

Publication Number 0120-0014-10

November 1984

K205 LOGIC ANALYZER

USERS MANUAL

Gould, Inc., Design & Test Systems Division
4650 Old Ironsides Drive
Santa Clara, CA 95054-1279
Telephone: (408) 988-6800
TWX/TELEX # 910-338-0509

Copyright © 1984. No part
of this publication may be
reproduced without written
permission from Gould Inc.,
Design and Test Systems
Division. Printed in U.S.A.



K205 Logic Analyzer with Disk Drive Option

WARNING

This equipment has not been tested to show compliance with new FCC Rules (47 CFR Part 15) designed to limit interference to radio and TV reception. Operation of this equipment in a residential area is likely to cause unacceptable interference to radio communication requiring the operator to take whatever steps are necessary to correct the interference.

The following procedures may help alleviate the Radio or Television Interference problems:

1. Reorient the antenna of the receiver receiving the interference.
2. Relocate the equipment causing the interference with respect to the receiver (move or change relative position).
3. Reconnect the equipment causing the interference into a different outlet so the receiver and the equipment are connected to different branch circuits.
4. Remove the equipment from the power source.

NOTE:

The user may find the following booklet prepared by the FCC helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock Number 004-000-00345-4.

PREFACE

This manual describes the capabilities, functions and operation of the K205 Logic Analyzer. Procedures are provided for a user to record and examine address, data and control signals of 8 and 16-bit microprocessors, ECL based systems, gate arrays, bit slice processors and other high speed microprocessors.

A Glossary of Terms is included in Appendix A of this manual. The Glossary describes unique hardware and software terms associated with operation of the K205.

The material in this manual reflects the Control Firmware level valid on November 1984, and is up-to-date at the time of publication, but is subject to change without notice.

Copies of this publication and other Gould Inc., Design and Test Systems Division publications may be obtained from the Gould Inc., Design and Test Systems Division sales office or distributor serving your locality.

If you require assistance on this product, please call Gould Inc., Design and Test Systems Division Customer Service on the toll-free, hot-line number listed below:

Nationwide (800) 538-9320/9321

California (800) 662-9231

WARRANTY

The Gould Inc., Design and Test Systems Division K205 is warranted against defects in materials and workmanship for a period of one year from date of shipment. Any floppy disk or hard disk drives attached to or contained within this equipment are warranted for 90 days from date of shipment. Gould Inc., Design and Test Systems Division will repair or replace products that prove to be defective during the warranty period.

Warranty service must be performed at a Gould Inc., Design and Test Systems Division authorized service facility. The customer must call Gould's Customer Service department at the toll-free numbers listed in the front of this manual and obtain a Return Authorization number prior to returning the unit for service. If the unit fails within 30 days of shipment date, Gould Inc. will pay all shipping charges relating to the repair of the unit. Units under warranty, but beyond the 30 day period should be sent to Gould Inc. prepaid, and Gould Inc. will return the unit prepaid. The customer must pay all shipping charges for units out of warranty.

Misuse of, abuse of or tampering with this unit will, at the discretion of Gould Incorporated, cause this warranty to be null and void.

CONTENTS

Chapter		Page
1	INTRODUCTION	
	GENERAL DESCRIPTION	1-1
	FEATURES AND APPLICABILITY.	1-1
	Software Control	1-1
	External Interface	1-3
	Reconfigurable Hardware and Software	1-3
	Trace Control.	1-4
	Tolerance Comparison Analysis.	1-4
	K205 HARDWARE CONFIGURATION	1-4
	Threshold/GPIB/RS-232 Board.	1-4
	Clock Board.	1-6
	MPU Board.	1-6
	Display Board.	1-6
	Data Boards.	1-6
	Control Boards	1-7
2	SPECIFICATIONS	
	K205 Unit Configuration.	2-1
	Power Requirements	2-1
	Physical Dimensions And Weight	2-1
	Environmental Limits	2-2
	Probes	2-2
	Data Inputs.	2-3
	Clocks	2-3
	External Clock Specification	2-4
	Data Set Up And Hold Time.	2-4
	DVM Input.	2-4
	Signal Outputs	2-4
	Memory	2-5
	Trace Control.	2-5
	Interface.	2-5
	Audible Tone Signal.	2-5
3	PHYSICAL DESCRIPTIONS	
	GENERAL	3-1
	K205 FRONT PANEL CONNECTORS AND SWITCHES.	3-1
	Display.	3-2
	AC Power ON/OFF and Power Indicator.	3-2
	Front Panel Connectors	3-2
	Input Modes.	3-2
	Keypanel	3-3
	Screen Setup and Display Key Group	3-4
	Control and Reference Key Group.	3-5
	Cursor Control Key Group	3-6
	Edit Key Group	3-7
	Record Key Group	3-8
	Data Entry Key Group	3-9
	Special Purpose Key Group.	3-10

Chapter		Page
3	PHYSICAL DESCRIPTION (cont'd)	
	REAR PANEL CONNECTORS AND SWITCHES.	3-11
	Interface Group.	3-11
	RS-232-C Ports	3-12
	Power Input Group.	3-13
4	OPERATION	
	GENERAL	4-1
	USER AIDS	4-1
	ORGANIZATION OF DISPLAYS.	4-1
	GETTING STARTED	4-4
	Probe Test	4-4
	OVERVIEW OF SCREEN APPLICATIONS	4-9
	Screen Format.	4-10
	DESCRIPTION OF DISPLAYS	4-12
	Configuration Screen	4-12
	Date/Time Setup Display.	4-13
	COMMON KEY FUNCTIONS.	4-14
	FORMAT SET UP SCREEN.	4-18
	Data Format Field.	4-20
	Fixed Formats.	4-21
	User Specified Format.	4-21
	Level Display.	4-21
	Section and Inputs Fields.	4-21
	Threshold Fields	4-22
	Polarity Fields.	4-23
	CLOCKS SET UP SCREEN.	4-24
	Clock Mode Field	4-24
	Master Clock Fields.	4-24
	Internal Master Clock.	4-25
	Master Clock Measurements.	4-26
	External Master Clock.	4-26
	Section Input Mode Selection	4-26
	Latch Clock.	4-27
	Sample/Store	4-27
	Split-Timing	4-29
	TRACE CONTROL SET UP SCREEN	4-30
	Set Up Trace	4-31
	Trace Control Command Descriptions	4-32
	Setting Up A Trace Level	4-34
	Pattern Definitions.	4-34
	Review Screen.	4-36
	ARM MODE SETUP SCREEN	4-38
	Comparison Counter Field	4-38
	Arm Mode Field	4-39
	Stop Rearm Condition Fields.	4-39
	Pass Counter Limit Field	4-39
	Auto Save Fields	4-40
	Auto Save Condition.	4-40
	Auto Save Filename	4-40
	Auto Compare Fields.	4-40

4	OPERATION (cont'd)	
	Auto Compare Range Fields	4-40
	Auto Compare Input Fields	4-41
	Auto Edge Tolerance Fields	4-42
	Arm Control	4-42
	Arm Key	4-42
	ADV Key	4-42
	Stop Key	4-42
	Stop W/XFR	4-42
	End of Recording	4-42
	DATA DISPLAY SCREEN	4-44
	Data Display Screen - Edit Mode	4-45
	TIMING DISPLAY SCREEN	4-48
	Timing Display Screen - Edit Mode	4-50
	Total Trace Time	4-50
	GRAPH DISPLAY SCREEN	4-52
5	INPUT/OUTPUT OPERATIONS	5-1
	I/O Function Selections	5-1
	Mode = Field	5-4
	GPiB Address = Field	5-4
	Terminator = Field	5-4
	EOI Output = Field	5-4
	Baud Rate = Field	5-4
	Word Length = Field	5-4
	Stop Bit(s) = Field	5-4
	Parity = Field	5-5
	Protocol = Field	5-5
	I/O Port = Field	5-5
	Record Length	5-5
	Command = Field	5-5
	Output String = Field	5-5
	Input String = Field	5-6
	Status Display	5-6
	Function Keys	5-6
	Interface	5-7
	GPiB	5-8
	RS-232-C	5-8
	GPiB INTERFACE DESCRIPTION	5-9
	GPiB Interface Connection	5-9
	Interface Mode	5-10
	Talk and Listen Mode	5-10
	IFC Command	5-10
	Device Trigger and Device Clear Commands	5-10
	Talk Only Mode	5-10
	Listen Only Mode	5-10
	Termination Characters	5-11
	GPiB STATUS BYTE	5-11
	RS-232-C	5-12
	Protocols	5-12
	RS-232-C Interface Connection	5-12
	The Null Modem	5-12
	Interfacing Two K205's	5-14

5	INPUT/OUTPUT OPERATIONS (cont'd)	
	GENERAL	5-15
	Record Types	5-15
	Conventions for Record Syntax.	5-16
	Quick-Key Choices.	5-16
	Record Categories.	5-16
	INVALID RECORDS	5-16
	RS-232-C.	5-17
	GPIB.	5-17
	RANGE SPECIFICATIONS.	5-17
	INDEX BY COMMAND.	5-19
	CLOCKS DEMUX (CD)	5-23
	CLOCKS MODE (CM).	5-24
	CLOCK/SAMPLE STORE (CS)	5-25
	INTERNAL CLOCK PERIOD (CI).	5-26
	SEND ALL CLOCKS RECORDS (C-).	5-27
	DATA AND CLOCK THRESHOLDS (FT).	5-28
	DATA FORMAT COLUMN DEFINITIONS (FD)	5-29
	DATA FORMAT LEVEL SELECT (FL)	5-30
	DATA FORMAT MODE (FF)	5-31
	DATA POLARITY FIELD (FP).	5-32
	VARIABLE THRESHOLD A (FA)	5-33
	VARIABLE THRESHOLD B (FB)	5-34
	SEND ALL FORMAT RECORDS (F-).	5-35
	TRACE CONTROL COMMAND (TC).	5-36
	TRACE CONTROL PARAMETER FIELD (TP).	5-39
	TRACE CONTROL PATTERN NAME (TN)	5-40
	TRACE CONTROL PATTERN VALUE FIELD (TV).	5-41
	SEND ALL TRACE CONTROL RECORDS (T-)	5-42
	ARM MODE (RM).	5-43
	AUTO COMPARE INPUTS (RI).	5-44
	AUTO COMPARE RANGE (RR)	5-45
	AUTO EDGE TOLERANCE (RE).	5-46
	AUTO SAVE (RS).	5-47
	COMPARISON COUNT MODE (RC).	5-48
	CONTROL CURSOR POSITION (CC).	5-49
	REFERENCE CURSOR POSITION (CR).	5-50
	SEND ALL ARM MODE RECORDS (R-).	5-51
	SEARCH/COMPARE FIRST/LAST/TOTAL (ZT).	5-52
	SEARCH COMPARE SELECT (ZC).	5-53
	SEARCH RESULTS (ZR)	5-54
	SEND ALL SEARCH/COMPARE RESULTS (Z-).	5-55
	ACQUISITION CONTROL (QQ).	5-56
	CLEAR DISPLAY (DC).	5-57
	DEVICE CLEAR (KK)	5-58
	DISPLAY TEXT (DT)	5-59
	PRINT SCREEN DIRECT (PD).	5-60
	PRINT SCREEN LONG (PL).	5-61
	GRAPH EXPANSIONS, LABELS (WG)	5-62
	SEARCH LEVEL (WV)	5-63
	SEARCH VALUE (WS)	5-64

Chapter		Page
5	INPUT/OUTPUT OPERATIONS (cont'd)	
	TIMING EXPANSION (WT)	5-65
	TIMING LABELS (WL)	5-66
	TIMING SEQUENCE (WQ)	5-67
	SEND ALL DISPLAY RECORDS (W-)	5-68
	DON'T-CARE DATA (MX)	5-69
	LEVEL DATA (LA/LB)	5-70
	SAMPLE DATA (MA/MB)	5-71
	SAMPLE DATA PARAMETERS (PA/PB)	5-72
	SEND ALL MEMORY RECORDS (QA/QB)	5-73
	BEEP SELECT (SE)	5-74
	CURRENT DATE AND TIME (SD)	5-75
	CURRENT DVM READING (SV)	5-76
	CURRENT MASTER CLOCK FREQUENCY (KF)	5-77
	K205 CONFIGURATION (KC)	5-78
	CURRENT K205 STATUS (KT)	5-79
	DISPLAY SCREEN (DS)	5-80
	KEYSTROKE RECORDS (\$-, \$-)	5-81
	SEND ALL SETUP RECORDS (--).	5-82
6	OPTIONS INSTALLATION	6-1
	GENERAL	6-1
	CARD CAGE ARRANGEMENT	6-2
	Data Board Configurations	6-2
	Clock Board Connections for C Option	6-2
	INSTALLATION OF SECTION C DATA BOARD	6-4
	Unpacking and Inspection	6-4
	Installation	6-5
	Removal of DOS Option Assembly	6-7
	INSTALLATION OF DOS OPTION	6-8
	Unpacking and Inspection	6-8
	Installation	6-8
Appendices		
A	GLOSSARY OF TERMS	A-1
B	K205 ERROR MESSAGES	B-1
C	DEFAULT VALUES	C-1
Figures		
1-1	K205-D Logic Analyzer User Controls and Indicators	1-2
1-2	K205 Simplified Block Diagram	1-5
3-1	K205 Front Panel	3-1
3-2	Screen Setup and Display Key Group	3-4
3-3	Control and Reference Key Group	3-5
3-4	Cursor Control Key Group	3-6
3-5	Edit Key Group	3-7
3-6	Record Key Group	3-8
3-7	Data Entry Key Group	3-9
3-8	Special Purpose Key Group	3-10
3-9	K205 Rear Panel	3-12

Figures (cont'd)	Page
4-1	Organization of Displays 4-3
4-2	Probe Test Display 4-4
4-3	Arm Mode Screen Display. 4-7
4-4	Timing Screen Display. 4-8
4-5	Setup Parameters for Acquisition Cycle 4-9
4-6	Configuration Screen 4-12
4-7	Date/Time Setup Screen 4-13
4-8	Typical Screen Display 4-15
4-9	Typical Screen Display with Help Messages. 4-16
4-10	Typical K205 Connection. 4-18
4-11	User Specified Format Screen 4-19
4-12	Format Screen with Binary Selected 4-20
4-13	Clock Screen with Standard Clock Mode. 4-24
4-14	Clock Screen With Internal Master Clock. 4-25
4-15	Clock Screen with External Master Clock Selected . . . 4-28
4-16	Trace Control Set Up Screen. 4-30
4-17	Trace Control Setup Screen with Don't-Care Entered . . 4-35
4-18	Trace Control Parameter Setup Review 4-37
4-19	Arm Mode Screen. 4-38
4-20	Auto Compare Range Field 4-41
4-21	Data Display Screen. 4-44
4-22	Data Display Screen in Edit Mode 4-45
4-23	Timing Display Screen. 4-48
4-24	Graph Display Screen 4-52
5-1	I/O Function Menu. 5-2
5-2	I/O Setup Screen 5-3
5-3	Simple Null Modem Wiring Diagram 5-13
5-4	Null Modem Wiring Diagram with DTR/DSR 5-13
5-5	Complete Null Modem. 5-14
6-1	K205 Card Cage Arrangement, Top View 6-3
6-2	K205 Ribbon Cable Connections at Card Cage 6-6
6-3	K205 DOS Power Harness Connection at Power Supply, Top View 6-10
6-4	K205 DOS Assembly, Top View with Cover Removed. . . . 6-10
6-5	Disk Drive Ribbon Cable Connection 6-11
C-1	Arm Mode Default Screen. C-3
C-2	Clocks Default Screen. C-4
C-3	Data Default Screen. C-5
C-4	Date/Time Default Screen C-6
C-5	Format Default Screen. C-7
C-6	Graph Default Screen C-8
C-7	Timing Default Screen. C-9
C-8	Trace Default Screen C-10

Tables

3-1	K205 I/O IEEE-488 Connector Pin-Descriptions 3-11
3-2	K205 RS-232-C Port Pin-Descriptions. 3-12
4-1	Radix Definitions. 4-22
4-2	Trace Control Command Format 4-33
5-1	GPIB Interface Capabilities. 5-9

Tables (cont'd)

Page

5-2	Trace Control Command Entries.	5-36
6-1	Section C 16 Inputs Option Components.	6-4
6-2	DOS Option Components.	6-8

INTRODUCTION

GENERAL DESCRIPTION

The Gould Model K205 Logic Analyzer (Figure 1-1) is a precision, high-performance test and development instrument that monitors and records digital input logic signals generated by the user's external target system. The K205 accepts 32 standard or 48 extended data inputs and 8 standard or 12 extended external clock inputs supplied via probe interface circuits. The extended 16 data and 4 clock inputs are provided by optional hardware.

The K205 provides a 10ns resolution on all channels, sophisticated trigger schemes, versatile clock scheme and a variety of data options to facilitate user operation. The user can rapidly examine and record addresses, data and control signals of ECL based systems, gate arrays, bit slice processors and other high-speed microprocessors.

FEATURES AND APPLICABILITY

Software Control

The K205 control logic performs measurements on the input signals to correlate data/timing characteristics and accomplish comparisons and capture of data samples; the results are then recorded in memory. The measurement operations are menu-driven by resident firmware which is controlled by manipulating various keys on the Keyboard Panel. The menus allow the user to set up test conditions, capture the results of binary logic states via trace control for data-domain analysis and display pulse-train waveforms for time-domain analysis. The display screen presents the results of analysis for examination and/or modification by the user.

The user-friendly control firmware generates the menus for selecting acquisition parameters and allows direct control over the acquisition process; furthermore, the control firmware displays and interprets the acquired data, and informs the user of current system status. Because the control firmware of the K205 is simple to use and versatile, the instrument is suitable for a variety of uses including laboratory software, hardware development, test engineering, and field service testing.

The K205 offers the user a menu-guided Trace Control* that is simple to use, and powerful. Trace levels can be rapidly set up using the menus and front panel keys. The flexibility of trace control is enhanced by a selection of commands that allow the user to select information to record.

Data may be displayed in hexadecimal, octal, binary, ASCII, and EBCDIC format or the user may elect to display the data in a user specified format.

*Gould Inc., Trademark pending

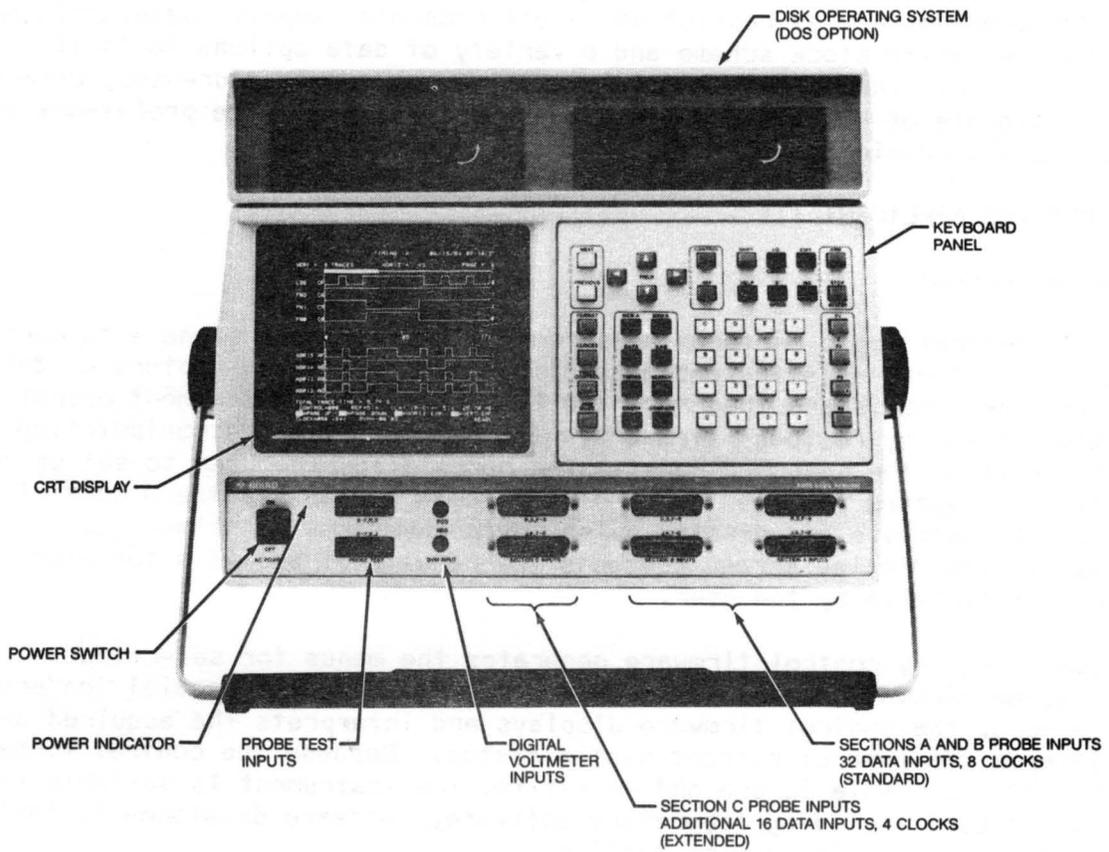


Figure 1-1. K205-D Logic Analyzer User Controls and Indicators

External Interface

The K205 may be interfaced to the user's system via rear panel connectors that provide GPIB or RS-232-C communication linkage. The I/O Setup Screen allows the user to set up parameters and initiate execution of the transfer operation.

The GPIB interface allows parallel transfer of menus and data between the K205 and the user's system. The communications parameters are programmable by the user to set up the following communication models for the GPIB link:

- Talk Only Mode - Transmit data and commands to a user's system.
- Listen Only Mode - Receive data and commands from a user's system
- Talk and Listen Mode - Perform interactive two-way dialogue between the K205 and a user's system to transmit and receive information

The RS-232-C interface allows serial transfer of menus and data between the K205 and a user's device, such as printer, personal computer, terminal, etc. The I/O Setup Screen allows the user to specify conditions, such as Baud Rate, Protocol, Word length, etc., that are used to control the I/O communication.

Reconfigurable Hardware and Software

The user can purchase a K205 unit in a minimum configuration of 32 inputs rated at 100 MHz. At some later date, the unit can be modified at the user's site to meet increased demands by adding 16 additional inputs. The following data input arrangements are supported:

Data inputs:

- 32 Standard Data inputs @ 100 MHz (Bits F-0) Sections A and B
- OR
- 48 Extended Data Inputs @ 100 MHz (Bits F-0) Sections A, B, and C

The user may also include the Disk Operating System (DOS) Option, which contains a dual, 5 1/4" disk drive system that provides the capabilities listed below. The DOS option may be purchased installed on the unit or added by the user at a later time.

- Save data automatically on two disks while the user is not operating the system
- Save setup conditions on the disk and recall at a later time
- Save acquired data and setup menus for later retrieval
- Load Diagnostic Software for troubleshooting K205 equipment operation
- Load Optional Disassemblers that translate binary information for various microprocessor's instructions and data into a mnemonic format.

Trace Control

The trace control functions of the K205 are menu driven and are programmable in an English-like language. Sixteen levels of trace control are available, each of which can be programmed to selectively trace, advance to the next level, jump to any level or stop the recording based on a match or non-match of independent patterns and the status of the delay counter. In conjunction with delay, this control scheme permits the user to locate and store several specific subroutines within a large program.

Tolerance Comparison Analysis

The K205 contains a memory that allows the user to enter Don't-Care states in the Data, Timing, or Arm Mode displays. When the compare function is enabled, comparisons are not made in those areas designated as Don't-Cares; consequently, the user is able to compensate minute timing deviations among the same type of boards.

K205 HARDWARE CONFIGURATION

Figure 1-2 is a simplified block diagram illustrating the major subassemblies of the K205. These subassemblies consist of printed circuit boards that interact with the Master Processor Unit (MPU) board to control K205 circuit functions. The functions of the following printed circuit boards are described in subsequent paragraphs:

- Threshold/GPIB/RS-232 Board
- Clock Board
- MPU Board
- Display Board
- Data Board
- Control Board

Threshold/GPIB/RS-232 Board

The Threshold/GPIB/RS-232 Board provides the fixed and variable threshold voltages for the probe pods. This board also contains an Analog-to-Digital Converter used for The Digital Voltmeter (DVM) and power supply check during power-up diagnostics.

The Threshold/GPIB/RS-232 Board supports the following I/O functions:

1. Two RS-232 ports (one port is labeled AUX)
2. One IEEE-488 Talker/Listener port
3. DVM inputs

Various parameters such as communications source, parity, and baud rate are selectable from the K205 key panel.

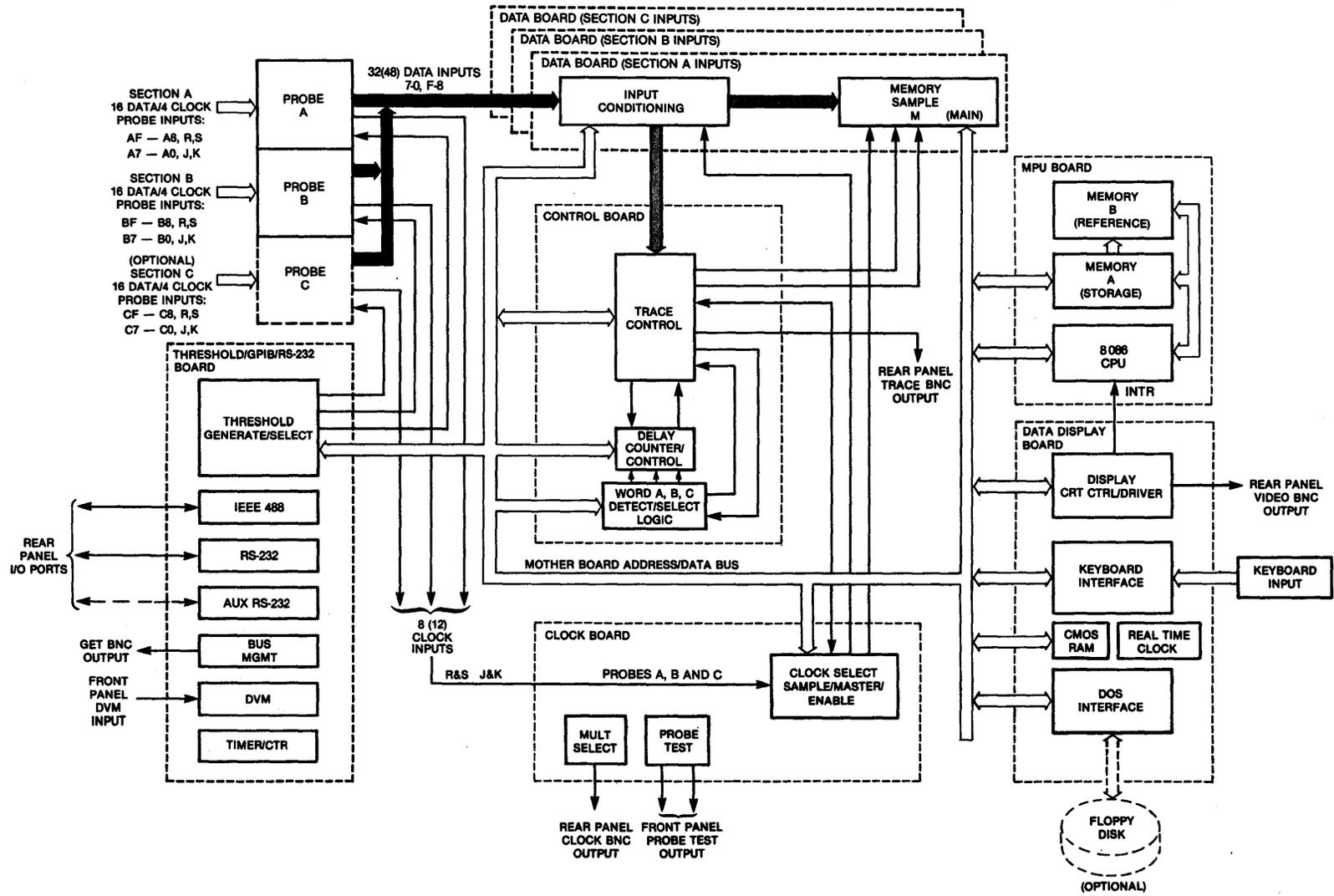


Figure 1-2. K205 Simplified Block Diagram

Clock Board

The Clock Board generates all internal timing, selects between the internal and external clocks, and combines all external clocks. The eight standard external clocks consist of six Sample clocks, AJ, AK, BJ, BK, BR and BS, and two Latch clocks, AR and AS. The 12 extended external clocks consist of six Sample clocks, AJ, AK, BJ, BK, CJ and CK, and six Latch clocks, AR, AS, BR, BS, CR, and CS.

The Clock Board also contains the level memory, which indicates the active program level for a given recording. In addition, this board retains the probe self-test ring counter; this counter is a psuedo ECL signal generator which is connected to the front panel for testing probes and the unit.

MPU Board

The MPU Board contains memories A and B, an 8086 CPU and the operating system firmware. Memories A and B are each 512 sample deep and 48 bits wide. This board provides control functions for the following:

- Display
- Display Setups
- Memory Transfers
- Keyboard
- Memory Functions
- Memory Compares

Display Board

The Display Board contains the keyboard detection circuitry, the CRT scanning and high voltage drive circuitry for the bit mapped display, and the interface circuitry for the DOS option. This board provides output to the VIDEO BNC Connector located on the back panel. This board also has CMOS RAMS to save setups at power down and contains a real-time clock that allows the K205 to log the current time of day and date of each recording.

Data Boards

Up to three Data Boards provide interface from the probes to the Control Board. In addition to sample mode input of data, these boards provide latch/demultiplexing of data by byte, latch mode and glitch capture circuitry.

The high-speed memory on each Data Board is 512 sample deep by 16 bits wide and gathers data at up to 100 MHz. Data is stored in memory on instruction from trace control.

The standard K205 unit employs two Data Boards (Input sections A and B) that accept 32 data inputs and 8 clock inputs. The extended unit has an additional Data Board which provides 16 additional data inputs and 4 clock inputs for a total of 48 data inputs and 12 clock inputs.

Control Board

The Control Board contains high-speed logic to enable the board to recognize trace control commands (GO TO, ADVANCE, TRACE and STOP). Present on this board is a sixteen-state counter for control of internal functions, such as delay. The board also provides word recognition circuitry. The delay function on this board contains an independent counter that advances on each clock pulse. This counter resets on each level change, including a jump to the same level. The delay command may be modified to function only if the parameter occurs when the counter is less than (<), equal to (=), greater than (>), less than or equal to (<=), greater than or equal to (=>), or not equal to (≠) the full count.

The Control Board also provides output to the TRACE BNC Connector located on the back panel.

Chapter 2

SPECIFICATIONS

The following is a summary of the physical, environmental, and operating characteristics of the K205.

K205 Unit Configurations

- Standard Unit: Provides inputs for 32 data signals and 8 clocks via input Sections A and B.
- Extended Unit: Provides inputs for 48 data signals and 12 clocks via input Sections A, B, and C.
- Section C Option: Provides probe inputs for 16 add-on data signals and 4 additional clocks via input Section C.
- DOS Option: Disk Operating System provides two 5 1/4" floppy disk drives mounted in an add-on assembly unit which provides 312K bytes of storage per disk.

Power Requirements

- Input Frequency: 50 or 60 Hz
Input Voltage: 90 to 135 VAC or 180 to 270 VAC
Input Power: 500 Watts without DOS option or 550 Watts with DOS option

Fuses for Rated Voltage:	Voltage Range	Fuse
	90 VAC to 135 VAC	3AG, 8 Amp
	180 VAC to 270 VAC	3AG, 4 Amp

Physical Dimensions and Weight

- Height: 8.6 inches (21.8 Cm) without DOS, 12 inches (30.1 Cm) with DOS
Width: 17.5 inches (44.5 Cm)
Depth: 24.7 inches (62.7 Cm) including handle
- Weight: 45 lbs. (20 Kg) without probes or DOS
55 lbs. (25 Kg) without probes

Environmental Limits

Ambient Temperatures: 39 to 115 Deg.F (4 to 46 Deg.C) OPERATING
-8 to 117 Deg.F (-20 to 50 Deg.C) STORAGE

Relative Humidity: 20% to 80% OPERATING
1% to 95% STORAGE

Max Wet Bulb: 78 Deg.F (25 Deg.C) OPERATING
No condensation STORAGE

Probes

Loading Characteristics:

Signal Inputs

Input resistance: 1 megohm referenced to threshold
Input capacitance: $\leq 6\text{pF}$ ($\leq 15\text{pF}$ with flying leads)

NOTE: Input resistance may approach 500K ohms at voltages exceeding ± 15 volts from threshold.

Maximum input without damage: ± 50 volts peak

Common mode range: ± 0.5 volt maximum between probe and unit probed

Ground Input: Input resistance is 91K ohms referenced to chassis

Probe Transfer Characteristics:

Bandwidth to 90% volts out: $> 100\text{MHz}$

Minimum swing for output: Threshold $\pm 0.20\text{V}$ maximum

Threshold variance: $\pm 15\text{MV}$ maximum, between input signals;
 $\pm 30\text{MV}$ maximum, any two probes

Input compensation: Even to 20% overcompensated

Thresholds: Thresholds are independently selectable for each probe:

TTL, +1.4 volts

ECL, -1.3 volts

VAR A and VAR B

NOTE: Variable thresholds may be set from -9.99 volts to +9.99 volts in 0.01 volt increments. Accuracy of all threshold voltages is 30mV.

Polarity: + or - is selectable for each signal

Data Inputs

32 standard (or 48 extended) data inputs configured in two (or three) input sections, A, B and C. Each section contains two input groups that accept 16 signals (one group for lower Bits 7-0, the other group for upper Bits F-8).

Input Modes: Sample Mode
Latch and Demultiplex Mode
Glitch Mode

Input Frequency: DC to 100 MHz (data)
DC to 50 MHz (clocks)

Clocks

The 32-standard input configuration provides 6 Sample (edge-sensitive) clocks and 2 Latch Enable (level-sensitive) clocks for a total of 8 external clocks.

The 48-extended input configuration provides 6 Sample (edge-sensitive) clocks and 6 Latch Enable (level-sensitive) clocks for a total of 12 external clocks.

Internal: Internal clock is selectable from 20 ns (50 MHz) to 100 ms (10Hz) in decades of time which is divided by units of 1 to 10 (i.e., 100ns, 1 us, 10 us and 1 us, 2 us, 3 us,... 10 us). One internal clock may be programmed per recording. This clock is edge sensitive.

A 10 ns (100 MHz) clock is available to the sample/store sections in addition to the external clock. This clock is edge sensitive.

External: Six external clock inputs which may be combined to form three Sample clocks, three Latch Enable clocks, and one Master (M) clock. These clocks are edge sensitive.

Sample clock: One sample clock may be specified for each input section (A, B, or C) to hold data for the master clock, or move trace data into memory (effective for internal, external, and 100 MHz clocks). This clock is edge sensitive.

Latch clock: A special case of Sample Mode which is used to temporarily hold (by latch) the first byte of multiplexed data. When the latch clock goes false, data is held in the input latched until the latch clock returns to true. The master clock then moves the sample into the pipeline (effective for external clocks only). This clock is edge sensitive.

M-Clock: The master clock is used to shift samples into memory and the trace control logic (effective for internal or external clocks). This clock is edge sensitive.

External Clock Specification:

Frequency: DC to 50 MHz

Pulse Width: 8 ns Minimum

Clock Skew: 7 ns Maximum between any two clock combinations

Latch Clocks Setup: 13 ns Minimum before Sample Clocks

Clock Frequency Measurement: The K205 automatically measures the external clock frequency from 100 Hz to 50 MHz with 0.1% accuracy

Data Set Up and Hold Time

Data must be present 12 ns maximum before, and stable until, the clock active edge. Typical setup time is 8 ns.

Data may change zero ns after the clock active edge

Minimum detectable pulse width is one clock period +5 ns

DVM Input

Range: +/- 20 VDC Maximum

Resolution: 20 mv

Input Impedance: 20k ohms

Accuracy: +/- 0.5%

Signal Outputs

VIDEO, BNC connector: 1 Vp-p into 75 ohms composite video output is compatible with RS-170

CLOCK, BNC connector: ECL active low corresponds to the internal clock

GET, BNC connector: Group execute trigger pulse output for the IEEE-488 Command - TTL

TRACE BNC connector: TTL high output when trace is enabled

Two LEMO connectors: +5V and -5.2V @ 300 mA

Memory

The K205 contains main memory M, storage memory A, and reference memory B. Memory M is organized as 512 by 36 or 52 bits. Four bits of each word are used to store the level at which data was recorded. The CPU reads data from M into A or from A into B. Both A and B are a part of the CPU memory.

The operating system accommodates up to 256K bytes of RAM and 128k bytes of ROM under the control of the 16-bit, 8086 CPU.

Trace Control

Trace control employs 16 trace levels that are defined by user inputs via the display menu and keyboard. Four commands are decoded for each of the sixteen levels. The four commands are TRACE, STOP, JUMP, and ADVANCE. Control begins at level zero.

A delay counter may be programmed from 1 to 65,535 clocks or events to begin tracing after the specified condition occurs. The rear panel BNC output for TRACE is at a TTL level that goes high while the K205 is tracing.

Interface

One RS-232-C Serial I/O Port configured as Data Terminal Equipment (DTE) six-wire system

One Auxiliary Serial I/O Port for RS-232-C (reserved for K205 options)

One IEEE-488 Bus Interface, Parallel Port with Talker/Listener configuration selectable by the user via software control

Timer: A 24-hour, time-of-day clock is backed up by a 2.9 V battery

Back Up Memory: A 2k x 16 CMOS memory with battery backup saves the setup of recording parameters if power is interrupted or when the unit is turned off.

Audible Tone Signal

An audible tone signal (beeper) which indicates keystroke errors can be enabled or disabled by the user via a menu display.

PHYSICAL DESCRIPTIONS

GENERAL

This chapter presents illustrations and functional descriptions of the controls, switches and connectors located on the front and rear panels of the K205.

K205 FRONT PANEL CONNECTORS AND SWITCHES

Figure 3-1 presents an overall view of the K205 front panel. The components of the front panel are categorized to simplify their description.

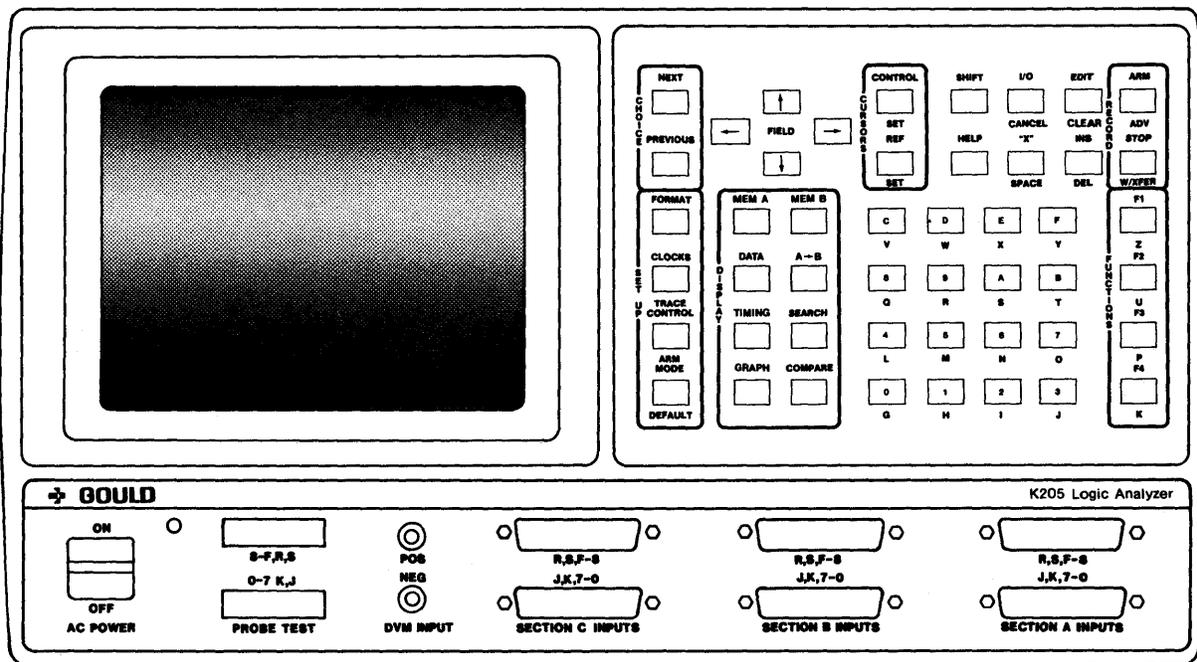


Figure 3-1. K205 Front Panel

Display

The K205 employs a built-in 8 inch diagonal raster scan CRT for display of all indicators, menus and data.

AC Power ON/OFF and Power Indicator

The AC Power switch is a double-pole, single-throw paddle switch. The switch is in the OFF position when the paddle is down and the ON position when the paddle is up. When the unit is on, the POWER indicator is illuminated, indicating the presence of both AC voltage and -5 VDC.

Front Panel Connectors

The front panel connectors, A(7-0) through C(7-0), and A(F-8) through C(F-8), are the data and clock inputs to the K205. The number and configuration of input connectors available to the user is dependent on the options installed in a given unit. The following is a listing of the four different options and active connector configurations:

- 32 Standard Inputs -- four connectors, A(7-0) through B(F-8).
- 48 Extended Inputs -- six connectors, A(7-0) through C(F-8).
- 32 Standard Inputs with DOS.
- 48 Extended Inputs with DOS.

Input Modes

The Input Modes available are described below.

1. Demultiplex

When Demultiplex is selected in Advanced Clocking mode, inputs are made to data channels (7-0) only. Data is internally shorted from input A(7-0) to channel A(F-8), respectively, due to the Latch Clock. Either one, two, or three sections may be in demultiplex mode.

2. Latch

When Latch is selected, those 8 inputs are held by the external latch clock in a temporary register located in front of the sample register.

3. Glitch

When Glitch is selected, any pulse at least 5 nanoseconds wide and 0.250 V across threshold is latched and held to appear as a change of state at the next sample clock. A Glitch is defined as any even number of threshold transitions of an input signal between sample clocks.

4. Sample

In Sample, the user may specify Internal or External clock, with each group of 16 inputs capable of being clocked independently.

Data present at the input is stored at the active transition of the user specified clock. Once data has been stored in the sample flip-flops, it is sent to the trace control board, and to memory for storage, if desired.

5. Store

When Sample is used, data is moved into memory at the Master Clock rate if the Trace Condition is enabled. When Store Mode is selected, data is moved into memory at the Section Store Clock rate if the Trace Condition is enabled. The use of either differing Store clocks for each section or a combination of Store and Sample Clocks can result in split-timing. Split-timing occurs whenever more than one clock rate is used for moving data into memory.

For example, Sections A and B are master clocked externally at 1 Mhz; Section C is store clocked internally at 100 Mhz. If trace is enabled for 2 master clocks, Sections A and B have 2 samples recorded; Section C has approximately 200 samples recorded, resulting in split Data and Timing Screens.

Keypanel

Figures 3-2 through 3-8 present detailed views of the major key groups of the K205 keypanel. Brief descriptions of these key groups are provided following the figures, with detailed descriptions of key functions available in Chapter 4 of this manual.

The keys are arranged in the following functional groups, which are described in subsequent paragraphs:

1. Screen Setup and Display keys
2. Control and Reference keys
3. Cursor Control keys
4. Edit keys
5. Record keys
6. Data Entry keys
7. Special Purpose keys

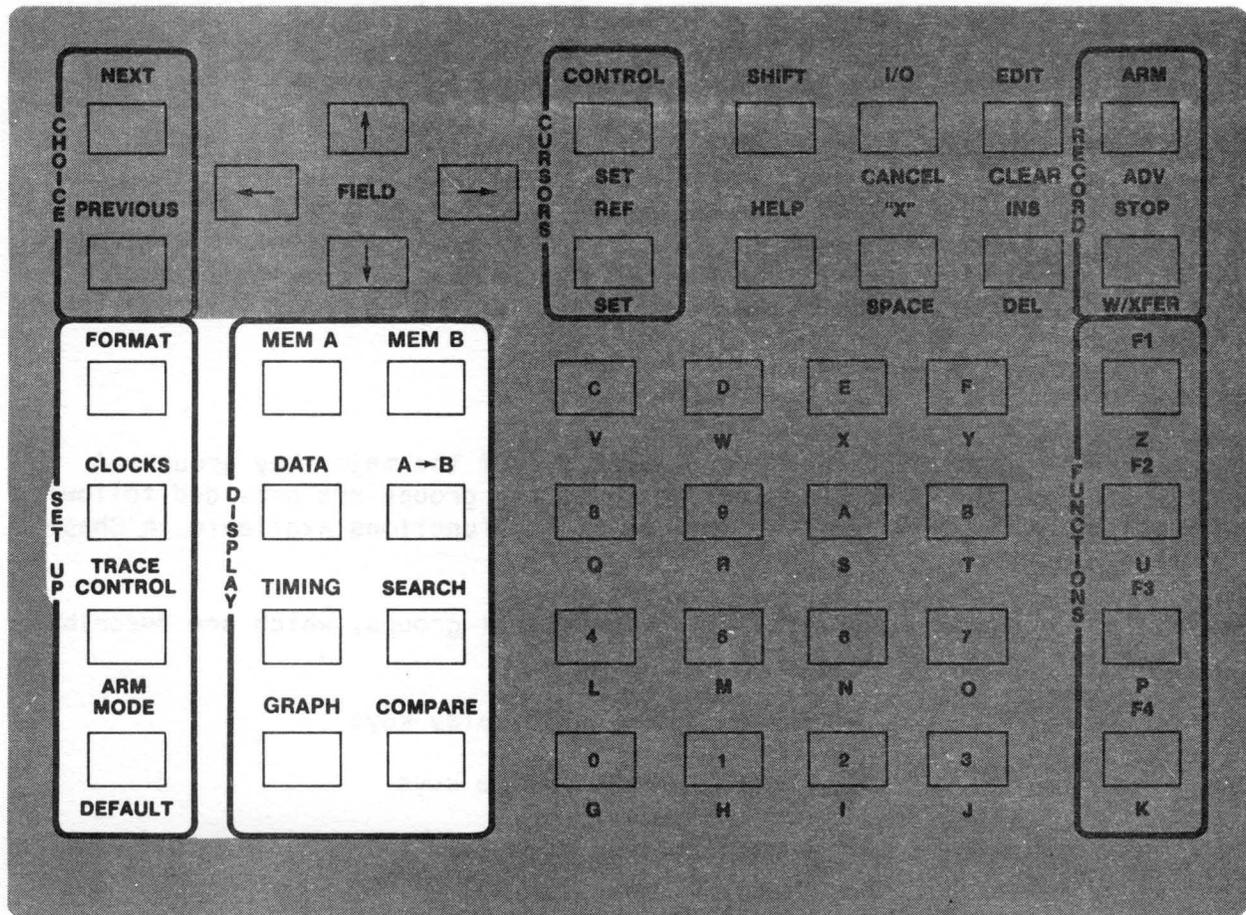


Figure 3-2. Screen Setup and Display Key Group

Screen Setup and Display Key Group

Figure 3-2 illustrates the Screen Setup and Display Key Group. When the setup screens are initially accessed, the M memory parameter setups are displayed. This key group allows the user to select the different displays needed to setup new M memory parameters and compare current M memory parameters with previous parameters. Additionally, the user may use keys of this group for the following:

- To display data
- Select A or B memory displays
- Transfer A memory data to B memory
- Either search for a given channel configuration or compare A memory data to B memory data
- Reset the K205 to its default state

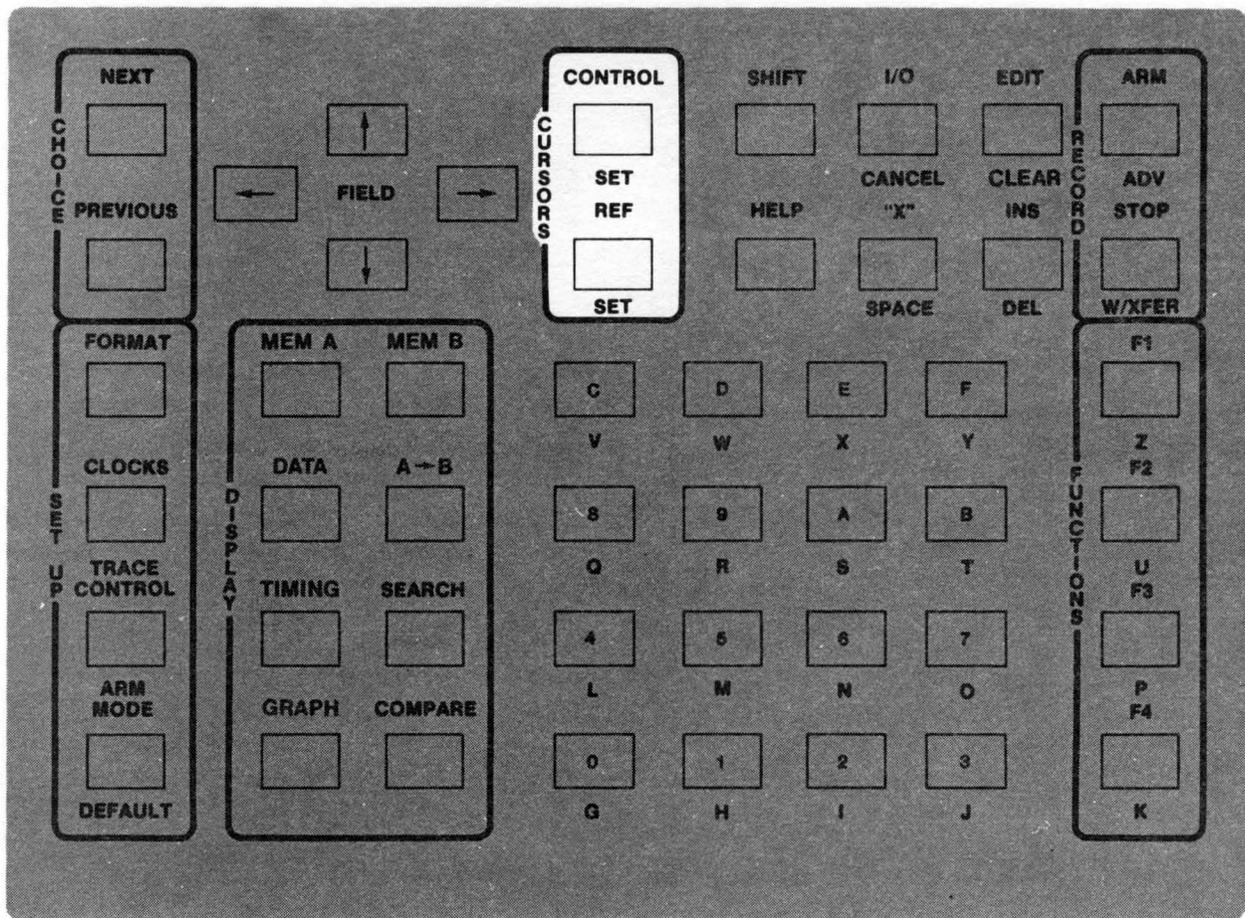


Figure 3-3. Control and Reference Key Group

Control and Reference Key Group

The Control and Reference Key Group (Figure 3-3) enables the user to set the Control and Reference values for cursor movement, which are used on the Data displays for locating specific items on the screen.

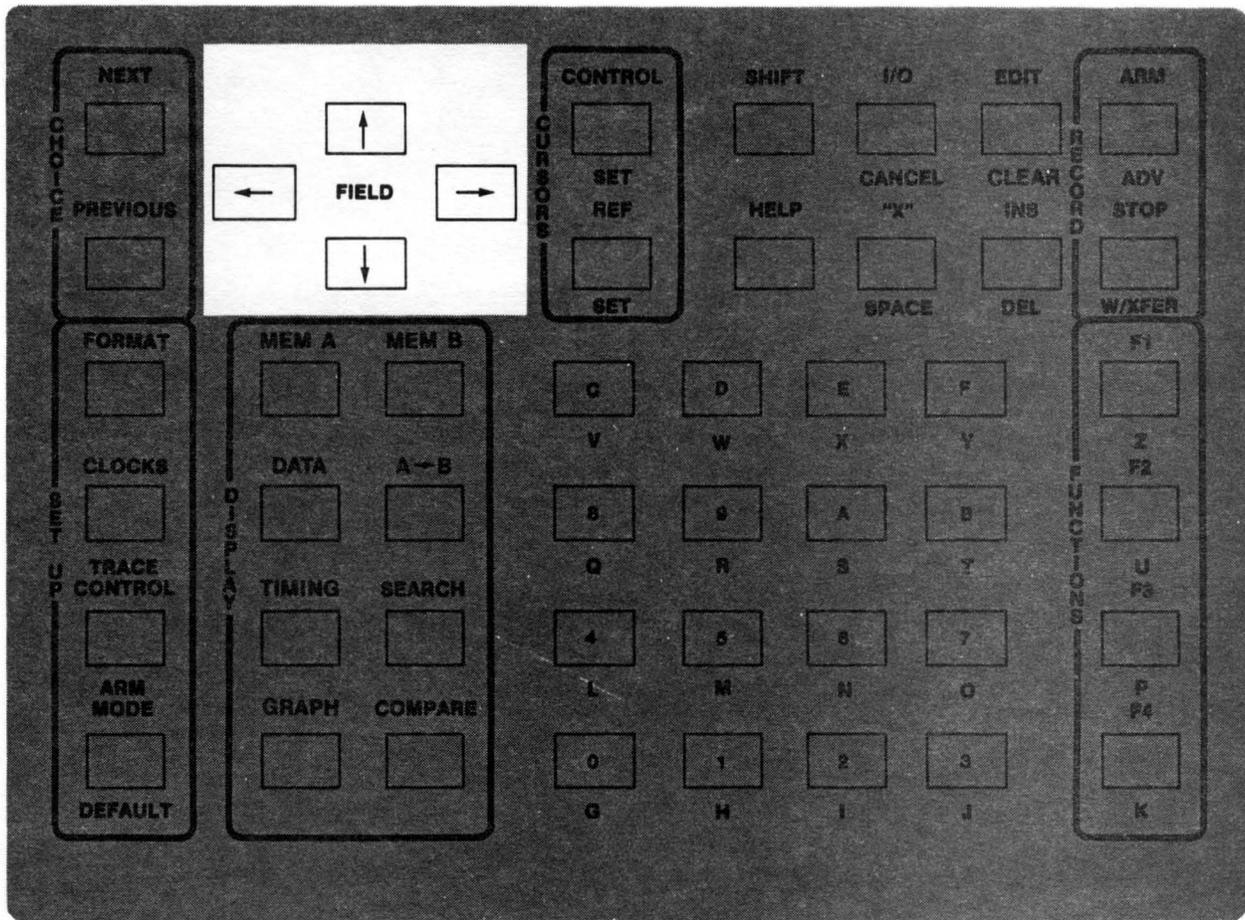


Figure 3-4. Cursor Control Key Group

Cursor Control Key Group

The Cursor Control Key Group (Figure 3-4) provides the user with a means of manually moving the cursor and shifting active fields on the display. If the cursor is flashing, depressing the SHIFT key and the right-arrow key will suppress the flashing for most displays. Flashing is restored by depressing either the right-arrow key or any other key.

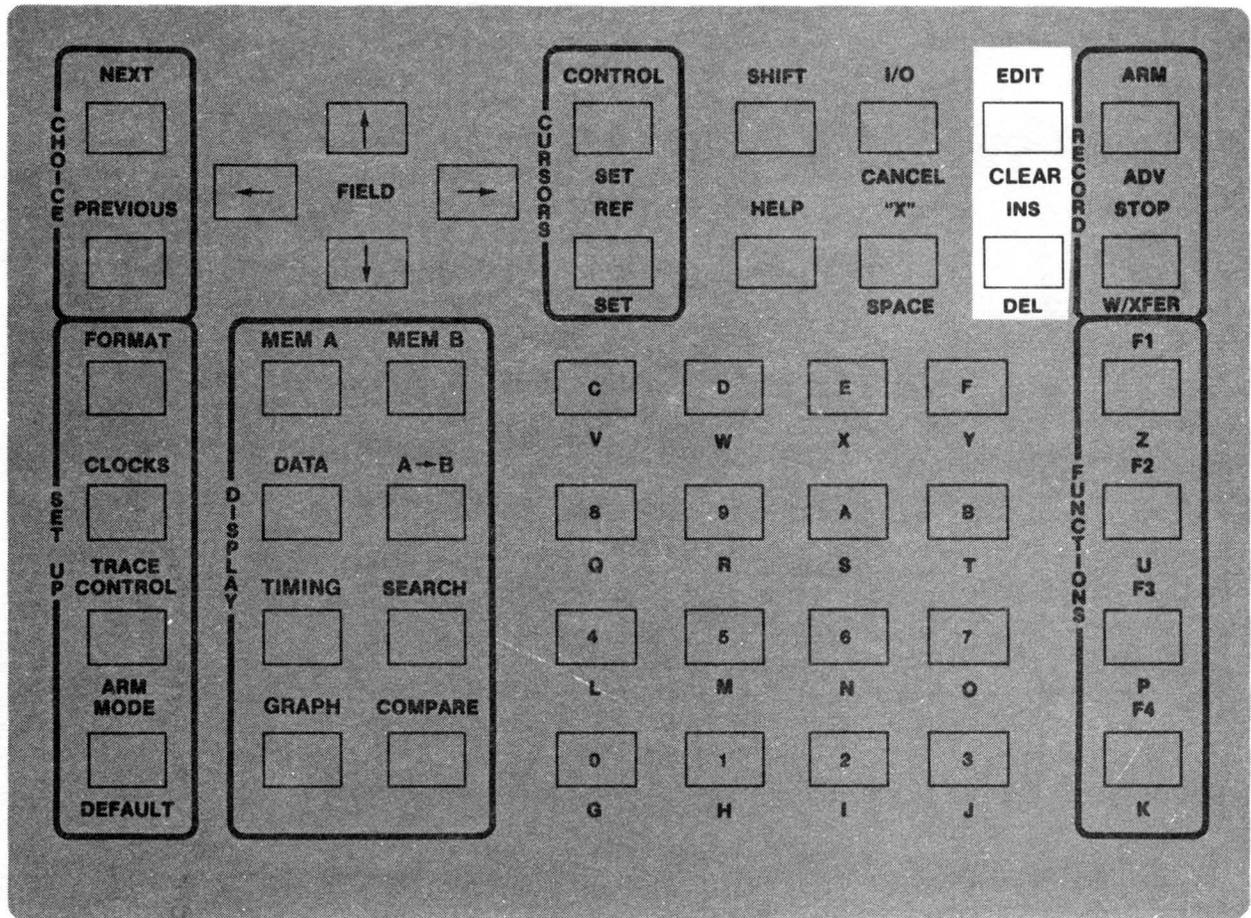


Figure 3-5. Edit Key Group

Edit Key Group

The Edit Key Group (Figure 3-5) allows the user to place the Data Screen in a mode in which the search word and/or level can be changed, and the B memory data altered.

The user may also use this key group to place the Timing Screen in a mode that allows resequencing of traces, changes of trace data in B memory, and entry of labels for specific fields.

Keys of this group may be used to insert and delete column information in certain displays. When in the Graph Screen, this key group facilitates vertical expansion of data.

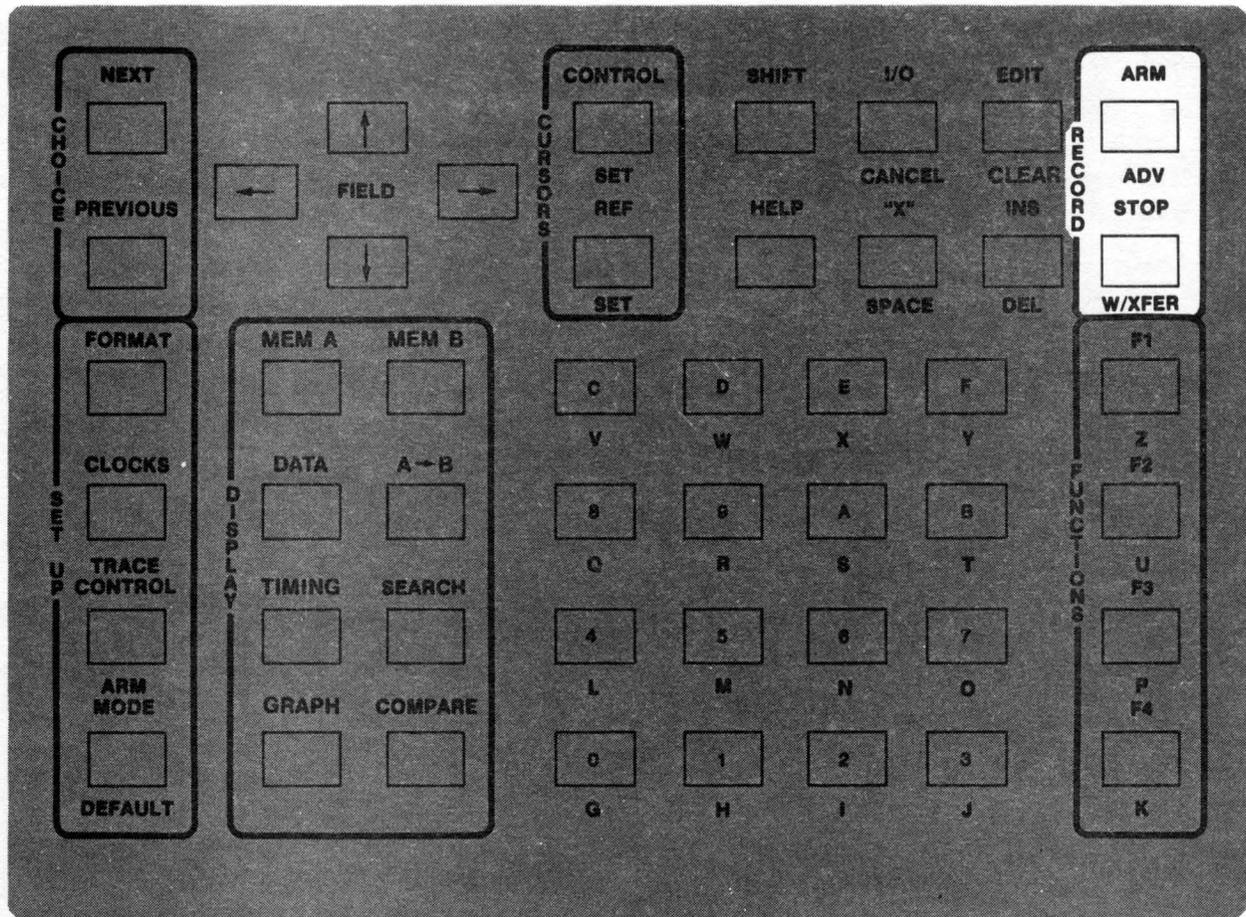


Figure 3-6. Record Key Group

Record Key Group

The Record Key Group (Figure 3-6) enables the user to initiate a recording cycle, manually move to the next level of trace prerequisites, stop a recording, and manually transfer memory M to memory A.

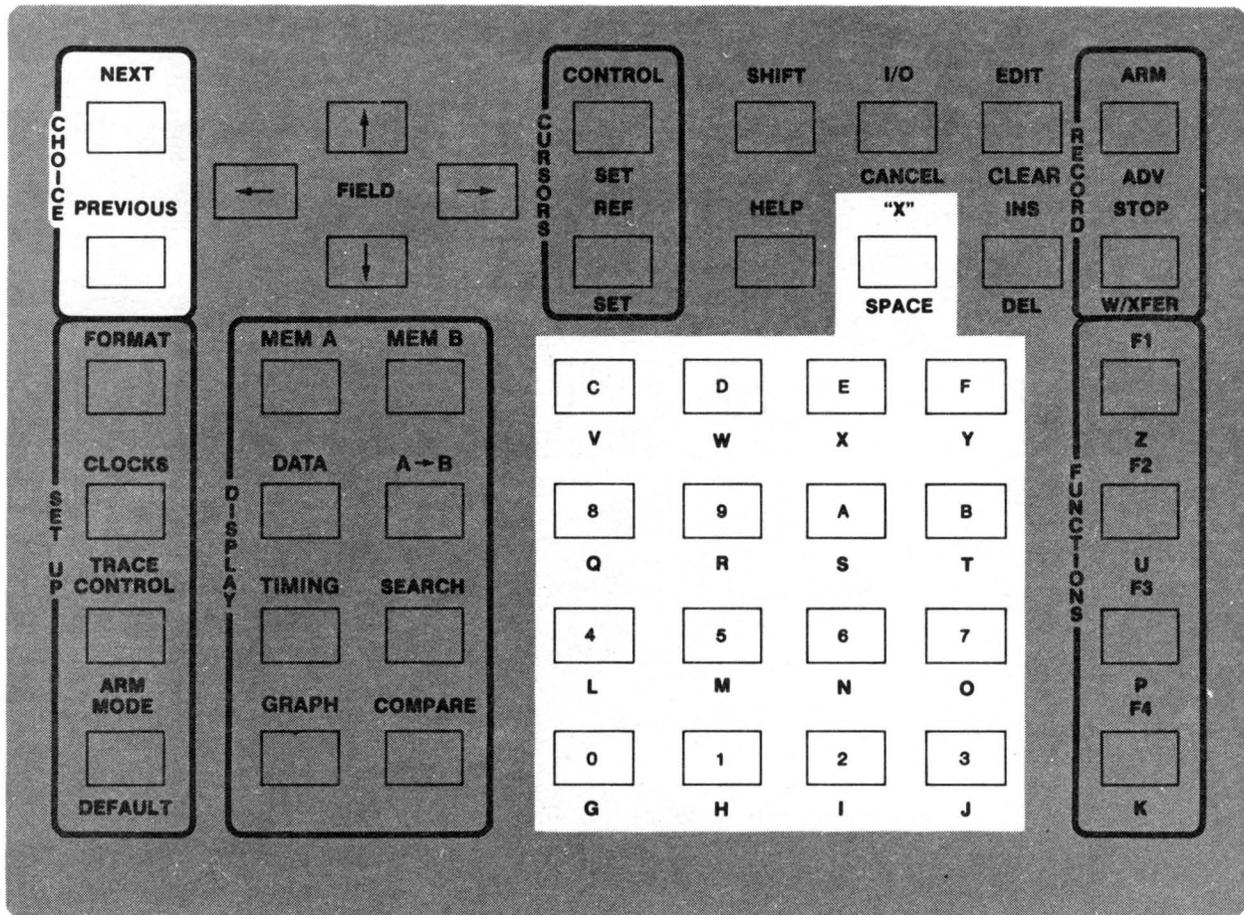


Figure 3-7. Data Entry Key Group

Data Entry Key Group

The Data Entry Key Group (Figure 3-7) allows the user to manually enter alphanumeric information into the various displays. Note that some of the alpha keys are located in the shifted positions of the Function Special Purpose Keys.

In addition to alphanumeric entries, this key group also enables the user to select the next and previous field values and insert spaces or Don't-Care values into certain displays.

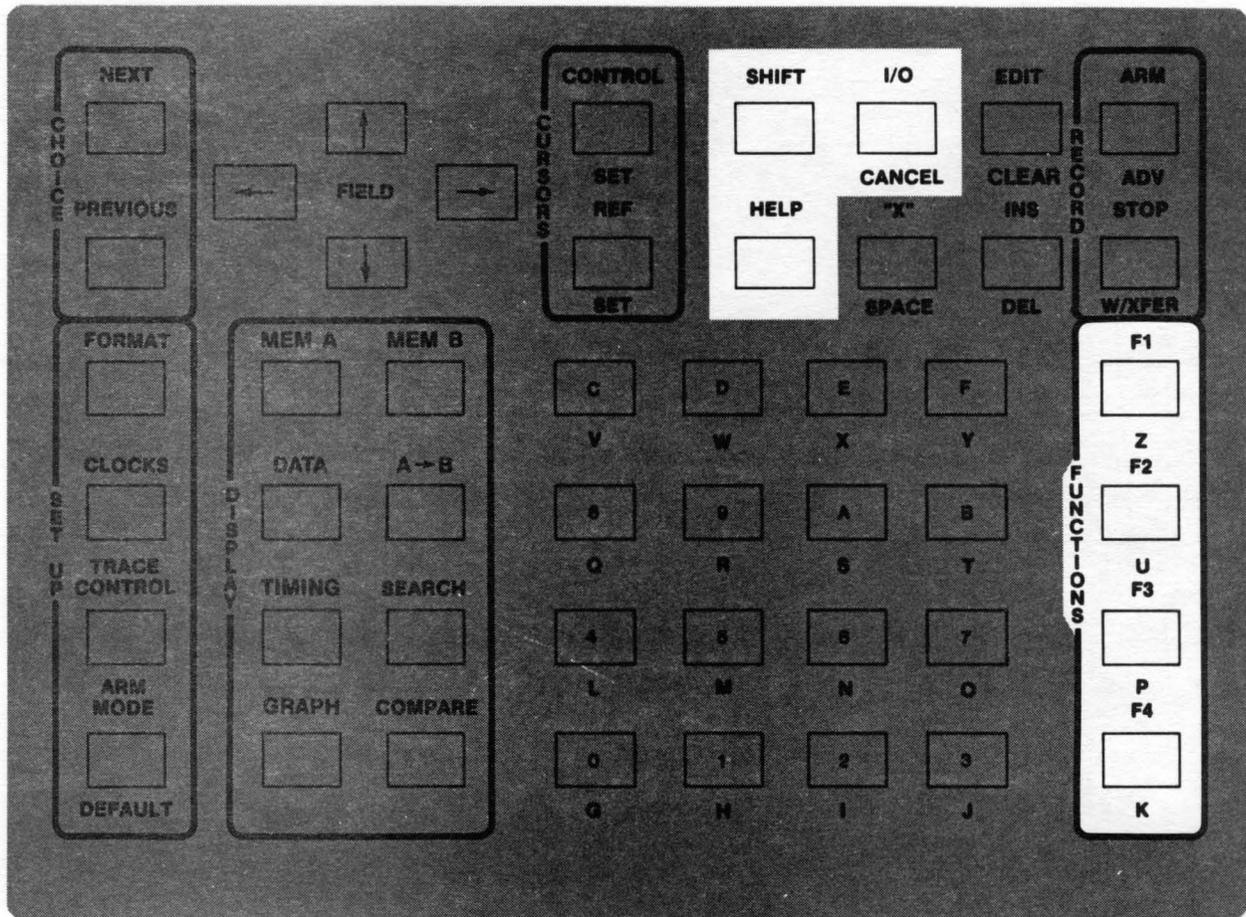


Figure 3-8. Special Purpose Key Group

Special Purpose Key Group

The Special Purpose Key Group (Figure 3-8) includes the Function keys, which change their purpose depending on the screen selected. In addition, this key group allows the user to shift the keyboard functions to their secondary functions, select the Help displays, and access external interface. The Help function provides the user with access to 7-line prompting messages. The Cancel key cancels the currently active send and print commands.

REAR PANEL CONNECTORS AND SWITCHES

Figure 3-9 presents an overall view of the K205 rear panel. The components of the rear panel are categorized into three groups: interface, power input and signal input. Note the arrangement of the interface connectors may vary on some models of the K205.

Interface Group

IEEE-488 Port

The IEEE-488 port is of standard configuration with full Talker/Listener capabilities. This port is configured through the I/O Set Up Screen. Table 3-1 lists the connector pin-descriptions for the IEEE-488.

Table 3-1. K205 I/O IEEE-488 Connector Pin-Descriptions

PIN NUMBER	SYMBOL	DESCRIPTION
1	D101	Data Input Output 1
2	D102	Data Input Output 2
3	D103	Data Input Output 3
4	D104	Data Input Output 4
5	EIO	End or identify
6	DAV	Data Valid
7	NRFD	Not Ready for Data
8	NDAC	Not Data Accepted
9	IFC	Interface Clear
10	SRQ	Service Request
11	ATN	Attention
12	Shield	
13	D105	Data Input Output 5
14	D106	Data Input Output 6
15	D107	Data Input Output 7
16	D108	Data Input Output 8
17	REN	Remote Enable
18	GND	Signal Ground Return for Pin 6
19	GND	Signal Ground Return for Pin 7
20	GND	Signal Ground Return for Pin 8
21	GND	Signal Ground Return for Pin 9
22	GND	Signal Ground Return for Pin 10
23	GND	Signal Ground Return for Pin 11
24	GND	Logic Ground

RS-232-C Ports

The RS-232-C ports are seven wire subsets with standard pin-outs. The ports are factory configured as DTE. Instructions on reconfiguring the ports as DCE may be obtained from the Gould Inc., Customer Service office listed in the Preface. Table 3-2 lists the pin-designations for the K205 RS-232-C ports.

Table 3-2. K205 RS-232-C Port Pin-Descriptions

Pin Number	Name	DTE Sender	DCE Receiver
2	BA	Transmit Data	Receiver
3	BB	Receive Data	Transmit Data
4	CA	Request to Send	Data Set Ready
5	CB	Clear to Send	Data Terminal Ready
6	CC	Data Set Ready	Request to Send
7	AB	Ground	Ground
20	CD	Data Terminal Ready	Clear to Send

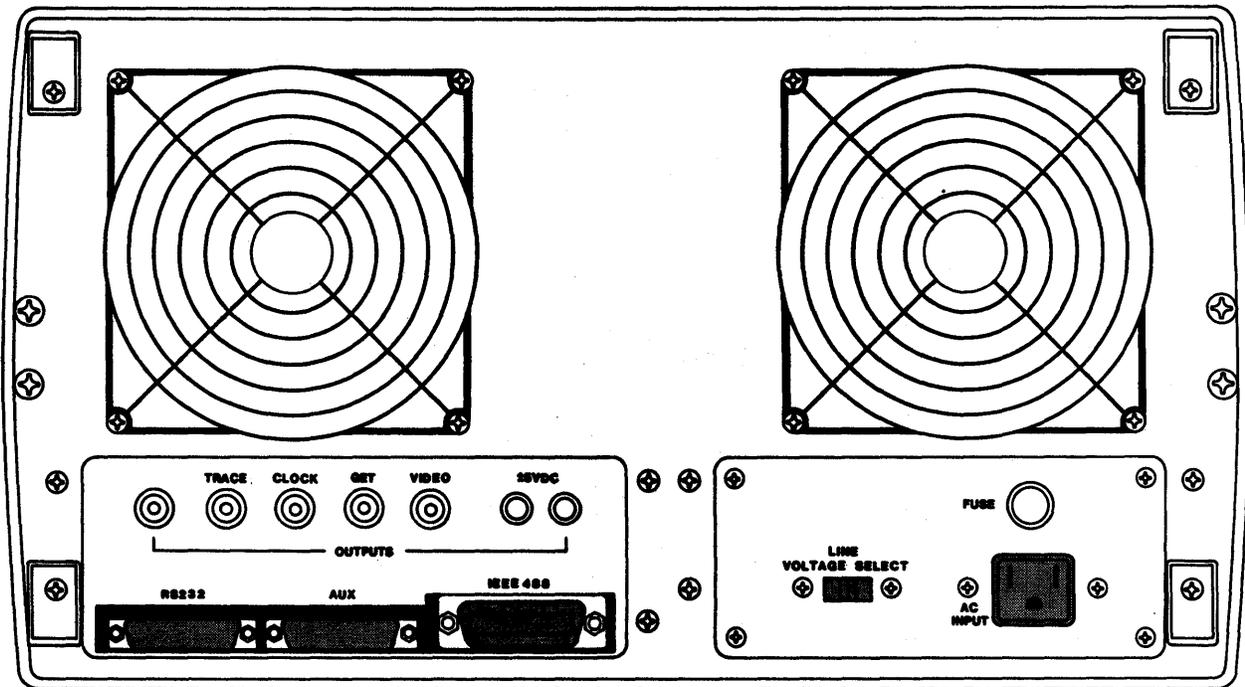


Figure 3-9. K205 Rear Panel

Power Input Group

Voltage Select: This two position switch selects the voltage range of the unit to match the incoming AC Line voltage.

Fuse: Standard fuse holder. Fuse rating must be selected to match the incoming AC Line voltage.

Fuses for Rated Voltage

<u>Voltage</u>	<u>Fuse</u>
90 VAC to 135 VAC	3AG, 8 Amp
180 VAC to 270 VAC	3AG, 4 Amp

AC IN: Standard AC, male, connector for power input.

OPERATION

GENERAL

This chapter describes the Gould K205 Logic Analyzer operating procedure and guides the user in setting up the equipment and operating the keyboard to perform the analysis. Various techniques can be employed to locate and identify malfunctions in the user's target hardware. The best approach for applying K205 capabilities depends upon the user's familiarity with basic techniques for analyzing digital circuit functions and making full use of the K205 instrument resources. The instrument's resources are sophisticated analysis tools in the form of menu-driven displays that set up test actions, perform measurements, track and control input signal characteristics, record test data and display the results upon demand.

A detailed description of each display screen and data field within the display is provided to guide the user in selecting and interpreting the display contents. The methods by which various keys can be used to reconfigure and alter these displays are also explained. The functions of certain keys and selected display elements are common to all displays. For this reason, these keys and display elements are explained at the beginning of this chapter, and in the interest of brevity, no further discussions of these items will be made when dealing with the individual displays.

The user should note that the displays in this chapter are shown in reverse video (black on white).

USER AIDS

The K205 firmware generates HELP messages that provide instructions to the user for understanding a specific operation. The associated help message for a given display can be accessed at any time by depressing the HELP key. The message appears at the upper or lower portion of the current display, depending on the location of the active field.

ORGANIZATION OF DISPLAYS

The organization of K205 displays is shown in the menu-tree diagram of Figure 4-1. These displays are arranged in four function categories as follows:

- Date/Time Setup
- Operation Setup
- Operation Response
- I/O Function

The K205 probes must be connected to the user's external equipment to supply input signals that are interrogated by the K205 internal logic and displayed on the screen. The various display categories are used to set up test conditions, display the analysis results, and effect I/O transfers to the user's external equipment units.

The entry point at the top of the diagram (Figure 4-1) begins with the Power Switch. Turning on AC power initializes the instrument, causing it to perform a self-test diagnostic of internal circuit functions and display the Configuration Screen after the diagnostic is completed. The Configuration Screen presents the hardware configuration of the K205 by indicating the number of input channels available to the user. The Configuration Screen may also be accessed at any time by depressing the SHIFT and DEFAULT keys. Note that the key(s) associated with accessing a particular display is shown enclosed in parenthesis adjacent to the display block.

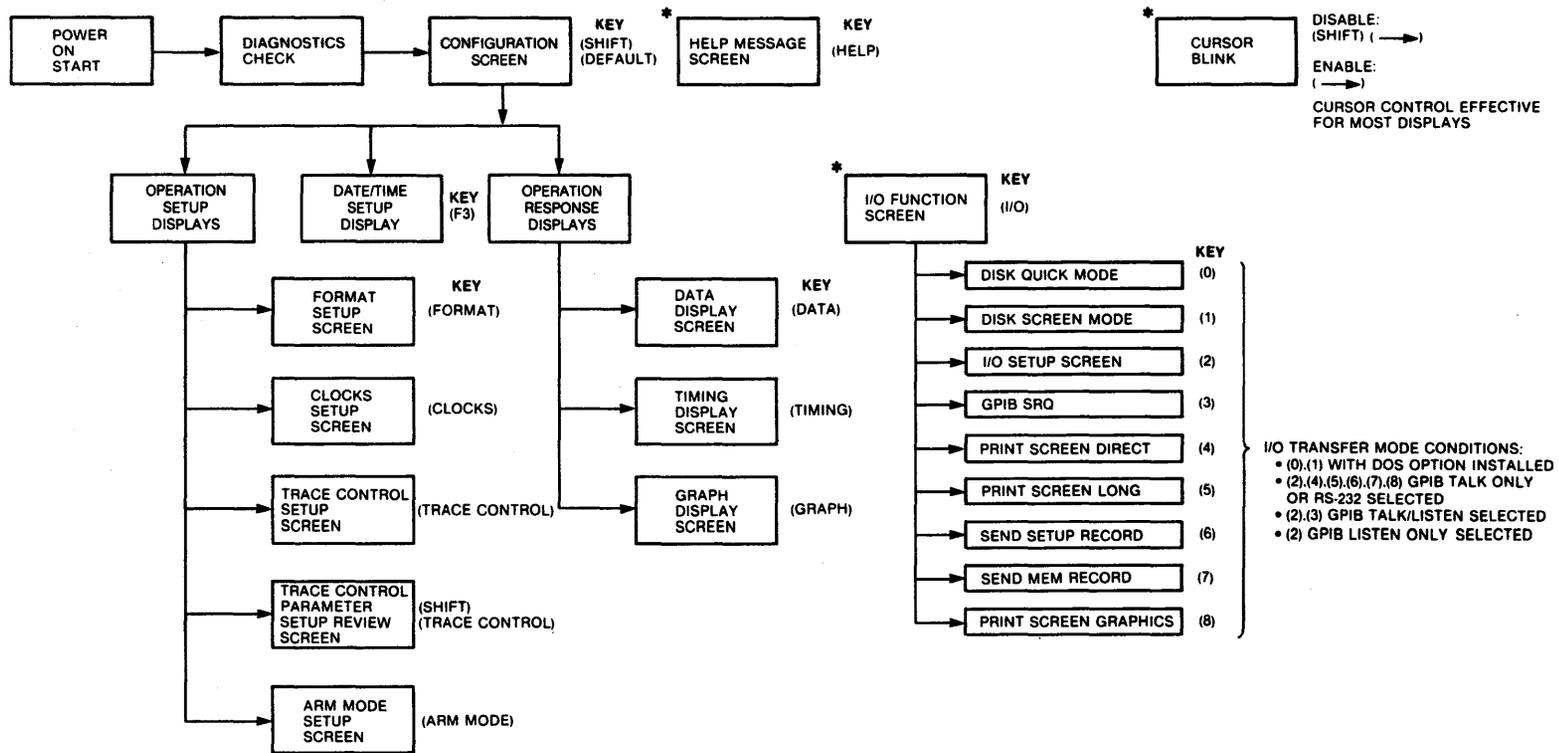
The first display category consists of the Date/Time Setup display. This display can be accessed by depressing the F3 key only when the Configuration Screen is present. The Date/Time Setup operations allow the user to set parameters for the Real Time clock which consists of the Date (month, day, year) and Time (hour, minutes). The user can also enable or disable the Error Beep by choosing the ON or OFF condition for the tone.

The second display consists of the Operation Setup displays. This display group allows the user to define various test parameters used by the instrument to collect input data and clock signals.

The third display category consists of the Operation Results displays. This display group presents data, timing and graph information on the screen that result from the analysis operation.

The fourth display category consists of I/O Functions. This display allows the user to perform various types of I/O transfers between the K205 unit and other user's equipment connected in the system via the RS-232-C and GPIB interface link. The I/O display can be accessed at any time without disrupting data presented in the displays.

Help Messages can be accessed at any time by depressing the HELP key. This display provides information to the user on equipment functions and operating capabilities. Likewise, the blinking of the cursor can be disabled by depressing the SHIFT and right-arrow keys, or enabled by depressing the right-arrow key.



NOTE: *

HELP MESSAGE
 USER'S GUIDE
 I/O FUNCTION
 CURSOR BLINK

THESE DISPLAY SCREENS
 MAY BE ACCESSED ANYTIME
 BY DEPRESSING THE
 SPECIFIED KEY(S)

Figure 4-1. Organization of Displays

GETTING STARTED

The following procedure provides a step-by-step guide to introduce a new user to operating the various key functions and displays of the K205. This procedure also may be used to verify that the K205 functions, including the probes, operate properly. Included in this section is a brief discussion of the Probe Test. Note that any time during this procedure, depressing the HELP key provides the legal choices for the current active field.

Probe Test

The 2 clock and 8 sample inputs of each probe can be quickly tested for correct detection of signal inputs by using the built-in Probe Test Sockets. These sockets generate a known ring counter and clocking signals. The Probe Test pattern generator produces two clock signals, in addition to eight data signals, per test socket. The first clock signal is an external J clock input for the lower order bits (7-0) probe of each section, or an R enable input for the high order bits (F-8) probe of each section. The second clock signal is an external K clock input for the low order probe of each section or an S enable input for the high order probe of each section. The clock and data signals, output by the probe test sockets, have a zero to minus 5 voltage. Figure 4-2 shows the clock and data patterns output by the upper probe test sockets.

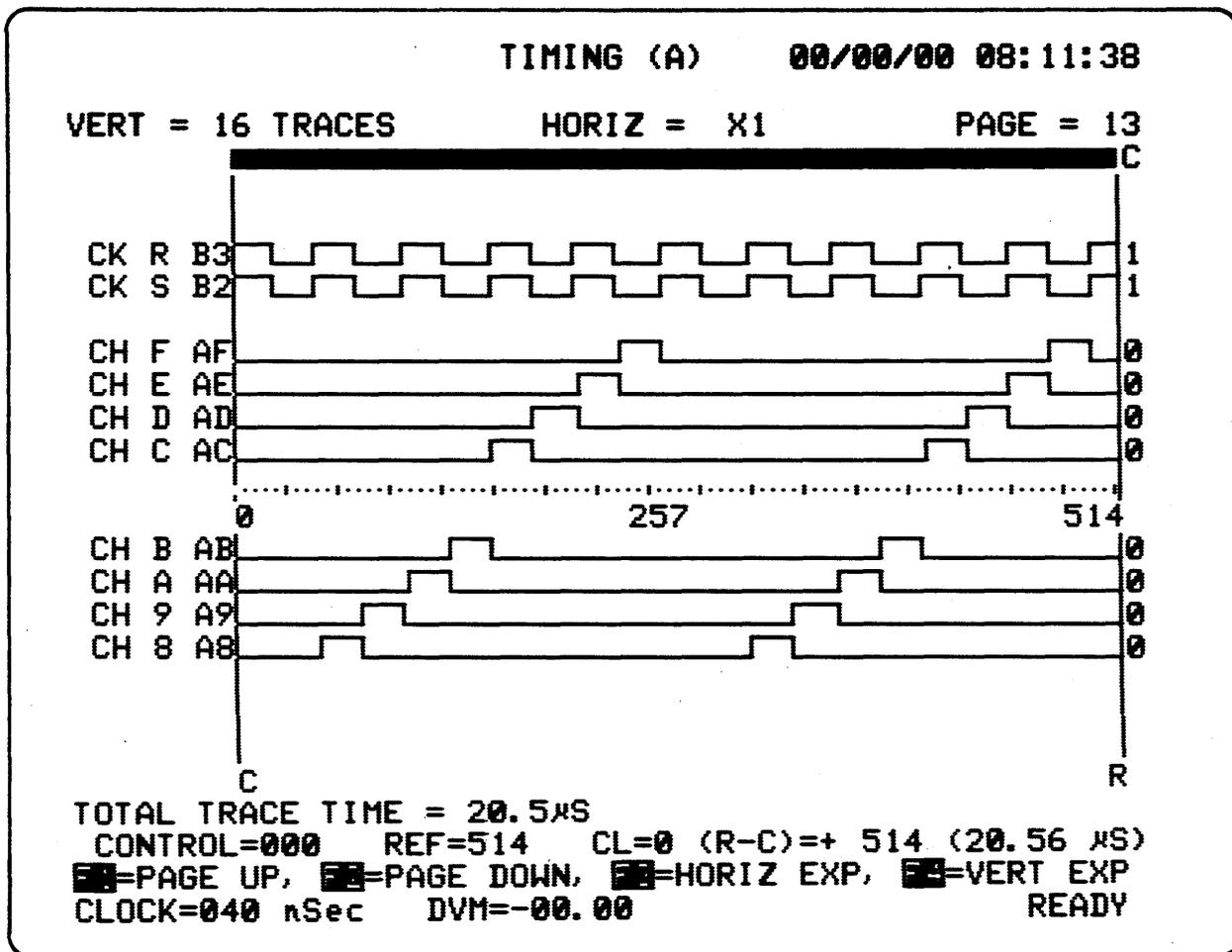


Figure 4-2. Probe Test Display

1. Connecting the Probes

- a. Verify AC power is off.
- b. Connect one end of the probe cable to the front panel socket labeled SECTION A INPUTS J,K,(0-7).

2. Configuration Display

- a. Turn on AC power; observe that the power indicator illuminates.
- b. Observe the system responds by displaying the messages for the start up diagnostics. These messages indicate the power-on test sequence is being executed. When the diagnostic tests are completed, the Configuration Display is presented on the screen. This display indicates which hardware options are installed; it also describes how to use various Function keys and access the HELP facility.
- c. Connect the other end of the probe cable to the lower front panel socket labeled PROBE TEST.

3. Default Setup

- a. Depress key F1 to select the Default Setup Parameters.
- b. Observe the following message is displayed near the top of the screen, informing the user that the factory default parameters have been loaded into the unit.

Default Setup M and Display values locked in . . .

4. Format Screen

- a. Depress the FORMAT key. Observe the Format Screen is displayed with the Data Format field active and all polarity values set to positive. Depress the down-arrow key twice. For 48 input systems, alternately depress the SHIFT and DEL keys 12 times each; for 32 unit systems, alternately depress the SHIFT and DEL keys 9 times each. This action deletes all but two columns in the field, thereby eliminating unwanted channels.
- b. Depress key F1 to move the active field to the top of the threshold location of the screen. Select ECL voltage level for each value by depressing numeric key 1. Note the active field immediately advances to the next threshold location after each value is entered. Use the NEXT/PREV keys to scroll through the choices, leaving the field at ECL before continuing this procedure.

5. Clocks Screen

- a. Depress the CLOCKS key. The Clock Screen is displayed with the Clock Mode field active.
- b. Use the down-arrow key to move the cursor to the Master Clock = field which contains the Time Unit and Clock Interval sections.

- c. Use the right-arrow key to move the cursor to the right so the cursor is located in the Decimal Clock Interval field.
- d. Use the numeric keys to directly enter 100 for the Clock Interval field; verify the Time Unit field is set to nanoseconds.

6. Trace Screen

- a. Depress the TRACE CONTROL key. The Trace Screen is displayed with the first command active.
- b. Depress the SHIFT and DEL keys to delete the first level instruction command; the level 0 command is replaced by the level 1 command.
- c. Move the active cursor to the Delay Count field by depressing the right-arrow key twice.
- d. Directly enter a value of 515 for clocks using the numeric keys.

7. Arm Mode Screen

- a. Depress the ARM MODE key. Note that the K205 is set to perform one recording and then stop. The Arm Mode Screen is displayed as shown below in Figure 4-3.

8. Initiating a Recording

- a. To initiate a recording, depress the ARM key. (The user should ensure that the ARM key, and not the ARM MODE key, is depressed.)
- b. Observe the Hardware Acquisition Status, which is located in the lower right portion of the screen. This status indicates a recording has occurred with the following condition:

READY	Ready for an Arm signal.
BUSY	Set up internally for a recording.
EOR	End of recording activity.

A recording occurs quickly; if necessary, depress the ARM key again to take a recording. If a recording fails to occur, the Acquisition Status continuously displays READY on the screen.

9. Data Screen

- a. Depress the DATA key.
- b. Observe the Data Screen is displayed in a format identical to that specified by the Format Screen. The data and time of the recording appear in the upper-right corner of the screen. All level indicators are at level 0 because this level was selected for the recording.
- c. To move the Control cursor, depress the CONTROL key. The up and down arrow keys are used to move in vertical direction. Similarly, to move the R cursor, depress the REF key and use the up and down arrow keys. (For additional information on cursor movement, refer to the Data Screen description in this chapter.)
- d. Depress keys F1 and F2 to scroll through the data page by page. Note the cursor movement is only in vertical direction for this particular screen.

```
ARM MODE (M)      10/03/84 16:30:08
AFTER ONE PASS,

  STOP

-----
AUTO COMPARE RANGE IS FOR 512 SAMPLES

USING INPUTS DEFINED ON FORMAT SCREEN

-----
      AUTO EDGE TOLERANCE = ± 2 SAMPLE(S)
EDGE TOLERANCE IS ASSOCIATED WITH MEMORY B AND IS
SET ON EACH A→B DATA TRANSFER OR BY PRESSING F4

-----
DVM=-00.00      F4=Set Tolerance
                                READY
```

Figure 4-3. Arm Mode Screen Display

10. Timing Screen

- a. Depress the TIMING key.
- b. Depress key F1 repeatedly until the A0-A7 input traces are displayed (Figure 4-4).
- c. The cursors are moved following the same procedure described for the Data Screen (step. c), except the cursors move in horizontal direction, using the left and right arrow keys. (For additional information on cursor movement, refer to the Timing Screen description in this chapter.)
- d. Use keys F3 and F4 to select the desired combination of horizontal and vertical displacement, respectively. Note the cursor movement is only in horizontal direction for this particular screen.

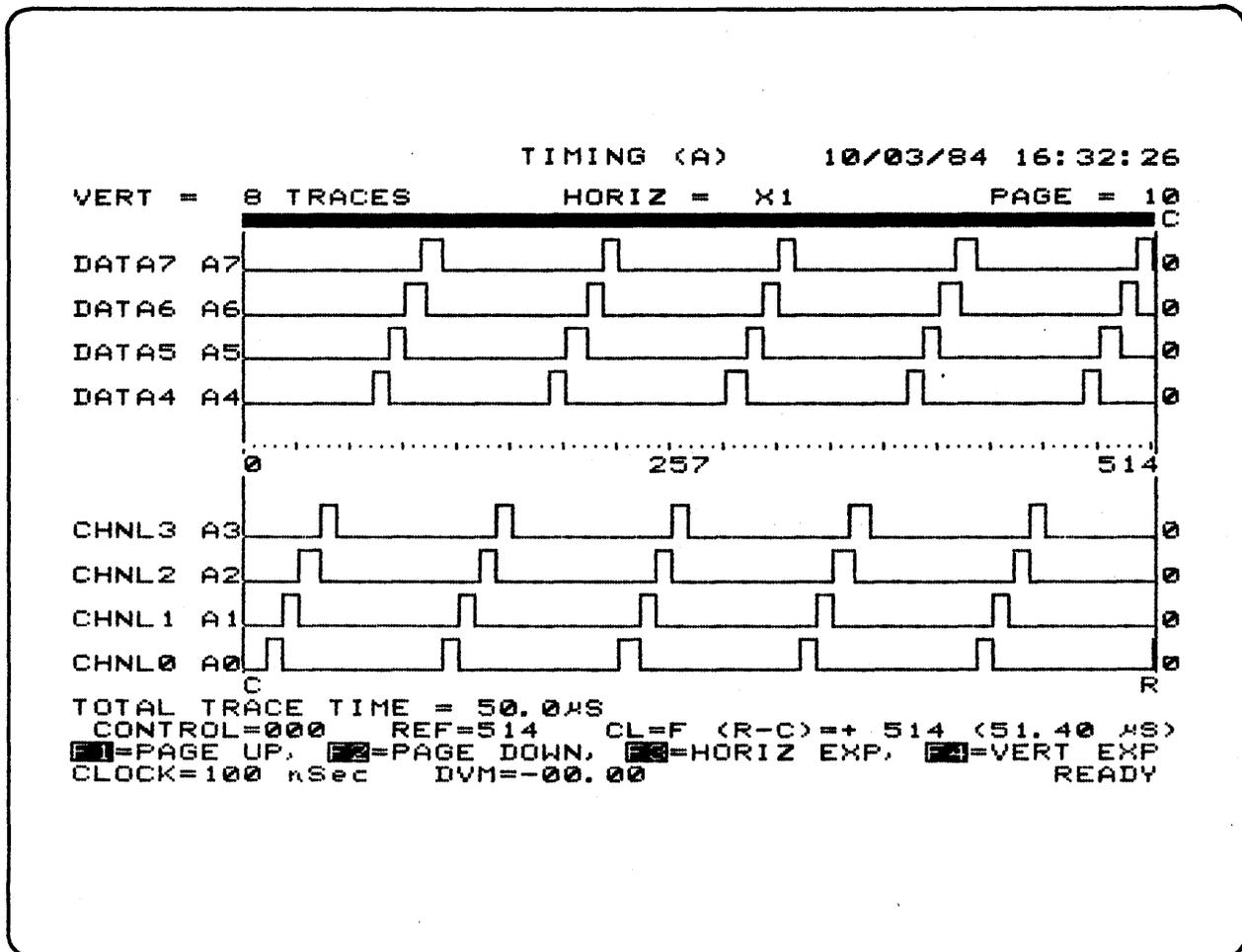


Figure 4-4. Timing Screen Display

OVERVIEW OF SCREEN APPLICATIONS

The various screens allow the user to set up conditions for running the analysis and reviewing the analysis results. The Setup screens are used for selecting operating parameters. Display screens are used for reviewing the results of recorded data and the hardware configuration of the K205.

The Setup screens are as follow:

Format	-Data format, thresholds and polarity selections
Clocks	-Clock and input mode selections
Trace Control	-Trace Control high level setup selections
Arm Mode	-Arm Cycle control and Auto Compare selections
Date	-Set Current Date and Time, Error beep
I/O	-GPIB and RS-232-C selections
Review	-Displays the current Trace Control setup in low-level language format

The Display screens are as follow:

Data	-Displays acquired data in data format selected on Format Screen
Timing	-Displays waveforms for acquired data
Graph	-Displays graph of acquired data versus sample number
Configuration	-Displays hardware configuration of K205

Three setup memories, M, A, and B, are associated with the Format, Clocks, Trace Control, and Arm Mode Screens. These Setup memories contain parameters which are used to set up the hardware for an acquisition cycle as shown in Figure 4-5. Setup memory M contains the setup parameters used during the next acquisition cycle. Setup memory A contains the setup parameters used during the most recent acquisition cycle. Setup memory B is a user-selected copy of Setup memory A, which may be used as a reference.



Figure 4-5. Setup Parameters for Acquisition Cycle

Two Data memories, A and B, are associated with the Data, Timing and Graph Screens. These memories contain the data acquired using Setup parameters from Setup A and Setup B.

Screen Format

Each screen is 29 rows by 52 columns. The screen name is centered at the top of the display on line 1. The name is followed by a memory indicator in parentheses for all screens except the Configuration, Date, Review, and I/O Screens. The memory indicator may be M, A, or B. When either no memory indicator is present or the memory indicator is M, the current date and time are displayed in the upper-right portion of the screen. If the memory indicator is A or B, and the data represents recorded data or setups, the date and time at which the A or B recording was taken is displayed; otherwise, the label of either Power Up Data or Reset Data is displayed in place of the data and time. When the unit is powered on, Setup A and B are copies of Setup M. Memory A and B data are set to a prespecified pattern. The label Reset Data results from depression of F4 when the Configuration Screen is displayed.

Line 2 is reserved for Error and Warning Messages, which appear in reverse video when either an invalid value is keyed in or to caution the user when necessary.

Line 28 displays the action which occurs if one of the Function keys is depressed.

Line 29 is reserved for information pertaining to the Master Clock used for recording, the DVM reading, the Comparison Count, the Pass Count, and the current hardware status, as shown in the following diagram:

```
+.....1.....2.....3.....4.....5..+
CLOCK=020 nSec  DVM=00.01  C/P=0000/0000  READY
CLOCK=EXTERNAL                                PASS=0001  LVL F
                                                    BUSY
                                                    CLOCK?
                                                    EOR
```

The first Status Line field is included only when the Data, Timing or Graph Screen is displayed. The field is labeled with CLOCK= and indicates the Master Clock used for the recording. If A is the memory indicator at the top of the screen, the field represents the Master Clock used for Memory A data; the Master Clock for Memory B data is displayed when B appears at the top of the screen. If the Master Clock source is Internal, the Internal clock period is displayed. If the Master Clock source is External, EXTERNAL is displayed.

The second Status line field is labeled with DVM= and indicates the DVM reading taken at the end of the A or B recording when A or B appears at the top of the screen as the memory indicator. When M is the memory indicator or no memory indicator is displayed, the DVM field indicates the current DVM reading and is updated once per second.

The third Status line field indicates the Comparison Count and Pass Count, if appropriate, for the A or B recording when A or B appears at the top of the screen as the memory indicator. When M is the memory indicator or no memory indicator is displayed, the field indicates the current count, if appropriate. This field is displayed for all screens only if AUTO REARM is selected in the Arm Mode Screen. The field values are presented as follows:

1. If INCREMENT COMPARISON COUNT is selected in the Arm Mode Screen, the label is C/P= followed by the values of the Comparison Count (4 digits) and the Pass Count (4 digits).
2. If INCREMENT COMPARISON COUNT is not selected, the label PASS= is displayed followed by the value of the Pass Count.

The last Status line field is displayed for all screens and represents the current hardware status as follows:

- READY -Indicates the unit is ready for an Arm Signal.
- BUSY -Indicates the hardware is being prepared for a record cycle.
- CLOCK? -Indicates the unit is awaiting a clock to start a recording.
- LVL 0 -Indicates the trace control level in which the unit is
through currently operating.
LVL F
- EOR -Indicates the recording cycle is completed and the information acquired is being stored. If Rearm is selected in the Arm Mode Screen, the conditions for Rearming are evaluated while this status is displayed.

08/08/84 14:40:49

➔ GOULD K205 LOGIC ANALYZER
** Press **F1** for Default Setup **

To view or modify the record parameters,
press any key in the group labeled SET UP.
For prompt messages, press HELP.

SOFTWARE RELEASE: X103

HARDWARE:

- COMM / THRESHOLD BD
- CLOCK BD
- TRACE CONTROL BD
- 48 DATA INPUTS
- DISK STORAGE SYSTEM
- 256K MAIN MEMORY

ACTIVE INPUTS:

INACTIVE INPUTS:

Help messages are available for every active field.
These messages provide a brief description of the
valid choices and the legal keys associated with
the current field or screen.

- F1 locks in the default setup and display values.
- F2 executes powerup diagnostics.
- F3 accesses DATE screen. F4 resets Memory A data.

DVM=-00.01

READY

Figure 4-6. Configuration Screen

DESCRIPTION OF DISPLAYS

Configuration Screen

Upon powering up the K205, the control firmware performs a short series of diagnostic tests on the microprocessor RAM and ROM, the keyboard, the CMOS, RAM and system voltages. When the diagnostic tests are successfully completed, the Configuration Screen (Figure 4-6) is displayed. This screen contains a message indicating successful completion of the diagnostics, a list of all options installed in the unit, the current software version number and several common display elements. If a failure is detected by the diagnostic, an error message is displayed and testing halted. Depress the NEXT key to continue testing. The Configuration Screen allows the user to perform the following functions:

- F1 Causes the default setup and display values to be selected. This allows the user to reset the system to a known state (the value set by the manufacturer). The current Date, Time and I/O configuration are not affected.

- F2 Causes the unit to perform powerup diagnostic tests as if the power had been turned off and then on again.
- F3 Causes the Date Screen to be displayed.
- F4 Causes memory A data to be set to all zeros. Level A data is set to all F's. The data and time stamp indicate Reset Data.

DATE		10/03/84 16:06:54
DATE = 10/03/84	ERROR BEEP = ON	
TIME = 16:06:00		
DVM=-00.00		READY

Figure 4-7. Date/Time Setup Screen

Date/Time Setup Display

The Date/Time Setup Screen (Figure 4-7) can only be accessed from the Configuration Screen by depressing the F3 key. When the screen is first entered, the current date and time are set in the Date and Time fields, located in the upper-left portion of the screen. The blinking cursor appears in the leftmost position of the Date field.

The date displayed can be altered using numeric keys 0 through 9. The new date is evaluated when either the user leaves the date field or the last digit of the date field is entered. If the new date is valid, the system clock is set with the new date.

The current time is altered using numeric keys 0 through 9. Note the digits representing seconds do not appear in reverse video and cannot be altered. The new time is evaluated when the user leaves the time field or the last digit of the time field is entered. If the new time is valid, the system clock is set with the new time and the seconds are set to zero.

The Error Beep field allows the user to either disable (0) or enable (1) the Beep tone when errors occur.

COMMON KEY FUNCTIONS

When selecting a Set Up screen, such as Format (Figure 4-8), several display elements are highlighted by reverse video.

These elements are referred to as fields, and information may be entered into them or the information within may be altered. Note that one of these fields is further highlighted by blinking reverse video. The blinking reverse video indicates this field is selected for immediate data entry or alteration; for this reason, this field will henceforth be referred to as the ACTIVE field. Positioning of the active field indication is controlled by use of the FIELD keys. The right and left arrow keys allow the user to reposition the active field laterally along the current character line. When the active field reaches the last available field in this character line, it wraps around to the first available field at the opposite end of the line. The up and down arrows permit the user to move the active field vertically through those character lines containing fields. A wraparound is performed at the uppermost or lowermost fields. The FIELD keys also perform other functions in specific displays. These functions are discussed in the descriptions of the display operation.

Many of the display fields (such as the Data Format field of the Format Screen) have multiple choices of data or information. When the field is active, the user may scroll forward or backward through the choices using the NEXT or PREVIOUS keys, respectively. Rapid selection of choices is facilitated by use of what is referred to as "Quick-Keys". Choices are assigned alphanumeric values, and the user may rapidly advance to another choice with a single depression of the alphanumeric key with the value which corresponds to the Quick-Key value. When Quick-Keys are used to make entries, the active field generally shifts to an adjacent field; if the NEXT/PREV keys are used, the active field does not reposition. As the various fields of each display are discussed in this text, the Quick-Key values of each choice are given in parenthesis; for example, (8).

Many of the keys on the keypad serve a dual function. The primary function of the keys is printed either directly on the keybutton or immediately above the keybutton in black lettering. The secondary function of dual-function keys is printed directly below the keybutton in blue lettering. To use the secondary functions, the user must first depress the SHIFT key and then the desired secondary function key. Ordinarily, the user must make a depression of the SHIFT key for each depression of a secondary function key, but in the event that several like entries in a row are desired, holding the function key in a depressed state causes a repetitive mode of operation.

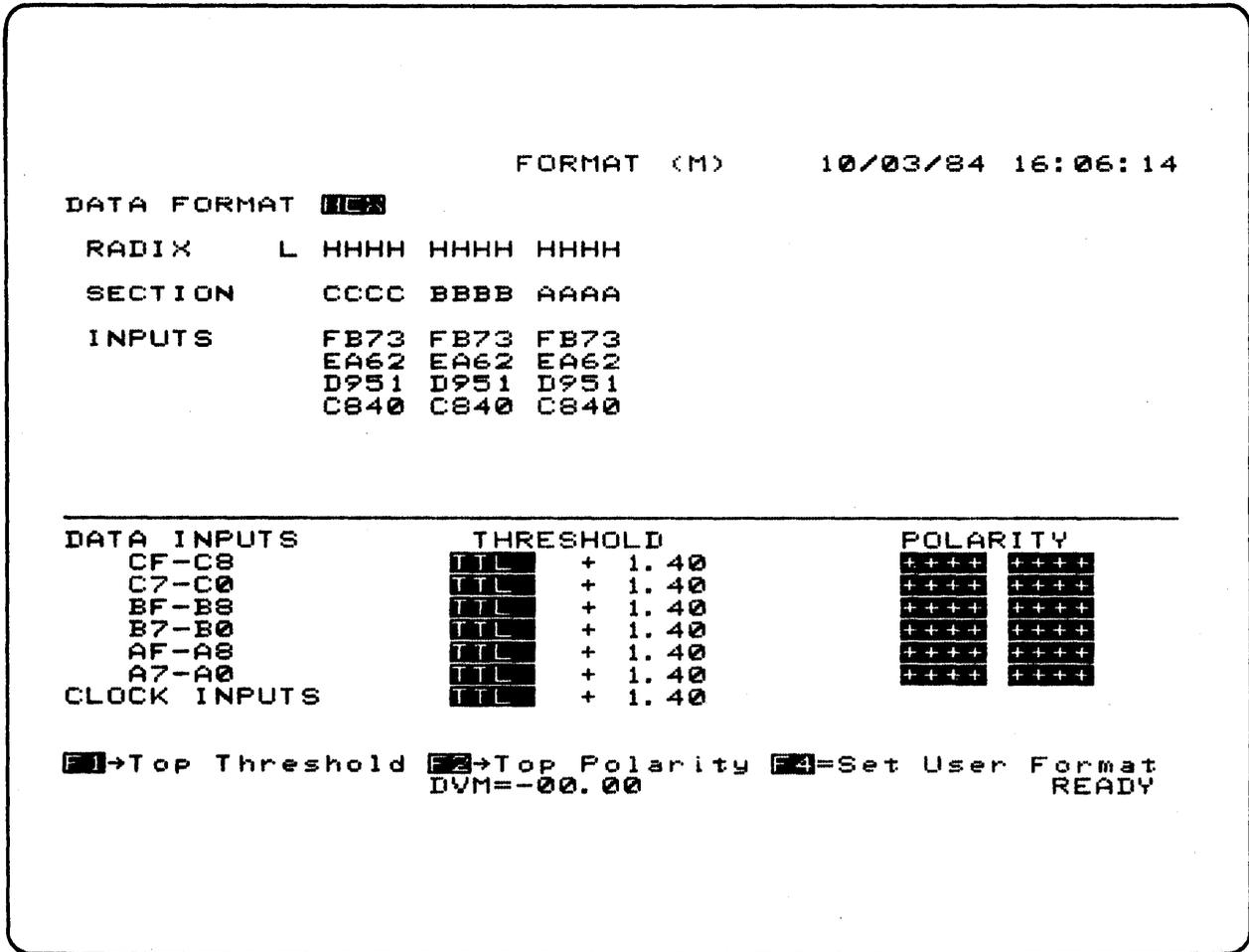


Figure 4-8. Typical Screen Display

A Help function is available in the K205. The user may access Help messages (Figure 4-9) by depressing the HELP key when in any of the Set Up or Display screens. Eight lines of information are presented in either the upper or lower half of the screen, depending on the location of the active field. The information provided is pertinent to the active field. The Help Screen also provides quick-key choices.

To use the X/SPACE functions in the Data and Timing Display Screens, in which comparisons are performed, the user must be in Edit mode. The Edit mode is entered by depressing the EDIT key, which allows the user to perform editing functions in the Data, Timing and Graph Display Screens. In the Trace Control Set Up Screen, the user may use the EDIT key to select a binary presentation of the Pattern Definitions.

The Insert and Delete key, INS/DEL, is used in the Format Set Up Screen to either insert additional columns into the display or delete existing columns from the display. As additional columns are inserted, the columnar information initially presented on the screen is shifted right in its entirety. Note that information shifted off the screen cannot be returned. When using DEL in this screen, columnar information is deleted, and the remaining information is shifted left to fill the void. For most numeric fields represented by two or more digits, depressing the SHIFT and CLEAR keys causes the field value to be set to the minimum legal value.

The INS/DEL key serves a function similar to the above when in the edit mode of the Timing Display Screen. Entire lines may be inserted or deleted and the lines below shift down or up, respectively. Note that more than 96 insertions in the inputs display cause information to be lost.

FORMAT SET UP SCREEN

The Format Set Up Screen allows the user to specify the display format used in the Data Display Screen. Due to the close relationship of the probes to the Format Set Up Screen, a discussion of the probes is necessary prior to discussing the Format Set Up Screen.

Figure 4-10 illustrates a typical connecting arrangement consisting of the D-connector, cable, probe case, probe tip, probe connectors with flying leads, and the grabbers which attach to various IC pins or a wire-wrap post on a PCB.

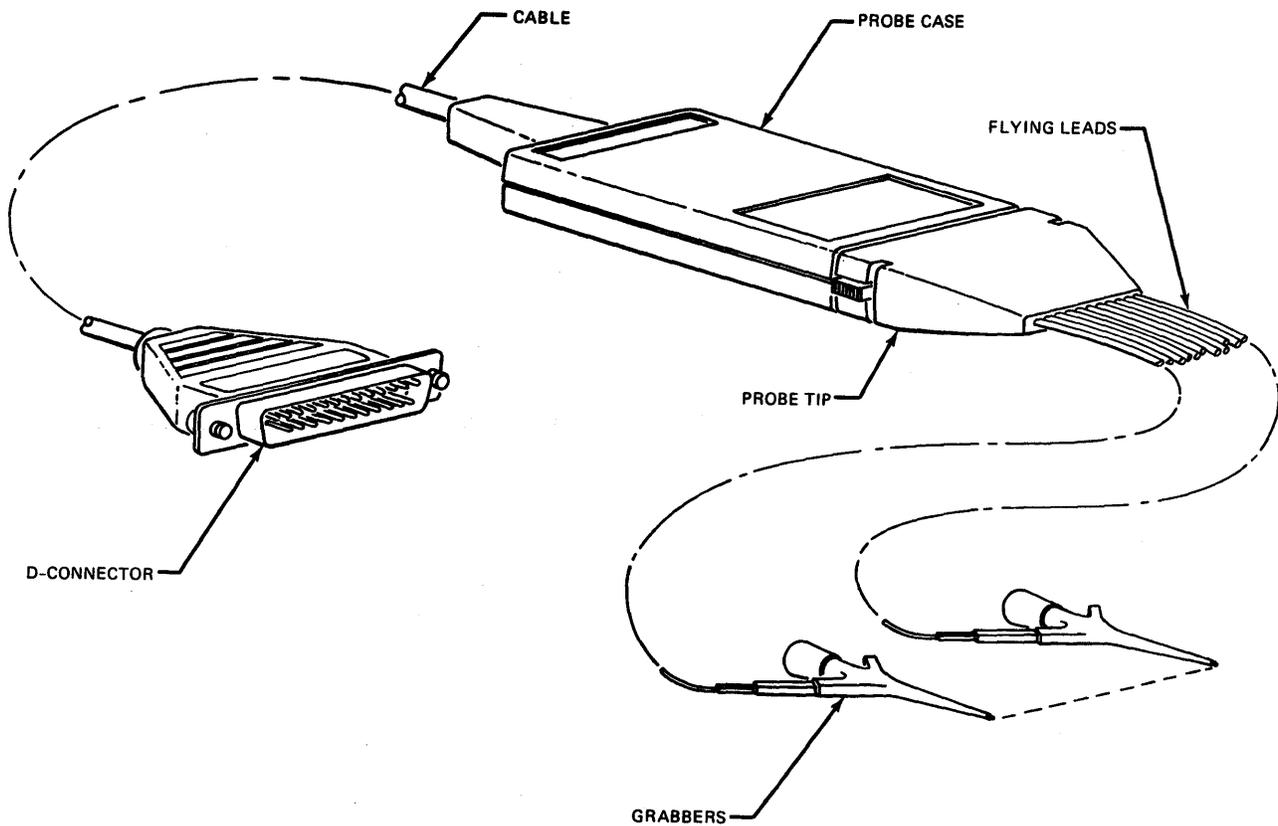


Figure 4-10. Typical K205 Connection

The probe assembly D-connector is labeled to indicate to which of the K205 front panel D-connectors it attaches. Additional identification of the probe assembly consists of a label on the probe case which identifies the probe and the attached color coded input lines. Note the individual input lines on the probe connector with flying leads are further alphanumerically identified at their tips, where the grabbers attach. The input line identifiers used on the probe case label are directly associated with the section and input identifiers used in the Format Set Up Screen, Figure 4-11. The probes are electrically interchangeable.

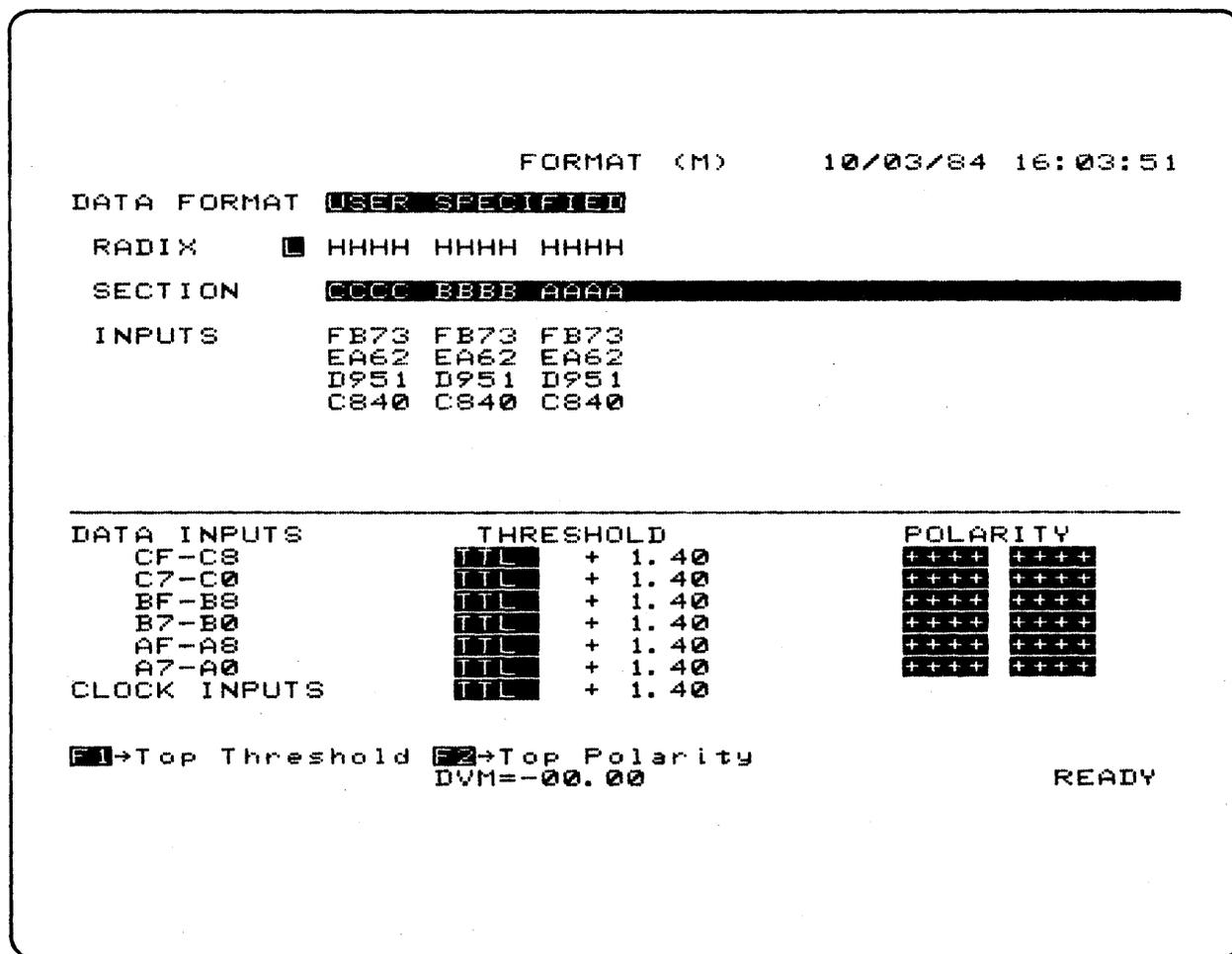


Figure 4-11. User Specified Format Screen

DATA FORMAT **BINARY**
 RADIX L BB
 SECTION CCCCCCCCCCCCCCCCCB BBBBBBBBBBBBBBBBBBBBAAAAAAAAA
 INPUTS FEDCBA9876543210 FEDCBA9876543210 FEDCBA98

DATA INPUTS	THRESHOLD	POLARITY
CF-C8	TTL + 1.40	++++ ++
C7-C0	TTL + 1.40	++++ ++
BF-B8	TTL + 1.40	++++ ++
B7-B0	TTL + 1.40	++++ ++
AF-A8	TTL + 1.40	++++ ++
A7-A0	TTL + 1.40	++++ ++
CLOCK INPUTS	TTL + 1.40	++++ ++

F1→Top Threshold **F2**→Top Polarity **F4**=Set User Format
 DVM=-00.01 READY

Figure 4-12. Format Screen with Binary Selected

Data Format Field

The Format Set Up Screen is used to specify the display format in the Data Display Screen, set the order of channels in the Graph Display Screen and set the radix used for the patterns in the Trace Control Set Up Screen. The Format Set Up Screen is called by depressing the FORMAT Set Up key. The field adjacent to the words Data Format is the active field. By depressing the NEXT or PREV keys, the user may scroll through the format choices. The user may also make choices using the quick-keys as shown below.

- (0) Hex Fixed format
- (1) Octal Fixed format
- (2) Binary Fixed Format, Inputs CF-A8 (48 input systems)
 Inputs BF-A0 (32 input systems)
- (3) User Specified (Binary, Hex, Octal, ASCII, EBCDIC)
- (4) Disassembler

Fixed Formats

The Hex (0), Octal (1), Binary (2), and Disassembler (4) choices provide predefined selections for the Section and Inputs fields. For Hex, Octal, and Binary formats, the available inputs are grouped into columns according to the format selected. In Hex format, columns are represented by four inputs; in Binary format, each column is represented by one input, (Figure 4-12); in Octal format, columns are represented by a combination of one input and three inputs. When any of the fixed formats is selected, the Trace level in which each data sample occurred is shown in the Data Display Screen as denoted by the L to the right of the Radix label.

User Specified Format

When User Specified format is selected, the user can select the format for the Data Display Screen by specifying the Level Display choice, and the Section and Inputs used for each column.

The User Specified format can be loaded with one of the fixed formats by moving the active cursor to the Data Format field, selecting the desired fixed format, and depressing key F4. If a disassembler is loaded, the User Specified format can be loaded following this same procedure. Once the Fixed Format is loaded, the User Specified Format may be selected and the display modified accordingly.

Level Display

The Level Display field, immediately adjacent to the Radix label, allows the user to specify if the Trace level in which each data sample occurred is shown in the Data Display Screen. The quick-key selections are (0) No and (1) Yes.

Section and Inputs Fields

The Section and Inputs fields allow the user to specify on an individual basis the inputs to be used for each column of the Data Display Screen. When User Specified format is selected, the entire Section line appears in reverse video; the Inputs field does not appear in reverse video, although all selections in the Inputs field can be altered.

In the Section field, the user may select the desired input section for each column by using the following keys: NEXT, PREV, A, B, C, (C for 48 input systems only), and SPACE (to specify a blank column). These characters, A through C for 48 input systems, and A through B for 32 input systems, correspond to the input connector pairs (section) of the connector panel. Each column of data in the Data Display Screen can only use inputs from a section of 16 inputs; for example, A(F-0). Depressing the SHIFT, CLEAR, DELETE and INSERT keys while in the Section field results in the following conditions:

SHIFT CLEAR	Deletes all columns below and to the right of the cursor.
DELETE	Deletes the column below the cursor.
INSERT	Inserts a blank column at the cursor.

In the input field, the user may select the desired inputs for the specified section by using the NEXT, PREV, 0-F, and SPACE (to enter a blank). Up to eight inputs may be specified for each nonblank Section column. When the user keys the desired section character into the section line, the active field relocates to the uppermost of eight vertical character fields. The order of bits is determined by the relative position of the input in its column; the uppermost input is the most significant bit, and the lowermost input is the least significant bit. Starting with a blank input column, as an entry between F and 0 is made in a field, the active field drops down to the next input character location. Simultaneously, the radix character directly above changes to reflect the number of inputs in use in this column. The radix character definitions are provided in Table 4-1.

Table 4-1. Radix Definitions

NUMBER OF INPUT CHARACTERS	RADIX LINE CHARACTER	DATA DISPLAY SCREEN RADIX
0		
1	B	BINARY
2	Q	BASE FOUR
3	O	OCTAL
4	H	HEX
5	X	Base 32, values 0-15 are displayed as 0-F 16-31 are displayed as G-V
6	A	ASCII 6
7	A	ASCII 7
8	E	EBCDIC

When inserting entries into an input lines column, blanks may be entered anywhere in the column, but the radix adjusts to the number of actual characters present in the column. When all desired entries in a column are completed, use of the right or left arrows of the field keys moves the active field to an adjacent column and up to the section line.

Threshold Fields

The lower half of the Format Display Screen is dedicated to the selection of thresholds for the clock inputs and each group of eight inputs, (i.e. by each probe) as well as the polarity for each input. As the user moves the active field down from the last character line of the inputs, the field adjacent to

the input group identifier, BF-B8 for 32 input systems and CF-C8 for 48 inputs systems, becomes the active field.

The choices available for this field are as follows:

- (0) TTL
- (1) ECL
- (2) VARA - variable
- (3) VARB - variable

The adjacent polarity and threshold voltage values of +1.4 for TTL and -1.3 for ECL are fixed values. When VARA or VARB is selected, note that the polarity and voltage values themselves become fields. For an active polarity field, selections available are +, quick-key (1), and -, quick-key (0). For an active voltage field, numeric keyboard entries from 000 to 999 may be made giving an effective range of -9.99V to +9.99V. The keyboard entries appear as they are made, in the voltage field, shifting from right to left in a manner similar to that in the common handheld calculator. Any change in polarity or voltage values causes a like change in all polarity or voltage fields for the same threshold; VARA or VARB. Thresholds are updated to the probe only when the ARM key is depressed.

Polarity Fields

To the right of the threshold values are the selection fields for assigning the polarity for each individual input. Quick-key values are (1) for +, and (0) for -. If an input is specified to be negative, the value read in is inverted prior to presentation in the Data Display, the Graph Display and the value column at the right end of the Timing Display. The Timing Display traces always show a signal more positive than threshold as a high and a signal more negative as a low regardless of the polarity selected.

The polarity values are associated with M, A and B data memories. Once a recording has been made, the polarity values cannot be changed. If the polarity differs in memory A and memory B, the data is compared according to its polarity.

CLOCKS SET UP SCREEN

Clock Mode Field

Upon entering the Clocks Screen, the Clock Mode field is active and the following choices are available:

- (0) Standard
- (1) Advanced

If Standard mode is selected, (Figure 4-13), all inputs are sampled at the Master Clock rate. In Advanced mode, different clocking schemes can be selected for each section of inputs.

Master Clock Fields

In the Master Clock field, either an (0) Internal or (1) External clock source may be selected.

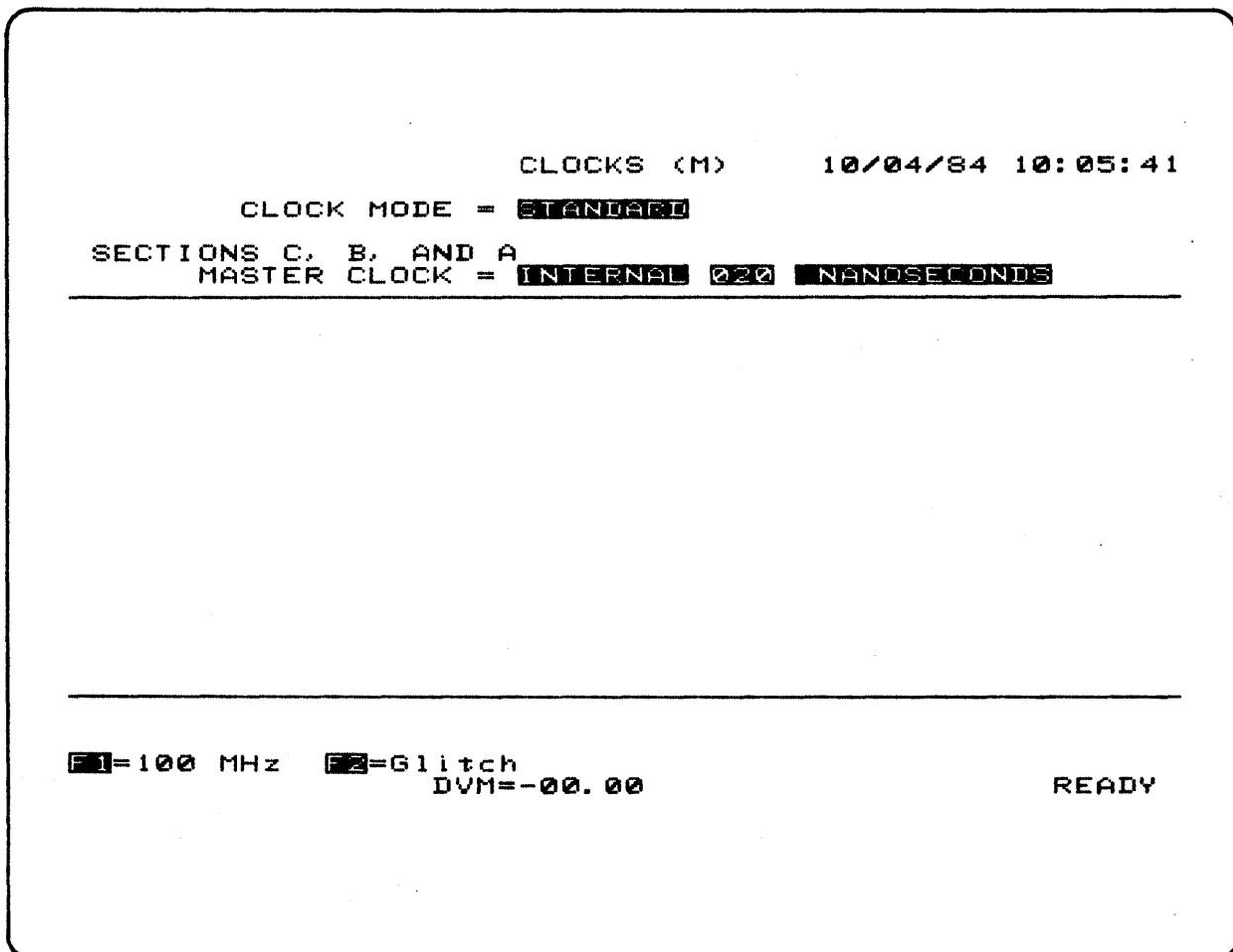


Figure 4-13. Clock Screen with Standard Clock Mode

Internal Master Clock

If Internal is selected (Figure 4-14), the Clock Interval and Time Unit may be specified. Valid internal clock periods range from 20 nanoseconds to 100 milliseconds, in a one through ten sequence.

```
CLOCKS (M)      10/03/84 16:28:05
CLOCK MODE = ADVANCED II
SECTIONS C, B, AND A
MASTER CLOCK = INTERNAL 020 NANoseconds
-----
SECTION C
[REDACTED] [REDACTED]
STORE SECTION C ON 10 NANoseconds
SECTION B
[REDACTED] [REDACTED]
STORE SECTION B ON 10 NANoseconds
SECTION A
[REDACTED] [REDACTED]
STORE SECTION A ON 10 NANoseconds
-----
F1=100 MHz   F2=Demux/Glitch   F3=Copy C→B   F4=Copy B→A
              DVM=-00.00              READY
```

Figure 4-14. Clock Screen with Internal Master Clock

The Clock Interval value can be entered using any combination of the 0 through 9 keys and the NEXT/PREV keys. When the NEXT/PREV keys are used, the Clock Interval value either increments or decrements in the following sequence:

1,	2,	. . .,	8,	9,
10,	20,	. . .,	80,	90,
100,	200,	. . .,	800,	900,

The NEXT/PREV keys only increment or decrement through valid clock period values.

When the time unit field is active, the following three choices are available:

- (0) milliseconds
- (1) microseconds
- (3) nanoseconds

Master Clock Measurements

If the Master clock source is External and the unit is not armed when the screen is first entered, the Master Clock frequency is measured and displayed at the bottom of the screen. Six External clock inputs may be combined to form two sample clocks and one Master (M) clock for 32 input systems and three sample clocks and one Master (M) clock for 48 input systems.

External Master Clock

For 48 input systems, the logical expressions formed by the six input fields allow the user to AND the J clock inputs in one group, OR the K clock inputs in another group, and then OR the two groups. For 32 input systems, the CJ and CK inputs are substituted with BR and BS inputs, respectively. When any of the six fields are active, the selections are as follow:

- (0) No clock input
- (1) Clock input, not inverted
- (2) Clock input, inverted

Section Input Mode Selection

If Advanced mode is selected, the clocking scheme for each section may be specified. The active fields for each section are the Demux field, the Latch/Glitch field, the Latch Clock expression, the Store/Sample choice and the Sample Clock Expression/Period.

In the Demux field, the user may select whether or not the inputs of a section are demultiplexed using the following keys:

- (0) No Demux (Inputs 7-0 and F-8 are independent.)
- (1) Demux (Inputs 7-0 are internally also connected to F-8, respectively.)

In the Latch/Glitch field, the following choices are available:

- (0) No latch or glitch capture
- (1) Latch
- (2) Glitch capture

If Latch is selected for either the F-8 or 7-0 inputs of a section, the Latch clock expression appears to the right of the Latch/Glitch field. The expression may appear on the first or second line of the Section, depending on which inputs have Latch selected; however, note only one expression appears for each section, corresponding to one Latch clock per section.

If Glitch is selected, any pulse crossing threshold 250mV for 5 nanoseconds or a move between samples is held as a change of state in the Latch. This even number of threshold crossings between samples is sampled as a change of state at the first sample clock after the pulse.

Latch Clock

For 48 input systems, the logical expressions formed by the six input fields allow the user to AND the R clock inputs in one group, OR the S clock inputs in another group, and then OR the two groups. For 32 input systems, the expression has only the AR and AS inputs ORed together. When any of the fields are active, the selections are as follows:

- (0) No clock input
- (1) Clock input, not inverted
- (2) Clock input, inverted

Sample/Store

The inputs for each section can be stored at either the Master Clock rate or Section Store Clock rate when Trace is enabled by selecting Sample (0) or Store (1), respectively. Note that in all cases, patterns are compared and trace decisions made at the Master Clock rate. Store just moves the data into memory when trace is true at the store rate.

The user may select to have the section inputs Stored/Sampled as follows:

- (0) INT (Internal)
- (1) EXT (External)
- (2) 10 nanoseconds
- (3) Same as Master Clock

If Internal is selected, the Internal Clock period fields appear to the right of the Sample Clock Source field. The Internal Clock period may be altered following the same procedure described in the Master Clock section. Whenever the Internal Clock period is changed, all other places where the clock is displayed on the screen are also changed simultaneously.

If External is selected, (Figure 4-15) the Clock expression may be selected following the same procedure described in the Master Clock Section. Note each section can have a unique sample clock.

```

                                CLOCKS (M)      10/03/84 16:23:27
                                CLOCK MODE = ADVANCED
SECTIONS C, B, AND A
MASTER CLOCK = EXTERNAL (<F1•B1•A1>)+(<F2+F3+F4>)
-----
SECTION C
    [ ] GLITCH F-8
    AND SAMPLE SECTION C ON SAME AS MASTER
SECTION B
    [ ]
    SAMPLE SECTION B ON SAME AS MASTER
SECTION A
    DEMUX 7-0 TO LATCH F-8 IF (<F1•F2•A1>)+(<CS+F3+F4>)
    7-0
    AND SAMPLE SECTION A ON EXT (<C1•F1•A1>)+(<F2+F3+F4>)
-----
Master Clock = > 10mS
F1=100 MHz   F2=Demux/Glitch   F3=Copy C→B   F4=Copy B→A
              DVM=-00.00                READY

```

Figure 4-15. Clock Screen with External Master Clock Selected

Through use of keys F1 through F4, the user can select 100 MHz clocking, set the Demux and Latch/Glitch fields for all sections, copy Section C selections to Section B, and copy Section B selections to Section A. The following provides detailed descriptions of these keys and their associated actions:

- F1 Depressing F1 changes the Clocks setup to 100 MHz clocking. The screen is redisplayed with the new settings.
- F2 Depressing F2 in Standard Clock Mode changes the Clock Mode to Advanced, selects Glitch with no Demux for all inputs, and samples all sections at the Master Clock rate. The screen is redisplayed with the new settings.

Depressing F2 in Advanced Clock mode alters the Demux and Latch/Glitch fields for all sections, depending on the current Latch/Glitch setting for the section A F-8 inputs, as follows:

CURRENT SECTION A F-8 INPUT VALUE	NEW DEMUX	NEW LATCH/GLITCH
---(No Latch or Glitch)	Demux	Latch F-8 --- 7-0
LATCH	---(No Demux)	Glitch F-8 Glitch 7-0

F3 Depressing F3 in Advanced Clock Mode duplicates all Section C selections in Section B. The screen is redisplayed with the Clock Mode field active.

F4 Depressing F4 in Advanced Clock mode duplicates all Section B selections in Section A. The screen is redisplayed with the Clock Mode field active.

Split-Timing

Split-Timing occurs whenever more than one clock rate is used for moving data into memory. The word SPLIT is briefly displayed in reverse video to the left of the CLOCKS header to inform the user that this condition is selected. Similarly, the SPLIT message appears on the associated Data, Timing and Graph display screens.

TRACE CONTROL SET UP SCREEN

When the Trace Control Set Up Screen is called from an initialized state, the screen appears as shown in Figure 4-16. Because there are a large number of choice combinations possible in this set up screen, the available field choices are presented in Table 4-2.

```

                                     TRACE (M)      10/03/84 16:21:10
LVL  COMMAND SEQUENCE:
0:TRACE  UNTIL  SAMPLE = TRIGGER
1:TRACE  FOR   00250 CLOCKS
-----

PATTERN DEFINITIONS:
NAME:      HHHH HHHH HHHH
00 ENABLE  =XXXX XXXX XXXX
01 TRIGGER =XXXX XXXX XXXX
02 -       =XXXX XXXX XXXX

F1→TOP CMD,  F2→TOP PTRN,  DVM=-00.00  F4=FILL-IN COL
                                     READY
```

Figure 4-16. Trace Control Set Up Screen

The K205 has sixteen levels of trace control, each of which can conditionally trace, stop the recording, advance to the next level or jump to another level. These actions can be specified to occur always, never, when sample equals pattern or when sample does not equal pattern. These conditions can also be set to occur only before, on, or after (or any combination of these) the time-out of the delay counter. The delay counter is cleared whenever the level is entered and may be set to count either clocks or occurrences of a data pattern (known as events delay).

The K205 trace control is set up from a split-screen display. The upper half of the screen allows the user to set up the trace control using high-level English-like commands. Each command is translated on entry into a low-level hardware setup, which may involve more than one hardware function. The lower half of the screen is used for defining named data patterns. When a trace control command line specifies that an action be performed when the incoming data matches or fails to match a given pattern, it refers to the data pattern by label.

Set Up Trace

Thirteen lines of trace control and eight lines of pattern definitions can be displayed at one time. If more room is required, either half of the screen can be scrolled. When the active field is moved to the edge of a screen half that has more lines waiting off screen, that screen half is scrolled to reveal these lines individually.

Where possible, the user is prevented from entering illegal command sequences. NEXT and PREV keys automatically skip over any choices that result in an illegal setup.

The INSERT key can be used to insert command lines. The command lines inserted are all null commands, which appear as ----- . The NEXT or PREV keys are used to select the desired command. The DELETE key removes commands. If the removal of one command line results in an illegal sequence, the following command lines are deleted until a legal sequence is obtained. All of the deleted command lines may be restored by immediately depressing the F3 key. Depression of any key other than the F3 key causes the deleted lines to be lost.

When the active field is a numeric field, the entire field blinks. The PREV or NEXT keys can be used to decrement or increment the number, or the decimal keys can be used to key in a new number.

When the active field is the pattern name field, depressing NEXT or PREV selects the next or previous defined name. The user may select the pattern via quick-keys, but he must key in two decimal digits corresponding to the desired pattern number as shown in the pattern definitions portion of the screen.

The two main commands are WAIT and TRACE. Either is followed by a condition which specifies when to proceed to the next action. WAIT causes the instrument to wait for a given condition without recording any data. TRACE causes the instrument to record while waiting for a condition. Table 4-2 lists the various condition choices available to set up the command sequences.

Trace Control Command Descriptions

- _____ Blank command line.
- WAIT FOR No tracing, wait for specified delay, then advance to next level.
WAIT UNTIL No tracing, wait until condition, then advance to next level.
WAIT _____ No tracing, no advance selected.
- TRACE FOR Trace all, advance to next level after specified delay.
TRACE UNTIL Trace all, advance to next level when condition true.
TRACE IF Trace only when condition is true, no advance selected.
TRACE _____ Trace all, no advance selected.
- OR UNTIL
Provides an alternate advance condition by setting up a Jump to the following level. When used at level F, wraps around to level 0, whereas the normal advance condition stops.
- OR GO TO lv IF
Attaches a Jump condition to the preceding WAIT or TRACE. If the condition is met, the K205 jumps to level lv on the following master clock. If the Jump condition occurs simultaneously with an Advance condition, the Jump takes priority.
- OR STOP IF
Attaches a Stop condition to the preceding WAIT or Trace command. If the condition is met, the K205 stops on the following master clock. The Stop condition takes priority over either the Jump or Advance conditions.
- ADVANCE IF
Available only on the line immediately following WAIT _____, TRACE _____ or TRACE IF, specifying the Advance condition to be attached to this command.
- SET DELAY
Sets up the delay count and mode for the level that follows. Delay count can be from 1 to 65535, delay modes are CLOCKS, where the counter is incremented once on every master clock, and COUNTS OF SAMPLE=, where the counter is incremented once for each sample that matches the selected pattern. Whenever a level is entered, the delay counter is reset to zero. After each delay pattern or clock, the delay counter is incremented by one. If advance on a pattern is used with delay by patterns, the two patterns must match, since the same hardware is used internally.
- GO TO lv No tracing, jump immediately to selected level.
STOP No tracing, stop immediately.

Table 4-2. Trace Control Command Format

(0) - - - -		
(1) WAIT	(0) FOR	(delay expression)
	(1) UNTIL	(condition)
	(2) - - - -	
(2) TRACE	(0) FOR	(delay expression)
	(1) UNTIL	(condition)
	(3) IF	(condition)
	(2) - - - -	
(3) OR UNTIL		(condition)
(4) OR GO TO (level) IF		(condition)
(5) OR STOP IF		(condition)
(6) ADVANCE IF		(condition)
(7) SET DELAY TO		(delay expression)
(8) GO TO (level)		
(9) STOP		

Parameter Definitions

(delay expression)	-	1 to 65535	(0) CLOCKS
			(1) COUNTS OF SAMPLE = (pattern)
(condition)	-	If set-delay not used:	SAMPLE (0) = (pattern)
			(1) ≠
		If set delay used:	SAMPLE = (pattern) (0) - - -
			≠
			SAMPLE = (pattern) (1) AND COUNT (relationship) delay
			≠
			COUNT (relationship) delay
(pattern)	-	1 to 8 character pattern name which may contain parenthetically enclosed character fill positions in which substitute values may be entered	
(relationship)	-	(0) = , (1) > , (2) ≥ , (3) = , (4) ≤ , (5) <	
(level)	-	level number value between 0 and 15 (0-F Hex)	

Setting Up A Trace Level

Each Trace Level may have up to five command lines, not including blank lines.

The first line is optional and is used to select the delay value and delay type for the Trace Level (SET DELAY). This line must be included if any of the following commands within the level use the COUNT (relationship) delay condition.

The second line specifies the primary command for the level, which may be TRACE, WAIT, GO TO, or STOP.

The third through fifth lines may be included only if the primary command is TRACE or WAIT. Each of these lines begins with a secondary command (ADVANCE IF, OR UNTIL, OR STOP IF, OR GO TO level IF). The secondary commands may appear in any order with the exception of the ADVANCE IF command, which must appear on the line immediately following a WAIT, TRACE, or TRACE IF command. The use of OR UNTIL and OR GO TO level IF is mutually exclusive within a level. Any or all of the secondary commands may be omitted.

line 1	: SET DELAY TO . . .	(optional)
line 2	: TRACE, WAIT, GO TO, STOP	(select one)
line 3	: ADVANCE IF, OR STOP IF, OR UNTIL, OR GO TO level IF	(all optional)

Pattern Definitions

The operator may define up to 50 data patterns, eight of which may be displayed at one time in the pattern definition half of the screen. Each definition line consists from left to right of a system-supplied two-digit number, the user-supplied name of one to eight ASCII characters, and the pattern value.

A new pattern is defined by moving the active field down to the numbered but undefined line after the last currently defined pattern. When the operator keys in a name for the pattern, the actual value of the symbol is all Don't-Cares. The active field can be moved to any column of the pattern. Depressing a hex digit appropriate for the radix in use enters that value; depressing the X/SPACE key enters a Don't-Care, (Figure 4-17). PREVIOUS or NEXT rolls the column through its legal values.

```

                                TRACE (M)      08/10/84 13:02:04

LVL  COMMAND SEQUENCE:
0:TRACE UNTIL SAMPLE = TRIGG(5)
1:TRACE FOR 00250 CLOCKS
-----

PATTERN DEFINITIONS:
NAME:      HHHH HHHH HHHH
00 ENABLE  = XXXX XXXX XXXX
01 TRIGG( ) =  EX XXXX XXXX
02 _       = XXXX XXXX XXXX

 → TOP CMD,  → TOP PTRN
                                DVM=-00.01
                                READY

```

Figure 4-17. Trace Control Setup Screen with Don't-Care Entered

Depressing the EDIT key while the active field is on a pattern definition line causes this one pattern to be displayed in a two-dimensional binary representation that is a duplicate of the column definitions in the Format Screen. This allows the pattern to be edited on a bit-by-bit basis and makes possible embedded Don't-Cares. Depressing EDIT again returns the screen to its standard display mode. The user should note that if some but not all bits of a pattern definition column were changed to Don't-Cares in the Edit mode, then when the pattern definition are viewed in the non-edit mode the character for that column is displayed as a small X with a box around it. If all bits for that column are Don't-Cares, the character displayed in the non-edit mode for that column is a large X.

Depressing INSERT causes the definition currently in the active field to be moved down one position and given the next higher number. The operator can then enter a new pattern name on this line and define a pattern for it.

Depressing DELETE removes the definition in the active field if that definition is not being referenced by an acquisition control line. If it is being referenced, an error message is displayed on line 2. An accidentally deleted pattern may be restored by depressing the F3 key.

If the name of a pattern is changed, the name will also be changed in all referencing trace control lines, so that these control lines will continue to reference that pattern.

When the active field is over a pattern value column, the F4 key can be used to enter a fill-in value in that column. This displays a reverse video underscore at this column and causes the last three characters of the pattern's name field to be replaced with (_). Up to five fill-in columns may be defined for each pattern, in which case the last seven characters of the name are replaced with (____). The purpose of this is to allow the user to enter different values into these columns each time the pattern is used. When the pattern is selected in the command half of the screen, its name is followed by parentheses surrounding one to five Don't-Care characters. The user may replace these Don't-Cares with actual values, which are substituted into the pattern at the designated columns.

If the user assigns a value to a pattern definition that has not been assigned a name, the K205 automatically names the pattern. The patterns are named by their location in the sequence of patterns (for example: P06).

Character line 28 of the screen presents definitions of the keys F1 through F4. These keys change functions depending on the screen being viewed. In the Trace Control Set Up Screen, F1 moves the active field to the uppermost command line, F2 moves the active field to the uppermost pattern definition, F3 reverses a deletion providing no intervening keyboard entries have been made, and F4 enters fill-in values into pattern definitions.

Review Screen

Once the user has completed a trace control setup, he can review his setup on a level by level basis by accessing the Trace Control Parameter Setup Review Screen, Figure 4-18.

```

                                REVIEW                                09/06/84 10:53:55

LEVEL 1  DELAY = 00500 CLOCKS
STOP NEVER
S =
JUMP TO 2 IF DATA = J
J =      XXXX      XXXXXXXX      XX
ADVANCE IF SAMPLE COUNT ≥ DELAY
A =
TRACE NEVER
T =

-----
1:WAIT FOR 00500 CLOCKS
OR UNTIL SAMPLE = ENABLE

                                DVM=-00.00                                READY

```

Figure 4-18. Trace Control Parameter Setup Review

This screen is selected by depressing the SHIFT key and then the TRACE CONTROL key. The screen generally appears as shown in Figure 4-18 with the Level field active. This field is the only alterable field in the display and allows the user to select specific individual trace levels for review. Selection is made via the NEXT/PREV key or the numeric keys.

The trace setup for a level is evaluated and presented on the basis of four commands as follows:

- Stop
- Jump
- Advance
- Trace

The condition and pattern are presented for each command. The user should note if he has set up a trace command to act on a given pattern and then later changes the trace command to Trace Always, the Trace Control Parameter Setup Review Screen displays a Trace Always Command and the original condition pattern. The Trace Control Command lines, which represent the corresponding setup or the Trace Setup Screen, are displayed at the bottom of the screen.

ARM MODE SETUP SCREEN

When the Arm Mode Setup Screen is selected, the active field is the Arm Mode: field, as shown in Figure 4-19.

```
ARM MODE (M)      09/06/84 10:55:24
AFTER EACH PASS,
  ---
  AUTO REARM ---
-----
AUTO COMPARE RANGE IS FOR 512 SAMPLES
-----
USING INPUTS DEFINED ON FORMAT SCREEN
-----
AUTO EDGE TOLERANCE = ± 0 SAMPLE(S)
EDGE TOLERANCE IS ASSOCIATED WITH MEMORY B AND IS
SET ON EACH A→B DATA TRANSFER OR BY PRESSING F4
-----
F1=No Stop   F2=Stop ≠   F3=Count ≠   F4=Set Tolerance
              DVM=-00.00                      READY
```

Figure 4-19. Arm Mode Screen

Comparison Counter Field

When AUTO REARM is selected in the Arm Mode field, the user may select to have the data captured at the end of each pass compared with the data in memory B. The Comparison Count is incremented each time the comparison is true. The available comparison choices are as follow:

- (0) ---(not used)
- (1) INCREMENT COMPARISON COUNTER IF A = B
- (2) INCREMENT COMPARISON COUNTER IF A ≠ B

Arm Mode Field

The user can use the following selections to either STOP the system at the end of one pass (Single Arm) or continue to rearm indefinitely or until the STOP Rearm condition is true (Conditional Rearm).

- (0) STOP (no rearm)
- (1) AUTO REARM

When the Arm Mode field is active and AUTO REARM is selected, the F1, F2, and F3 keys set the STOP Rearm condition and Comparison Count fields for frequently-used applications as follows:

	Comparison Count	Stop Rearm Condition
F1=No Stop	(0) ---	(0) ---
F2=Stop ≠	(1) ---	(3) UNLESS A ≠ B
F3=Count ≠	(2) If A ≠ B	(0) ---

Stop Rearm Condition Fields

When AUTO REARM is selected, depressing the STOP key and/or setting a STOP Rearm condition stops the system from rearming. The STOP Rearm conditions are displayed to the immediate right of the Arm Mode field. Up to two conditions may be selected with the following choices:

- (0) --- (Stop Never)
- (1) UNLESS PASS COUNT =
- (2) UNLESS A = B
- (3) UNLESS A ≠ B

If --- is selected, no other fields appear to the right of ---. If UNLESS PASS COUNT = is selected, the user can move the cursor to the right to set the Pass Counter Limit. If UNLESS A = B or UNLESS A ≠ B is selected, the user can move the cursor to the right and select a Pass Limit Option using the following selections:

- (0) --- (no pass limit)
- (1) OR PASS COUNT =
- (2) AND PASS COUNT >=

If the Pass Count is included in the STOP Rearm condition, the user can move the cursor to the right to set the Pass Counter Limit.

Pass Counter Limit Field

The user can specify a count limit of 1 through 9999 passes. The Pass Counter is set to 0 when the ARM key is depressed. At the end of each pass, the Pass Counter is incremented by one.

Auto Save Fields

The Auto Save function is available only if the AUTO REARM is selected and the disk option installed. The Auto Save function allows the user to save recorded data to disk at the end of each recording.

Auto Save Condition

The user can choose whether or not to use the Auto Save Function by selecting one of the following:

- (0) --- (never)
- (1) IF A = B
- (2) IF A \neq B
- (4) ALWAYS

Auto Save File Name

Three fields are associated with the filename. The first field specifies if the Memory A data should be written to drive A (0) or drive B (1).

The second field selects the filename. This field is six characters in length and is entered using numeric keys 0 through 9, A through Z, and the X/SPACE keys. The filename may not begin with a space nor may spaces be embedded between non-space characters.

The last field selects the file version number. This is a two-digit field with legal values ranging from 00 through 99. The version number is entered directly using numeric keys 0 through 9. After the file is saved, the version number is automatically incremented by one for the next save.

Auto Compare Fields

The Auto Compare fields are used under the following conditions: when a Comparison count evaluation is performed, an A to B evaluation is performed for the STOP Rearm condition, and the Compare Mode is used in the Display Screen. For the first two conditions, only the selections active at the time the recording is initiated are used. The current Setup M values are used for the Compare mode.

Auto Compare Range Fields

The sample used in the comparison are selected as follows:

- (0) SAMPLE(S) BETWEEN CURSOR
- (1) SAMPLE(S) SELECTED BELOW
- (2) ALL 512 SAMPLES

If SAMPLES BETWEEN CURSORS is selected, the Control and Reference values are displayed on the next two lines.

If SAMPLES SELECTED BELOW is selected, the user can fill in the MEM-A and MEM-B starting numbers (0 through 514) and the total number of samples (1 to 515) to be compared, as shown in Figure 4-20.

```

                                ARM MODE (M)      10/04/84 10:06:33
AFTER EACH PASS.
      INCREMENT COMPARISON COUNTER IF A ≠ B
AND AUTO REARM ---
AND SAVE MEMORY A TO A:RESULT-00.MA IF A ≠ B
-----
AUTO COMPARE RANGE IS FOR SAMPLE(S) SELECTED BELOW
      MEM-A STARTING AT 4,
      MEM-B STARTING AT 0,
      FOR 50 SAMPLE(S). ( MAXIMUM = 511 )
      USING INPUTS DEFINED ON FORMAT SCREEN
-----
      AUTO EDGE TOLERANCE = ± 1 SAMPLE(S)
      EDGE TOLERANCE IS ASSOCIATED WITH MEMORY B AND IS
      SET ON EACH A→B DATA TRANSFER OR BY PRESSING F4
-----
                                DVM=-00.00      F4=Set Tolerance
                                                                READY

```

Figure 4-20. Auto Compare Range Field

Auto Compare Input Fields

The user can select which inputs are used in the comparison as follows:

- (0) INPUTS DEFINED ON FORMAT SCREEN
- (1) INPUTS SELECTED BELOW

IF INPUTS SELECTED BELOW is selected, the user may choose to either omit an input from the comparison by selecting (0), or include an input by selecting (1). When the user is in the AUTO COMPARE INPUTS select field with INPUTS SELECTED BELOW displayed, the selected inputs can be set to the inputs defined on the Format Screen by depressing F1. The user can then omit or select inputs as required.

Auto Edge Tolerance Fields

The Auto Edge Tolerance fields in the lower portion of the screen allow the user to specify Don't-Cares for a given number of samples on each side of a transition. The Don't-Cares are associated with data memory B and are visible when viewing the memory B Data Display and Timing Display Screens.

The tolerance is entered by making the desired value field active and entering a value of 0 to 9. 0 represents all Do-Cares. The value is then transferred to the B memory on the next A to B data transfer or upon depression of the F4 key.

Arm Control

When Setup Parameters are selected in the Format, Clocks, Trace and Arm Mode Screens, the Record keys are used to initiate, stop, and force an Advance condition for recording.

Arm Key

The user may initiate a data recording by depressing the ARM key. The message BUSY is displayed in the lower righthand corner of the screen while the hardware is prepared for the recording. If a recording is in progress when the ARM key is depressed, the first recording is stopped immediately and the new recording is initiated.

When a recording is initiated, the Comparison Count and Pass Count are each set to zero. Both counters are updated at the end of each record cycle.

ADV Key

If an Advance condition is not found while the unit is recording, the user can force an Advance by depressing the ADV key (SHIFT/ARM).

Stop Key

During the process of a recording, the user may stop the recording by depressing the STOP key. This action terminates the recording process without recording any data in memory A.

Stop W/XFR

Depressing the STOP W/XFR key (SHIFT/STOP) stops the recording and causes any traced data to be transferred to Memory A.

End of Recording

At the end of each recording, the message EOR appears in the lower-right portion of the screen. While EOR is displayed, the following processing occurs:

1. Pass Count Comparison Count are incremented, if required. The date, time, and DVM reading are recorded.
2. The Setup record parameters saved at the beginning of the recording are copied to Setup A.

3. The recorded data is copied to Data A.
4. If AUTO REARM is selected and the STOP Rearm condition is not true, the next recording is started.

If Auto Save is selected and the Save Condition is met, the recorded data, including Level Data, Pass Count, Comparison Count, Date, Time and DVM reading, are saved to the file specified. As one diskette becomes full, an attempt is made to save files to the other diskette. If one file already exists, a hardware failure occurs, or there is no space left on the diskettes, no file is saved and the appropriate message is displayed. After the file is saved, the version number is incremented by one for the next save.

Data Display Screen - Edit Mode

The Data Display Screen has a search word displayed at the top of the leftmost column of samples. When the Edit key is depressed, the Search word is changed to reverse video and the active field appears at its leftmost column. (See Figure 4-22.)

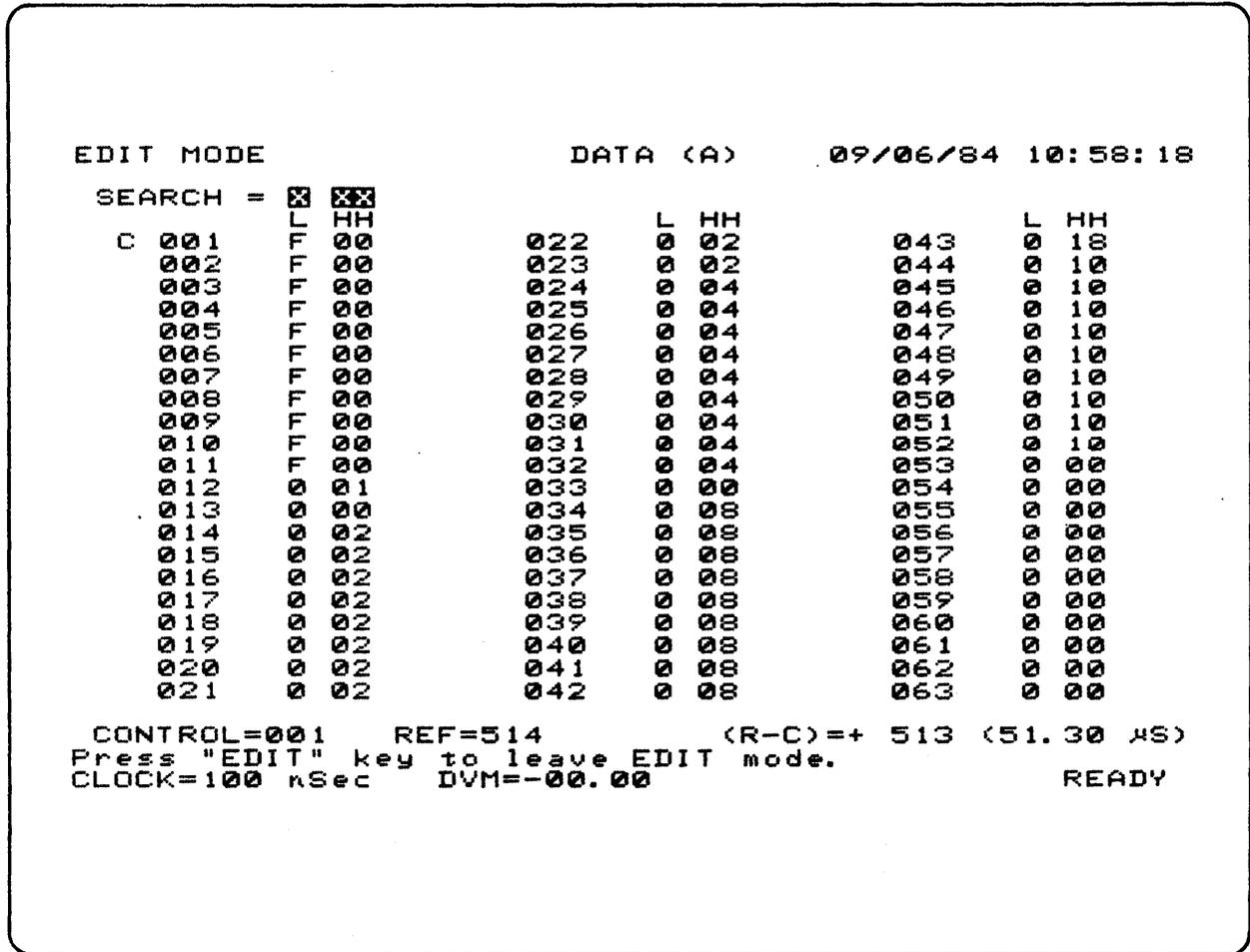


Figure 4-22. Data Display Screen in Edit Mode

The Hex keys, NEXT, PREV and X can be used to select a search value. Once set up, edit mode is left by depressing the EDIT key again. Depressing the SEARCH key causes the K205 to search the entire memory buffer (512 samples) for all samples that match the selected search value. Any samples currently on the screen that match the search value are tagged with an asterisk. A summary line appears near the bottom of the screen, showing the total number of matching samples and the sample numbers of the first and last match. The NEXT or PREV keys can be used to move the C tag to the start of the next or previous block of matching samples.

When in edit mode with memory B selected, the active field can be moved down from the search word field into the recorded data display. In this field, the hex keys can be used to enter new values into the B memory. Depressing the X key enters a value of Don't-Care. Attempting to move the blinking cursor past the lowermost sample in the first column causes the data to scroll up one position. This scrolling may cause the C tag to be moved off the screen. This is the only case in which the C tag is removed. Leaving edit mode with the screen scrolled in this manner causes the screen to be regenerated to its original position.

The contents of memory A can be compared with the contents of memory B by depressing the COMPARE key. Any samples not identical (except for Don't-Care bits) are tagged with a not-equals sign. A summary line is displayed near the bottom of the screen, showing the total number of samples not equal, and the first and last not equal samples. These items are displayed in the same places where the search information is displayed; therefore, search and compare are mutually exclusive. Requesting either function causes the other function to be disabled if it was active. The NEXT or PREV keys may be used to move the C tag to the start of the next or previous block of not equal samples.

Note that if a skewed comparison is selected in the Arm Mode Set Up Screen, the samples tagged differ in data memories A and B. For example, the Arm Mode Set Up Screen is set up with the following conditions:

MEM-A STARTING AT 003
MEM-B STARTING AT 005
FOR 010 SAMPLE(S)

In this case, samples 3 through 13 in data memory A are compared with samples 5 through 15 in data memory B. If sample 3 in A does not match sample 5 in B, but all others match, then the Data Display Screen tags sample 3 when viewing memory A and sample 5 when viewing memory B.

21 to 84 samples are displayed on the screen depending on the number of inputs available on the unit and the radix selected in the Format Set Up Screen. Reading from left to right, each sample line is displayed with a space for the C (control) or R (reference) tag followed by a three-digit sample number. Following the sample number, a space is reserved for tags generated by the search (*) or compare (≠) functions. To the right of this space there is an available space for an optional one-digit level number character followed by up to 40 characters displayed in character row four.

The Data Display Screen C and R tags and the respective Timing Display Screen cursor and reference vertical lines are interactive. For a change made to one in a given screen, there is an equal change to its counterpart in another screen. When the Data Display Screen is selected, the first data line displayed is the line at the C tag. The following sample lines appear underneath this one, forming a column of samples. Each column consists of 21 samples, and up to three columns may be displayed.

To manually move the C or R tag, the desired tag is selected by depressing the CONTROL or REF key, respectively. The tag can then be moved up or down using the up-arrow or down-arrow keys. When the C tag is moved, it always remains in the leftmost column of samples. When the C tag is at the bottom of the data column and an attempt is made to move the tag further down, the data samples scroll up while the C tag remains stationary. Similarly, an attempt to move the C tag up when the tag is at the uppermost sample line causes the samples to scroll down. The R tag may be moved to any position on or off screen. When moving the R tag in areas off screen, the user can monitor the R tag location via the REF = display element in character line 27 of the screen.

The C tag may also be moved by depressing the Page Up (F1) or Page Down (F2), function keys. These keys cause the C tag to move up or down by 21 Samples, completely regenerating the display. When viewing the data, NEXT or PREV moves the C tag to the next or previous level transition, except when the Search or Compare function is active.

The C tag may be set by first depressing the SHIFT key and then the CONTROL key. The desired position value is controlled via the 0 through 9 keys. Depressing the CONTROL key again enters the value. If the new position of the C tag is still in the leftmost column of samples, only the C tag is moved; otherwise, the screen is regenerated with the C tag at the uppermost sample line. The R tag is similarly set by depressing the SHIFT key and the REF key, but the screen is never regenerated.

TIMING DISPLAY SCREEN

The Timing Display Screen, Figure 4-23, presents recorded data. Up to 16 inputs are presented as idealized oscilloscope traces. The most recently recorded data is located on the right side of the screen. Data recorded earlier is located on the left.

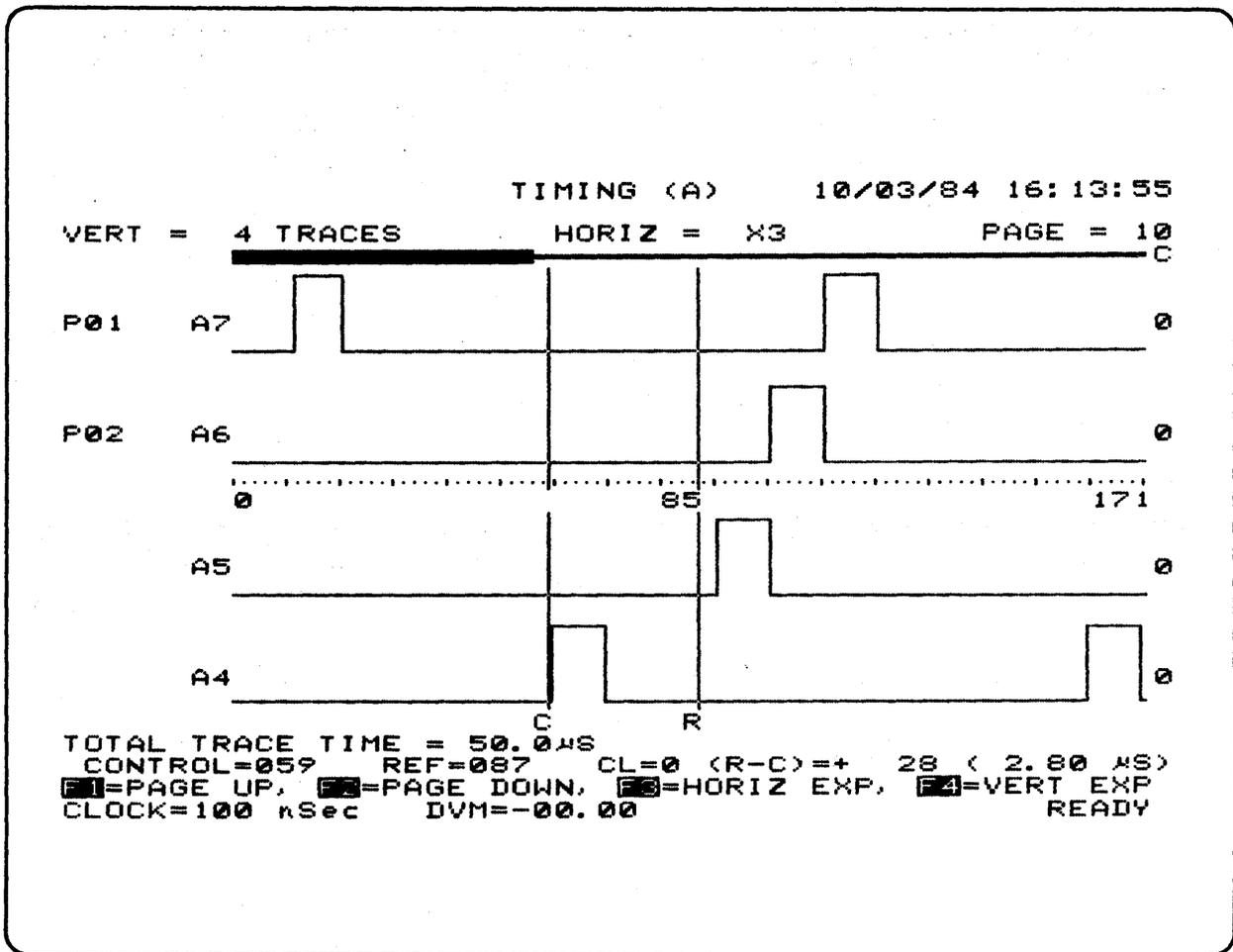


Figure 4-23. Timing Display Screen

The Timing Display Screen consists of a header on character line one, a display of current expansion settings on character line three, up to 16 timing traces and a control and reference location readout on character line 27. Once the Timing Display Screen has been accessed, the user may depress the EDIT key and assign five-character labels to the left edges of all traces. These labels are initialized to all blanks and are separated from the two-character input identifiers by a blank. The user may enter a five-character name in the specific field, possibly the mnemonic of the signal being displayed for this trace. This label remains attached to the trace input regardless of any future input sequence changes. The two-character input identifiers consist of a section character (C through A) followed by the input line number (F-0). Next is the trace itself, which occupies 43 character columns. To the right of the trace is a readout of the value of the trace under the cursor or reference, whichever was moved last. This readout takes into account the selected polarity of the input, while the timing trace always displays a value more positive than threshold as high and a value more negative as low, regardless of the selected polarity.

The traces may be displayed in one of three possible horizontal expansions: x1, x3, and x6. In x1 the recorded data is compressed by a factor of three, so that all 515 samples fit on the screen. In compressed mode, each point on the screen is generated by looking at the next three samples. If any one of these samples differs from the last point displayed, the next point displayed is the opposite of the last point. This condition assures that single sample glitches are always displayed. Since a three to one compression is referred to as x1, a one to one display of the data must be called x3. Expansion by two is also provided and is labeled x6. In all expansion except x1, not all data fits on the screen. When the Timing Display is first accessed, the traces are presented in a X1 mode. Successive depressions of the F3 key select the different expansion modes in order of their magnitude with a rollover from the X6 to X1 modes.

Note that when in the X1 expansion mode, the entirety of character line four is illuminated. This illuminated stripe represents the 515 word recording buffer. When expansion mode X3 or X6 is selected, the illuminated stripe narrows in width, and when the cursor is moved in one of these expanded modes, the remaining portion of the illuminated stripe moves. The narrowed illuminated stripe represents the portion of the recording buffer being viewed in the expanded modes. The position along character line four of the narrowed illuminated stripe represents the location within the buffer of the portion being viewed.

There are also three possible vertical expansions that can be used; v16, v8, v4, in which sixteen, eight or four traces, respectively, are displayed at once. In the Timing Display Screen, there is an input sequence table with 96 entries. This table is divided up into pages of four traces each. The page being displayed can be changed using the Page Up or Page Down keys, F1 and F2, respectively. Page 0 can be selected by entering SHIFT/F1.

The height of each trace is determined by the vertical expansion as follows:

TRACES	NUMBER OF PAGES ON SCREEN
16	4
8	2
4	1

Selection of the different vertical expansion modes is made using the F4 key in a manner similar to selecting the horizontal expansion mode.

Timing Display Screen - Edit Mode

The Timing Screen has an edit mode used for the following functions: changing the trace labels, resequencing the traces and altering the data in the B memory. Edit mode is entered by depressing the EDIT key. In edit mode, the trace labels and input IDs are displayed in reverse video. The active field appears at the topmost input ID.

Inputs can be resequenced by moving the active field to input ID fields and keying in new input numbers, using the hex characters A-C followed by 0-F. When the first character is entered, the trace area is cleared. The active field cannot be moved until the second digit is entered. The NEXT or PREVIOUS keys may also be used to change inputs. The SPACE key may be used to remove inputs from the screen. Note that removing inputs will not increase vertical expansion.

Input labels may be set by moving the active field to the desired column. The characters Space, 0-9 and A-F may be entered directly from the hex pad. Hex pad entry causes the active field to move right one position. The other characters, G-Z, are entered via shifted Hex pad keys. Keys F1 through F4 enter the characters +, -, *, and /, respectively.

If in memory B (memory select can be changed while in Edit mode), the active field can be moved into the trace area and used as an editing cursor. In this field, the active field becomes narrow and slightly taller than one trace. The number of the sample under the editing cursor is displayed at the bottom of the screen. The right and left arrow keys can be used to move the cursor to any desired position. Data values of 0 or 1 can be keyed in directly. Don't-Cares can also be keyed in, using the X key. These Don't-Cares appear as cross-hatched areas.

If the editing cursor is moved past the right edge of the screen, the data on the screen is shifted so that the editing cursor remains on the screen and the C cursor is moved to stay at the left edge. When edit mode is exited or memory A is selected, the screen stays in its current position.

When the Compare function is active and Memory A is selected, Memory B data is simultaneously displayed using dotted lines. This condition allows the user to quickly verify where mismatches occur. Similarly, memory A is displayed using dotted lines when the Compare function is active with memory B selected.

Total Trace Time

If the Compare and Search functions are not active, the Total Trace Time for the recording is displayed just above the Control and Reference readouts. The Total Trace time represents the total time the trace function was active during the recording. This value is less than or equal to the actual elapsed recording time depending on the Trace Control Setup used.

The Data Display Screen C and R tags and the respective Timing Display Screen cursor and reference vertical lines are interactive. For a change made to one in a given screen, there is an equal change to its counterpart in another screen. When the Timing Screen is selected, the C tag is visible on the screen.

To manually move the C or R tag, the desired tag is selected by depressing the CONTROL or REF key, respectively. The tag can then be moved left or right using the left or right arrow keys. When the C tag is at the rightmost portion of the Timing display and an attempt is made to move the tag further right, the data samples scroll left while the C tag remains stationary. Similarly, an attempt to move the C tag left when the tag is at the leftmost sample causes the samples to scroll right. The R tag may be moved to any position on or off screen. When moving the R tag in areas off screen, the user can monitor the R tag location via the REF = display element in character line 27 of the screen.

When viewing the data, NEXT or PREV moves the C tag to the next or previous level transition, except when the Search or Compare function is active. The C tag may be set by first depressing the SHIFT key and then the CONTROL key. The desired position value is controlled via the 0 through 9 numeric keys. Depressing the CONTROL key again enters the value. If the new position of the C tag is still on the screen, only the C tag is moved; otherwise, the screen is regenerated with the C tag at the leftmost sample. The R tag is similarly set by depressing the SHIFT key and the REF key, but the screen is never regenerated.

GRAPH DISPLAY SCREEN

The K205 Graph Display Screen (Figure 4-24), plots the recorded data samples as a graph, with position on the y-axis determined by the value of the recorded sample and position on the x-axis determined by the sample number. The screen is entered by depressing the GRAPH key.

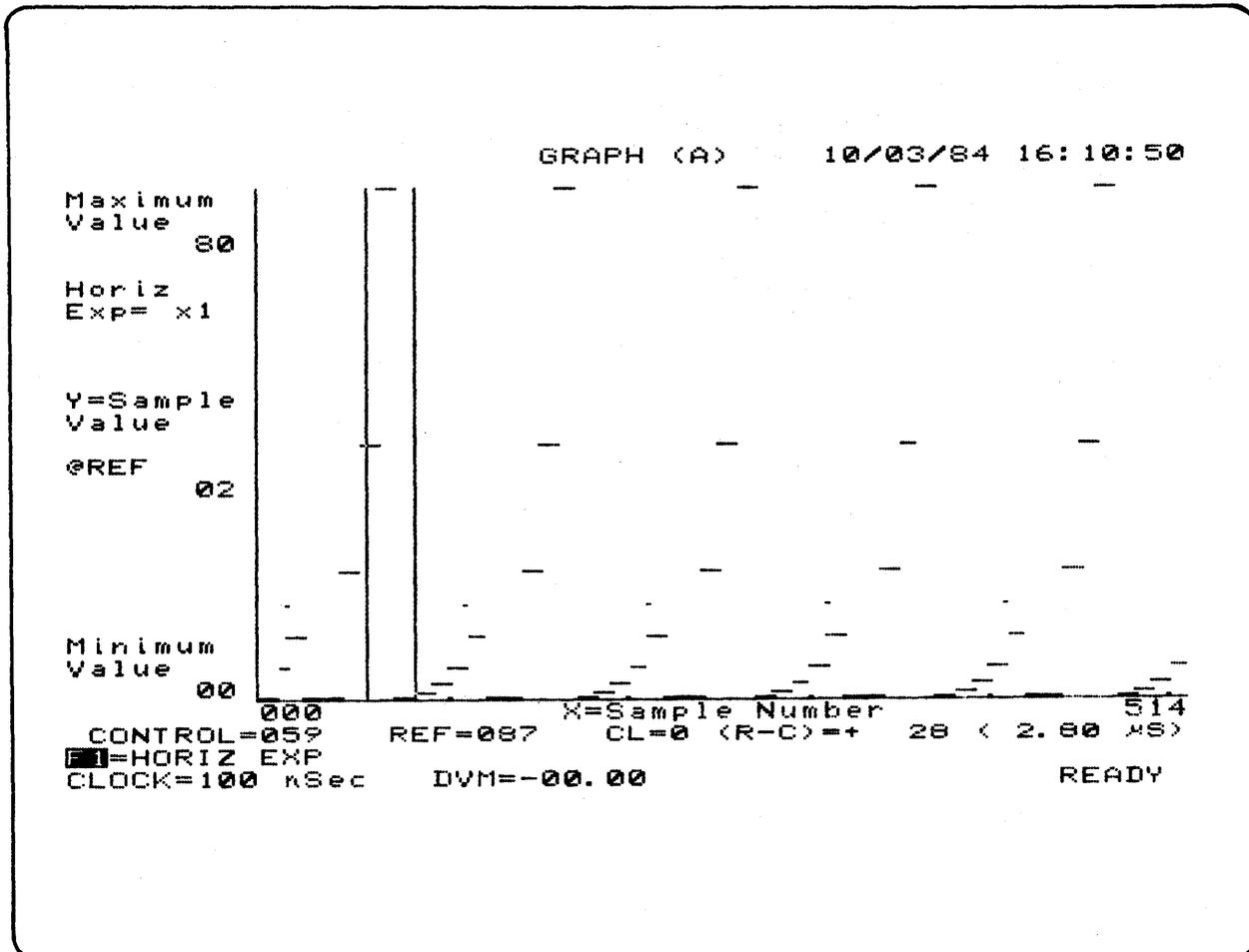


Figure 4-24. Graph Display Screen

Upon selecting the Graph Display Screen, the user may depress the EDIT key. The upper and lower limit values become fields. The leftmost character of the upper limit field is the active field. By using the right and left arrows and the hex keypad, the user may edit the upper limit to a new value. The user can then depress the down arrow to make the leftmost character of the lower limit field the active field. The editing procedure for the lower limit is the same as that for the upper limit. The limits are always displayed in hex to conserve room on the CRT. When the new limits have been entered, depressing EDIT again restores the limit fields to normal video and causes the graph to be regenerated using the new limits.

Upon selecting this screen, the currently selected memory (A or B) is plotted. For each point to be plotted, the sample at that point is converted to a 32-bit value by reordering the first 32 bits of the sequence of inputs selected in the Format Set Up Screen.

With less than 32 inputs selected, all bits are included in the value and the number of characters required for the range and their values are adjusted. Once a 32-bit value is obtained, it is compared against the upper and lower limits selected in the Graph Display Screen. If out of range, a point is plotted at either the topmost or lowermost scanline. If in range, the correct position relative to the limits is determined and the point is plotted.

Only 230 scanlines are available for the graph display, so the resolution is slightly less than 8 bits. To expand the graph vertically, closer limits must be selected. Horizontally, only 172-bit positions are used. The x1 expansion displays three samples on each column. The x3 expansion displays one sample on each column, so only 172 samples are shown. In x6, only 86 samples are displayed. Horizontal expansion is selected via the F1 key.

When the Graph display is selected, the C tag is visible on the screen. To manually move the C or R tag, the desired tag is selected by depressing the CONTROL or REFERENCE key, respectively. The tag can then be moved left or right using the left and right arrow keys. When the C tag is at the rightmost sample display and an attempt is made to move the tag further right, the data samples scroll left while the C tag remains stationary. Similarly, an attempt to move the C tag left when the tag is at the leftmost sample causes the samples to scroll right. The R tag may be moved to any position on or off screen. When moving the R tag off screen, the user can monitor the R tag location via the REF = display element in character line 27 of the screen.

When viewing the data, NEXT or PREVIOUS moves the C tag to the next or previous level transition, except when the Search or Compare function is active.

The C tag may be set by first depressing the SHIFT key and then the CONTROL key. The desired position value is controlled via the 0 through 9 numeric keys. Depressing the CONTROL key again enters the value. If the new position of the C tag is still on the screen, only the C tag is moved; otherwise, the screen is regenerated with the C tag at the leftmost sample. The R tag is similarly set by depressing the SHIFT key and the REF key, but the screen is never regenerated.

INPUT/OUTPUT OPERATIONS

I/O Function Selections

This chapter provides information concerning the Input/Output (I/O) Screen and its associated functions, including descriptions of the various Record Types. Depression of the I/O key accesses the I/O Function menu, as shown in Figure 5-1. Nine quick-key choices allow interaction with peripheral equipment attached to the K205 as follows:

- | | |
|-------------------------|---|
| (0) Disk Quick Mode | -Allows keyboard inputs for disk operations while viewing setup or display screens. |
| (1) Disk Screen Mode | -Selects the full screen Disk Operating System mode. |
| (2) I/O Setup Screen | -Selects I/O Setup Screen for configuring the I/O ports. |
| (3) GPIB-SRQ | -Causes the K205 to set the GPIB-SRQ line active. |
| (4) Print Screen Direct | -Causes the K205 to send the visible portion of the screen presently displayed to the host or terminal. |
| (5) Print Screen Long | -Causes the K205 to send all information for a given screen to the host or terminal. |
| (6) Send Setup Records | -Causes the K205 to send all setup records for the currently active memory (M, A, or B). |
| (7) Send Memory Records | -Causes the K205 to send memory records. If the currently active memory is A or M, memory A records are sent; if the active memory is B, memory B records are sent. |
| (8) Print Graphics | -Causes the K205 to send the exact bit mapped graphics display to an *Epson FX-80, or equivalent printer. Graphics mode is valid for any screen, but is especially useful for printing timing charts and other graphic screens. |

*EPSON is a Trademark of Epson Corporation.

```
                                CLOCKS (M)      09/21/84 09:06:47
                                CLOCK MODE = STANDARD
SECTIONS C, B, AND A
MASTER CLOCK = INTERNAL 020 NANoseconds
-----

I/O FUNCTIONS:
[0]=DISK QUICK MODE           [4]=PRINT SCREEN DIRECT
[1]=DISK SCREEN MODE          [5]=PRINT SCREEN LONG
[2]=I/O SETUP SCREEN          [6]=SEND SETUP RECORDS
                                [7]=SEND MEMORY RECORDS
                                [8]=PRINT SCREEN GRAPHICS
-----
                                DVM=-00.00          READY
```

Figure 5-1. I/O Function Menu

Note that the number of choices available depends on the configuration of the K205 and the I/O mode in which it is operating.

The I/O Setup Screen (Figure 5-2) allows the user to select and view parameters used for the communications port. This screen is accessed by depressing the I/O key and the numeric key 2.

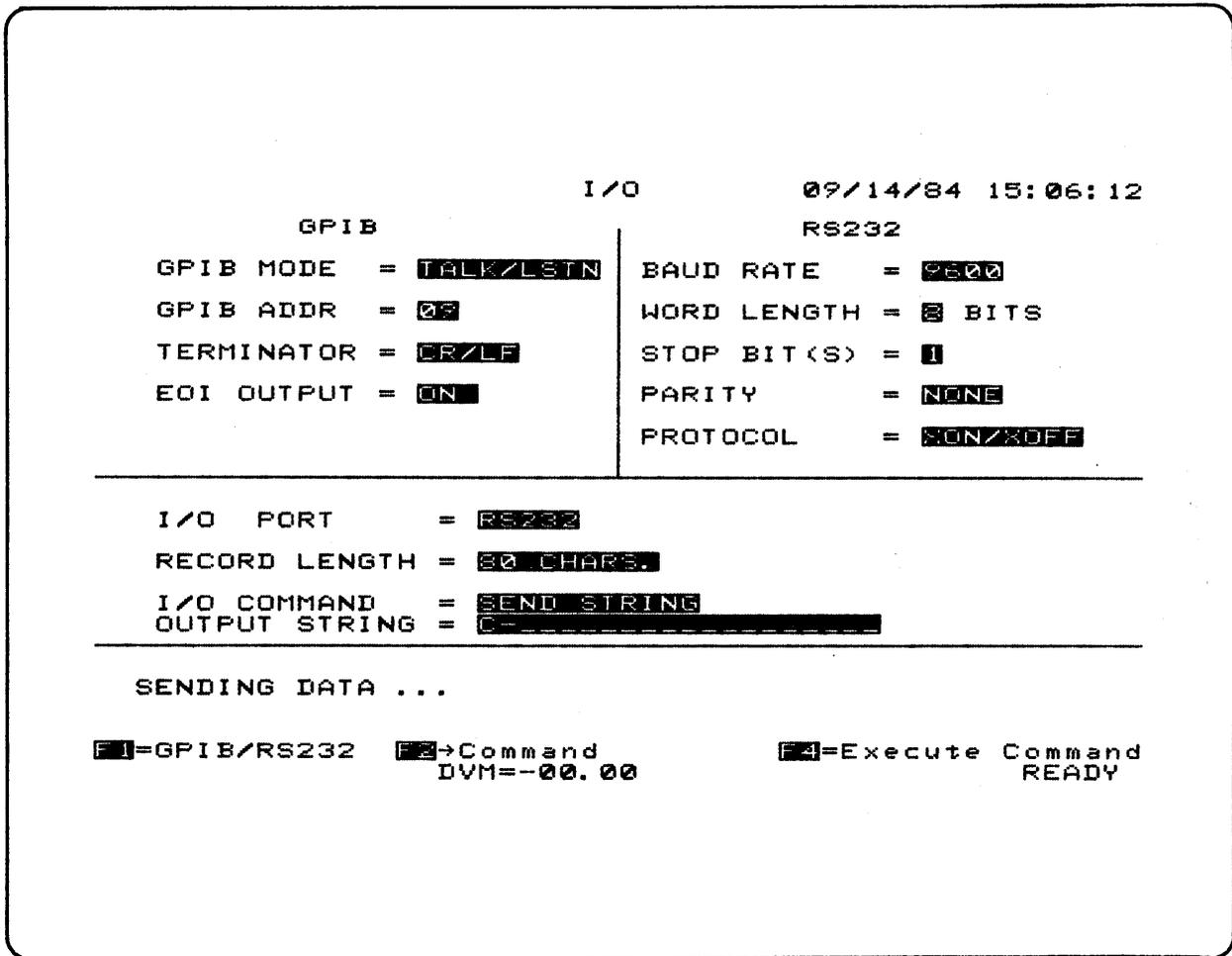


Figure 5-2. I/O Setup Screen

The screen is divided into three portions as follows:

- Upper Left Portion - For use in configuring GPIB port.
- Upper Right Portion - For use in configuring the RS232C port.
- Lower Portion - Active port selection.

When the I/O Setup Screen is first accessed, the GPIB Mode = field is active. Note that in the following descriptions of the I/O Setup Screen, the available selections are only accessible when the given field is active.

Mode = Field

The following quick-key choices are available in the GPIB mode of operation:

- (0) TALK ONLY
- (1) LSTN ONLY
- (2) TALK/LSTN

GPIB Address = Field

The user can directly assign a two-digit GPIB address to the K205 using legal decimal values of 00 through 30. The GPIB address is selectable only when the GPIB mode is TALK/LSTN.

Terminator = Field

The user can define the end-of-line delimiter as follows:

- (0) CR/LF
- (1) CR

EOL Output = Field

The user can select to either disable (0) or enable (1) the End or Identify GPIB line. When enabled, the EOL line is forced true as the last data byte of each record is sent.

Baud Rate = Field

The user can set the RS-232-C communications rate using the following baud rate choices:

- (0) 110
- (1) 150
- (2) 300
- (3) 600
- (4) 1200
- (5) 1800
- (6) 2400
- (7) 4800
- (8) 9600

Word Length = Field

The user may select a word length of seven bits (0) or eight bits (1).

Stop Bit(s) = Field

The user may select a word length of one Stop bit (0) or two Stop bits (1).

Parity = Field

The parity choices are as follows:

- (0) None
- (1) Even
- (2) Odd

Protocol = Field

The protocol choices are XON/XOFF (0) and RTS/CTS (1).

I/O Port = Field

The user can select communication through the RS-232-C port (0) or the GPIB port (1). When the GPIB port is chosen and TALK ONLY mode is not selected, the only other field available in this section of the display is Character Length =. If the RS-232-C port or GPIB TALK ONLY mode is chosen, a third field, Command =, appears.

Record Length

The user can specify record lengths of 80 characters (0) or an unlimited number of characters (1) to be sent from the K205.

Command = Field

The user can specify the information to be sent from the K205 as indicated below.

- (0) Send all Setup
- (1) Send all Memory
- (2) Send all Display Parameters
- (3) Send all Search
- (4) Send Status
- (5) Send String
- (6) Process Input String

The I/O command field is only selectable under the following conditions:

1. The I/O port choice is RS-232-C
2. The I/O port choice is GPIB and the GPIB mode is TALK ONLY.

Output String = Field

This field is available only when the Send String command is selected. Up to 20 characters may be specified using the alphanumeric, SPACE, F1 (=), F2 (\$), F3 (_), CONTROL ("("), REF (")"), and EDIT (+) keys. SHIFT CLEAR causes the character at the cursor as well as all characters to the right of the cursor to appear as underline (_) characters. When F4 is depressed with the Send String command selected, all characters up to the first underline (_) character in the Output String field are sent with the appropriate terminator appended. This feature is useful for remotely controlling one K205 from another K205.

Input String = Field

This field is available only when the Process Input String command is selected in the I/O command field. Up to 12 characters may be entered using the alphanumeric, CONTROL, REF, EDIT, F1, F2 and F3 keys. SHIFT CLEAR causes the character at the cursor as well as all characters to the right of the cursor to be set to the underline () character. When F4 is depressed, the input string up to the first underline () character is processed with an appended terminator as if received through the current I/O port.

Status Display

When data is output from the K205, SENDING DATA appears at the bottom of the screen. As data is received by the K205, RECEIVING DATA ... appears at the bottom of the screen.

When the GPIB port is used, the GPIB status appears in the lower-right corner of the screen labeled GPIB =. The three status indicators relate to Remote/Local, Talker/Listener, and Service Request state of the K205 GPIB interface as follows:

Remote/Local	LOCS (local mode) REMS (remote mode) RWLS (remote with local lockout) LWLS (local with local lockout)
Talker/Listener	NA (neither active) TA (talker addressed) LA (listener addressed)
Service Request	NPR (no request) SRQ (service requested)

These messages can be useful when first attempting connection to the K205. For example, if SENDING DATA appears on the screen but the receiving device does not detect any input, the cable may not be connected; in the case of the RS-232-C, CTS may not be active.

Function Keys

The following describes the various function keys available in the I/O Setup Screen:

- F1 The user can quickly switch the I/O port selection between GPIB and RS-232-C using the F1 key. When F1 is depressed, the I/O port selection is changed and the active field becomes the topmost setup field for the newly selected I/O port.
- F2 This choice is available only when the I/O command field is displayed and allows the user to move the active field immediately to the I/O command field.

- F4 When the I/O Command field is displayed, depressing F4 causes the appropriate records to be sent or action taken as follows:

Command	Records Sent
Send All Setup	All Format, Clocks, Trace Control, Arm Mode for selected memory
Send All Memory	If MEM = A: MA, LA, PA If MEM = B: MB, LB, PB, MX
Send Display Parameters	WG, WL, WQ, WS, WT, WV, ZC, CC, CR
Send All Search	ZR, KT
Send Status	KT
Send String	Specified Output String
Process Input String	Input String processed as described above

Interface

The K205 can communicate with a variety of other instruments, computers, and peripherals. This section contains the specific information needed to operate the K205 over two interfaces: the IEEE STD 488-1978 and EIA-RS-232-C. The IEEE STD 488-1978 is an 8-bit parallel interface, commonly referred to as the General Purpose Instrumentation Bus (GPIB). The EIA-RS-232-C is an asynchronous bit serial interface.

The specific mechanical, electrical, and functional characteristics and standards of the GPIB and RS-232-C are explained in detail in the following references.

GPIB

1. IEEE Standard Digital Interface for Programmable Instrumentation (IEEE STD 488-1978). Osborne/McGraw-Hill.
2. Pet and the IEEE-488 Bus. E./ Fisher & C. Jensen. Osborne/McGraw-Hill, 1980.
3. Articles in Microcomputing, July, 1980; Electronic Test, April, 1981.
4. "IEEE-488": Its impact on the Design, Building and Programming of Automatic Test and Measurement Systems" by David W. Ricci, Hewlett-Packard. Presented at ELECTRO '80, Session 3: IEEE-488 User Fundamentals, May 13-15, 1980, Boston, MA.

RS-232-C

1. EIA Standard, Interface between DTE and DCE, RS-232-C.
2. EIA, Application Notes for RS-232-C Standard (Bulletins 9 & 12).
3. CCITT Series V Recommendations.
4. Data sheets and application notes of various Data Communication chips.
5. Digital, Technical Aspects of Data Communication, J. McNamara.
6. Data Communication Handbook, A. Weissberger.

GPIB INTERFACE DESCRIPTION

The K205 GPIB Interface is an implementation of the IEEE 488-1978 published November 30, 1978, under the title "IEEE Standard Digital Interface for Programmable Instrumentation". This implementation supports the capabilities and electrical interface as defined by that standard. Table 5-1 lists the K205 GPIB interface capabilities.

Table 5-1. GPIB Interface Capabilities

Source Handshake	(SH1)	Complete Capability
Acceptor Handshake	(AH1)	Complete Capability
Talker Function	(T5)	Basic Talker Talk Only Unaddress if MLA
Talker Function with Address Extension	(TE0)	No Capability
Listener Function	(L3)	Basic Listener Listen Only Unaddress if MLA
Listener Function with Address Extension	(LE0)	No Capability
Service Request	(SR1)	Complete Capability
Remote Local Function	(RL1)	Complete Capability
Parallel Poll Function	(PP1)	Remote Configuration
Device Clear Function	(DC1)	Complete Capability
Device Trigger Function	(DT1)	Complete Capability
Controller Function	(C0)	No Capability

GPIB Interface Connection

A female connector labeled IEEE 488 is provided on the rear connector panel of the K205. Connect one end of the GPIB cable to this connector and the other end to a controller or another K205. The instrument can be operated locally or from a remote station.

Interface Mode

The first field in the GPIB interface section of the I/O Setup Screen is designed for interface mode selection. The K205 can be configured to operate in one of the following three interface modes:

1. Talk and Listen
2. Talk Only
3. Listen Only

Talk and Listen Mode

In this mode, the K205 accepts information from, as well as transfers information to, a controller. This mode is best suited for automatic testing of equipment. To use Talk and Listen mode, assign an address between 0 and 30 in decimal to the instrument.

The K205 processes records sent on the GPIB bus when addressed to listen. The K205 can also be addressed to talk. In that case, the instrument processes records and sends the necessary information back to the controller.

IFC Command

The IFC Command, sent via the IFC line, clears the K205 GPIB and sets the Talk and Listen states to idle.

Device Trigger and Device Clear Commands

The Device Trigger command, a multiwire message, causes a pulse on the rear panel GET BNC connector. The Device Clear command, a multiwire message, causes the Default Setup M and Display values to be set in the K205. The K205 is disarmed.

Talk Only Mode

The foremost application of Talk Only mode is the transfer of information to a dedicated GPIB printer to provide hard copies of setup screens, timing diagrams, or memory.

Talk Only mode is also used to transfer setups and/or contents of memory A or B to another K205.

Listen Only Mode

Similar to Talk Only mode, Listen Only mode has limited use; it is used to receive information from another K205. This condition permits users to remotely change the K205 talk/listen mode since it always receives and processes records in Listen Only; for example, the user can change the instrument to Talk and Listen mode.

Termination Characters

Because the K205 can be configured to send any of four termination strings, the unit has flexibility to adapt to any controller. For example, some controllers must receive Carriage Return only. Others may require both Carriage Return and Line Feed to terminate a record. The four termination strings are as follow:

1. CR and LF
2. CR&LF + EOI
3. CR
4. CR + EOI

GPIB STATUS BYTE

By using the KT command (refer to the Record Type index in this chapter) or issuing a serial poll command, the user may read the GPIB Status Byte. The bits of the Status Byte have the following meaning:

Bit	Meaning
7	Recording in progress (armed but not stopped)
6*	SRQ - K205 requests service
5	Error in powerup diagnostics
4*	Listen Record error, rest of record ignored
3	Not used (always zero)
2*	Acquisition control error (ARM control)
1*	GPIB SRQ key depressed
0*	Recording complete

*These bits are cleared following a serial poll response and when the K205 sends a KT record.

RS-232-C

This interface is provided for applications where the K205 is remotely controlled using modems and telephone lines. The RS-232-C interface can also be used to connect the K205 to a local peripheral. The interface characteristics can be selected in the I/O Setup Screen. The K205 is configured as a Data Terminal Equipment (DTE).

Protocols

The modem control lines are used to control an asynchronous modem. The RTS/CTS handshake is used to synchronize two devices with different processing speeds. This feature protects the internal buffer from overflowing with received characters. The K205 uses the Data Terminal Ready (DTR) signal to indicate the imminent buffer overflow; thus data should not be sent until this signal is released. The K205 ceases transmission if the Clear To Send (CTS) signal goes false.

Many computers and peripherals use XOFF/XON (DC3/DC1, control S/control Q in ASCII table) protocol to synchronize their data exchange. The K205 has implemented this software protocol. When the K205 can only accept a few more characters, an XOFF character (CTRL/S) is sent to signal additional time is required to empty and process the input buffer. The XON character then indicates the K205 is ready to accept more data. If the K205 receives an XOFF character, information is not transmitted until an XON signal is received.

RS-232-C Interface Connection

One female connector labeled RS-232-C is provided on the rear connector panel of the K205. To access the K205 from a remote location, simply connect the K205 to a modem or an acoustic coupler with an RS-232-C cable. The cable should have male connectors on both ends. The instrument can also be connected to various computers and computer peripherals. Most computer peripherals operate as DTE, indicated by a female connector in the back of the instrument. Pins 2 and 3 wires in the cable have to be interchanged in one connector to transfer signals properly. This is essentially an implementation of the null modem. The user can arrange one of the following three configurations when a modem or acoustic coupler is not used. The following configurations can be used to connect the K205 locally with another DTE such as a CRT terminal.

The Null Modem

The user might desire to use the simple circuit shown in Figure 5-4. Note, however, that this circuit lacks handshake capabilities.

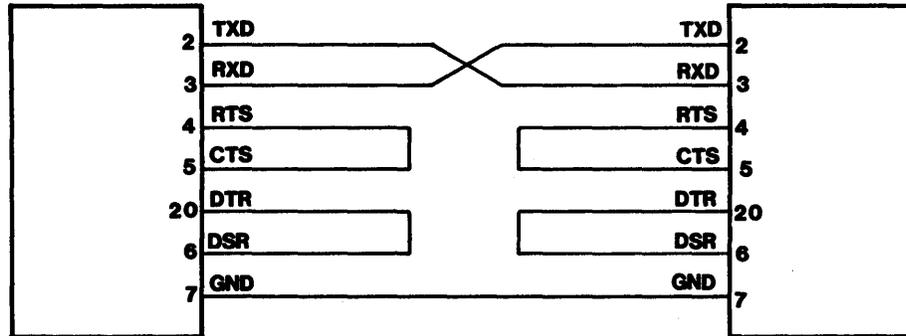


Figure 5-3. Simple Null Modem Wiring Diagram

Another alternative to implementing an easy wiring configuration is shown in Figure 5-4. This circuit allows logic handshaking by means of the DTR/DSR lines.

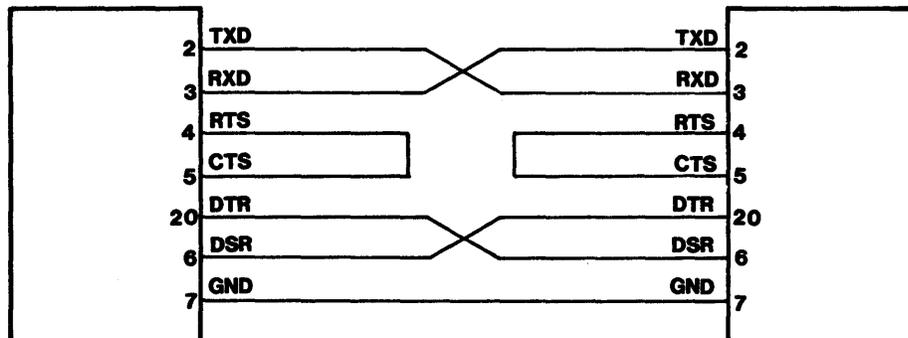


Figure 5-4. Null Modem Wiring Diagram with DTR/DSR

The interconnection shown in Figure 5-5 is a complete arrangement to interconnect the K205 to any computer using the earlier described hardware handshake capabilities.

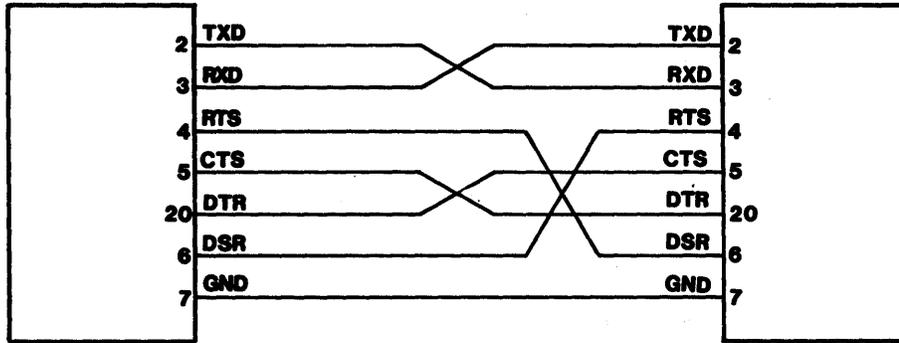


Figure 5-5. Complete Null Modem

Interfacing Two K205's

Two K205's easily interface to each other; however, if one unit is a 32-input system and the other a 48-input system, the user must set up the 32-unit remotely from the 48-input unit in order to ensure proper duplication.

GENERAL

This section presents the K205 Record Types. Each Record Type description explains the syntax, procedures and system response.

It is strongly recommended that the user become familiar with Chapter 4 (Operation) prior to attempting remote operation of the K205.

Record Types

The following three types of GPIB/RS-232-C records can be used when operating the K205:

- Request Record - Requests the instrument to return an output record.
- Input/Output - If sent to a K205 (input), an input/output record commands the instrument to set a parameter to particular value. If sent back from the K205 (output), an input/output record indicates the value of the parameter. The input/output records are complimentary and can both be performed for one operation.
- Command - Instructs the instrument to perform some action; a command record can only be sent, with no response from the K205.

The general format for these record types is as follows:

1. INPUT/OUTPUT

<memory indicator> <record identifier> <range> = <data> <end of line>

2. REQUEST

<memory indicator> <record identifier> <range> <end of line>

All records are represented by ASCII characters and begin with a two-character record identifier. However, for all input/output records and request records used for setup screen parameters, the two-character record identifier may be preceded by a Memory Indicator, either A or B. If the Memory Indicator is absent, the memory defaults to Memory M. Input/output records may be divided into scalar records, in which single values are sent, and array records, in which one or more values may be sent. For data array records, the record identifier must be followed by a range specification, which consists of parenthesis containing the range. Scalar Data identifiers may not be followed by parenthesis.

GPIB records sent by the K205 are terminated by a carriage return, linefeed (CR/LF), or carriage return (CR), depending upon the GPIB terminator selection on the I/O Setup Screen. RS-232-C records sent by the K205 are always terminated by a CR/LF. Records received by the K205 must end with a CR; linefeeds are ignored.

In response to most request records, the K205 sends output records with the same record identifier as the request record, as shown in the following example:

```
(Request record sent to the K205)  CM<end-of-line>
(Response from K205)                CM=SI<end-of-line>
(Request record sent to K205)       FT(0-2)<end of line>
(Response from K205)                FT(0-2)=TTT<end-of-line>
```

Conventions for Record Syntax

The format for each record type is listed under the headings of MEMORY SELECT, RECORD ID, RANGE INDEX, and DATA. For input/output records, an = must be inserted between the RANGE INDEX and DATA fields. All records must end with an end-of-line (EOL) terminator. Listed below is a description of the various symbols used in the syntax.

- , - Entries separated by comma for Data choice field (e.g. *, L, G), indicate selections.
- { } - Braces, which must not be entered, indicate required entries.
- () - Parenthesis enclosing an index must be included where specified.
- NA - Not Applicable; the field is not required.
- <A/B> - Memories A or B can be selected for setup data by prefixing the letter A or B. If omitted, Memory M is used.

A superscript numeral outside an entry enclosed in braces indicates the amount of times the selected entry must be sent; the total amount of entries can consist of a combination of desired entries.

Quick-key Choices

Where applicable, the various quick-key choices associated with a given record type are provided. The user should note that these quick-key choices are not used in remote operation of the K205 and are presented only to inform the user of available choices for direct interfacing with the instrument.

Record Categories

The Record Types are alphabetically ordered by function name, rather than the actual record names; however, an index is provided in front of the record types, providing the record identifiers in alphabetical order and the corresponding page number on which the record appears.

INVALID RECORDS

The K205's response to invalid records or data depends on which communication port, RS-232-C or GPIB, is active.

RS-232-C

When RS-232-C is active and the K205 receives an invalid record type or data, the K205 sends the following Invalid Record message:

```
end-of-line "IR=*** INVALID RECORD ***" end-of-line
```

The K205 then discards the remaining portion of the received record and scans the input until an end-of-line message is received. If the K205 itself receives the IR record, it sends an end-of-line message. When a data record is received and processed, the K205 responds with an end-of-line message if data is valid; otherwise, the Invalid Record is sent. The K205 accepts and ignores any number of end-of-line messages and accepts either CR or CR/LF as the end-of-line message. The K205, however, always sends CR/LF as the end-of-line message. If the K205 receives an end-of-text character (Ctrl-C, 03H), it immediately cancels the command processing and waits for a new record identifier.

The maximum record length can be selected on the I/O Setup Screen to be either 80 characters or unlimited. This capability is useful when the output is sent to a printer or CRT. The K205 batches all received records and processes them sequentially.

GPIB

When GPIB is active and the K205 receives an invalid record type or data, it performs the following functions:

- a) The K205 sets bit 4 (listen error record) in the GPIB status byte and then sends an SRQ-message to the controller.
- b) The K205 discards the remainder of the received record and scans the input until an end-of-line message is received.

If the K205 itself receives an Invalid Record, it accepts and ignores the record (i.e., no response is set back). When a data record has been received and processed, the K205 does not respond if data is valid; otherwise, bit 4 is set in the GPIB status byte and a SRQ-message is sent to the controller. The K205 accepts any number of end-of-line messages. The K205 accepts either CR or CR/LF as the end-of-line message. The K205, however, always sends the end-of-line message selected on the I/O Setup Screen (either CR or CR/LF).

If the K205 receives an end-of-text character (Ctrl-C, 03H), it immediately cancels the command processing and waits for a new record-identifier. The maximum record length can be selected on the I/O Setup Screen to be either 80 characters or unlimited. This capability is useful when the output is sent to a printer or CRT. The K205 batches all received records and processes them sequentially.

RANGE SPECIFICATIONS

The following presents the range specifications for input/output array-record types. Note the Range Index field lists both the minimum and maximum index value for the record. The data values listed for Array records indicate the selection(s) required for each element of the array (e.g., if the range is (0-3), data must be entered four times) except when a colon separator is used in the range index.

The brackets below indicate required entries:

1. ({ Index })

Record includes only one array value.

Example: (0) (5) (456) . . .

2. ({ Lower } - { upper })

Record includes all values in the range in ascending order.

Example: (0-2) (5-123) (500-514) . . .

3. ({ upper } - { lower })

Record includes all values in the range in descending order.

Example: (2-0) (123-5) (514-500) . . .

4. ({ lower } /)

Input Records: Values included start from the specified lower limit in ascending order. Request Records: Requests all values starting from the specified lower limit to the absolute upper limit.

Example: (2/) (123/) (500/) . . .

5. ({ upper } \)

Input Records: Values included start from the specified upper limit in descending order. Request Records: Requests all values starting from the specified upper limit to the absolute lower limit.

Example: (2\) (123\) (500 \)

6. (-)

Input Records: Values included start from the absolute lower limit in ascending order. Request Records: Requests all values starting from the absolute lower limit to the absolute upper limit.

7. ({ lower } : { upper })

Input Records: Only one array value is included; all array elements in the range are set to that value.

Example: (2:0) (123:5) (514:500) . . .

8. (:)

Input Record: Only one array value is included; all array elements are set to that value.

NOTE: When the communication port is GPIB, the FIXED format range specifications (1,2,3) are processed slightly faster than the VARIABLE format range specifications.

INDEX BY COMMAND

		see page
C-	Send All Clocks Records	5-27
CC	Control Cursor Position	5-49
CD	Demux Select.	5-23
CI	Internal Clock Period	5-26
CM	Clock Mode.	5-24
CR	Reference Cursor Position	5-50
CS	Sample/Store Select	5-25
DC	Clear CRT Display	5-57
DS	Display Screen.	5-80
DT	Display Text on CRT	5-59
F-	Send All Format Records	5-35
FA	Variable Threshold A.	5-33
FB	Variable Threshold B.	5-34
FD	Data Format Column Definitions.	5-29
FF	Data Format Mode.	5-31
FL	Data Format Level Select.	5-30
FP	Data Polarity	5-32
FT	Data Threshold.	5-28
KC	K205 Configuration.	5-78
KF	Current Master Clock Frequency.	5-77
KK	Device Clear.	5-58
KT	K205 Current Status	5-79
LA	Level Data A.	5-70
LB	Level Data B.	5-70
MA	Sample Data A	5-71
MB	Sample Data B	5-71

MX	Don't-Care Data	5-69
PA	Sample Data Parameters A.	5-72
PB	Sample Data Parameters B.	5-72
PD	Print Screen Direct	5-60
PL	Print Screen Long	5-61
QA	Send All Memory A Records	5-73
QB	Send All Memory B Records	5-73
QQ	Acquisition Control	5-56
R-	Send All Arm Mode Records	5-51
RC	Comparison Count Mode	5-48
RE	Auto Edge Tolerance	5-46
RI	Auto Compare Inputs	5-44
RM	Arm Mode Select	5-43
RR	Auto Compare Range.	5-45
RS	Auto Save	5-47
SD	Current Date and Time	5-75
SE	Beep Tone Select.	5-74
SV	Current DVM Reading	5-76
T-	Send All Trace Control Records.	5-42
TC	Trace Control Command	5-36
TN	Trace Control Pattern Name.	5-40
TP	Trace Control Parameter Field	5-39
TV	Trace Control Pattern Value Field	5-41
W-	Send All Display Records.	5-68
WG	Graph Expansion	5-62
WL	Timing Labels	5-66
WQ	Timing Sequence	5-67
WS	Search Value.	5-64

WT	Timing Expansion.	5-65
WV	Search Level.	5-63
Z-	Send All Search Records	5-55
ZC	Search/Compare Select	5-53
ZR	Search/Compare Results.	5-54
ZT	Search/Compare First/Last/Total	5-52
--	Send All Arm Mode, Clocks, Format and Trace Records	5-82
\$+	Normal Mode Keystrokes.	5-81
\$-	Shifted Keystrokes.	5-81

THIS PAGE INTENTIONALLY BLANK

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>									
<A/B>	{ CD }	{ (0-2) }	{ = { <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="border-left: 1px solid black; padding-left: 2px;">*</td> <td style="padding-left: 2px;">D</td> <td rowspan="4" style="border-left: 1px solid black; border-right: 1px solid black; padding: 0 5px;">}</td> </tr> <tr> <td style="border-left: 1px solid black; padding-left: 2px;">*</td> <td style="padding-left: 2px;">L, G</td> </tr> <tr> <td style="border-left: 1px solid black; padding-left: 2px;">*</td> <td style="padding-left: 2px;">L, G</td> </tr> <tr> <td style="border-left: 1px solid black; padding-left: 2px;">If L,</td> <td style="padding-left: 2px;">H, L, *</td> </tr> </table> } 6	*	D	}	*	L, G	*	L, G	If L,	H, L, *
*	D	}										
*	L, G											
*	L, G											
If L,	H, L, *											
			{ EOL }									

Record Type - Input/Output/Request: Array

The selected index must be in a range of 0 through 2 and specifies the Clock Section; 0 selects Section A, 1 selects Section B and 2 selects Section C.

The first data choice specifies either no Demux (*) or Demux (D) for the Clock Section.

The second and third data choices specify the Latch/Glitch mode for the 7-0 and F-8 inputs, respectively. * selects no Latch/Glitch, L selects Latch Mode and G selects Glitch Mode.

If Latch Mode (L) is selected, the fourth data choice is included. H, L and * are selected in any combination of six to specify the Latch Clock Expression for the Clock Section; H selects Active High, L selects Active Low and * selects not used.

For 48 input systems, these six selections for the fourth data choice represent the following Clock Inputs, presented from left to right on the screen: CR, BR, AR, CS, BS and AS. For 32 input systems, values for CR, BR, CS and BS must be included; however, these values cannot be viewed on the screen and are not used for recordings.

Quick-key choices are available to select the following conditions:

Demux Select	Latch/Glitch Mode	Clock Inputs
(0) No Demux	(0) No Latch/Glitch	(0) Clock Input Not Used
(1) Demux	(1) Latch Mode	(1) Active High
	(2) Glitch Mode	(2) Active Low

Note the cursor advances to the adjacent field immediately after the selection is entered.

Example Entry and Screen Display: CD(2)=D*L**H***

```
SECTION C
  DEMUX 7-0 TO LATCH F-8 IF (  •  • AR ) + (  +  +  )
  7-0
```

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{ CM }	NA	{ = } { S, A } { I, E } { H, L, * } 6 { EOL }

Record Type - Input/Output/Request: Scalar

The first data choice specifies the Clock Mode; S selects Standard and A selects Advanced.

The second data choice specifies the Master Clock Source; I selects Internal and E selects External.

If External (E) is selected, the third data choice must be included to specify the Master Clock Expression. *, H, and L must be selected in any combination of six; * selects not used for inputs, H selects Active High and L selects Active Low.

These six selections represent the following Clock Inputs, presented from left to right on the screen: CJ, BJ, AJ, CK, BK and AK for 48 input systems, and BR, BJ, AJ, BS, BK and AK for 32 input systems.

Quick-key Choices are available to select the following conditions:

Clock Mode	Master Clock Source	Clock Inputs
(0) Standard	(0) Internal	(0) Clock Input Not Used
(1) Advanced	(1) External	(1) Active High
		(2) Active Low

Note the cursor immediately advances to the adjacent field after the selection is entered.

Example Entry and Screen Display: CM=AE**L***

CLOCK MODE = **ADVANCED**

SECTIONS C, B, AND A
 MASTER CLOCK = **EXTERNAL** (**■** • **■** • **■**) + (**■** + **■** + **■**)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{CS}	{(0-2)}	{=} {S, R} {I, E} {H, L, *} ⁶ H, M} {EOL}

Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 2 and specifies the Clock Section values; 0 selects A, 1 selects B and 2 selects C.

The first data choice specifies the Clock Section Mode; S selects Sample and R selects Store.

The second data choice specifies the Sample/Store Clock Source; I selects Internal, E selects External, H selects 10 Nanoseconds, and M selects the same value as the Master Clock.

If External (E) is selected for the Sample/Store Clock Source, the third data choice is included. H, L and * must be selected in any combination of six to specify the Sample/Store Clock Expression for the Clock Section; * selects not used for the input, H selects Active High and L selects Active Low.

These six selections represent the following Clock Inputs, represented from left to right on the screen: CJ, BJ, AJ, CK, BK and AK for 48 input systems, and BR, BJ, AJ, BS, BK and AK for 32 input systems.

Quick-key choices are available to select the following conditions:

Sample/Store	Sample/Store Clock Source	Clock Inputs
(0) Sample	(0) Internal	(0) Clock Input Not Used
(1) Store	(1) External	(1) Active High
	(2) 10 Nanoseconds	(2) Active Low
	(3) Same as Master Clock	

Note the cursor immediately advances to the adjacent field after the selection is entered.

Example Entry and Screen Display: CS(0)=SEHHH***

AND SAMPLE SECTION A ON EXT (CJ•BJ•AJ) + (L+L+L)

INTERNAL CLOCK PERIOD (CI)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ CI }	NA	{ = } { 001-900 } { M, U, N } { EOL }

Record Type - Input/Output/Request: Scalar

The first data choice must be selected from a range of 001 through 900 and specifies a value for the Time Interval field. The valid clock periods range from 020 nanoseconds through 100 milliseconds in a one through ten sequence.

The second data choice specifies the Time Unit; M selects milliseconds, U selects microseconds and N selects nanoseconds.

Quick-keys are available to select the following conditions for the Time Unit:

- (0) Milliseconds
- (1) Microseconds
- (2) Nanoseconds

Note the cursor remains in the field following execution of the selection. Valid values for the Clock Interval can be directly entered using the 0 through 9 numeric keys.

Example Entry and Screen Display: CI=100N

SAMPLE SECTION B ON INT 100 NANoseconds

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ C- }	NA	NA { EOL }

Record Type - Request

The K205 responds by sending the following output records:

CM, CI, CS, CS

Example Entry and Screen Response: C-

```
CM=AI
CI=020N
CD(0-2)=*****
CS(0-2)=RHRHRH
```

DATA AND CLOCK THRESHOLDS (FT)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ FT }	{ (0-6) }	{ = } { T, E, A, B } { EOL }

Record Type - Input/Output/Request: Array

The index selected must be in a range of 0 through 6 and specifies the Input Group as follows:

- (0) Clocks
- (1) A7-A0
- (2) AF-A8
- (3) B7-B0
- (4) BF-B8
- (5) C7-C0
- (6) CF-C8

The inputs are presented on the screen with A7-A0 located on the bottom and CF-C8 on the top of the Data Inputs Column.

The data choice specifies the threshold assigned to the input group; T selects TTL, E selects ECL, A selects VARA, and B selects VARB.

Quick-keys are available to select the following conditions for the threshold type:

- (0) TTL
- (1) ECL
- (2) VARA
- (3) VARB

The cursor moves in a vertical direction to the next adjacent field after the selection is entered.

Example Entry and Screen Display: FT(0-4)=AETTT

BF-B8	TTL	+	1.40	++++	++++
B7-B0	TTL	+	1.40	++++	++++
AF-A8	TTL	+	1.40	+- - -	- + + +
A7-A0	ECL	-	1.30	++++	++++
CLOCK INPUTS	VARA	+	5.00		

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>	First Value
<A/B>	{FD}	{(0-39)}	{=} {0-8} A0, A1, A2, . . . CE, CF}	{EOL}

Record Type - Input/Output/Request: Array

The selected index must be in a range of 0 through 39 and specifies the desired Data Format Column(s). Up to 40 columns may be defined by the user.

The first data choice for each index specifies the radix for the column as follows:

- | | | |
|------------------|-----------|------------|
| (0) Blank Column | (3) Octal | (6) ASCII6 |
| (1) Binary | (4) Hex | (7) ASCII7 |
| (2) Quad | (5) X | (8) EBCDIC |

The first data choice also specifies the number of character pairs to follow, which select the Inputs.

The second data choice selects the character pair(s). Each character pair consists of an Alpha character in the range of A through C, which specifies the Section, followed by a Hex character in the range of 0 through F, which specifies the Input number.

Quick-keys are available to select the following conditions for the Data Input(s):

- (0-F) Selects Input Number
- (A-C) Selects Section for Input Column
(C is only valid with 48 input systems.)

NOTE: If Memory M is selected, this record type represents the Data Format Column Definitions for the User Specified Mode. However, all blanks within columns are purged. If either Memory A or B is selected, this record type represents the Data Format Column Definitions used when the A or B acquisition was initiated.

Example Entry and Screen Display: FD(0-3)=1B004AF AEADAC4ABAAA9A8

```
SECTION      B AA
INPUTS      0 FB
             EA
             D9
             C8
```

DATA FORMAT LEVEL SELECT (FL)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ FL }	NA	{ = } { T, F } { EOL }

Record Type - Input/Output/Request: Scalar

When Memory M is selected, either T or F can be selected to display the Level Memory on or off, respectively, when in User Specified Mode. When T is selected, an L, representing Level, appears in the Level Memory Field, which is located adjacent to the Radix field on the screen. When F is selected, the Level Memory is blank.

If either Memory A or B is selected, this record indicates the Data Format Level Select used when the A or B acquisition was initiated.

Quick-keys are available to select the following conditions for the Level Memory:

- (0) Level not included in Display
- (1) Include level in Display

The cursor remains in the Level Field after the selection is entered.

Example Entry and Screen Display: FL=T

RADIX B HH HH

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ FF }	NA	{ = } { 0-4 } { EOL }

Record Type - Input/Output/Request: Scalar

The data choice is a numeric character in the range of 0 through 5 and specifies the Data Format Mode as follows:

- (0) Hex
- (1) Octal
- (2) Binary
- (3) User Specified
- (4) Disassembler

These choices can also be directly entered using the corresponding numeric keys. The cursor remains in the Data Format Mode field after the selection is entered.

Example Entry and Screen Display: FF=3

DATA FORMAT **USER SPECIFIED**

DATA POLARITY FIELD (FP)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{ FP }	{ (0-47) }	{ = } { +, - } { EOL }

Record Type - Input/Output/Request: Array

The selected index must in the range of 0 through 47, with 0 corresponding to Input A0 and 47 corresponding to Input CF. The inputs are presented on the screen with A0 located in the lower-right and CF in the upperleft of the Data Polarity columns.

The data choice is either + or - and specifies the polarity assigned to the selected Input to be positive or negative, respectively.

Quick-key choices are available to assign the Data Polarity as follows:

- (0) Negative
- (1) Positive

Note the cursor movement is left to right. To move the cursor to the right, use the left-arrow key.

Example Entry and Screen Display: FP(0-15)=-+++++++-----++

AF-A8	TTL	+	1.40	++--	-+++
A7-A0	ECL	-	1.30	++++	+++-

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{FA}	NA	{=} {+, -} {000-999} {EOL}

Record Type - Input/Output/Request: Scalar

The first data choice is either + or - and specifies the polarity of the threshold to be either positive or negative, respectively.

The second data choice specifies the voltage; three numeric characters forming a value in the range of 000 through 999 are selected. The numeric characters are presented on the screen with the first character as a whole number and the following characters as decimal values.

Quick-keys are available to select the following conditions for the polarity:

- (0) Negative
- (1) Positive

The cursor remains on the input selected for alteration.

The voltage value can be entered directly using the 0 through 9 numeric keys.

Example Entry and Screen Display: FA=+500

CF-C8 VARA + 5.00 + + + + + + + +

VARIABLE THRESHOLD B (FB)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{FB}	NA	{=} {+, -} {000-999} {EOL}

Record Type - Input/Output/Request: Scalar

The first data choice is either + or - and specifies the polarity of the threshold to be either positive or negative, respectively.

The second data choice specifies the voltage; three numeric characters forming a value in the range of 000 through 999 are selected. The numeric characters are presented on the screen with the first character as a whole number and the following two characters as decimal values.

Quick-keys are available to select the following conditions for the polarity:

- (0) Negative
- (1) Positive

The cursor remains on the input selected for alteration.

The voltage value can be directly entered using the 0 through 9 numeric keys.

Example Entry and Screen Display: FB=-750

B7-B0

VARB = 7.50

++++ ++

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ F- }	NA	NA { EOL }

Record Type - Request

The K205 responds by sending the following output records:

FF, FL, FD, FT, FA, FB, FP

Example Entry and Screen Response: F-

```

FF=3
FL=T
FD(0-3)=1B004AFAEADAC4ABAAA9A8
FD(4-7)=04A7A6A5A44A3A2A1A00
FD(8-11)=0000
FD(12-15)=0000
FD(16-19)=0000
FD(20-23)=0000
FD(24-27)=0000
FD(28-31)=0000
FD(32-35)=0000
FD(36-39)=0000
FT(0-6)=AETTTT
FA=+500
FB=-999
FP(0-47)=-+++++-----+++++
    
```

TRACE CONTROL COMMAND (TC)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{TC}	{(0-79)}	{=} {ASCII STRING} ²³ {EOL}

Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 79. This index specifies the line number of the Trace Control.

The data choice is an ASCII string consisting of 23 characters selected as presented in Table 5-1. Definitions for entries are provided following the table.

Table 5-2. Trace Control Command Entries

ASCII CHAR. ENTRY	FUNCTION	COMMAND SELECTION	ENTRY SELECTIONS
1	COMMAND		* W T U G S A D J H
2	COMMAND EXTENSION	If command = W or T If command = G or J otherwise	* F U I (0...F) *
3	CONDITION SELECT	If command is W,T,U,G,S,A otherwise	S C A *
4	PATTERN	If command is W,T,U,G,S,A otherwise	E N *
5,6	PATTERN SELECT	Must be number of valid pattern	(00...49)
7-16	PATTERN FILL-IN DIGIT	Must be five character pairs, each representing the ASCII- encoded hexadecimal value of a fill-in character	00-FF
17	DELAY RELATION	If character 2 is C or A otherwise	> = < G # L < *
18-22	DELAY		(00001...65535)
23	DELAY	If command is WF TF or D otherwise	(C or S) *

ENTRY DEFINITIONS:

ASCII CHARACTER
ENTRY #

1st	<u>ENTRY</u>	<u>DEFINITION</u>
	*	Null
	W	WAIT
	T	TRACE
	U	OR UNTIL
	G	OR GO TO
	S	OR STOP
	A	ADVANCE
	D	SET DELAY
	J	GO TO
	H	STOP
2nd	<u>ENTRY</u>	<u>DEFINITION</u>
	*	Don't Care - Blank
	F	FOR
	U	UNTIL
	I	IF
	(0...F)	Target Level
3rd	<u>ENTRY</u>	<u>DEFINITION</u>
	S	Sample Pattern
	C	Count
	A	Sample and Count
	*	Don't-Care
4th	<u>ENTRY</u>	<u>DEFINITION</u>
	E	When equal
	N	When not equal
	*	Don't-Care
5th and 6th	<u>ENTRY</u>	<u>DEFINITION</u>
	00..49	Pattern Number
7th - 16th (See NOTE)	<u>ENTRY</u>	<u>DEFINITION</u>
	00-FF	(7,8) 5th Fill-In Character (9,10) 4th Fill-In Character (11,12) 3rd Fill-In Character (13,14) 2nd Fill-In Character (15,16) 1st Fill-In Character

ENTRY DEFINITIONS: (Cont'd)

17th	<u>ENTRY</u>	<u>DEFINITION</u>
	>	Count greater than delay
	=	Count equal to delay
	<	Count less than delay
	G	Count greater than or equal to delay
	≠	Count not equal to delay
	L	Count less than or equal to delay
	*	Don't-Care

18th - 22nd	<u>ENTRY</u>	<u>DEFINITION</u>
	(00001...65535)	delay count

23rd	<u>ENTRY</u>	<u>DEFINITION</u>
	C	Clocks
	S	Counts of Sample = pattern

NOTE: The actual value displayed on the screen depends on the format (or radix) selected for each fill-in column. For a binary radix in which only one input is used, the fill-in character is represented only by the least significant bit of the fill-in value. For a hex radix (four inputs), the four least significant bits are used. For ASCII-7, the true value is represented by the seven least significant bits of the fill-in value.

Example Entry and Screen Display:

TC(0-1)=TUSE01FFFFFFFFF05=00512CTFSE00FFFFFFFFF=00250C

LVL COMMAND SEQUENCE:
 0:TRACE UNTIL SAMPLE = TRIG(X5)
 1:TRACE FOR 00250 CLOCKS

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ TP }	{ (0-49) }	= { { 0-5 } FIRST VALUE { 00-39 } }
			{ EOL }

Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 49 and specifies the Pattern Line number.

The first data choice is a numeric character in the range of 0 through 5 and specifies the number of fill-in columns for the selected pattern. Note that selecting zero clears any set parameters.

The second data choice consists of a numeric character pair in the range of 00 through 39 and specifies the column fill-in (s). The number of pairs must coincide with the numeric character specified for the first data choice.

The columns are presented from left to right on the screen, with 0 corresponding to the column immediately to the right of the = pattern field and 39 corresponding to the rightmost column.

Example Entry and Screen Display: TP(0-2)=0212130

```

                PATTERN DEFINITIONS:
NAME:          HHHH HHHH HHHH
00 ENABLE     =0010 0020 5555
01 TRIG(--)   =0020 0030 AA
02 -          =XXXX XXXX XXXX

```

TRACE CONTROL PATTERN NAME (TN)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{ TN }	{ (0-49) }	{ = } { ASCII CHAR } ⁸ { EOL }

Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 49 and specifies the sequentially numbered Pattern Definition Line number.

The data choice consists of any combination of eight ASCII alpha characters, numeric symbols and spaces, which specify the pattern name.

Example Entry and Screen Display: TN(0-2)=ENABLE TRIGGER

```

00 ENABLE      =0010  0020  5555
01 TRIG<__>  =0020  0030  PA
02 -          =XXXX  XXXX  XXXX
    
```

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{TV}	{(0-49)}	= { * , 1 , 0 } ⁴⁸ {EOL}

Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 49 and specifies the Pattern Definition Line number, presented on the screen from top to bottom, beginning with 0.

The first data choice consists of any combination of 48 asterisks, zeros or ones, which specify Don't-Care, 0 or 1, respectively, for each of the 48 Inputs. The first character selected corresponds to Input CF and the last character corresponds to Input A0.

Example Entry and Screen Display: (Hex Data Format selected)

TV(0)=0000000000010000000000000001000000101010101010101

00 ENABLE =0010 0020 5555

SEND ALL TRACE CONTROL RECORDS (T-)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{ T- }	NA	NA { EOL }

Record Type - Request

The K205 responds by sending the following output records:

TC, TN, TP, TV

Example Entry and Screen Response:

```
TC(0-1)=TUSE01FFFFFFFFF05=00512CTFSE00FFFFFFFFF=00250C
TC(2-3)=****00FFFFFFFFF=00512C*****FFFFFFFFF*****
TC(4-5)=*****FFFFFFFFF*****FFFFFFFFF*****
TC(6-7)=*****FFFFFFFFF*****FFFFFFFFF*****
TC(8-9)=*****FFFFFFFFF*****FFFFFFFFF*****
:
:
TV(45)=*****
TV(46)=*****
TV(47)=*****
TV(48)=*****
TV(49)=*****
```

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{RM}	NA	{ = { { S, R } * , L, E, N } * , P, L } 0000-9999 } { EOL }

Record Type - Input/Output/Request: Scalar

The first data choice specifies the Arm Mode; S selects Stop and R selects Auto Rearm.

The second data choice is only included if Auto Rearm (R) is selected and represents the first Rearm condition; * selects Unconditional Rearm, L selects Unless Pass Count =, E selects Unless A = B, and N selects unless A \neq B.

The third data choice is only included if either Unless A = B (E) or Unless A \neq B (N) is selected and specifies the second Rearm condition; * selects No Additional Condition, L selects Or Pass Count =, and P selects And Pass Count \geq .

The fourth data choice is only included if Or Pass Count = (L) or And Pass Count \geq (P) is selected; four numeric characters, each in the range of 0 through 9 are selected to specify the Pass Limit value. These values appear from left to right on the screen.

Quick-keys are available to select the conditions presented below. Note the cursor remains in the field selected for alteration.

Arm Mode	First Rearm Condition	Second Rearm Condition
(0) STOP After One Pass	(0) <u> </u> (Stop Never)	(0) <u> </u> (No Pass Limit)
(1) Auto Rearm	(1) Unless Pass Count =	(1) Or Pass Count =
	(2) Unless A = B	(2) And Pass Count \geq
	(3) Unless A \neq B	

The Pass Limit value can be directly entered using the 0 through 9 numeric keys.

Example Entry and Screen Display: RM=RL0100

AND **AUTO REARM** **UNLESS PASS COUNT = 0100**

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{RR}	NA	{=} {F S A} {000-514} {000-514} {001-515} {EOL}

Record Type - Input/Output/Request: Scalar

The first data choice specifies the Auto Compare Range Mode; F selects Sample(s) Between Cursors, S selects Sample(s) Selected Below, and A selects 512 Samples.

The next three data choices are included if the first data choice is Sample(s) Selected Below (S). The second and third data choices consist of three numeric characters in the range of 000 through 514. The third data choice consists of three numeric characters in the range of 001 through 515. These characters specify the Mem-A Start, Mem-B Start and the total number of samples to be compared, which appears as And For ___ Samples on screen.

These fields are presented on the screen with Mem-A at the topmost position on the screen, followed by Mem-B and For ___ Samples. Note the total number of samples may not exceed the value of 515 minus the greater of the Mem-A and Mem-B starting samples numbers.

Quick-keys are available to select the conditions listed below for the Auto Compare Range. Note the cursor remains in the field after the selection is entered.

- (0) Sample(s) Between Cursors
- (1) Sample(s) Selected Below
- (2) 512 Samples

The values for Mem-A, Mem-B, and Auto Compare Total may be directly entered using the 0 through 9 numeric keys.

Example Entry and Screen Display: RR=S000010505

```

AUTO COMPARE RANGE IS FOR SAMPLE(S) SELECTED BELOW
MEM-A STARTING AT 0,
MEM-B STARTING AT 10,
FOR 505 SAMPLE(S). ( MAXIMUM = 505 )
    
```

AUTO EDGE TOLERANCE (RE)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{RE}	NA	{=} {0-9} {EOL}

Record Type - Input/Output/Request: Scalar

The data choice consists of a numeric character in the range of 0 through 9 and specifies the Auto Edge Tolerance selection. This value is used to set the Don't-Care memory during the next A-->B transfer.

The Auto Edge Tolerance field is located in the lower portion of the screen.

The Auto Edge Tolerance can be directly entered using numeric keys 0 through 9. The cursor remains in the field after the selection is entered.

Example Entry and Display Screen: RE=0

```
      AUTO EDGE TOLERANCE = ±  SAMPLE(S)
EDGE TOLERANCE IS ASSOCIATED WITH MEMORY B AND IS
SET ON EACH A→B DATA TRANSFER OR BY PRESSING 
```

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{RS}	NA	{=} {*, E, N} {EOL} {A, B} {Filename} {00-99}

Record Type - Input/Output/Request: Scalar

The first data choice specifies the Auto Save condition; * selects No Auto Save, E selects Save if A = B and N selects Save if A ≠ B.

If the first data choice is Save if A = B (E) or Save if A ≠ B (N), the next three data choices must be included.

The second data choice specifies either Drive A (A) or Drive B (B).

The third data choice consists of six alphanumeric characters which specify the filename for the save. Spaces may be included but not imbedded between the alphanumeric characters. The characters appear from left to right in the Save field.

The fourth choice consists of a numeric character pair in the range of 00 through 99 and indicates the starting version number for the filename.

Quick-keys are available to select the following conditions:

Increment Comparison Counter	Auto Save Drive
(0) () Not Used	(0) Drive A
(1) Increment if A = B	(1) Drive B
(2) Increment if A ≠ B	

The filename for the save and its starting version number can both be directly entered using both the Alpha and 0 through 9 numeric keys.

Example Entry and Screen Display: RS=NA RESULT00

AND SAVE MEMORY A TO **A:RESULT-00.HH** **IF A ≠ B**

COMPARISON COUNT MODE (RC)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
<A/B>	{RC}	NA	{=} {*, E, N} {EOL}

Record Type - Input/Output/Request: Scalar

The data choice specifies the Comparison Count; * selects Not Used, E selects If A = B and N selects If A \neq B.

Quick-key choices are available to select these conditions for the Comparison Count:

- (0) Not Used
- (1) If A = B
- (2) If A \neq B

The cursor remains in the field after the selection is entered.

Example Entry and Screen Display: RC=N

INCREMENT COMPARISON COUNTER IF \neq

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{CC}	NA	{=} {000-514} {EOL}

Record Type - Input/Output/Request: Scalar

The data choice consists of three numeric characters forming a value in the range of 000 through 514 and specifies the Control Cursor position.

NOTE: Although the Control Cursor value is more closely associated with the Display records, it is included in this section as it directly affects an Arm Mode Screen selection; specifically, the Auto Compare range choice Between Cursors is dependent upon the value of the Control Cursor.

Example Entry and Screen Display: CC=004

CONTROL=004

REFERENCE CURSOR POSITION (CR)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{CR}	NA	{=} {000-514} {EOL}

Record Type - Input/Output/Request: Scalar

The data selection consists of three numeric characters forming a value in the range of 000 through 514 and specifies the Reference Cursor position.

NOTE: Although the Reference Cursor value is more closely associated with the Display Records, it is included in this section as it directly affects an Arm Mode Screen selection; specifically, the Auto Compare range choice Between Cursors is dependent on the Reference Cursor value.

Example Entry and Screen Display: CR=514

REF=514

SEARCH/COMPARE FIRST/LAST/TOTAL (ZT)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{ ZT }	NA	{ = } { 0-515 } { 0-514 } { 0-514 } { EOL }

Record Type - Output/Request: Scalar

The first data choice forms a numeric value in the range of 0 through 515; the second and third data choices each form a numeric value in the range of 0 through 514.

If Search is active, the first data choice specifies the total number of samples matching the Search Word/Level. The second data choice specifies the number of the first sample matching the Search Word/Level. The third data choice specifies the number of the last sample matching the Search Word/Level.

If Compare is active, the first data choice specifies the total number of sample mismatches; the second data choice specifies the number of the first sample mismatch. The third data choice specifies the number of the last sample mismatch.

Note the second and third data choices are only included if the first data choice is other than 0.

Example Entry and Screen Display: ZT=032002498

SEARCH "*" = 032 FIRST = 002 LAST = 498

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{ ZC }	NA	{ = } { 0, 1, 2 } { EOL }

Record Type - Input/Output/Request: Scalar

The data choice specifies the Search/Compare Mode; 0 selects Not Active; 1 selects Search Active; 2 selects Compare Active.

Example Entry: ZC=1

SEARCH RESULTS (ZR)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{ZR}	{(0-514)}	{=} {0, 1} {EOL}

Record Type - Output/Request: Array

The selected index is in a range of 0 through 514 and specifies the sample number.

The data choice is either 0 or 1.

If Search is active, 0 indicates the sample did not match the Search word; 1 indicates a match.

If Compare is active, 0 specifies no mismatch; 1 specifies a mismatch.

NOTE: Search results may be output but not accepted by the K205 as false information could be presented in such a case.

Example Entry and Screen Display: ZR(0-10)=0010000000

```

SEARCH = X  XXXXX  XXXXX  XXXX2
          L  HHHH  HHHH  HHHH
C  000  *  0000  0000  0000  0000  0021  1010  1010  1010
   001  0101  0101  0101  0222  1616  1616  1616
   002  0202  0202  0202  0223  1717  1717  1717
   003  0303  0303  0303  0224  1818  1818  1818
   004  0404  0404  0404  0225  1919  1919  1919
   005  0505  0505  0505  0226  1A1A  1A1A  1A1A
   006  0606  0606  0606  0227  1B1B  1B1B  1B1B
   007  0707  0707  0707  0228  1C1C  1C1C  1C1C
   008  0808  0808  0808  0229  1D1D  1D1D  1D1D
   009  0909  0909  0909  0300  1E1E  1E1E  1E1E
   010  0A0A  0A0A  0A0A  0301  1F1F  1F1F  1F1F
  
```


ACQUISITION CONTROL (QQ)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{(QQ)}	NA	{=} {A, D, S, X} {EOL}

Record Type - Command

The data choice consists of one alphanumeric character, either A, D, S or X. This selection performs the identical function to record keys on the K205 as follows:

- (A) Arm
- (D) Advance
- (S) Stop
- (X) W/xfer

Example Entry: QQ=A

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{DC}	NA	NA {EOL}

Record Type - Command

When this record is received, the K205 CRT is blanked except for the status information displayed on the topmost and lowermost lines. This record enables the user to display messages on the screen using record type DT.

Example Entry: DC

DEVICE CLEAR (KK)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{KK}	NA	NA {EOL}

Record Type - Command

When this record is received, the Default Setup M and display values are loaded into RAM. This record type function is identical to the conditions which occur when the F1 key is depressed while the Configuration Screen is displayed.

Example Entry: KK

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{DT}	NA	{=} {02-08 01-52 01-52 text} {EOL}

Record Type - Command

This record enables the user to display text on the K205 screen.

The first data choice consists of a numeric character pair in the range of 02 through 28, which specifies the row at which data is displayed.

The second and third data choices both consist of a numeric pair in the range of 01 through 52 and specify the starting column at which text is displayed and the number of text characters, respectively.

The fourth data choice specifies the text to be displayed, using alphanumeric characters.

Example Entry and Screen Display: DT=03341150 MHZ MODE

```

                                CLOCKS (M)      09/28/84 10:22:29
    CLOCK MODE = STANDARD      50 MHZ MODE
    SECTIONS C, B, AND A
    MASTER CLOCK = INTERNAL 020 NANoseconds
  
```

PRINT SCREEN DIRECT (PD)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{ PD }	NA	NA { EOL }

Record Type - Command

When this record is received, the K205 sends an exact copy of the current text on screen.

NOTE: This data stream is intended for a printer and will not be accepted by another K205.

Example Entry: PD

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{ PL }	NA	NA { EOL }

Record Type - Command

Sending PL followed by a carriage return prints out Trace Control and DOS Directory Screens in their full length and entirety; Data screens are printed out from the cursor to end of memory.

When in other screens, sending PL returns a copy of the screen.

NOTE: This data stream is intended for a printer and will not be accepted by another K205.

Example Entry: PL

GRAPH EXPANSION, LABELS (WG)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{WG}	NA	{=} {0, 1, 2} {Hex Char} ⁸ {Hex Char} ⁸ {EOL}

Record Type - Input/Output/Request: Scalar

The first data choice specifies the Graph Expansion; 0 selects x1, 1 selects x3, and 2 selects x6.

The second and third data choices both consist of eight characters in the Hex range of 0 through F and select the upper and lower graph limit, respectively, of the graph.

The numeric characters are presented in reverse order on the screen.

Example Entry and Screen Display: WG=0EFFFFFF00000000

Maximum
Value
FFFFFFFE

Horiz
Exp= x1

Y=Sample
Value

@CONTROL
00000000

Minimum
Value
00000000

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{WV}	NA	{=} {*}, Hex Char {EOL}

Record Type - Input/Output/Request: Scalar

The data choice specifies the Search Level value. An asterisk selects Don't-Care; a specific value can be specified in the Hex range of 0 through F.

Example Entry and Screen Display: WV=*

```

SEARCH = X  XXXX  XXXX  XXX2
          L  HHHH  HHHH  HHHH
C 000    F  0000  0000  0000    021    L  HHHH  HHHH  HHHH
  001    F  0101  0101  0101    022    F  1515  1515  1515
  002    * F  0202  0202  0202    023    F  1616  1616  1616
  003    F  0303  0303  0303    024    F  1717  1717  1717
  004    F  0404  0404  0404    025    F  1818  1818  1818

```

SEARCH VALUE (WS)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{ WS }	{ (0-47) }	{ = } { *, 1, 0 } { EOL }

Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 47 and specifies the Data Input number, with 0 corresponding to A0 and 47 corresponding to CF on the screen.

The data choice is either a 0, 1 or an asterisk for Don't-Care.

Note the Search Value appears in the Data Display Screen on line 3.

Example Entry and Screen Display:

WS(0-47)=010000000100000001000000010000000100000001000000

```

SEARCH = X 0202 0202 0202
          L HHHH HHHH HHHH
C 000    F 0000 0000 0000      0221  L HHHH HHHH HHHH
  001    F 0101 0101 0101      0222  F 1515 1515 1515
  002    F 0202 0202 0202      0223  F 1616 1616 1616
  003    F 0303 0303 0303      0224  F 1717 1717 1717
  004    F 0404 0404 0404      0225  F 1818 1818 1818
          F 1919 1919 1919
    
```

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{WT}	NA	{= {0, 1, 2} 0, 1, 2 00, 01, 02, ..., 19, 23} {EOL}

Record Type - Input/Output/Request: Scalar

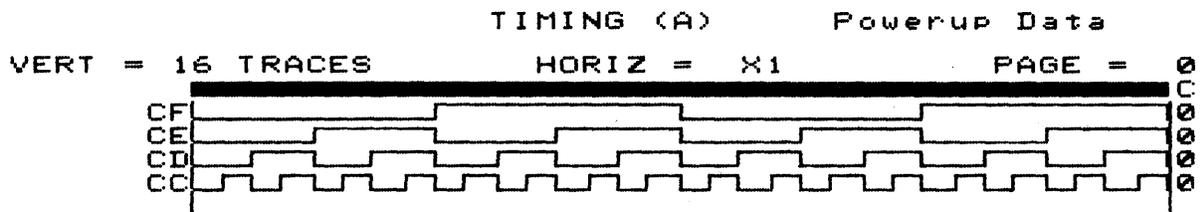
The first data choice specifies the Timing Screen Horizontal Expansion; 0 selects x1, 1 selects x3 and 2 selects x6.

The second data choice specifies the Timing Screen Vertical Expansion; 0 selects 16 traces, 1 selects 8 traces and 2 selects 4 traces.

The third data choice is a numeric pair in the range of 0 through 23 and specifies the page number. The maximum legal value for the page number depends on the Vertical Expansion, selected as follows:

- 4 Traces - Page 23
- 8 Traces - Page 22
- 16 Traces - Page 20

Example Entry and Screen Display: WT=0000



TIMING LABELS (WL)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{WL}	{(0-47)}{=}	{ASCII} ⁵ {EOL}

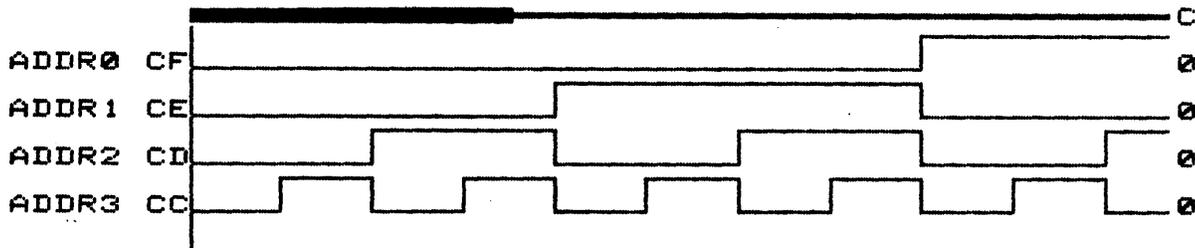
Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 47. This index specifies the input number, with 0 corresponding to the A0 input and 47 corresponding to the CF input.

Five ASCII characters must be selected for each input to specify the Timing Trace label.

In the Timing Display Screen, the Timing labels appear in the leftmost columns, followed by the input identifiers (A0-CF) and the Timing traces.

Example Entry and Screen Display: WL(44-47)=ADDR3ADDR2ADDR1ADDR0



SYNTAX

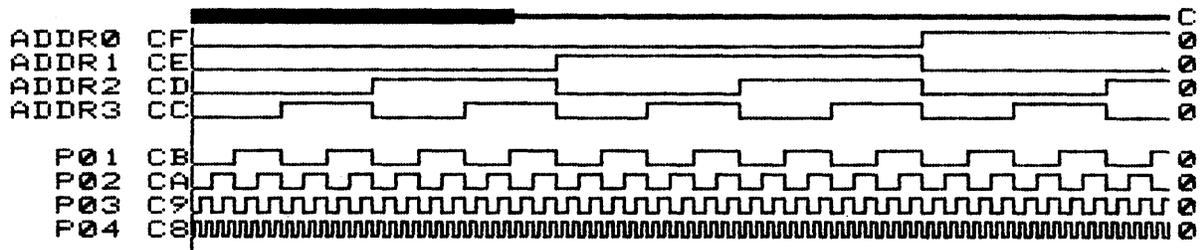
<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{WQ}	{(0-95)}	{=} {A0, A1, ... CE, CF} {EOL}

Record Type - Input/Output/Request: Array

The selected index must be in the range of 0 through 95. This index specifies the traces, with 0 corresponding to the top trace on page 0 and 95 corresponding to the lowermost trace on the last page.

The data choice consists of a data pair in the range of A0 through CF and specifies the input selected by the indexed trace.

Example Entry and Screen Display: WQ(0-7)=CFCECDCCCBCAC9CB



SEND ALL DISPLAY RECORDS (W-)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{ W- }	NA	NA { EOL }

Record Type - Request

The K205 responds by sending the following display records:

WV, WS, WT, WQ, WL, WG, ZC, CC, CR

Example Entry and Screen Response: W-

```

WV=*
WS(0-47)=0100*****
WT=0008
WQ(0-29)=CFCECDCCCBCAC9C8C7C6C5C4C3C2C1C0BFBEBCB8B7B6B5B4
WQ(30-59)=B1B0AFADACABAAA9ABA7A6A5A4A3A2A1A0*****
WQ(60-89)=*****
WQ(90-95)=*****
WL(0-12)=GAZ          KEV          -12      +5
WL(13-25)=          RST
WL(26-38)=  05   06   07   08   09PIN10  GND   IO   WR   01   02
WL(39-47)=  32   33   34   35   36   37   38   39PIN40  RD  ALE
WG=0EFFFFFFF00000000
ZC=1
CC=000
CR=514
    
```

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{MX}	{(0-514)}	{=} {HEX CHAR} ¹² {EOL}

Record Type - Input/Output/Request: Array

The Don't-Care Memory is associated with Memory B sample data and selects to either include, Care, (0) or not include, Don't Care (1), bits when Compare is active.

The selected index must be in a range of 0 through 514 and specifies the sample number.

Each sample is specified by twelve Hex characters in the range of 0 through F. The first Hex character selects the CF-CC inputs and the last Hex character selects the A3 through A0 inputs.

Example Entry and Screen Display: MX(0)=000FFFF0FFFF

```
C 000   F XXX0 000X 0000   021   F 1515 1515 1515
```

LEVEL DATA (LA/LB)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{ LA/LB }	{ (0-514) }	{ = } { HEX CHAR } { EOL }

Record Type - Input/Output/Request: Array

LA selects Memory A level data; LB selects Memory B level data.

The selected index must be in the range of 0 through 514 and specifies the sample number.

The data choice must be a Hex character in the range of 0 through F and specifies the Trace Control level active at the time the sample was recorded.

Example Entry and Screen Display: LB(0-3)=012F

C	000	0	XXX0	000X	0000	021	F	1515	1515	1515
	001	1	0101	0101	0101	022	F	1616	1616	1616
	002	2	0202	0202	0202	023	F	1717	1717	1717
	003	F	0303	0303	0303	024	F	1818	1818	1818

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{MA/MB}	{(0-514)}	{=} {HEX CHAR} ¹² {EOL}

Record Type - Input/Output/Request: Array

MA selects Memory A data; MB selects Memory B data.

The selected index must be in the range of 0 through 514 and selects the sample number.

Each sample is represented by twelve Hex characters in the range of 0 through F. For each sample, the first Hex character corresponds to the CF-CC inputs and the last character corresponds to the A3-A0 inputs.

Example Entry and Screen Display:

MA(0-4)=000000000000010101010101020202020202030303030303040404040404

C 000	F 0000	0000	0000	021	F 1515	1515	1515
001	F 0101	0101	0101	022	F 1616	1616	1616
002	F 0202	0202	0202	023	F 1717	1717	1717
003	F 0303	0303	0303	024	F 1818	1818	1818
004	F 0404	0404	0404	025	F 1919	1919	1919

SAMPLE DATA PARAMETERS (PA/PB)

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{ PA/PB }	NA	{ = } { 0000-9999 } { 0000-9999 } { ASCII CHAR } { EOL }

31

Record Type - Output/Request: Scalar

When this record type is received, the K205 responds by sending 39 characters, which represent the Pass Count, Comparison Count, Total Trace Time, Date, Time and DVM reading taken at the end of the recording for Memory A (PA) or Memory B (PB).

The first four characters specify the Pass Count and the next four characters specify the Comparison Count; both are represented in a range of 0000 through 9999.

Next, follows a string of 31 ASCII characters. The first ten ASCII characters specify the Total Trace Time, followed by eight characters, which specify the Date. The next eight characters specify the Time, followed by the final six characters, which specify the DVM reading.

Example Entry and Screen Display: 09/19/8410:30:24-00.00 PA=001000105.0uS

TIMING (A) 09/19/84 10:30:24

TOTAL TRACE TIME = 5.0uS
 CONTROL=000 REF=514 CL=F (R-C)=+ 514 (10.28 uS)
 [F1]=PAGE UP, [F2]=PAGE DOWN, [F3]=HORIZ EXP, [F4]=VERT EXP
 CLOCK=020 nSec DVM=-00.00 C/P=0010/0010 READY

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{QA/QB}	NA	NA {EOL}

Record Type - Request

The K205 responds by sending the following memory records:

For QA: PA, MA, LA

For QB: PB, MB, MX, LB

Example Entry: QA

BEEP SELECT (SE)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{SE}	NA	{= 0, 1} EOL}

Record Type - Input/Output/Request: Scalar

The data choice specifies the error beep tone to be either enabled (1) or disabled (0).

Example Entry and Screen Display: SE=1

ERROR BEEP = **ON**

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{SD}	NA	{=} {01-02 / 01-31 / 00-99} {EOL} {00-23 : 00-59 : 00-59}

Record Type - Input/Output/Request: Scalar

The first five data choices specify the current date by month, day and year. The choices consist of numeric character pairs, followed by backslashes, within the following ranges: 01 through 12 for the month (/), 01 through 31 for the day (/), and 00 through 99 for the year. Additional error checking is performed for months with fewer than 31 days and for leap years.

The next five choices specify the current time based on a twenty-four hour clock in hours, minutes and seconds. The choices consist of numeric character pairs, followed by colons, in the following ranges: 00 through 23 for hours (:), 00 through 59 for minutes (:), and 00 through 59 for seconds.

NOTE: Although a numeric pair other than 00 may be specified for the seconds of an input record, 00 is used to program the system clock. For output records, the seconds are accurate.

Example Entry and Screen Display: SD=09/19/8410:47:26

DATE = 09/19/84
TIME = 10:47:00

CURRENT DVM READING (SV)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{SV}	NA	{=} {+, -} {EOL} 0-9 0-9 . 0-9 0-9

Record Type - Output/Request: Scalar

When this record is received, the K205 responds by sending the current DVM reading.

Example Entry: SV=-00.00

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{KF}	NA	{=} {ALAPHNUMERIC CHARACTER} ¹⁰ {EOL}

Record Type - Output/Request: Scalar

When this record is requested, the K205 responds with an alphanumeric string consisting of ten characters, including spaces. The K205's response depends on the Master Clock mode selected and the current record status of the unit as follows:

If Clock Mode is Internal, Internal Clock Period is returned.

If Clock Mode is External and the unit is not Armed, the Clock Period is measured and its value returned.

If Clock Mode is External and the unit is Armed, the message returned is: UNIT ARMED.

Example Entry: KF=UNIT ARMED

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{ KC }	NA	{ = } { K205 } { Software Version } { 0, 1, 2 } { 0, 1 } { EOL }

Record Type - Output/Request

When this record is received, the K205 responds with a string of ten characters.

The first four characters specify the device type; specifically, K205.

The fifth through eighth characters indicate the firmware version number.

The ninth character identifies the number of Data Boards installed; 2 for 48 input systems (CF-A0), 1 for 32 input systems and 0 otherwise.

The tenth character indicates whether DOS is (1) or is not (0) installed.

Example Entry: KC=K2051.2 21

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{KT}	NA	{=} ⁸ {0, 1} {READY, BUSY, CLOCK?, EOR,} {LVL 0 - LVL F} {EOL}

Record Type - Output/Request

When this record is received, the K205 responds by sending a string of fourteen characters.

The first eight characters are the binary representation of the eight Status Byte bits, with the first character representing the most significant bit and the eighth character representing the least significant bit.

The ninth character indicates the current record status as follows:

- (0) READY
- (1) BUSY
- (2) CLOCK?
- (3) EOR
- (4) LVL 0 - LVL F

The last five characters indicate the current record status.

Example Entry: KT=110100012CLOCK?

DISPLAY SCREEN (DS)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
NA	{ DS }	NA	{ = } { A, C, D, F, G, I, O, R, S, T, W, X } { EOL }

Record Type - Input/Output/Request

The data choice specifies the current screen as follows:

- A - Arm Mode
- C - Clocks
- D - Data
- F - Format
- G - Graph
- I - I/O
- O - Disk Operating System
- R - Trace Control Review
- S - Date
- T - Timing
- X - Trace Control
- W - Configuration

NOTE: Selecting O only applies to those systems with the Disk Operating System installed.

Example Entry: DS=I

SYNTAX

MEMORY SELECT	RECORD ID	RANGE INDEX	DATA
NA	{ \$-/\$+ }	NA	{ = } { 01-48 } { EOL }

Record Type, - Command

This record enables the user to simulate key entry via the front panel.

Sending either \$+= or \$-= specifies normal or shifted, respectively, front panel keys. Each key, represented by a numeric character pair, must be in the range of 01 through 48. The desired key is specified as follows:

01 - NEXT	13 - RIGHT	25 - SHIFT	37 - EDIT
02 - PREV	14 - DOWN	26 - HELP	38 - INS
03 - FORMAT	15 - MEM B	27 - D	39 - F
04 - CLOCKS	16 - DATA	28 - 9	40 - B
05 - TRACE	17 - SEARCH	29 - 5	41 - 7
06 - ARM MODE	18 - COMPARE	30 - 1	42 - 3
07 - UP	19 - CONTROL	31 - I/O	43 - ARM
08 - LEFT	20 - REF	32 - X/SPACE	44 - STOP
09 - MEM A	21 - C	33 - E	45 - F1
10 - DATA	22 - 8	34 - A	46 - F2
11 - TIMING	23 - 4	35 - 6	47 - F3
12 - GRAPH	24 - 0	36 - 2	48 - F4

A SHIFT key value (25) in a \$+ record causes the key value immediately following to be shifted.

Example Entry: \$+=05

SEND ALL SETUP RECORDS (--)

SYNTAX

<u>MEMORY SELECT</u>	<u>RECORD ID</u>	<u>RANGE INDEX</u>	<u>DATA</u>
<A/B>	{--}	NA	NA {EOL}

Record Type - Request

The K205 responds by sending the following output records:

CM, CD, CI, CS
FD, FF, FL, FP, FT, FA, FB
RC, RE, RI, RM, RR, RS, CC, CR
TC, TN, TP, TV

Example Entry and Screen Response: --

```
CM=SI
CI=O2ON
CD(0-2)=*****
CS(0-2)=RHRHRH
```

•
•
•

OPTIONS INSTALLATION

GENERAL

This chapter describes procedures for installing the Section C Input option and DOS option equipment on the K205. This optional equipment is provided in kit form for users who desire to expand the operating capabilities of their equipment. Once installed, the K205 automatically recognizes its new hardware configuration when powered up. The Configuration Screen indicates the new hardware options available for the user and the system responds appropriately. The following kits are available:

- Section C, 16 Inputs Option Kit, Part Number 0120-0057-10
- Disk Storage System Option Kit, Part Number 0114-0468-30

Each kit contains installation instructions for the equipment option. Internal wiring harness assemblies that interface with optional printed circuit board connectors are installed in the K205 chassis by the factory to facilitate the addition of options by the user. These harness assemblies are located at the upper right-hand side of the card cage. Individual cables contained within the harness are labeled for identification and the entire bundle of cables is exposed when the top cover is removed from the K205 chassis.

The DOS Option Kit includes a power cable assembly and signal cable assembly that must be installed by the user. The associated diagrams and wiring details are contained in the installation procedure.

The installation procedure for both option kits are described in subsequent sections of this chapter. The DOS functional description and operation are described in a separate K205 User's Manual Addendum, Publication Number 0120-0095-10, which is included in the kit.

CARD CAGE ARRANGEMENT

The K205 card cage arrangement is shown in Figure 6-1. The board ejector tabs on each printed circuit board are numbered to correspond to the assigned slot location in the card cage. For the most part, the assigned board is dedicated to reside in its assigned slot location except where specified below for the three Data Boards. The installed boards are secured in the card cage by a slotted retainer bar, which is fastened to the top of the card cage by two screws.

Data Board Configurations

Three Data Boards reside in slot locations A2, A3 and A4. The ejector tabs are not numbered because each board is identical and interchangeable for these slots. Each of the slot locations, however, is associated with a particular Section Input as shown in Figure 2-4.

The K205 Instrument configured for 32 inputs (Sections A and B) will use two Data Boards installed in slot locations A4 and A3, respectively.

Instruments configured for 48 inputs (Optional Section C) use an additional Data Board installed in slot location A2.

Clock Board Connections for C Option

The Clock Board is configured with jumpers which select clock signals for 32-input or 48-input capability as determined by the number of Data Boards installed in the unit. When the C Option Data Board is added to an existing 32-input unit, it is necessary to rearrange the eight jumper connections on the Clock Board to enable the Section C clock inputs and convert the BR, BS Sample Clocks into Latch Clocks. It is also necessary to remove the Clock Board from the card cage to change the jumper connections.

The eight jumpers are contained at board location column 3, row K. These jumpers are to be relocated to pins from the common/lower row to pins at the common/upper row to provide the following connection points:

T2-T3, T5-T6, T8-T9, T11-T12

T14-T15, T17-T18, T20-T21, T23-T24

Rearranging the jumper connections enables the Section C clock inputs and routes the BR and BS clocks into the user specified Latch clock equation. The K205 software will not recognize the C clock inputs unless these jumper connections are completed.

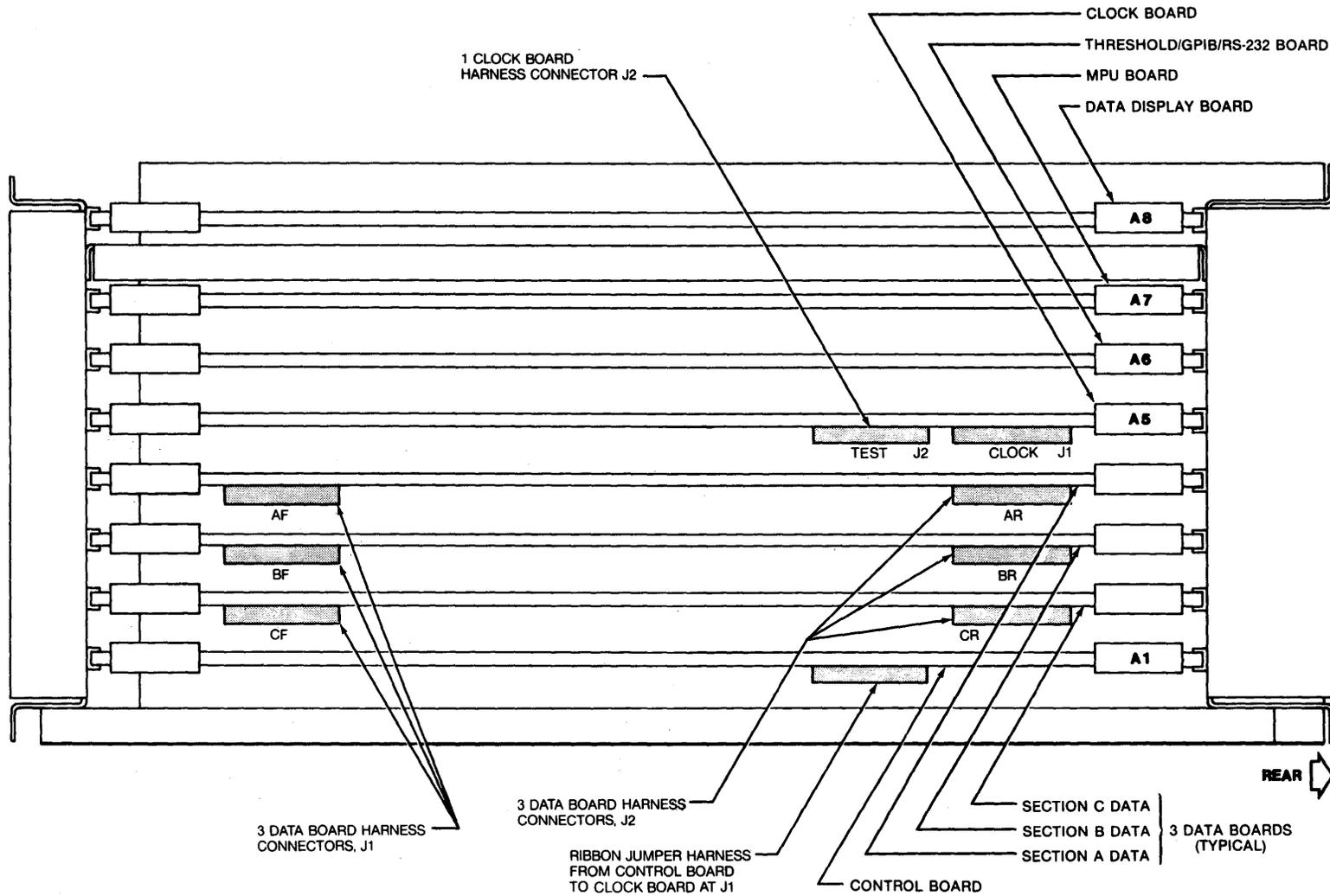


Figure 6-1. K205 Card Cage Arrangement, Top View

INSTALLATION OF SECTION C DATA BOARD

Unpacking and Inspection

The Data Board and probes supplied for the Section C Input Option provide 16 additional inputs (CF-C0) which expand the K205 system configuration to accommodate 48 inputs. All hardware items required to install and operate this option at the user's site are shipped in packaged units. All items shipped for the system configuration are described in Table 6-1.

Table 6-1. Section C 16 Inputs Option Components

QUANTITY	PART NUMBER	DESCRIPTION
1	0114-0110-10	Data Board, Printed Circuit Board Assembly
1	0117-0224-10	Input Cable Set (LOW)
2	0114-1071-10	Grabber Set
1	0120-0031-60	Probe, RS, F-8 (HIGH)
1	0120-0031-60	Probe, JK, 7-0 (LOW)
1	0117-0294-50	Input Cable Set (HIGH)
1	0120-0035-10	Instruction Sheet

All equipment was thoroughly inspected and checked out at the factory prior to packaging for shipment. After removing the equipment from its shipping container, inspect for scratches, dents or other damage that might have occurred during shipping. Refer to the shipping papers to verify that all items were received.

If equipment received from the carrier is incomplete or damaged, do not install the equipment. File a claim with the shipping firm immediately, and notify Gould Inc., Design and Test Systems Division Customer Service department at once. Gould Inc., Design and Test Systems Division will arrange for replacement of the equipment without waiting for settlement of the claim against the carrier.

Installation

Prior to beginning the option installation, position the carrying handle of the K205 to the front of the machine so that the unit rests flat on the work surface.

```
* * * * *  
*                                     *  
*           WARNING                   *  
*                                     *  
* Disconnect the 115/240 VAC source *  
* to the K205 prior to installing   *  
* any options; otherwise, a shock  *  
* hazard exists. Also, high voltage *  
* is present on the CRT and Display *  
* Board.                             *  
*                                     *  
* * * * *
```

The following steps outline the procedure necessary to install the Section C Input Data Board Option in the K205 units that do not contain the DOS Option. If the DOS Option is present in lieu of the top cover, refer to the DOS Option Removal Procedure at the end of this section.

1. Remove the six Philips-head screws securing the top cover, and carefully lift it from the unit.
2. Remove the two screws that secure the card retainer bar to the top of the card cage and lift it from the chassis.
3. Carefully disconnect the cable harnesses from board sockets at card cage locations A3, A4 and A5, noting which sockets are associated with each cable.
4. Position the Option C Data Board with the solder side toward the power supply of the unit. Carefully insert the Data Board into the card slot A2 designated for SECTION C DATA (refer to Figure 6-1). Ensure the Data Board is seated firmly in the motherboard sockets.
5. It is also necessary to remove the Clock Board from the card cage to change the jumper connections. The eight jumpers are contained at board location column 3, row K. These jumpers are to be relocated to pins from the common/lower row to pins at the common/upper row, to provide the following connection points:

T2-T3, T5-T6, T8-T9, T11-T12

T14-T15, T17-T18, T20-T21, T23-T24

6. Replace the card cage retainer bar and secure with two screws.

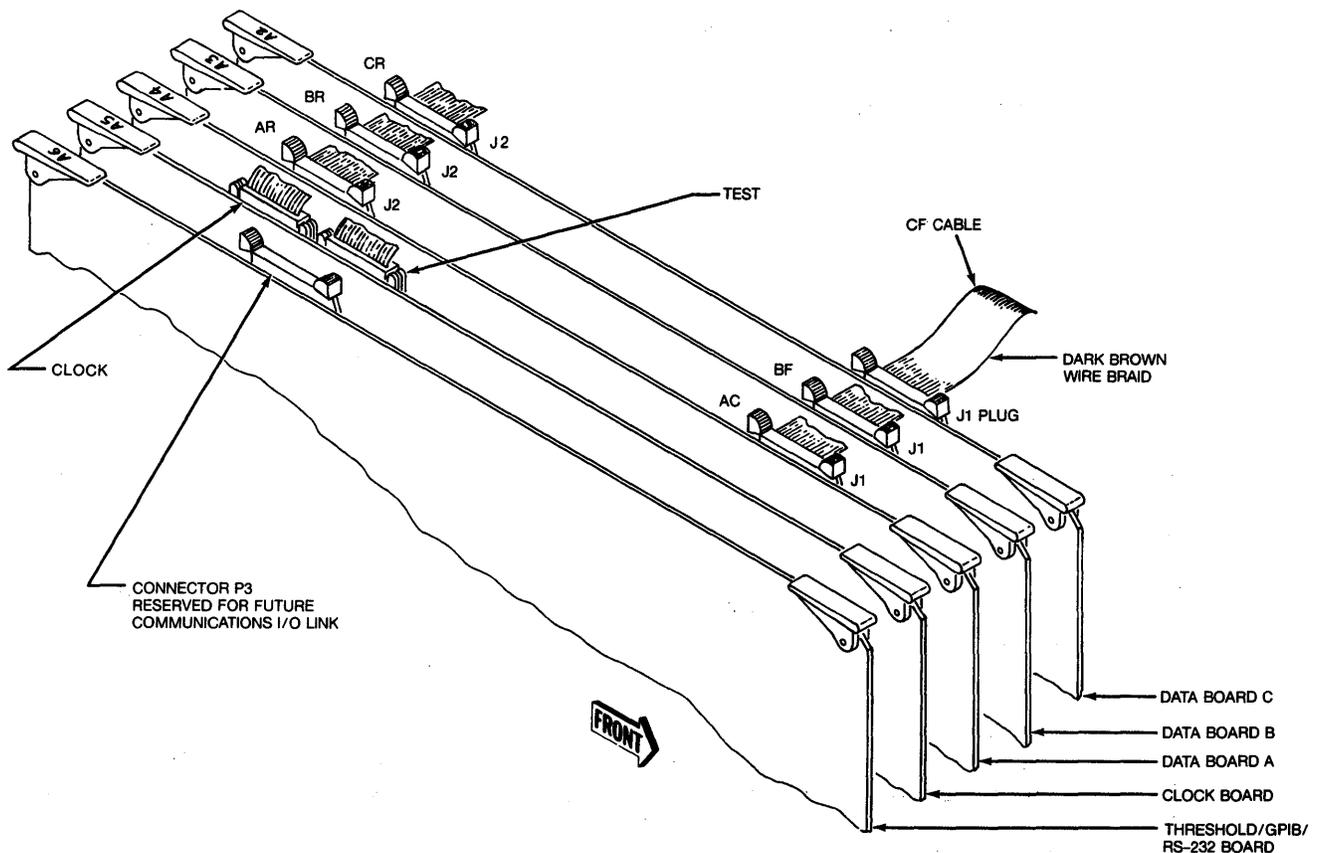


Figure 6-2. K205 Ribbon Cable Connections at Card Cage

7. Referring to Figure 6-2, locate the two unattached ribbon cables labeled CF and CR. Install the CF ribbon cable connector on J1 near the front of the machine. The dark-brown wire braid on the connector should be located to the front of the machine. (NOTE: If J1 is installed backwards, equipment will not be damaged; however, the data at D0 will be displayed on channel D7. Reversing the connector will correct this condition.) Next, install the CR ribbon cable connector on J2 near the rear end of the machine. The correct cable connections are shown in Figure 6-2.
8. Carefully replace the harness connectors removed earlier in Step 3. Ensure each harness is connected to its respective socket, as shown in Figure 6-2.
9. Ensure the harness cables are properly positioned and do not interfere with reinstallation of the top cover. Reinstall the top cover.
10. Reinstall the six retaining screws.
11. Reconnect the 115/240 VAC source to the K205.

Removal of DOS Option Assembly

The DOS assembly may be removed from the K205 chassis to gain access to the card cage or other components. Use the following procedure to accomplish removal.

1. Remove the four Phillips-Head screws securing the top cover to the DOS assembly, and carefully lift the top cover from the DOS housing.
2. Remove the two screws that secure the DOS base and ground connection lug to the top of the K205 chassis.
3. Remove the four screws (2 on each side) that secure the DOS assembly to the K205 chassis.

NOTE: It is necessary to disconnect the power harness and I/O ribbon cable at the DOS assembly in order to remove it from the K205 chassis.

4. Carefully lift the DOS assembly from the K205 chassis. Hold the DOS assembly suspended and disconnect the power harness plug. Disconnect the I/O ribbon cable from the interface connector, J3, on the DOS Controller Board in the DOS assembly. Pull the I/O cable through the access slot under the printed circuit board so that the DOS assembly is fully separated from the K205 chassis.
5. Position the DOS assembly on its side to the left of the K205 chassis. The front of the DOS assembly should be located at the front of the K205 chassis.
6. Reinstall the DOS assembly by reversing the removal procedure. Ensure that the I/O signal cable is properly routed through the access slot under the printed circuit board and is properly folded at the Controller Board connector (J3) so that it does not bind, nor interfere with other internal components, when the DOS assembly is positioned on top of the K205 chassis.

INSTALLATION OF DOS OPTION

Unpacking and Inspection

All hardware items required to install and operate the Disk Operating System (DOS) option at the user's site are shipped in packaged units. External cables are included for connecting all components in the system. All items shipped for the system configuration are described in Table 6-2.

Table 6-2. DOS Option Components

Quantity	Part Number	Description
1	0114-0468-30	DOS Option Assembly (Kit)
1	0120-0095-10	Storage Operating System Manual
2	0120-0079-10	K205 Storage Operating System Disk Set
1	0120-0096-10	DOS Option Instruction Sheet

All equipment was thoroughly inspected and checked out at the factory prior to packaging for shipment. After removing the equipment from its shipping container, inspect for scratches, dents or other damage that might have occurred during shipping. Refer to the shipping papers to verify that all items were received.

If equipment received from the carrier is incomplete or damaged, do not install the equipment. File a claim with the shipping firm immediately, and notify Gould Inc., Design and Test Systems Division Customer Service department at once. Gould Inc., Design and Test Systems Division will arrange for repair or replacement of the equipment without waiting for settlement of the claim against the carrier.

Installation

Prior to beginning the option installation, position the carrying handle of the K205 to the front of the machine so that the unit rests flat on the work surface.

```
*****  
*                                     *  
*           WARNING                   *  
*                                     *  
* Disconnect the 115/240 VAC source  *  
* to the K205 prior to installing    *  
* any options; otherwise, a shock   *  
* hazard exists. Also, high voltage *  
* is present on the CRT and Display *  
* Board.                             *  
*                                     *  
*****
```

The following steps outline the procedure necessary to install the DOS option in the K205.

1. Remove the six Philips-head screws securing the top cover to the K205 chassis, and carefully lift it from the unit.
2. Remove the four Philips-head screws securing the top cover to the DOS assembly, and carefully remove the top cover from the unit. Note the orientation of the ribbon cable connectors and power harness connectors as they relate to the disk drives (Figures 6-3 and 6-4). Disconnect the I/O ribbon cable connectors from the Disk Controller Board and remove the cable from the DOS assembly. (This will facilitate positioning and folding the I/O cable after the DOS unit is placed on the K205 chassis.)
3. Referring to Figure 6-5, connect the single ribbon connector to the Data Display Board connector P4, located near the center of the unit. It will be necessary to remove the card cage retainer bar and raise the Data Display Board approximately 2 inches in the card cage to gain access to the P4 connector. Pin 1 is at the top of connector P4.
4. Position the DOS assembly on the K205 chassis and route the I/O ribbon cable through the access slot in the base of the DOS assembly. Do not connect the I/O ribbon cable at this time.
5. Locate the DOS power harness connector cable near the power supply which is installed by the manufacturer for interfacing the DOS option (See Figure 6-3). Connect the power harness connector plug from the DOS unit to the power supply harness connector through the rear access slot.
6. Fold the I/O ribbon cable under the Disk Controller Board so that it is routed to the left Controller Board connector, J3, as shown in Figure 6-4. Pin 1 is at the front of connector J3. Connect the I/O ribbon cable to the Controller Board connector. Ensure that no cables interfere with the final positioning of the DOS assembly, and seat the assembly on the top of the K205 chassis.
7. Install the six retaining screws, 2 screws that secure DOS Base and ground lug to the top of the K205 chassis and 4 screws that secure the sides of DOS unit to the K205 chassis.
8. Reinstall the DOS top cover with the four retaining screws.
9. Reconnect the 115/240 VAC source to the K205 unit.

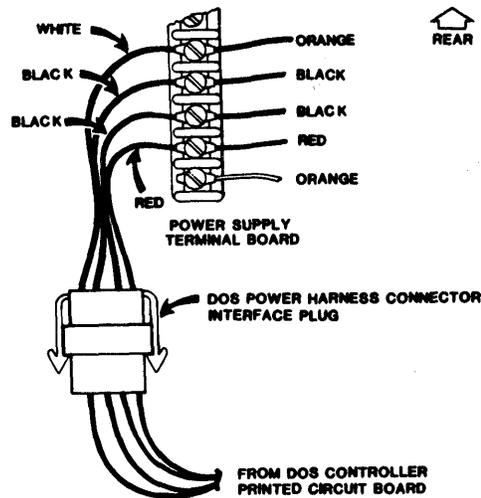


Figure 6-3. K205 DOS Power Harness Connection at Power Supply, Top View

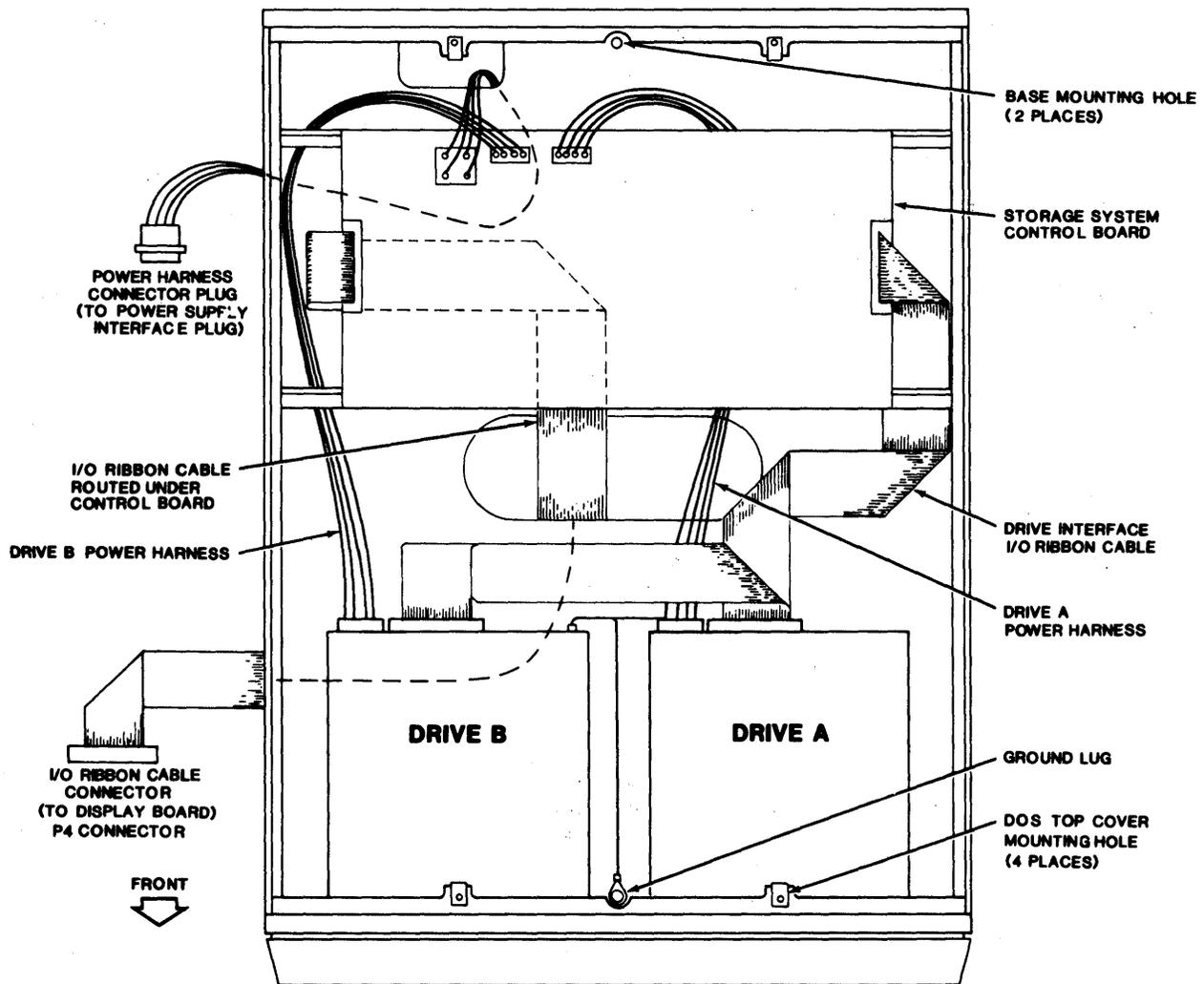


Figure 6-4. K205 DOS Assembly, Top View with Cover Removed

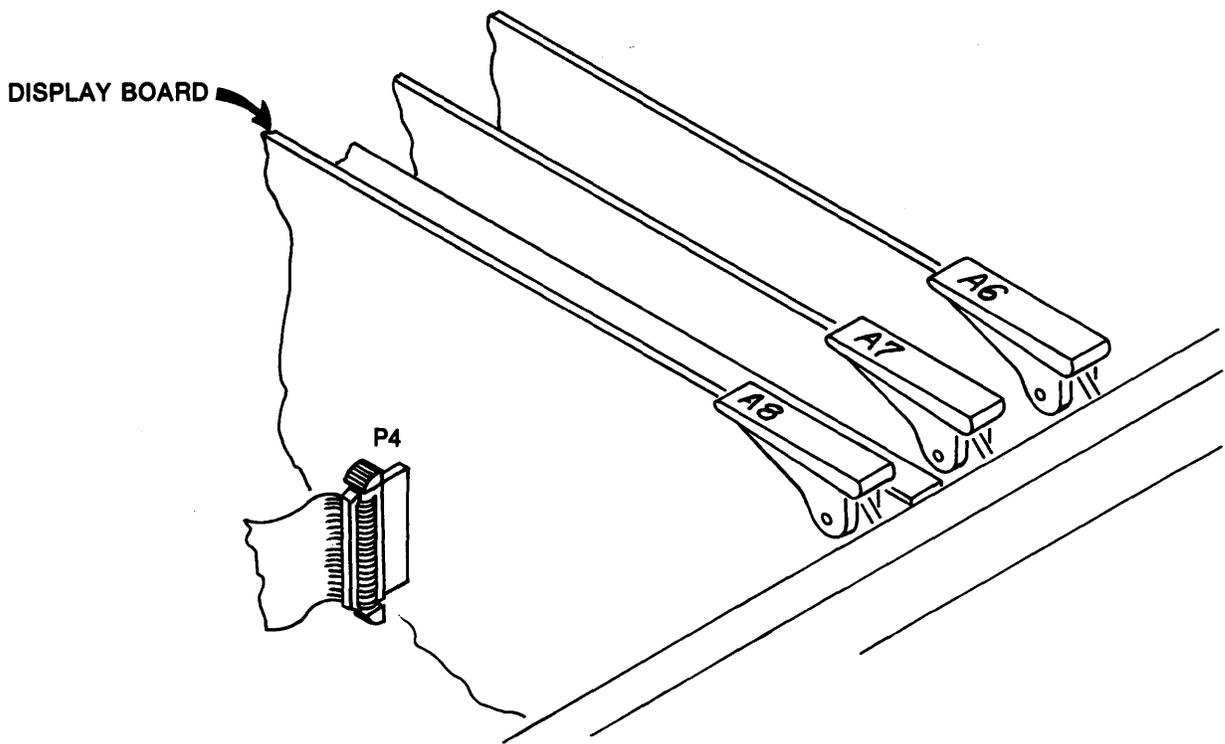


Figure 6-5. Disk Drive Ribbon Cable Connection

GLOSSARY OF TERMS

Acquisition Cycle

The cycle that a logic analyzer performs to acquire data consisting of the following steps:

1. Analyzer flushes all acquisition memory to 0 (zero).
2. Analyzer starts acquiring data.
3. End of record is reached.
4. Data is transferred from acquisition memory to system.
5. CRT display is updated with new data.

This cycle may be modified somewhat in auto-arm modes.

Active Field

The one data field on the CRT that is changed by depressing one of the data entry keys. The active field is identified by a blinking cursor.

Analog

In analog systems, information is encoded as a continuous range of signal values (voltage or current); in a digital system, information is encoded as signals that at any given time can only produce one of two states, 0 or 1.

Analog to Digital Conversion

The process of translating an analog signal into a sequence of binary digits that is representative of the analog signal level.

Arm Mode

The mode of operation of the logic analyzer when the ARM key is depressed.

- a. Single arm, in which one acquisition cycle (pass) is performed each time the ARM key is depressed.
- b. Auto Rearm, in which the analyzer continuously rearms until the STOP key is depressed.
- c. Auto Rearm with condition (also known as autostop), in which the analyzer rearms until some condition occurs.

Clock Transition

The change of state of a clock line. For each clock pulse, two transitions occur: the rising and falling edges of the pulse. In most cases, data is transferred only on one of these edges.

Data Domain Analysis

The use of the logic analyzer to view digital data decoded as symbolic values. Normally, the data is displayed as binary, octal or hexadecimal, although ASCII and EBCDIC representations can also be viewed.

Data Pattern Definitions

In the K205 Logic Analyzer, the trace control system can be programmed to act on the appearance of a given pattern in the data stream. Part of the Trace Control screen is used for entering certain pattern values and assigning them symbolic names.

Data Transition

The change of state of a data line.

Delay Counter

A 16-bit counter on the trace control board that is loaded with a pre-programmed value whenever a trace control level is entered or re-entered. On each level, the counter can be programmed to decrement either on each clock or on occurrences of the advanced pattern. Whenever a level is entered, the hardware is in the state $COUNT < DELAY$. When the counter reaches zero, the hardware is in the state $COUNT = DELAY$. Thereafter, the state is $COUNT > DELAY$.

Demultiplex

Several microprocessors use a multiplexed bus, in which data, address and status information are sent over the same set of lines at different times. To simplify use of the logic analyzer with these processors, a demultiplex mode is provided, in which data from one set of probe inputs (7-0) of each section is routed internally to the 7-0 and F-8 probe inputs of the same section.

Event

In a logic analyzer, an "event" is a series of one or more contiguous samples in which a particular condition is true, surrounded by samples in which that condition is not true.

Field

A field is a part of a display that shows one particular type of information. Usually the term refers to display items that can be altered by the operator.

Logic Analyzer

A logic analyzer is a device that records digital signals and displays recorded data.

Master Clock

The clock moves data into the trace control board and into the acquisition memory.

Occurrence

One "event" is an appearance of a given condition, for however long the condition remains true. One "occurrence" is the presence of a condition on any sample, regardless of whether it was also true on the previous sample. For example, if a condition is true for three samples in a row, this is considered three "occurrences" of that condition, but only one "event".

Pass Counter

A counter that keeps track of the number of arm cycles that have occurred since the ARM key was depressed.

Quick-Key

When setting up the K205, most fields have a fixed number of legal choices. These fields can normally be set using the NEXT or PREV keys, but can also be set by entering the hex digit associated with the desired choice. A hex digit key used in this manner is referred to as a "quick-key".

Radix/Radices

The radix of a number system is equal to the number of possible symbols for each digit. The binary number system has a radix of 2, since each digit is one of two possible symbols: 0 and 1. Octal has a radix of 8; hexadecimal has a radix of 16. In the K205 logic analyzer, the term generally indicates a symbolic representation system, where the choices are: Binary (1 bit), Quad (2 bits), Octal (3 bits), Hex (4 bits), X (5 bits), ASCII-6 (6 bits), ASCII-7 (7 bits), and EBCDIC (8 bits).

Recording

A recording is the data traced during an acquisition cycle and retained when the acquisition cycle ends. If the logic analyzer traces more samples than its memory can store, only the most recent data is retained.

Split Timing/Clocking

Split Timing occurs whenever more than one clock rate is used for moving data into memory and is associated with the Clocks, Data, Timing and Graph Display Screens in the K205. The word "SPLIT" is briefly displayed in reverse video on the given screen to indicate this condition.

Threshold

A voltage limit above or below which a signal is recognized as a defined value, usually the binary digit of 1 or 0.

Threshold Range

A voltage range over which successive threshold measurements are made.

Time Domain Analysis

Time domain analysis displays the recorded data as idealized oscilloscope traces. This analysis is useful for viewing timing relationships among the signal lines.

Tolerance Comparison

The K205 can compare the data stored in memory A with that stored in memory B. To enhance flexibility, the K205 allows "Don't-Care" samples to be stored in memory B. These samples are simply not compared with their counterparts in memory A. This condition allows tolerances to be placed around rising and falling edges in memory B. The Arm Mode screen provides a means for generating tolerances around each edge in the memory B buffer.

Trace Command Sequence

In the K205 logic analyzer, trace control is setup through a series of simple commands. These form a sequence of commands that are performed on each acquisition cycle, subject to conditional commands present in the sequence.

Trace Control

Trace Control is a trademarked feature of Gould logic analyzers. It is a system for selectively storing events of interest while ignoring all other system activity.

Trace Level

The K205 trace control system has sixteen basic states, called levels, each of which has certain options and conditions. When each sample is traced, the trace level is stored along with the data. These levels can be viewed in the Data screen.

Appendix B

K205 ERROR MESSAGES

This Appendix provides a listing of error messages generated by the K205. Any additional explanation of the messages are enclosed in parenthesis. The error messages are grouped in the following categories:

- General Messages
- Arm Mode Screen
- Clocks Screen
- Format Screen
- Trace Control screen
- I/O Related Functions
- Disk Related Operations

When an error condition occurs, the beep tone sounds, if enabled. In most cases, a message is displayed on line 2 of the screen with a brief description of the problem.

General Messages

Illegal key - Press "HELP" for more information

Illegal quick mode key - Depress "HELP" for legal keys

Illegal value - Press "HELP" for legal values

Cannot alter Memory A or B Setup

(Values may be changed only when the 'M' indicator is displayed for this screen.)

AC POWER INTERRUPTION. Press NEXT to Restart.

(This message is displayed when a power glitch occurs.)

UNASSIGNED INTERRUPT. Press NEXT to restart.

(This message is displayed when an unexpected and unspecified interrupt occurs.)

Arm Mode Screen

SET TOLERANCE

(This message is displayed when the F4 key is depressed and indicates the Don't-Care memory is being altered with the selected Auto Edge tolerance value.)

Clocks Screen

Warning: Split-Timing selected

(This message alerts the user that clocking has been selected; this condition results in at least one section of data being stored at a different rate from the other sections.)

Format Screen

User Specified Format set to HEX
User Specified Format set to BINARY
User Specified Format set to OCATL
User Specified Format set to DISASSEMBLER

(The appropriate message is displayed when the F4 key is depressed with one of the fixed formats selected.)

Trace Control Screen

Cannot insert new line - 80 lines already defined

Cannot insert pattern - 50 patterns already defined

Pattern cannot have more than five fill-in columns

Cannot insert line in front of ADVANCE command

(The ADVANCE command must immediately follow the TRACE or WAIT command.)

Cannot enter Edit Mode while on a fill-in column

Cannot delete pattern - Referenced in a Command line

I/O Related Functions

Invalid Record Received...

(IR type record received.)

GPIB REMOTE MODE - PRESS [F1] TO RETURN TO LOCAL

(The K205 is under remote control. The user may restore control to the local front panel by depressing the F1 key.)

GPIB REMOTE MODE WITH LOCKOUT

(The K205 is under remote control. The local user is locked out.)

Print/Send Job Aborted

(If the K205 is actively sending data, depression of the CANCEL key causes this message to be displayed.)

INVALID

(An invalid record is received. This message is not to be confused with receipt of an IR record.)

Print/Send Job in progress. Press CANCEL to abort.

(This warning is displayed when a new request to send data is made by the local user while an operation is still in progress.)

Press Hex Pad keys for menu choice or IO key to exit

(This prompt occurs when an illegal key is depressed while the I/O function menu is displayed.)

Disk Related Operations

One moment please.

(This message is displayed when a disk access operation is in progress and a screen key is depressed. The message indicates the screen key has been recognized and will be processed immediately following completion of the disk operation.)

Cannot load Disk system.

Appendix C

DEFAULT VALUES

This Appendix presents the Default screens of the K205.

When the F1 key is depressed while the Configuration screen is displayed, some system variables are set to specified values. These variables are listed below with their corresponding default values. Illustrations of all affected screens as they appear with default values are provided in this section.

SCREEN	FIELD NAME	VALUE
Arm Mode	Arm Mode	Stop
	Stop Rearm	No Stop
	Comparison Count	No Count
	Auto Compare Range Select	512 Samples
	Start Mem-A	000
	Start Mem-B	000
	Total Compare	514
	Input Select	Inputs defined on format screen
	Selected Inputs	All
	Auto Edge Tolerance	0
Clocks	Clock Mode	Standard
	Master Clock Source	Internal
	External Master Clock	(__ * __ *AJ)+(__ + __ + __)
	Internal Clock	020 Nanoseconds
	All Sections Demux Select	Not Selected
	Latch/Glitch	Not Selected
	Latch Clock	(__ * __ *AR)+(__ + __ + __)
	Sample/Store	Store
	Section Source	10 Nanoseconds
	External Section Clock	(__ * __ *AJ)+(__ + __ + __)

SCREEN	FIELD NAME	VALUE
Data	Control Cursor	000
	Reference Cursor	514
	Search Level	Don't-Care
	Search Word	All Don't-Care
	Search/Compare	Neither active
Date/Time	Error Beep	ON
Format	Data Format	User Specified
	Level Select	Selected
	Section	CCCC BBBB AAAA (48)
	Inputs	FB73 FB73 FB73 EA62 EA62 EA62 D951 D951 D951 C840 C840 C840
	Threshold	All TTL
	Polarity	All Positive (+)
	Graph	Minimum Value
Maximum Value		FFFFFFFF
Horizontal Exp		X1
Timing	Timing Sequence	All inputs in descending order (CF, CE, ..., A1, A0)
	Page	0
	Horizontal Exp	X1
	Vertical Exp	16 Traces
Trace Control	Timing Labels	All Blank
	Command Sequence	0: Trace until sample = Trigger 1: Trace for 00250 Clocks
	Pattern Definitions	00 Enable all Don't-Cares 01 Trigger all Don't-Cares 02 _ all Don't-Cares

ARM MODE (M) 10/04/84 13:53:16

AFTER ONE PASS,

STOP

AUTO COMPARE RANGE IS FOR **512 SAMPLES**

USING **INPUTS DEFINED ON FORMAT SCREEN**

AUTO EDGE TOLERANCE = ± **2** SAMPLE(S)
EDGE TOLERANCE IS ASSOCIATED WITH MEMORY B AND IS
SET ON EACH A→B DATA TRANSFER OR BY PRESSING **F4**

DVM=-00.00

F4=Set Tolerance
READY

Figure C-1. Arm Mode Default Screen

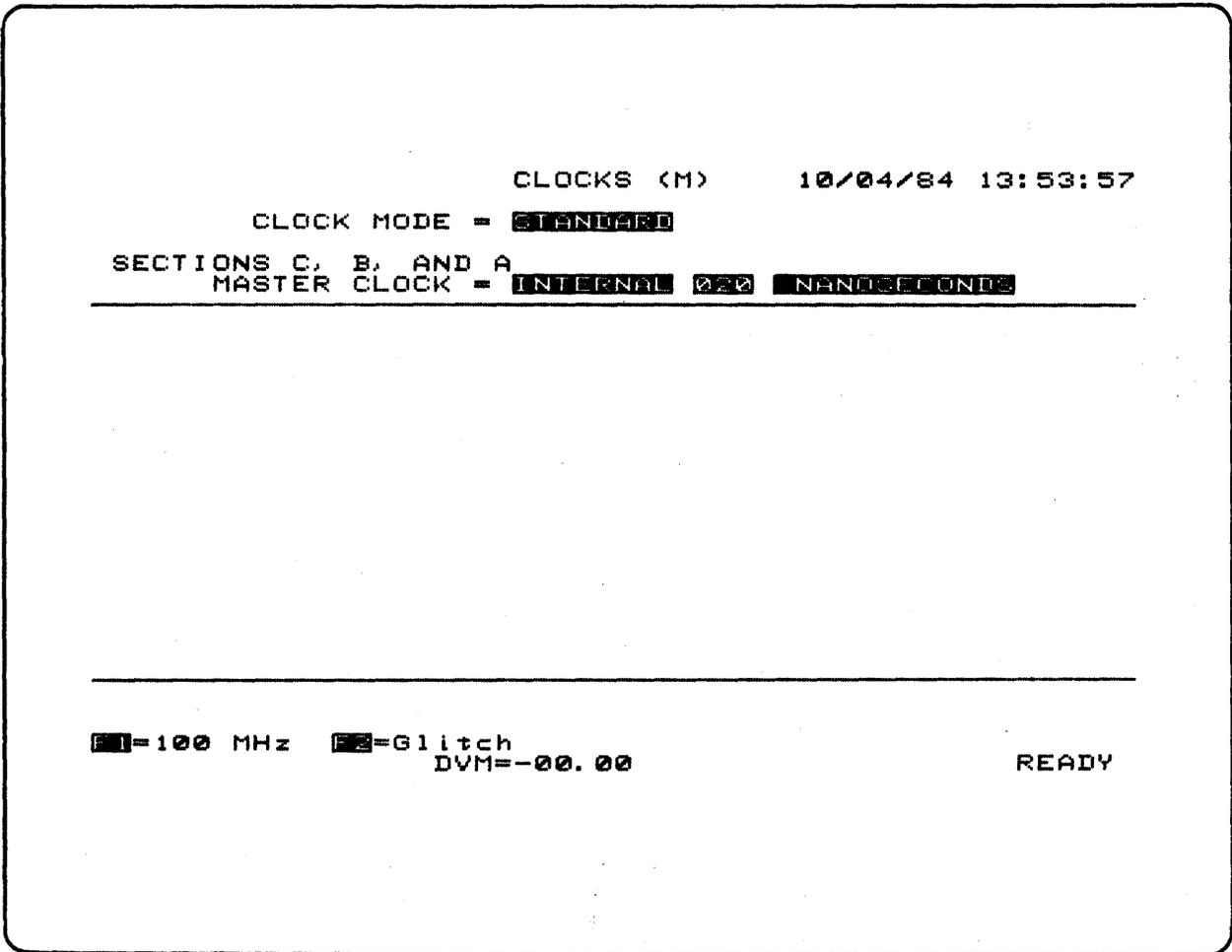


Figure C-2. Clocks Default Screen

```

                                DATA (A)      Powerup Data
SEARCH = X XXXX XXXX XXXX
C 0000 F F F F H H H H H H H H 0000 F F F F H H H H H H H H
0001 F F F F 00101 010101 010101 0001 F F F F 1515 1515 1515
0002 F F F F 00202 020202 020202 0002 F F F F 1616 1616 1616
0003 F F F F 00303 030303 030303 0003 F F F F 1717 1717 1717
0004 F F F F 00404 040404 040404 0004 F F F F 1818 1818 1818
0005 F F F F 00505 050505 050505 0005 F F F F 1919 1919 1919
0006 F F F F 00606 060606 060606 0006 F F F F 1A1A 1A1A 1A1A
0007 F F F F 00707 070707 070707 0007 F F F F 1B1B 1B1B 1B1B
0008 F F F F 00808 080808 080808 0008 F F F F 1C1C 1C1C 1C1C
0009 F F F F 00909 090909 090909 0009 F F F F 1D1D 1D1D 1D1D
0010 F F F F 00A0A 0A0A0A 0A0A0A 000A F F F F 1E1E 1E1E 1E1E
0011 F F F F 00B0B 0B0B0B 0B0B0B 000B F F F F 1F1F 1F1F 1F1F
0012 F F F F 00C0C 0C0C0C 0C0C0C 000C F F F F 2020 2020 2020
0013 F F F F 00D0D 0D0D0D 0D0D0D 000D F F F F 2121 2121 2121
0014 F F F F 00E0E 0E0E0E 0E0E0E 000E F F F F 2222 2222 2222
0015 F F F F 00F0F 0F0F0F 0F0F0F 000F F F F F 2323 2323 2323
0016 F F 1010 1010 1010 0010 F F F F 2424 2424 2424
0017 F F 1111 1111 1111 0011 F F F F 2525 2525 2525
0100 F F 1212 1212 1212 0012 F F F F 2626 2626 2626
0101 F F 1313 1313 1313 0013 F F F F 2727 2727 2727
0200 F 1414 1414 1414 0014 F F F F 2828 2828 2828
                                041 F F F F 2929 2929 2929

CONTROL=000 REF=514 (R-C)=+ 514 (10.28 MS)
F1=PAGE UP, F2=PAGE DOWN - USE EDIT TO CHANGE SEARCH
CLOCK=020 nSec DVM= **.*
READY

```

Figure C-3. Data Default Screen

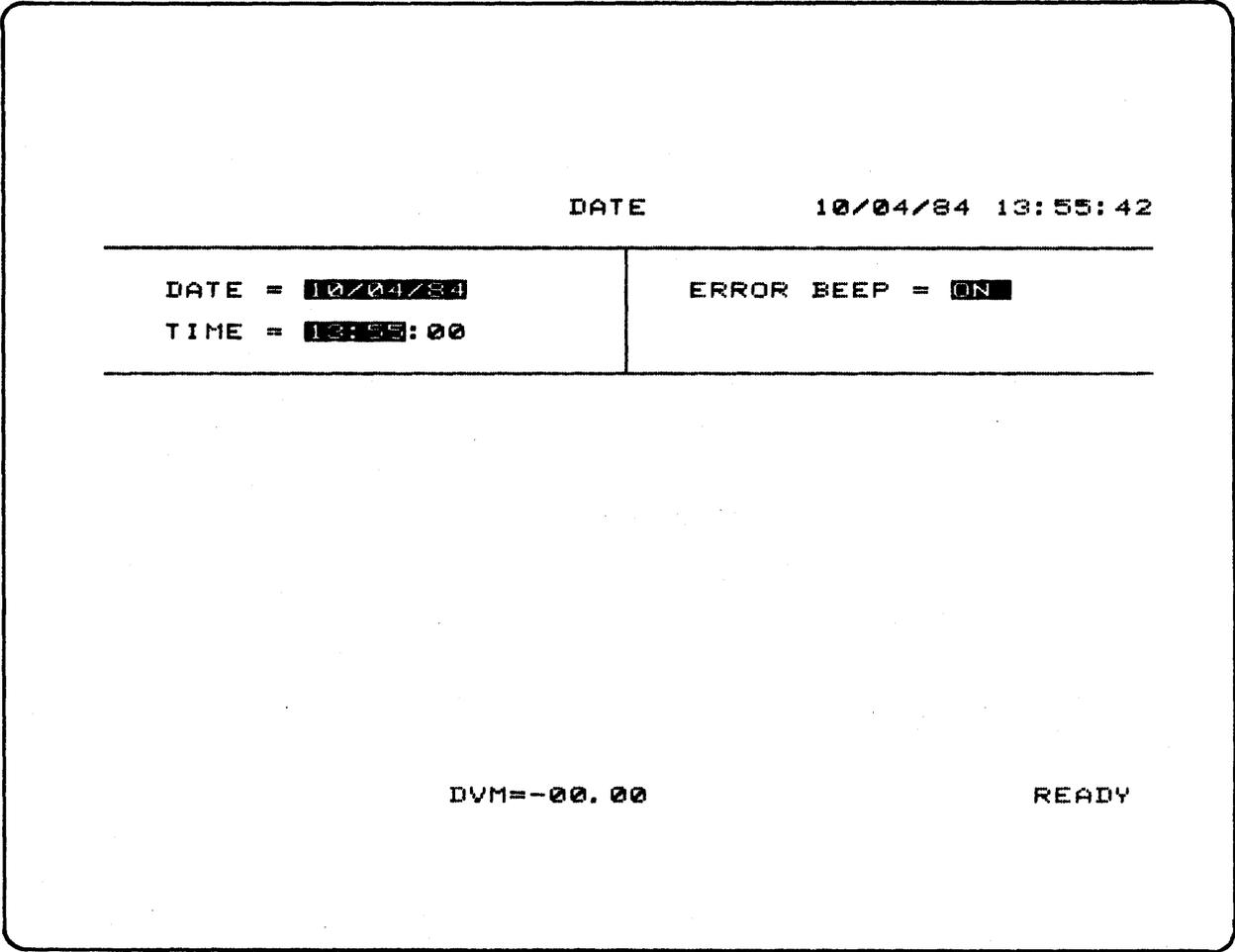


Figure C-4. Date/Time Default Screen

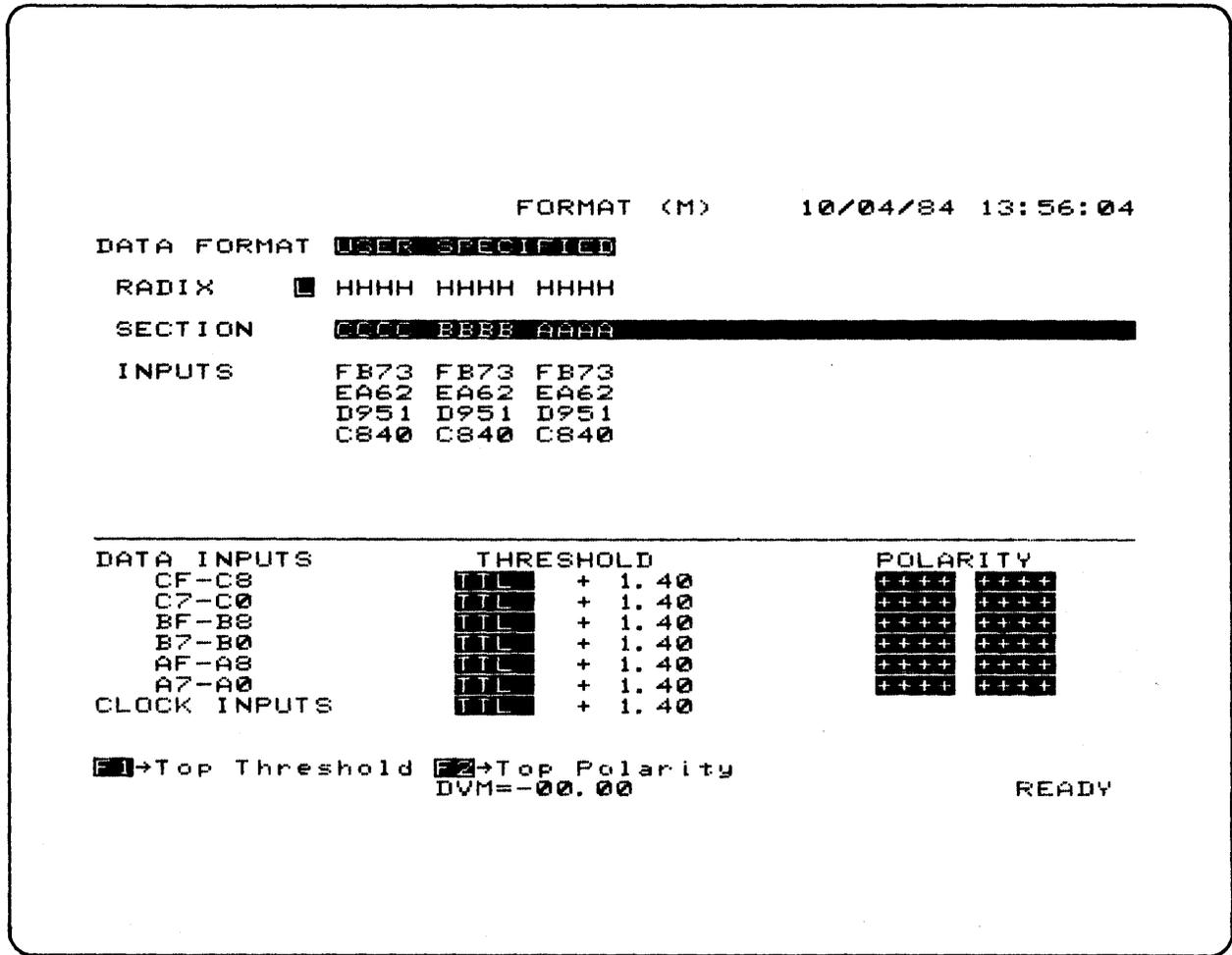


Figure C-5. Format Default Screen

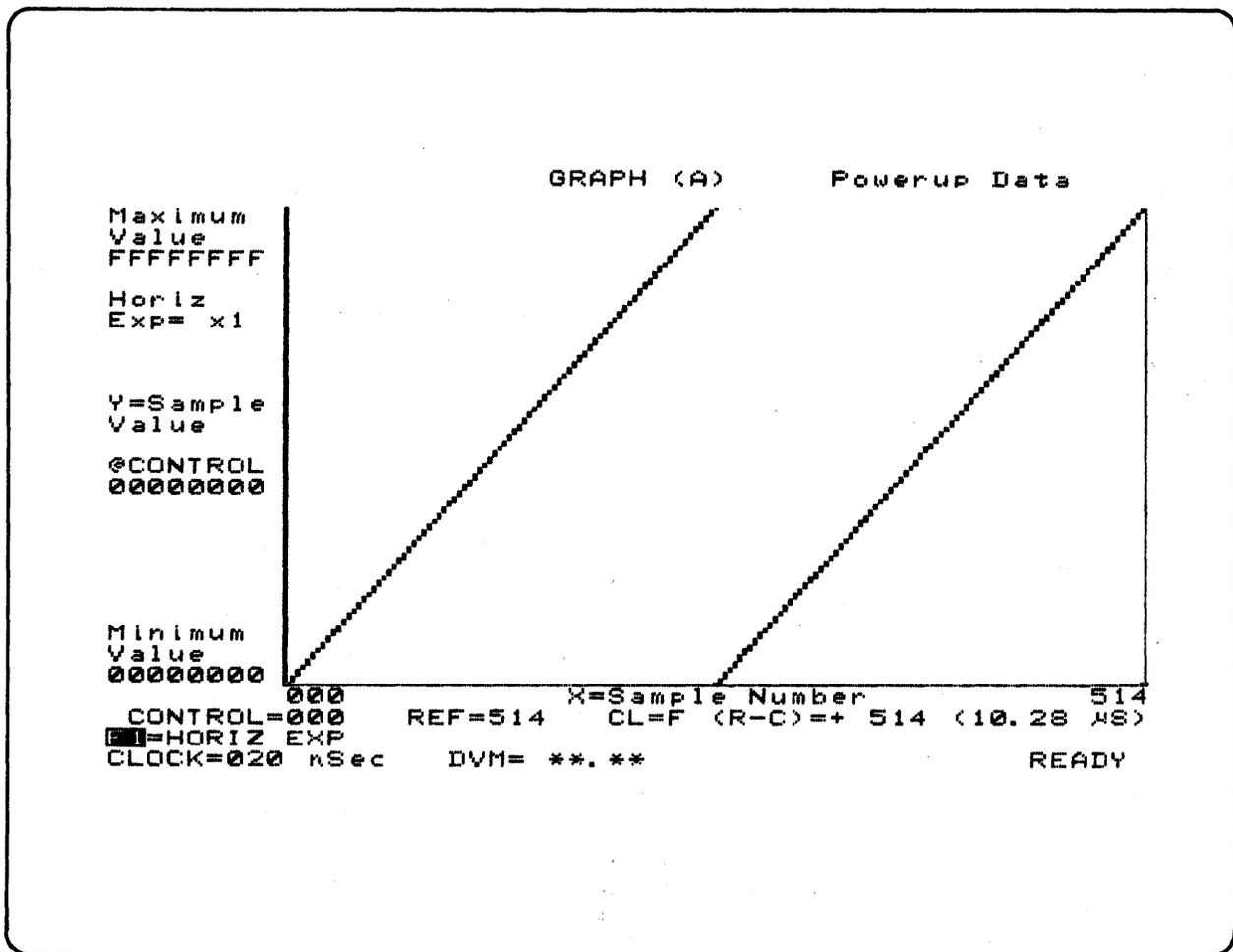


Figure C-6. Graph Default Screen

TRACE (M) 10/04/84 13:58:27

LVL COMMAND SEQUENCE:
0:TRACE UNTIL SAMPLE = TRIGGER
1:TRACE FOR 00250 CLOCKS

PATTERN DEFINITIONS:
NAME: HHHH HHHH HHHH
00 ENABLE =XXXX XXXX XXXX
01 TRIGGER =XXXX XXXX XXXX
02 - =XXXX XXXX XXXX

→TOP CMD, →TOP PTRN
DVM=-00.00

READY

Figure C-8. Trace Default Screen