe how to change and use the CMPR submenu displays. They discuss the submenu fields and their optional values, and show how to scroll the display.

Figure 5-11 illustrates the CMPR submenu display and its fields. Only the fields labeled (5) and (6) are discussed here, since they are different from the SRCH submenu fields. For information on how to manipulate fields labeled (1)-(4) and (7), refer to the *SRCH Submenu Fields and Values* part of this section.

4433-46

Figure 5-10. Display of Character's CMPR submenu.



4433-47

Figure 5-11. Character's CMPR submenu and its reverse-video fields.

(5) COMPARE COUNTER

Refer to the *State Table Menu* section.

(6) COMPARE WINDOW FIELD.

Refer to the *State Table Menu* section.

START AND STOP

The 318/338 provides two kinds of start functions.

- Start parallel acquisition - The 318 can acquire 16 channels of data and the 338 can acquire 32 channels of data (both up to 256 bytes/channel) in parallel mode when the START key is pressed.
- Start serial acquisition - The 318/338 can acquire serial data (up to 256 characters) in serial mode when the START key is pressed.

The remainder of this section discusses the start functions and stop procedures.

ACQUISITION STATUS READOUT

When an operation is in progress or after it is done, acquisition status messages occupy the bottom right corner of the 318/338 screen. These messages appear regardless of which menu is currently displayed on the screen.

START ACQUISITION

Press START to start an acquisition.

When START is pressed, the 318/338 displays a message at the bottom right corner of the screen reading <WAITING TRIG>. Even while acquiring data, all keys except START are available. The methods of triggering and storing are similar to those for serial and parallel modes.

There are four basic steps to the acquisition operation: (1) acquiring data and clocking it into memory, (2) generating a trigger, (3) generating a memory stop/store, and (4) displaying data.

The following paragraphs describe these four basic steps and how they are achieved.

ACQUIRING DATA

When acquisition starts, the 318/338 immediately begins to acquire data. The incoming data is compared to the probe thresholds in order to determine high and low logic states. These thresholds are specified in the Threshold menu.

In parallel mode, the parallel bits of high and low logic are clocked into memory at the rate specified in the Trigger menu. If clock qualifiers are used, the data is only clocked in when all qualifier conditions are true.

In serial mode, to allow the 318/338 to correctly interpret serial data, serial protocol variables (BITS/WORD, BAUD RATE, PARITY) must agree with the data being received. These serial protocol variables are specified in the Setup and Trigger menus.

WAITING FOR THE TRIGGER

When data is clocked into memory, it is compared to the word recognizers specified in the Trigger menu. Then, when the word recognizer conditions are met, a trigger occurs. If a trigger is not generated, the 318/338 displays a message at the bottom right corner of the screen reading <WAITING TRIG>.

WAITING FOR STOP/STORE

When a trigger occurs, the 318/338 waits for the stop/store. This is determined by the trigger's position relative to acquisition memory. When the trigger reaches its position as specified in the Trigger menu, acquisition stops and the most currently acquired data is retained in memory.

If a trigger has occurred, but acquisition is not completed, the 318/338 displays a message at the bottom right corner of the screen reading <TRIG'D>. This message is usually caused by a long trigger delay coupled with a slow clock.

DATA DISPLAY

When acquisition is finished, the 318/338 immediately displays the acquired data. If the trigger was positioned in memory, the T character is put in the trigger word position on the data display screen, and the trigger position is displayed at the bottom right corner of the screen. For example, <T = 7W> means trigger position equals 7 and the type of trigger is internal trigger word.

If the trigger is not in memory, a message appears in the same corner. For example, <T = −100◇> means trigger position equals −100 (the '−' sign shows that the trigger is not in memory), and the type of trigger is either glitch or external.

If the STOP key was used to stop acquisition, a message appears in the same corner. For example, <ST : NO TRIG> means the trigger has not occurred; acquisition is then stopped when STOP is pressed. But if STOP was pressed while hardware was being set up in single acquisition or the first cycle of repeat acquisition, then <ST:NO ACQ> appears in the same corner. This message means acquisition did not start. All invalid data will then appear on the screen.

NOTE

During acquisition, if a hardware-setting parameter is changed, a message appears in the same corner of the screen after acquisition is done. For example, <SETUP CHANGED> means acquired data is unmatched with hardware setting parameters.

SLOW ACQUISITION

While acquisition is in progress, the 318/338 may display a message reading <SLOW CLOCK>. This message appears when an acquisition clock has not been received for approximately 25 ms. The <SLOW CLOCK> message does not necessarily mean there is an acquisition error. The message may be the result of a slow external clock.

STOP PROCEDURES

The 318/338 provides three kinds of stop functions: parallel acquisition stop, serial acquisition stop, and quitting from remote mode. (Refer to the *RS-232C Programming* section.)

When the STOP key is pressed and acquisition stops, the 318/338 displays a message. For example: <ST: T = 7W>, which means that the internal trigger position is 7; acquisition was stopped by pressing STOP.

NOTE

Before acquisition memory is full, you may press STOP. In this case, old data (called invalid data) that has not been rewritten at this acquisition will be displayed with maximum-rate timing characters in the Timing Diagram menu, or with special characters in the State Table menu.

TYPICAL APPLICATION

This section serves as a learning guide to the effective use of the 318/338 data acquisition operation. There are two examples:

- Parallel acquisition - using the built-in pattern generator to perform eight-channel acquisition.
- Serial acquisition - using the built-in pattern generator to acquire serial data.

PARALLEL ACQUISITION

The following example illustrates the characteristics of the parallel acquisition operation. It shows how to set up the trigger and clocks, and illustrates the resulting data displays.

SETTING UP THE PROBES

The P6451 eight-channel data probe and the P6107 external clock probe are connected to the A input connector (POD A) and the EXT CLOCK INPUT (BNC connector), respectively, on the 318/338 right side panel. In addition, the P6451 probe leads and the P6107 probe leads are connected to TEST OUTPUT (labeled G through 7, and C, respectively) on the right side panel.

The following list specifies the probe connections for this application:

TEST OUTPUT (right side panel)

P6451 (connected to A)	CH0→ 0 CH1→ 1 CH2→ 2 CH3→ 3 CH4→ 4
P6107 (connected to EXT CLOCK INPUT)	CH5→ 5 CH6→ 6 CH7→ 7 Probe Tip→ C

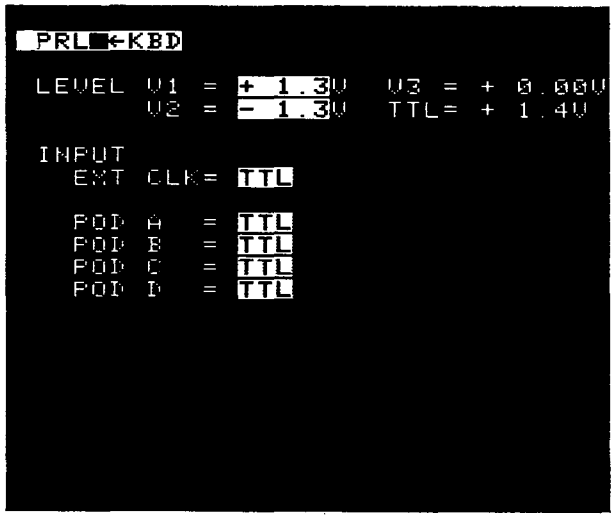
SETTING UP PARALLEL ACQUISITION

With the probes connected as described above, you can perform the following eight-channel parallel acquisition example.

Before setting up the trigger, the number of channels being displayed in the Trigger menu and State Table menus must be limited to the pod(s) being used. Figure 7-1 illustrates how to set up the Setup menu to limit the display to pod A, and Figure 7-2 illustrates how to set up the Threshold menu with all inputs set to TTL level.

4433-48

Figure 7-1. Setting up the Setup menu.



4433-49

Figure 7-2. Setting up the Threshold menu.

To set up the trigger, set the Trigger menu to the INT TRIG mode as shown in Figure 7-3; CLK is set to the rising edge of the external clock (EXT↓). The external clock is supplied by the built-in pattern generator's output clock which is running at 10μs intervals. First, set the trigger to X (don't care); the triggers are now positioned at the beginning of memory. All qualifier lines are set to OFF.

Figure 7-3. Setting up the Trigger menu.

DISPLAYING DATA

To acquire data, press START. The 318/338 immediately begins to acquire data.

After the system is started, the 318/338 waits for a trigger, while the Acquisition Status message <WAITING TRIG> is displyed in blinking video. When the trigger occurs, the message is changed to <TRIG'D>. Acquisition stops once acquisition memory has been filled.

Figures 7-4 and 7-5 illustrate the resulting Timing Diagram SRCH and Δ T submenus. You can find any word in memory (ACQ and REF) by using the search function or scroll keys, and can make a timing measurement between any two words by using the Δ T feature.

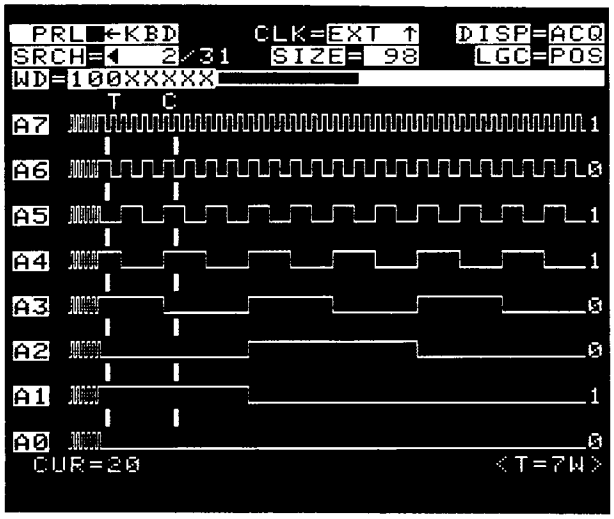


Figure 7-4. Timing Diagram SRCH display of parallel acquisition.

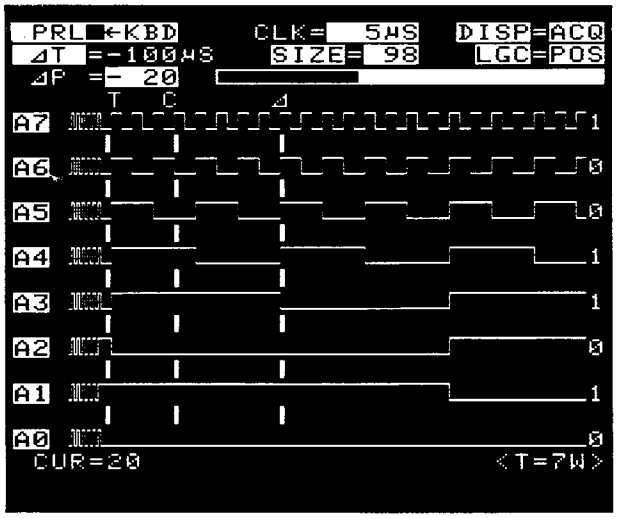
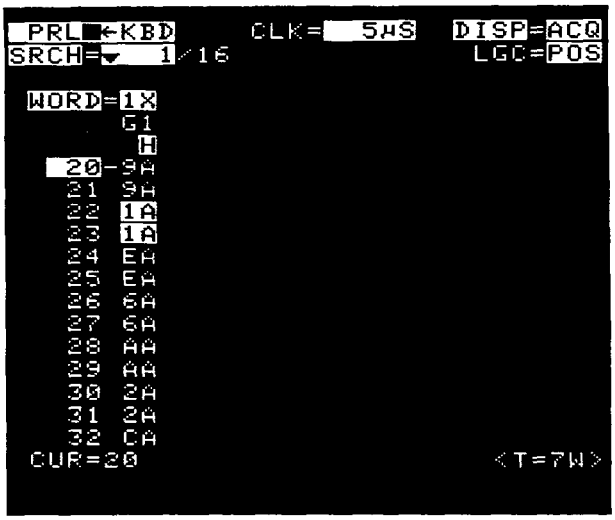
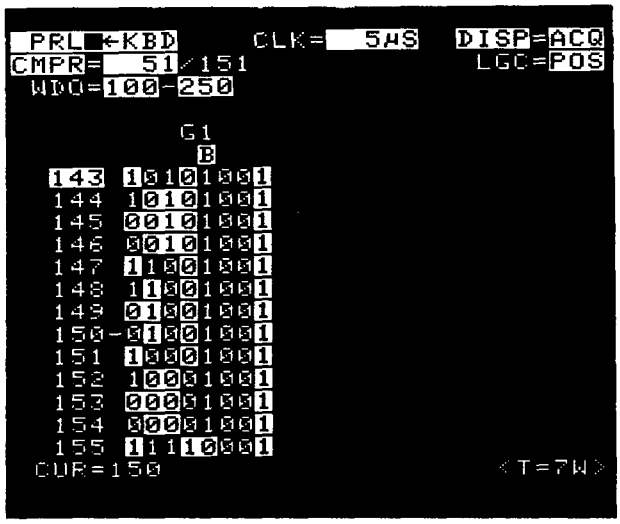


Figure 7-5. Timing Diagram ΔT display of parallel acquisition.



4433-53

Figure 7-6. State Table SRCH display of parallel acquisition.



4433-54

Figure 7-7. State Table CMPR display of parallel acquisition.

Figures 7-6 and 7-7 illustrate the resulting State Table SRCH and CMPR menus. You can find any word in memory (ACQ and REF) by using the search function or scroll keys, and can find the differences between ACQ memory and REF memory by using the compare feature.

SERIAL ACQUISITION

The following example illustrates the characteristics of the serial acquisition operation. It shows how to set up the trigger and parameters, and it illustrates the resulting data displays.

SETTING UP THE PROBES

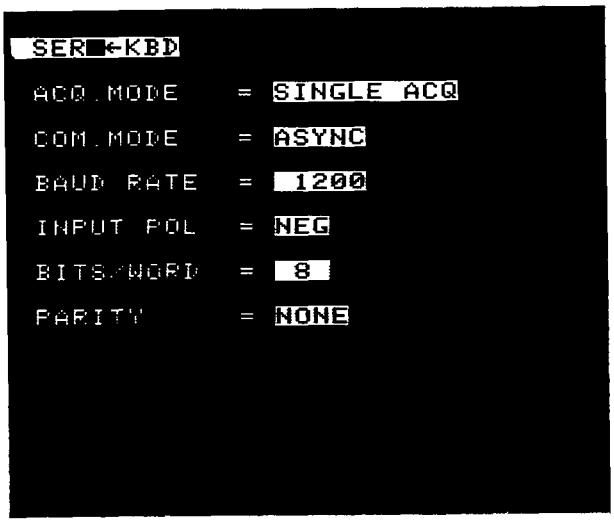
The P6107 serial data probe is connected to the SERIAL DATA INPUT connector on the left side panel. Attach the probe lead to TEST OUTPUT #2, right side panel.

NOTE

Do not confuse this probe with the P6107 external clock (EXT CLK) probe. The P6107 serial data probe must be compensated to 40 pf.

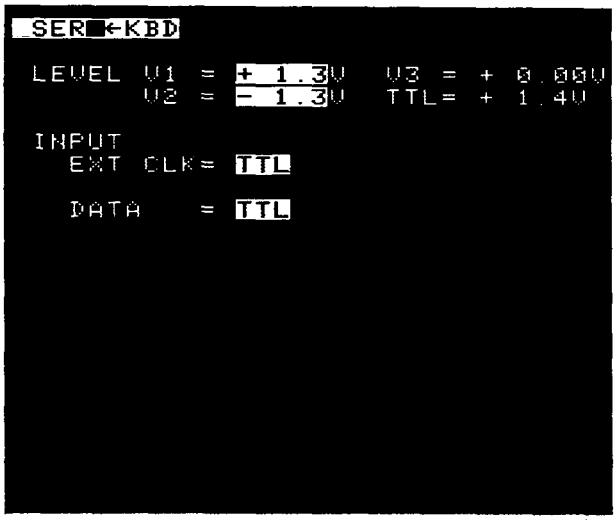
SETTING UP SERIAL ACQUISITION

Adjust the Setup menu as follows: single acquisition, ASYNC mode, 1200 baud rate, negative input polarity, 8 bits/word, and no parity (see Figure 7-8). In the Threshold menu, set the external clock and data thresholds to TTL (see Figure 7-9). In the Trigger menu, select internal trigger and set both trigger words to don't care (X) (see Figure 7-10).



4433-55

Figure 7-8. Setting up the serial Setup menu.



4433-56

Figure 7-9. Setting up the serial Threshold menu.

4433-58

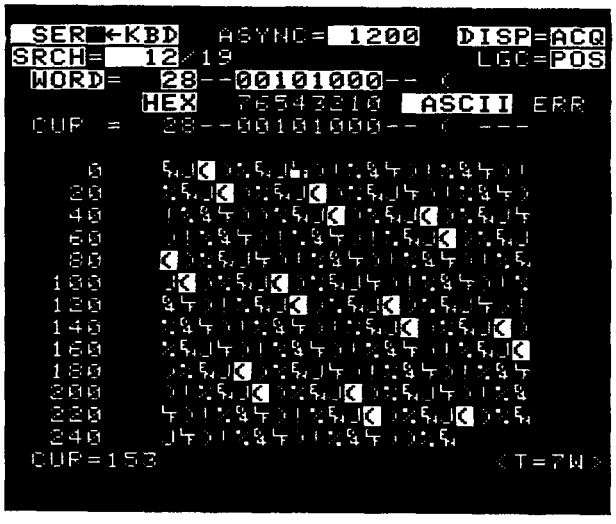
Figure 7-10. Setting up the serial Trigger menu.

DISPLAYING DATA

First, press DATA. To acquire data, press START. The 318/338 immediately begins to acquire data.

After the system is started, the 318/338 waits for a trigger after memory is full, while the Acquisition Status message <WAITING TRIG> is displayed in blinking video. When the trigger occurs, the message is changed to <TRIG'D>. Acquisition stops once acquisition memory has been filled, and the message is changed to <T = 7W>.

Figures 7-11 and 7-12 illustrate the resulting Character SRCH and CMPR submenus. You can find any word in memory (ACQ and REF) by using the search function or scroll keys, and can find the differences between ACQ and REF memories by using the compare feature.

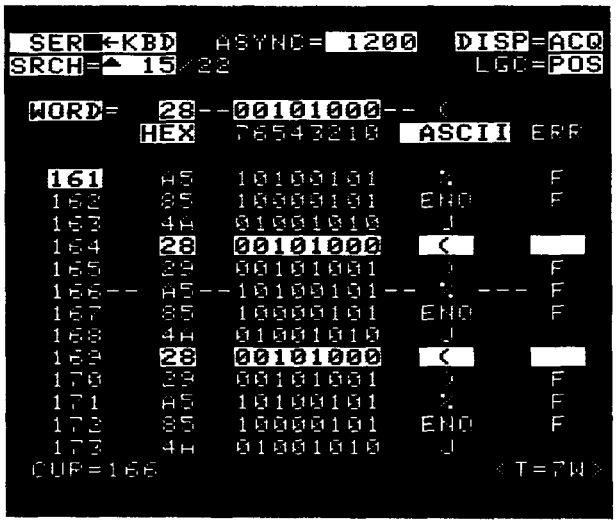


4433-57

Figure 7-11. Character SRCH display of serial acquisition.

4433-59

Figure 7-12. Character CMPR display of serial acquisition.



4433-60

Figure 7-13. State Table SRCH display of serial acquisition.

4433-61

Figure 7-14. State Table CMPR display of serial acquisition.

Figures 7-13 and 7-14 illustrate the resulting State Table SRCH and CMPR submenus. You can find any word in memory (ACQ and REF) by using the search function or scroll keys, and can find the differences between ACQ and REF memories by using the compare feature.

RS-232C PROGRAMMING

INTRODUCTION

The 318/338 has an RS-232C data communication port. It allows a remote operator to control the 318/338 through the data communication line.

Remote control is accomplished by remote control commands sent from a remote data terminal. You can control the 318/338 from this remote keyboard. Data dump, load, and error check functions are also available.

If you want to use the RS-232 port, perform the following steps.

1. Attach the RS-232 cable and MODEM or NULL MODEM. (RS-232 cable connection is shown in Figures 8-1 and 8-2.)
2. Move the edit cursor to the major mode selection field (PRL←RMT).

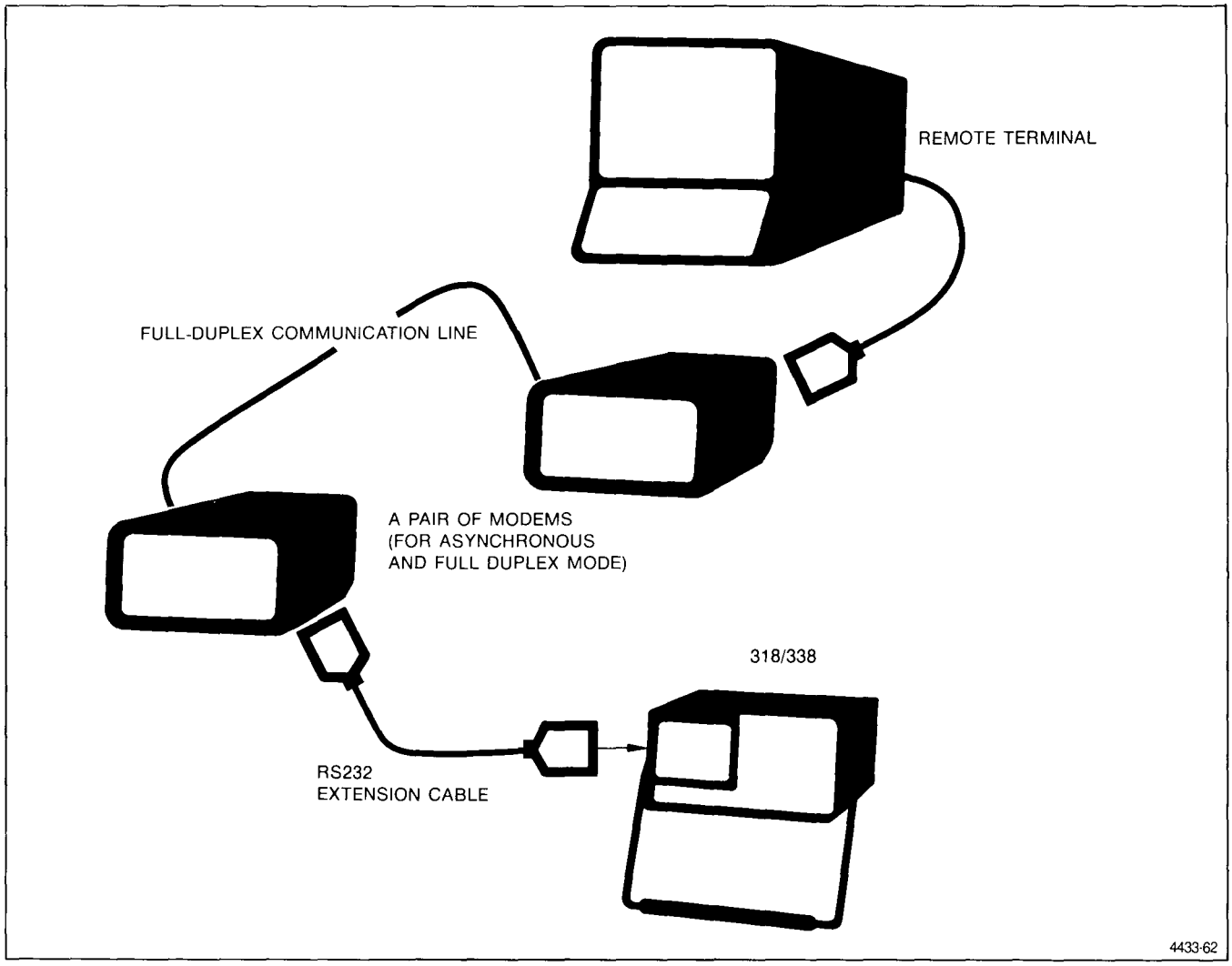


Figure 8-1. RS-232 cable connection for remote terminal.

3. Press SELECT to set source mode to RMT.
4. Press EXECUTE.

The RS-232 Setup display appears on the screen.

MENU FIELDS AND VALUES

Before starting remote control, you can use the RS-232 Setup menu to change the parameters for data communication.

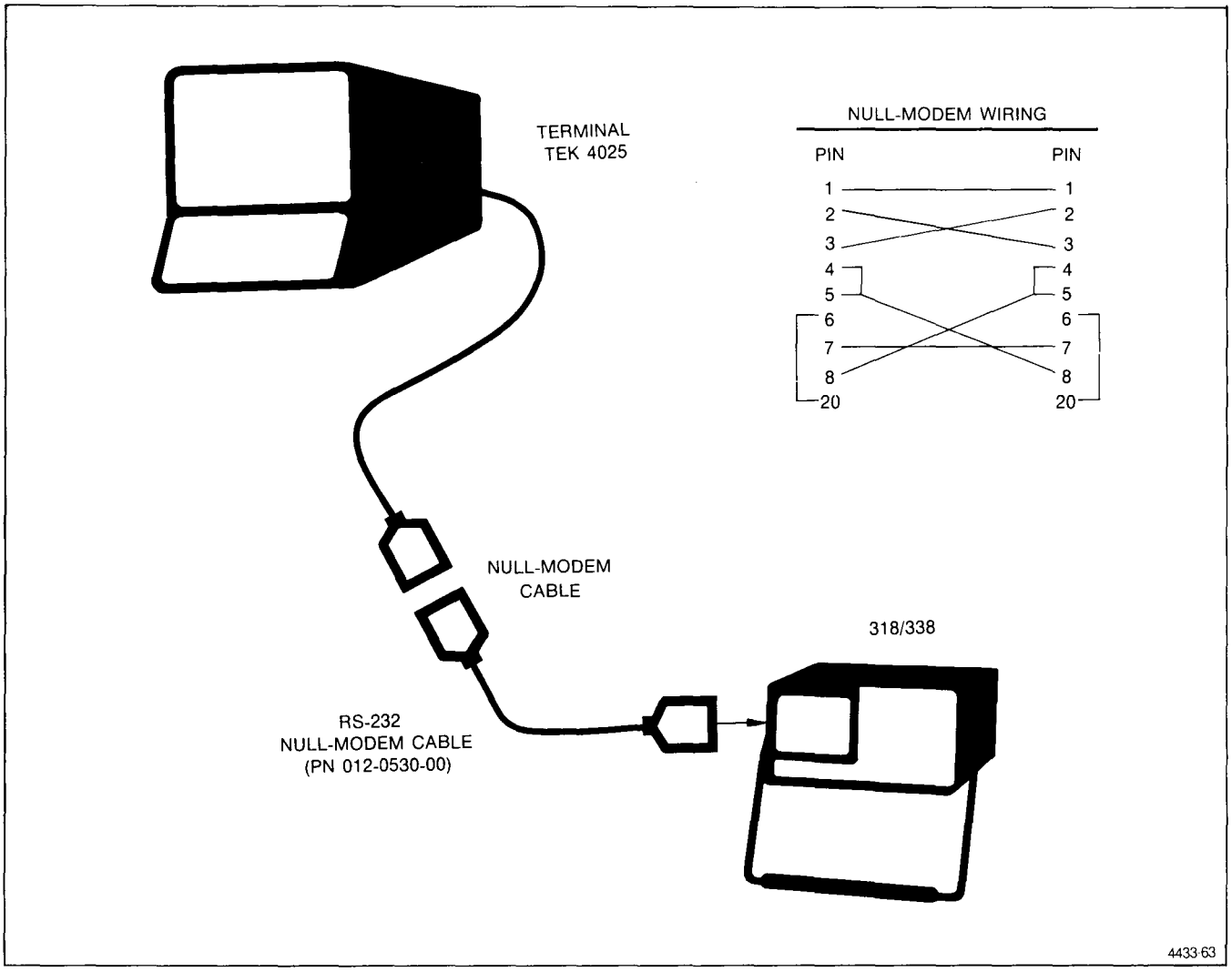


Figure 8-2. RS-232 cable connection for in-house terminal.

Figure 8-3 illustrates the menu and its fields. The selectable fields appear on the screen in reverse video. Refer to the numbered callouts in Figure 8-3 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

(1) ECHO MODE FIELD

The ECHO mode field is used to select the echo-back mode of inputting characters from the remote terminal.

Following is the echo-back mode application:

If ECHO is ON, all characters input at the remote terminal are sent back from the 318/338 and displayed at the remote terminal.

If ECHO is OFF, characters input at the remote terminal are not sent back from the 318/338 and are not displayed at the remote terminal.

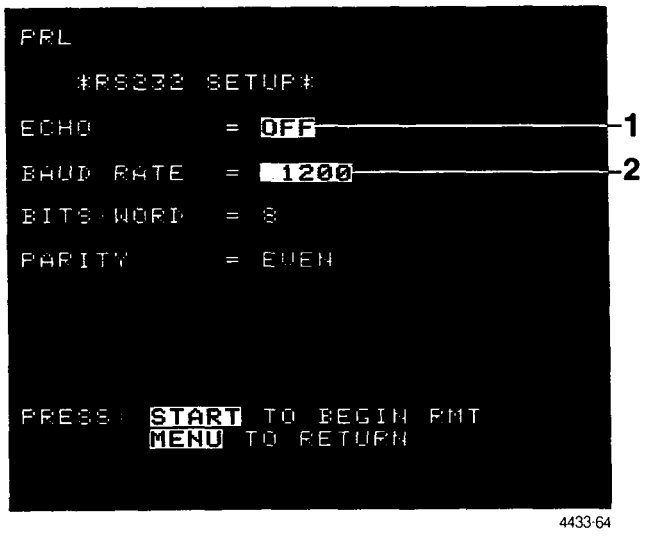


Figure 8-3. RS-232 Setup menu and its reverse-video fields.

[To change echo-back mode]

1. Move the edit cursor to the ECHO mode field.
2. Press SELECT to change echo-back mode.

(2) BAUD RATE FIELD

The BAUD RATE field is used for setting communication line speed. Press INCR or DECR to change the baud rate.

Following is a list of the baud rates supported by the 318/338:

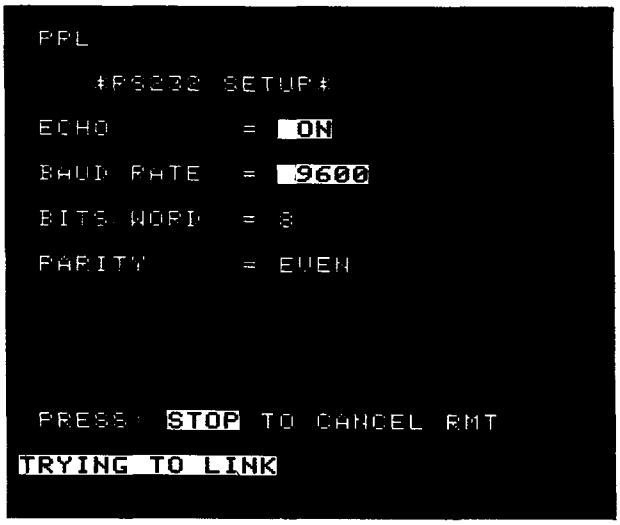
BAUD RATES
---
110 bits/second
150
300
600
1200 <------ default baud rate
2400
4800
9600

[To increase or decrease the baud rate]

1. Move the edit cursor to the BAUD RATE field.
2. Press INCR to increase the baud rate; press DECR to decrease the baud rate.

LINK PHASE OPERATION

With the RS-232 Setup menu on the screen, press START to start remote control. After remote control has been started, all 318/338 keys will be disabled except STOP. The screen will then appear as in Figure 8-4.



4433-65

Figure 8-4. Display of RS-232 Link Phase.

The TRYING TO LINK message on the bottom line of the screen indicates the status of the link. The link phase process is crucial since it checks communication parameters.

The link phase process is as follows:

1. The 318/338 checks the MODEM ready status (tests the DSR signal).
2. The 318/338 sends the link request message to the remote terminal.
3. The 318/338 waits for the IDENT command to be typed in on the remote terminal to establish the communication link.
4. If the IDENT command is not received within about 1.5 minutes, the 318/338 sends the link request message again.
5. Step 4 is repeated up to ten times, or until the 318/338 receives the IDENT command.
6. If the 318/338 receives the IDENT command, link phase is complete and the 318/338 sends the LINK ESTABLISHED message to the remote terminal.

The 318/338 then returns to the previous menu and is able to accept remote control command.

If the 318/338 does not receive the IDENT command from the terminal or modem, link phase has failed.

The 318/338 returns to the RS-232 setup mode and displays NO RESPONSE on the bottom line of the screen.

NOTE

The operator of the remote terminal must type in IDENT after receiving the link request message. The operator will then receive the LINK ESTABLISHED message.

REMOTE MESSAGE

The remote control mode has seven unique status messages. These messages appear at the bottom left of the 318/338 screen in reverse video.

Status is indicated by the remote messages as follows:

NOTE

Normal operation to terminate remote control:

1) Press STOP on the 318/338.

2) Send LOCAL command to the 318/338 from the remote terminal.

REMOTE MESSAGE	STATUS OF THE 318/338
TRYING TO LINK	the 318/338 is waiting for the IDENT command from the remote terminal.
NO RESPONSE	appears when the 318/338 does not receive the IDENT command within 15 minutes after the start of link phase.
REMOTE START	allows the 318/338 to accept remote control commands.
REMOTE END	appears when remote mode is terminated by normal operation.

The following three messages indicate communication line errors. When these errors occur, remote mode is closed automatically except when doing link phase.

COMM ERR: DSR	MODEM status DSR is not ON. This indicates that the MODEM cable is not connected or MODEM power is not ON. The 318/338 checks DSR at the start of remote control.
COMM ERR: CTS	MODEM status CTS is not ON. Indicates a communication line or MODEM error. The 318/338 checks CTS while it is transmitting.
COMM ERR: CD	MODEM status CD is not ON. Indicates a communication line or MODEM error. The 318/338 checks CD while it is receiving.

REMOTE CONTROL OPERATION AT THE TERMINAL

The RS-232 port allows a remote operator to control the 318/338 over the MODEM or NULL MODEM. This is referred to as remote control operation.

The communication mode of the RS-232 option is ASYNCHRONOUS on FULL DUPLEX line, and the remote terminal must be in the same mode. If it is not, data communication is impossible.

Remote control is performed by the remote control commands supplied from the remote terminal. The remote control commands include all of the 318/338 keyboard functions, memory data control functions, and some convenience functions. The following paragraphs describe these remote commands.

COMMAND SEQUENCE

The input character from the terminal will be effective as the remote command only if it is sent after the command prompt character is received.

If you send a character before the prompt is received, the input is ignored.

Command prompt characters are * and ENQ (Hex 05). (ENQ is a non-printing character.)

COMMAND FORMAT

All messages consist of seven-bit ASCII characters.

A carriage return is recognized as the message terminator by the 318/338 (except while the memory is receiving data).

Two or more commands can be combined in a single message if they are separated by a semi-colon.

EXAMPLE: multiple command input format

*DATA;CRT ALL;CRT?

The input message string can be up to 79 characters (includes CR).

A command is separated from its argument by a space. Multiple arguments are not supported.

Arguments consisting of literal alphanumeric strings are enclosed in quotes.

EXAMPLE: alphanumeric string (with message command)

*MESSAGE "TEST MESSAGE"

All numeric arguments are decimal. The range of values is described for each command.

Lower-case command characters are recognized the same as upper-case characters.

A back-space character is available and can be used to correct the last character sent if no carriage return has been sent.

FUNCTION OF REMOTE CONTROL COMMANDS

The 318/338 device-dependent command language is described below. Commands are grouped by functional category.

SYSTEM COMMANDS

The following commands are used for querying system status and changing the system control method.

ERR?

Queries 318/338 for communication error counts. Parity, framing, and overrun errors are monitored and counted by the 318/338. If many errors occurred, you should check the communication line.

The 318/338 responds:

ERROR	PARITY	FRAMING	OVERRUN
COUNT=	0	2	0

occurred error count

ID?

Queries 318/338 for identification.

The 318/338 responds:

ID SONY/TEK 318/338,V79.1 [F1.0]

where [F1.0] represents instrument's current firmware version for mask ROMs (not including patch changes).

IDENT

Only used to establish communication link.

The 318/338 waits for this command to start communicating with the terminal when in the link phase.

LOCAL

Disconnect communication line and reset modem control signals.

The 318/338 responds with the following remote control end message:

REMOTE MODE IS CLOSED

KEYSTROKE COMMANDS

Each of the following commands corresponds to a key on the 318/338 keyboard.

Keystroke commands are divided into the following functional groups:

- menu selection commands
- edit cursor control commands
- parameter entry commands
- acquisition control commands
- scroll commands

MENU SELECTION COMMANDS

These commands correspond to four MENU keys.

SETUP
Corresponds to SETUP key.
Display Setup menu.

THRES
Corresponds to THRESHOLD key.
Displays Threshold menu.

TRIGGER
Corresponds to TRIGGER key.
Displays Trigger menu.

DATA
Corresponds to DATA key.
Displays data on the 318/338 screen.

EDIT CURSOR CONTROL COMMANDS

These commands correspond to four edit cursor vector keys. The <N> argument represents the number of positions you want to move the edit cursor. This number must be in the range 1-255. Zero cannot be used. If you select no number, the argument is automatically set to 1.

NOTE

A space is required between commands and the <N> argument.

DOWN <N>
Corresponds to ↓ edit key.
Moves edit cursor down N times.

LEFT <N>
Corresponds to ← edit key.
Moves edit cursor to the left N times.

RIGHT <N>
Corresponds to → edit key.
Moves edit cursor to the right N times.

UP <N>
Corresponds to ↑ edit key.
Moves edit cursor up N times.

PARAMETER ENTRY COMMANDS

These commands are used to enter parameters. The <N> argument function is the same as for the edit cursor commands.

DECR <N>
Corresponds to DECR key.

INCR <N>
Corresponds to INCR key.

SELECT <N>
Corresponds to SELECT key.

NOTE

While in remote control operation, the SELECT key cannot be used in the ←RMT field.

EXECUTE
Corresponds to EXECUTE key.

ENTER "<STRING>"
Enters alphnumeric <STRING> in field marked by edit cursor.

NOTE

<STRING> is preceded and followed by quotation marks (" ").

There are only 17 legal alphanumeric characters for <STRING> on the 318/338 keyboard. (These characters are: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, and X.)

The <STRING> can be up to 32 characters long.

Use this command when grouping probes, setting the trigger word, and in other cases to set alphanumeric parameters.

ACQUISITION CONTROL COMMANDS

These two commands control data acquisition of the 318/338.

START
Starts 318/338 data acquisition.

NOTE

After pressing START, allow time for data to be updated before typing CRT?.

STOP
Stops 318/338 data acquisition.

SCROLL COMMANDS

These commands move the screen cursor in the DATA display. The <N> argument function is the same as for the edit cursor commands.

SCRDOWN <N>
Corresponds to the →↓ scroll key.
Moves data cursor down N times.

SCRLEFT <N>
Corresponds to the ←↑ scroll key.
Moves data cursor to the left N times.

SCRIGHT <N>
Corresponds to the →↓ scroll key.
Moves data cursor to the right N times.

SCRUP <N>
Corresponds to the ←↑ scroll key.
Moves data cursor up N times.

SCREEN COMMANDS

The following commands are used for reading and writing to the 318/338 screen.

CRT <row>
Selects <row> of the 318/338 screen to send to the terminal in ASCII. The <row> argument must be in 0-19 or CUR or ALL; default <row> is 0.

Following is the function of each argument:

CRT 0 through 19: Numbering begins at the top of the 318/338 screen.

CRT CUR: The 318/338 screen line that includes the edit cursor is selected. CUR argument is converted to a CRT row number and then used.

CRT ALL: All of the 318/338 current screen is selected.

NOTE

The CRT argument is held until it is changed by the CRT command, so it is not neccesary to set the CRT argument each time to transmit the CRT data.

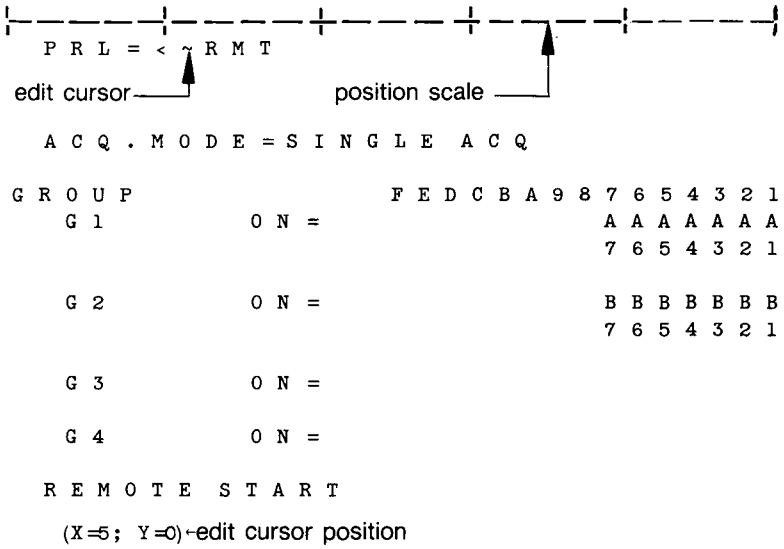
CRT?
Displays on the remote terminal one or all lines from the 318/338 screen in ASCII form. Screen lines are determined by the CRT <row> command. The 318/338 sends position scale data before screen line data and sends edit cursor position data after screen line data.

NOTE

CRT <row> selects the row to be displayed; CRT? displays the <row> on the remote terminal.

Following is a sample output of the 318/338 screen data:

(Parallel setup screen)



NOTE

Edit cursor position data format is as follows:

When X=5 and Y=0, X is the character position, numbering from left of screen. Y is the row number of the 318/338 screen. "^" indicates edit cursor.

Screen data is sent in line lengths of 64 characters with carriage return and line feed characters in between lines.

Waveforms and other special characters of the 318/338 are mapped to ASCII. (See character conversion table later in this section.)

MESSAGE "<STRING>"

Display <STRING> message on the bottom line of the 318/338 screen in reverse video.

The <STRING> argument characters are any ASCII characters, but they convert to the 318/338 standard character set when they appear on the 318/338 screen. The <STRING> argument can be up to 14 characters.

MEMORY DATA CONTROL COMMANDS

These commands are used for reading and writing to the 318/338 system memory; these are disabled while data is being acquired. Output data format for the terminal is hex.

ACQ?

Dump 318/338 acquisition memory data to the terminal.

Following is the list of acquisition memory depth:

MODEL	ACQ-MODE	ACQ-MEMORY DEPTH (BYTES)
318	PARALLEL	512
338	PARALLEL	1024
318	SERIAL	256
338	SERIAL	256

REF?

Dump 318/338 reference memory data to the terminal. Reference memory depth is the same as acquisition memory depth.

GLT?

Dump 318/338 glitch memory data to the terminal. The 318 has a 512-byte glitch memory; the 338 has a 256-byte glitch memory. This command is not executed in SERIAL mode because SERIAL mode has no glitch data.

NOTE

Following is the response memory data format of ACQ?, REF?, GLT? :

MEMORY DUMP DATA

```
"SOH" 0000="STX"00 01 -- (16 BYTE/LINE) -- 0E 0F,"ETX","CR","LF","NULL"
"SOH" 0010="STX"30 31 -------------------- 52 53,"ETX","CR","LF","NULL"
   |    |    |              |    |    |        |    |    |
   |    |    |              |    |    |        |    |    |
"SOH" 01F0="STX"A0 B0 -------------------- 18 19,"ETX","CR","LF","NULL"
"SOH","NULL"x5,"STX","EOF"
```

Characters enclosed in double quotes are ASCII non-printing characters.

"NULL"= null character; HEX CODE: 00 (CNTRL-@)

"SOH" = start of header; HEX CODE: 01 (CNTRL-A)

"STX" = start of text; HEX CODE: 02 (CNTRL-B)

"ETX" = end of text; HEX CODE: 03 (CNTRL-C)

"EOF" = end of file; HEX CODE: 04 (CNTRL-D)

"CR" = carriage return; HEX CODE: 13

"LF" = line feed; HEX CODE: 10

REF <N>
Loads 318/338 reference memory data. Argument <N> selects source of load data; it must be 1-3. The new REF data will not be displayed until data is redisplayed.

Following is the <N> argument function:

<N>=1: Loads from the remote terminal by character.

You must wait for load start until you receive "*READY*" message. Loadable HEX data format (1-byte data made up of two ASCII characters) must be as follows.

"STX",char,char,.....char,"EOF","CR" (Useable data characters are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F; others are ignored.)

If load data is received by the 318/338, data for the A probe is loaded first, followed by the B probe, etc. The "*RECEIVE END*" message will then be displayed on the terminal.

<N>=2: Loads from acquisition memory. Glitch data is also loaded in this operation.

<N>=3: An increment pattern is also loaded in the reference and glitch memory.

TONVM <N>
Saves to 318/338 non-volatile memory with current setup parameters. Argument <N> selects the setup NVM number; it must be 1-3.

FMNVM <N>
Loads current setup parameters from 318/338 NVM. Argument <N> selects the setup NVM number; it must be 1-3.

NOTE

You cannot retrieve acquisition or reference memory data remotely.

NOTE

TONVM <N> and FMNVM <N> commands are available only when cursor position is at X=5, Y=0 (i.e., ←RMT).

The 318/338 responds with the NVM operation status message for these NVM commands.

Refer to following message list: (A description of these messages is given in the *Non-volatile Memory Control* section.)

MESSAGE	CONTENTS
EXECUTED	NVM operation normal end
WRITE PROTECTED	cannot write to NVM
NOT AVAILABLE!	NVM has no data
DATA ERROR!	data error has occurred

HELP COMMAND

HELP?

Allows you to see the remote control command list. It includes all remote commands described above.

ERROR MESSAGE

When the 318/338 cannot accept the remote control command, it sends error messages to the terminal.

Error message list:

ERROR MESSAGE	ERROR DESCRIPTION
CMD ERR	Input command spelling is bad or command string is greater than 79 characters.
ARG ERR	Input argument is not supported by the 318/338 or argument string is over the decided character size.
EXEC ERR	Occurs when the 318/338 executes the command. This error message is displayed on the bottom line of the screen, so you can read it by CRT command.

NON-VOLATILE MEMORY CONTROL

The 318/338 has a 2048-byte non-volatile memory (NVM) for retention of acquired or reference data, and setup parameter data while power is off.

NVM power is protected by a lithium battery for a period of at least five years.

The NVM is divided into four independent areas: NVM #1, #2, #3, and #4.

NVM #1, #2, and #3 are used to store setup parameter data. When setup data is loaded from NVM, data moves from the selected NVM (#1, #2, or #3) to the SYStem-RAM area. When setup data is saved to NVM, data moves from SYS-RAM to selected NVM.

NVM #4 is used to store acquisition or reference data. When ACQ or REF data is loaded from NVM, data moves from NVM #4 to ACQ or REF memory. When ACQ or REF data is saved to NVM, data moves from ACQ-MEM or REF-MEM to NVM #4.

When you save data to NVM that already contains data, new data will overwrite original data. For long-term data retention, you must protect the important data area of NVM.

When you want to use NVM, perform the following operation.

1) Move the edit cursor to the major mode selection field (←KBD).
2) Change the major mode to NVM by pressing SELECT.
3) Press EXECUTE.

The NVM Setup menu appears on the screen.

NVM SETUP MENU

The NVM Setup menu provides access to NVM operation. It sets the NVM menus and display status.

There are two NVM selectable fields:

- NVM MODE - the mode of NVM operation.
- NVM# - the target NVM number.

To start NVM operation after you set NVM menus, press START. The NVM operation result message is displayed after the NVM operation is executed.

If you want to escape from NVM mode, press a MENU key.

DEFAULT DISPLAY

Figure 9-1 illustrates the NVM Setup menu power-up default values.

READING THE MENU AND THE STATUS

Refer to Figure 9-1 when reading the following paragraphs.

NVM MODE refers to the mode of NVM operation. NVM# is the target NVM number for NVM operation.

STATUS indicates the current status of the NVM memories. Numbers 1 through 4 are the unique sections of NVM. NVM #1, #2, and #3 are used to store setup parameters; NVM #4 is used to store acquisition memory or reference memory data.

DEFAULT OPERATION

The power-up default values of the NVM Setup menu (see Figure 9-1) set NVM MODE to LOAD and NVM# to 1.

The STATUS screen display indicates current NVM status information.

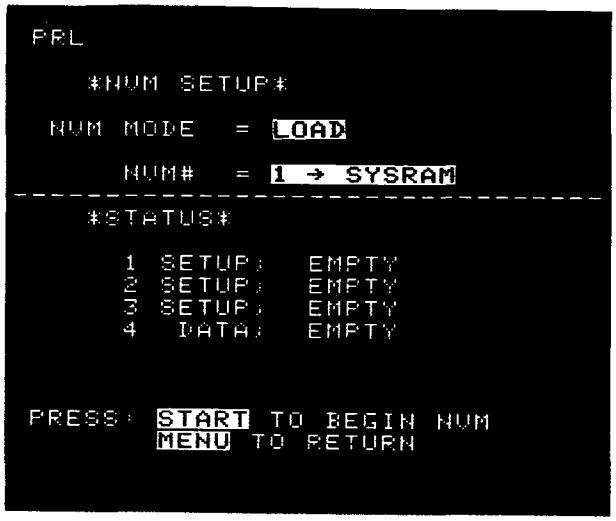


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Figure 9-1. Default display of NVM Setup menu.

MENU FIELDS AND VALUES

Figure 9-2 illustrates the menu and its fields. The selectable fields appear on the screen in reverse video. When you are in the NVM Setup menu, the edit cursor moves between only these two fields.

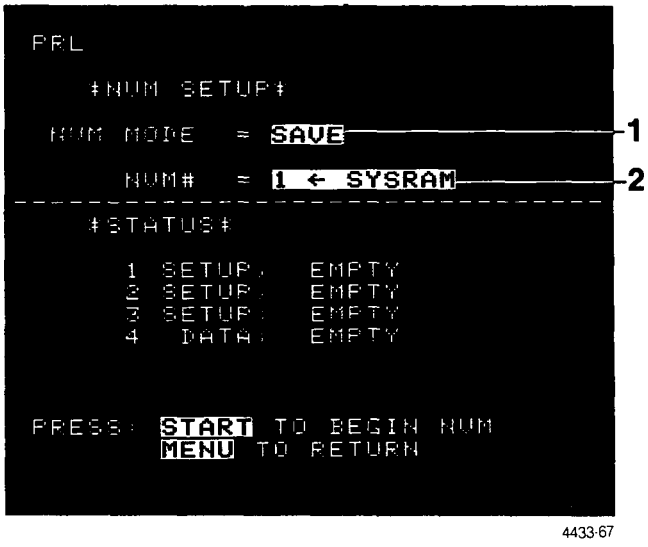


Figure 9-2. NVM Setup menu and its reverse-video fields.

Refer to the numbered callouts in Figure 9-2 when reading the following paragraphs. These callouts are intended as a visual reference, and do not imply sequence of use.

(1) NVM OPERATION FIELD

The NVM operation field is used to set the mode of operation.

The following four operation modes are available:

MODE	FUNCTION
LOAD	loads setup parameters or data from NVM
SAVE	saves to NVM with setup parameters or data
PROTECT	sets NVM to write protect mode
UNPROTECT	sets NVM to read/write mode

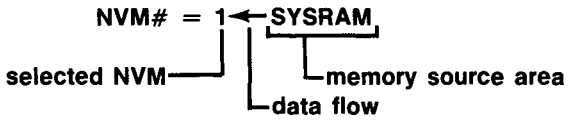
[To select NVM operation mode:]

1. Move the edit cursor to the NVM operation mode field.
2. Press SELECT to select operation mode. The mode display will change.

(2) NVM# FIELD

To retrieve a setup or data from NVM, the major mode of the 318/338 must correspond to the major mode of the stored setup or data (i.e., you must be in PRL mode to retrieve parallel data or setups and in SER mode to retrieve serial data or setups). The major mode of the 318/338 is shown in the first line of the display.

The NVM# field indicator includes three types of information as follows:



Data flow and memory source area appear only when NVM MODE is LOAD or SAVE. The data flow indicator is changed automatically by NVM MODE selection, and the source area indicator is changed by NVM# selection.

The following table illustrates these two indicators' variation by NVM MODE and NVM#:

NVM MODE =	LOAD	SAVE
data flow =	→	←

NVM# =	1	2	3	4
source area =	SYSRAM	SYSRAM	SYSRAM	ACQMEM or REFMEM (refer to NOTE)

SYSRAM = system RAM for setup parameters

ACQMEM = acquisition memory

REFMEM = reference memory

NOTE

When NVM #4 is selected, the "4" indicator will not change if the INCR or DECR key is pressed only once. It is used for two sources of data (acquisition data or reference data). Only the source area is changed when the INCR or DECR key is pressed once.

[To select NVM number:]

1. Move the edit cursor to the NVM # field.
2. Press INCR to increase the NVM number; press DECR to decrease the NVM number.

STATUS DISPLAY

Refer to Figure 9-3 when reading the following.

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Figure 9-3. NVM status sample display.

When operating in NVM mode, the current NVM status is indicated by the STATUS display.

The NVM has the following four types of data status:

STATUS	MEANING
EMPTY	NVM has no data.
FULL	NVM has setup parameter data (this information for NVM #1, #2, #3).
ACQ	NVM has acquisition data (NVM #4 only).
REF	NVM has reference data (NVM #4 only).

Data protect mode displays P in reverse video to the right of data status information. If NVM is protected, you cannot SAVE to NVM.

"PRL:" and "SER:" indicate the major status mode for stored data. If the current major mode does not match this mode, you cannot LOAD from NVM.

After executing NVM operation, the 318/338 updates the status and displays new status automatically.

NOTE

Performing NVM diagnostics will EMPTY (clear) all NVM including WRITE PROTECTED memory.

RESULT OF NVM OPERATION

Refer to Figure 9-4 when reading the following.

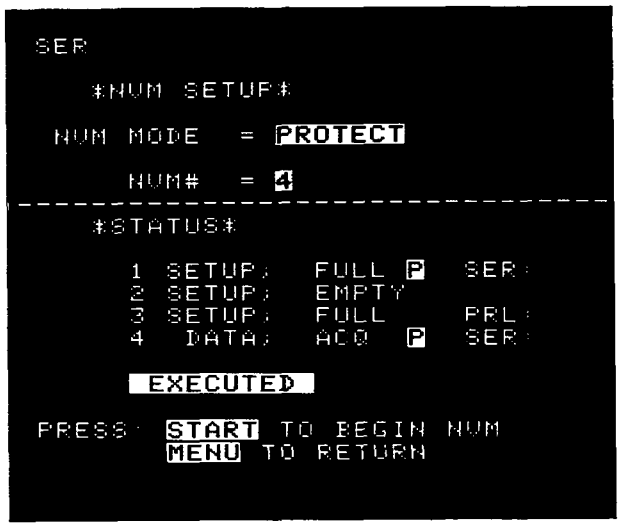

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Figure 9-4. NVM result sample display.

After executing NVM operation, the 318/338 displays the result of the operation under the status information in reverse video.

This message is cleared when NVM# or NVM MODE is changed by keyboard operation.

The messages indicate the following information:

MESSAGE	MEANING
EXECUTED	Selected operation is completed.
WRITE PROTECTED	SAVE mode is attempted while NVM is protected. Operator must unprotect NVM to complete SAVE operation.
NOT AVAILABLE!	LOAD, PROTECT, or UNPROTECT mode is selected, and NVM is EMPTY or NVM major mode does not match current major mode. Operator must check the NVM status.
DATA ERROR!	Data compare error occurred during data transmission. NVM data is usually broken by this error; operator must check the NVM by diagnostic program.

APPENDIX A (ACQUISITION AND PROMPT MESSAGES)

The following table lists the error and acquisition status messages that may appear on the screen. The messages are listed in alphabetical order.

Table A-1
ACQUISITION AND PROMPT MESSAGES

COMM ERR:CD COMM ERR:CTS COMM ERR:DSR	REMOTE MODE message. These messages appear when the 318/338 detects modem or communication line errors.
<SETUP CHANGED>	This message appears when you change the hardware setup while acquiring data.
NO RESPONSE	REMOTE MODE message. Link message timed out.
REMOTE START REMOTE STOP	REMOTE MODE message. Communication link is complete and remote control is started. Remote mode is terminated.
PRESS STOP	In some fields it is necessary to press the STOP key before performing new operations during data acquisition.
USE SELECT USE EXECUTE USE INCR/DECR USE 0-1,X USE 0-7,X USE 0-9,X USE 0-F,X USE A,B,X USE 0-D,X	These messages appear when you use the wrong key while trying to select a field value. The messages list the valid keys.
<SLOW CLOCK>	This message appears when external or internal is longer than 25 ms.
<ST:SETUP CHANGED> <ST:NO TRIG> <ST:T=−1000W> <ST:NO ACQ>	These messages, except for <ST:NO ACQ>, appear when you press the STOP key during data acquisition. <ST:NO ACQ> appears when you press the STOP key while setting up hardware in single acquisition or the first cycle of repeat acquisition.
<T=255W> <T=−100◇>	These messages appear when the 318/338 is finished acquiring data and the numbers included in these messages indicate the trigger position. A "W" means it was internally triggered and an "O" means glitch or Ext. Trig.
TRYING TO LINK	REMOTE MODE message. The 318/338 is waiting for the link message from the terminal.
<WAITING TRIG>	This appears just before the 318/338 starts an acquisition and continues until trigger occurs.

APPENDIX B (ERROR CODES)

Table B-1
ERROR CODES IN SELF TEST

Code	Meaning
00	ROM U1 (00 to 3FFF) may be damaged.
01	ROM U2 (4000 to 7FFF) may be damaged.
02	ROM U3 (Page 1: 8000 to BFFF) may be damaged.
03	ROM U4 (Page 2: 8000 to BFFF) may be damaged.
05	ROM U6 (Page 4: 8000 to BFFF) may be damaged.
06	ROM U7 (C000 to DFFF) may be damaged.
10	Display RAM (E800 to EFFF) may be damaged.
11	System RAM (F000 to FFFF) may be damaged.
KBD	Some keys may be depressed.
TIME BASE	Timer or system clock may be damaged.
T/H	Errors are detected in V3=(V1+V2)/2 test.
WR	Word Recognizer RAMS (WR0 and WR1) may be damaged.
ACQ	High-speed RAM may be damaged.
SQRAM	Sequencer RAM may be damaged.
NDL	Event/Delay carry flag is not set.
SEQ	Some flags for trigger sequence may be damaged.
SER	SI0 for serial acquisition may be damaged.
RMT	SI0 for remote control may be damaged.
NVM	Non-volatile memory may be damaged.

Table B-2
ERROR CODES FOR PARALLEL TESTS IN DIAGNOSTICS MENU

Code	Meaning
20	Cannot write word "55" into WR0, or cannot read data from high-speed RAM.
21	Cannot write word "AA" into WR0, or cannot read data from high-speed RAM.
22	Cannot write word "55" into WR1, or cannot read data from high-speed RAM.
23	Cannot write word "AA" into WR1, or cannot read data from high-speed RAM.
30	Cannot write "55H" into high-speed RAM, or cannot read data from high-speed RAM.
31	Address counter carry flag is not set.
32	Cannot write "0AAH" into high-speed RAM, or cannot read data from high-speed RAM.
33	Address counter carry flag is not set.
40	Cannot write "55H" into SQRAM, or cannot read data from high-speed RAM.
41	Cannot write "0AAH" into SQRAM, or cannot read data from high-speed RAM.
50	N-flag is not set.
51	TRIG'D flag is not set.
52	Stop flag is not set.
53	Acquired data is not equal to expected data.

Table B-3
ERROR CODES FOR SERIAL TESTS IN DIAGNOSTICS MENU

Code	Meaning
B4	Serial status register read error.
B5	Serial receive ready not off.
B6	Serial error register read error.
B7	Serial framing-error bit not off.
B8	Serial overrun-error bit not off.
B9	Serial parity-error bit not off.
BA	EXT TRIG bit not off.
BB	EXT TRIG bit not on.
BC	Data loop-back test error at 75 baud (from RS-232 output to serial input).
BD	Data loop-back test error at 200 baud.
BE	Data loop-back test error at 2400 baud.
BF	Data loop-back test error at 1800 baud.
C0	Data loop-back test error at 1200 baud.
C1	Data loop-back test error at 4800 baud.
C2	Data loop-back test error at 110 baud.
C3	Data loop-back test error at 9600 baud.

Table B-4
ERROR CODES FOR REMOTE TESTS IN DIAGNOSTICS MENU

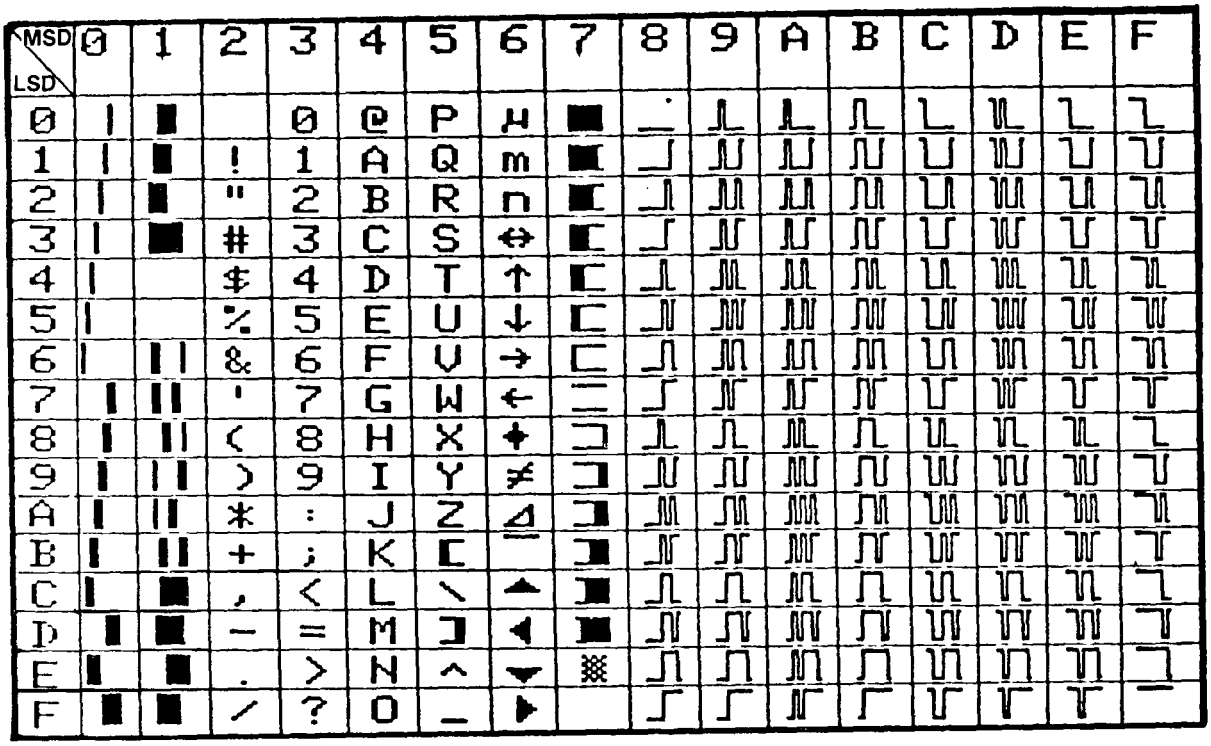
Code	Meaning
96	RTS not on.
97	CTS not on.
98	CD not on.
99	RTS not off.
9A	CTS not off.
9B	CD not off.
9C	DTR not on.
9D	DSR not on.
9E	RS-232 status register read error.
9F	RS-232 receive ready flag not off.
A0	RS-232 transmit empty flag not on.
A2	RS-232 error register read error.
A3	RS-232 framing error flag not off.
A4	RS-232 overrun error flag not off.
A5	RS-232 parity error flag not off.
AA	Increment pattern data loop-back test error at 110 baud (from RS-232 output to RS-232 input).
AB	Increment pattern data loop-back test error at 150 baud (from RS-232 output to RS-232 input).
AC	Increment pattern data loop-back test error at 300 baud (from RS-232 output to RS-232 input).
AD	Increment pattern data loop-back test error at 600 baud (from RS-232 output to RS-232 input).
AE	Increment pattern data loop-back test error at 1200 baud (from RS-232 output to RS-232 input).
AF	Increment pattern data loop-back test error at 2400 baud (from RS-232 output to RS-232 input).
B0	Increment pattern data loop-back test error at 4800 baud (from RS-232 output to RS-232 input).
B1	Increment pattern data loop-back test error at 9600 baud (from RS-232 output to RS-232 input).
B2	Interrupt mode data loop-back test error at 9600 baud.

Table B-5
ERROR CODES FOR NVM TESTS IN DIAGNOSTICS MENU

Code	Meaning
C8	Data error when data pattern is FF.
C9	Data error when data pattern is 00.
CA	Data error when data pattern is 01.
CB	Data error when data pattern is 02.
CC	Data error when data pattern is 04.
CD	Data error when data pattern is 08.
CE	Data error when data pattern is 10.
CF	Data error when data pattern is 20.
D0	Data error when data pattern is 40.
D1	Data error when data pattern is 80.
D2	Data error when data pattern is marching pattern.
D3	Data error when data pattern is incrementing pattern.

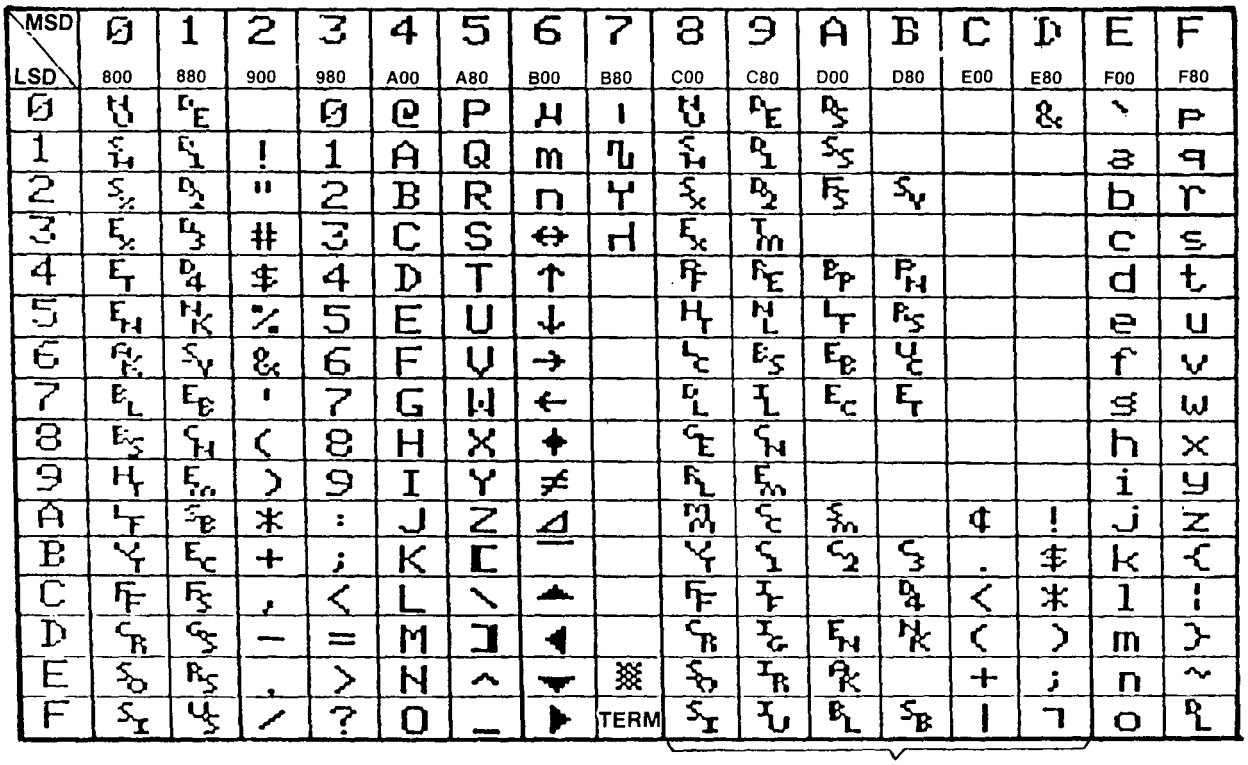
APPENDIX C (CHARACTER SET)

Table C-1
318/338 CHARACTER SET (PARALLEL)



MSD / LSD	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P										
1			!	1	A	Q										
2			"	2	B	R										
3			#	3	C	S										
4			$	4	D	T										
5			%	5	E	U										
6			&	6	F	V										
7			'	7	G	W										
8			(	8	H	X										
9			)	9	I	Y										
A			*	:	J	Z										
B			+	;	K											
C			,	<	L											
D			-	=	M											
E			.	>	N											
F			/	?	O											

Table C-2
318/338 CHARACTER SET (SERIAL)



MSD / LSD	0 800	1 880	2 900	3 980	4 A00	5 A80	6 B00	7 B80	8 C00	9 C80	A D00	B D80	C E00	D E80	E F00	F F80
0				0	@	P								&		
1			!	1	A	Q										
2			"	2	B	R										
3			#	3	C	S										
4			$	4	D	T										
5			%	5	E	U										
6			&	6	F	V										
7			'	7	G	W										
8			(	8	H	X										
9			)	9	I	Y										
A			*	:	J	Z								¢	!	
B			+	;	K								.	$		
C			,	<	L								<	*		
D			-	=	M								(	)		
E			.	>	N								+	;		
F			/	?	O			TERM					|	¬		

EBCDIC

APPENDIX D (SPECIFICATIONS)

Tables D-1, D-2, and D-3 list the electrical, environmental, and physical characteristics of the 318/338. The electrical characteristics are valid when the 318/338 has been adjusted as described in the *318/338 Logic Analyzer Service Manual (Calibration)* at an ambient temperature between +20° to +30°C (+68° to +86°F), is operating at an ambient temperature between 0° to +50°C (+32° to +122°F), and has warmed up for at least 20 minutes.

Table D-1
318/338 ELECTRICAL SPECIFICATIONS

Characteristics	Performance Requirements		Supplemental Information	
PARALLEL ANALYZER FUNCTION				
Data Input (Using P6451 Probe)			See P6451 literature for more information.	
Channels	(318) 16 channels. Glitch data is detected on all 16 channels. (338) 32 channels. Glitch data is detected on low-order 8 channels (on POD A).			
Input R and C	1 MΩ ±5%, paralleled by approx. 5 pF (without leads).			
Minimum logic swing	500 mV p-p 4% of threshold voltage.			
Maximum logic swing	−15 V to threshold voltage plus 10 V.			
Maximum non-destructive	±40 V max.			
Glitch data width	5 ns minimum with 350 mV overdrive from threshold.			
Threshold V1 (0.1 V step variable) V2 (0.1 V step variable) V3 TTL	Voltage −10 V to +10 V −10 V to +10 V (V1 + V2) /2 +1.4 V		Accuracy ±0.2 V ±0.2 V ±0.2 V ±0.2 V One of four levels is selectable for each pod.	
Sampling				
Clock source	internal or external			
External clock mode (using P6107 Probe)	318	338	Typically: 318	338
Data setup time	13 ns min.	14 ns min.	8 ns	10 ns
Data hold time	0 ns max.	0 ns max.	−3 ns	−1 ns
Clock period, minimum	20 ns	50 ns		
Clock pulse width High-logic level Low-logic level	 9 ns min. 9 ns min.	 15 ns min. 15 ns min.		

Table D-1 (cont.)

Characteristics	Performance Requirements		Supplemental Information
Input R and C	10 MΩ ±3% paralleled by approx. 13 pF at probe tip.		1.0 MΩ ±5% paralleled by approx. 20 pF at BNC.
Minimum logic swing	700 mV p-p centered on threshold voltage.		
Maximum logic swing	±20 V peak.		
Maximum non-destructive	400 V peak at probe tip. 40 V peak at BNC input connector.		
Threshold	Voltage		Accuracy
V1 (0.1 V step variable)	−10 V to +10 V		±0.23 V
V2 (0.1V step variable)	−10 V to +10 V		±0.23 V
V3	(V1 + V2) /2		±0.23 V
TTL	+1.4 V		±0.23 V
Clock polarity	+ or − edge		
Internal clock mode	318	338	
Sample interval	20 ns to 500 ms/ sample in 1-2-5 sequence.	50 ns to 500 ns/ sample in 1-2-5 sequence.	
Crystal oscillator			100 MHz ±0.005 MHz
Data pulse width to ensure sampling, minimum	1 sample interval +5 ns		
Maximum data skew between channels	10 ns max.		Typically: 5 ns
Data Memory Depth			
	(318)		
Acquisition memory	16 X 256 bits		
Reference memory	16 X 256 bits		
Glitch memory	16 X 256 bits		
	(338)		
Acquisition memory	32 X 256 bits		
Reference memory	32 X 256 bits		
Glitch memory	8 X 256 bits		

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
Triggering		
Trigger source	internal, glitch, or external	
Internal trigger		Word trigger and glitch trigger are OR'ed together.
Word recognizer	Three: Word "A", Word "B", and Word "C"	Selected channels are AND'ed together.
Input	All data input channels from P6451 data acquisition probe.	
Bit condition selection	Logic 1, Logic 0, or X (don't care)	
Recognizer sequence	NXWA [FLW'D BY / THEN / OR / OFF] WB [FLW'D BY / THEN / OR / RESET ON / OFF] WC N: number of WA events, 65,000 max.	
Glitch trigger		Selected channels are OR'ed together.
External trigger		
External trigger input	Mini-jack connector on the right side panel, TTL compatible.	
Threshold	1.4 V nominal (TTL level)	
Polarity	+ or − edge	
Pulse width, min.	20 ns	
Trigger position		In delay mode, the trigger position is assigned by the user as follows: Trigger position = (250 − delay value).
Begin	word 7	
Center	word 127	
End	word 247	
Delay	word 250 (when delay value is set to 0)	
Trigger position accuracy	±1 clock	External trigger only.
Trigger mode	Immediately (first trigger) or After Memory Full	If instrument does not complete full memory acquisition before the end of store, a fraction of the display is indicated as "invalid" data on data display.

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
Trigger output	Initiated high when an internal trigger sequence, glitch trigger, or external trigger was detected. Reset on next acquisition start.	
Output level	TTL	0.7 V or less for low level output.
Voltage, maximum	+6 V	2.4 V or more for high level output.
Current, maximum		
High-logic level	−1 mA	
Low-logic level	2 mA	
Typical propagation delay	60 ns after the trigger event is clocked and detected with internal clock.	
	80 ns after the trigger event is clocked and detected with external clock.	Measured from external clock input to trigger output.
	±1 clock interval when external trigger is used.	Measured from external trigger input to trigger output.
Qualifier		
Input	9th channel of each P6451 probe is used as a qualifier input.	For more information, refer to P6451 literature.
Input R and C	1 MΩ ±5%, paralleled by approx. 5 pF (without leads).	
Minimum logic swing	500 mV p-p centered on threshold voltage.	
Maximum logic swing	−15 V to threshold voltage plus 10 V.	
Maximum non-destructive	±40 V max.	
Threshold		Threshold level for qualifier input is same as data inputs.
Mode	Each input is programmable for use as either a clock (clock + trigger) or trigger qualifier.	All inputs chosen as clock qualifiers are ANDed together to qualify the clock. All inputs chosen as trigger qualifiers are ANDed together to qualify the trigger.
	318 / 338	
Setup time	14 ns max. / 20 ns max.	
Hold time	0 ns max. / 0 ns max.	
Polarity	Selectable HI or LOW.	

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
Data Display		
Timing diagram mode		
Number of channels	Maximum of 8 channels present on the screen at one time.	
Window size	256 (requires fuzz character), 196 bits in mag 1, 98 bits in mag 2, 49 bits in mag 4.	
Channel ordering		Channel reordering is specified on the timing data display. A single channel need not be unique within the timing display. Timing channel reordering does not alter the trigger characteristics.
Display page selection	318: 2 pages; 338: 4 pages	
Glitch display	Glitch information can be displayed on timing diagram as a bit-width transition edge.	
CRT DISPLAY SYSTEM		
CRT		
Display area		Approx. 6.8 cm (W) X 5.4 cm (H)
Phosphor		P 31
Geometry		1 mm bot maximum on any straight vertical or horizontal line.
Linearity		1.4 times maximum or 0.9 times minimum at the corner of display area in comparison to same character positioned at center screen.
Accelerating voltage		Approx. 6 KV
Deflection current		
vertical		Approx. 300 mA p-p
horizontal		Approx. 1A p-p
Screen buffer memory size		1280 X 8 bits
Screen format		32 characters/row, 20 rows/screen
Refresh rate		60 frames/second
Character generation		
character matrix		5 X 7 character 7 X 10 block
character ROM size		2 K byte for parallel function 2 K byte for serial function

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
Composite video output	525-line interlaced 60 Hz composite video V_{glitch}: approx. 0.7 V with 75 Ω termination V_{on}: approx. 0.3 V with 75 Ω termination V_{off}: approx. 0 V with 75 Ω termination V_{sync}: approx. −0.3 V with 75 Ω termination Vh_{sync}: 63.5 μs ±0.1 μs Tv_{sync}: 16.7 mS ±0.1 ms	
Output impedance	Approx. 75 Ω	
TEST SIGNAL OUTPUT		
Test Output		
Output level	TTL level	0.7 V or less for low-level output. 2.4 V or more for high-level output.
Voltage, maximum	+6 V peak	
Current, maximum		
High-logic level		−0.5 mA
Low-logic level		2 mA
Repetition rates	C-10 μs 0-20 μs 1-40 μs 2-80 μs 3-160 μs 4-320 μs 5-640 μs 6-1.28 ms 7-2.56 ms	G-GND These test signals may be accessed by P6451 data probe, P6107 external clock probe, or P6107 serial data probe.
Start Output	Generated when the instrument begins to acquire data.	
Output level	TTL level	0.7 V or less for low-level output. 2.4 V or more for high-level output.
Voltage, maximum	+6 V peak	
Current, maximum		
High-logic level	−1 mA	
Low-logic level	2 mA	
Pulse width	Approx. 650 ns	

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
POWER SUPPLY		
Ranges of line voltages	90 V to 132 V AC or 180 V to 250 V AC, 48 Hz to 440 Hz, single phase	
Power consumption	95 W max, 150 VA max.	
DC supply voltages		
+12 V Supply		
Regulation	±1 V max.	
Ripple	50 mV p-p max.	
Max. rated current	0.07A	
Current limit point		Three terminal regulator
−12 V Supply		
Regulation	±1 V	
Ripple	50 mV p-p	
Max. rated current	0.07A	
Current limit point		Three terminal regulator
+5 V Supply		
Regulation	±0.05 V max.	
Ripple	50 mV p-p max.	
Max. rated current	1.5 A min., 2.6 A max.	
Current limit point		110% - 200%
−5 V Supply		
Regulation	±0.05 V	
Ripple	50 mV p-p max.	
Max. rated current	4.0A min., 7.4 A max.	
Current limit point		110% - 200%
−3.3 V Supply		
Regulation	±0.05 V	
Ripple	40 mV p-p	
Max. rated current	0.5 A min., 1.2 A max.	
Current limit point		110% - 200%

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
−2 V Supply		
Regulation	±0.02 V max.	
Ripple	40 mV p-p max.	
Max. rated current	1.0A min., 2.6 A max.	
Fan drive voltage		Typically: 10 V - 11 V at T_a = 25°C
SERIAL STATE ANALYZER FUNCTION		
Data Input (Using P6107 Probe)		
Input R and C	10 MΩ ±3%, paralleled by approx. 13 pF at probe tip.	P6107 probe should be compensated for 40 pF input capacitance.
	1 MΩ ±5%, paralleled by approx. 40 pF at BNC.	
Minimum logic swing	500 mV p-p centered on threshold voltage.	
Maximum logic swing	±30 V peak.	
Maximum non-destructive	400 V peak at probe tip.	
	40 V peak at BNC input connector.	
Threshold voltage	Voltage at probe tip:	Accuracy:
V1 (0.1 V step variable)	−10 V to +10 V	±0.23 V
V2 (0.1 V step variable)	−10 V to +10 V	±0.23 V
V3	(V1 + V2) /2	±0.23 V
TTL	1.4 V	±0.23 V
		One of four levels is selectable. Sets threshold voltage at 0 V + 3 V for measurement of RS-232C interface signal.
Sampling		
Clock source	internal or external	
External clock input (using P6107 probe)	P6107 probe (the same probe as parallel)	
External clock polarity	+ or − edge	

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
Data sampling rates		
Internal clock for asynchronous mode	50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600 and 19200 bits per second	16X sampling clock
Accuracy of internal clock	±0.02%, except 110-134.5 bits per second. At these clock rates, the accuracy is relaxed to 0.9%.	
External clock for asynchronous mode	Up to 19200 bits per second. 1X or 16X, selectable.	1X sampling clock
External clock for synchronous mode	Up to 19200 bits per second.	
Setup and hold time for synchronous mode.		
Setup time	3 μs maximum with respect to external clock edge.	
Hold time	3 μs maximum with respect to external clock edge.	
Stop bit (asynchronous mode only)	Responds to one or more.	
Trigger output	The trigger output is initiated high when the preset trigger words or external trigger was detected. Reset on next acquisition start.	
Data Display		
State Table mode		
Data format	Hex, Binary, Octal, ASCII, EDCDIC radix.	
Data table size	13 rows.	
Parity error	Parity error is indicated as "P" in the error display column adjacent to ASCII character display column, if programmed.	
Framing error (asynchronous mode only)	Framing error point is indicated as "F" in the error display column.	
Overrun error	Overrun error point is indicated as "O" in the error display column.	Overrun error occurs when the data speed is faster than instrument's data-handling speed.

Table D-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
RS-232C INTERFACE		
Data transmission timing	asynchronous only	
Communication mode	full duplex	
Bits/Characters	8 bits with parity	ASCII characters
Parity	even	
Stop bit	Responds one or more, sends one.	
Remote echo selection	ON or OFF	
Data transfer rate	110, 150, 300, 600, 1200, 2400, 4800, 9600, BPS.	
Signal characteristics	Meets RS-232C standard.	
I/O connector	25-pin standard connector	
	Pin 1 protective ground 2 transmitted data 3 received data 4 request to send 5 clear to send 6 data set ready 7 signal ground 8 received line signal detector 20 data terminal ready	GND to DCE from DCE to DCE from DCE from DCE GND from DCE to DCE
	inputs: 3, 5, 6, 8 mark or OFF: −25 V to −3 V space or ON: +3 V to +25 V input impedance: 3 KΩ to 7 KΩ	
	outputs: 2, 4, 20 mark or OFF: −7.5 V maximum space or ON: +7.5 V minimum with load impedance: 3 KΩ minimum	
NON-VOLATILE MEMORY		
Memory size	3 pages for setup parameters; one page for ACQ or REF data.	8 X 2048 bits
Non-volatile period	Approx. 5 years at room temperature.	
Non-volatile Memory control	From keyboard or RS-232 bus.	
Battery		Lithium battery (battery capacity: 750 mAH or more)
Battery voltage check	A check is performed of the battery at power-up diagnostic.	

Table D-2
318/338 ENVIRONMENTAL SPECIFICATIONS

Characteristics	Performance Requirements	Supplemental Information
Temperature		
Operating	0°C to +50°C	
Storage	−55°C to +75°C (but contents of non-volatile memory may be lost when temperature range exceeds −40°C)	
Altitude		
Operating	To 15,000 feet. Maximum allowable ambient temperature decreased by 1°C/1000 feet from 5000 feet to 15,000 feet.	
Storage	To 50,000 feet.	
Humidity	Five cycles (120 hrs. total) with equipment tested at 90% to 95% relative humidity. Tested non-operating at 60°C and operating to meet MIL-STD-810C method 507.1 procedure 1 V, modified as specified in MIL-T-28800B paragraph 4. 5. 5. 1. 2.	class 5
Vibration		
Operating (062-2858-00)	A 15-minute sweep along each of 3 major axes at a total displacement of 0.015 inch p-p (2.3 g's at 55 Hz), with frequency varied from 10 Hz to 55 Hz to 10 Hz. Hold 10 minutes at each major resonance, or if no major resonance present, hold 10 minutes at 55 Hz.	
Shock		
Operating and storage (062-2858-00)	30 g's 1/2 sinewave, 11 ms duration, 3 shocks per axis in each direction for a total of 18 shocks.	
Electromagnetic compatibility	Meets FCC part 15, subpart J, class A	
Transportation		
Package vibration		30 minutes slightly in excess of 1 g.
Pagkage drop (062-2858-00)		3 feet, 10 drops on any corner, edge, or flat surface.

Table D-3
318/338 MECHANICAL SPECIFICATIONS

Characteristics	Performance Requirements	Supplemental Information
Weight		
Net, without accessories	about 5.1 Kg	
Shipping, domestic	about 12 Kg	
Dimensions		
Heights		
without accessory pouch	12.0 cm (4.7 in)	
with accessory pouch	17.4 cm (6.8 in)	
Width with handle	23.7 cm (9.3 in)	
Depth, handle not extended	40.9 cm (16.1 in)	
Depth, handle extended	49.2 cm (19.4 in)	