ADVANTEST®
ADVANTEST CORPORATION

INSTRUCTION
MANUAL
TR4725
Logic Analyzer

PREFACE

Conformity with the system disks

This instruction manual conforms to the following system disks:

P4725-7071FJ V2.0

P47250-001FJ V2.0

P47251-001FJ V2.0

P47252-001FJ V2.0

P47241-001FJ V2.0

P47242-001FJ V2.0

P47243-001FJ V2.0

TR4725
LOGIC ANALYZER
INSTRUCTION MANUAL

RECORD OF REVISIONS

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OEA	Jun 02/86				

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LIST OF RELATED MANUALS

Manual No.	Manual Name	Remarks
TR4725	Logic Analyzer	
TR47250	Personality Kit	
TR47251	Personality Kit	
TR47252	Personality Kit	
TR47241	Personality Kit	
TR47242	Personality Kit	
TR47243	Personality Kit	

TR4725
LOGIC ANALYZER
INSTRUCTION MANUAL

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1. GENERAL INFORMATION

1.1 HOW TO USE THIS INSTRUCTION MANUAL

This TR4725 Logic Analyzer instruction manual consists of: the TR4725
instruction manual (hereafter called the main unit instruction manual),
and the instruction manual for each personality kit (hereafter called the
PK instruction manual).

The TR4725 can concurrently perform logic state analysis, and logic timing
analysis by using the separately-purchased personality kit (active probe),
and the optional timing module (Opt.4725+70). The combination of TR4725
with these units provides for three types of features given below.

(1) Timing-only analyzer
With the combination of TR4725 and Opt.4725+70.

(2) State-only analyzer
With the combination of TR4725 and the personality kit.

(3) S & T (state and timing) analyzer
With the combination of TR4725, and both Opt.4725+70 and the personality
kit.

The general description of the TR4725 operating method as a timing-only
analyzer is presented in Chapters 1, 2 and 3 of the main unit instruction
manual.

For the general description of the TR4725 operating method as an S & T
analyzer, read Chapter 1, and Section 2.8 in Chapter 2 in the main unit
instruction manual, and Chapters 1, 2 and 3 in the PK instruction manual
in this order.

Chapters 4 to 8 in the main unit instruction manual describe the operating
method on common functions among systems (1), (2) and (3) above.
Chapter 4 in the PK instruction manual describes detailed operating method
of the functions according to the type of the personality kit; the
contents of these functions can be confirmed by users by referring to the
operation examples in Chapter 3, and the appendices in the main unit
instruction manual, or the HELP (key) function index for this TR4725.

The other parts of both instruction manuals describe operation checking
methods, and the precautions for storage or shipping and the TR4725
performance characteristics.

1.2 INTRODUCTION

The ADVANTEST TR4725 Logic Analyzer can totally debug the system programs by concurrently measuring and observing software- and hardware-oriented operations. Its general features are as follows:

(1) S & T function:
A single TR4725 unit can accommodate both the "logic state analyzing function" (software-oriented analysis) which can analyze the microprocessor operations, and the "logic timing analyzing function (option)" (hardware-oriented analysis) which can analyze the peripheral circuit operations. The TR4725 does not only operate each function independently, but also arms triggers mutually in both functions. These functions ensure the entire digital system operation analysis with a single TR4725 unit.

(2) New user interface:
The new interface is used to secure simple technical manipulations; compared with the conventional model, more complicated operations are generally needed in proportion to function diversification (multi-page menu selection, multi-window display, and QuickGET/SAVE functions). A 3.5-inch. microfloppy disk drive (with 1MB capacitance when unformatted), a 5-inch. x 9-inch. large scale CRT (80 characters by 24 lines display), and a scrolling knob are provided as the devices to support further interface improvement.

(3) Personality kit system state analyzer:
The input section in the TR4725 state analyzer can be interchangeable by using a plug-in system probe called a "personality kit". With this feature, the most suitable personality kit for measurement-related systems can be selected to perform the best-conditioned measurement.
The use of the flexible tracing control (trace window condition), mnemonics, symbols, and codes can ensure effective debugging operation.

(4) Timing analyzer to be used with great ease like an oscilloscope:
The QuickVIEW function is provided with the 100 MHz timing analyzer consisting of 16 channels, thus ensuring real-time measurement usually executed by oscilloscope.

(5) Built-in program function:
The TR4725 standard measurement function can be coupled mechanically with a simple programming, thus ensuring further measurement economization, automation, and standardization.

(6) System program presentation through floppy disks:
Future function version can easily be updated by exchanging the system floppy disks.

1.3 PREPARATIONS

1.3.1 Checking TR4725 Appearance and Its Accessories

Upon receiving the TR4725, check its appearance to see if the instrument has been scratched or damaged during transportation.

Next, check the standard accessories by referring to the list below to confirm the quantity and ratings. If there is any scratch, damage, or shortage, contact your nearest ADVANTEST representatives. Their addresses and telephone numbers are given at the end of this manual.

(1) TR4725 standard accessories

Item	Stock No.	Q'ty	Remarks
Fuse	MDA-7A	2	
Fuse	MDA-4A	(2)	For the option 40
Power cable	MP-43	1	
Instruction manual	E4725	1	

(2) Opt.4725+70 (an option) standard accessories
When a timing module is installed as an option, the following articles are added to the list (1) above.

Item	Stock No.	Q'ty	Remarks
Data acquisition probe E	TR14702-01	1	
Data acquisition probe F	TR14702-02	1	
Probe lead set	A04701-52	2	
Probe hook	A04701-11	2	10 pieces per set
System software package	P4725-7071FJ	2	
Blank disk	OM-D4440	2	SONY brand
Disk box		1	
Miscellaneous box		1	

1.3.2 Environmental Requirements and Precautions

(1) Avoid places where the instrument may easily be covered with dusts,
    exposed to direct sunlights, and damaged by corrosive gases.
    The ambient temperature should be between +5° and +40°C. The
    humidity should be between 20% and 80%. (Note that no dew
    condensation should occur.)

(2) Cooling ventilation
    The TR4725 cooling ventilator inhalls air at the rear panel connector
    slot and at the rear section of the right side panel. This TR4725
    exhausts air out at the rear panel fan. Therefore, set the TR4725 in
    an appropriate place where its ventilation facilities are not hindered.
    Note that users should not put things on the top of TR4725.

(3) The TR4725 has been well designed against noise generation at the AC
    power line. Note, however, that the TR4725 should be used where
    little noise is generated. To prevent excessive noise generation, use
    the noise filter.

(4) Do not use the TR4725 where it may receive vibration shock.

(5) Operating the TR4725
    To protect the built-in floppy disk drive, do not use the TR4725 with
    its front panel facing upward. (Use the TR4725 with its front panel
    kept in ±30° to the horizontal direction.)

(6) CRT display screen distortion
    The CRT display screen has been adjusted so as to minimize its
    distortion. Note, however, that the screen may distort occasionally
    due to the external magnetic field, or terrestrial magnetism.

1.3.3 Connecting Power Source

(1) Connecting the power cable to the TR4725
    First, confirm that the TR4725 from panel POWER switch is OFF. Then,
    connect the supplied power cable to the rear panel AC LINE connector.
    The working power source voltage value has already been set at the
    time of delivery at user's request.
    The standard voltage value (unless otherwise specified) ranges from 90
    to 132 Vac. The voltage value specified by the option 40 ranges from
    180 to 249 Vac. Power line frequencies for both cases (for a standard
    and optional cables) are set to 50 or 60 Hz.

(2) Power cable and its adapter
    A power cable plug consists of three prongs. Its rounded center prong
    works as a ground.
    When connecting the power cable to the inlet by using the adapter
    A09034, connect either the earth lead from the adapter (see
    Figure 1-1 (a)), or the earth terminal mounted on the mainframe rear
    panel, to the external earth for grounding.

This A09034, as illustrated in Figure 1-1 (b), has two electrodes, A
and B; they have different widths from each other.
Accordingly, the user should confirm the polarization of both the plug
and inlet, and insert the adapter into the inlet properly. When
A09034 does not fit the inlet to be used, purchase another adapter
KPR-13.

To the AC power
source inlet

Adapter A09034

Earth prong

Power cable
three-prong plug

to connect this pin   to the mainframe
with the ground

Adapter A09034
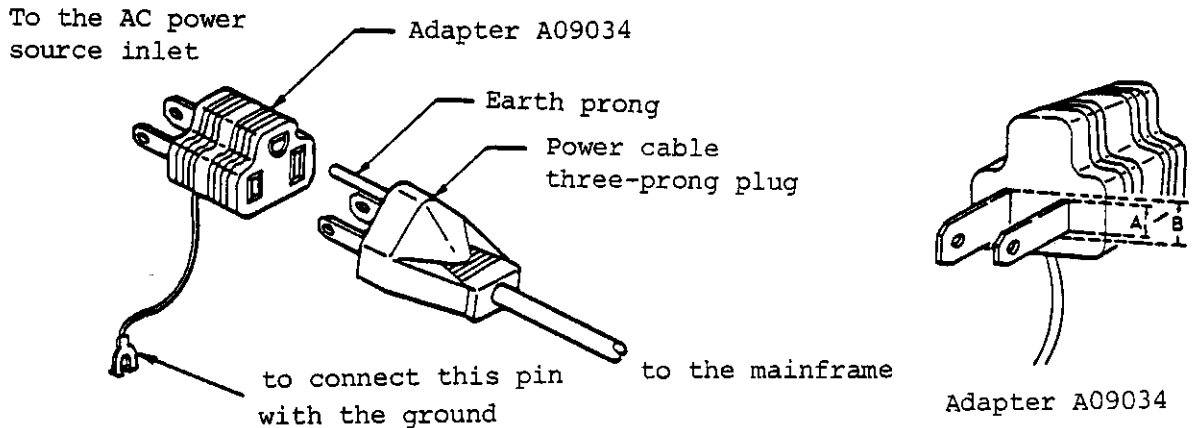
Figure 1-1 Power Cable Plug and Adapter

(3) Replacing fuse
To replace an old fuse with a new one, first, set the POWER switch to
OFF, and then remove the power cable from the AC LINE connector.
Next, slide the fuse box plastic cover in the right side of the AC
LINE connector toward the left. To remove the fuse, pull the lever on
which FUSE PULL is inscribed.
Replace the fuse with the one mentioned below. (See Figure 1-2.)
Standard MDA-7A
Optional 40 .... MDA-4A
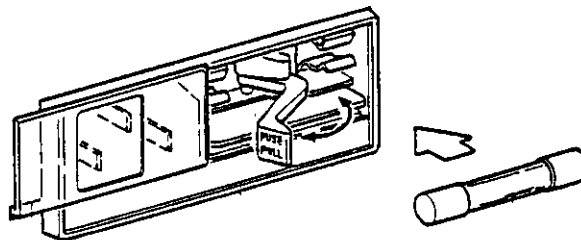
Figure 1-2 Replacing Fuse

1 - 5*

2. PREPARATIONS AND PREVIOUS INFORMATION REQUIRED FOR MEASUREMENT EXECUTION

2.1 PURPOSE OF THIS CHAPTER

First users should read this chapter beforehand, as it is written for users who are about to use the TR4725 Logic Analyzer for the first time, describing preparatory actions and previous informations required to execute measurement. The users are advised to read this chapter to try actual operations, keeping the machine at hand. This chapter is written to enable the users to understand the TR4725 quite easily by just following the explanations.

As Chapters 2 and 3 emphasize the use as a timing-only analyzer, the users who perform state analysis using the personality kit need not read these. (Note that they should read Chapters 2 and 3 in the PK instruction manual instead.)

2.2 CONNECTING DATA ACQUISITION PROBE E/F

Two probes, data acquisition probe E (TR14702-01; hereafter called probe E) and data acquisition probe F (TR14702-02; hereafter called probe F), are used to capture data from the system under test (hereafter called SUT). Each probe can capture signals of eight channels.

The shapes and parts names of probe E/F are shown in Figure 2-1.

Probe connector

Probe pod

Probe cable

Probe
(TR14702-10/02)

Probe lead set
(A04701-52)

Probe hook
(A04701-11)

Pin socket
(the tip of the probe lead set)
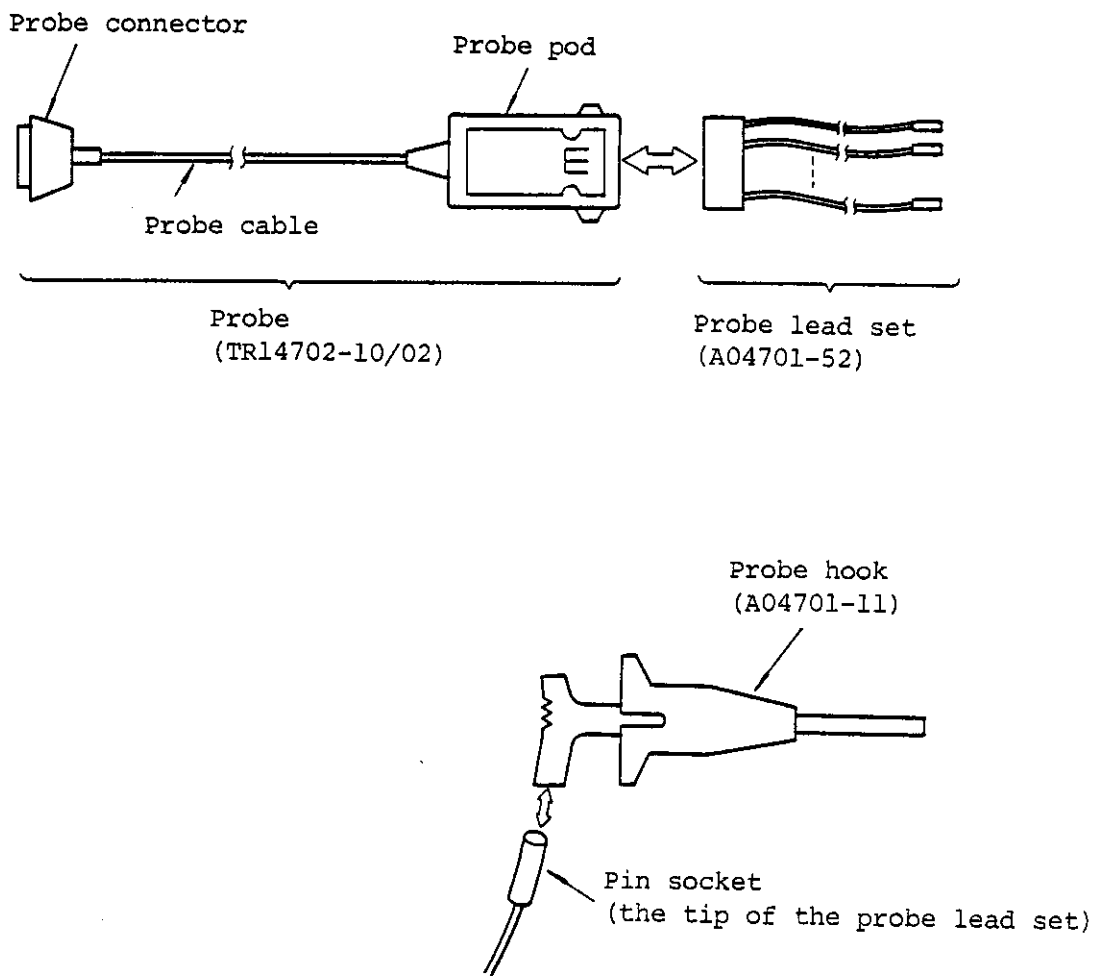
⟺ indicates that the part can be
freely attached and removed.

Figure 2-1   Probe E/F Shape and Parts Names (Standard Configuration)

First, connect the probe to the TR4725 main unit. Connect the probe E
cable connector to the probe slot E ('E' is marked at the rear panel) and
the probe F cable connector to the probe slot F after each probe connector
is put through the cable holder at the left of the rear panel as shown in
Figure 2-2.

```
———————————————————————————— CAUTION ————————————————————————————

Before connecting probe E/F, make sure to turn OFF the power of the main
unit.
```

TR4725 rear panel

Probe slot E

Probe connector*

E

F

Cable holder

Probe slot F
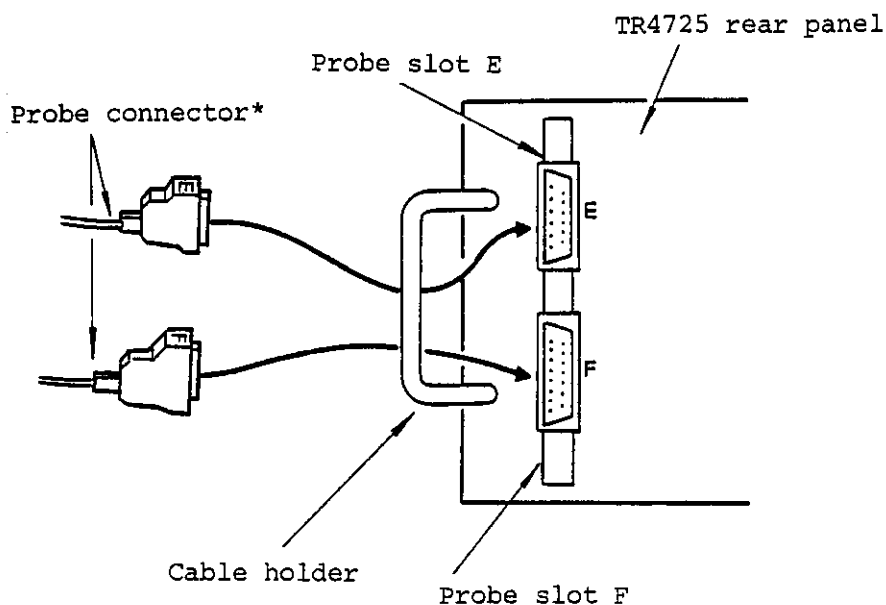
*:   Insert the connector name plate E/F upward

Figure 2-2 Connecting Probe E/F to the TR4725 Main Unit

Next, connect probe to SUT. As a standard procedure, use the probe lead
set (A04701-52) with pin socket to connect probe to SUT via probe hook
(A04701-11; single hook). When the pin which is suitable for pin socket
is found in SUT, direct connection with the pin socket is possible. The
stock No. and size of the pin socket is as follows:

Manufacturer	Stock No.	Suitable size
AUGAT KK-JAPAN	LSG-2BG2-1	0.51 mmϕ - 0.76 mmϕ

If necessary, probe can be connected to the SUT by using other optional
accessories. Instead of the standard probe hook, the probe hook with a
double hook tip-pin (A04701-16; double hook) can be used. (Refer to
Figure 2-3 (a).)

Use the probe lead set (A04701-51) when soldering is used instead of probe
hook or pin socket for connection. In this case, the connection of eight
channels can be performed in one procedure (refer to Figure 2-3 (b)).

The use of the DIP IC clip (A04702-30/40/48/64) makes the connecting with
DIP IC easier. In this case, connect the pin socket to the pin of the
clip. (Refer to Figure 2-3 (c).)

Probe hook (A04701-16)

(a)

Pin socket
(the tip of the probe lead set)

SUT

Probe lead set (A04701-51)

Soldering (SUT)

(b)

Probe pod

Pin socket

(c)

DIP IC clip
A04702-30
A04702-40
A04702-48
A04702-64

DIP IC (SUT)
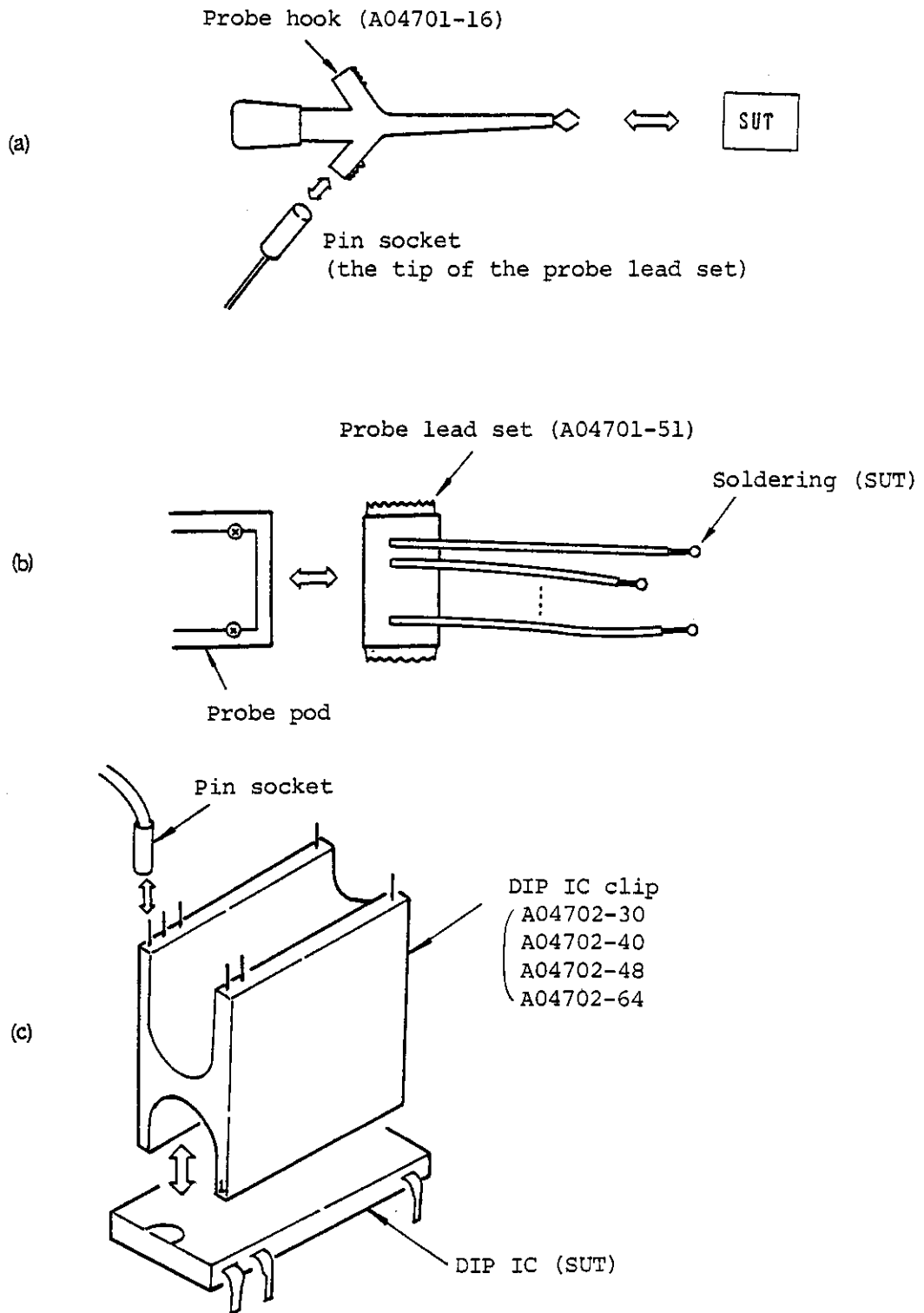
*:   Match and then insert at pin 1.

Figure 2-3   Connecting SUT with Optional Accessories

2.3 LOADING THE SYSTEM SOFTWARE

The software (system software) which controls the operation of the
personality kit is loaded from the system disk (TR14702-02) to the
internal memory and executed. The built-in floppy disk drive is used for
the system software loading.

Insert the system disk into the floppy disk drive, turn ON the POWER
switch, and then loading starts automatically.

As shown in Figure 2-4, the following messages are displayed for loading:

TR4725

TIMING ONLY

System software loading in progress

Self-test ended

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Figure 2-4 Screen Display for Loading

Loading requires approximately one minute. At the end of loading,
CONFIGURATION (corresponds to CONFIG key) menu is displayed and the system
enters into enabled state as shown in Figure 2-5.

```
** CONFIGURATION **                                    TIMING ONLY    <TRACE TIMING>
-LABEL-
      PROBE              ┌─PROBE_F─┐                    ┌─PROBE_E─┐
      DATA CHANNEL       7654 3210                      7654 3210
                         ↓↓↓↓ ↓↓↓↓                      ↓↓↓↓ ↓↓↓↓
      THRESHOLD          [TTL] [TTL]                    [TTL] [TTL]
      LABEL    POL
      PRB_F7   [+]◄────────┘                   LABEL    POL
      PRB_F6   [+]◄──────┘                     PRB_E7   [+]◄────────┘
      PRB_F5   [+]◄────┘                       PRB_E6   [+]◄──────┘
      PRB_F4   [+]◄──┘                         PRB_E5   [+]◄────┘
      PRB_F3   [+]◄───────────┘                PRB_E4   [+]◄──┘
      PRB_F2   [+]◄─────────┘                  PRB_E3   [+]◄───────────┘
      PRB_F1   [+]◄───────┘                    PRB_E2   [+]◄─────────┘
      PRB_F0   [+]◄─────┘                      PRB_E1   [+]◄───────┘
                                               PRB_E0   [+]◄─────┘
-VARIABLE THRESHOLD-
      V3 = [   1.4V]          V4 = [ -1.3V]

-SAMPLING-
      CLOCK RATE [ 10ns]      MODE [SAMPLE]

                                                       03-FEB-86  09:02
```
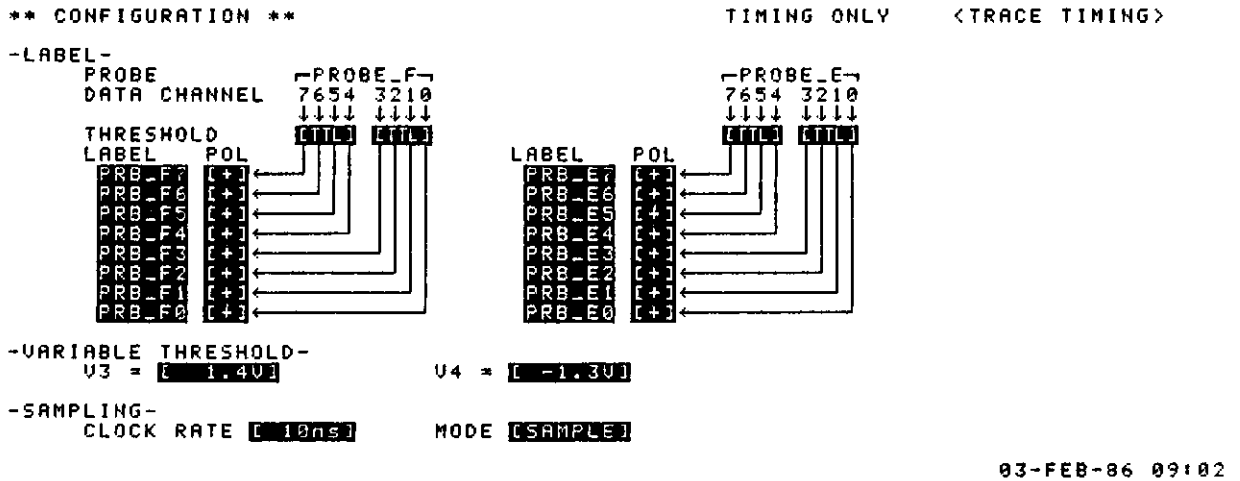
Figure 2-5   Screen Display at the End of Loading (CONFIG Menu Screen)

When the screen as shown in Figure 2-6 is displayed, it indicates that the
internal clock is not functioning properly. Set the precise time by
referring to Section 8.1 of the main unit instruction manual.

```
** CONFIGURATION **                          TIMING ONLY    <TRACE TIMING>
-LABEL-
      PROBE            ┌PROBE_F┐             ┌PROBE_E┐
      DATA CHANNEL     7654 3210             7654 3210
                       ↓↓↓↓ ↓↓↓↓             ↓↓↓↓ ↓↓↓↓
      THRESHOLD        [TTL] [TTL]           [TTL] [TTL]
      LABEL   POL                    LABEL    POL  │││││ │││││
      PRB_F7  [+]←┐                  PRB_E7
      PRB_F6  [+]←┤                  PRB_E6
      PRB_F5  [+]←┤                  PRB_E5
      PRB_F4  [+]←┤                  PRB_E4
      PRB_F3  [+]←┤                  PRB_E3        Real Time Clock is not valid.
      PRB_F2  [+]←┤                  PRB_E2
      PRB_F1  [+]←┤                  PRB_E1        Please push UTILITY key
      PRB_F0  [+]←┘                  PRB_E0
-VARIABLE THRESHOLD-                                  to set date and time.
      V3 = [  1.4V]          V4 = [ -1.3V]
-SAMPLING-
      CLOCK RATE [ 10ns]     MODE [SAMPLE]
                                                     ##-###-## ##:##
```
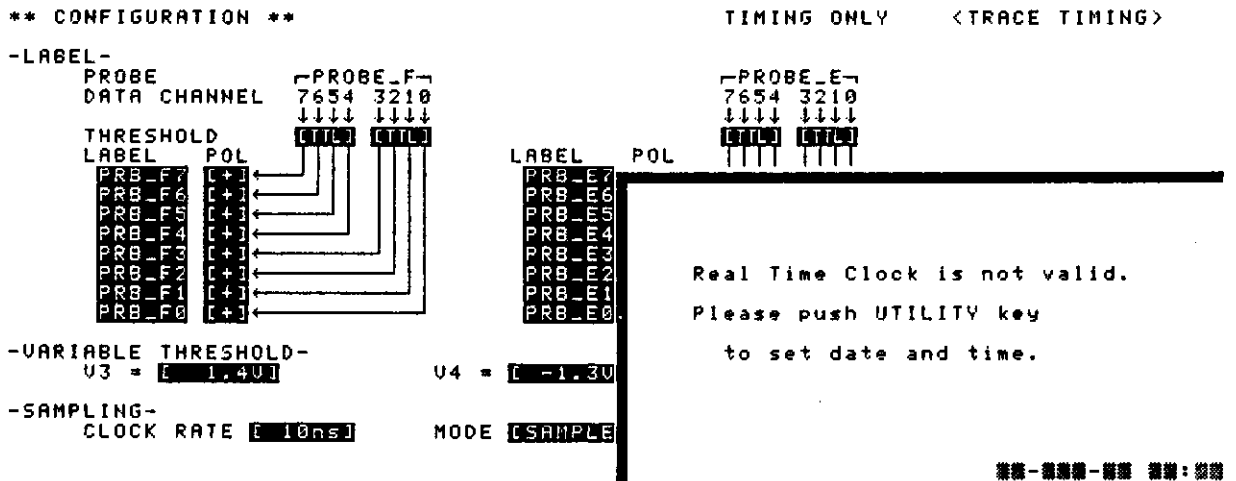
Figure 2-6 Screen Display Requesting Built-in Clock Setting

The display as shown in Figure 2-7 appears, requiring insertion of the system disk when the system disk is not inserted in the floppy disk drive when the POWER switch is turned ON. When the system disk is inserted, even when this display is shown, loading will start automatically. After the display of Figure 2-4, the display of either Figure 2-5 or Figure 2-6 appears and the system enters into operation-enabled state.

<div align="center">

TR4725

TIMING ONLY

Please enter TR4725 TIMING ONLY System Software Package !

↓

Self-test ended

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</div>

Figure 2-7 Screen Display Requesting System Disk Insertion

2.4 CRT DISPLAY FORMATS AND THEIR MEANINGS

One sample data file is stored in the system disk for the explanation from Sections 2.4 to 2.6. To better understand the operation, read the following descriptions while actually operating the personality kit.

Press ⌷ on the upper right of the front panel. Then, the menu display

as shown in Figure 2-5 will appear (the same display as shown after the loading of the system software). The setting of the input channel configuration is enabled on the CONFIG menu screen.

Press ⌷ and the display as shown in Figure 2-8 will appear. The

setting of the trace condition is enabled on the TRACE menu screen.

```
** TRACE SPECIFICATION **                          TIMING ONLY     <TRACE TIMING>

[TRACE TIMING  ]_____QuickVIEW [OFF]

        LABEL            ENBL_T  TRIG_T
                                              CLOCK RATE [ 10ns]
        PRB_F7  (PRB_F7)   X        X
        PRB_F6  (PRB_F6)   X        X         DELAY = +0000 (0ns)
        PRB_F5  (PRB_F5)   X        X
        PRB_F4  (PRB_F4)   X        X
        PRB_F3  (PRB_F3)   X        X
        PRB_F2  (PRB_F2)   X        X
        PRB_F1  (PRB_F1)   X        X
        PRB_F0  (PRB_F0)   X        X
        PRB_E7  (PRB_E7)   X        X
        PRB_E6  (PRB_E6)   X        X
        PRB_E5  (PRB_E5)   X        X
        PRB_E4  (PRB_E4)   X        X
        PRB_E3  (PRB_E3)   X        X
        PRB_E2  (PRB_E2)   X        X
        PRB_E1  (PRB_E1)   X        X
        PRB_E0  (PRB_E0)   X        X

                                                      03-FEB-86 11:29
```

Figure 2-8 TRACE Menu Screen (TRACE SPECIFICATION)

Press ▭ and the display as shown in Figure 2-9 will appear. Analysis

of the captured data is enabled on the DISPLAY menu screen.
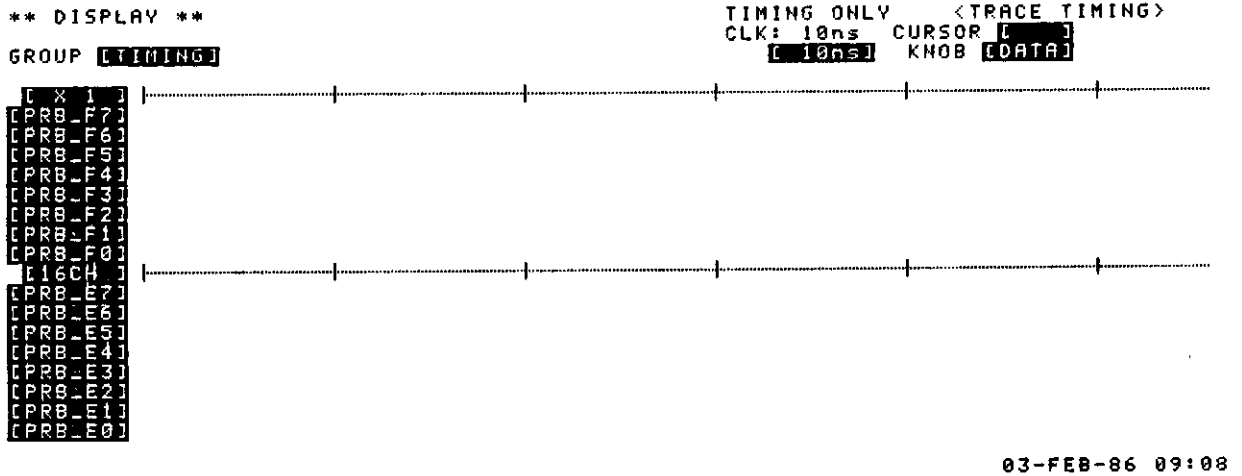
Figure 2-9 DISPLAY Menu Screen

Basic measurement is executed in the State Only and S & T analyzers by
interacting with the above three menu screens (configuration, trace
specification, and display) and the menu screen by SYMDEF key (symbol
definition).

Press ⎡ ᴜɴ ⎤ on the lower center of the front panel twice. The file is

read out and the data is displayed on the screen (refer to Figure 2-10).
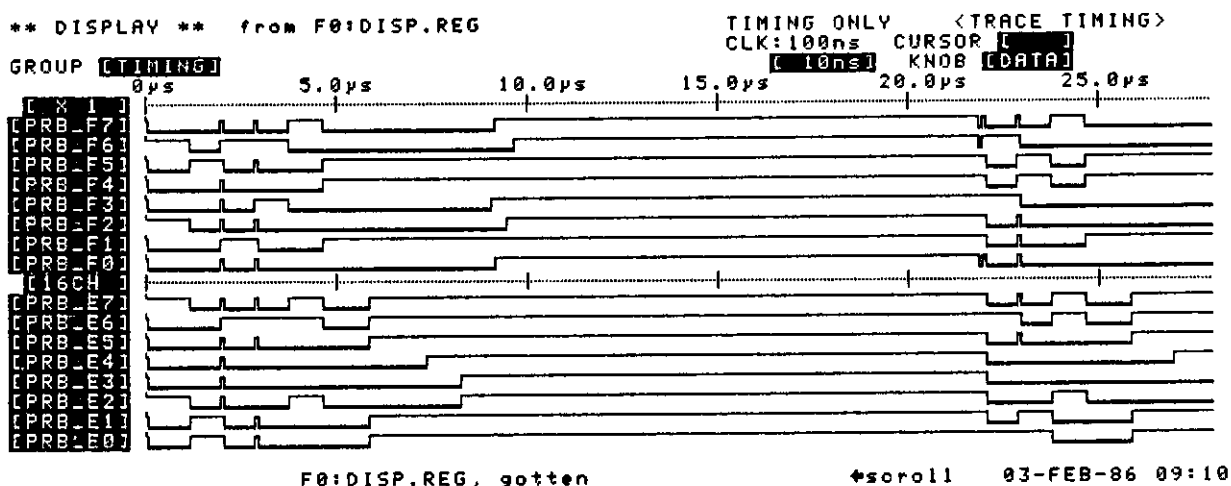
Figure 2-10 Sample Data for Explanation

Each CRT display format contains a specific definition. The operation has
been made easier by sustaining definition consistency through the whole
displays.

(1) "Normal display":
    Usually displayed by characters or diagrams in green; used for displaying
    fixed information such as header word or measured data.
    This indication is equivalent to headers such as DISPLAY on the upper left
    of the screen or measured data (list) in the above sample data.

(2) "Inverse display":
    Indicates inversed luminance of the character or diagram. This is called
    "menu item". The user can use this to set or revise data. [HEX] is
    equivalent to this display in the above sample data.

(3) Normal blink display":
    Blinks to display "normal display"; used to display the status of the
    error message, measurement or I/O execution. By pressing any numeric key
    (for instance, 0) when the display as shown in Figure 2-10 appears, the
    message called "normal blink display" is displayed on the bottom line of
    the CRT display.

(4) "Inverse blink display":
   Blinks to display "Inverse display"; indicates the "menu item" that can be
   currently entered. The blinking portion, in particular, is called "input
   prompt". The display format of [ADRS] immediately after GET is equivalent
   to this.

(5) "Half tone display":
   Indicates the half luminance which is used for measurement execution or
   I/O operation.
   The "input prompt" cannot be moved to the "menu item" which is turned to
   half-tone display (the setting of data to the menu item becomes disabled).
   Press ⬚ on the lower center of the front panel twice, and the display
   as shown in Figure 2-11 will appear. The menu display (e.g. main menu)
   other than the smaller menu display newly appearing on the CRT display
   (e.g. sub-menu) is called "half-tone display". Pay attention when
   referencing the display of figures since the "half-tone display" cannot be
   printed on the screen which is output by a video plotter (as shown in
   Figure 2-11).
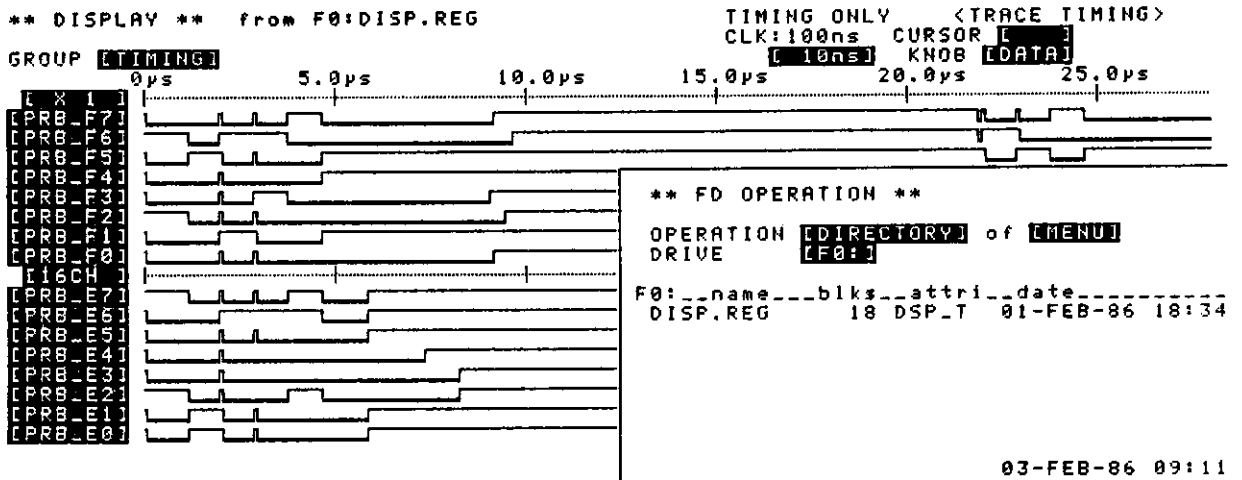
Figure 2-11   FD Menu Screen

2.5 INPUTTING DATA TO MENU ITEMS

The menu display corresponding to keys of MENU and I/O key groups can be
displayed by pressing the key accordingly.

More than one menu items are presented on the menu display. The menu
display corresponding to the MENU key group is called main menu display.
The menu display corresponding to the I/O key group is called sub-menu
display. The sub-menu display can be called or deleted at any time to the
main menu display (when deleting, press any key of the MENU key group or
[STOP]). The main menu display becomes half-tone display when the sub-menu
display is called. Try to enter keys to actually understand their
functions. The four basic rules for inputting data to the menu items are
as follows:

● The menu item for data inputting is displayed inversely.
● The menu item (input prompt) for inputting data (currently permitted) by
  pressing the ENTRY key is displayed by inverse blink display.
● Input prompt can be moved by [↑][↓][←][→] or [□] .
● The menu item enclosed in brackets can be selected by the SELECT key.

(1) The menu item enclosed in brackets:
     For the menu item enclosed in brackets, data is input by pressing SELECT

     ([MX] , [MV]) key to select from the chain data group. The data group

     is selected in due order with [MX] key; in inverse order with [MV] key.

Pay attention that the same menu item of the selectable data group can be
different according to the ambient conditions. The selection range of the

data group can be referenced beforehand with [MX] (refer to item (1) of
Section 2.6).
No syntax error will occur with the data input by SELECT key, thus this
method is adopted by the TR4725 as much as possible. The normal display
enclosed in brackets are also menu items. However, data input is not
allowed because of only one menu item selection.
This inputting method is adopted for most of menu items in DISPLAY menu
screen.
Try to observe how the display can be changed for the data group in the
GROUP or RADIX menu item pressing [MX] .

(2) The menu items not enclosed in brackets:
   For menu items that are not enclosed in brackets, data can be input by
   pressing any ENTRY keys other than the SELECT key.
   These menu items are designed for defining GROUP, SYMBOL, and CODE names
   (these are for the state analysis section only) or calling/storing file
   name and require numeric values of binary, octal, decimal, and
   hexadecimal. The initial character (or digit) of each menu item becomes

   the input prompt when the input prompt item is moved by ⬆⬇⬅➡. Next,

   the system is set to NIBBLE mode by entering either 🔲 or input data of
   one character (or one digit). When ⬅ or ➡ is pressed, input prompt can
   shift one character (or one digit) at a time (LED of NIBBLE key is lit).
   When data of full character (or full digit) is input, NIBBLE mode is
   released and the input prompt is moved to the next menu item (menu item of
   the right on the same line or the left end on the next line). For the
   menu item such as the one selected by GET/SAVE key (requesting file name)
   which can only enter one character at a time, NIBBLE mode is automatically
   set and the LED of the key is lit.

   As an example of the above data entry method, label names may be entered
   into the timing—only analyzer. First, press 🔲 . Then, the menu
   display for label name appers on the screen. This menu display data field
   can accept a label name of up to 6 characters. After the name is entered,
   press 🔲 . Pressing 🔲 indicates that the label name entered in
   the CONFIG menu display has been used as a signal name of the
   corresponding channel.

   No explanation of the menu display of SYMDEF (not used for timing only
   analyzer) or PROGRAM key that execute a line of the menu items is given in
   this section.

2.6 USE OF HELP KEY

[HELP] assists the user by providing useful information for operating this

personality kit. It has two functions: HELP (menu item) and HELP (key).
HELP (menu item) displays the data input related information (an
active-type of information which changes with the measuring conditions) to
each menu item. For the menu item which uses the SELECT key, the

selectable data group when [MEN] / [PREV] is pressed is displayed.

HELP (key) displays the key-related information (a static-type of
information which does not change with the measuring conditions) which
includes basically the key function summary, the summary of the related
key functions, and the index to the instruction manual.

The operating method for each function differs.

(1) HELP (menu item) function
This function is available whenever the data input to the menu item is

possible (system disk is not necessarily required). When [HELP] is
pressed and then released, the HELP screen is displayed on the lower right

or lower left of the CRT display avoiding the input prompt menu items.
The examples are shown in Figures 2-12 and 2-13.
The HELP screen can be deleted by pressing any key including the scroll
knob. However, whichever key is pressed, its function remains valid (for
instance: when the ENTRY key is pressed, data input is executed. Turning
the scroll knob can delete HELP screen without affecting the main menu
screen). Test the HELP function in DISPLAY menu screen.

```
** DISPLAY **    from F0:DISP.REG        TIMING ONLY     <TRACE TIMING>
                                         CLK:100ns   CURSOR [       ]
GROUP [TIMING]                              [ 10ns]   KNOB [DATA]
          0µs          5.0µs      10.0µs   15.0µs     20.0µs      25.0µs
[ X 1 ]
[PRB_F7]
[PRB_F6]
[PRB_F5]
[PRB_F4]
[PRB_F3]
[PRB_F2]
[PRB_F1]
[PRB_F0]
[16CH ]
[PRB_E7]
[PRB_E6]
[PRB_E5]
[PRB_E4]                                  [NEXT]:→[ X 2 ]→[ X 5 ]→[ X 10]→[X1/10]→
[PRB_E3]                                  [PREV]:→[X 1/2]→[X 1/5]→[X1/10]→
[PRB_E2]                                  T
[PRB_E1]                                  0 ━━━━━━━━━━━━━━━━━━━━━━━━━━ 2K
[PRB_E0]

                                         ◆scroll    03-FEB-86  09:14
```
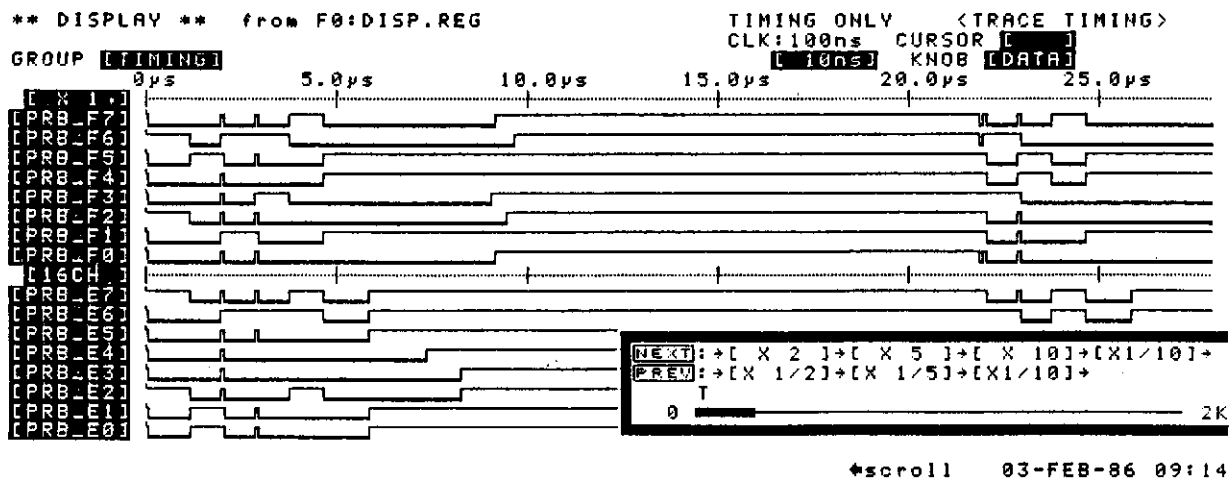
Figure 2-12 HELP (Menu Item) Function Display Example (1)
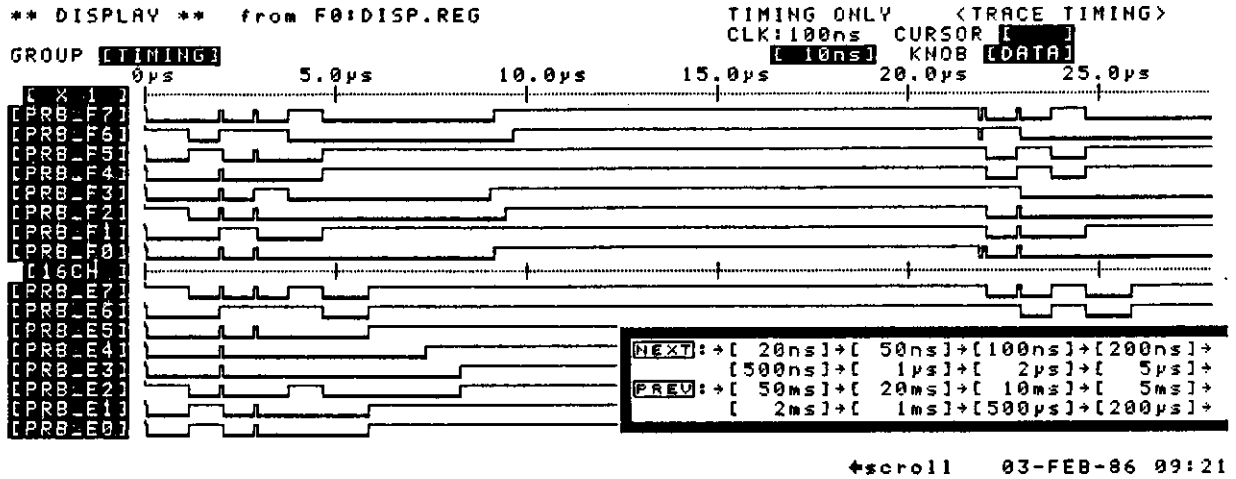
Figure 2-13   HELP (Menu Item) Function Display Example (2)

(2) HELP (key) function
This function is available only when the system disk is installed in the floppy disk drive and the system is under the key entry enabled state. The HELP screen is displayed on the right or the left side of the CRT

avoiding the menu item of the input prompt when [HLP] is pressed along

with other desired function key. The display examples are shown in Figure 2-14 and 2-15.
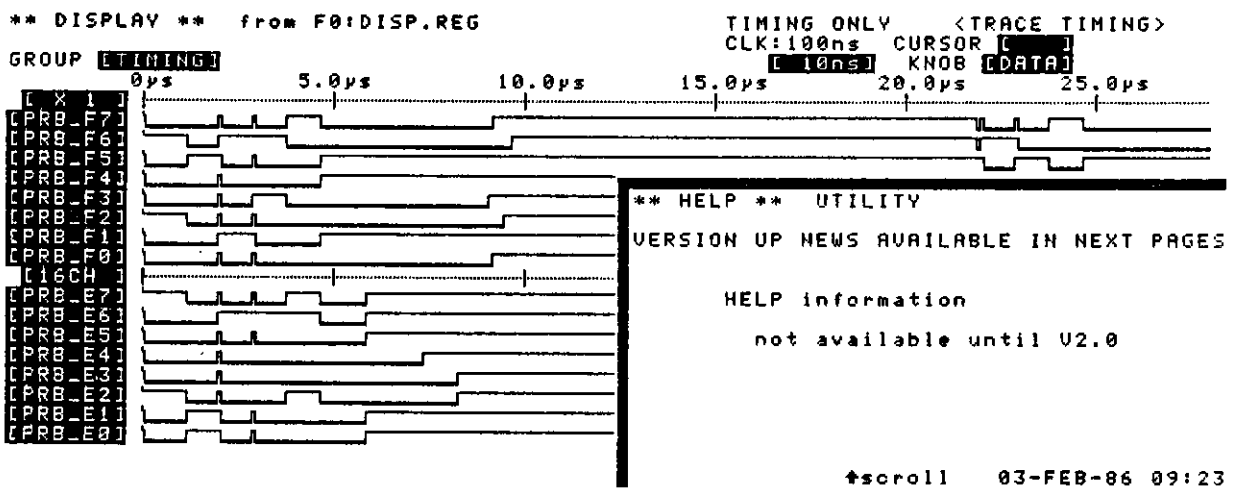
Figure 2-14 HELP (Key) Function Display Example (1)

```
** CONFIGURATION **                                    TIMING ONLY    <TRACE TIMING>

-LABEL-
     PROBE              ┌─PROBE_F─┐                    ┌─PROBE_E─┐
     DATA CHANNEL        7654 3210                      7654 3210
                         ↓↓↓↓ ↓↓↓↓                      ↓↓↓↓ ↓↓↓↓
     THRESHOLD          [TTL] [TTL]                     [TTL] [TTL]
     LABEL    POL        ││││ ││││        LABEL   POL   ││││ ││││
** HELP **  UTILITY                               [+]◄──────┘│││ ││││
                                                  [+]◄───────┘││ ││││
VERSION UP NEWS AVAILABLE IN NEXT PAGES           [+]◄────────┘│ ││││
                                                  [+]◄─────────┘ ││││
                                                  [+]◄───────────┘│││
     HELP information                             [+]◄────────────┘││
                                                  [+]◄─────────────┘│
        not available until V2.0                  [+]◄──────────────┘

                                                  []

                                                  []

            ↑scroll                                            03-FEB-86 09:25
```
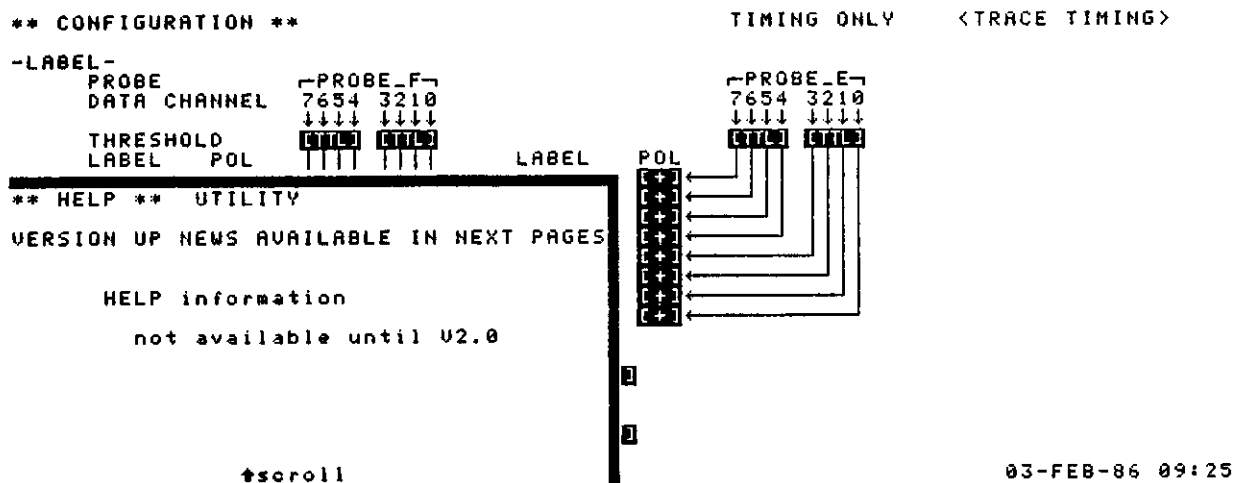
Figure 2-15   HELP (Key) Function Display Example (2)

When the scroll mark is displayed on the bottom line of the CRT, it
indicates that the further data exist.   The latest data can be displayed

by turning the scroll knob or pressing PAGE [↑], [↓] Keys.

Pressing any key, other than the scroll knob, can delete the HELP (key)
screen.   However, the EDIT and ENTRY keys can only be used to delete the
screen, and the original key function becomes invalid.
The information displayed by the HELP (key) function and the currently
displayed menu screen are not directly relates.   Data is read and
displayed from the system disk onto the HELP (key) screen, so the system
disk must be installed in the floppy disk drive.   When the system disk is
not installed and this function is attempted to activate, the message as
shown in Figure 2-16 is displayed.   Test this function.
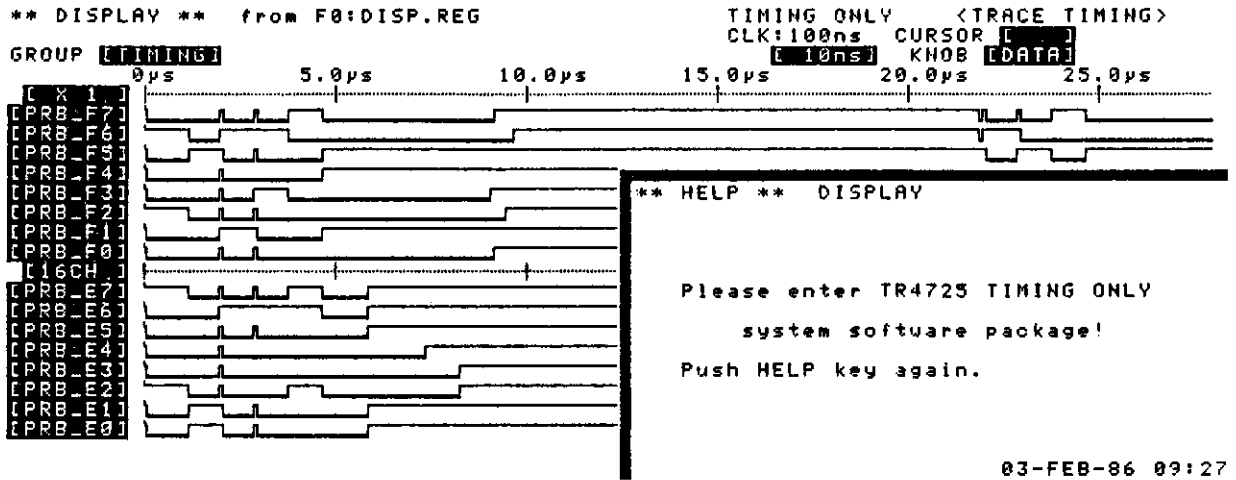
Figure 2-16   Screen Requesting System Disk Insertion by
the HELP (Key) Function

Screens are configured from combination of main menu, sub-menu, HELP (menu
item), and HELP (key) screens and the attached screen other than the main
menu screen can be deleted completely by pressing [sʀᴏᴩ] .

2.7 USER DISK PREPARATION

The explanations of the previous sections are for actually operating the
Personality Kit by its system disk, while this section deals with storing
the measuring conditions, measured data, and programs on the user disk.
The user disk is prepared by using the operation examples in Chapter 3.
Disk formatting is required for preparing a user disk from a blank one.
Remove the used system disk from the floppy disk drive and replace it

with a blank disk. Press [ⁱᵃ] and then [ᴹᴬⁱⁱ] four times, and the screen

as shown in Figure 2-17 will appear.

```
** DISPLAY **  from F0:DISP.REG          TIMING ONLY    <TRACE TIMING>
                                         CLK:100ns  CURSOR [     ]
GROUP [TIMING]                             [ 10ns]  KNOB [DATA]
        0ps        5.0ps      10.0ps     15.0ps      20.0ps      25.0ps
[ X 1 ]
[PRB_F7]
[PRB_F6]
[PRB_F5]
[PRB_F4]
[PRB_F3]                                 ** FD OPERATION **
[PRB_F2]
[PRB_F1]                                 OPERATION [FORMAT    ]
[PRB_F0]                                 DRIVE     [F0:]
[16CH ]                                  DESCRIPTION
[PRB_E7]
[PRB_E6]
[PRB_E5]
[PRB_E4]
[PRB_E3]
[PRB_E2]
[PRB_E1]
[PRB_E0]
                                                    03-FEB-86 09:31
```
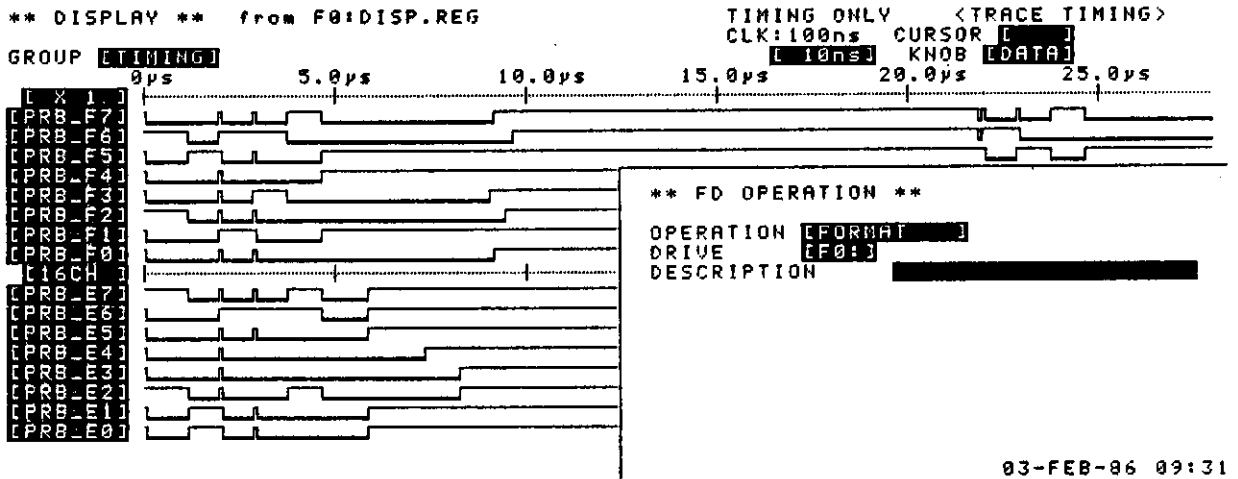
Figure 2-17 Disk Format

Next, press [↓] twice to move the input prompt to the menu item
"DESCRIPTION" and input characters of less than 20 character long (For
instance: "MY DISK"). Then, press [ⁱᵃ] . The screen will ask "FORMAT?".
Press the green key on the bottom right corner of the front panel and then
[²] to start formatting. When the screen as shown in Figure 2-18
appears, it indicates the end of formatting. (The green key is the shift
key, and "Y" is entered by the operations described above.)

Figure 2-18 Display at the End of Disk Formatting

Press [⌐] and then press [SAVE] twice, and the data that is currently

displayed on the screen is written into the disk.

When [FD] is pressed twice consecutively, the file names stored in the
user disk is read. The file that was written just now should bear the
file name DISP.S1 (the name is automatically named by the TR4725).

Perform the following procedures to call the file. Press [GET] and turn

the scroll knob clockwise, and the file bearing the DISP.S1 will appear in

the file name menu item. Next, again press [SAVE] and the file read from

the user disk is displayed on the CRT. The fact that the displayed data
belongs to the file named DISP.S1 is displayed on the first line of the
CRT.

To delete the file, press [FD] and then press [GET] twice, and the

command "PURGE" will appear. Move the input prompt to the menu item
"NUMBER OF DELETED FILE" and set the numeric data of "01" with the SELECT
key.

Then press [FD] to start the execution of PURGE to delete the file. Any
blank disk which is 3.5 inches, 80 tracks and dual side - double density
is applicable, no matter what brand. (For instance: the OM-D4440 model
of SONY, or the ADVANTEST A09502 model with a set of ten disks).

2.8 PANEL DESCRIPTIONS

This section gives a general description of the TR4725. The first-time
users of TR4725 do not need to read this section thoroughly. For better
understanding of this section, refer to Figures 2-19 and 2-20.

-- Front panel --

(1) MENU key group
    Pressing a key in this group displays the main menu on the CRT. Pressing
    one during measurement execution interrupts the system's operation and
    displays the specified menu on the CRT.
    Pressing one during I/O operation displays the specified menu on the CRT
    after preserving the data under execution. The CONFIG menu is
    automatically displayed on the CRT immediately after the system software
    loading.

    TRACE key   :   Pressing this key displays the TRACE menu on the CRT. The
                    TRACE menu selection sets various trace conditions.

    DISPLAY key: Pressing this key displays the DISPLAY menu on the CRT.
                    This DISPLAY menu selection displays measurement data in
                    various formats.

    CONFIG key :   Pressing this key displays the CONFIG menu on the CRT. This
                    CONFIG menu selection makes up the measurement input
                    channels. The state analysis section groups the input
                    channels and defines its input group name.

    SYMDEF key :   Pressing this key displays the SYMDEF menu on the CRT. This
                    SYMDEF menu selection defines symbols or codes for every
                    input group.

    PROGRAM key: Pressing this key displays the PROGRAM menu on the CRT.
                    This PROGRAM menu selection creates command files in which
                    measurement procedures, etc. are written.

    UTILITY key: Pressing this key displays the UTILITY menu on the CRT.
                    This UTILITY menu selection sets the internal calendar
                    clock, etc.

(2) EDIT key group
    This key group edits a menu item in the menu screen displayed on the CRT.
        and [↑][↓] :   Pressing these keys moves the input prompt to a menu item
                       field to the other menu item fields above and below the
                       original field.
        and [←][→] :   Pressing these keys moves the input prompt which is
                       positioned in a menu item field to the other menu item
                       fields on the left or right side of that original field.
                       When the system is set in the NIBBLE mode, these keys can
                       move the input prompt positioned in a menu item field to the
                       left and right within the same menu item field, digit by
                       digit.

NIBBLE key : Pressing this key sets the ⊟ , ⊟ keys in the NIBBLE mode, or releases them from being set in the NIBBLE mode.
Setting NIBBLE mode lights the LED on this key.
Note that this NIBBLE mode is automatically set according to the menu item selection. In this case, the LED is also turned on.

INSERT and DELETE keys: Pressing these keys inserts or deletes data line by line when the SYMDEF and PROGRAM menus are

displayed on the CRT. The ☐ key is provided

with the function that alters the data display for the state analysis and timing analysis.

DEFAULT key: Pressing this key returns each menu screen to the initial display.

(3) ENTRY key group
This key group enters data in each menu item field. These menu item fields are made to accept data entries with the SELECT key.
When used with the green shift key, this key group can enter alphabetical characters. When the LED on the shift key is on, the green characters printed beneath each key can be entered in the data fields.

NEXT and PREV keys : Pressing these SELECT keys select data among several data groups in a menu item

which is enclosed by parentheses. ☐

selects data group in a sequential order

circularly; ☐ selects in the reverse order.

0 thru 9, and A thru F keys : Pressing these keys enter binary, octal, decimal, and hexadecimal numeric data.

A thru Z keys : Pressing these keys enter alphabetical characters.

SPACE key : Pressing this key enters a "space" character. Note that this "space" is handled as a normal character if used for the file name to be defined in the TR4725 system.

. key : Pressing this key enters a "period". A "period" is used to separate the extension from its file name.

DON'T CARE key : Pressing this key enters a number called "don't care number" which regards a certain digit in binary, octal, or hexadecimal number as a specified number.

+/- key   : Pressing this key inverts a positive numeric into a negative
                one, and vice versa. Note that this numeric must be one to
                be entered in a menu item field. (That is, its absolute
                value does not exceed the defined upper/lower limits.)

(4) EXECUTE key group
     This key group starts and stops the measurement operation.
     RUN key   : Pressing this key starts the measurement execution based on
     [RUN]   the trace condition which is set on the TRACE menu screen.

     AUTO key: Pressing this key starts the measurement execution according to
     [AUTO]   the sequence of command file created at the PROGRAM menu screen.
     STOP key: Pressing this key forcibly stops the measurement execution, and
     [STOP]   also erases the sub-menu and HELP screens from the CRT.

(5) SCROLL key group
     This key group scrolls the menu screen up and down, and to the left and to
     the right.
     Scroll knob: Turning this scroll knob manually scrolls up and down, and
                   to the left and to the right.
     PAGE keys   : Pressing these PAGE keys scroll page by page.

(6) I/O key group
     This key group displays the sub-menu screen on the CRT to operate I/O
     devices, and executes their operations.
     When a sub-menu screen appears on the CRT, the main menu screen disappears
     in the half tone mode, and data entries are temporarily disabled.
     FD key   : Pressing this key operates both the built-in and external
     [FD]   3.5-inch. microfloppy disk drive units. This key is now
                    provided with eight functions: DIRECTORY, REGISTER, PURGE,
                    DELETE, FORMAT, RENAME, COPY, and STATUS.
                    This FD key can be used on all main menu screens other than
                    on the UTILITY menu screen.
                    Pressing this key, when data entries in the main menu screen
                    are enabled, displays the sub-menu screen on the CRT. When
                    the system is set in a mode, the main menu screen is set in
                    the half tone display mode, and after this, the sub-menu
                    screen accepts data entries instead.
                    Pressing the FD key after this executes the sub-menu screen
                    commands.
     GET key   : Pressing this key reads a file in the floppy disk, and
                    displays it on the main menu screen.
     [GET]   This key is also provided with a function as an execution
                    key.
                    Pressing this key twice consecutively enables the QuickGET
                    function for a specific file (the registered file).

SAVE key   : Pressing this key writes a data displayed on the main menu
[SAVE]   screen into a file in the floppy disk.
                This key is also provided with a function as an execution
                key. Pressing this key twice consecutively enables the
                QuickSAVE function for a specific file (the system saved
                file).

COMM key   : Pressing this key communicates with the external computer
[COMM]   and terminal devices. This key is also provided with a
                function as an execution key.

(7) HELP key [HELP]
    This key is used as a TR4725 operation quick guidance, and is used at any
    time other than during measurement and I/O executions. It is used to
    refer to the key function reference table, and to refer to the selectable
    data group at the menu item.

(8) 3.5-inch. microfloppy disk drive
    Used as an auxiliary memory of TR4725. The dual sided double density
    floppy disk capacitance is 1MB when unformatted. The capacitance after
    being formatted is 632.5KB if unused. (1KB equals 1024 B.)
    After power is supplied, this disk drive is also used for the TR4725
    system software loading operation.

(9) POWER switch
    Supplies AC power to the entire TR4725 system. Setting ON supplies AC
    power, and at the same time, operates the "self-diagnostics function" to
    confirm the correct operation of TR4725. Setting OFF disconnects AC power
    immediately.

(10) KEYBOARD connector
     Connects the accessory ASCII keyboard to the TR4725. The keyboard power
     source is also supplied through this connector.

-- Rear panel --

(11) RS-232C connector
     Used to perform a serial communication with the external computers, and
     the terminals. The signals conform to the RS-232C standards.

(12) AUX FDU connector
     Connects the TR4725 with the optional 3.5-inch. microfloppy disk drive
     units.

(13) PROBE TEST connector
     Used to perform the general-purpose and microprocessor probe testing. To
     perform testing, the probe test adapter conforming to each probe is
     required.

(14) VIDEO OUT connector
     Connects the TR4725 with the video plotter and the video display unit.
     The signal level conforms to the RS-170 standards.

(15) TRIG OUT (SYNC) connector
     Outputs the trigger pulses output at the state analysis section. Can be
     used as the trigger pulse to the other logic analyzer and oscilloscope.

(16) TRIG OUT (ASYNC) connector
     Outputs the trigger pulses generated at the timing analysis section. Can
     be used as the trigger pulse to be sent to the other logic analyzer and
     oscilloscope.

(17) Probe slot A
     Used to connect the TR4725 with the general-purpose and microprocessor
     probes.

(18) Probe slot B
     Used to connect the TR4725 with the general-purpose and microprocessor
     probes.

(19) Probe slot C
     Used to connect the TR4725 with the general-purpose and microprocessor
     probes.

(20) Problem slot D
     Used to connect the TR4725 with the general-purpose and microprocessor
     probes.

(21) Probe slot E (option)
     Used to connect the TR4725 with the data acquisition probe E when using
     the optional timing analysis section.

(22) Probe slot F (option)
     Used to connect the TR4725 with the data acquisition probe F when using
     the optional timing analysis section.

(23) Cable holder
     Used to hold the probe cables.

(24) Fuse holder
     Contains 7 A slow-blow fuse (standard). To replace a fuse, remove the
     power cable, slide the fuse plastic cover to the left, and pull the lever
     on which FUSE PULL is inscribed.

(25) GND terminal
     Is a grounding terminal. When using the power cable with as supplied 3-2
     prong conversion adapter, ground the lead connected to the adapter or this
     GND terminal to the earth.
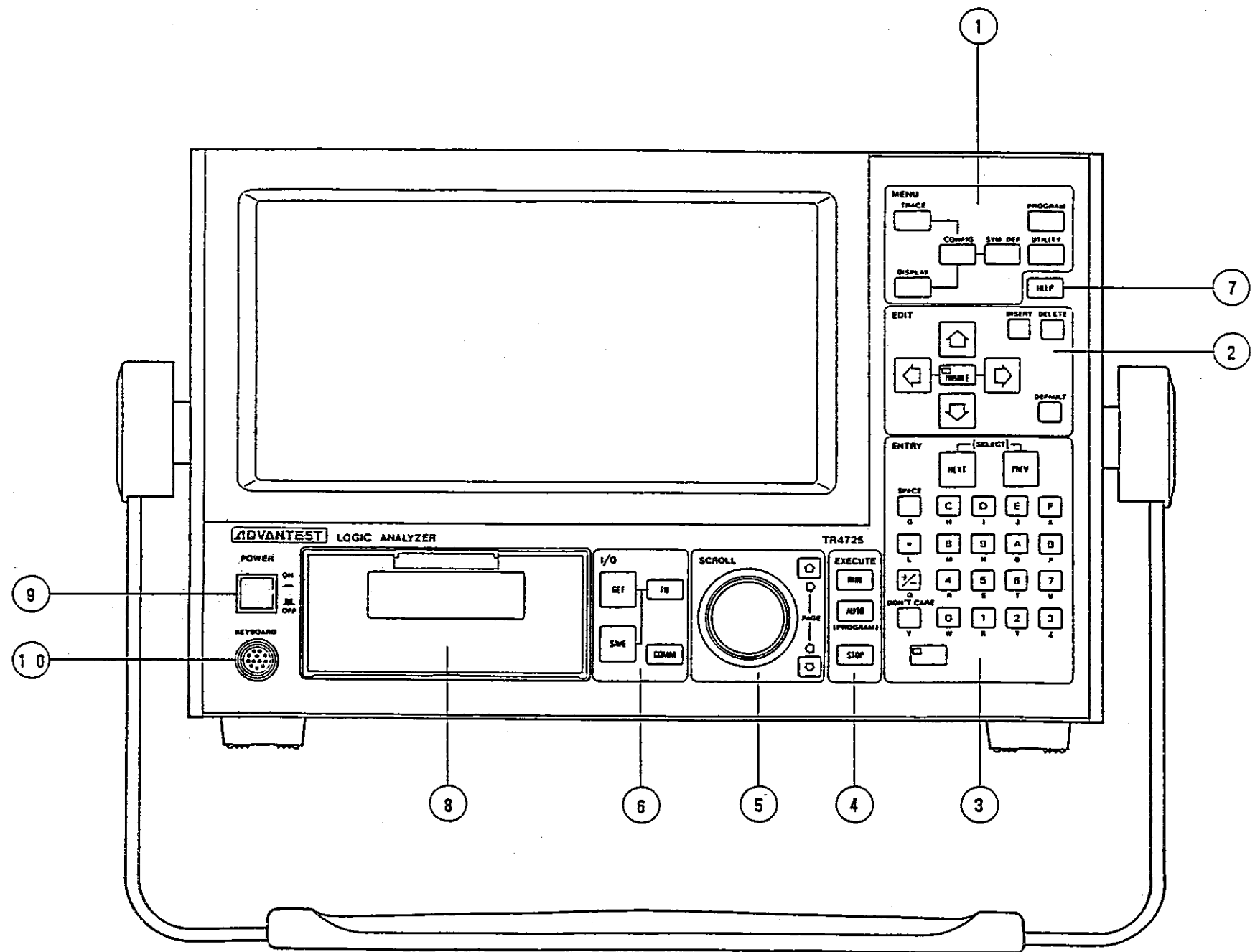
Figure 2-19 Front Panel Descriptions
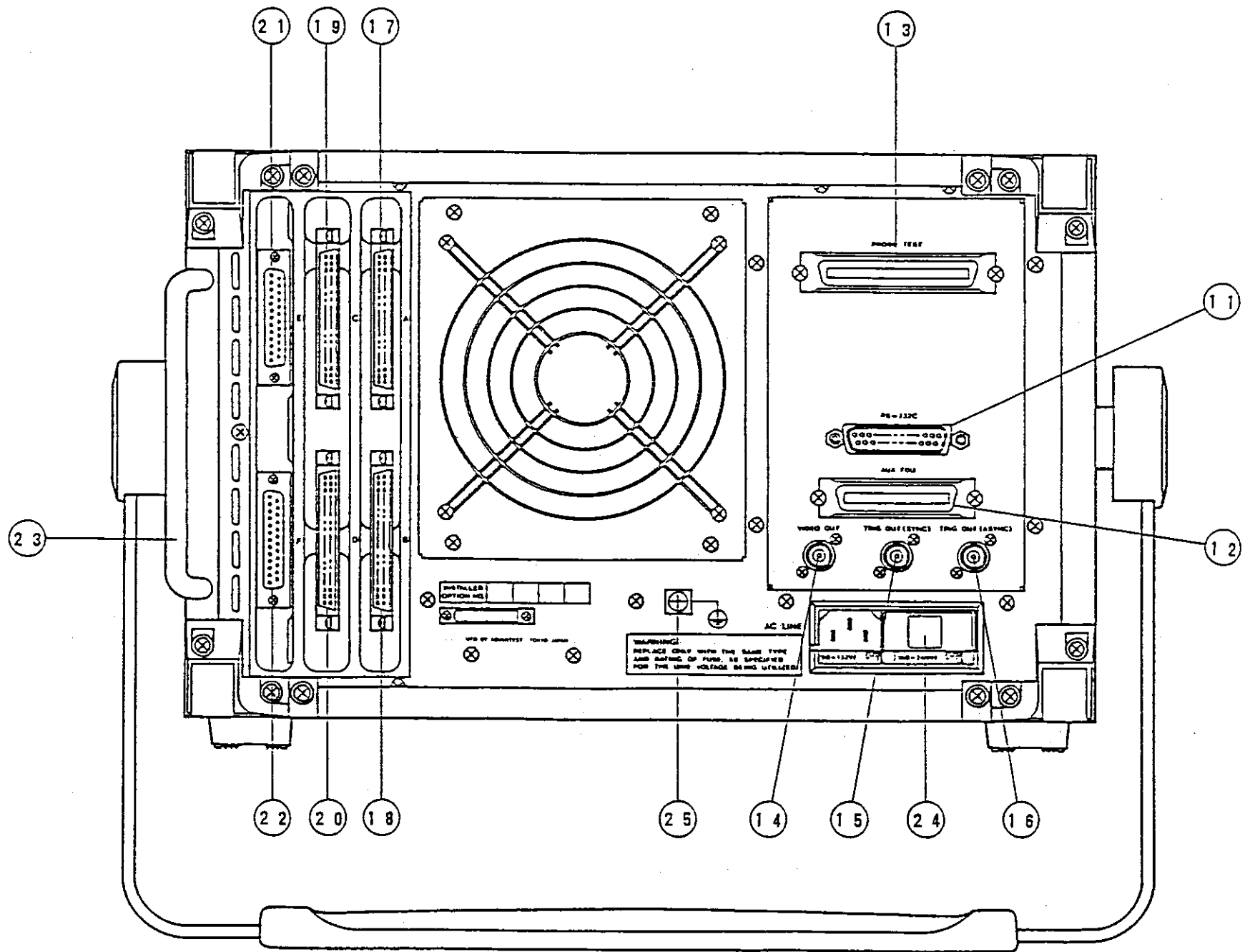
Figure 2-20 Rear Panel Descriptions

3. EXAMPLES OF OPERATION (TIMING-ONLY ANALYZER)

3.1 PURPOSE OF THIS CHAPTER

This chapter presents some examples of the timing-only analyzer operation to the first-time users to give them an immediate understanding of how to operate this unit.

This chapter need not be read by those using the TR4725 as a state-only analyzer or an S & T analyzer; they should read Chapter 3 in the PK instruction manual instead.

Chapters 4 to 6 detail the main procedures to operate the TR4725, but users do not have to read these chapters beforehand. They are advised to use the target sections in these chapters as reference materials, looking up the examples below when necessary.

The operating method of TR4725 is based on simple, coherent rules, thus enabling certain kinds of operations by analogy. The following examples are intended to help the users to understand the relationships among the individual functions described in Chapters 4 to 6. It is recommended that users follow the descriptions, actually press the keys, and try as many operations as possible.

3.2 SIMPLE EXAMPLES

First, connect the probes E/F (see Section 2.2), and perform the system
software loading.

In response to this, the message, ** CONFIGURATION ** appears on the CRT.

Next, enter an appropriate signal (TTL level signal is recommended) to the
probe F channel number 7. Then, press [**] to display the signals on the
top channel (label name PRB_F7), as shown in Figure 3-1. The sampling
clock at this time is 10 ns (100 MHz).

```
** DISPLAY **   from ACQ_MEM                    TIMING ONLY    <TRACE TIMING>
                                                CLK: 10ns   CURSOR [      ]
GROUP [TIMING]                                     [ 10ns]  KNOB [DATA]
        0ns          500ns          1.00µs     1.50µs         2.00µs       2.50µs
[  X  1 ]
[PRB_F7]
[PRB_F6]
[PRB_F5]
[PRB_F4]
[PRB_F3]
[PRB_F2]
[PRB_F1]
[PRB_F0]
[16CH. ]
[PRB_E7]
[PRB_E6]
[PRB_E5]
[PRB_E4]
[PRB_E3]
[PRB_E2]
[PRB_E1]
[PRB_E0]
                                                    +scroll   03-FEB-86 09:41
```
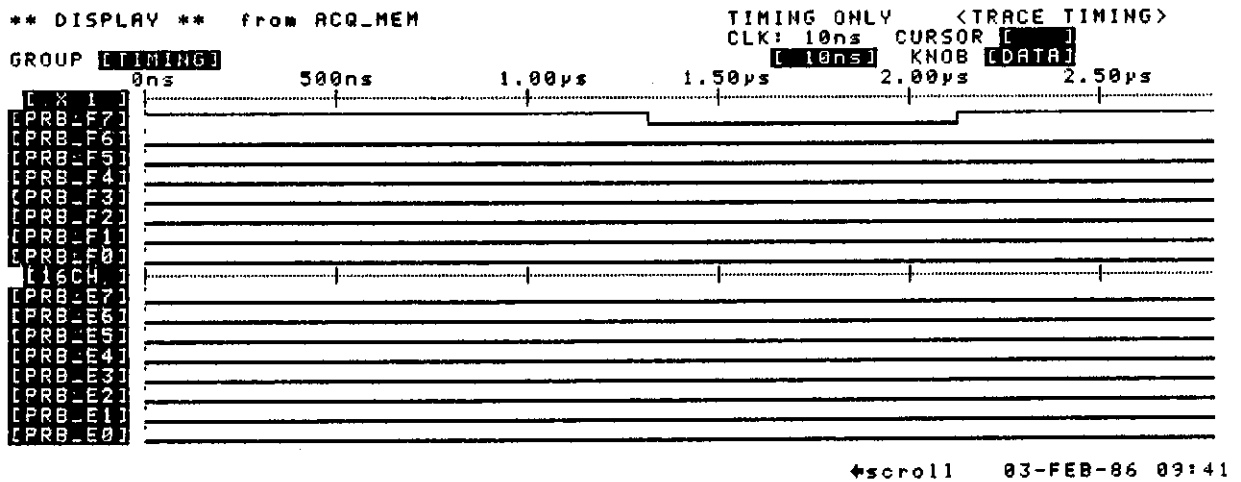
Figure 3-1   Example of Measurement (Sampling Clock: 10 ns)

Sufficient alteration may not appear depending on the input signal. Press
[ ] to move the input prompt to the sampling clock menu item. Then, press

[**]   to change the sampling clock. (Press [**]   three times to set the

clock to 100 ns.) Next, press [**] to display data ten times as minutely
as the data in Figure 3-1, as illustrated in Figure 3-2.

```
** DISPLAY **  from ACQ_MEM                    TIMING ONLY    <TRACE TIMING>
                                               CLK:100ns   CURSOR [      ]
GROUP [TIMING]                                     [100ns]   KNOB [DATA]
         0µs         5.0µs        10.0µs       15.0µs      20.0µs      25.0µs
[ X  1.]
[PRB_F7]
[PRB_F6]
[PRB_F5]
[PRB_F4]
[PRB_F3]
[PRB_F2]
[PRB_F1]
[PRB_F0]
[16CH.]
[PRB_E7]
[PRB_E6]
[PRB_E5]
[PRB_E4]
[PRB_E3]
[PRB_E2]
[PRB_E1]
[PRB_E0]
                                              ←scroll   03-FEB-86 09:43
```
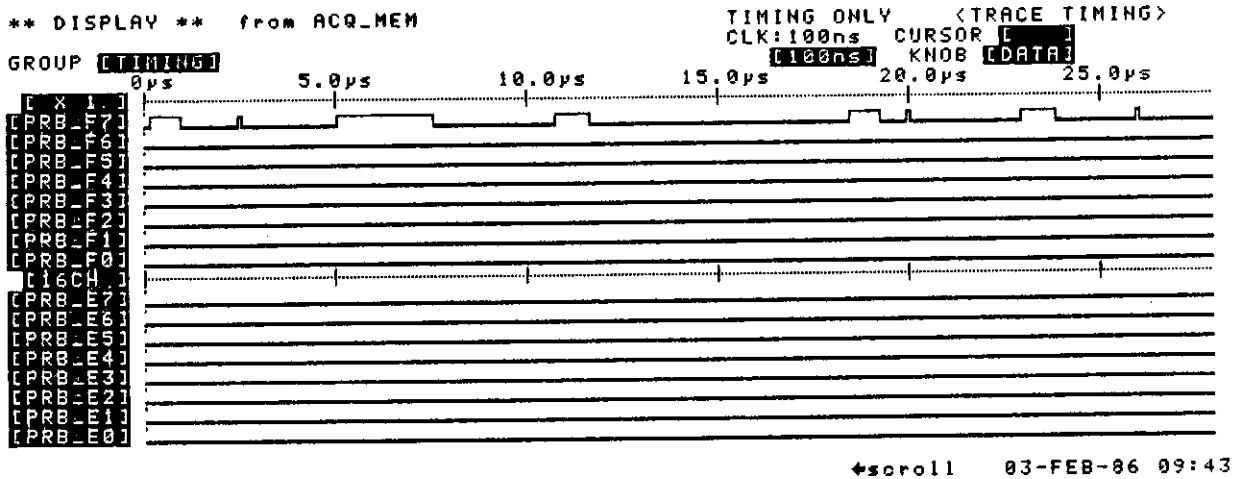
Figure 3-2 Example of Measurement (Sampling Clock: 100 ns)

Press [••] several times. Note that, in this state, the display start
point of the input signals cannot be presumed. Next, turn the scroll knob
(clockwise to move data to the left; counterclockwise to move data to the
right).

Then, press [↓] to move the input prompt to the [x 1] (time axis

magnification ratio) menu item field. Then, press [×n] or [n×] to

change the time axis magnification ratio. "x n" magnifies the time in the
time axis. "x 1/n" reduces the time in the time axis. In particular, "x
1/10" displays all the data in the acquisition memory (16 ch. x 2048
sampling) on the CRT.

Then, press [⌐] to move the input prompt to the [PRB_F7] menu item

field. To input "DATA", use the character keys in the ENTRY key group.
(See Figure 3-3.) Note that the user should use the shift key (green key)

at the same time. Then, press [⌐] to display [DATA] into which the

label name [PRB_F7] has been changed, as shown in Figure 3-4. This
function is very useful for data analysis operation.

```
** CONFIGURATION **                              TIMING ONLY    <TRACE TIMING>
-LABEL-
        PROBE            ┌PROBE_F┐               ┌PROBE_E┐
        DATA CHANNEL     7654 3210               7654 3210
                         ↓↓↓↓ ↓↓↓↓               ↓↓↓↓ ↓↓↓↓
        THRESHOLD        [TTL] [TTL]             [TTL] [TTL]
        LABEL   POL                     LABEL    POL
        DATA_   [+]                     PRB_E7   [+]
        PRB_F6  [+]                     PRB_E6   [+]
        PRB_F5  [+]                     PRB_E5   [+]
        PRB_F4  [+]                     PRB_E4   [+]
        PRB_F3  [+]                     PRB_E3   [+]
        PRB_F2  [+]                     PRB_E2   [+]
        PRB_F1  [+]                     PRB_E1   [+]
        PRB_F0  [+]                     PRB_E0   [+]

-VARIABLE THRESHOLD-
        V3 = [    1.4V]          V4 = [  -1.3V]

-SAMPLING-
        CLOCK RATE [100ns]      MODE [SAMPLE]

                                                        03-FEB-86 09:47
```

Figure 3-3   Example of Label Name Definition
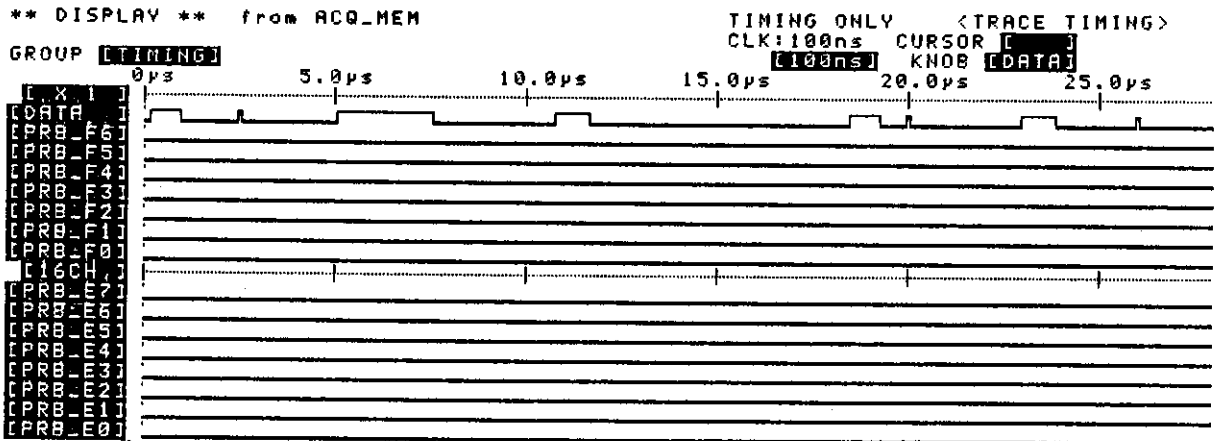
```
** DISPLAY ** from ACQ_MEM                   TIMING ONLY    <TRACE TIMING>
                                             CLK:100ns  CURSOR [      ]
GROUP [TIMING]                                   [100ns]   KNOB [DATA]
        0µs         5.0µs       10.0µs      15.0µs      20.0µs      25.0µs
[ X ]
[DATA ]
[PRB_F6]
[PRB_F5]
[PRB_F4]
[PRB_F3]
[PRB_F2]
[PRB_F1]
[PRB_F0]
[16CH ]
[PRB_E7]
[PRB_E6]
[PRB_E5]
[PRB_E4]
[PRB_E3]
[PRB_E2]
[PRB_E1]
[PRB_E0]

                                             ↑scroll    03-FEB-86 09:48
```

Figure 3-4   Example of Label Name Usage

First, it is important for the user to try various operations on the
DISPLAY menu screen to be fully familiarized with its functions and
results. With this DISPLAY screen, the user can perform all operations

using ⬆ , ⬇ , ⬅ , ➡ , [▥] , and [▥] . See the appropriate part in

Section 4.7.1 for the screen display format and its functions, and the
menu item functions; Section 4.7.2 for data scrolling, Section 4.7.3 for
cursor manipulation (two cursors A and B can be used at the same time),
Section 4.7.4 for time axis magnification and reduction which were
explained previously, and Section 4.7.6 for the relationship of displayed
data with acquisition memory. For the screen that appears by pressing

[▥] , see Section 4.2.3 for practice.

Next, press   [▥] , and then press ➡ repeatedly to move the input prompt

to the TRIG_T field. Press [·] to set "1" at the position which
corresponds to "DATA", as shown in Figure 3-5. Then, press [▥] to
display the screen as shown in Figure 3-6. After this, the initial
display will be set at H level even if [▥] key is pressed repeatedly.
This condition is defined as "triggered". The trigger point on the screen
is always handled as the first data on the screen (displayed as 0 ns in
the time axis).

```
** TRACE SPECIFICATION **                    8086/MAX/QUEUE <TRACE TIMING>
[ TRACE  TIMING   ]----------------------------------------------QuickVIEW [OFF]
          LABEL          ENBL_T  TRIG_T
                                             .CLOCK RATE [100ns]
     DATA   (PRB_F7)    █          █
     PRB_F6 (PRB_F6)    █          █        DELAY = [+0000] (0µs)
     PRB_F5 (PRB_F5)    █          █
     PRB_F4 (PRB_F4)──  █   ────── █
     PRB_F3 (PRB_F3)    █          █
     PRB_F2 (PRB_F2)    █          █
     PRB_F1 (PRB_F1)    █          █
     PRB_F0 (PRB_F0)──  █   ────── █
     PRB_E7 (PRB_E7)    █          █
     PRB_E6 (PRB_E6)    █          █
     PRB_E5 (PRB_E5)    █          █
     PRB_E4 (PRB_E4)──  █   ────── █
     PRB_E3 (PRB_E3)    █          █
     PRB_E2 (PRB_E2)    █          █
     PRB_E1 (PRB_E1)    █          █
     PRB_E0 (PRB_E0)──  █   ────── █

                                             03-FEB-86 15:16
```

Figure 3-5 Example of Trigger Pattern (TRIG_T) Setting

```
** DISPLAY **  from ACQ_MEM                    TIMING ONLY    <TRACE TIMING>
                                               CLK:100ns  CURSOR [    ]
GROUP [TIMING]                                    [100ns]  KNOB [DATA]
        0µs          5.0µs        10.0µs       15.0µs      20.0µs      25.0µs
[ X 1 ]
[DATA   ]
[PRB_F6]
[PRB_F5]
[PRB_F4]
[PRB_F3]
[PRB_F2]
[PRB_F1]
[PRB_F0]
[16CH ]
[PRB_E7]
[PRB_E6]
[PRB_E5]
[PRB_E4]
[PRB_E3]
[PRB_E2]
[PRB_E1]
[PRB_E0]
```

                                              ←scroll   03-FEB-86 09:52
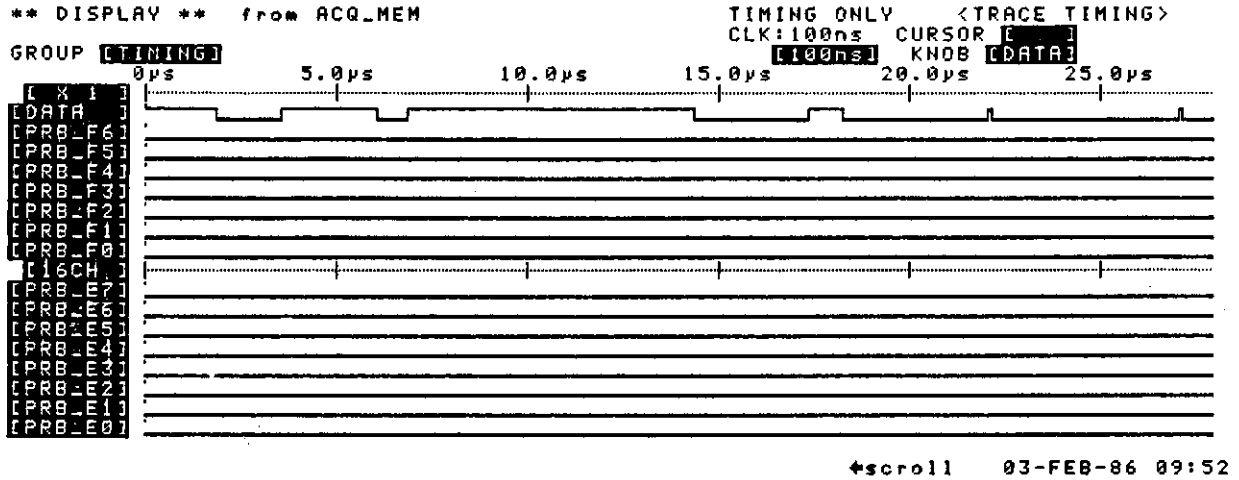
Figure 3-6   Example of Measurement by Trigger Pattern Setting

Press [TRACE] again to set 0 in ENBL_T, and -0001 in DELAY. Then, press

[RUN] to set the screen as shown in Figure 3-7. In this case, the trigger
point can be observed more clearly.

Figure 3-7 Example of Delay Usage

For the screen that appears by pressing ⌷ , see Section 4.4.3 for

practice. The user can master the basic operations by trying all the
examples given in this section.

3.3 FLOPPY DISK APPLICATIONS

When the TR4725 POWER switch is turned OFF, both the data set in menu item fields on each menu screen at Section 3.2 and the measured data are all erased. To use the data above repeatedly, the user is advised to store them on the floppy disks. The TR4725 disk file operation can be done easily, unlike that for general-purpose computers such as personal computers.

See Section 4.2.4 for file processing concerned with the screen operation by the CONFIG key.

See Section 4.4.5 for file processing concerned with the screen operation by the TRACE key.

See Section 4.7.5 for file processing concerned with the screen operation by the DISPLAY key.

3.4 QuickVIEW FUNCTION

The TR4725 Logic Analyzer accommodates a new function called QuickVIEW.
This QuickVIEW is provided with oscilloscopic functions, which can easily
be used during timing analysis operation.

An oscilloscope observes and measures the transitional conditions of the
signals to be measured by frequently manipulating the time axis, the input
gain switches, or the trigger level knob, to set the condition where the
user can monitor the desired screen and data.

The characteristics of the signals handled by an oscilloscope are quite
different from those handled by the QuickVIEW function. Therefore, the
QuickVIEW function does not operate in exactly the same way as for the
oscilloscope. The QuickVIEW function performs a similar operation to the
above by using the scroll knob with the simple technique required by an
soscilloscope.

The operation method is very simple. First, press [ ] to move the

input prompt to the QuickVIEW menu item field, and press [ ] to set

it [ON]. Next, press [ ] to enter the system in the QuickVIEW mode.
After this, just turn the scroll knob to alter the sampling clock, and to
observe its result in real-time operation.

For further description of this QuickVIEW function, see Section 4.8.

3.5 EXAMPLES OF PROGRAM USAGE

Any persons who have mastered the operation method given in the previous sections can create measurement procedure programs with a simple programming technique.

If ☐ is pressed, the user is immediately allowed to start

programming. Only pressing ☐ or ☐ , and ☐ are required to create a program.

The commands selected by ☐ or ☐ can be executed in a similar way

as for the key manipulation. For instance, specifying [TRACE] is handled

as the ☐ operation.

The created program can be executed by pressing ☐ twice in a row. To stop the operation, press ☐ .

See Section 6.2.1 for the editor manipulation method, and see Section 6.2.2 for the types of selectable commands and their functions.

The created program can be stored or used as a file (command file). For its applications, see Section 6.4.

See Section 6.3 for how to execute the command file.

It is recommended that the user practices by trying out the following program examples.

Figure 3-8 shows a program which executes measurement repeatedly (repeat function). This repeat function had been handled as a fixed function by conventional logic analyzers, but can be developed into various function variations by the TR4725. An example of these is shown in Figure 3-9. This program displays the acquisition data on the screen for at least five seconds.

A program does not always have to contain the RUN command. Figure 3-10 shows a program which sets the measurement conditions only. This program is useful to set the measurement conditions when used as a routine program. Figure 3-11 shows a program which changes the TRACE data only, measures it three times, and saves each measurement result to the system saved file.

Figure 3-12 shows a program which operates in the same way as above, but measures that TRACE data 10 times repeatedly.

```
** PROGRAM **                                    TIMING ONLY    <TRACE TIMING>
LN___COMMAND_____COMMENT_____
00  [RUN]
01  [GOTO] LN[00]                                    ;████████████████████
02   END
```

03-FEB-86 10:01

Figure 3-8   Program of Executing the Repeat Function - 1

```
** PROGRAM **                                    TIMING ONLY    <TRACE TIMING>
LN___COMMAND_____COMMENT_____
00  [RUN]
01  [WAIT] 005 sec                                   ;████████████████████
02  [GOTO] LN[00]
03   END
```

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Figure 3-9   Program of Executing the Repeat Function - 2

```
** PROGRAM **                                              TIMING ONLY    <TRACE TIMING>

LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                ;
01 [GET] [F0:] TEST1.CNF  GET
02 [TRACE]
03 [GET] [F0:] TEST1.TRC  GET
04  END
```

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Figure 3-10 Program Which Sets Measurement Conditions Only

```
** PROGRAM **                                              TIMING ONLY    <TRACE TIMING>

LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                ;
01 [GET] [F0:] TEST1.CNF  GET
02 [TRACE]
03 [GET] [F0:] TEST1.TRC  GET
04 [RUN]
05 [SAVE] [QUICK] [F0:] SAVE
06 [TRACE]
07 [GET] [F0:] TEST2.TRC  GET
08 [RUN]
09 [SAVE] [QUICK] [F0:] SAVE
10 [TRACE]
11 [GET] [F0:] TEST3.TRC  GET
12 [RUN]
13 [SAVE] [QUICK] [F0:] SAVE
14  END
```

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Figure 3-11 Programming Example - 1

```
** PROGRAM **                                              TIMING ONLY    <TRACE TIMING>

LN___COMMAND_____COMMENT_____
00 [DEFINE] [I=] 00                                            ;
01 [CONFIG]
02 [GET] [F0:] TEST1.CNF   GET
03 [TRACE]
04 [GET] [F0:] TEST1.TRC   GET
05 [RUN]
06 [SAVE] [QUICK] [F0:] SAVE
07 [COUNT+1] [I]
08 [IF] [I≠] 10 THEN GOTO LN[05]
09  END
```

03-FEB-86 10:16

Figure 3-12   Programming Example - 2

4. BASIC MEASUREMENT OPERATIONS

4.1 INTRODUCTION

   This chapter describes the basic measurement operations required in the
   TR4725 system. Note that readers should read Chapters 1 to 3 before
   reading this chapter.

   4.1.1 Menu Screen and Its Function

      The TR4725 Logic Analyzer employs the operation method based on the
      menu selection system. A screen having one or more related menu items
      is called a menu screen.

      A menu screen is provided with two types of displays; one is opened by
      pressing a key in the MENU key group, another is opened by pressing a
      key in the I/O key group, or the AUTO key. The former screen occupies
      almost the entire CRT display space. It is also called a main menu
      screen because it is mainly used for measurement operations. The
      latter appears over the main menu screen. It is also called a
      sub-menu screen because it supports the main menu screen.

      The main menu screen used for the basic measurement operation is
      opened by pressing one of four keys, CONFIG, SYMDEF, TRACE, or DISPLAY
      of the MENU key group.

      The menu screen opened by the CONFIG key specifies the TR4725 input
      specification (configuration). The functions to be executed on this
      menu screen are called CONFIG function.

      The menu screen opened by the SYMDEF key defines (symbol definition)
      SYMBOL and CODE. (SYMDEF function)

      The menu screen opened by the TRACE key sets the trace condition
      setting (trace specifications). (TRACE function)

      The menu screen opened by the DISPLAY key displays and analyzes the
      measured data. (DISPLAY function)

      An example of the main menu screen is given in Figure 4-1. The menu
      screen is displayed in the area excluding the two lines from the top
      and those from the bottom of the CRT display. The actual images of
      menu screens differ depending on each menu screen, but are designed to
      take the same operation method. (For details, refer to each menu
      screen description.)

```
** DISPLAY **   from F0:DISP.REG                    PK id.          <TRACE S&T(S+T)>

GROUP [ADRS   ] [DATA   ] [STATUS] [DATA    ]              [       ] [        ] [        ]
RADIX [HEX    ] [HEX    ] [HEX   ] [BIN     ]              [HEX    ] [HEX     ] [HEX     ]
[LN]--+----------+----------+---------+-----------------+--------+---------+--------
0000   079000    90E0      C4        1001 0000 1110 0000
0001   F6CCAB    4F8B      84        0100 1111 1000 1011
0002   079000    A010      C4        1010 0000 0001 0000
0003   F6C5A1    45A3      84        0100 0101 1010 0011
0004   F6C8AB    45C5      84        0100 0101 1100 0101
0005   058086    57E4      A4        0101 0111 1110 0100
0006   058F8C    6000      A4        0110 0000 0000 0000
0007   F6C866    7E4B      84        0111 1110 0110 1011
0008   F6C16E    786B      84        0111 1000 0110 1011
0009   F6C160    7782      84        0111 0111 1000 0010
0010   F6CB58    FFCA      84        1111 1111 1100 1010
0011   F6C058    F0E0      84        1111 0000 1110 0000
0012   F2CD68    080E      84        0000 1000 0000 1110
0013   F2CD60    082E      84        0000 1000 0010 1110
0014   F2C662    0B4C      84        0000 1011 0100 1100
0015   F2C86B    0068      84        0000 0000 0110 1000
0016   F2C66C    018E      84        0000 0001 1000 1110

                                                    +scroll   03-FEB-86 10:39
```

Figure 4-1 Example of the Main Menu Screen

No menu screens other than above are used in the basic measurement operation. Therefore, the user should refer to each applicable item.

The menu screen opened by the PROGRAM key creates a program for the measurement procedure, etc. (PROGRAM function; see Section 6.2.)

The menu screen opened by the UTILITY key gives services which have no direct relation to the measurement operation itself. (UTILITY function; see Chapter 8.)

The menu screen opened by the GET/SAVE/FD keys performs the disk file processing function related to the main menu screen. (GET/SAVE/FD functions; see Chapter 5.) These GET/SAVE functions are closely related to the menu screen for the basic measurement operation, and so there is a general description on each.

The menu screen opened by the COMM key sets the conditions to communicate with the external devices via the RS-232C interface.

4.1.2 Relationship between Each Menu Screen

The basic measurement operation is performed by being assigned to four menu screens: CONFIG, SYMDEF, TRACE, and DISPLAY. Therefore, a strong interdependent relationship exists among these four. The basic operations are undertaken by specifying one of four types of names which can be defined by the user: GROUP, SYMBOL, CODE (these are used for state analyzing), and LABEL (used for timing analyzing).

The GROUP name is defined at the CONFIG menu screen as an input channel group name which is handled as one unit when organizing the state analyzing section input channels. This name is used at the menu screens SYMDEF, TRACE, and DISPLAY.

To be used as substitutions of numeric string, and numeric value, the SYMBOL and CODE names are respectively defined on the SYMDEF menu screen based on the GROUP name above, and are used on the TRACE and DISPLAY menu screens.

To be used as an input signal label for timing analyzing, the LABEL name is defined on the CONFIG menu screen, and is used on the TRACE and DISPLAY menu screens.

Relationships among the above are illustrated in Figures 4-2 and 4-3. The key layout on the panel has been designed with these relationships in mind.

```
        ┌───────────┐
        │  T R A C E│◄
        └───────────┘
                          Use of defined
                          SYMBOL and CODE names

Use of defined
GROUP name


                    Use of defined
                    GROUP name

     ┌───────────┐                    ┌───────────┐
     │ C O N F I G│──────────────────►│ S Y M D E F│
     └───────────┘                    └───────────┘
                    Definition of          Definitions of
                    GROUP name             SYMBOL and CODE
                                           names

Use of defined
GROUP name


        ┌───────────────┐
        │ D I S P L A Y │◄   Use of defined
        └───────────────┘    SYMBOL and CODE names
```
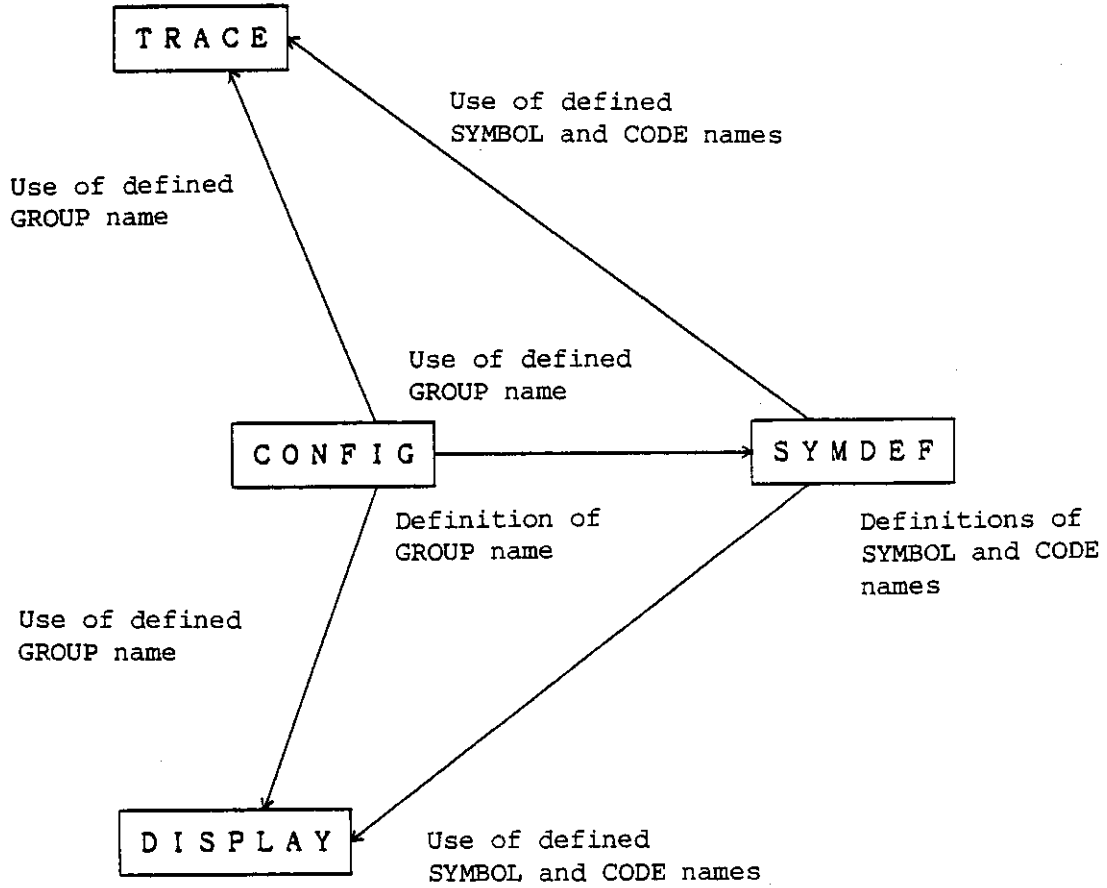
Figure 4-2 Relationships among Each Menu Screen (at State Analysis)

```
  ┌───────────┐
  │  T R A C E │
  └───────────┘
        ↑
         \
          \    Use of defined LABEL name
           \
            \
  ┌─────────────┐
  │  C O N F I G │  Definition of LABEL name
  └─────────────┘
          \
           \   Use of defined LABEL name
            \
             ↓
  ┌─────────────┐
  │  D I S P L A Y │
  └─────────────┘
```
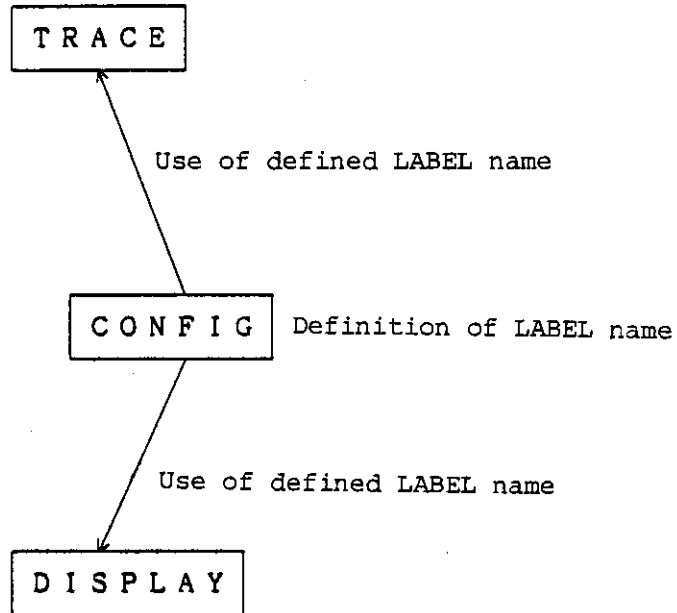
Figure 4-3 Relationships among Each Menu Screen (at Timing Analysis)

4.2 INPUT CHANNEL CONFIGURATION (CONFIG)

The CONFIG function determines the TR4725 input section characteristics.
The input signals captured from the SUT (system under test) by the probe
are processed into the data which eases the operation and interprocessing,
according to the conditions set on the CONFIG menu screen. The data is
processed to have 48 chs. (depending on the personality kit, all of the
channels may not be used) at the state analyzer; 16 chs. at the timing
analyzer.

4.2.1 CONFIG Menu Screen

Pressing [⊓] displays the CONFIG menu screen. This CONFIG menu
screen is divided into three types according to the measurement mode
(see Section 4.4.1), as illustrated in Figure 4-4.

(one or two pages)   (two or three pages)   (one page)

    TRACE STATE   TRACE S&T (S→T)   TRACE TIMING
                         TRACE S&T (T→S)

▶represents the top of the page.

Figure 4-4   CONFIG Menu Screen Type (Size)

The size (number of pages) of the state analyzer space in the menu
screen depends on the personality kit (PK). The TRACE STATE mode uses
one or two pages, the TRACE S&T (S→T) and TRACE S&T (T→S) modes use
two or three pages, and the TRACE TIMING mode uses one page.

Here, a "page" is defined as a collection of related menu items which can be displayed on one screenful of CRT display. (Different definition has been made to other menu items, but each definition can keep coherence during operation.) For menu screens having two or more pages, use the scroll knob or the PAGE keys ⬆ and ⬇, to monitor the whole menu screen. The scroll knob smoothly accesses the desired section in the menu screen at a specified speed (even when the data continues to the next page(s)). The PAGE keys ⬆ and ⬇ access the page including its header (see the section pointed by ▶ in Figure 4-4). The display limits may change according to the input prompt movement caused by pressing the EDIT (arrow) or ENTRY keys.

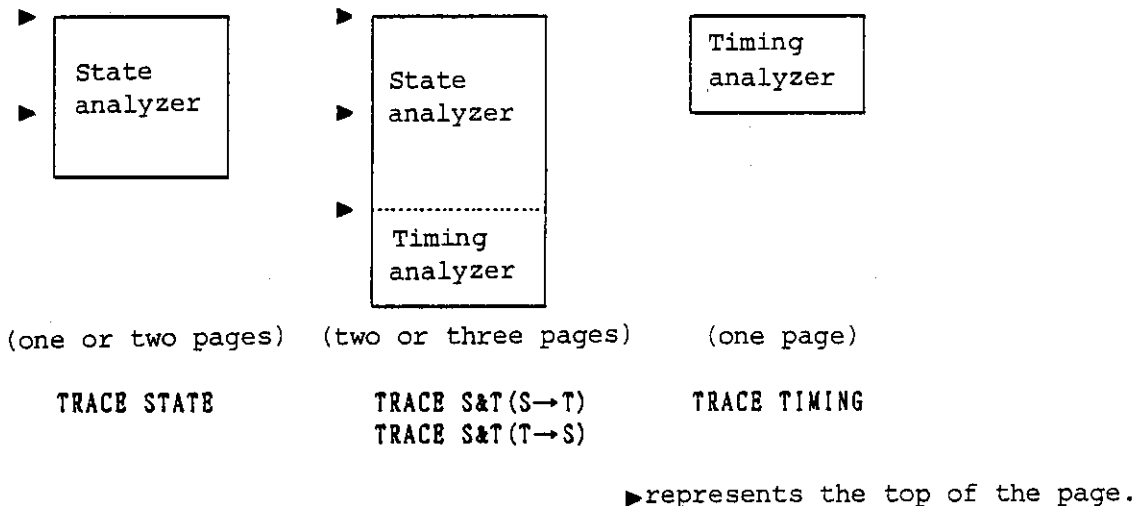Which section of the menu screen is not displayed on the CRT display can be checked by the scroll marks (↑ ↓) in the lowermost line.

The boundary between the state analyzing and the timing analyzing section (always set to the lower side) in a menu screen is explained on the CRT display by using dashed lines.

The file processing (SAVE/GET functions; see Section 4.2.4.) to be described in a later section is intended for the menu items on these menu screens. (Therefore, data differs depending on the measurement mode and personality kit.)

4.2.2 Input Channel Configuration at State Analysis

The "input channel configuration" at state analysis differs depending on the personality kit to be used.

One of its basic function defines several input GROUPs (called GROUP hereafter). A GROUP is a unit to handle multiple input channels. The other functions are to specify the device to be measured, to set the threshold voltage to convert the input signal into digital data, and to set the sampling clock generation method to capture that above data.

Up to six types of GROUP can be defined. Some of the types have been specified beforehand in the personality kit on which the device to be measured is fixed. (For example, ADRS, DATA, STATUS are given as GROUP names.) Up to six alphanumeric characters can be used as a GROUP name.

For details, refer to the PK instruction manual.

4.2.3 Input Channel Configuration at Timing Analysis

The timing analyzer is optionally equipped.

This timing analyzer input channel configuration has a function which determines how to sample signals and how to convert them into the internal data. Note that these signals are sent via 16 channels in total from two probes: the data probe E (TR14702-01) and the data probe F (TR14702-02).

The CONFIG initial menu screen (timing analyzer) is shown in Figure 4-5.

Setting TRACE TIMING as a measurement mode displays the timing analyzer menu screen only (one page).

Setting TRACE S&T (S→T), or TRACE S&T (T→S) as a measurement mode handles the menu screens both at state analyzing and at timing analyzing as a series of menu screen (multiple pages). The number of menu screen pages of the state analyzing differs according to the personality kit being used, but is always displayed on the timing analyzing menu screen.

To enter data on the menu screen at timing analysis, the user should display this menu screen by using the scroll knob, or the PAGE ⬆ key. The programmable data, here, is as follows:

● THRESHOLD	:	Selects the threshold voltage among TTL (approx. 1.4 V), ECL (approx. −1.3 V), V3, and V4. V3 and V4 range from −12.7 to +12.7 V, and can freely be set in steps of 100 mV.
● POL	:	Selects the polarity for signal capturing.
● LABEL	:	Input signals sent from each probe attach individual names, which can be referred to at the time of trace condition setting, or acquisition data display. The data probe E uses PRB_E7 to PRB_E0 as individual channel names; the data probe F uses PRB_F7 to PRB_F0 in the same way. These names are used when no name is set in this menu item; however, the user can specify the input signal name by himself. Up to six alphanumeric characters can be used as a LABEL name.

● <u>SAMPLING CLOCK RATE</u>: The sampling clock (10 ns to 50 ms) in the internal TR4725 system is used for input signal sampling at timing analysis. The clock rate can be selected in this data field. The sampling clock rate can also be selected on the <u>TRACE</u> and <u>DISPLAY</u> menu screens. The latest selected rate is used to execute the measurement.

● <u>SAMPLING MODE</u>   : The timing analyzer sampling system can be divided into two types: SAMPLE and LATCH modes. The sampling mode samples the input signals at the internal clock sampling edge. Therefore, no input signal alteration can be detected between sampling intervals (generally termed as a glitch).
The latch mode can detect the glitch. The minimum detectable glitch width is 5 ns.
The display relationship of the input signal with the data obtained through these sampling modes is illustrated in Figure 4-6.

```
** CONFIGURATION **                              PK id.           <TRACE S&T(S+T)>

-LABEL-
     PROBE          ┌PROBE_F┐                      ┌PROBE_E┐
     DATA CHANNEL   7654 3210                       7654 3210
                    ↓↓↓↓ ↓↓↓↓                       ↓↓↓↓ ↓↓↓↓
     THRESHOLD      [TTL] [TTL]                      [TTL] [TTL]
     LABEL   POL                       LABEL   POL
     [PRB_F7] [+]←┐                     [PRB_E7] [+]←┐
     [PRB_F6] [+]←┤                     [PRB_E6] [+]←┤
     [PRB_F5] [+]←┤                     [PRB_E5] [+]←┤
     [PRB_F4] [+]←┤                     [PRB_E4] [+]←┤
     [PRB_F3] [+]←┤                     [PRB_E3] [+]←┤
     [PRB_F2] [+]←┤                     [PRB_E2] [+]←┤
     [PRB_F1] [+]←┤                     [PRB_E1] [+]←┤
     [PRB_F0] [+]←┘                     [PRB_E0] [+]←┘

-VARIABLE THRESHOLD-
     V3 = [   1.4V]          V4 = [  -1.3V]

-SAMPLING-
     CLOCK RATE [  10ns]     MODE [SAMPLE]

                                              ↓scroll   03-FEB-86 10:41
```
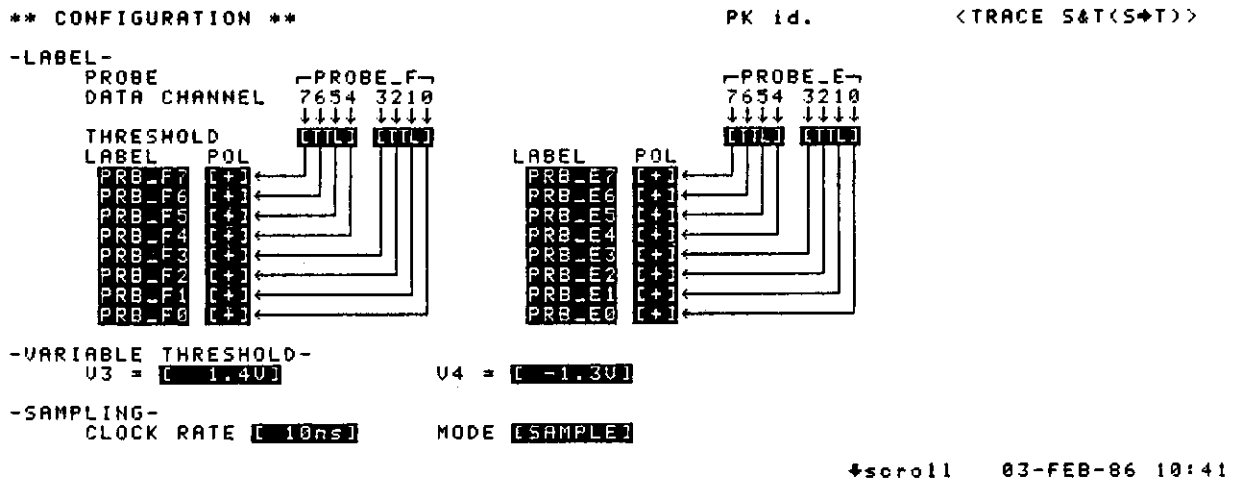
Figure 4-5 <u>CONFIG</u> Initial Menu Screen (at Timing Analysis)

Internal sampling
clock

Channel n
input signal

Gb

Ga

Threshold
← voltage

Sampling
mode

Memory
contents

Display

0 1 1 1 1 1 0 0 0 0 1

Latch
mode

Memory
contents

Display

0 1 1 1 0 1 0 0 1 0 1

Ga↑   Gb↑

Figure 4-6 Sampling Mode and Data Display

4.2.4 Setting Data SAVE/GET Functions

Setting data on the menu screen (partially displayed on the CRT) can be stored on a file at any time. (SAVE function; see Section 5.3.)

Setting data in the file can be displayed on the menu screen at any time. (GET function; see Section 5.2.)

Both functions can be executed with no technical difficulties.

Pressing [ᴮᴹ] displays the main menu screen in half tone display mode, and also displays the SAVE sub-menu screen as shown in Figure 4-7. The file name, CONFIG.Sn (n=1 to 99), is named and controlled under the TR4725 system. (System saved file; see Section 5.1.4.) To specify a file name with the user specification, enter the name (for example, TEST1.CNF) by using the ENTRY key.
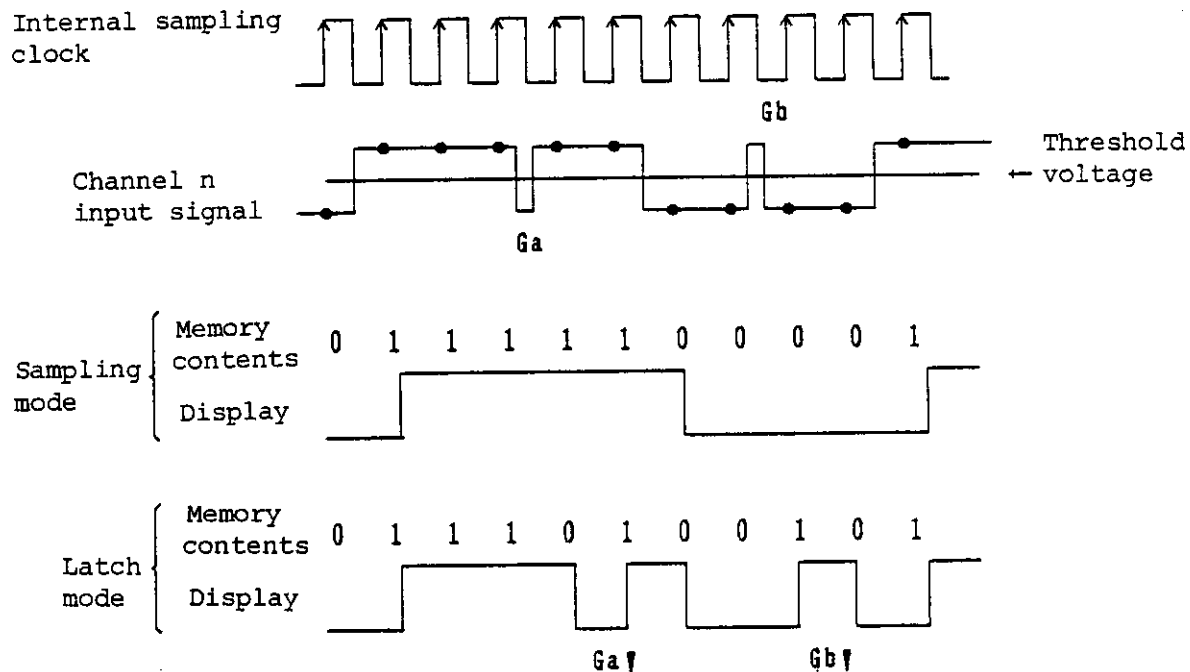
Pressing [ˢᴹ] again starts the execution. When its execution is completed, the SAVE sub-menu screen disappears, and the original main menu screen resumes again. To use the file name which is managed by the TR4725, press [ᴮᴹ] twice in a row to write the setting data in the file. (This in particular is called a QuickSAVE function.)
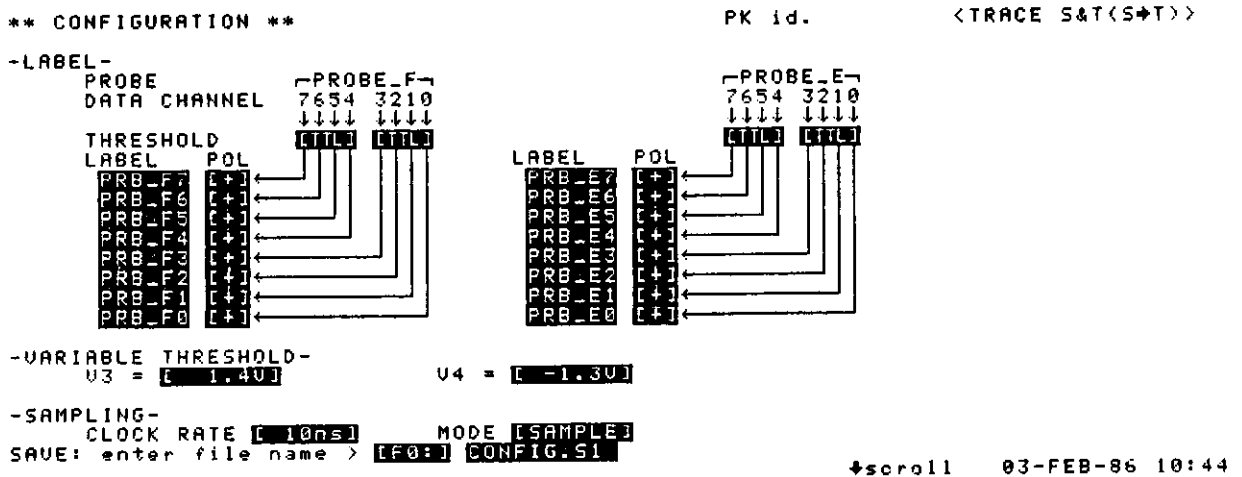

Figure 4-7 SAVE Sub-menu Screen (on the CONFIG Main Menu Screen)

To check to see which types of files exist on the disk, press [⬚₁₀]
twice in a row. This manipulation displays the main menu screen in
the half tone display mode, and displays the sub-menu display, as
shown in Figure 4-8. (DIRECTORY-of-MENU function; see Section 5.4.1.)

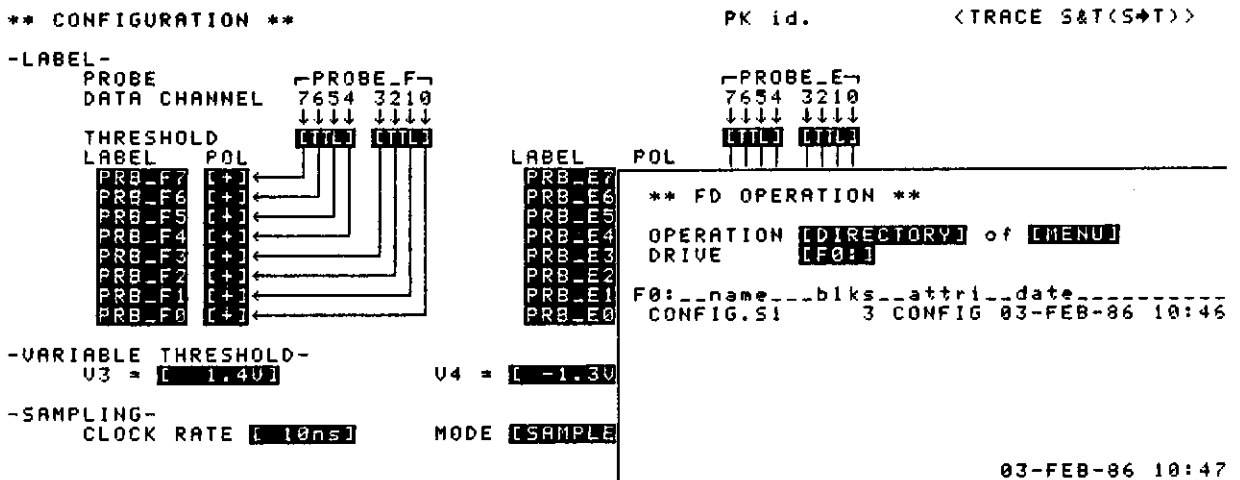To erase this sub-menu screen, execute the SAVE or GET function, or
press [⬚ₛₜₚ] .

```
** CONFIGURATION **                              PK id.        <TRACE S&T(S→T)>
-LABEL-
        PROBE             ┌─PROBE_F─┐            ┌─PROBE_E─┐
        DATA CHANNEL       7654 3210              7654 3210
                           ↓↓↓↓ ↓↓↓↓              ↓↓↓↓ ↓↓↓↓
        THRESHOLD         [TTL] [TTL]            [TTL] [TTL]
        LABEL    POL                   LABEL   POL  ││││ ││││
        PRB_F7  [+]←─────────          PRB_E7
        PRB_F6  [+]←────────           PRB_E6   ** FD OPERATION **
        PRB_F5  [+]←────────           PRB_E5
        PRB_F4  [+]←───────            PRB_E4   OPERATION [DIRECTORY] of [MENU]
        PRB_F3  [+]←──────             PRB_E3   DRIVE     [F0:]
        PRB_F2  [+]←─────              PRB_E2
        PRB_F1  [+]←────               PRB_E1   F0:__name___blks__attri__date_____
        PRB_F0  [+]←───                PRB_E0   CONFIG.S1      3 CONFIG 03-FEB-86 10:46
-VARIABLE THRESHOLD-
        V3 = [   1.4V]          V4 = [  -1.3V]

-SAMPLING-
        CLOCK RATE [  10ns]        MODE [SAMPLE]
                                                            03-FEB-86 10:47
```

Figure 4-8 <u>FD</u> Sub-menu Screen (on the <u>CONFIG</u> Main Menu Screen)

Pressing [⬚ᴳᴱᵀ] displays the main menu screen in the half tone display

mode, and displays the <u>GET</u> sub-menu screen as shown in Figure 4-9.
Note that no file name is usually displayed on the screen. (A message
"CONFIG.REG" is displayed when there is a registered file; see
Section 5.1.4.) Next, turn the knob clockwise to display all files in
the alphabetical order. Stop turning when the target file name

appears. Pressing [⬚ᴳᴱᵀ] again after this starts the execution. When

the execution is completed, the <u>GET</u> sub-menu screen disappears, and
the original main menu screen resumes on the CRT. This GET function
requires no file name entry using the <u>ENTRY</u> key. (This in particular
is called a QuickGET function.) The displayed setting data is the
specified data in the file, and its file name is displayed on the top
line as shown in Figure 4-10. This menu screen erases the file name
when even one piece of data is entered by the <u>ENTRY</u> key.

Figure 4-9   GET Sub-menu Screen (on the CONFIG Main Menu Screen)

Figure 4-10   Data Setting Example Using GET Function
(on the CONFIG Main Menu Screen)

4.3 SYMBOL AND CODE DEFINITION (SYMDEF)

The TR4725 Logic Analyzer (at the state analyzing mode) sets the trace conditions (TRACE function), displays and analyzes the measured data (DISPLAY function) by using not only numerics and the fixed codes, but also the SYMBOL and CODE names defined by the user. The SYMDEF is the function which defines these names.

A SYMBOL can be used for GROUP having a specified number of channels. It functions to give one SYMBOL name to one numeric string within a certain range (or a numeric value). The debugging efficiencies can be increased by using the SYMBOL name corresponding to the names of label, variables, and procedure, which are for program development.

A CODE can be used for GROUP having a maximum of eight channels. It functions to give one numeric to one CODE name, and is used by the user to ease code table creation, etc.

4.3.1 SYMDEF Menu Screen

Pressing ☐ displays the SYMDEF menu screen. (See Figure 4-11.)

This SYMDEF menu screen consists of up to 12 window menus, as illustrated in Figure 4-12.

The setting data to be displayed on the CRT display at one time contains up to 16 SYMBOL or CODE definition data on one of the window menu screen. The definition data for a single SYMBOL or CODE name is a collection of the related multiple menus displayed on a single line. This is called a "menu item line". Variable-length data can be entered in the menu item field. To increase its readability, one of the menu item lines is displayed in the inverse mode.

For the window menu screen having more than 17 menu item lines, the scroll knob or the PAGE ↑ and ↓ keys are used to monitor the whole window menu screen.

The scroll knob accesses the desired section of the menu item smoothly at the specified speed. The PAGE ↑ and ↓ keys feed the menu item line in steps of 10 lines. The scroll mark (↑ ↓) indication in the lowermost line shows the user which section of the window menu screen is not displayed.

To display the window menu screen which is different from the current display on the CRT, the user should change the menu items, GROUP (selected among the defined GROUP names), and TYPE (selected among the SYMBOL and CODE names).

For the personality kit which has fixed SUT, there are no window menu screens corresponding to the GROUP name called "DATA". (Neither SYMBOL, nor CODE)

```
** SYMBOL DEFINITION **                    PK id.        <TRACE S&T<S+T>>
GROUP [ADRS  ]    TYPE [SYMBOL]
RADIX [HEX   ]
                  [RANGE  ]
LN___NAME___VALUE__LOW:HIGH_USE_---------------------------------------------
00 ▋▋▋▋▋▋▋▋  0000   0000:0000 [  ]
```

                                                          03-FEB-86 11:01

Figure 4-11   **SYMDEF** Initial Menu Screen
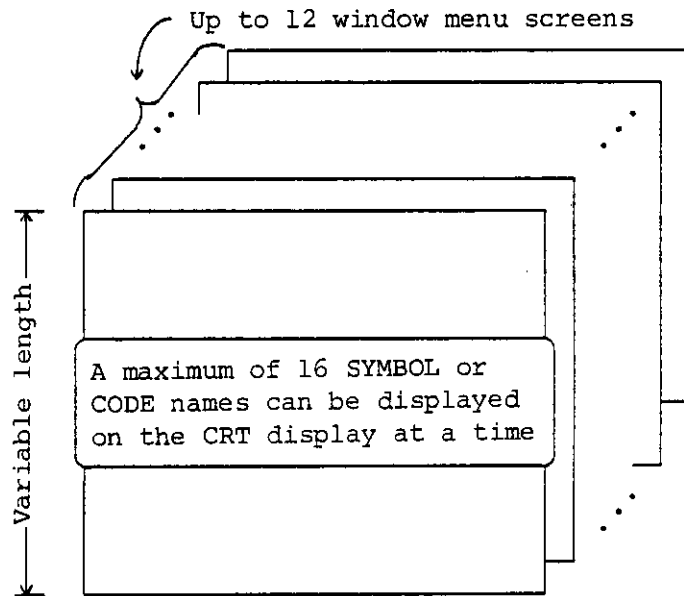
Figure 4-12   **SYMDEF** Menu Screen Configuration

4.3.2 SYMBOL Definition

In the SYMDEF menu screen initial state, the first defined GROUP name, and at the same time, the SYMBOL window menu screen, are displayed on the CRT. First, select a GROUP name. Note that a SYMBOL definition must be made to this GROUP name in the GROUP menu item field. Next, move the input prompt to the menu item line, to enter each menu item as follows:

- NAME : Enter a maximum of eight alphanumeric characters as a SYMBOL name. The preceding space is valid. (A shift-down effect can be obtained in the DISPLAY mode.)
- VALUE: Enter the SYMBOL base value.
- LOW : Enter the minimum numeric string value. Enter the absolute value if the menu item immediately above the current menu item field is in the RANGE mode; enter the relative value to VALUE if that menu item field is in the OFFSET mode.
- HIGH : Enter the maximum numeric string value. Enter the absolute value if the menu item immediately above the current menu item field is in the RANGE mode; enter the relative value to VALUE if that menu item field is in the OFFSET mode.
- USE : The number of SYMBOL names are restricted due to being defined with the SELECT key at the TRACE menu screen. Specifying the ◆ mark in this menu item field enables the free SYMBOL name specification on the TRACE menu screen. The DISPLAY menu screen can use whole defined SYMBOL names regardless of this specification.

Figure 4-13 illustrates a SYMBOL application example. If an N channel GROUP is to be defined, the GROUP function takes a value of 0 to 2^{N-1}. Setting VALUE, HIGH, and LOW specifies the SYMBOL referrable range within its numeric space. No restriction is made among VALUE, LOW, and HIGH, except the point that no value duplication and "LOW HIGH" condition can be allowed.

Figure 4-13 (a) assumes the condition where VALUE = LOW. This setting is used most commonly among the users. Names of procedure, function, subroutine, variables are used to define a SYMBOL name. Its range is specified by VALUE, LOW, and HIGH. The TRACE and DISPLAY menu screens refer to the numeric in a SYMBOL name + n (offset) format.

Figure 4-13 (b) assumes the condition where VALUE = HIGH. This setting is used for stacking operation. The TRACE and DISPLAY menu screens refer to the numeric in a SYMBOL name - n (offset) format.

Figure 4-13 (c) assumes the condition where VALUE is set in the intervals between LOW and HIGH. This setting is used for stack frame operation. The TRACE and DISPLAY menu screens refer to the numeric in a SYMBOL name + n or a SYMBOL name - n format.

Figure 4-13 (d) assumes the condition where VALUE is set out of the
intervals between LOW and HIGH. This setting is a variation of the
example in Figure 4-13 (a).

No illustration is made, but the condition where VALUE = LOW = HIGH is
also possible. This setting needs a value setting to VALUE only.

To add or delete the menu item line, use ⬇ , 🔲 , and 🔲 . To

newly create a menu item line, use ⬇ . Move the input prompt to the
bottom line, and press ⬇ , to create a new menu item line immediately
after the menu item line in which the input prompt is set. The input
prompt is then moved to the new menu item line.

2^{N-1} _____ HIGH

VALUE ⟶ LOW
(=VALUE)

0 ⟶

(a)

2^{N-1} _____

VALUE ⟶ HIGH
(=VALUE)

LOW

0 ⟶

(b)

2^{N-1} _____

HIGH

VALUE ⟶

LOW

0 ⟶

(c)

2^{N-1} _____

HIGH

LOW

VALUE ⟶

0 ⟶

(d)
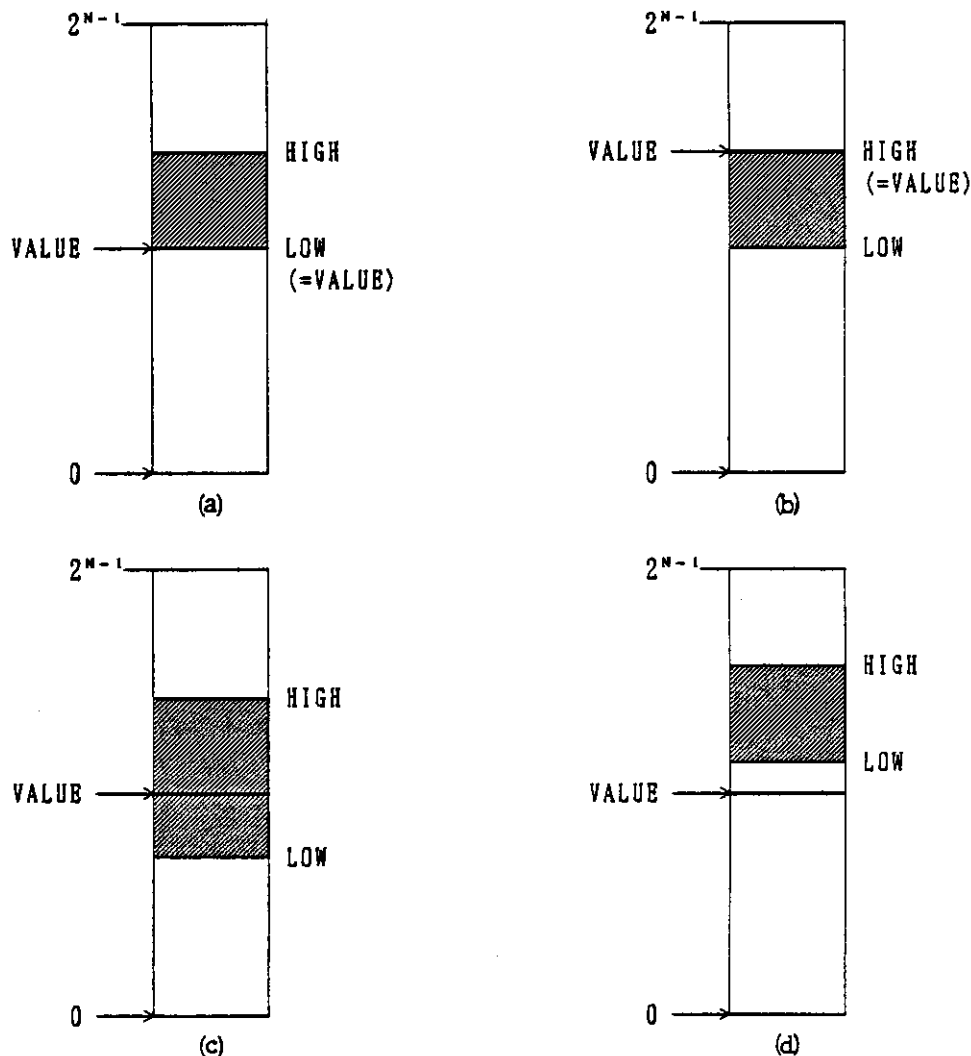
Figure 4-13 Examples of SYMBOL Application

Pressing INSERT ☐ adds a new menu item line immediately before the menu

item line in which the input prompt is set, and then moves that input
prompt to the newly-created line.

Pressing DELETE ☐ deletes the menu item line in which the input prompt

is set. If the menu item line is the only one, which has the input
prompt, the contents of the menu will be cleared.

No values between the different SYMBOLs (VALUE, LOW to HIGH) can be
allowed. The maximum number of the SYMBOLs which can be defined is
100 max. per GROUP; a total of 200 symbols can be defined for all
GROUPs. Of these 200 symbols, the maximum number of symbols which can
be used at the TRACE menu screen is 50 per GROUP.

A SYMBOL definition example is shown in Figures 4-14 (a) and
4-14 (b). The entire same definition of SYMBOL is made by RANGE as in
Figure 4-14 (a), and by OFFSET as in Figure 4-14 (b).

```
** SYMBOL DEFINITION **                        PK id.        <TRACE S&T(S+T)>

GROUP [ADRS   ]    TYPE [SYMBOL]
RADIX [HEX    ]
                          [RANGE  ]
LN___NAME___VALUE___LOW:HIGH__USE-------------------------------------------------
00 TIMER      FC98C  FC98C:FCA49 [+]
01   TIMESUB  FC402  FC402:FC41D [+]
02   LEVEL    09078              [+]
03   JPTABLE  FC132  FC132:FC13D [ ]
04 PAUSE      FC7A4  FC7A4:FC7AD [+]
05   SETQUE   FCABE  FCABE:FCACB [+]
06 SCHEDULE   FC5FC  FC5FC:FC6B4 [+]
07    STACK   08862  08462:08862 [ ]
```

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Figure 4-14 (a) Example of SYMBOL Definition (Displayed by RANGE)

```
** SYMBOL DEFINITION **                      PK id.        <TRACE S&T(S+T)>

GROUP [ADRS   ]   TYPE [SYMBOL]
RADIX [HEX    ]
                          [OFFSET]
LN___NAME___VALUE____LOW:HIGH___USE_____
00 TIMER    FC98C +00000:+000BD [+]
01  TIMESUB FC402 +00000:+0001B [+]
02  LEVEL   09078              [+]
03  JPTABLE FC132 +00000:+0000B [ ]
04 PAUSE    FC7A4 +00000:+00009 [+]
05  SETQUE  FCABE +00000:+0000D [+]
06 SCHEDULE FC5FC +00000:+00063 [+]
07     STACK 08862 -00400:+00000 [ ]
```

Figure 4-14 (b) Example of SYMBOL Definition (Displayed by OFFSET)

4.3.3 CODE Definition

A CODE can be defined in the same way as for a SYMBOL to be defined
for the GROUP having up to eight channels. One CODE expresses one
numeric in a one-to-one correspondence. A CODE is used like an ASCII
code. (Note that the ASCII code itself can be used on the DISPLAY
menu screen.) Both SYMBOL and CODE can be defined for a single
GROUP. (In this case, these menu screens are handled as individual
window menu screens.) To define the CODE, the user should select the
desired GROUP name, and set TYPE as a CODE.

Then, enter the following in each menu item in the menu item line:

● NAME : Enters an alphanumeric of up to eight characters as a CODE
          name. The preceding space is valid. (The shift-down effect
          can be obtained in the DISPLAY mode.)
● VALUE: Enters the CODE value.
● USE : Enters the information of whether or not to use the CODE in
          the TRACE menu screen. (Specifying the ◆ mark enables the
          use of CODE.)

A CODE can be used to define the code table, but note that the user
does not always have to define all the values.

The maximum number of CODEs which can be defined is 256 (2^8 for a
GROUP having eight channels) per GROUP; a total of 512 codes can be
defined for each GROUP. Of these 512 codes, the maximum number of
CODEs which can be used on the TRACE menu screen is 50 per GROUP.

An example of CODE definition is shown in Figure 4-15. The
personality kit having fixed SUT to be measured has the defined CODEs
for the GROUP "STATUS". (For details, refer to each personality kit
instruction manual.)

```
** SYMBOL DEFINITION **                        PK id.          <TRACE STATE>
GROUP [FLAGS ]    TYPE [CODE   ]
RADIX [BIN    ]

LN___NAME____-VALUE-USE_____
000 ZERO      000  [*]
001 ONE       001  [*]
002 TWO       010  [*]
003 THREE     011  [*]
004 FOUR      100  [*]
005 FIVE      101  [*]
006 SIX       110  [*]
007 SEVEN     111  [*]
```

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Figure 4-15 Example of CODE Definition

4.3.4 SAVE/GET Functions for the Setting Data

The setting data (e.g., all the window menus of up to 12 screens as
shown in Figure 4-12) on the menu screen can be stored on the file at
any time. (SAVE function; see Section 5.3.)

The setting data in the file can be displayed on the menu screen at
any time. (GET function; see Section 5.2.)

Both functions can be executed with a very simple operation.

Pressing [SAVE] displays the menu screen in the half tone display

mode, and displays the <u>SAVE</u> sub-menu screen, as shown in Figure 4-16.
The file name, SYMDEF.Sn (n = 1 to 99), is named and managed by the
TR4725 system (system saved file; see Section 5.1.4.). To use a file
name to be specified by the user, enter the file name by using the

<u>ENTRY</u> key (for example, TEST1.SYM). Pressing [SAVE] again after this

starts the execution. When the execution is completed, the <u>SAVE</u>
sub-menu screen disappears, and the original main menu screen resumes
again. To use the file name being managed by the TR4725, just press

[SAVE] twice consecutively to write the setting data into the file.

(This in particular is called a QuickSAVE function.)

```
** SYMBOL DEFINITION **                          PK id.        <TRACE S&T(S+T)>

GROUP [ADRS  ]    TYPE [SYMBOL]
RADIX [HEX   ]
                         [OFFSET]
LN___NAME___VALUE____LOW:HIGH___USE------------------------------------------
00 TIMER    FC98C +00000:+0008D [*]
01  TIMESUB FC402 +00000:+0001B [*]
02  LEVEL   09078              [*]
03  JPTABLE FC132 +00000:+0000B [ ]
04 PAUSE    FC7A4 +00000:+00009 [*]
05  SETQUE  FCABE +00000:+0000D [*]
06 SCHEDULE FC5FC +00000:+000B8 [*]
07    STACK 08862 -00400:+00000 [ ]
```

```
SAVE: enter file name > [F0: ] SYMDEF.S1
                                                83-FEB-86 11:13
```

Figure 4-16 <u>SAVE</u> Sub-menu Screen (on the <u>SYMDEF</u> Main Menu Screen)

To check what type of files exists on the disk, press [ID] twice in a
row. This manipulation displays the main menu screen in the half tone
display mode, and displays the <u>FD</u> sub-menu screen, as shown in
Figure 4-17. (DIRECTORY-of-MENU function; see Section 5.4.1.) To
erase this sub-menu screen, execute the SAVE or GET function, or press

[STOP] .

```
** SYMBOL DEFINITION **                    PK id.          <TRACE S&T(S+T)>

GROUP [ADRS  ]    TYPE [SYMBOL]
RADIX [HEX   ]
                         [OFFSET]
LN___NAME___VALUE____LOW:HIGH___USE_____
00 TIMER     FC98C +00000:+000BD [+]
01  TIMESUB FC402 +00000:+0001B [+]
02  LEVEL   09078              [+]
03  JPTABLE FC132 +00000:+0000B [ ]          _____
04 PAUSE    FC7A4 +00000:+00009 [+]
05  SETQUE  FCABE +00000:+0000D [+]     ** FD OPERATION **
06 SCHEDULE FC5FC +00000:+00089 [+]
07    STACK 08862 -00400:+00000 [ ]     OPERATION [DIRECTORY] of [MENU]
                                        DRIVE     [F0:]

                                        F0:__name___blks__attri__date_____
                                        SYMDEF.S1     8 SYMDEF 03-FEB-86 11:14
                                        TIMER.SYM     8 SYMDEF 03-FEB-86 11:06



                                                      03-FEB-86 11:15
```

Figure 4-17   FD Sub-menu Screen (on the SYMDEF Main Menu Screen)

Pressing [GET] displays the main menu screen in the half tone display

mode, and displays the GET sub-menu screen as shown in Figure 4-18.
(A message "SYMDEF.REG" is displayed when a registered file exists;
see Section 5.4.1.) Turning the knob clockwise, next, displays the
file names in the alphabetical order. Stop turning when the desired

file name appeared. Pressing [GET] again after this operation starts

the execution. When the execution is completed, the GET sub-menu
screen disappears and the original main menu screen resumes again. No
file name entry with the ENTRY key is necessary for GET sub-menu
screen. (This in particular is called a QuickGET function.) The
displayed setting data on the screen is equal to the specified data in
the file, and its file name is displayed in the uppermost line. Even
a piece of data entered by the ENTRY key at this menu screen would
delete this file name.

```
** SYMBOL DEFINITION **                          PK id.         <TRACE S&T(S+T)>

GROUP [ADRS   ]    TYPE [SYMBOL]
RADIX [HEX    ]
                     [RANGE  ]
LN___NAME___VALUE___LOW:HIGH__USE_____
00 ▮▮▮▮▮▮▮▮ 00000 00000:00000 [ ]
```

```
GET : enter file name > [F0:] ▮_____▮                      03-FEB-86 11:20
```

Figure 4-18   GET Sub-menu Screen (on the SYMDEF Main Menu Screen)

```
** SYMBOL DEFINITION **   from F0:TIMER.SYM     PK id.         <TRACE S&T(S+T)>

GROUP [ADRS   ]    TYPE [SYMBOL]
RADIX [HEX    ]
                     [RANGE  ]
LN___NAME___VALUE___LOW:HIGH__USE_____
00 TIMER    FC98C FC98C:FCA49 [+]
01  TIMESUB FC402 FC402:FC41D [+]
02  LEVEL   09078            [+]
03  JPTABLE FC132 FC132:FC13D [ ]
04 PAUSE    FC7A4 FC7A4:FC7AD [+]
05  SETQUE  FCABE FCABE:FCACB [+]
06 SCHEDULE FC5FC FC5FC:FC6B4 [+]
07    STACK 08862 08462:08862 [ ]
```

```
           F0:TIMER.SYM, gotten                             03-FEB-86 11:21
```

Figure 4-19   Example of Data Setting Using GET Function
              (on the SYMDEF Main Menu Screen)

4.4 TRACE CONDITION SETTING (TRACE)

TRACE specifies the measurement mode, and sets the trace conditions.
Setting trace conditions is one of the major jobs among the measurement
conditions setting procedures.

The main purpose of the trace condition setting is to restrict the trigger
to be a reference bit. This trigger as a reference bit restrictively
obtains the data necessary for SUT (system under test) operation analysis
from a large amount of data flown via the input channels.

The TR4725 can counteract the complicated data flow by being combined with
the S&T function (trigger arming), or a combination of the multiple trace
window conditions (for the state analyzing function).

4.4.1 Measurement Mode Selection and TRACE Menu Screen

Pressing ⬜ displays the TRACE menu screen on the CRT. The

timing-only analyzer displays the initial menu screen as shown in
Figure 4-20, and the state-only analyzer displays the initial menu
screen as shown in Figure 4-21.

```
** TRACE SPECIFICATION **                          TIMING ONLY    <TRACE TIMING>

[TRACE TIMING  ]_____QuickVIEW [OFF]

          LABEL            ENBL_T   TRIG_T
        PRB_F7 (PRB_F7)      X        X      CLOCK RATE [ 10ns]
        PRB_F6 (PRB_F6)      X        X
        PRB_F5 (PRB_F5)      X        X      DELAY = +0000  (0ns)
        PRB_F4 (PRB_F4)----- X ------ X
        PRB_F3 (PRB_F3)      X        X
        PRB_F2 (PRB_F2)      X        X
        PRB_F1 (PRB_F1)      X        X
        PRB_F0 (PRB_F0)----- X ------ X
        PRB_E7 (PRB_E7)      X        X
        PRB_E6 (PRB_E6)      X        X
        PRB_E5 (PRB_E5)      X        X
        PRB_E4 (PRB_E4)----- X ------ X
        PRB_E3 (PRB_E3)      X        X
        PRB_E2 (PRB_E2)      X        X
        PRB_E1 (PRB_E1)      X        X
        PRB_E0 (PRB_E0)----- X ------ X

                                              03-FEB-86  11:30
```

Figure 4-20   TRACE Initial Menu Screen (at the Timing-only Analyzer)

```
** TRACE SPECIFICATION **                    PK id.          <TRACE STATE>

[TRACE STATE   ]------------------------------------------------------------
  ┌ STORE1 = [1024] states    DELAY = [+0000]
1 │
  │ GROUP     [ADRS   ] [DATA   ] [STATUS] [       ] [       ] [       ]
  │ RADIX     [HEX   ] [HEX   ] [HEX   ] [HEX   ] [HEX   ] [HEX   ]
  │
  │ ENBL1     XXXXX    XXXX      X
  │ TRIG1 [ ] XXXXX    XXXX      X
  │ [OR0]
  │ DSBL1     XXXXX    XXXX      X
  │
  └ TRIG PASS = [001]          TRIG OUT(SYNC) [OFF]

  [STOP  ]
```

                                                    03-FEB-86 11:23

        Figure 4-21   TRACE Initial Menu Screen (at the State-only Analyzer
                      or at the S&T Analyzer)

        The S&T analyzer can select the following four types of measurement
        modes from the menu items described in the upper left corner.

        ● TRACE STATE .... Only the state analyzer (48 chs.) operates.
        ● TRACE S&T (S → T) ... The state analyzer (48 chs.) and the timing
                               analyzer (16 chs.) operate simultaneously. The
                               trigger system at the state analyzing section
                               disarms the trigger arming condition in the
                               timing analyzer.
        ● TRACE S&T (T → S) ... The state analyzer and the timing analyzer
                               operate simultaneously. The trigger system at
                               the timing analyzing section disarms the
                               trigger arming condition in the state analyzer.
        ● TRACE TIMING .... Only the timing analyzer operates.

        The timing analyzing section (option) is required to operate each
        measurement mode: TRACE S&T (S → T) or TRACE S&T (T → S), and TRACE
        TIMING. All the selected measurement mode are displayed on the
        uppermost right corner of the menu screen.

        Depending on the type of the measurement mode, the TRACE menu screen
        is divided into three types, as illustrated in Figure 4-22.

(1/2/3/4 pages)
TRACE STATE

(2/3/4/5 pages)
TRACE S&T (S→T)
TRACE S&T (T→S)

(1 page)
TRACE TIMING

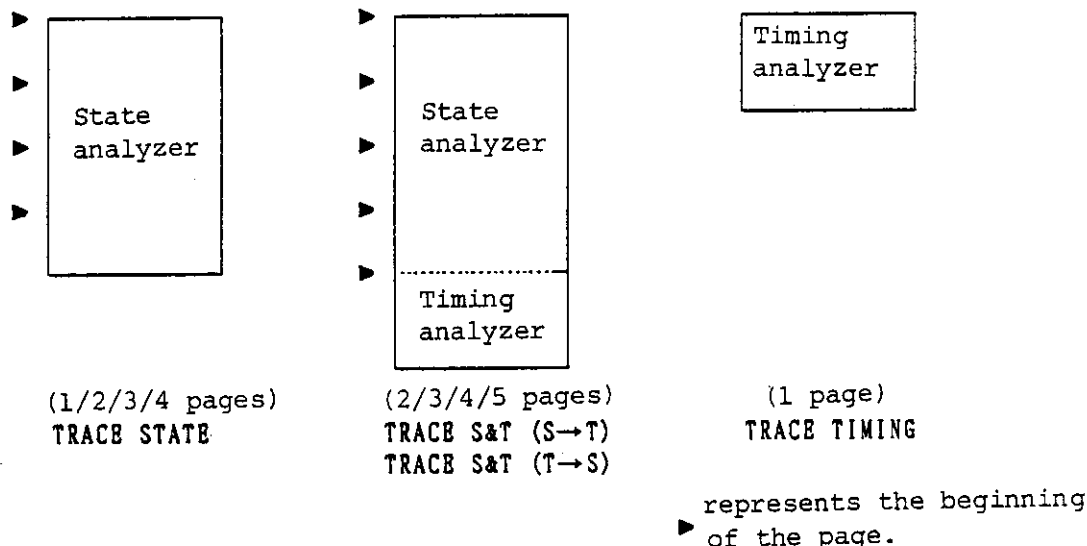▶ represents the beginning of the page.

Figure 4-22   TRACE Menu Screen Type (Size)

The size (the number of pages) of the state analyzer in the menu screen matches the number of the trace window conditions. 1 to 4 pages are used for the TRACE STATE mode; 2 to 5 pages for both the TRACE S&T (S→T) and TRACE S&T (T→S) modes; and 1 page for the TRACE TIMING mode.

A "page" expressed here is defined as a series of menu items which can be displayed on one screen of the CRT display.

The menu screen having two or more pages monitors the whole menu screen by using the scroll knob, or the PAGE keys ⬆ and ⬇. The scroll knob accesses the desired section on the menu screen smoothly at the specified speed (even when the data continues to the next pages). The PAGE ⬆ and ⬇ keys accesses a page including its page header (the section indicated by the ▶ mark as shown in Figure 4-22). The display range may vary according to the input prompt movement by EDIT key (arrow key), or the ENTRY key entry.

The scroll mark (↑ ↓) in the lowermost line of the CRT indicates which section of the menu screen is not displayed. The boundary between the state analyzing section (always set in the lower side) and the timing analyzing section is expressed with dashed lines on the CRT display.

The file processing to be explained later in this chapter (SAVE/GET functions; see Section 4.4.5) are made to the menu items on these menu screens above.

4.4.2 Trace Condition Setting at State Analysis

A trace condition set at state analysis consists of a combination of up to four trace window conditions, and up to four trace window conjunctions.

Each trace window condition sets the trigger conditions which are independent from each other, and obtains data based on that trigger conditions.

The data sequence obtained by the trace window condition n (n = 1 to 4) is called a trace window n (n = 1 to 4). The trace window conjunction is used to control the time relationship between trace windows.

(1) Menu items for trace window condition setting
A single trace window condition consists of three parts: store and trigger conditions, and trigger pulse on/off specification. (See Figure 4-23.) In the following explanation, n takes a value ranging from 1 to 4.

The store condition (STOREn, DELAY) specifies the positional relationship between the size and the trigger point of the trace window n. (See Figure 4-24.)

- STOREn : The state analyzer acquisition memory (ACQ_MEM) contains an area of 48 chs. x 1024 states in size. This area can be used by being divided into several sections to the vertical direction. The value can be set with powers of two (0, 1, 2 to 1024). With the value of 0, no data can be stored to the acquisition memory. (Note that the trigger condition is valid.) With 1, only the trigger values can be stored to the memory. To use multiple trace windows, the user first have to set 512 or less as the store value of the trace window 1. The combination with the trace window conjunction enables a flexible data capturing operation.

- DELAY : Sets the positional relationship of the oldest data position at the trace window n with the trigger point position. The programmable range is the states (in decimal) between − (the store value − 1) and +3072. The negative delay value indicates that the data located before the trigger point can also be obtained. When STOREn = 0, this menu item is invalid.

The trigger conditions (ENBLn, TRIGn, DSBLn, TRIG PASS) specify the
reference point (trigger point) for data capturing. (See
Figure 4-25.) The GROUP ANDed patterns are actually used for each
ENBLn, TRIGn, and DSBLn. If possible, the numeric values (BIN, OCT,
and HEX) as well as SYMBOL and CODE may be used as RADIX for each
GROUP. To use these values, the user should enter the ◆ mark in USE
field on the SYMDEF menu screen in advance. (See Sections 4.3.2 and
4.3.3.)

● TRIGn   : Must accommodate the data to be a trigger.
                   Actually, all the items matching this pattern
                   cannot always be a trigger, but only the data
                   which satisfies the restriction made by the
                   following menu item setting value.
                   The leftmost menu item [ ] in the TRIGn line
                   specifies the NOT trigger specification. This NOT
                   trigger specification handles the specified
                   pattern negation as a trigger pattern.
                   The [OR0] menu item selection specifies the OR
                   trigger. Of the two set trigger patterns, OR1
                   handles the one which appeared earlier on the
                   screen as a trigger. OR2 is set the OR trigger
                   for three trigger patterns; OR3 for four trigger
                   patterns. Up to four trigger patterns can be set
                   at the whole state analyzer.

● ENBLn   : Is a leading pattern to enable the TRIGn pattern
                   detection. Only the data which matches the TRIGn
                   pattern after the data matching the ENBLn pattern
                   appears.

● DSBLn   : Is a leading pattern to disable the TRIGn pattern
                   detection. After the data matching the DSBLn
                   pattern appears, no data can be handled as a
                   trigger even if there is data which matches the
                   TRIGn pattern. (The data matching the ENBLn
                   pattern is also required.)

● TRIG PASS   : Can ignore the (TRIG PASS - 1) number of data even
                   if it can be a trigger. Can set a value ranging
                   from 1 to 256 (in decimal).

The trigger pulse on/off specification menu items are depicted as
follows:

● TRIG OUT (SYNC): Determines if the specified pulse must be output
                   (by ON/OFF manipulation) when the data matching
                   the TRIGn pattern appears at the BNC connector of
                   TRIG OUT (SYNC) on the rear panel. Has a negative
                   pulse having 50 ns width at the TTL level.

```
** TRACE SPECIFICATION **                    PK id.        <TRACE STATE>

[TRACE STATE   ]_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

  [THEN ]

┌ STORE2 = [ 256] states   DELAY = +0000
2
│ GROUP    [ADRS ] [DATA  ] [STATUS] [        ] [        ] [        ]
│ RADIX    [HEX  ] [HEX   ] [HEX    ] [HEX    ] [HEX    ] [HEX     ]
│
│ ENBL2    XXXX     XXXX     XXXX
│ TRIG2 [  ] FFC0   XXXX     XXXX
│ [OR0]
│ DSBL2    XXXX     XXXX     XXXX
│
└ TRIG PASS = 001          TRIG OUT(SYNC) [OFF]

  [THEN ]

┌ STORE3 = [ 512] states   DELAY = +0000
3
```
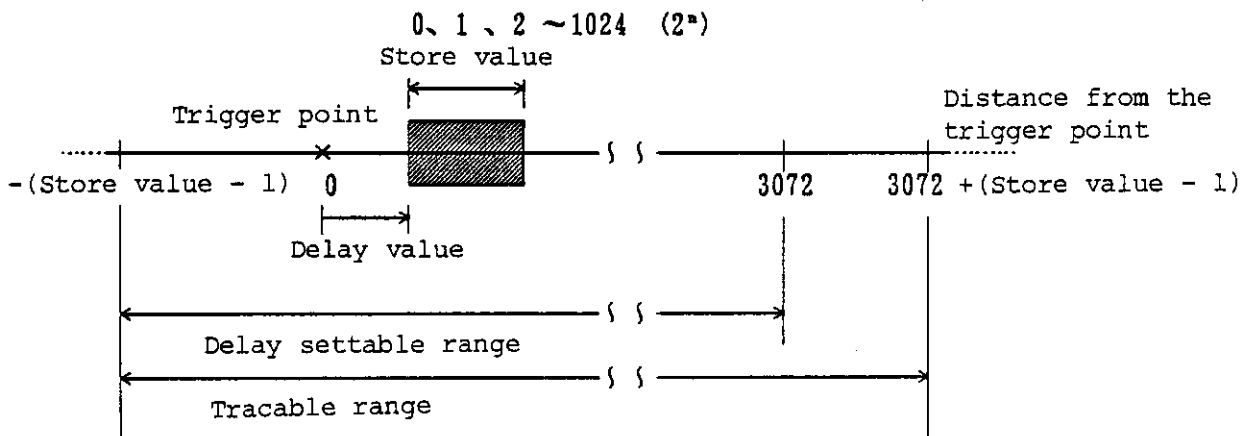
Figure 4-23   Trace Window Conditions

Figure 4-24   Store Conditions

Trigger point Store value

Invalid due to   Invalid due to
leading DSBL   TRIG PASS setting

Delay
value

o   represents the ENBLn pattern.

Δ   represents the DSBLn pattern.

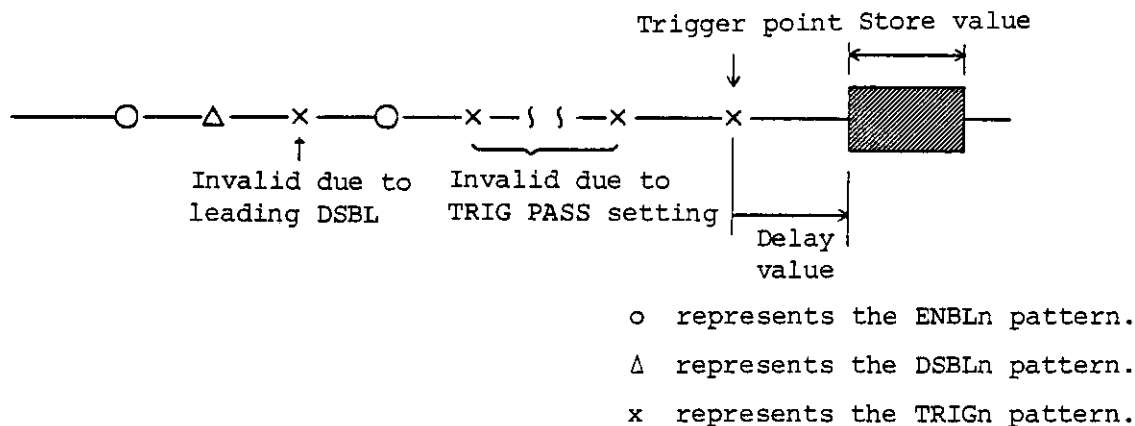x   represents the TRIGn pattern.

Figure 4-25   Trigger Conditions

(2) Trace window conjunction
    The trace window conjunction links multiple trace window conditions,
    and thereby it can organize flexible trace conditions to process
    complicated data flow. (With this feature, a method for higher-level
    measurement operation can be organized by using the PROGRAM function.
    (See Section 6.2.)
    The trace window conjunction can be divided into the following four
    types: (See Figure 4-26.)

● STOP :   Terminates the measurement execution. Can be used even if
           the total value of STOREn is less than 1024 states.
● THEN :   Starts the measurement execution based on the next trace
           window condition after the measurement execution based on a
           trace window condition is completed. Up to four trace
           window conditions can be linked by this THEN specification.
● AGAIN: Repeats the measurement execution based on the immediately
           preceding trace condition until the acquisition memory
           becomes full.
● TOP :   Returns to the trace window condition 1 to continue the
           measurement execution.

Above four trace window conjunctions can be used in combination with
each other.
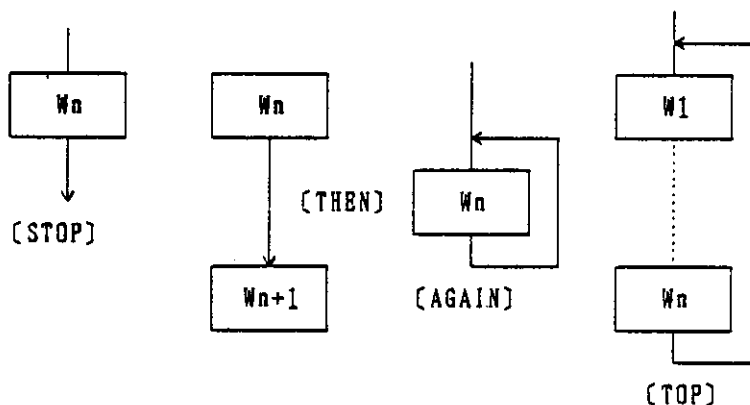
Wn : Trace window condition n (n = 1 to 4)

[ ] : Trace window conjunctions

Figure 4-26 Trace Window Conjunctions Function

(3) Trace window conditions and trace window conjunctions
This section describes some examples of the trace window conditions
combined with the trace window conjunctions. (See Figures 4-27 (a) to
(f).)

● Figure 4-27 (a) illustrates the conventional logic analyzer
  setting. This setting is used for the initial menu screen. The
  value other than 1024 can be selected as a store value.
● Figure 4-27 (b) illustrates AGAIN repeating the trace window
  condition 1.
● Figure 4-27 (c) illustrates THEN linking the trace window conditions
  1 to 4.
● Figure 4-27 (d) illustrates the preset trigger retrieving data, and
  then repeating the following trace window conditions.
● Figure 4-27 (e) illustrates the trigger returning to the trace
  window condition 1 again after completing the repeat execution of
  the conditions.
● Figure 4-27 (f) illustrates the configuration for setting, e.g., a
  sequential trigger function. Both ENBLn and TRIGn (n = 1 to 3) are
  used as an enable pattern. In this case, these are handled as the
  eight level sequential trigger. Note that, in addition to this,
  DSBLn can also be used as one of the trace window conditions, thus
  ensuring more complicated setting.
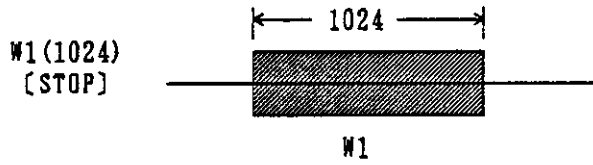
Setting

Figure 4-27 (a)

Setting
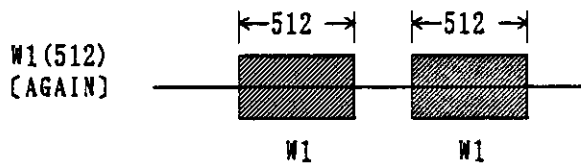
Figure 4-27 (b)

Setting
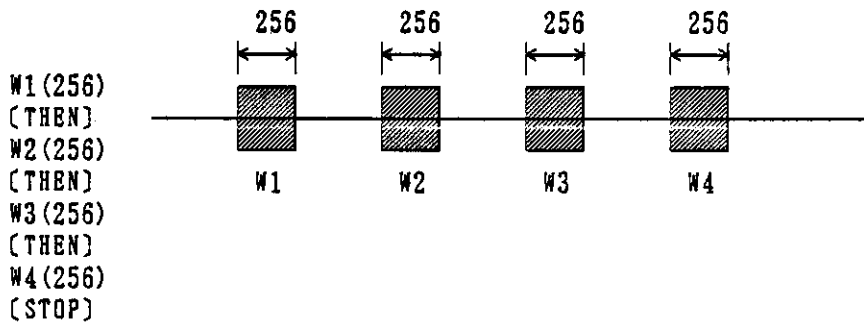
Figure 4-27 (c)

Figure 4-27 Examples of Trace Window Conditions Combined
with Trace Window Conjunction

Setting

W1(512)
[THEN]
W2(256)
[AGAIN]

256   256

|←—512 —→| |←—| |←—|

W1   W2   W2

Figure 4-27 (d)

Setting

W1(256)
[THEN]
W2(256)
[TOP]

256   256   256   256

W1   W2   W1   W2

Figure 4-27 (e)

Setting

W1(0)
[THEN]
W2(0)
[THEN]
W3(0)
[THEN]
W4(1024)
[STOP]

|←— 1024 —→|

—○—×——○—×——○—×——○——

W1   W2   W3   W4

o: ENBLn pattern

x: TRIGn pattern

Wn (store value)
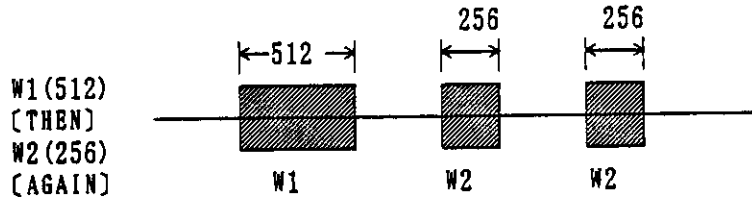
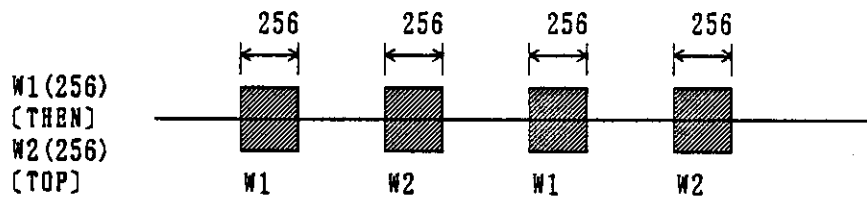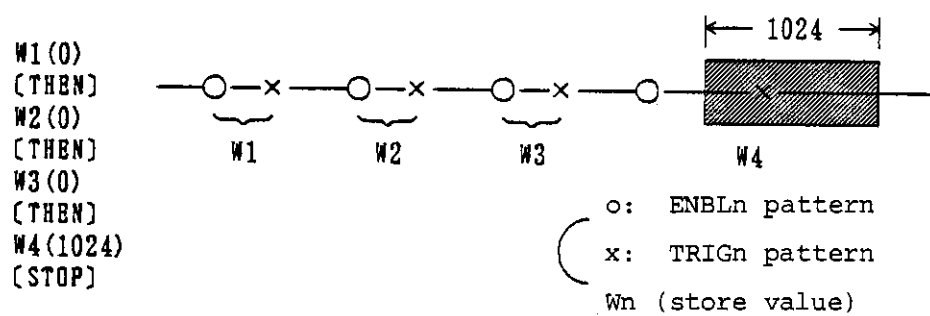Figure 4-27 (f)

Figure 4-27 Examples of Trace Window Conditions Combined
             with Trace Window Conjunctions (Cont'd)

4.4.3 Trace Condition Setting at Timing Analysis

The timing analyzing section is optionally installed.

Its trace conditions are to perform necessary data acquisition
operation out of the input signals.

The TRACE menu screen (at timing analysis) is shown in Figure 4-28.
The user-specified label names and the channel-dedicated label names
(which are parenthesized) are displayed on the screen. The
user-specified label name is defined on the CONFIG menu screen (in the
timing analyzer).

When there is no user-specified label name, the channel-dedicated
label name is displayed at the position prompting for that
user-specified label name.

The programmable data is as follows:

- TRIG-T : A trigger is a reference data to secure data in the
  acquisition memory (ACQ_MEM; 16 chs. x 2048 samples).
  The pattern which must be accommodated by that data is
  specified in this data field.

- ENBL_T : Is the leading pattern to enable the TRIG_T pattern
  detection. Sets a trigger by selecting the data which
  matches the TRIG_T pattern after the data matching the
  ENBL_T pattern appears.

- CLOCK RATE: Selects the internal clock value. Uses the same value
  as for the SAMPLING CLOCK RATE specified on the CONFIG
  menu screen.

- DELAY : Sets the relationship of the trigger point which is
  obtained by the TRIG_T pattern with the oldest data.
  A clock rate (in decimal) ranging from -2044 to +2048
  can be set. The time corresponding to the set delay
  value is also displayed. The negative delay value
  indicates that the data located before the trigger
  point can also be obtained.

```
** TRACE SPECIFICATION **                      PK id.        <TRACE S&T(S→T)>

[TRACE S&T(S→T)]_____[TRIG1] disarms TRIG_T_____QuickVIEW [OFF]
          LABEL       ENBL_T  TRIG_T
     PRB_F7 (PRB_F7)    X        X      CLOCK RATE [ 10ns]
     PRB_F6 (PRB_F6)    X        X
     PRB_F5 (PRB_F5)    X        X      DELAY = +0000  (0ns)
     PRB_F4 (PRB_F4)    X        X
     PRB_F3 (PRB_F3)    X        X
     PRB_F2 (PRB_F2)    X        X
     PRB_F1 (PRB_F1)    X        X
     PRB_F0 (PRB_F0)    X        X
     PRB_E7 (PRB_E7)    X        X
     PRB_E6 (PRB_E6)    X        X
     PRB_E5 (PRB_E5)    X        X
     PRB_E4 (PRB_E4)    X        X
     PRB_E3 (PRB_E3)    X        X
     PRB_E2 (PRB_E2)    X        X
     PRB_E1 (PRB_E1)    X        X
     PRB_E0 (PRB_E0)    X        X

                                         ↓scroll   03-FEB-86 11:46
```

Figure 4-28   TRACE Menu Screen (at Timing Analysis)

4.4.4 Relationship of the State Analyzer with the Timing Analyzer

The TRACE S&T (S → T) and TRACE S&T (T → S) measurement modes can both operate the state analyzer and the timing analyzer simultaneously. These analyzers sample the input signals using individual sampling clocks, therefore, the correspondence between their operation timing is not clear enough. This TR4725 analyzer can obtain the information on how their timing corresponds with each other by arming triggers mutually at the two timing and state analyzers.

The setting for arming operation is performed by selecting the menu item in the right side of the menu item which sets the measurement mode. (Note that this menu item is not displayed on the screen when the system is in either the TRACE STATE or TRACE TIMING measurement mode.)

(1) When in the TRACE S&T (S → T) mode
    The TRACE S&T (S → T) mode sets TRIGn in the following data field:
       [TRIGn] disarms TRIG_T
    (The default value is TRIG1.)
    The term "disarm" means to release the arming state. When in the arming state, the system does not perform trigger detection operation. The measurement execution process in the TRACE S&T (S → T) is illustrated in Figure 4-29. This figure has omitted the detailed description (such as ENBL) on the trigger conditions.
    Figure 4-29 (a) illustrates the state analyzer and the timing analyzer where the trigger conditions are set. The timing analyzer is kept in the arming state until the prespecified TRIGn (n = 1 to 4) is detected at the state analyzing section. After this arming state is released, the trigger conditions at the timing analyzer become valid.

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Figure 4-29 (b) illustrates that the trigger condition at the timing
analyzer is set using the default value. In this case, the trigger
points for the state analyzer, and the timing analyzer match with each
other from the point of their operation timing.
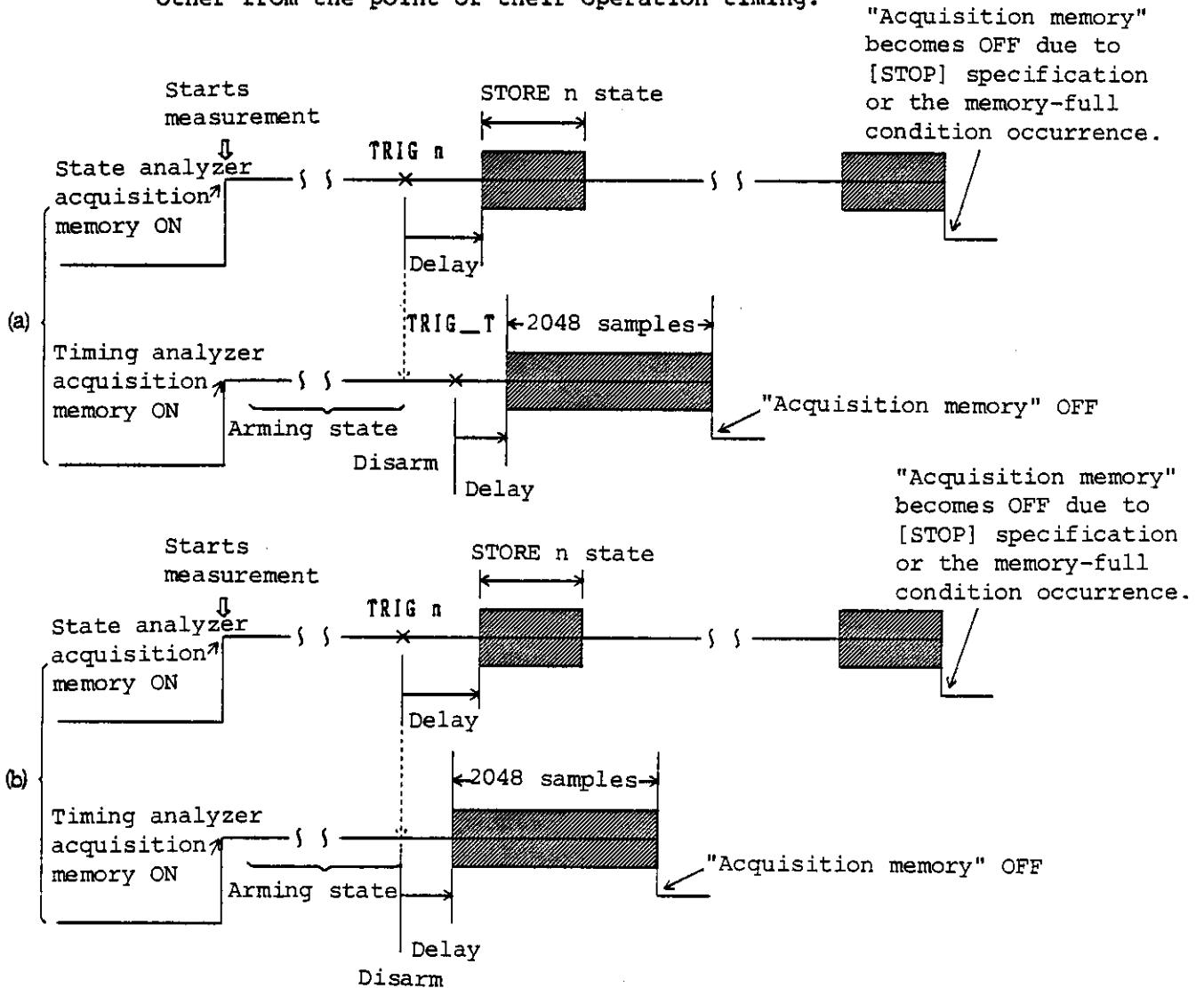
Figure 4-29 TRACE S&T (S→T) Mode Measurement Execution Process

(2) When in the TRACE S&T (T→S) mode
The TRACE S&T (T→S) mode set TRIGn in the following data field:
  TRIG_T disarms [TRIGn]
(The default value is TRIG1.)
The measurement execution process in the TRACE S&T (T→S) mode is
illustrated in Figure 4-30. This figure has omitted the detailed
description of the trigger conditions.

Figure 4-30 (a) illustrates the state analyzer and the timing analyzer
in which the trigger conditions are set. The trace window condition n
at the state analyzer is kept in the arming state until the TRIG_T is
detected at the timing analyzer. A trace window condition which is to
be executed earlier than the trace window condition n is executed
normally.
Figure 4-30 (b) illustrates that the trigger condition at the timing
analyzer is set using the default value. In this case, the trigger
points of the trace window condition n for the state analyzer and the
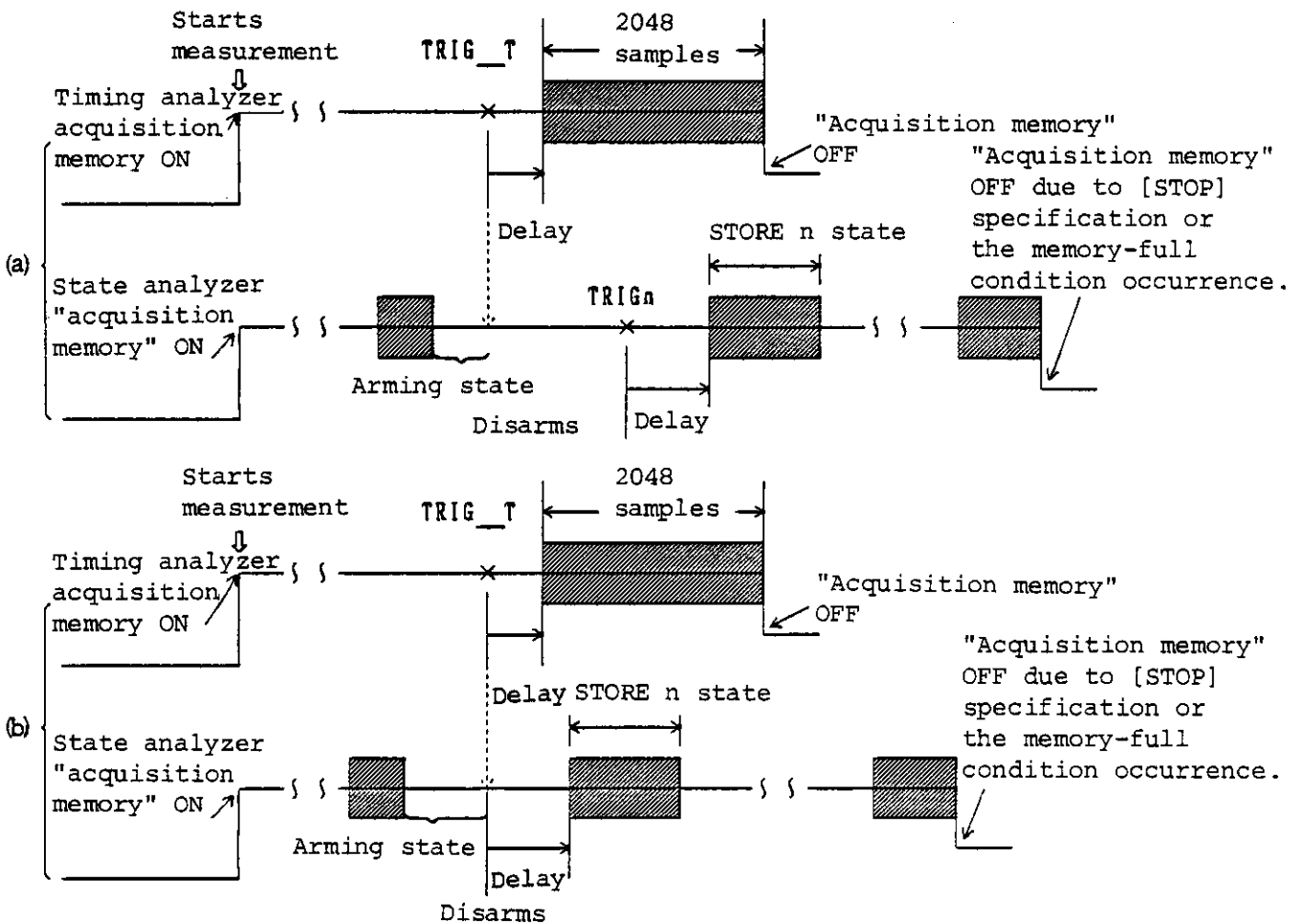timing analyzer match with each other from the point of their
operation timing.

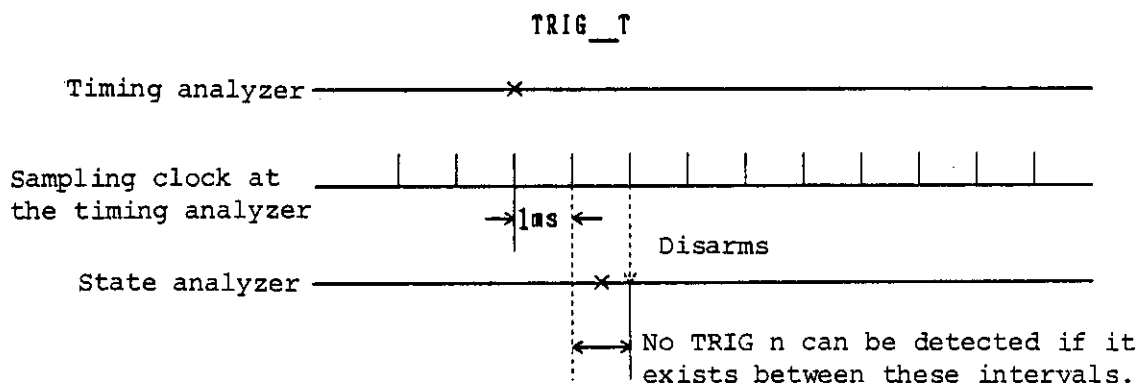Figure 4-30   TRACE S&T (T → S) Mode Measurement Execution Process

---

——————————— CAUTIONS ————————————

The TR4725 analyzer checks the latched data by the sampling clock if it
is a trigger. Therefore, note that TR4725 requires a maximum of one
sampling clock delay time to recognize data as a trigger after the
actual trigger pattern generation.
Especially, when in "TRACE S&T (T→S)" mode, if the system operates the
timing analyzer at the very slow sampling clock rate compared with the
operating speed such as microprocessor to be measured at the state
analyzer, and then observes the data captured via the state analyzer
(i.e., 1 ms), the proper microprocessor operation can be observed if
there is the above differential between the actual TRIG_T generation
point and the arming release point for the state analyzer. In this
case, be sure to use the same or better (faster) clock rate than the one
used at the state analyzer. The sampling clock rate used at the state
analyzer usually corresponds to the microprocessor instruction cycle.

TRIG_T

Timing analyzer ————————————×————————————————

Sampling clock at
the timing analyzer
→|1ms|←
Disarms

State analyzer ————————————————×————————————————

|←——→| No TRIG n can be detected if it
exists between these intervals.

4.4.5 SAVE/GET Functions for Setting Data

The setting data (partially displayed) on the menu screen can be
stored on the file at any time. (SAVE function; see Section 5.3.)

The setting data in the file can be displayed on the menu screen at
any time. (GET function; see Section 5.2.)

Pressing ⌷⣉⌷ displays the main menu screen in the half tone

display mode, and displays the SAVE sub-menu screen on the CRT, as
shown in Figure 4-31. Note that the file name TRACE.Sn (n = 1 to 99)
is named and managed by the TR4725 (system saved file; see
Section 5.1.4). To use a user-specified file, use the ENTRY key to

enter that file name (i.e., TEST1.TRC). Press ⌷⣉⌷ again after this

to start the execution. After the execution is completed, the SAVE
sub-menu screen disappears, and the original main menu screen resumes
again. To use the file name which is managed by the TR4725 system,

just press ⌷⣉⌷ twice to write the setting data on the file. This

in particular is called a QuickSAVE function.)

```
** TRACE SPECIFICATION **                    PK id.        <TRACE S&T(S→T)>
[ TRACE  S&T(S→T) ]--------[TRIG1] disarms TRIG_T------------------QuickVIEW [OFF]
┌ STORE1 = [1024] states   DELAY = +0000
│1
│ GROUP      [ADRS  ] [DATA  ] [STATUS] [      ] [      ] [       ]
│ RADIX      [HEX   ] [HEX   ] [HEX   ] [HEX   ] [HEX   ] [HEX · ]
│
│ ENBL1      XXXX     XXXX     XXXX
│ TRIG1 [ ] FFC0      XXXX     XXXX
│ [OR0]
│ DSBL1      XXXX     XXXX     XXXX
└ TRIG PASS = 001            TRIG OUT(SYNC) [OFF]
  [STOP ]
```

```
         LABEL        ENBL_T   TRIG_T
                                            CLOCK RATE [ 10ns]
SAVE: enter file name > [F0:] TRACE.S1
                                            ↑scroll    03-FEB-86 11:48
```

Figure 4-31 SAVE Sub-menu Screen (on the TRACE Main Menu Screen)

To check which type of files exists on the file, press ⌷ⁱᴰ⌷ twice in a
row. This manipulation displays the main menu screen in the half tone
display mode, and displays the FD sub-menu screen, as shown in
Figure 4-32. (DIRECTORY-of-MENU function; see Section 5.4.1.) To
delete this sub-menu screen, execute the SAVE or GET function, or
press ⌷ˢᵀᴼᴾ⌷.

Pressing [⏏] displays the main menu screen in the half tone display

mode, and displays the GET sub-menu screen, as shown in Figure 4-33.
Usually, no file name is displayed on the screen. (When the
registered file exists, the message "TRACE.REG" is displayed on the
screen.) (See Section 5.4.1.) Next, turning the knob clockwise
displays the file names in alphabetical order. Stop turning the knob

when the desired file name appears on the screen. Press [⏏] after

this to start the execution. After the execution is completed, the
GET sub-menu screen disappears and the original main menu screen
resumes again. No file name entry from the ENTRY key is required when
using the GET function. (This in particular is called a QuickGET
function.) The displayed setting data indicates the data in the file,
and is displayed on the uppermost line of the screen, as shown in
Figure 4-34. At this menu screen, even one piece of data entered by
the ENTRY key erases the file name.

```
** TRACE SPECIFICATION **                    PK id.         <TRACE S&T(S→T)>

[TRACE S&T(S→T)]_____[TRIG1] disarms TRIG_T_____QuickVIEW [OFF]

  ┌ STORE1 = [1024] states    DELAY = [+0000]
  │
  1  GROUP    [ADRS  ] [DATA  ] [STATUS] [      ] [      ] [       ]
  │  RADIX    [HEX   ] [HEX   ] [HEX   ] [HEX   ] [HEX   ] [HEX    ]
  │
  │  ENBL1        XXXX    XXXX    XXXX    ** FD OPERATION **
  │  TRIG1 [ ]  FFC0    XXXX    XXXX
  │  [OR0]                               OPERATION [DIRECTORY] of [MENU]
  │  DSBL1        XXXX    XXXX    XXXX    DRIVE      [F0:]
  │
  └ TRIG PASS = [001]           TRIG OUT(SYN  F0:__name___blks__attri__date_____
    [STOP  ]                                 TRACE.S1      3 TRACE  03-FEB-86 11:49

  ........................................
         LABEL        ENBL_T  TRIG_T

                                                          03-FEB-86 11:50
```

Figure 4-32 FD Sub-menu Screen (on the TRACE Main Menu Screen)

4.4 TRACE CONDITION SETTING (TRACE)

```
** TRACE SPECIFICATION **                    PK id.          <TRACE S&T(S+T)>
[TRACE S&T(S+T)]_____[TRIG1] disarms TRIG_T_____QuickVIEW [OFF]
  STORE1 = [1024] states   DELAY = +0000
1
   GROUP     [ADRS  ] [DATA  ] [STATUS] [         ] [        ] [         ]
   RADIX     [HEX   ] [HEX   ] [HEX   ] [HEX     ] [HEX     ] [HEX     ]

   ENBL1         XXXX     XXXX     XXXX
   TRIG1  [  ]   XXXX     XXXX     XXXX
   [OR0]
   DSBL1         XXXX     XXXX     XXXX
   TRIG PASS = 001            TRIG OUT(SYNC) [OFF]
   [STOP ]
```
```
        LABEL         ENBL_T  TRIG_T
                                          CLOCK RATE [ 10ns]
GET : enter file name > [F0:] _____
                                          +scroll   03-FEB-86 11:52
```

Figure 4-33   GET Sub-menu Screen (on the TRACE Main Menu Screen)

```
** TRACE SPECIFICATION **  from F0:TEST1.TRC   PK id.        <TRACE S&T(S+T)>
[TRACE S&T(S+T)]_____[TRIG1] disarms TRIG_T_____QuickVIEW [OFF]
  STORE1 = [1024] states   DELAY = +0000
1
   GROUP     [ADRS  ] [DATA  ] [STATUS] [         ] [        ] [         ]
   RADIX     [HEX   ] [HEX   ] [HEX   ] [HEX     ] [HEX     ] [HEX     ]

   ENBL1         XXXX     XXXX     XXXX
   TRIG1  [  ]   FFC0     XXXX     XXXX
   [OR0]
   DSBL1         XXXX     XXXX     XXXX
   TRIG PASS = 001            TRIG OUT(SYNC) [OFF]
   [STOP ]
```
```
        LABEL         ENBL_T  TRIG_T
                                          CLOCK RATE [ 10ns]
        F0:TEST1.TRC, gotten              +scroll   03-FEB-86 11:55
```

Figure 4-34   Example of Data Setting with the GET Function
             (on the TRACE Main Menu Screen)

4.5 EXECUTING MEASUREMENT

[RUN] or [AUTO] is used to execute measurement.

The RUN key executes measurement in two ways: one is the normal
measurement which is executed every time [RUN] is pressed. This
measurement must be based on the measurement conditions fixed on such menu
screens as CONFIG, SYMDEF, and TRACE. The other is the QuickVIEW
measurement which can be executable repeatedly, changing the setting
conditions for the timing analysis.

The AUTO key executes measurement based on the program in which the
measurement procedure is coded.

The following examples illustrate only the execution for normal
measurement. See Section 4.8 for the QuickVIEW measurement; Section 6.3
for the execution with the AUTO key.

Pressing [RUN] starts the measurement execution. If the I/O unit is under
execution when [RUN] is pressed, the system waits for its completion, and
then starts the measurement.

Starting the measurement displays the main menu screen in the half tone
display mode, and disables the menu item entries. In this state, the
system displays the measurement execution status in the lower part of the
CRT display. Figure 4-35 presents an example of TRACE STATE, and
Figure 4-36 presents an example of TRACE S&T (S →T).

The measurement execution status for TRACE STATE and TRACE TIMING are made
in a single line, and those for TRACE S&T (S →T) and TRACE S&T (T →S) are
made in two lines.

```
** TRACE SPECIFICATION **                      PK id.          <TRACE STATE>

[TRACE STATE   ]-- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
  ┌ STORE1 = [1024] states   DELAY = +0000
  |1
  |  GROUP    [ADRS  ] [DATA  ] [STATUS] [        ] [        ] [        ]
  |  RADIX    [HEX  ]  [HEX  ]  [HEX   ] [HEX   ]   [HEX   ]   [HEX   ]
  |
  |  ENBL1      XXXX     XXXX     XXXX
  |  TRIG1 [  ] FFC0     XXXX     XXXX
  |  [OR0]
  |  DSBL1      XXXX     XXXX     XXXX
  └ TRIG PASS = 001           TRIG OUT(SYNC) [OFF]

   [STOP ]




              STATE : waiting for ENBL1                  03-FEB-86 11:57
```

Figure 4-35   TRACE STATE Measurement Execution Status

```
** TRACE SPECIFICATION **                      PK id.        <TRACE S&T(S→T)>

[TRACE S&T(S→T)]--------[TRIG1] disarms TRIG_T---------------QuickVIEW [OFF]
  ┌ STORE1 = [1024] states   DELAY = +0000
  |1
  |  GROUP    [ADRS  ] [DATA  ] [STATUS] [        ] [        ] [        ]
  |  RADIX    [HEX  ]  [HEX  ]  [HEX   ] [HEX   ]   [HEX   ]   [HEX   ]
  |
  |  ENBL1      XXXX     XXXX     XXXX
  |  TRIG1 [  ] FFC0     XXXX     XXXX
  |  [OR0]
  |  DSBL1      XXXX     XXXX     XXXX
  └ TRIG PASS = 001           TRIG OUT(SYNC) [OFF]

   [STOP ]
.................................................................................
        LABEL        ENBL_T   TRIG_T
                                          CLOCK RATE [ 10ns]
                   STATE : waiting for ENBL1
                   TIMING: in arming (up to TRIG1)          03-FEB-86 11:59
```

Figure 4-36   TRACE S&T (S→T) Measurement Execution Status

(1) Status at state analysis:
The following messages follow the indication of "STATE:". The underscore section is displayed in the normal blink mode.
- in arming (up to TRIG_T) ... Indicates that the state analyzing section (or the specific trace window condition) is in the arming state. In this arming state, the system does not detect ENBLn, TRIGn, and DSBLn. Specifying TRIG_T at timing analysis section releases (disarms) this arming mode.
- waiting for ENBLn ... Displayed during the system is waiting for the reception of data having the ENBLn pattern.
  Also displayed when the clock from SUT microprocessor does not applied.
- waiting for TRIGn ... Displayed during the system is waiting for the reception of data having the TRIGn pattern.
- m trigs passed (TRIGn) ... When a numeric value larger than 2 is set to TRIG PASS, m (1 to 255), the number of ignored TRIGn patterns, are displayed on the screen.
- in delaying (STOREn) ... Displayed when the number of the captured data is less than those set in STOREn, even if the trigger is detected.
- acquisition ended ... Displayed when the measurement is completed.

(2) Status at timing analysis:
The following messages follow the indication of "TIMING:". The underscore section is displayed in the normal blink mode.
- in arming (up to TRIGn) ... Indicates that the timing analysis section is in the arming state. In this arming state, the system does not detect ENBL_T and TRIG_T. Specifying TRIGn at the state analyzer releases (disarms) this arming mode.
- waiting for ENBL_T ... Displayed during the system is waiting for the reception of data having the ENBL_T pattern.
- waiting for TRIG_T ... Displayed during the system is waiting for the reception of data having the TRIG_T pattern.
- in delaying ... The trigger is displayed when the number of the captured data is less than the size of the acquisition memory (only when the low speed clock is selected).
- acquisition ended ... Displayed when the measurement is completed.

After the entire measurement operation is completed, TRACE STATE and TRACE S&T (S → T) display the state analysis.
DISPLAY menu screen; TRACE S&T (T → S) and TRACE TIMING display the timing analysis DISPLAY menu screen automatically.
Pressing a key of the MENU key group and a key other than [STOP] displays "ignored!" on the screen, and these key operations is ignored.
Pressing a key of the MENU key group aborts the measurement execution forcibly, and the specified menu screen appears after "aborted!" is displayed on the screen.
Pressing [STOP] also aborts the measurement execution in much the same way as above.
In any case, no correct data is displayed on the screen unless the indication, "acquisition ended", is displayed on that screen.

- <u>RADIX</u>   : Sets the cardinal number to display the specified
                     GROUP data. Sets one of the following items: BIN
                     (binary), OCT (octal), DEC (decimal), HEX
                     (hexadecimal), ASCII (for 7 or 8 channel only), MNEM
                     (for the dedicated PK DATA only), SYMBOL (see
                     Section 4.3.2), and CODE (for a GROUP having up to
                     eight channels; see Section 4.3.3).

- [LN]   : Allows a data entry in the line number of the menu
                     item field, which is the next line of [LN].
                     Changing [LN] with the <u>SELECT</u> key executes the
                     subcommand for the <u>DISPLAY</u> menu screen. (Reference
                     memory operation; see next page.)

- Line number: Entering a decimal number in this menu item field with
                     the <u>ENTRY</u> key displays the line number data for that
                     number displayed on the screen. The input prompt
                     defaults a 100th digit position. This default
                     position can be changed by pressing ⊟ and ⊟.

The data scroll operation is described next.

The displayed data can be scrolled up and down by the scroll knob at a
specified speed. (Turn the knob clockwise to scroll data up.)

The <u>PAGE</u> ⬆ and ⬇ keys scroll data up and down in a 10 display line
block. The scroll marks (↑ ↓) in the lowermost right side of the CRT
display indicate to which direction (upward or downward) this
scrolling operation can still be made.

4.6.3 Reference Memory Operation

A reference memory (REF_MEM) keeps the reference data to be compared
with the captured data in the acquisition memory (ACQ_MEM).

Data comparison between acquisition and reference memories can be
performed using the PROGRAM function. (See Section 6.2.2.)

The captured data transfer route and the commands (and subcommands)
needed for this data transfer operation are shown in Figure 4-40.
Data transfers of ① to ③ in this figure are performed on the
DISPLAY menu screen as subcommands.

When the user presses the <u>SELECT</u> key after moving the input prompt to
[LN], the user can use a route by selecting one among three

subcommands respectively shown in ① to ③. Pressing ☐   for

the selected subcommand executes that subcommand. (See Figure 4-41.)

```
** DISPLAY **  from ACQ_MEM                    PK id.        <TRACE STATE>

GROUP [ADRS   ] [DATA   ] [STATUS] [        ] [      ] [     ] [        ] [        ]
RADIX [HEX    ] [HEX    ] [HEX    ] [HEX     ] [HEX   ] [HEX  ] [HEX     ] [HEX     ]
[LN]-+--------+---------+--------+---------+--------+--------+--------+----------
0000   F01060    80C4      D
0001   F01062    3200      D
0002   F01064    2A00      D
0003   F01066    8803      D
0004   F01068    620E      D
0005   F0106A    2F04      D
0006   F0106C    2F01      D
0007   000FAE    000A      A
0008   000FAC    0000      A
0009   F0106E    2F08      D
0010   000FAA    0002      A
0011   000FA8    0000      A
0012   F01070    61B2      D
0013   000FA6    0400      A
0014   000FA4    0000      A
0015   000FA0    00F0      A
0016   F01060    80C4      D

                                    +scroll   03-FEB-86 12:59
```

Figure 4-39 Example of Dividing Memory to Use (STORE=16, AGAIN)

When the trigger mark field overlaps the memory fragmentation boundary
mark field, the trigger mark in the normal display mode appears on
that field. (The trigger mark is displayed in the half tone display
mode when only this mark exists on the screen.)

The displayed data source is displayed on the uppermost left side of
the CRT display. This indicates from which resource the currently
displayed data is sent. ACQ_MEM indicates data from the acquisition
memory, REF_MEM indicates the data from the reference memory, and a
file name indicates the data from the corresponding file. ACQ_MEM is
always set immediately after the measurement execution completion.

The current target name and measurement mode are displayed on the
uppermost right side of the CRT. Note that these indications have no
direct relation with the currently displayed data.

The menu item setting and its efficiencies are described as follows:

● GROUP   : Up to eight menu items are available for GROUP.
                  Selects the GROUP defined on the CONFIG menu screen by
                  using the SELECT key manipulation to display GROUP in
                  a specified order. The single GROUP data can be
                  displayed on different areas at the same time.
                  Selecting a blank prevents a specific data from being
                  displayed on the CRT. The width of the GROUP display
                  varies widely according to both the number of defined
                  channels and RADIX. No combination of GROUP and RADIX
                  which exceeds the CRT display width is allowed.

4.6.2 Setting Display Formats and Menu Items

The initial menu screen at state analysis is shown in Figure 4-38.
This screen displays the first 17 state data of the acquisition memory
(ACQ_MEM; 48 chs. x 1024 states). The GROUP display order depends
upon the definition order on the CONFIG menu screen.

The RADIX is displayed in hexadecimal number (HEX). The underscore
displayed in half tone display mode represents the trigger mark. When
multiple trace window conditions (see Section 4.4.2) are used to
divide the acquisition memory, the memory fragmentation boundary marks
appear on the screen, as shown in Figure 4-39. When the number of
stores is 1 or 2, neither memory fragmentation boundary marks nor
trigger marks appear on the screen.

```
** DISPLAY **  from ACQ_MEM                    PK id.        <TRACE STATE>

GROUP [ADRS    ] [DATA    ] [STATUS] [       ] [      ] [     ] [      ] [        ]
RADIX [HEX     ] [HEX     ] [HEX    ] [HEX    ] [HEX   ] [HEX  ] [HEX   ] [HEX     ]
[LN]-+---------+---------+--------+--------+--------+--------+--------+------------
0000  F01060    80C4     D
0001  F01062    3200     D
0002  F01064    2A00     D
0003  F01066    B883     D
0004  F01068    620E     D
0005  F0106A    2F04     D
0006  F0106C    2F01     D
0007  000FAE    000A     A
0008  000FAC    0000     A
0009  F0106E    2F0B     D
0010  000FAA    0002     A
0011  000FA8    0000     A
0012  F01070    61B2     D
0013  000FA6    0400     A
0014  000FA4    0000     A
0015  000FA0    00F0     A
0016  000FA2    1072     A

                                        ↑scroll   03-FEB-86 12:57
```

Figure 4-38   DISPLAY Initial Menu Screen (at State Analysis)

4.6 DISPLAYING ACQUISITION DATA AT STATE ANALYSIS (DISPLAY)

This DISPLAY function analyzes the captured data in the acquisition memory by displaying it in various formats.

4.6.1 DISPLAY Menu Screen

Pressing ⬚ displays the DISPLAY menu screen. The DISPLAY menu screen also appears automatically after the measurement execution is completed.
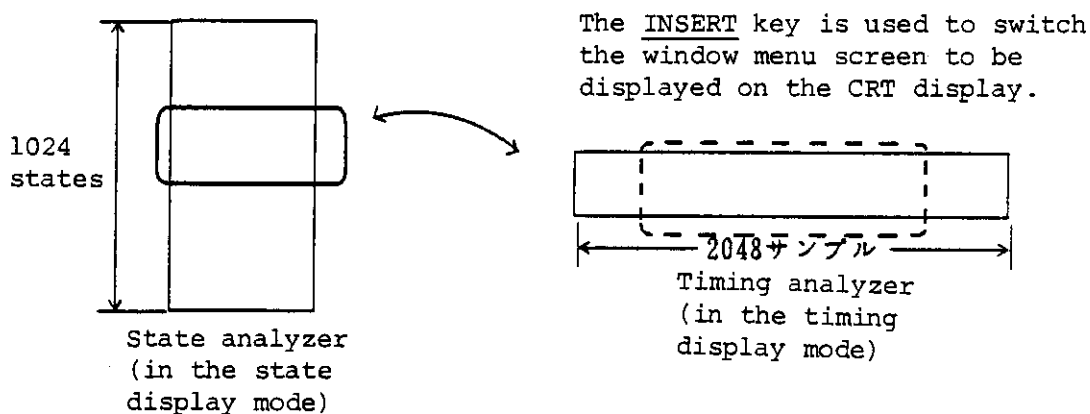

Figure 4-37   DISPLAY Menu Screen Configuration

The DISPLAY menu screen, as illustrated in Figure 4-37, consists of two window display sections (simply termed a menu screen if not confused); the state analyzing and timing analyzing sections. Portions of the acquisition data on either of those sections would be displayed once on the CRT display. After the measurement execution is completed, the menu screen at the state analyzing section is displayed when the system is in either TRACE STATE or TRACE S&T (S→T) mode, and the menu screen at timing analysis is displayed when the system is in either TRACE S&T (T→S) or TRACE TIMING mode.

When the system is in either TRACE STATE or TRACE TIMING mode, there are only two menu screens; one at the state analyzing section, and the other at the timing analyzing section.

When the system is in either TRACE S&T (S→T) or TRACE S&T (T→S) mode, the menu displays at these state and timing analyzing section

can be switched by using ⬚ at a specific timing.

```
** DISPLAY **  from ACQ_MEM                        PK id.          <TRACE STATE>

GROUP [ADRS  ] [DATA  ] [STATUS] [       ] [      ] [      ] [      ] [      ]
RADIX [HEX   ] [HEX   ] [HEX   ] [HEX    ] [HEX   ] [HEX   ] [HEX   ] [HEX   ]
[REF_MEM+DISPLAY] by [INSERT]    ---+--------+--------+--------+--------+-------
0000  F01060    80C4    D
0001  F01062    3200    D
0002  F01064    2A00    D
0003  F01066    B883    D
0004  F01068    620E    D
0005  F0106A    2F04    D
0006  F0106C    2F01    D
0007  000FD6    000A    A
0008  000FD4    0000    A
0009  F0106E    2F0B    D
0010  000FD2    0019    A
0011  000FD0    0000    A
0012  F01070    61B2    D
0013  000FCE    0400    A
0014  000FCC    0000    A
0015  000FC8    00F0    A
0016  000FCA    1072    A

                                                        03-FEB-86  13:47
```

Figure 4-41   Executing Subcommands

4.6.4 SAVE/GET Functions for the Measured Data

Measurement data (partially displayed on the screen) on the menu
screen can be stored to the file at any time. (SAVE function; see
Section 5.3.)

The measurement data in the file can be displayed on the menu screen
at any time. (GET function; see Section 5.2.)

Both cases can be executed with a very simple operation.

Pressing   [sm]   displays the menu screen in the half tone display mode,

and displays the SAVE sub-menu screen, as shown in Figure 4-42. The
file name, DISP.Sn (n = 1 to 99), is named and managed by the TR4725
system (system saved file; see Section 5.1.4). To use a file name to
be specified by the user, enter the file name by using the ENTRY key

(for example, TEST1.DSP). Press   [sm]   again after this to start the

execution. When the execution is completed, the SAVE sub-menu screen
disappears, and the original main menu screen resumes again. This
manipulation stores the data displayed on the overall menu screen to a
single file. (Note that the measurement data at timing analysis,
which is not displayed when in either TRACE S&T (S → T) or TRACE S&T
(T → S) mode, is also stored to a single file.) To use the file name

being managed by the TR4725, just press   [sm]   twice in a row to write

the setting data into the file. (This in particular is called a
QuickSAVE function.)

```
** DISPLAY **  from ACQ_MEM                    PK id.         <TRACE STATE>

GROUP [ADRS   ] [DATA   ] [STATUS] [        ] [        ] [        ] [       ] [       ]
RADIX [HEX    ] [HEX    ] [HEX   ] [HEX     ] [HEX     ] [HEX     ] [HEX    ] [HEX    ]
[LN ]-+--------+--------+--------+--------+--------+--------+--------+-----------
0010   000FD2   0019     A
0011   000FD0   0000     A
0012   F01070   61B2     D
0013   000FCE   0400     A
0014   000FCC   0000     A
0015   000FC8   00F0     A
0016   000FCA   1072     A
0017   F01024   4E56     D
0018   F01026   0000     D
0019   000FC4   0000     A
0020   000FC6   0FEC     A
0021   F01028   48E7     D
0022   F0102A   1C18     D
0023   000FC2   0400     A
0024   000FC0   0000     A
0025   000FBE   0400     A
0026   000FBC   0000     A
SAVE: enter file name > [F0:] DISP.S1
                                                  ↑↓scroll   03-FEB-86 13:07
```

Figure 4-42 SAVE Sub-menu Screen (at State Analysis: DISPLAY)

To check what type of files exist on the disk, press ⬚ twice in a
row. This manipulation displays the main menu screen in the half tone
display mode, and displays the FD sub-menu screen as shown in
Figure 4-43. (DIRECTORY-of-MENU function; see Section 5.4.1.) To
erase this sub-menu screen, execute the SAVE or GET command, or press
⬚ .

```
** DISPLAY **  from ACQ_MEM                    PK id.         <TRACE STATE>

GROUP [ADRS   ] [DATA   ] [STATUS] [        ] [        ] [        ] [       ] [       ]
RADIX [HEX    ] [HEX    ] [HEX   ] [HEX     ] [HEX     ] [HEX     ] [HEX    ] [HEX    ]
[LN ]-+--------+--------+--------+--------+--------+--------+--------+-----------
0010   000FD2   0019     A
0011   000FD0   0000     A
0012   F01070   61B2     D
0013   000FCE   0400     A
0014   000FCC   0000     A          +-------------------------------------------+
0015   000FC8   00F0     A          | ** FD OPERATION **                        |
0016   000FCA   1072     A          |                                           |
0017   F01024   4E56     D          | OPERATION [DIRECTORY] of [MENU]           |
0018   F01026   0000     D          | DRIVE     [F0:]                           |
0019   000FC4   0000     A          |                                           |
0020   000FC6   0FEC     A          | F0:__name___blks__attri__date_____  |
0021   F01028   48E7     D          | DISP.S1       50 DISP    01-FEB-86 11:42   |
0022   F0102A   1C18     D          |                                           |
0023   000FC2   0400     A
0024   000FC0   0000     A
0025   000FBE   0400     A
0026   000FBC   0000     A
                                                              03-FEB-86 13:25
```

Figure 4-43 FD Sub-menu Screen (at State Analysis: DISPLAY)

(1) [REF_MEM←DISPLAY] subcommand

Transfers the currently displayed data (the acquisition memory data if RUN is just completed, and the data in a file if the GET function is just completed) to the reference memory. Note that the displayed data has no change after this data transfer.

(2) [REF_MEM→DISPLAY] subcommand

Transfers the data in the reference memory to the display buffer. Then, the CRT displays the reference memory data. The message, "from REF_MEM", is displayed on the DISPLAY source column.

(3) [ACQ_MEM→DISPLAY] subcommand

Transfers the acquisition memory data on the display buffer. The CRT displays the acquisition memory data. The message, "from ACQ_MEM", is displayed on the DISPLAY source column. Note that this subcommand is automatically executed immediately after RUN is completed.

① [REF_MEM ← DISPLAY]
② [REF_MEM → DISPLAY]
③ [ACQ_MEM → DISPLAY]

Figure 4-40 Transfer Route of the Acquisition Data

Pressing [⚏] displays the main menu screen in the half tone display

mode, and displays the GET sub-menu screen as shown in Figure 4-44.
(A message "DISP.REG" is displayed when there is a registered file;
see Section 5.1.4.)

Turning the knob clockwise, next, displays the file names in
alphabetical order. Stop turning when the desired file name

appears. Press [⚏] again after this to start the execution. When

the execution is completed, the GET sub-menu screen disappears and the
original main menu screen resumes again. No file name entry with the
ENTRY key is necessary for GET sub-menu screen. (This in particular
is called a QuickGET function.) The displayed setting data on the
screen is equal to the specified data in the file, and its file name
is displayed in the uppermost line, as shown in Figure 4-45.

Note that, however, the data to be stored to the file is either
measured data or its attributive data, and therefore, no data such as
on the GROUP display order, the combination of GROUP and RADIX, and
the initially displayed line number, can be stored. (These are
displayed according to the current setting.)

```
** DISPLAY **   from ACQ_MEM                    PK id.         <TRACE STATE>

GROUP [ADRS    ] [DATA    ] [STATUS] [        ] [        ] [        ] [        ] [        ]
RADIX [HEX     ] [HEX     ] [HEX   ] [HEX     ] [HEX     ] [HEX     ] [HEX     ] [HEX     ]
[LN]-+--------+--------+--------+--------+--------+--------+--------+-----------
0010  000FD2   0019     A
0011  000FD0   0000     A
0012  F01070   61B2     D
0013  000FCE   0400     A
0014  000FCC   0000     A
0015  000FC8   00F0     A
0016  000FCA   1072     A
0017  F01024   4E56     D
0018  F01026   0000     D
0019  000FC4   0000     A
0020  000FC6   0FEC     A
0021  F01028   48E7     D
0022  F0102A   1C18     D
0023  000FC2   0400     A
0024  000FC0   0000     A
0025  000FBE   0400     A
0026  000FBC   0000     A
GET : enter file name > [FD:]  _____       ↑↓scroll   03-FEB-86 13:30
```

Figure 4-44 GET Sub-menu Screen (at State Analysis: DISPLAY)

```
** DISPLAY **  from F0:DATA2.DSP                    PK id.         <TRACE STATE>

GROUP [ADRS   ][DATA   ][STATUS][        ][        ][        ][        ][        ]
RADIX [HEX    ][HEX    ][HEX    ][HEX     ][HEX     ][HEX     ][HEX     ][HEX     ]
[LN]--+--------+---------+--------+--------+--------+--------+--------+---------
0000   000F88   0000     B
0001   000F8A   0019     B
0002   000F8C   0000     B
0003   000F8E   000A     B
0004   000F90   0005     B
0005   000F92   0002     B
0006   000F94   0000     B
0007   000F96   0400     B
0008   000F98   0000     B
0009   000F9A   0400     B
0010   000F9C   0000     B
0011   F01092   4E5E     D
0012   000F9C   0000     B
0013   000F9E   0FC4     B
0014   F01094   4E75     D
0015   000FA0   00F0     B
0016   000FA2   1072     B

               F0:DATA2.DSP, gotten                  ↑scroll    03-FEB-86 13:38
```

Figure 4-45   Display Example of the Measured Data Set by GET
                (at State Analysis)

4.7 DISPLAYING CAPTURED DATA AT TIMING ANALYSIS (DISPLAY)

4.7.1 Setting the Display Format and the Menu Items

The DISPLAY function displays the measured data in the acquisition memory or the file on the CRT display in an appropriate format for analyzing.

The initial DISPLAY menu screen is shown in Figure 4-46.
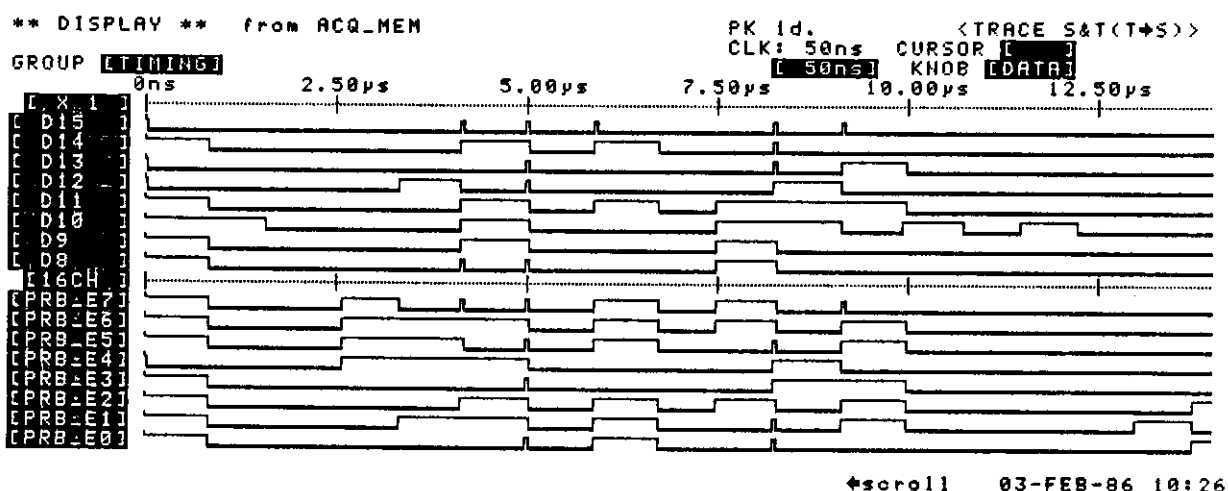
Figure 4-46   Initial DISPLAY Menu Screen (at Timing Analysis)

The input data from the data probes E and F are displayed in the order from 7 to 0, that is, from F7 to F0, and from E7 to E0. (These input data can be referred to by each label name, PRB_F7 to PRB_F0, or PRB E7 to PRB_E0 if these label names are not defined on the CONFIG menu screen.)

The time axis magnification ratio is set to x1, and the first 280 samples of the measurement data are displayed with the maximum display resolution on the initial menu screen.

The displayed data source is indicated in the uppermost left side of the screen. This indicates from where the currently displayed data is sent. ACQ_MEM indicates the data from the acquisition memory, and a file name indicates the data from the corresponding file. ACQ_MEM is always set immediately after the measurement execution completion.

The current target name and measurement mode are displayed on the uppermost right side of the screen. Not that these indications have no direct relation with the currently displayed data.

The time axis scale indicates the time differential between the trigger point and the displayed data. Accordingly, this time axis scale moves according not to the fixed scale but to the data scrolling operation.

Five or six scales appear on one screen.

The relationship of the time axis scale with the displayed data is given in the list below.

Time axis magnification ratio	Time axis scale intervals
x 1/10	Every 500 samples
x 1/5	Every 250 samples
x 1/2	Every 100 samples
x 1	Every 50 samples
x 2	Every 25 samples
x 5	Every 10 samples
x 10	Every 5 samples

The trigger points are expressed with vertical dotted lines, being overlapped on the measurement data.

The lowermost left side of the screen shows the data and time as well as the arrow signs indicating the direction to which scrolling operation can be mode. The ⬅ scroll indicates that scrolling to the left direction is possible (the beginning portion of the measurement data is currently displayed). The ➡ scroll indicates that scrolling to the right direction is possible (the end portion of the measurement data is currently displayed). The ⬅ ➡ scroll indicates that scrolling in both directions is possible.

The effects obtained through the menu item setting operation are described according to the numbers in Figure 4-46.

① GROUP:
Handles TIMING as a special group at the state analyzing section. When the measurement mode is set either to TRACE S&T (S → T) or to TRACE S&T (T → S), the GROUP menu selection switches the menu screens of the state and timing analyzing sections with each other. Note that

the user can use ☐ but not the SELECT key.

② Label + data:
Data is displayed in the order from PRB_F7 to PRB_F0 (data probe F),
or from PRB_E7 to PRB_E0 (data probe E). When the label is predefined
by the user on the CONFIG menu screen (at timing analysis; see
Section 4.2.2), the system uses that user-defined label. (Figure 4-46
is an example of the case above.)
The SELECT key displays data in a specified order. A single data can
be displayed twice on different areas.
When a blank label is selected by use of the SELECT key, no data
appears on the screen.

③ Time axis magnification ratio:
The time axis magnification ratio can be selected from among seven
types: x1/10, x1/5, x1/2, x1, x2, x5, and x10. The reference point
where data is to be magnified is set to the leftmost data position if
no cursor appears, and set to the cursor position if it appears on the
screen. (For details, see Section 4.7.4.)
The relationship of the time axis magnification ratio and the number
of the displayed data on the screen is given in the list below.

Time axis magnification ratio	Number of the displayed data
x 1/10	2048 samples
x 1/5	1400 samples
x 1/2	560 samples
x 1	280 samples
x 2	140 samples
x 5	56 samples
x 10	28 samples

If the trigger point can be specified due to the forcible measurement
execution abortion made by pressing [STOP] , the system displays the time
axis scale, handling the first data as a starting point. (No time
differential is displayed.)

④ The number of the display channels:
The number of display channels can be specified by selecting the
following three types: 16CH, 8CH U, and 8CH L. 16CH displays 16
channels simultaneously. 8CH U displays the higher-order 8 channels
out of the 16 channels displayed by 16CH; 8CH L displays the
lower-order 8 channels of these 36 channels.
Figure 4-47 illustrates the channel display in Figure 4-46 by using
the 8CH U mode.

⑤ CLK:
The value displayed in normal mode represents the sampling clock rate
of the displayed data. Selecting the value in the menu item
immediately beneath the data changes the sampling clock rate at the
next measurement execution. This menu item is the same as SAMPLING
CLOCK RATE on the CONFIG menu screen (at timing analysis).

⑥ CURSOR:
This menu item selection specifies the type of the cursor to be
displayed on the screen. The user can select among the following four
types: blank (no cursor), A, B, and A & B. The one cursor
specification is called a single cursor mode, and two cursor
specification is called a double cursor mode.

⑦ KNOB:
This menu item selection specifies the object to be moved by the
scroll knob, or the PAGE ⊟ and ⊟ keys.
Up to four types of selections are possible: DATA, A, B, and A & B.
Note that, however, the cursor not selected by the CURSOR cannot be
selected by this menu item.
DATA selection performs the display data scrolling. In this case, the
cursor cannot be moved.
A selection moves the cursor A, and B selection moves the cursor B.
A & B selection moves both cursors A and B, keeping a certain time
interval between A and B. (This is called a double cursor
synchronization mode.)
The DEFAULT key is used to initialize the menu screen. When on the
DISPLAY menu screen, this key only returns the measurement data
display to the starting point, and does not change the menu item data.

```
** DISPLAY **  from ACQ_MEM                    PK id.           <TRACE S&T(T→S)>
                                               CLK: 50ns  CURSOR [      ]
GROUP [TIMING]                                       [ 50ns]  KNOB [DATA]
        0ns         2.50µs      5.00µs      7.50µs     10.00µs     12.50µs
   [ X 1 ]
   [ D15 ]
   [ D14 ]
   [ D13 ]
   [ D12 ]
   [8CH U]
   [ D11 ]
   [ D10 ]
   [ D9 ]
   [ D8 ]

                                               ←scroll   03-FEB-86 10:28
```
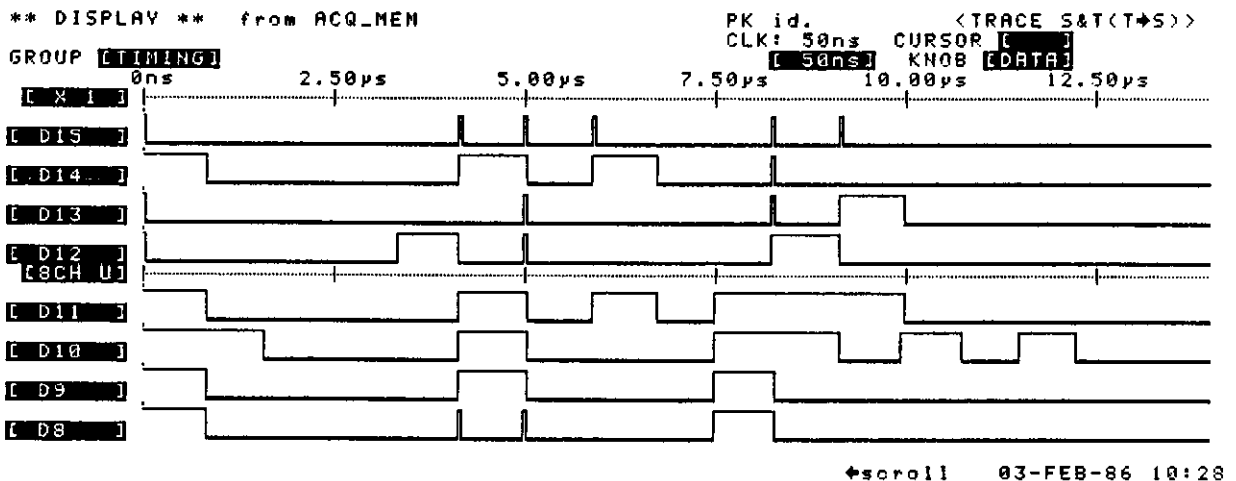
Figure 4-47 Example of 8CH U Display

4.7.2 Data Scrolling Operation

When DATA is selected by the menu item KNOB, the SCROLL key group enables the display data scrolling.

The scroll knob scrolls data in steps of one sample at a specified speed.

The PAGE ⊟ and ⊟ keys scroll data in one page block. (Assume that the arrow signs of these keys indicate the cursor movement directions.)

Turning the scroll knob clockwise or pressing the PAGE ⊟ key displays data in the order from old to new. (Data is set in the left scroll mode.) This operation is common to the scrolling operation performed at the state analyzer, viewed from the standpoint of that data scrolling order.

Turning the scroll knob counterclockwise or pressing the PAGE ⊟ key displays data in the order from new to old. (Data is set in the right scroll mode.) This operation is common to the scrolling operation performed at the state analyzer, viewed from the standpoint of that data scrolling order.

The number of data per page during page scrolling is described on the list below.

Time axis magnification ratio	Number of data per page	Number of pages in whole ACQ_MEM
x 1/10	2048 samples	1 page
x 1/5	1250 samples	Approx. 1.6 pages
x 1/2	500 samples	Approx. 4.1 pages
x 1	250 samples	Approx. 8.2 pages
x 2	125 samples	Approx. 16.4 pages
x 5	50 samples	Approx. 41.0 pages
x 10	25 samples	Approx. 81.9 pages

In the page scrolling function, approx. 10% of data displayed on the CRT display is scrolled, being overlapped with each other. This helps the user to confirm the relation between data which crosses pages. Figure 4-48 demonstrates this status of the data scrolled to the left direction by one page, by using the example in Figure 4-47.
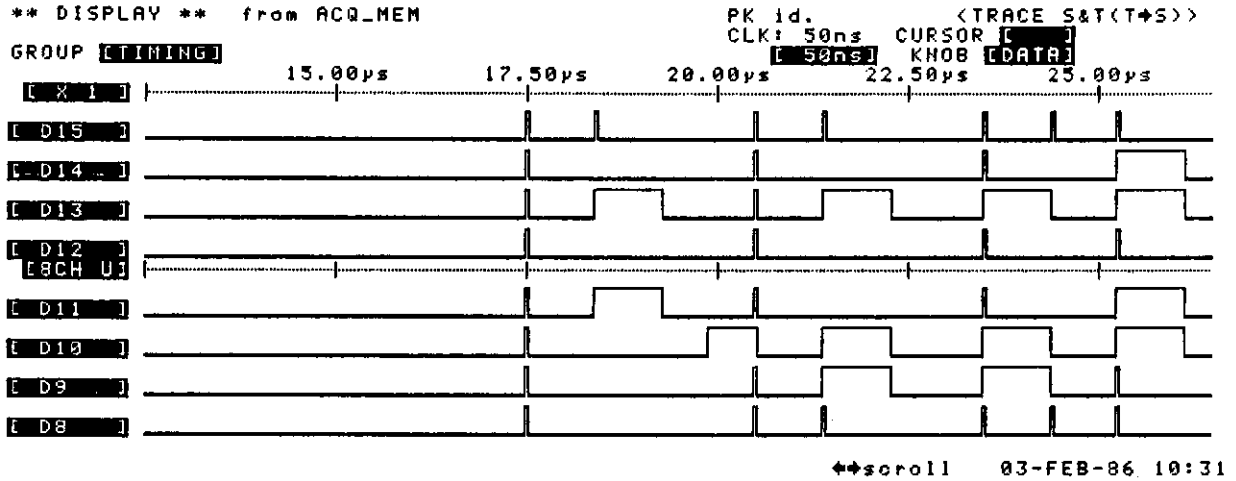
Figure 4-48   Page Scrolling Efficiencies

4.7.3 Cursor Movement Operation

Selection of A, B, or A & B in the menu item field KNOB moves the cursor by using the SCROLL key group.

The cursor movement scope is restricted only on the screen. When the cursor moves to the margin (left, right, top, or bottom) on the screen, it remains at that position. This status switches the current normal mode to the data scroll mode.

Purposes of using the cursor are to read data value by pointing out that data on the screen, to clarify the time relationship between data, etc. Another purpose of setting the reference position on the screen can be given when the time axis is magnified. The relationship of the menu item CURSOR selection with the reference position during the time axis magnification is described as follows:

CURSOR	Reference position
	Data left margin
A	Cursor A
B	Cursor B
A&B	Cursor on the left side

No positional relationship between the displayed data and the cursor is changed even if the time axis magnification ratio is changed.

(1) When in the single cursor mode
An example of the display in the single cursor mode is shown in
Figure 4-49. The cursor A or B moves on each dedicated "rail" (also
used as a time axis scale). The data value pointed by the cursor is
expressed in binary, and is displayed in the left side of the left
data margin.

- Turning the scroll knob clockwise moves the cursor to the right in
  steps of one sample. When this manipulation is continued after the
  cursor has reached the right data margin, the cursor is kept at the
  same position and then the data starts being scrolled to the left.
  (New data begins appearing on the CRT.)
- Turning the scroll knob counterclockwise moves the cursor to the
  left in steps of one sample. When this manipulation is continued
  after the cursor has reached the left data margin, the cursor is
  kept at the same position and then the data starts being scrolled to
  the right. (Old data begins appearing on the CRT.)
- Pressing the PAGE ⊟ key moves the cursor to the right data margin.
  Pressing this key again scrolls the data in the left direction, one
  page at a time, with the cursor being kept at the same position.
  (New data begins appearing on the CRT.)
- Pressing the PAGE ⊟ key moves the cursor to the left data margin.
  Pressing this key again scrolls the data in the right direction, one
  page at a time, with the cursor being kept at the same position.
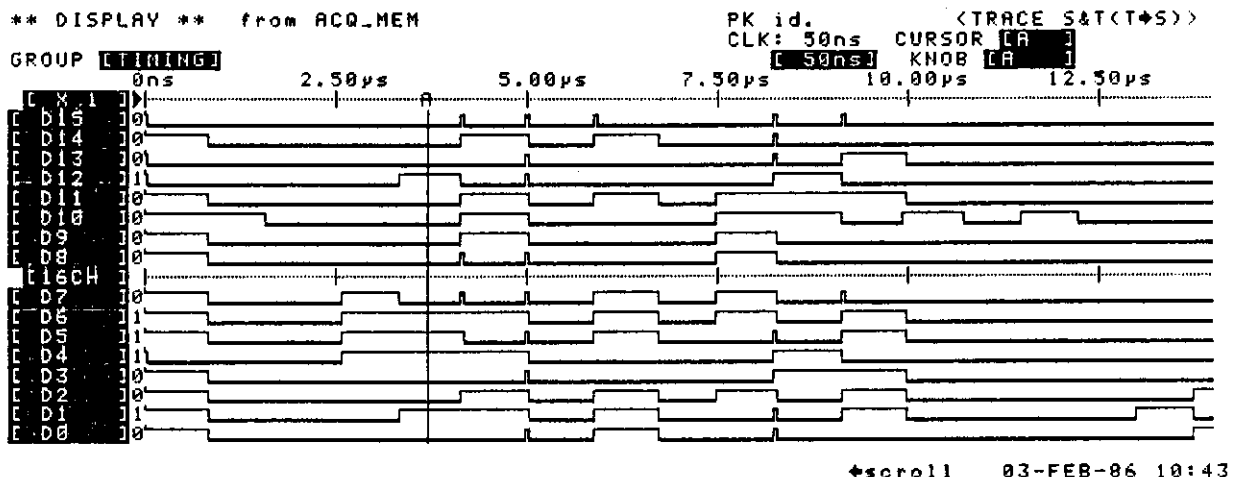 (Old data begins appearing on the CRT.)

Figure 4-49 Example of Display in the Single Cursor Mode

(2) When in the double cursor mode

An example of the display in the double cursor mode is shown in
Figure 4-50. The data value pointed by the left cursor is expressed
in binary, and is displayed in the left side of the left data margin.
The data value pointed by the right cursor is expressed in binary, and
is displayed in the right side of the right data margin. The triangle
mark in the left side of the rail clarifies which cursor points out
which data, even if the two cursors are close with each other.

The time differential between the cursors A and B is indicated on the
upper right corner of the CRT.

The cursor movement operation is performed in much the same way as for
the single cursor mode if the menu item KNOB selection is set to A to
B even when the system is in the double cursor mode.

When the menu item KNOB selection is set to A & B, these cursors, A
and B, move synchronously, keeping a certain time interval between
them. This double cursor synchronization mode of cursors A and B is
described below.

An example of the display in the double cursor synchronization mode is
shown in Figure 4-51. This example moves the cursors A and B
synchronously, keeping 500 ns time intervals between them.

● Turning the scroll knob clockwise moves the cursor to the right in
  steps of one sample. When this manipulation is continued after the
  cursor has reached the right data margin, the cursor is kept at the
  same position and then the data starts being scrolled to the left.
  (New data begins appearing on the screen.)

● Turning the scroll knob counterclockwise moves the cursor to the
  left in steps of one sample. When this manipulation is continued
  after the cursor has reached the left data margin, the cursor is
  kept at the same position and then the data starts being scrolled to
  the right. (Old data begins appearing on the screen.)

● Pressing the PAGE ⇨ key moves the cursor to the right data margin.
  Pressing this key again scrolls the data to the left, one page at a
  time, with the cursor being kept at the same position. (New data
  begins appearing on the screen.)

● Pressing the PAGE ⇦ key moves the cursor to the left data margin.
  Pressing this key again scrolls the data to the right, one page at a
  time, with the cursor being kept at the same position. (Old data
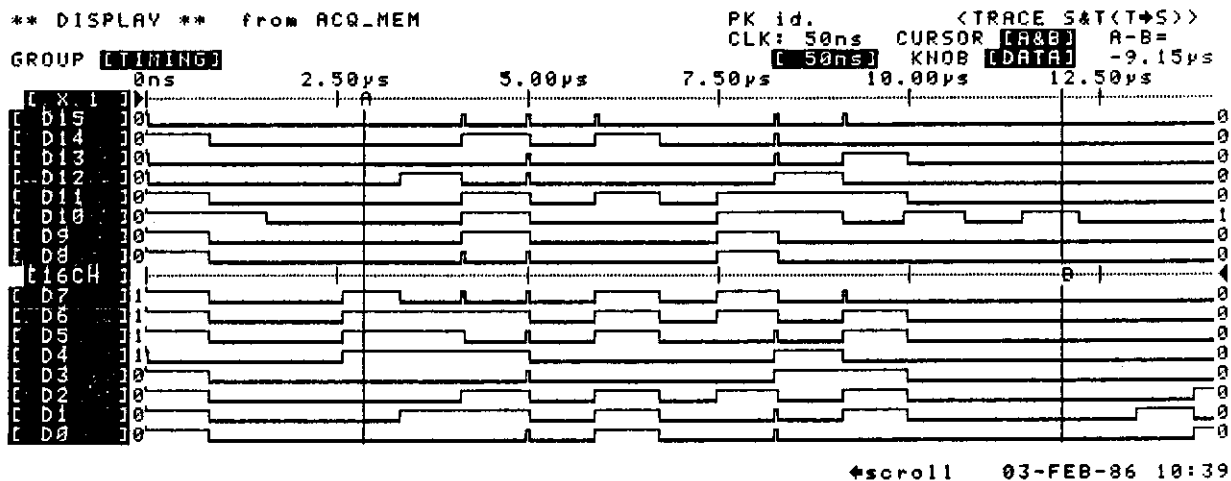 begins appearing on the screen.)

Figure 4-50   Example of Display in the Double Cursor Mode
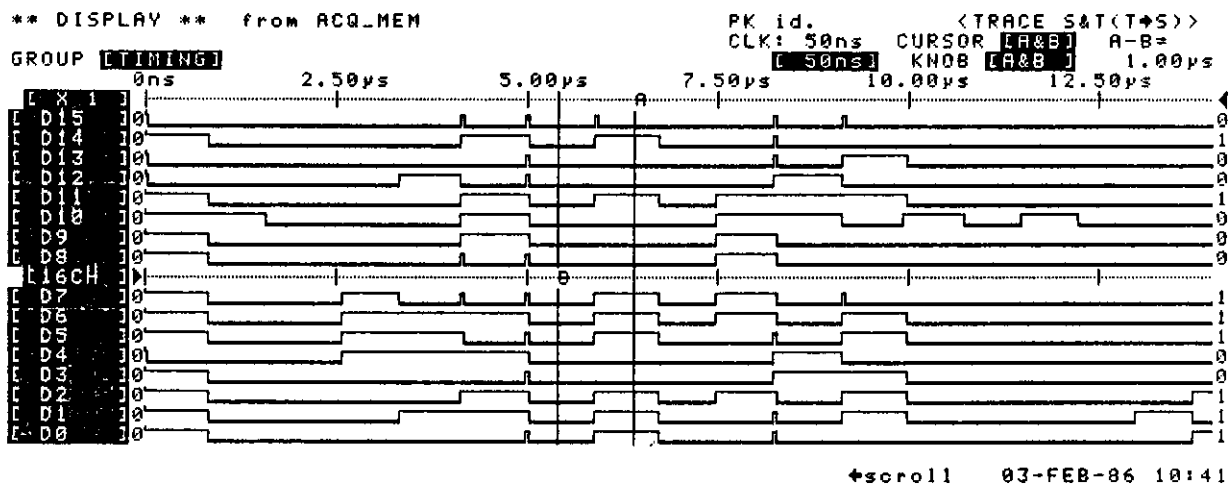
Figure 4-51   Example of Display in the Double Cursor Synchronization Mode

4.7.4 Magnifying and Reducing the Time Axis

The measured data is displayed on the DISPLAY menu screen, having the time concept within it.

The time axis magnification ratio at the initial screen is set to x1, where, of a maximum of 2048 samples, the first 280 measurement data samples are displayed correctly with the best display resolution on the CRT display.

To change the time axis magnification ratio, the user should move the input prompt to the menu item field where [x1] is indicated by using EDIT key, and then set a desired value with the SELECT key. The user can select the magnification ratio among seven types: x1/10, x1/5, x1/2, x1, x2, x5, and x10.

The relationship of the time axis magnification ratio and the number of displayed data on the screen is given below.

Time axis magnification ratio	Number of displayed data
x 1/10	2048 samples
x 1/5	1400 samples
x 1/2	560 samples
x 1	280 samples
x 2	140 samples
x 5	56 samples
x 10	28 samples

The time axis scale indicates the time differential between the trigger point and the displayed data. The relationship of the time intervals between the time magnification ratio and the time axis scale is given below.

Time axis magnification ratio	Time axis scale intervals
x 1/10	Per 500 samples
x 1/5	Per 250 samples
x 1/2	Per 100 samples
x 1	Per 50 samples
x 2	Per 25 samples
x 5	Per 10 samples
x 10	Per 5 samples

Accordingly, the actual time axis scale intervals (time) at each time
axis magnification ratio is set "number of data x sampling clock
cycle".

The reference point for the time axis magnification can be specified
by using the cursor.

The cursor which can perform setting at the menu item CURSOR, and
specify the reference point is described below.

CURSOR	Reference point specification
	Data left margin
A	By cursor A
B	By cursor B
A&B	By the left cursor

Note that the cursor points out the data itself, but not an alteration
point from 0 to 1, and vice versa. The TR4725 cursor is always
pointing the center of data displayed on the screen, regardless of the
time axis magnification ratio.

An oscilloscope cursor can point out the specified position of the
waveform. The difference between the TR4725 and oscilloscope cursors
is described (see Figure 4-52) by using an example of pulse width
measurement.

To measure a signal pulse width at an oscilloscope, the user should
adjust the two cursors (scales can be substituted), as shown in (a),
to 50% level of the signal to read the difference between that level
and the original one. (The measurement value is displayed on the
screen with a recently developed oscilloscope.)

Assume that the TR4725 analyzer places one cursor (i.e., cursor B in
figure below) in the left margin at the 1 level, another (i,e., cursor
A in figure below) at the 0 level, on the right side of the 1 level on
the right margin. With this condition, the TR4725 system displays its
difference on the screen with an indication, "A - B". Note that the
positions where the cursor can move to and from are restricted to
those marked with . The user must also note that when the time axis
magnification ratio increases, the TR4725 display may look quite
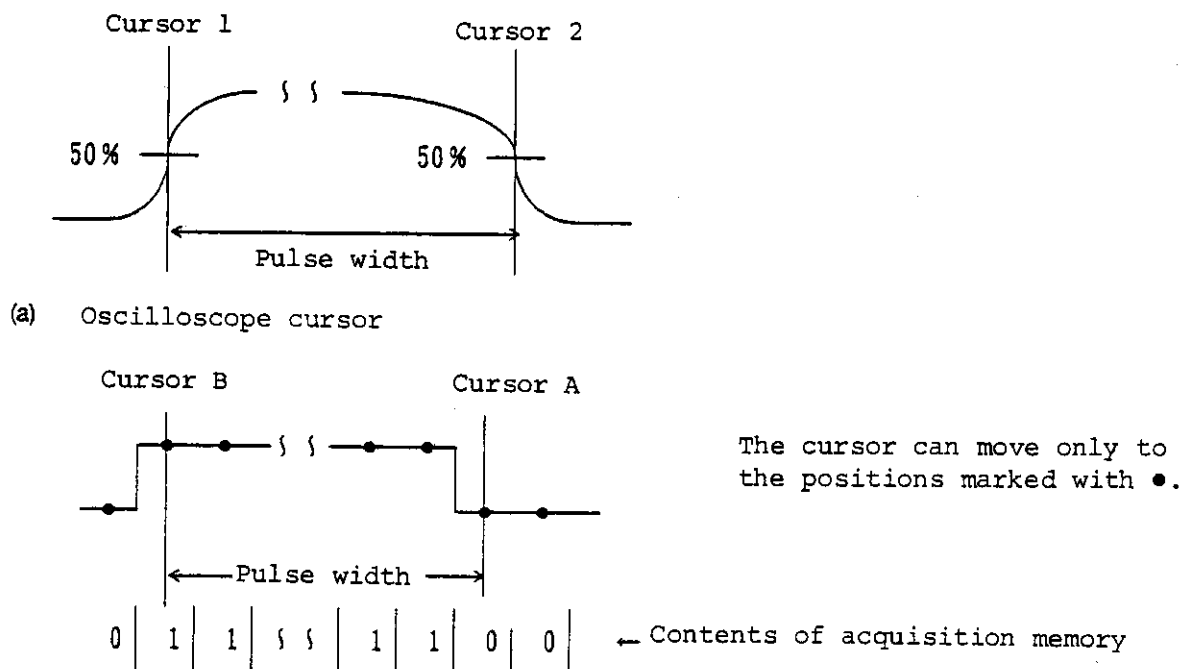different from the oscilloscope in appearance.

(a) Oscilloscope cursor

The cursor can move only to
the positions marked with ●.

Figure 4-52 Pulse Width Measurement Using Cursors

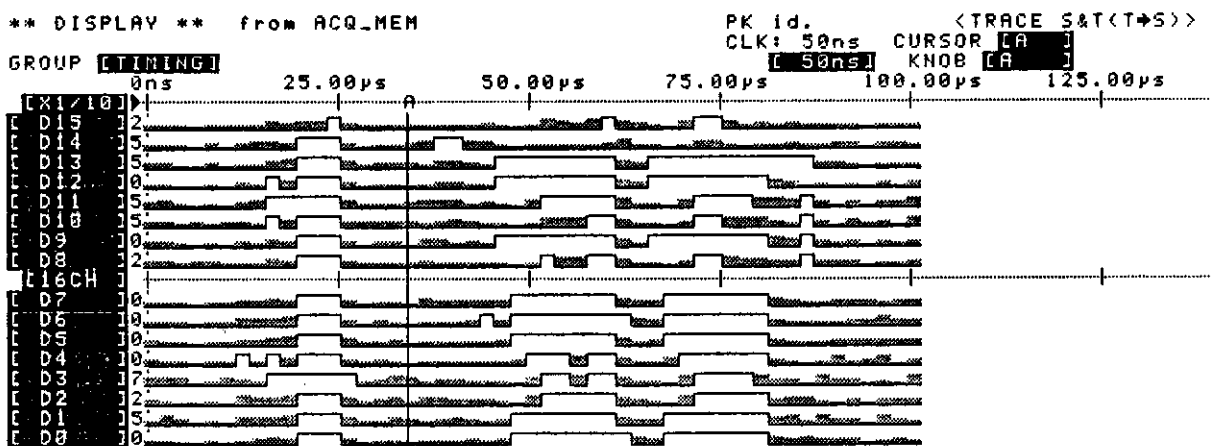When the time axis magnification ratio is set either x1/10, x1/5, or
x1/2, no measurement data can be displayed correctly. (The data is
displayed in condensed form.) The Opt.70 displays data by use of the
statistic process mechanism as shown in Figure 4-53. This figure
demonstrates an example of x1/10 setting, where the overall
measurement data having 2048 samples are displayed on the CRT display.

This display method divides the measurement data into several segments of a size (40, 20, and 8 samples for x1/10, x1/5, and 1/2 time axis magnification ratio, respectively). It then counts the generation frequency of 1 in each segment, and classifies that frequency into six types of waveforms to display according to the table below. This classification helps the user to understand the measurement data macroscopically.

Generation frequency of 1	Waveform display	Read-out display
100% (set to all 1)	H display (with fine lines)	1
75% or more to less than 100%	Histogram display (four types)	9
50% or more to 75% or less		7
25% or more and 50% or less		5
0% or more to 25% or less		2
0% (set to all 0)	L display (with heavy lines)	0

** DISPLAY ** from ACQ_MEM   PK id.   <TRACE S&T<T→S>>
                                               CLK: 50ns   CURSOR [A   ]
GROUP [TIMING]   [50ns]   KNOB [A   ]
        0ns   25.00µs   50.00µs   75.00µs   100.00µs   125.00µs
  [X1/10]
   D15
   D14
   D13
   D12
   D11
   D10
   D9
   D8
  [16CH]
   D7
   D6
   D5
   D4
   D3
   D2
   D1
   D0

                                                               03-FEB-86 10:50

Figure 4-53 Example of Time Axis Reduction Display (x1/10)

4.7.5 SAVE/GET Functions for the Measured Data

The measured data on the menu screen can be stored on the file at any time. (SAVE function; see Section 5.3.)

The measured data in the file can be displayed on the menu screen at any time. (GET function; see Section 5.2.)

Both functions can be executed with a very simple operation.

Press [sw] displays the menu screen in the half tone display mode,

and displays the SAVE sub-menu screen, as shown in Figure 4-54. The file name, DISP.Sn (n = 1 to 99), named and managed by the TR4725 system. To use a file name to be specified by the user, enter the

file name by using the ENTRY key. Press [sw] again after this to

start the execution. When the execution is completed, the SAVE Sub-menu Screen disappears, and the main menu screen appears again.

To use the file name being managed by the TR4725, just press [sw]

twice in a row to write the measured data into the file. (This in particular is called a QuickSAVE function.)

```
** DISPLAY **  from ACQ_MEM                PK id.           <TRACE S&T(T+S)>
                                           CLK: 50ns   CURSOR [   ]
GROUP [TIMING]                             [ 50ns ]   KNOB [DATA]
            5.00µs        7.50µs      10.00µs    12.50µs       15.00µs        17.50
   [ X ]
   [ D15 ]
   [ D14 ]
   [ D13 ]
   [ D12 ]
   [ D11 ]
   [ D10 ]
   [ D9 ]
   [ D8 ]
   [16CH ]
   [ D7 ]
   [ D6 ]
   [ D5 ]
   [ D4 ]
   [ D3 ]
   [ D2 ]
   [ D1 ]
   [ D0 ]
SAVE: enter file name > [F0:] DISP.S1                    ++scroll   03-FEB-86 10:52
```
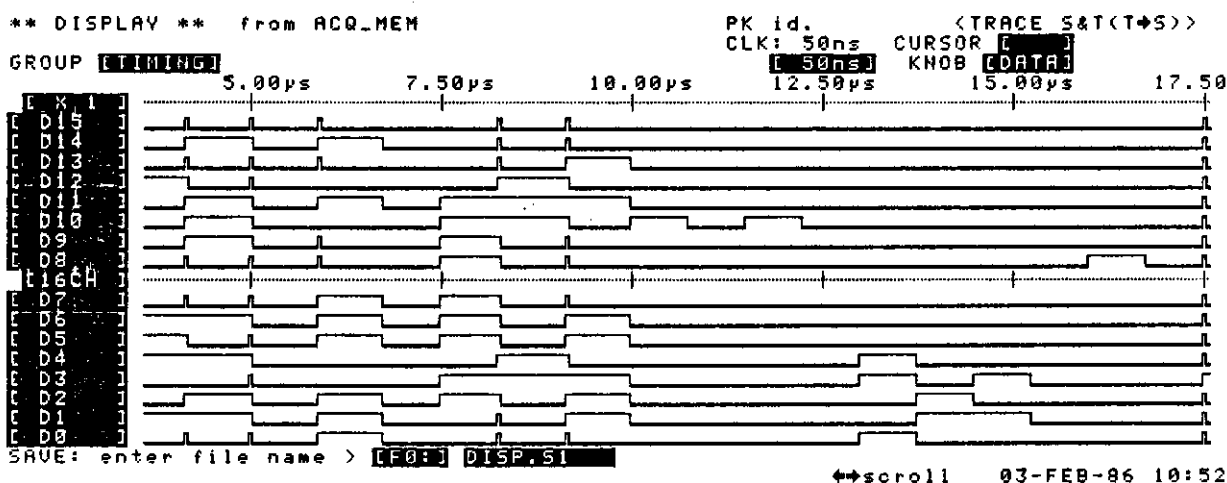
Figure 4-54 SAVE Sub-menu Screen (at Timing Analysis: DISPLAY)

To check what type of files exists on the disk, press [ID] twice in a row. This manipulation displays the main menu screen in the half tone display mode, and displays the FD sub-menu screen as shown in Figure 4-55. (DIRECTORY-of-MENU function; see Section 5.4.1.) To erase this sub-menu screen, execute the SAVE or GET function, or press [STOP] .
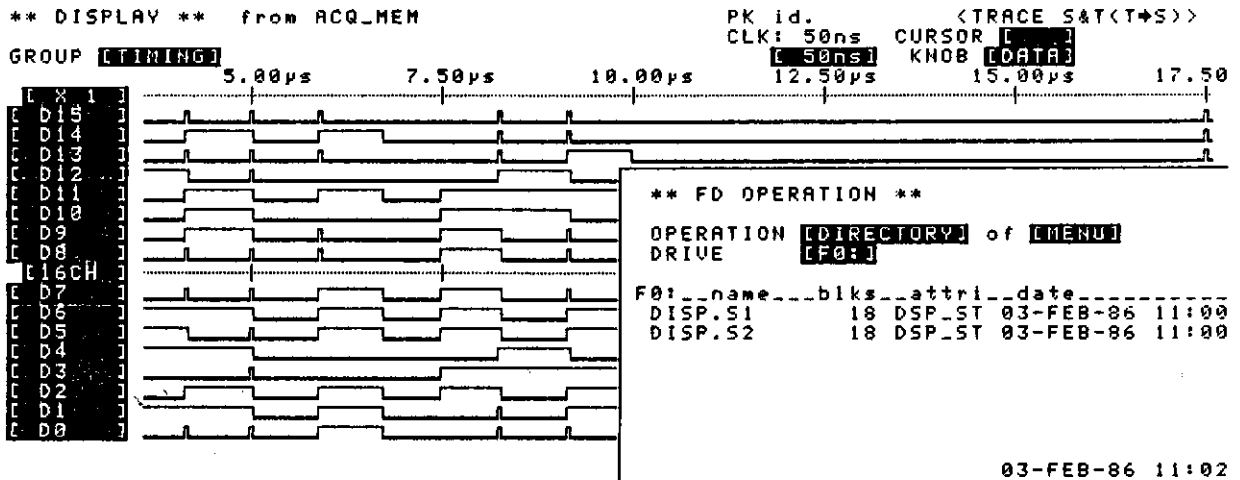
Figure 4-55 **FD** Sub-menu Screen (at Timing Analysis: DISPLAY)

Pressing [ ] displays the main menu screen in the half tone display

mode, and displays the GET sub-menu screen as shown in Figure 4-56.
(A message "DISP.REG" is displayed when there is a registered file;
see Section 5.1.4.) Turning the knob clockwise, next, displays the
file names in the alphabetical order. Stop turning when the desired

file name appears. Press [ ] again after this to start the

execution. When the execution is completed, the GET sub-menu screen
disappears and the original main menu screen resumes again. No file
name entry with the ENTRY key is necessary for GET sub-menu screen.
(This in particular is called a QuickGET function.) The displayed
data on the screen is equal to the measured data in the specified
file, and its file name is displayed in the uppermost line, as shown
in Figure 4-57. Note that the data to be stored to the file is either
measurement data or its attribute data, not information on the time
axis magnification ratio, the number of display channels, the order of
the channels to be displayed, and the cursor operation. (These are
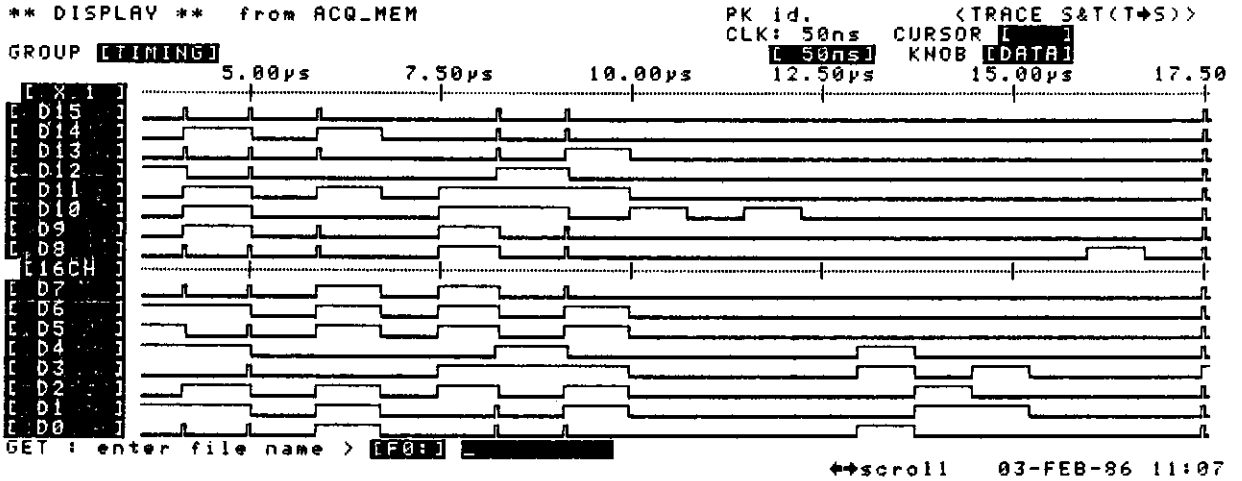displayed according to the currently setting data.)

Figure 4-56 GET Sub-menu Screen (at Timing Analysis: DISPLAY)
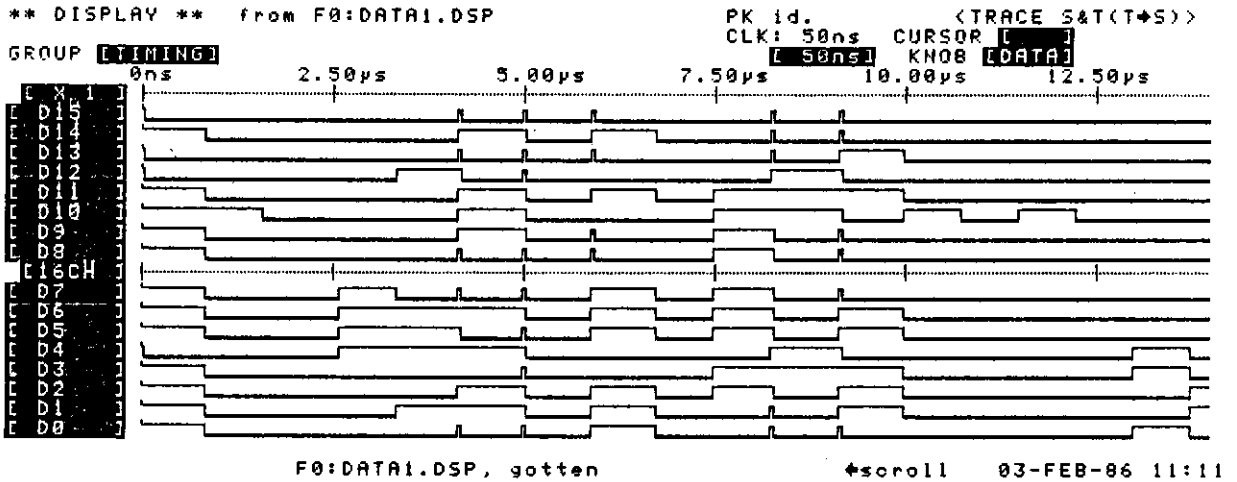

Figure 4-57 Example of Measurement Data Display with the GET Function
(at Timing Analysis)

4.7.6 Data Display Range Marker

The data display range marker indicates that the measurement data currently displayed on the CRT display corresponds to that portion of data having up to 2048 samples with it. Pressing $\boxed{\text{HIF}}$, after moving the input prompt either to [TIMING] or to [xn] (time axis magnification ratio), displays the data display range marker on the screen, as shown in Figure 4-58.

The section enclosed by a heavy line in this figure indicates the measurement data range, where T represents the trigger point. When the measurement data has 2048 samples, 2K (2047 exactly) is displayed on the screen as the maximum sample number, as shown in this figure. When the measurement data contains fewer than 2048 samples, the maximum sample number is set to the acquisition size -1.
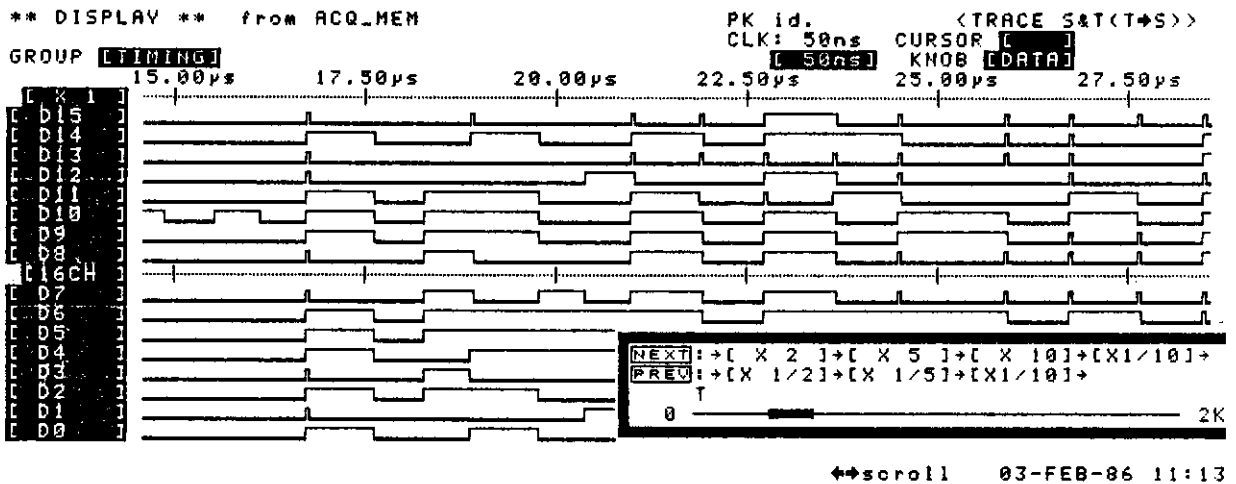

Figure 4-58   Example of Data Display Range Marker

4.8 QuickVIEW FUNCTION (AT TIMING ANALYSIS)

4.8.1 Functional Description and Preparation for Measurement

A QuickVIEW function is provided with easy-to-use oscilloscopic
functions, thus ensuring the increase of measurement speed. In the
QuickVIEW mode, the system alters the sampling clock frequency, delay,
and threshold voltage at a specified execution point, and then
observes its results under almost real-time operation. These actions
allow new functions and performance which were not provided for the
conventional logic analyzers; the latest system can simplify the
condition setting operation (no conditions may be set in advance), and
check the transitional conditions during operation.

The QuickVIEW function can be used when the system is in TRACE S&T
(S → T) or in TRACE TIMING mode.

The system needs to be preset to use the QuickVIEW function. First,

press ⬜ to display TRACE menu screen. Setting the measurement

mode to TRACE S&T (S → T) or to TRACE TIMING displays the QuickVIEW
menu item on the screen. Then, press the SELECT key to turn it [ON].
(See Figure 4-59; the default is OFF.) The TRACE menu screen sets the
trace conditions. (See Section 4.4.3.) No enable nor trigger can be
changed in the QuickVIEW mode, so the user should set these values in
advance. When the system is in the TRACE S&T (S → T) mode, the trace
conditions at state analysis is handled as the arming conditions at
the timing analyzing section, thus ensuring more flexible trigger
specification. When in the TRACE S&T (S → T) mode, the data at the
state analyzing section is displayed on the DISPLAY menu screen where
the menu selection has completed. When the system is in the QuickVIEW
mode, however, only the data at timing analysis is displayed on the
screen. (No state analysis data can be displayed if the QuickVIEW
function execution is not aborted.)

Next, press ⬜ to display the CONFIG menu screen on the CRT. The

CONFIG menu screen (at the timing analyzing section) sets the
condition setting for the input section. (See Section 4.2.3.) To
alter the threshold voltage with the QuickVIEW mode, be sure to set V3
or V4 in the menu item of the target input channel threshold voltage.
Figure 4-60 shows an example which performs a level conversion for the
probe F channels 0 to 3 by use of the threshold voltage V3. No label
name, polarity, nor sampling mode can be changed with the QuickVIEW
mode, so the user should set them in advance.

4.8 QuickVIEW FUNCTION (AT TIMING ANALYSIS)

```
** TRACE SPECIFICATION **                          PK id.          <TRACE TIMING>

[TRACE TIMING  ]---------------------------------------------QuickVIEW [ON ]

         LABEL            ENBL_T  TRIG_T
      D15   (PRB_F7)         X       1     CLOCK RATE [ 10ns]
      D14   (PRB_F6)         X       1
      D13   (PRB_F5)         X       1     DELAY = +0000  (0ns)
      D12   (PRB_F4)·······  X  ···· 1
      D11   (PRB_F3)         X       1
      D10   (PRB_F2)         X       X
      D9    (PRB_F1)         X       X
      D8    (PRB_F0)·······  X  ···· X
      D7    (PRB_E7)         X       X
      D6    (PRB_E6)         X       X
      D5    (PRB_E5)         X       X
      D4    (PRB_E4)·······  X  ···· X
      D3    (PRB_E3)         X       X
      D2    (PRB_E2)         X       X
      D1    (PRB_E1)         X       X
      D0    (PRB_E0)·······  X  ···· X

                                                    03 FEB-86 11:20
```

Figure 4-59 Setting QuickVIEW Mode

```
** CONFIGURATION **                                PK id.          <TRACE TIMING>

-LABEL-
     PROBE          ┌─PROBE_F─┐              ┌─PROBE_E─┐
     DATA CHANNEL    7654 3210               7654 3210
                     ↓↓↓↓ ↓↓↓↓               ↓↓↓↓ ↓↓↓↓
     THRESHOLD      [TTL] [V3]              [TTL] [TTL]
     LABEL   POL                   LABEL   POL
      D15   [+]←                    D7    [+]←
      D14   [+]←                    D6    [+]←
      D13   [+]←                    D5    [+]←
      D12   [+]←                    D4    [+]←
      D11   [+]←                    D3    [+]←
      D10   [+]←                    D2    [+]←
      D9    [+]←                    D1    [+]←
      D8    [+]←                    D0    [+]←

-VARIABLE THRESHOLD-
     V3 = [   1.4V]        V4 = [  -1.3V]

-SAMPLING-
     CLOCK RATE [ 50ns]    MODE [SAMPLE]

                                                    03-FEB-86 11:2·
```

Figure 4-60 Using the Threshold Voltage V3

4.8.2 Summary on Key Operation

Pressing [ᴬᴹ] starts the QuickVIEW function execution if the QuickVIEW menu item is set to ON the TRACE menu screen. Once the system is set in the QuickVIEW mode, none of the DISPLAY menu items of the DISPLAY menu screen allow data entries (this is a normal display condition), and instead the display accommodates only two menu items in the lowermost line. Unlike other menu screens, no input prompt exists on the screen. This is because the key which specifies data in the menu item field has already been determined. The two menu items are expressed as "[M1] = M2". The menu item in the left side is a change item at the QuickVIEW function, which can be selected among four selection items, CLOCK (sampling clock), DELAY (delay), V3 or V4 (threshold value), by using the SELECT key. The one in the right side is to set each variable value. To set the value, use the PAGE [↑] and [↓] keys, and the DEFAULT key.

The key operation with the QuickVIEW mode is common regardless of the change items, and is summarized as follows:

● SELECT key : Pressing [ᴷᴵᴵ] selects the QuickVIEW change item in

the order from CLOCK, DELAY, V3, V4, and CLOCK.

Processing [ᵐᵛ] selects that item in the reverse

order.

● STOP key : Pressing [ˢᵀᴼᴾ] aborts the QuickVIEW function execution, and displays the DISPLAY menu screen. Press [ᴬᴹ] after this to resume the QuickVIEW function execution. Note that [ᴬᴹ] execution is invalid during QuickVIEW function execution.

● Knob : Using the knob sets the change item value continuously with every base unit.

	Knob counterclockwise rotation			Knob clockwise rotation	
	Alteration direction	Lower limit value	Base unit	Alteration direction	Upper limit value
CLOCK	To the lower-speed direction	1 ms	1-2-5 step	To the higher-speed direction	10 ns
DELAY	To the negative direction	-2044 clock	1 clock	To the positive direction	+2048 clock
V3	To the negative direction	-12.7 V	0.1 V	To the positive direction	+12.7 V
V4	To the negative direction	-12.7 V	0.1 V	To the positive direction	+12.7 V

● DEFAULT key: Using ⬜ sets the change item value to the default

   value.

	Default value	Remarks
CLOCK	10 ns	
DELAY	0 clock	
V3	+1.4 V	TTL reference value
V4	-1.3 V	ECL reference value

● PAGE ⬆ and ⬇ keys: Pressing the PAGE ⬆ and ⬇ keys sets the change
                      item value repeatedly by fixed increments.

4.8 QuickVIEW FUNCTION (AT TIMING ANALYSIS)

	PAGE key		PAGE key	
	Setting value	Lower limit value	Setting value	Upper limit value
CLOCK	1 ms	1 ms	10 ns	10 ns
DELAY	*1	-2044 clock	*2	+2048 clock
V3	*3	-12.7 V	*4	+12.7 V
V4	*3	-12.7 V	*4	+12.7 V

*1: The set value - the number of data per page (example: 250 with
     x1 mode)

*2: The set value + the number of data per page (example: 250 with
     x1 mode)

*3: The integer closest to the setting data to the negative direction
     (example: -1.3 V → -2.0 V)

*4: The integer closest to the setting data to the positive direction
     (example: +1.4 V → +2.0 V)

Note that the upper and lower limit values for DELAY, V3, and V4 are
not found with the expression which finds the setting value.

● MENU key group: Pressing one key of the MENU key group aborts the
                    QuickVIEW function execution, and displays the menu
                    screen corresponding to that key. Press [ᴹᴺ] after
                    this to resume the QuickVIEW function execution.

● Other keys   : Pressing keys other than above displays an error
                    message, and ignores the key entry.
                    ENTRY key group other than the SELECT key ...
                        Displays the message, "use KNOB!".
                    EDIT key group other than the DEFAULT key, HELP
                    key, RUN key, AUTO key, and I/O key group ...
                        Displays the message, "ignored!".

4.8.3 Changing Sampling Clock

    When the system is in the QuickVIEW mode, the user can change the
    sampling clock, in the same way as for operating the oscilloscope time
    axis knob and observe data at a real-time system. With this
    mechanism, the user can quickly set the sampling clock at an
    appropriate value even when no sampling clock is set beforehand. The
    QuickVIEW menu screen to set the sampling clock is shown in
    Figure 4-61.

Turning the knob clockwise selects a higher-speed sampling clock
(10 ns for upper limit value) and counterclockwise sets a lower-speed
one (1 ms for lower limit value), and executes the measurement based
on that clock rate. The CLK indication on the upper side of the menu
screen signifies in the same way as for the one on the normal <u>DISPLAY</u>
menu screen. That is, the value enclosed by parentheses indicates the
one specified by the user, and the value just above that value in
parentheses indicates the sampling clock for the currently displayed
measurement data.

Pressing the <u>PAGE</u>⬇ key sets the sampling clock to 10 ns (the upper
limit value); pressing the <u>PAGE</u>⬆ key sets it to 1 ms (the lower limit
value).

Pressing ⬜ sets the default value 10 ns.

If key entries are attempted beyond the upper and lower limits even
after default values are set to both directions, the system displays
"upper limit!", or "lower limit!" on the screen, and ignores the key
entries.

Pressing ⬛ᵀᵒᵖ aborts the QuickVIEW execution, and displays the normal
<u>DISPLAY</u> menu screen after displaying "aborted!" on the screen.

When the current measurement is not completed after four seconds from
the previous measurement completion time, the system displays "slow!"
on the screen. Concurrently, it displays the measurement execution
status showing the cause of the error.
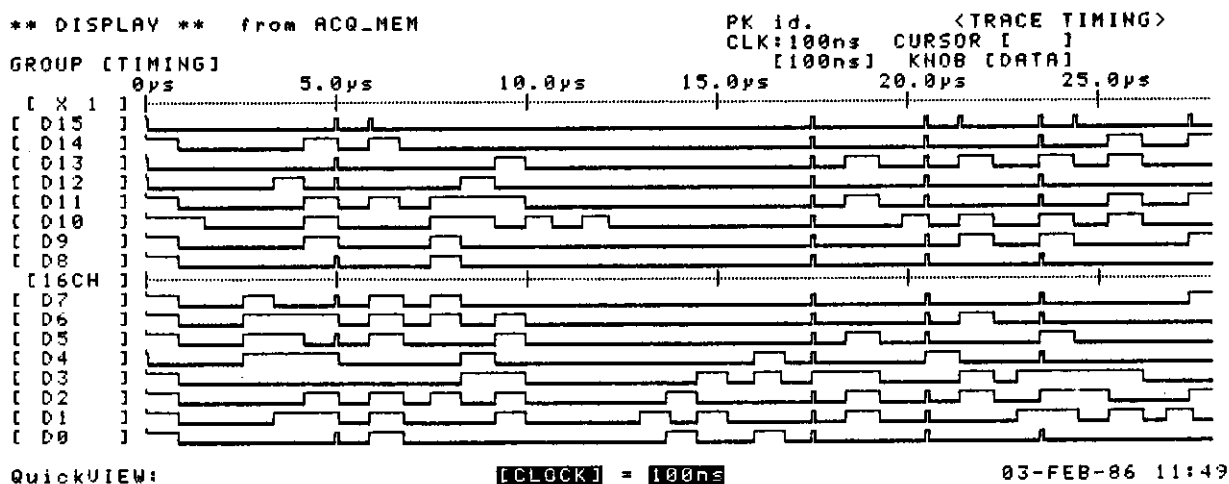
Figure 4-61 Changing Sampling Clock

4.8.4 Changing Delay

When the system is in the QuickVIEW mode, the user can change the
delay which specifies the data capture position to the acquisition
memory based on the trigger point as a reference point and observe the
data at a real-time system. This trigger point is treated just as a
reference point, thereby the point the user really wants to observe
may be before or after that trigger point but not on it. In this
system, time intervals often cannot be assumed beforehand. Therefore,
the user executes the measurement first to specify the delay,
monitoring the measurement data on the screen. This delay
specification method assures quick measurement operation. The
QuickVIEW menu screen to set the delay is shown in Figure 4-63.

Turn the knob clockwise to change the setting value to the positive
direction (2048 for upper limit clock), and counterclockwise for the
negative direction (-2044 for lower limit clock). Based on these
values, the system performs the measurement execution.

Of the captured data (usually, 2048 samples) the first n number of the
data is displayed on the screen, as illustrated in Figure 4-62. The
value n depends upon the time axis magnification ratio, and is given
below.

Time axis magnification ratio	n: number of displayed data
x 1/10	2048
x 1/5	1400
x 1/2	560
x 1	280
x 2	140
x 5	56
x 10	28

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Delay

(a) Minus delay

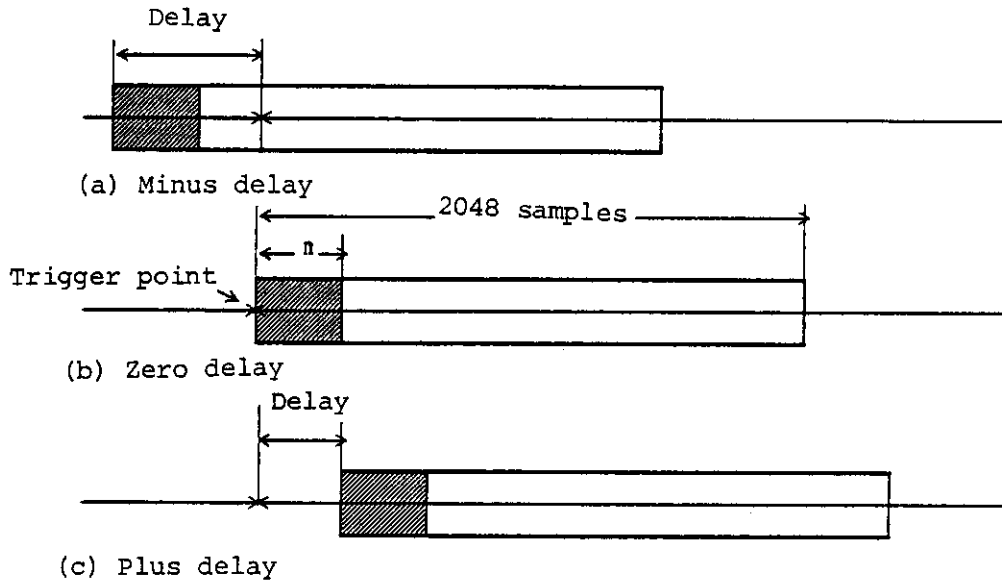2048 samples

Trigger point

(b) Zero delay

Delay

(c) Plus delay

Figure 4-62   Display Range with the Delay and Trigger Point as Base

Press the PAGE ⬆ key to add the number of data corresponding to one page of data to the preset value; press the PAGE ⬇ key to subtract that number of data. The number of data which can be accommodated in one page depends upon the time axis magnification ratio, and is presented below. In both cases, the upper and lower limit values are set 2048 clock, and -2044 clock, respectively.

Time axis magnification ratio	Number of data corresponding to one page of data
x 1/10	Upper/lower limit values
x 1/5	1250
x 1/2	500
x 1	250
x 2	125
x 5	50
x 10	25

Pressing ☐ sets 0 clock of the default value.

If key entries beyond the upper and lower limits are attempted even after default values are set to both directions, the system displays "upper limit!", or "lower limit!" on the screen, and ignores the key entries.

Pressing [stop] aborts the QuickVIEW execution, displays the normal DISPLAY menu screen after displaying "aborted!" on the screen.

When the current measurement is not completed after four seconds from the previous measurement completion time, the system displays "slow!" on the screen. Concurrently, it displays the measurement execution status which show the cause of the error.
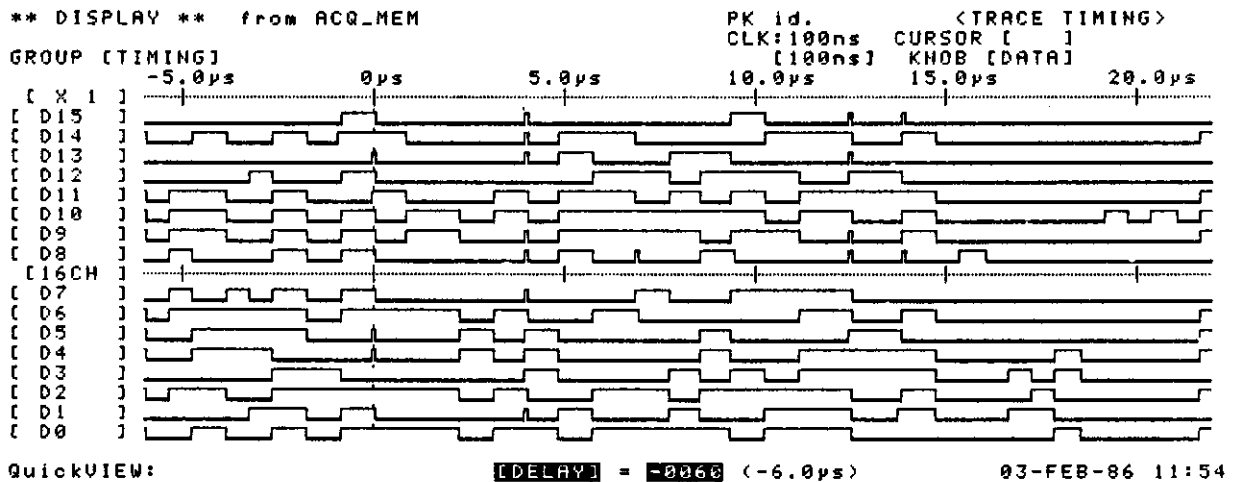
Figure 4-63   Changing Delay

4.8.5 Changing Threshold Voltage

When the system is in the QuickVIEW mode, the user can change the
threshold voltage which is a reference voltage to digitize the input
signal and observe data at a real-time system. Changing the threshold
voltage helps the user to understand the input signal voltage axis
direction characteristics (e.g., signal level and noise) with a simple
technique.

To change the threshold voltage, the user should set V3 or V4 in the
threshold voltage menu item field at the input channel in advance.
(See Figure 4-60.) The QuickVIEW menu screen to set this threshold
voltage is shown in Figure 4-64. In this menu screen, the target
input channel label name is highlighted on the screen to be
distinguished from other names on the screen. (This is an example
where a single signal is captured twice, at TTL and at V3.)

Turning the knob clockwise changes the setting value to the positive
direction (+12.7 V for upper limit value), and to the negative
direction (-12.7 V for lower limit value), and executes the
measurement based on those setting values.

Pressing the PAGE ⬆ key changes the threshold voltage to the integer
closest to that preset threshold voltage value to the positive
direction (for example; +1.4 V → 2.0 V), and the PAGE ⬇ key to the
negative direction (for example; -1.3 V → -2.0 V). In both cases, the
upper/lower limit values are set to +12.7 V and -12.7 V, respectively.

Pressing ⬜ sets the default value. The default value at V3 is set

to +1.4 V (as a TTL IC base voltage), and that at V4 is set to -1.3 V
(as an ECL IC base voltage).

If key entries beyond the upper and lower limits are attempted even
after default values are set to both directions, the system displays
"upper limit!", or "lower limit!" on the screen, and ignores the key
entries.

Press [STOP] to abort the QuickVIEW execution, to display the normal
DISPLAY menu screen after displaying "aborted!" on the screen.

When the current measurement is not completed after four seconds from
the previous measurement completion time, the system displays "slow!"
on the screen. Concurrently, it displays the measurement execution
status which shows the cause of the error.
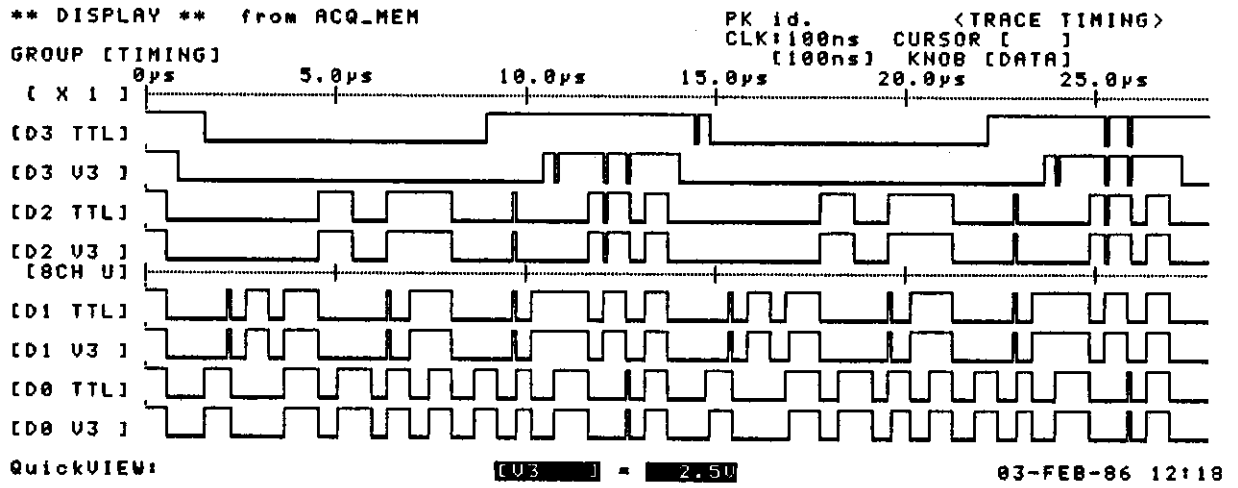
4.8 QuickVIEW FUNCTION (AT TIMING ANALYSIS)

Figure 4-64 Changing Threshold Voltage

5. DISK FILE PROCESSING FUNCTIONS AND OPERATIONS

5.1 PREPARATORY INFORMATION FOR DISK FILE PROCESSING

5.1.1 Disk File Processing Outline

All kinds of measurement can be executed by the basic measurement functions described in the previous chapter. However, these functions become inadequate in fine measurement when using complicated measuring conditions or when processing a large quantity of data. Therefore, the disk file processing facility is provided in the TR4725 for storing the measuring conditions and measured data into files.

Disk file processing can be executed any time in the key entry enabled state of CONFIG, SYMDEF, TRACE, DISPLAY, and PROGRAM main menu screens. (Disk file processing cannot be executed during measurement, I/O device execution and on the menu screen of UTILITY.)

The keys for disk file processing are GET, SAVE, and FD.

The GET function reads and displays data from the file onto the main menu screen.

The SAVE function writes the data displayed on the main menu screen into the file.

The FD function, an accumulation of disk file processing commands, is an auxiliary function for file copy and deletion.

Disk file processing handles built-in floppy disk drive (built-in drive; displayed as F0:) and the external accessory floppy disk drive (auxiliary drive; displayed as F1:).

To operate these drive units, the TR4725 constructs a file system with file names attached on the operating system, and performs the same operations as the ones performed in general-purpose computers using any user-defined file name.

For handling file names, this operating method has high flexibility for control in managing files, but becomes complicated as it is necessary to enter the file name for each operation.

To avoid such tedious file operating methods, the TR4725 provides the QuickGET/SAVE function which requires no file name entry and is compatible with the GET/SAVE function.

Since the TR4725 processes file naming and its management by itself, the QuickGET/SAVE function provides applications of the file processing without adding any extra burden to the user.

5.1.2 Handling the Disk

Pay attention to the environmental conditions for storing floppy disks
to avoid any unfavorable conditions such as dust, damp, low
temperature, and magnetism. Any micro floppy disk of 3.5 inch double
density specification (e.g., SONY, model OM-D4440) can be applied to
the TR4725. When the floppy disk is inserted into the disk drive, the
protective cover opens automatically. Unlike the conventional 8 inch
or 5.25 inch floppy disks, the disk surface is not exposed, as the
protective cover is usually closed. Also, the write protect facility
is contained in the floppy disk. The use of this facility is
illustrated in Figure 5-1. The system disk is write-protected when
shipped.

The reverse side of the disk

Write protect slide
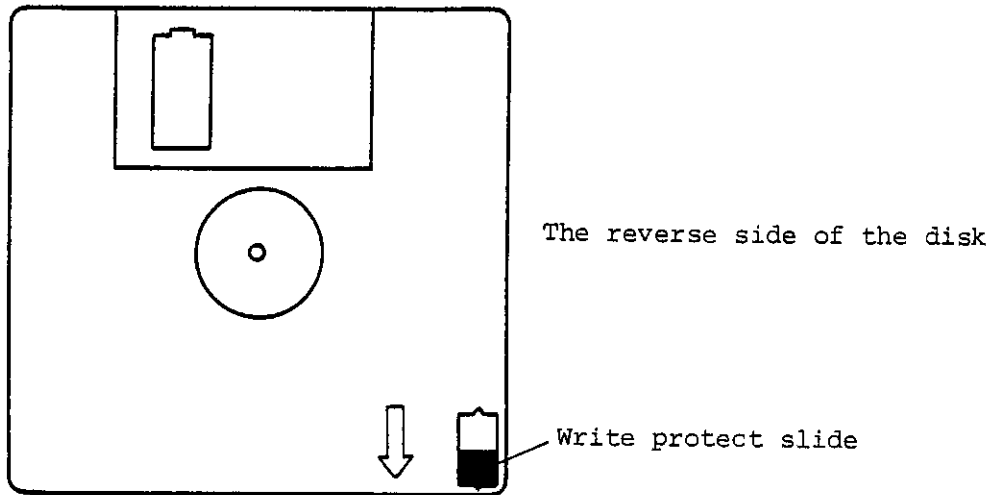
(a) File creation is not executable

Write protect slide
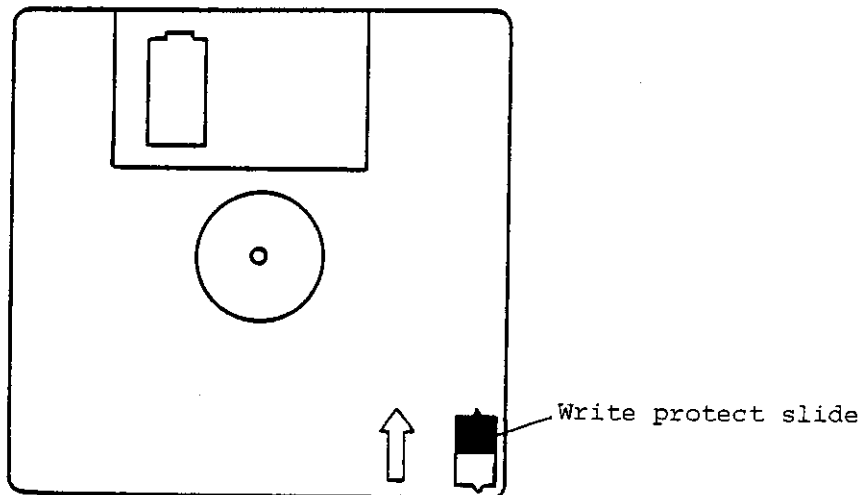
(b) File creation is executable

Figure 5-1 Write Protect Tab

The floppy disk specifications are as below:

- Service life   : 3×10^6 passes/track
- Disk interchange   : 20000 times
- Ambient temperature for operation: $10^{\circ}C$ to $60^{\circ}C$
- Humidity for operation   : 8% to 80% RH (without condensation)
- Ambient temperature for storage : $4^{\circ}C$ to $53^{\circ}C$
- Humidity for storage   : 8% to 90% RH (without condensation)

5.1.3 System Disk and User Disk

There are two kinds of floppy disks that can be applied to the TR4725: system disk and user disk. A set of two (of the same contents) system disks is provided with the Opt.4725+70 timing module and each personality kit.

Most of the system software which controls the operation of TR4725 is included in the system disk. The system disk provides appropriate updating for facility enforcement. Other than being provided as an accessory, the system disk can be purchased separately.

The user disk can be created by using the system disk. The user disk created thus becomes the disk exclusive to each personality kit. That is, the user can create a user disk with its personality kit but cannot store information related to other personality kits in the same disk. The relationship is illustrated in Figure 5-2.

The protection mechanism inhibits file disorder

System disk: P4725-7071FJ

TR4725 timing-only user disk

...

System disk: P47250-001FJ

TR47250 user disk

...

System disk: P47251-001FJ

TR47251 user disk

...
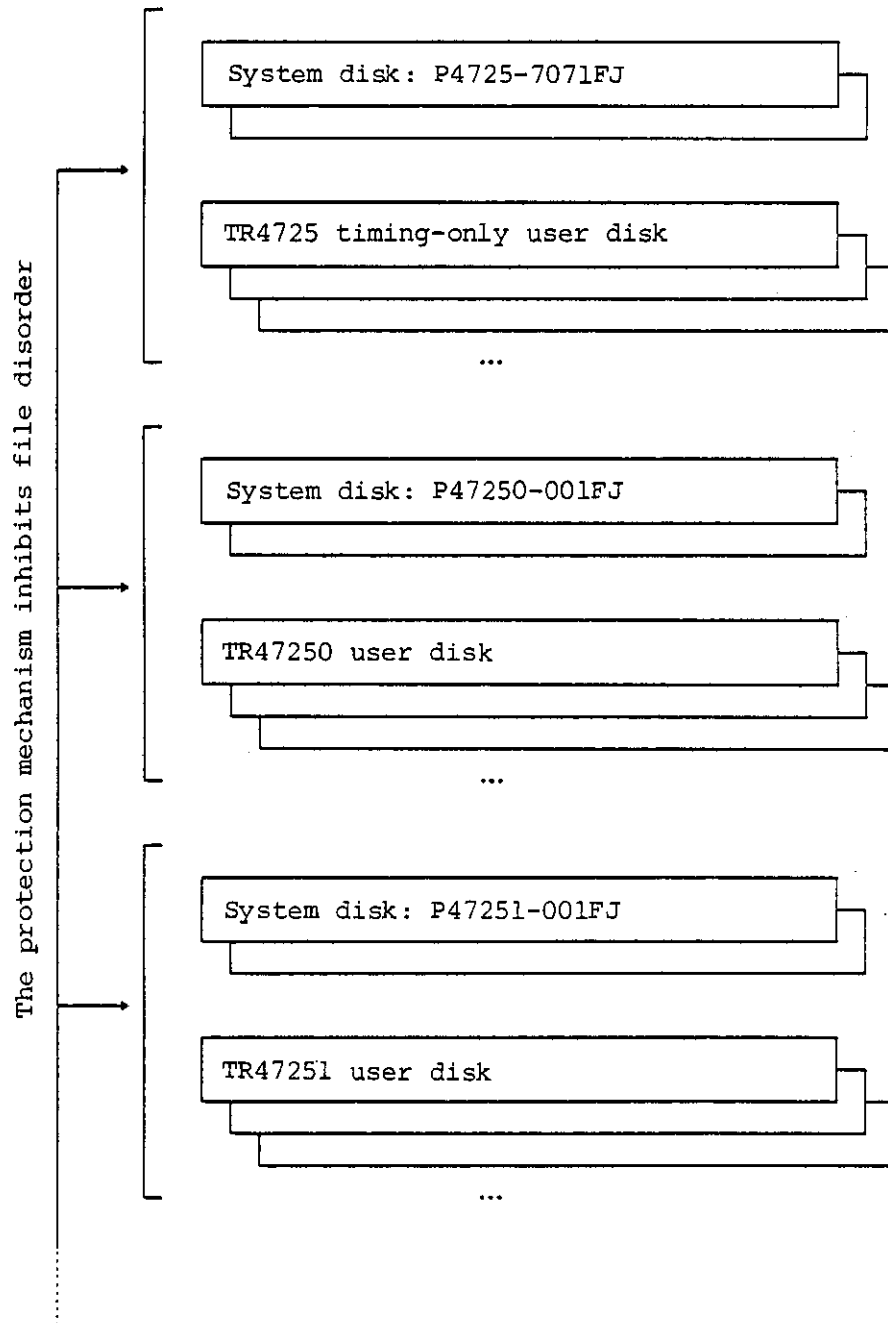
Figure 5-2 System Disk and User Disk

Only DIRECTORY and STATUS operations can be operated on disks that
have different personality kit correspondence (system or user disk).
Example of the status of the system and user disks are shown
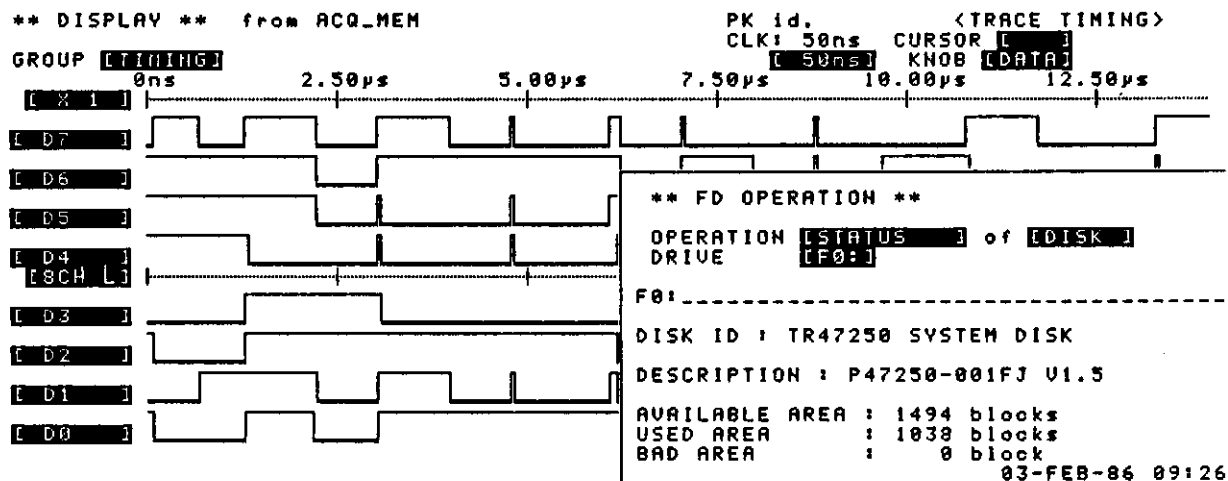respectively in Figures 5-3 and 5-4.
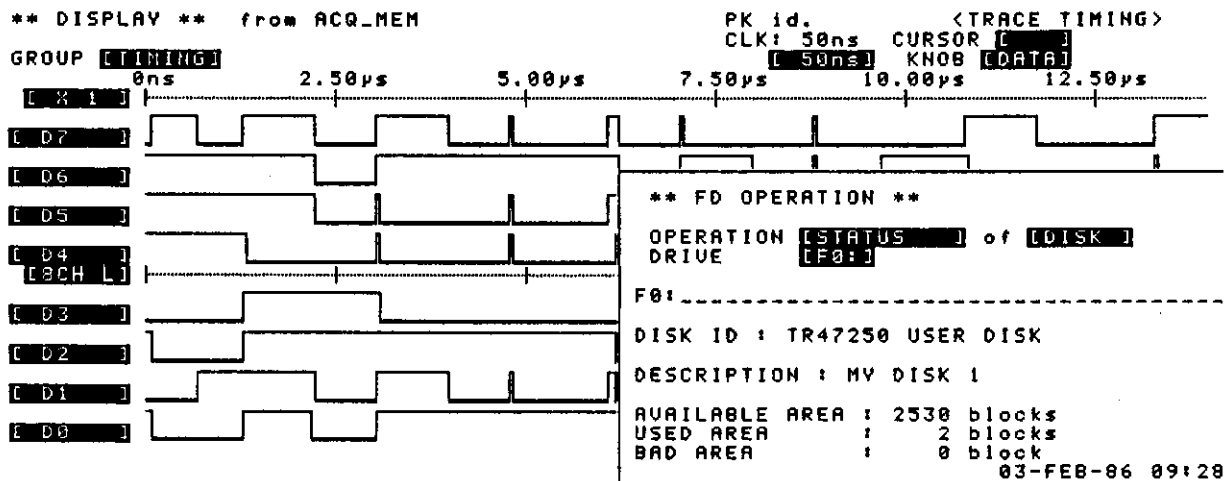

Figure 5-3 System Disk Status Example

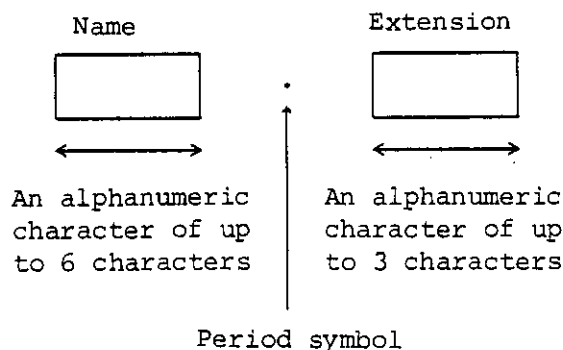Figure 5-4 Example of User Disk Status

Contents of the system disk cannot be seen by the user. The disk is
protected against any possible destruction caused by operation error.
Therefore, it is recommended to use only the user disk for storing the
user data.

FORMAT facility is used to create the user disk (refer to
Section 5-8). When an unused blank disk (capacity 1MB, when
unformatted) is used as a user disk, it can only be applied as the
external memory of 632.5KB (1KB = 1024B).

5.1.4 Types of File

The files in the user disk are uniquely identified by file name, file
attribute, and file control classification. File attribute indicates
the type of data included in the file; file control classification
indicates the file control assignment. Since these classifications
are consistent for file processing, it is not necessary to be
concerned with them in actual use. (Therefore, the operation is
simplified and the function upgraded.)

File name is composed of the name and extension parts.

```
        Name                    Extension

      ┌──────────┐   .        ┌──────────┐
      │          │   ↑        │          │
      └──────────┘   │        └──────────┘

      ←─────────→    │        ←─────────→

   An alphanumeric   │     An alphanumeric
   character of up   │     character of up
   to 6 characters   │     to 3 characters

                  Period symbol
```

Even if there is only one character in the name part, the file name is
valid. For example, "1", "1." and "A.1" are all correct file names.
"1" is treated as the equivalent of the file name "1." in the TR4725.
Special file names are used according to the file attribute and file
control classification.

There are seven types of file attributes corresponding to the main
menu screen in which files are used.

● CONFIG: Contains the <u>CONFIG</u> main menu screen data
● SYMDEF: Contains the <u>SYMDEF</u> main menu screen data
● TRACE : Contains the <u>TRACE</u> main menu screen data
● DSP_S : Contains the <u>DISPLAY</u> main menu screen data when the
          measurement mode is set to TRACE STATE.
● DSP_T : Contains the <u>DISPLAY</u> main menu screen data when the
          measurement mode is set to TRACE TIMING. (The timing-only
          analyzer only uses this file attribute.)
● SP_T : Contains the <u>DISPLAY</u> main menu screen data when the
          measurement mode is set to TRACE S&T (S → T) or TRACE S&T
          (T → S). (In S&T analyzer, DSP_S, DSP_T, DSP_ST file
          attributes can be obtained.)
● PROG : Contains the <u>PROGRAM</u> main menu screen data

When attempting to use the file that is currently being interacted and
operated, the main menu screen based on the file attributes can
operate as the file system directory, making the file operation
appreciably easier. File names and file attributes can be checked by
the DIRECTORY facility (refer to Section 5.4.2). One example is shown
in Figure 5-5.

```
** DISPLAY ** from ACQ_MEM                    PK id.           <TRACE TIMING>
                                              CLK: 50ns  CURSOR [      ]
GROUP [TIMING]                                    [ 50ns]  KNOB [DATA]
              0ns      2.50µs      5.00µs    7.50µs     10.00µs    12.50µs
  [ X 1 ]  |········+···········+···········+···········+···········+···········+··|
  [ D7  ]
  [ D6  ]
  [ D5  ]                                   ** FD OPERATION **
  [ D4  ]
  [8CH L]                                   OPERATION [DIRECTORY] of [ALL ]
                                            DRIVE     [F0:]
  [ D3  ]
                                            F0:__name___blks__attri__date_____
  [ D2  ]                                     CODE.2        4  SYMDEF  03-FEB-86  09:33
                                              CONFIG.S1     3  CONFIG  03-FEB-86  09:31
  [ D1  ]                                     DISP.S1      18  DSP_T   03-FEB-86  09:35
                                              SYMBOL.1      4  SYMDEF  03-FEB-86  09:33
  [ D0  ]                                     TEST1.CNF     3  CONFIG  03-FEB-86  09:31
                                              TEST1.DAT    18  DSP_T   03-FEB-86  09:35
                                              TEST1.PRG     2  PROG    03-FEB-86  09:34
                                              TEST1.TRC     3  TRACE   03-FEB-86  09:32
                                              ↑scroll         03-FEB-86  09:39
```
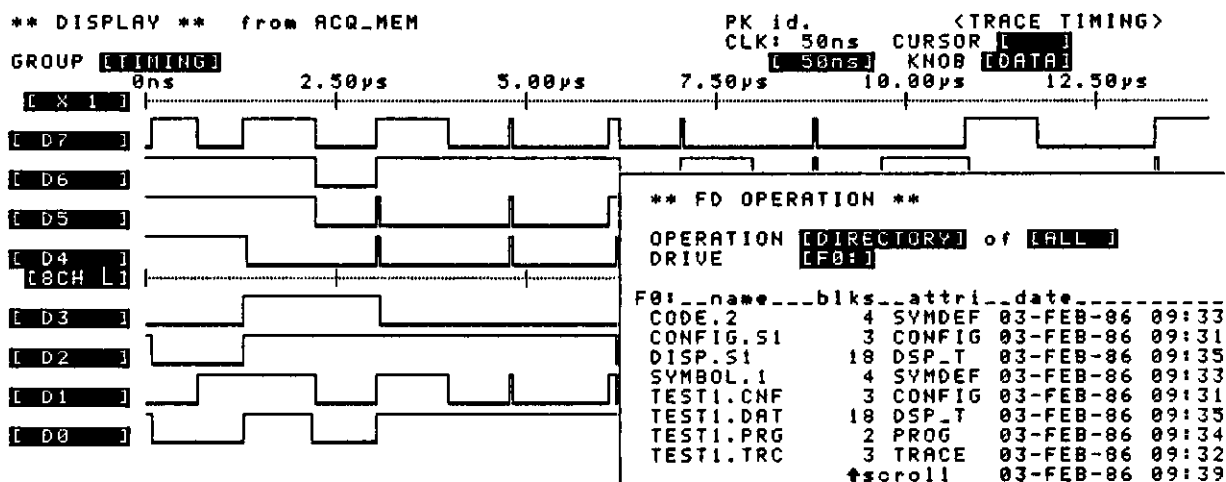
Figure 5-5   File Name and File Attribute Checking

The relationship between the file name, file attribute, file control
classification and the main menu screen is shown in Table 5-1.

Table 5-1   Types of File

Menu screen	File attribute	File control classification	File name
CONFIG	CONFIG	User file	Random*
		System-saved file	CONFIG.S1 - CONFIG.S99
		Registered file	CONFIG.REG
SYMDEF	SYMDEF	User file	Random*
		System-saved file	SYMDEF.S1 - SYMDEF.S99
		Registered file	SYMDEF.REG
TRACE	TRACE	User file	Random*
		System-saved file	TRACE.S1 - TRACE.S99
		Registered file	TRACE.REG
DISPLAY	DSP_S DSP_T DSP_ST	User file	Random*
		System-saved file	DISP.S1 - DISP.S99
		Registered file	DISP.REG
PROGRAM	PROG	User file	Random*
		System-saved file	PROG.S1 - PROG.S99
		Registered file	PROG.REG

*: .EXE, .SYS, .Sn (n:numeral), .REG cannot be used as the extension

According to the file control classification, files are classified in
3 types: user file, system-saved file, and registered file.

● User file: The file created by the user with any file name given.
  The file or the file contents can be deleted by DELETE function
  (Section 5.7), RENAME function Section 5.9, and COPY function
  (Section 5.10). The file must be controlled by the user. EXE, SYS,
  Sn (n:numeral), REG cannot be used as the extension of the file name.
● System-saved file: The file created by the QuickSAVE function
  (Section 5.3). The TR4725 executes file naming and file control.
  The only difference with the user file is that the user cannot
  delete the system-saved file randomly.
  By using PURGE function (Section 5.6), the system-saved files can be
  deleted collectively in the order of the creation stages. (DELETE
  and RENAME functions cannot be used here; also, this file cannot be
  the destination of COPY function.) Each main menu screen can
  accommodate 99 file names, as shown in Table 5-1 (the extensions:
  .S1 to .S99).

There are three types of file attributes on the <u>DISPLAY</u> main menu
screen, but these are not related to the file name (that is, they
cannot be mixed).
To save only a portion of the system-saved files, use PURGE function
to delete the system-saved files after copying the contents of the
file that needs to be saved to the user file using COPY function.

● Registered file: The file that is obtained by QuickGET function
(Section 5.2). It can be created by using REGISTER function
(Section 5.5) to register one of the user files or system-saved
files for each main menu screen. After the registration, the
original file can be deleted.

A maximum of 199 files, including the aforementioned 3 file types, can
be created in the user disk. However, since the file size differs
depending on the contents, it is not always possible to create 199
files.

The usable user disk capacity is 2530 blocks (632.5KB, for 1 block =
256B). The file numbers in the user disk, the total size (in block
units), and the size of the usable area can be checked by STATUS
function (Section 5.11).

5.1.5 <u>GET</u>/<u>SAVE</u>/<u>FD</u> Sub-menu Screen Activation and Erasure

Press any of [GET] / [SAVE] / [FD] to execute disk file processing; the

sub-menu screen is displayed overlapping the main menu screen
(multi-window display). The display position of the sub-menu screens
is fixed on the CRT display. The display examples of the <u>GET</u>, <u>SAVE</u>,
and <u>FD</u> sub-menu screens are shown in Figures 5-6, 5-7, and 5-8,
respectively. The overlapped main menu screen becomes half-tone
display and the input to it is temporarily inhibited. The input
prompt which was originally in the main menu screen moves to the
sub-menu screen.
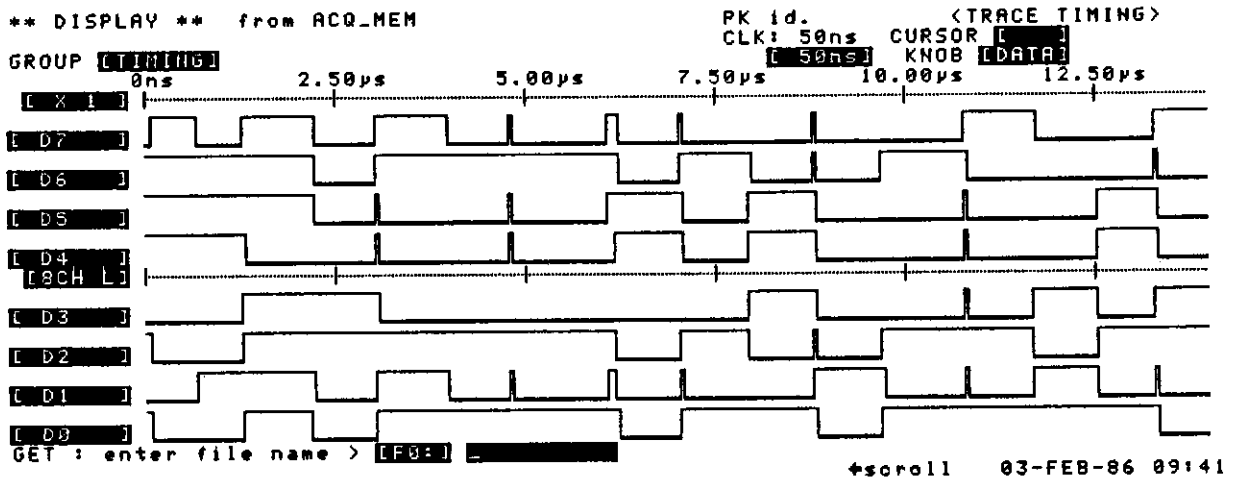
Figure 5-6   GET Sub-menu Screen Display Example
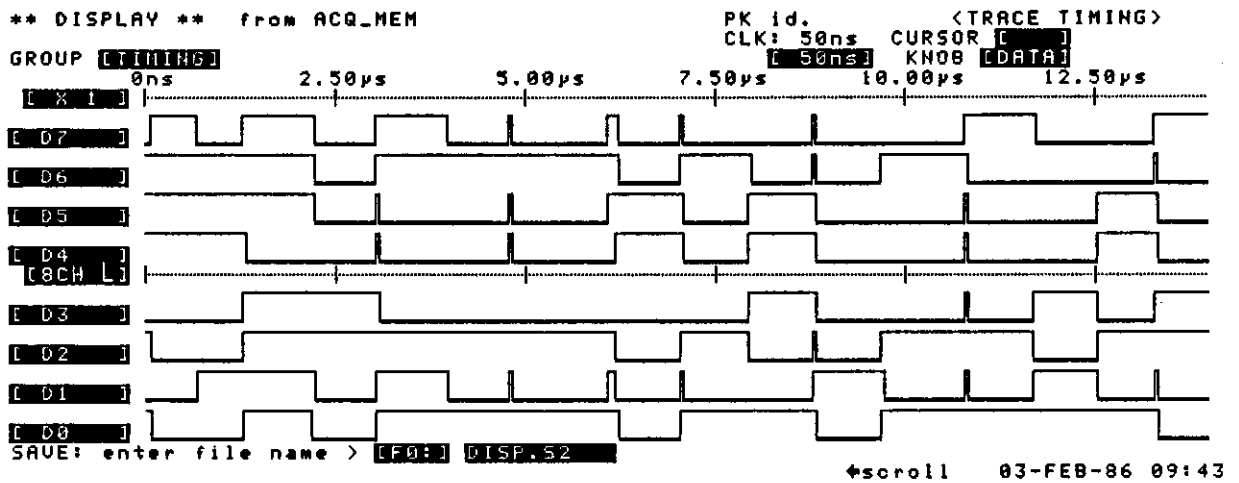
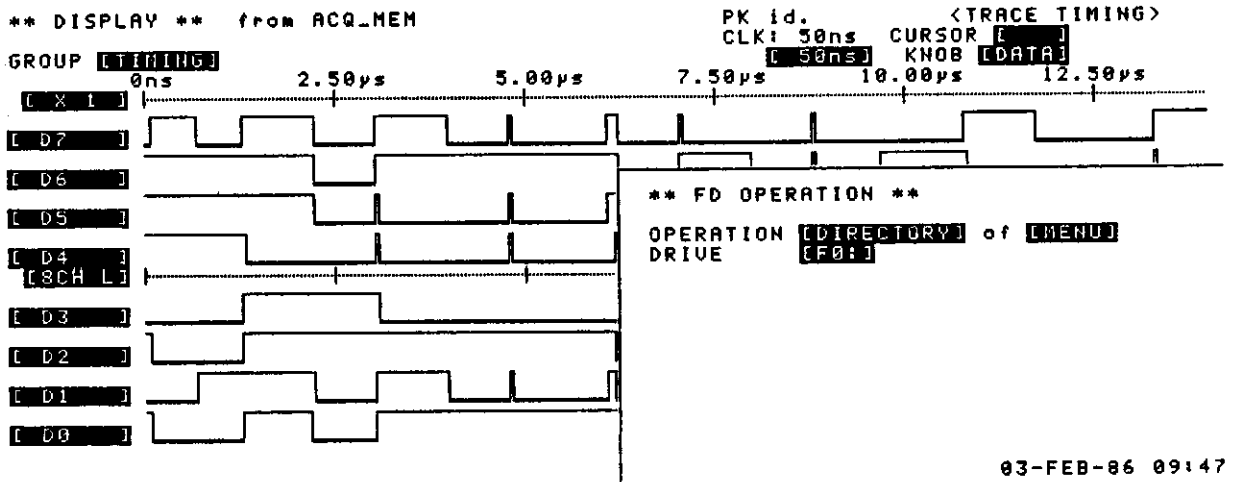Figure 5-7   SAVE Sub-menu Screen Display Example

Figure 5-8 FD Sub-menu Screen Display Example

GET/SAVE sub-menu screen can be simultaneously displayed with FD
sub-menu screen. One example is shown in Figure 5-9. Here, the order
in which keys are pressed does not matter. The input prompt moves to
the sub-menu screen which corresponds to the key pressed last. The
input prompt can be moved, as for the main menu screen, by any key in
the EDIT key group.
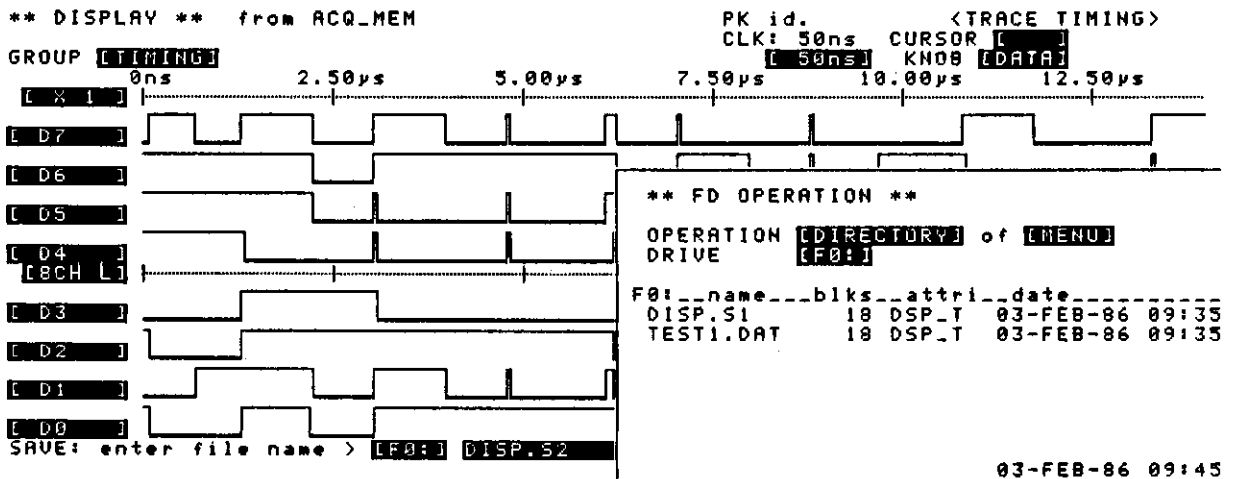
Figure 5-9 Example of Displaying GET/SAVE and FD Sub-menu Screens

The operating commands for disk file processing in the FD sub-menu
screen can be selected by the SELECT key. Make sure that the
DIRECTORY command is selected when pressing [ᴎ] to activate the
sub-menu screen.

The following commands can be selected when [ᴴᴵᴵ] is pressed:

DIRECTORY → REGISTER → PURGE → DELETE → FORMAT → RENAME → COPY → STATUS →
DIRECTORY

The following commands can be selected when [ᴺᴵⱽ] is pressed:

DIRECTORY → STATUS → COPY → RENAME → FORMAT → DELETE → PURGE → REGISTER →
DIRECTORY

The file disk execution is performed by the [ᴳᴵ] / [ˢᴬᴷ] / [ᴎ] keys.

When two of the sub-menu screens are displayed, start the function
execution by pressing the key that is in charge of the sub-menu screen
with the input prompt currently displayed. To delete the sub-menu
screen, there are two methods:

● Execute GET/SAVE function: The sub-menu screen is erased at the end
  of the execution. If FD sub-menu screen is displayed, it is erased
  at the same time.
● Press [ˢᵀᴼᴾ] : If only one sub-menu screen is displayed, it is
  erased. The sub-menu screen which has the input prompt is erased
  where there are two sub-menu screens.

In whichever case, the half-tone displayed main menu screen returns to
the original display once the sub-menu screen is erased, and the input
prompt moves to the menu item displayed before the sub-menu screen was
activated. If GET function is executed, the data read from the file
to each menu item of the main menu screen is displayed.

5.2 GET FUNCTION AND ITS OPERATIONS

5.2.1 Normal GET Function and Its Operations

The GET function reads the specified file (file attribute; refer to Section 5.1.4) from the files related to the currently displayed main menu and displays the data on the main menu screen.

When [GET] is pressed, the sub-menu screen asking the file name is

displayed on the bottom left of the CRT display; the main menu screen becomes half-tone display disabling data entry to it temporarily; and the input prompt moves to the menu item of the file name in the GET sub-menu screen..

By pressing the ENTRY key, the disk drive is specified (F0: built-in

drive, F1: auxiliary drive) and the file name is input. Press [GET]

again and the execution starts. If the execution ends normally, the sub-menu screen disappears, the main menu screen returns to the original display, the data read from the file is displayed, and the data input to the menu item is enabled. The file name obtained is displayed on both the center of the upper most line and the left of the bottom line of the main menu screen. To look for the desired file, combining this function with the directory display is most convenient. In this case, first press [D] twice to check the file

name and then press [GET] to perform the above-mentioned procedures

(refer to Figure 5-10, 5-11, and 5-12).

When an error is found (for instance, the disk is not installed), the contents of the error is shown on the left bottom message line. The message contained in the message line can be deleted with any key input.
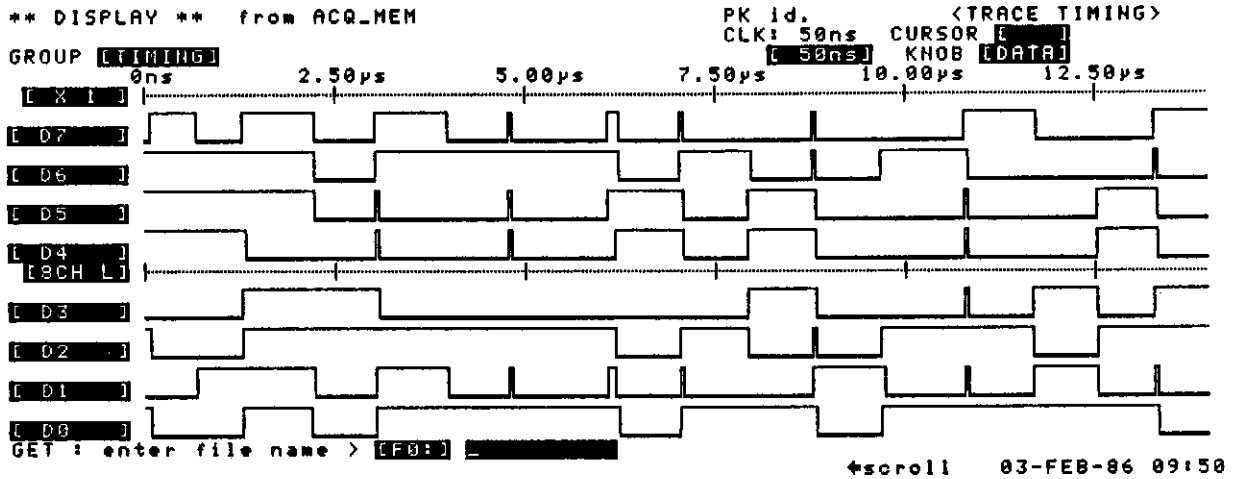
Figure 5-10   GET Function: Initial Menu Screen
(Without the Registered File)
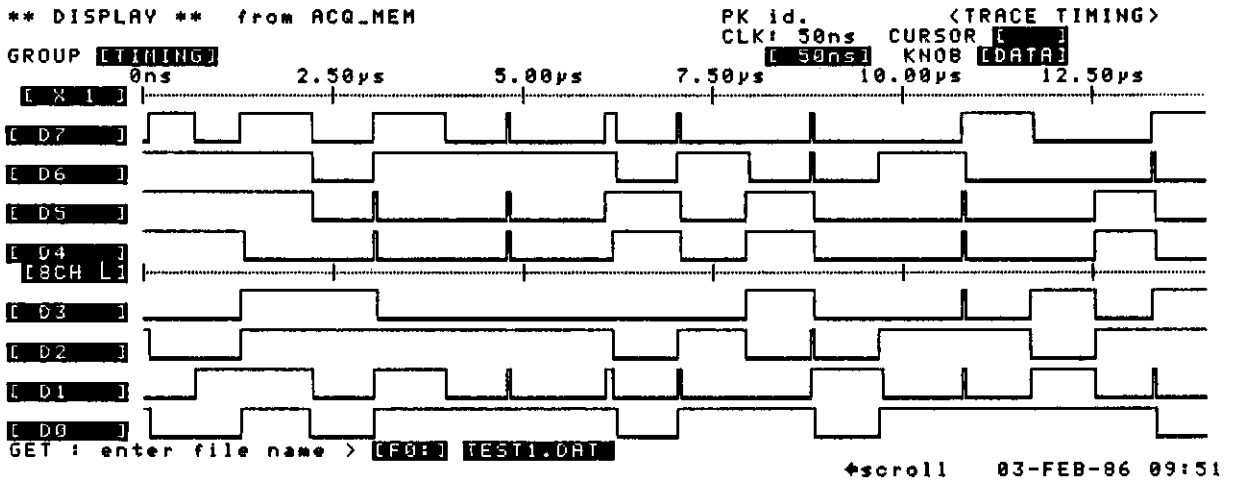
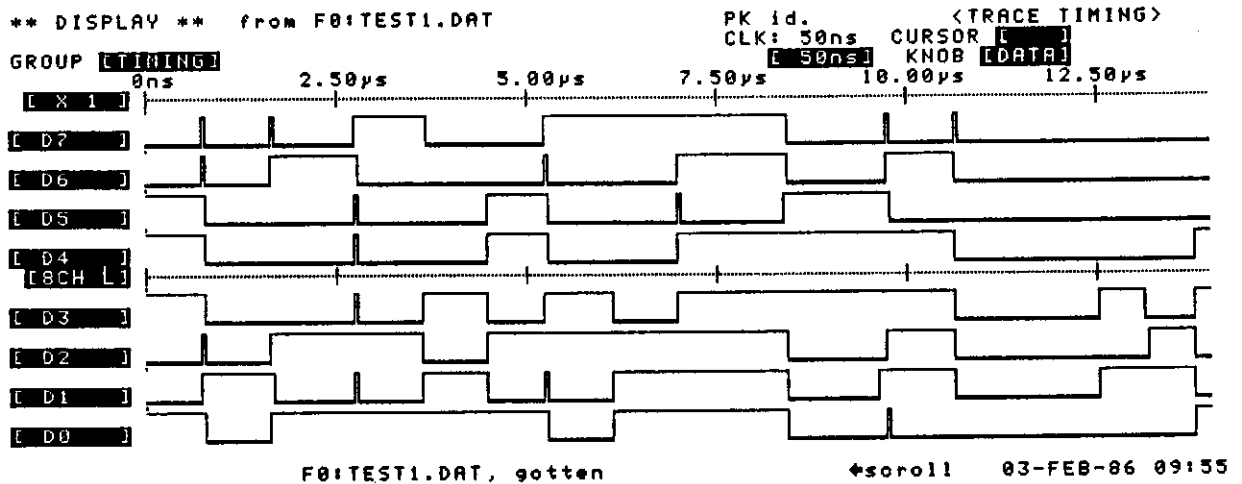Figure 5-11   GET Function: Example of File Name Input

Figure 5-12 GET Function: Example of Display After Execution

5.2.2 QuickGET Function and Its Operations

When the GET function is used, the file name input can be quite a
burden to the entire operation. Thus, the TR4725 provides a combined
indirect operating procedure which does not require direct entry of
the file name by the ENTRY key. There are two methods and either can
execute the GET function rapidly: one is by using the registered file
(refer to Section 5.1.4), and the other is by using the scroll knob.
This is called the QuickGET function. With the QuickGET function,
normal GET function can be discarded.

After the registered file has been registered, press [GET] and the

registered file name is displayed on the sub-menu screen (refer to

Figure 5-13). Since the following [GET] becomes the execution key,

pressing [GET] again displays the registered file contents on the main

menu screen without inputting all the file names. One by one, the
registered file can be registered on each main menu screen; therefore,
it is more convenient to register and store the file which is used
most often.

The more commonly practiced method is using the scroll knob. After

the sub-menu screen is activated by pressing $\boxed{\text{GET}}$, turn the scroll

knob clockwise and the file names in the disk are displayed
consecutively. Stop turning the scroll knob when the desired file name

is displayed. Press $\boxed{\text{GET}}$ and the data read from the file is

displayed on the main menu screen. When $\boxed{\text{GET}}$ is used with the

directory display, the file name on the top of the directory with the
file name for the GET function are displayed simultaneously.
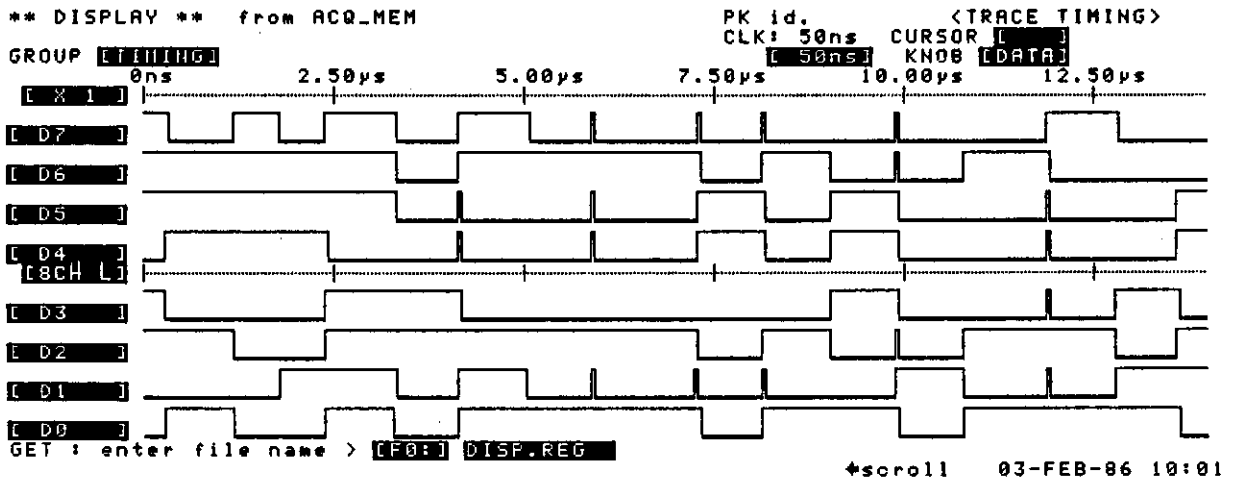
Figure 5-13 GET Function: Initial Screen (with Registered File)

5.3 SAVE FUNCTION AND ITS OPERATIONS

5.3.1 Normal SAVE Function and Its Operations

The SAVE function writes the data of the currently displayed main menu screen into the specified file. The file contents can be updated. A new file can also be created.

Press [SAVE] and the sub-menu screen asking the file name is displayed

on the bottom left of the CRT display. The main menu screen becomes half-tone display and the data entry is temporarily inhibited. The input prompt moves to the menu item of the file name on the SAVE sub-menu screen.

Specify the disk drive by the ENTRY key (F0: built-in drive, F1:

auxiliary drive), input the file name, and press [SAVE] again to start

the execution. When the execution ends normally, the sub-menu screen disappears, the main menu screen returns to the original display, and the data of the main menu screen is written into the file.

The saved file name is displayed on the left of the bottom line of the main menu screen. To check the created file, it is convenient to combine the directory display with SAVE function.

In this case, after checking the file name by pressing [ID] twice,

press [SAVE] and perform the aforementioned procedures (refer to

Figures 5-14, 5-15, and 5-16).

When an error is found during SAVE function execution (for instance: write cannot be executed with the write protect on the disk, refer to Section 5.1.2; or when the disk is full, refer to Section 5.11), the error message is displayed on the message line on the bottom left. The message on the message line can be deleted by any key input.

** DISPLAY ** from ACQ_MEM

GROUP [TIMING]

PK id.   <TRACE TIMING>
CLK: 50ns   CURSOR [   ]
            [50ns]   KNOB [DATA]

0ns   2.50µs   5.00µs   7.50µs   10.00µs   12.50µs

[X 1]

[D7]

[D6]

[D5]

[D4]
[8CH L]

[D3]

[D2]

[D1]

[D0]

SAVE: enter file name > [F0:] DISP.S1

** FD OPERATION **

OPERATION [DIRECTORY] of [MENU]
DRIVE   [F0:]

F0:__name___blks__attri__date_____
DISP.REG   18 DSP_T 03-FEB-86 09:59
TEST1.DAT   18 DSP_T 03-FEB-86 09:54

03-FEB-86 10:10
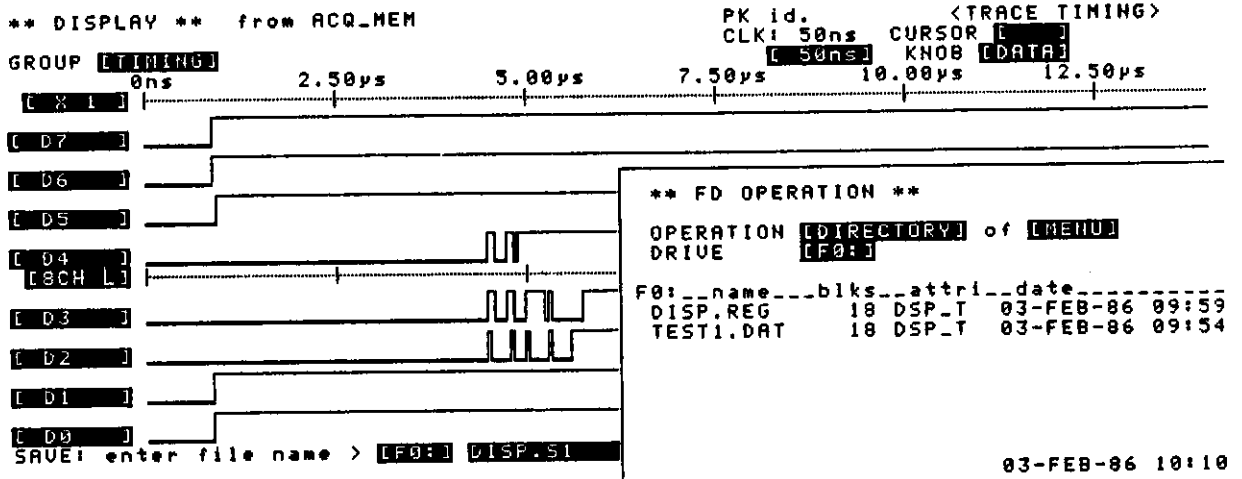
Figure 5-14 SAVE Function: Example of Initial Menu Screen

** DISPLAY ** from ACQ_MEM

GROUP [TIMING]

PK id.   <TRACE TIMING>
CLK: 50ns   CURSOR [   ]
            [50ns]   KNOB [DATA]

0ns   2.50µs   5.00µs   7.50µs   10.00µs   12.50µs

[X 1]

[D7]

[D6]

[D5]

[D4]
[8CH L]

[D3]

[D2]

[D1]

[D0]

SAVE: enter file name > [F0:] TEST2.DAT

** FD OPERATION **

OPERATION [DIRECTORY] of [MENU]
DRIVE   [F0:]

F0:__name___blks__attri__date_____
DISP.REG   18 DSP_T 03-FEB-86 09:59
TEST1.DAT   18 DSP_T 03-FEB-86 09:54

03-FEB-86 10:13
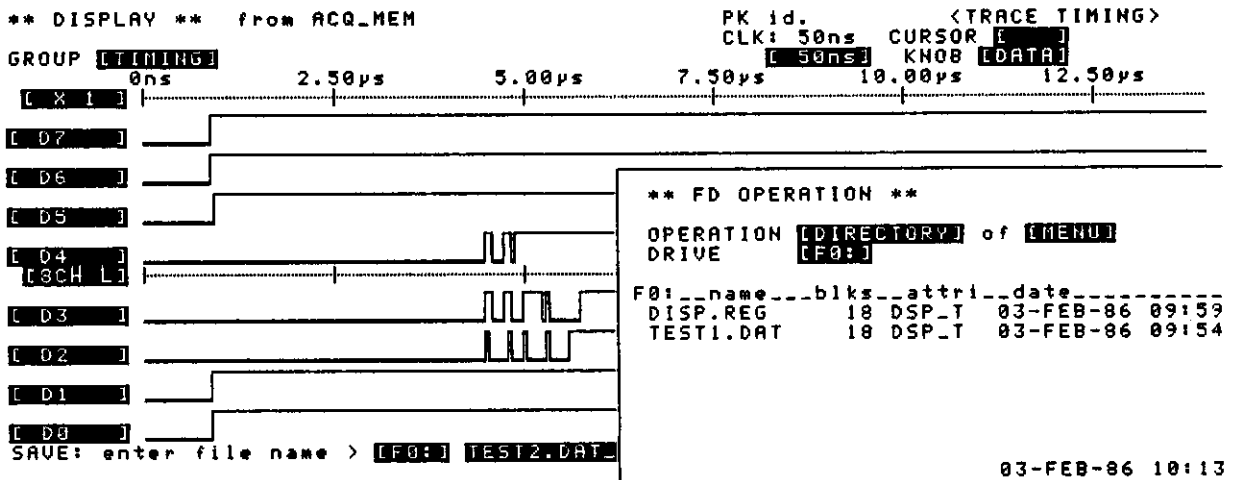
Figure 5-15 SAVE Function: Example of File Name Input

```
** DISPLAY ** from ACQ_MEM                    PK id.         <TRACE TIMING>
                                              CLK: 50ns   CURSOR [     ]
GROUP [TIMING]                                   [ 50ns]    KNOB [DATA]
          0ns        2.50µs      5.00µs      7.50µs      10.00µs       12.50µs
   [ X 1 ]
   [ D7  ]
   [ D6  ]
   [ D5  ]
   [ D4  ]
   [8CH L]
   [ D3  ]
   [ D2  ]
   [ D1  ]
   [ D0  ]

        F0:TEST2.DAT, saved                    +scroll   03-FEB-86 10:14
```
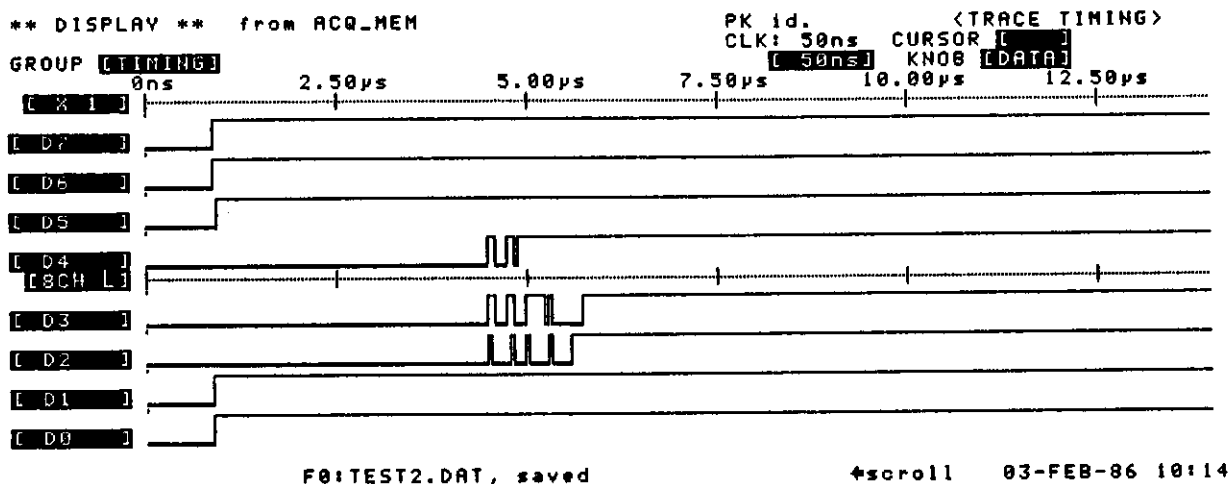
Figure 5-16   SAVE Function: Example of Display After Execution

5.3.2 QuickSAVE Function and Its Operation

When the SAVE function is used, directly inputting file names can be a demanding operation. It is helpful to save files that are to be stored in the disk. However, for files whose final storage is not certain, especially when a large quantity of data (of more than one file) needs to be collected rapidly, the normal SAVE function becomes tedious.

The TR4725 thus provides an operating procedure that do not require direct execution of the file name entry by the ENTRY key. This procedure can execute the SAVE function rapidly by using the system-saved file (refer to Section 5.1.4) and is called the QuickSAVE function.

Press · [SAVE] and the system-saved file name is displayed on the menu item of the file name on the sub-menu screen (refer to Figure 5-17). The number of the system-saved file name as shown in the figure is "the number of the system-saved file number previously created + 1".

The following [SAVE] becomes the execution key. Once it is pressed, data on the main menu screen can be written into the system-saved file without inputting file name. A maximum of 99 system-saved files can be created for each main menu screen. (However, the total number of the files which can be created in one user disk is a maximum of 199 and the total file size is a maximum of 2530 blocks.)

When a portion of the saved system-saved file is stored as the user
file with a random file name attached, first copy the system-saved
file to be stored into the user file by COPY function (refer to
Section 5.10). Then, delete the system-saved file with PURGE function
(refer to Section 5.6). Pay attention that DELETE function cannot be
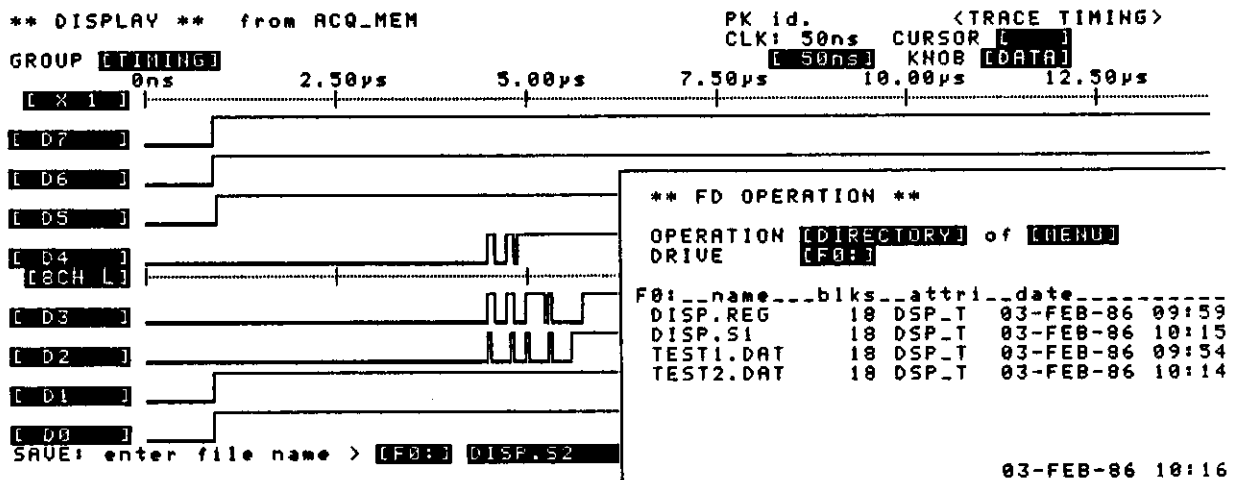used to delete the system-saved file.

```
** DISPLAY **  from ACQ_MEM                    PK id.        <TRACE TIMING>
                                               CLK: 50ns  CURSOR [      ]
GROUP [TIMING]                                   [ 50ns]   KNOB [DATA]
        0ns        2.50µs        5.00µs        7.50µs      10.00µs     12.50µs
    [ X 1 ]  |.................|.................|.................|.................|

  [ D7    ]  ___|

  [ D6    ]  ___|

  [ D5    ]  ___|                                    ** FD OPERATION **

  [ D4    ]  _____JUL           OPERATION [DIRECTORY] of [MENU]
   [8CH L]  |.................|.................|       DRIVE     [F0:]

  [ D3    ]  _____JUL_TL_           F0:__name___blks__attri__date_____
                                                         DISP.REG    18 DSP_T  03-FEB-86 09:59
  [ D2    ]  _____JULTL_            DISP.S1     18 DSP_T  03-FEB-86 10:15
                                                       TEST1.DAT   18 DSP_T  03-FEB-86 09:54
  [ D1    ]  ___|                                     TEST2.DAT   18 DSP_T  03-FEB-86 10:14

  [ D0    ]  ___|
SAVE: enter file name > [F0:] DISP.S2
                                                                    03-FEB-86 10:16
```

Figure 5-17 QuickSAVE Function

5.4 DIRECTORY FUNCTION AND ITS OPERATIONS

5.4.1 DIRECTORY-of-MENU Function and Its Operations

DIRECTORY-of-MENU function lists the files (file attribute; refer to Section 5.1.4) which are related to the current main menu screen in the user disk.

Press ⬜ and the FD sub-menu screen is displayed at the right of the CRT display. The main menu screen becomes half-tone display, the data input to the menu item is temporarily inhibited, and the input prompt moves to the command section of the menu item on the sub-menu screen. After the desired disk drive (F0: built-in drive, F1: auxiliary drive) is selected, press ⬜ again to start the execution (refer to Figure 5-18). Since the drive selection default value setting is F0: just press ⬜ twice to check the disk directory for built-in drive.

The index of the directory display is as follows: name indicates the file name; blks (blocks) means the file size (1 block = 256B); attri indicates the file attribute (refer to Section 5.1.4); and date means the date when the file was created.

Eight files can be displayed on the sub-menu screen at a time. When there are more than eight files in the disk, a scroll mark will be displayed on the bottom line of the sub-menu screen. Press the key in the SCROLL key group to scroll the files.

The file names are sorted and displayed in the alphabetical order.

By either pressing ⬜ or a key in the MENU key group, the FD

sub-menu screen can be erased. The sub-menu screen is erased when

⬜ or ⬜ is pressed and its execution is completed.

Figure 5-18 DIRECTORY-of-MENU Function: Example of Display After Execution

5.4.2 DIRECTORY-of-ALL Function and Its Operations

DIRECTORY-of-ALL function lists the entire files in the user disk.

Press ⬚ and FD sub-menu screen is displayed on the right of CRT
display. The main menu screen becomes half-tone display, the data
entry to the menu item is temporarily inhibited, and the input prompt
moves to the command section menu item of the sub-menu screen. Since

DIRECTORY-of-MENU command was selected, press ⬚, ⬚ (or ⬚)

to change the command to DIRECTORY-of-ALL. After the desired disk
drive (F0: built-in drive; F1: auxiliary drive) is selected, press
⬚ again to start the execution (refer to Figure 5-19). The default
setting for disk drive selection is F0:.

The meaning of the directory display index is as follows: name
indicates the file name; blks (blocks) means the file size (1 block =
256B); attri indicates the file attribute (refer to Section 5.1.4);
and date means the date when the file was created.

Files are displayed in alphabetical order. Eight files can be
displayed on the sub-menu screen at a time. When there are more than
eight files in the disk, a scroll mark is displayed on the bottom line
of the sub-menu screen and by pressing the key in the SCROLL key group
the scrolling of files can be executed.

Press ⌊STOP⌋ or any key of the MENU key group to erase the FD sub-menu

screen. When ⌊GET⌋ or ⌊SAVE⌋ is pressed and its execution is

completed, the sub-menu screen is erased.


```
** DISPLAY **  from ACQ_MEM                    PK id.          <TRACE TIMING>
                                               CLK: 50ns  CURSOR [      ]
GROUP [TIMING]                                     [ 50ns]  KNOB [DATA]
        0ns        2.50μs        5.00μs      7.50μs    10.00μs      12.50μs
[  X  1 ]

[  D7   ]

[  D6   ]
                                                   ** FD OPERATION **
[  D5   ]
                                                   OPERATION [DIRECTORY] of [ALL ]
[  D4   ]                                          DRIVE     [F0:]
[8CH L]
                                                   F0:__name___blks__attri__date_____
[  D3   ]                                          CODE.2       4  SYMDEF 03-FEB-86 09:33
                                                   CONFIG.S1    3  CONFIG 03-FEB-86 09:31
[  D2   ]                                          DISP.REG    18  DSP_T  03-FEB-86 09:59
                                                   DISP.S1     18  DSP_T  03-FEB-86 10:15
[  D1   ]                                          SYMBOL.1     4  SYMDEF 03-FEB-86 09:33
                                                   TEST1.CNF    3  CONFIG 03-FEB-86 09:31
[  D0   ]                                          TEST1.DAT   18  DSP_T  03-FEB-86 09:54
                                                   TEST1.PRG    2  PROG   03-FEB-86 09:34
                                                               +scroll  03-FEB-86 10:20
```

Figure 5-19 DIRECTORY-of-ALL Function: Example of Display After Execution

5.5 REGISTER FUNCTION AND ITS OPERATIONS

REGISTER function creates the registered file for the QuickGET function (refer to Section 5.2.2).

Registered files can be created one by one for each main menu screen, by using one of the user or system-saved files (refer to Section 5.1.4) with REGISTER function.

Also, REGISTER function can be used to trace the original file from the registered file.

When a system-saved file is registered as a registered file combined with the execution PURGE function, the system-saved file with a renewed file name is followed. Also, when the original file of the registered file is deleted, the identity of the original file becomes unclear even when the registered file remains unaffected.

Press [FD] and the FD sub-menu screen is displayed on the right of the CRT display; the main menu screen becomes half-tone display; the data input to the menu item is temporarily inhibited; and the input prompt moves to the command selection menu item of the sub-menu screen.

Since the DIRECTORY-of-MENU command has been selected, press [MENU] to

change the function to REGISTER (refer to Figure 5-20).

After selecting the disk drive (F0: the defaulted built-in drive; F1: auxiliary drive) and the file name to be the registered file, press [FD] again to start the execution (refer to Figure 5-21).

The name of the original file of the registered file can be displayed by simply selecting the REGISTER command (refer to Figure 5-20).

Press [STOP] or any of the MENU key group to erase the FD sub-menu screen.

The sub-menu screen can be erased when [GET] or [SAVE] is pressed and its
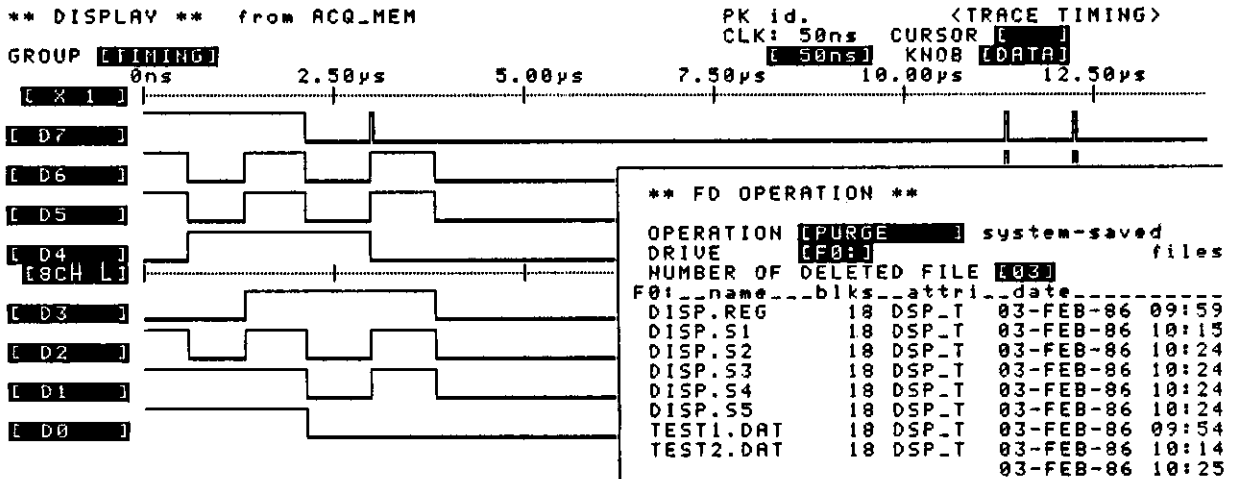
execution is completed.

Figure 5-20   REGISTER Function: Initial Menu Screen
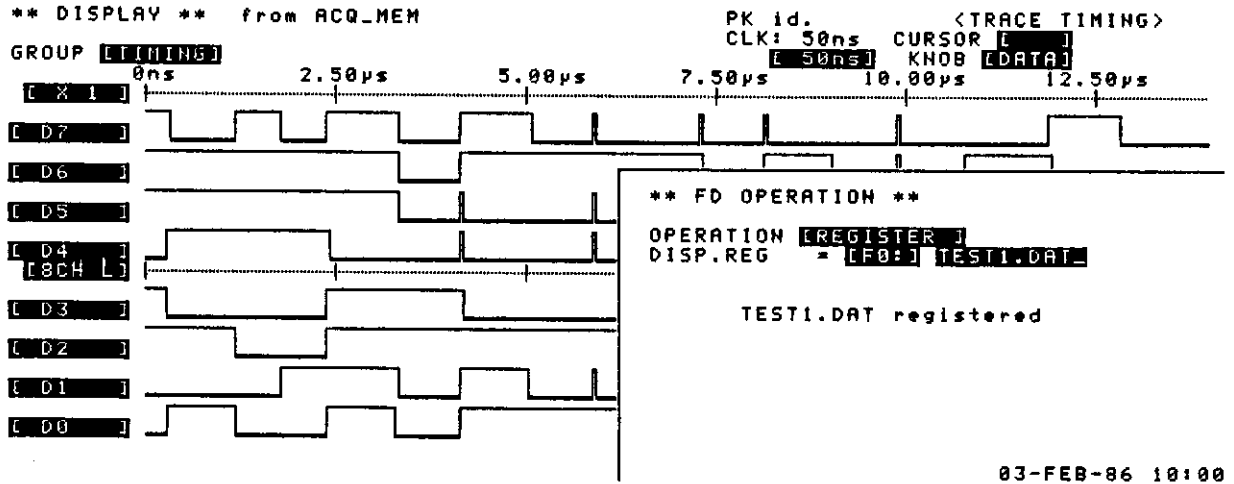
Figure 5-21   REGISTER Function: Example of Display After Execution

5.6 PURGE FUNCTION AND ITS OPERATIONS

PURGE function deletes the system-saved file (refer to Section 5.1.4)
which is created by the QuickSAVE function (refer to Section 5.3.2).

Usually, files (the user files) can be deleted by DELETE function (refer
to Section 5.7). However, system-saved files are files controlled by the
TR4725, and random deletion destroys the consistency of the file control,
so PURGE function is used to delete the system-saved file. Several
specified files can be deleted in order of creation. If there is a
portion of the system-saved files within the file group which needs to be
deleted, copy the file contents to the user files with COPY function
(refer to Section 5.10) before using the PURGE command.

Press ⌑ and the _FD_ sub-menu screen is displayed on the right of the CRT
display; the main menu screen becomes half-tone display; the data entry is
temporarily inhibited; and the input prompt moves to the command selection
menu item of the sub-menu screen. Since DIRECTORY-of-MENU

command has been selected, press ⌑ twice to change the command to
PURGE.

It is safer to check the file name by the directory display before
deleting a file. After DIRECTORY-of-MENU function (refer to

Section 5.4.1) is executed, press ⌑ twice to change it into PURGE.

When executing DIRECTORY-of-MENU function on the built-in drive, press the
aforementioned ⌑ twice; for auxiliary drive, before pressing ⌑ a
second time, it is necessary to specify the drive to F1:.

Scrolling is permitted when the scroll mark is displayed on the bottom of
the directory display _FD_ menu screen (which indicates that there are more
than 8 files stored).

Next, press ⌑ twice to move the input prompt to the NUMBER OF DELETED

FILE menu item and set the number of the deleted file with ⌑ or

⌑ . The initial value of the file number is 0. 1 is incremented

every time ⌑ is pressed. When the file number displayed is 0 and

⌑ is pressed, the maximum value of the deletable files is displayed

(refer to Figure 5-22).

When [₁₀] is pressed after the file number is set, deletion starts (at the end of the deletion, the execution result is displayed as the directory display; refer to Figure 5-23).

File deletion starts from old files (the oldest file should be the one with ".S1" extension) and the extension number of the remaining file becomes smaller than the deleted file numbers. For instance, three files in Figures 5-22 and 5-23 are deleted, so the extensions of the remaining files change from ".S4", ".S5" to ".S1" and ".S2", respectively.

When a system-saved file has become a registered file, the change of the extensions follows.

PURGE function cannot operate when the disk is in write protect condition (refer to Section 5.1.2).

Press [stop] or any of the MENU key group to erase the FD sub-menu

screen. The sub-menu screen can be erased when [or] or [sm] is

pressed and its execution is completed.

```
** DISPLAY **  from ACQ_MEM                    PK id.           <TRACE TIMING>
                                               CLK: 50ns  CURSOR [       ]
GROUP [TIMING]                                      [ 50ns]  KNOB [DATA]
          0ns      2.50µs      5.00µs      7.50µs      10.00µs      12.50µs
  [ X 1 ]
  [ D7  ]
  [ D6  ]
  [ D5  ]                                      ** FD OPERATION **
  [ D4  ]                                      OPERATION [PURGE    ] system-saved
  [8CH L]                                      DRIVE    [F0:]                files
                                               NUMBER OF DELETED FILE [03]
  [ D3  ]                                      F0: __name___blks__attri__date_____
  [ D2  ]                                      DISP.REG    18  DSP_T  03-FEB-86  09:59
                                               DISP.S1     18  DSP_T  03-FEB-86  10:15
  [ D1  ]                                      DISP.S2     18  DSP_T  03-FEB-86  10:24
  [ D0  ]                                      DISP.S3     18  DSP_T  03-FEB-86  10:24
                                               DISP.S4     18  DSP_T  03-FEB-86  10:24
                                               DISP.S5     18  DSP_T  03-FEB-86  10:24
                                               TEST1.DAT   18  DSP_T  03-FEB-86  09:54
                                               TEST2.DAT   18  DSP_T  03-FEB-86  10:14
                                                                      03-FEB-86  10:25
```

Figure 5-22 PURGE Function: Specifying the Desired File Numbers

```
** DISPLAY **  from ACQ_MEM                PK id.        <TRACE TIMING>
                                           CLK: 50ns  CURSOR [      ]
GROUP [TIMING]                                [ 50ns]  KNOB [DATA]
        0ns       2.50µs      5.00µs      7.50µs   10.00µs     12.50µs
  [ X 1 ]
  [ D7  ]
  [ D6  ]
  [ D5  ]
  [ D4  ]                                    ** FD OPERATION **
  [8CH L]
  [ D3  ]                                    OPERATION [PURGE    ] system-saved
  [ D2  ]                                    DRIVE       [F0:]              files
  [ D1  ]                                    NUMBER OF DELETED FILE [00]
  [ D0  ]                                    F0:__name___blks__attri__date_____
                                             DISP.REG   18 DSP_T  03-FEB-86 09:59
                                             DISP.S1    18 DSP_T  03-FEB-86 10:24
                                             DISP.S2    18 DSP_T  03-FEB-86 10:24
                                             TEST1.DAT  18 DSP_T  03-FEB-86 09:54
                                             TEST2.DAT  18 DSP_T  03-FEB-86 10:14

                                                        03-FEB-86 10:27
```
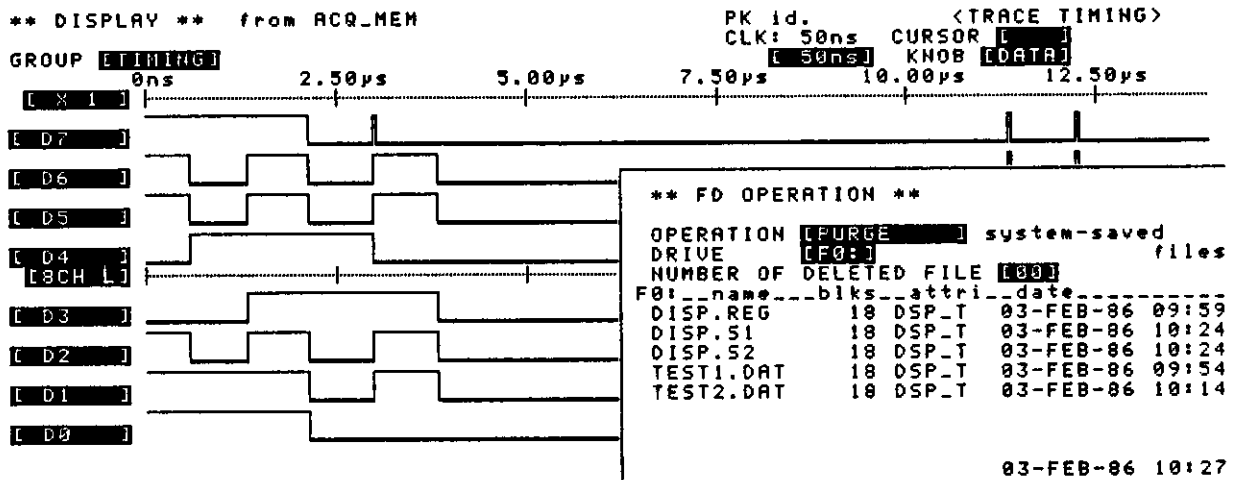
Figure 5-23 PURGE Function: Example of the Display After Execution

5.7 DELETE FUNCTION AND ITS OPERATIONS

DELETE function deletes user files (refer to Section 5.1.4). The file
name can be specified one by one for file deletion. However, the file
name wild card is not supported.

Instead of DELETE function, use PURGE function (refer to Section 5.6) to
delete system-saved files (refer to Section 5.1.4).

Press ⌷ and the FD sub-menu screen is displayed on the right of the CRT
display; the main menu screen becomes half-tone display; the data entry to
the menu item is temporarily inhibited; and the input prompt moves to the
command selection menu item of the sub-menu screen.

Since the DIRECTORY-of-MENU command has been selected, change it to DELETE

by pressing ⌷ three times. It is safer to check the file name by

using the directory display before deleting a file. After
DIRECTORY-of-MENU function (refer to Section 5.4.1) is executed, change it

into DELETE by pressing ⌷ three times (refer to Figure 5-24). When

executing DIRECTORY-of-MENU function on the built-in drive, press ⌷
twice; for the auxiliary drive, set the DRIVE to F1: before pressing ⌷
a second time. Scrolling is permitted when the scroll mark is displayed
on the bottom of the FD menu screen (which indicates that there are more
than 8 files).

Next, press ⌷ to move the input prompt to the menu item of the file
name. The file name can be input by pressing any key of the ENTRY key
group. After the file name is input, press ⌷ to start the execution.
At the end of the execution, the result is displayed as the directory
display (refer to Figure 5-25). Note that DELETE function cannot be
executed when the disk is in write protect condition (refer to
Section 5.1.2).

Press ⌷ or any of the MENU key group to erase the FD sub-menu screen.

The sub-menu screen can be erased when ⌷ or ⌷ is pressed and

its execution is completed.

** DISPLAY ** from ACQ_MEM

```
** DISPLAY **  from ACQ_MEM                          PK  id.              <TRACE TIMING>
                                                      CLK: 50ns   CURSOR [        ]
GROUP [TIMING]                                             [ 50ns]   KNOB [DATA]
         0ns        2.50ps       5.00ps       7.50ps      10.00ps     12.50ps
[  X  1 ]
[  D7   ]
[  D6   ]
[  D5   ]                                    ** FD OPERATION **
[  D4   ]
[8CH L]                                      OPERATION [DELETE      ]
                                             FILE NAME [F0:] TEST2.DAT_
[  D3   ]                                    F0:__name___blks__attri__date_____
[  D2   ]                                      DISP.REG     18  DSP_T   03-FEB-86  09:59
[  D1   ]                                      DISP.S1      18  DSP_T   03-FEB-86  10:24
                                               DISP.S2      18  DSP_T   03-FEB-86  10:24
[  D0   ]                                      TEST1.DAT    18  DSP_T   03-FEB-86  09:54
                                               TEST2.DAT    18  DSP_T   03-FEB-86  10:14

                                                                       03-FEB-86  10:30
```
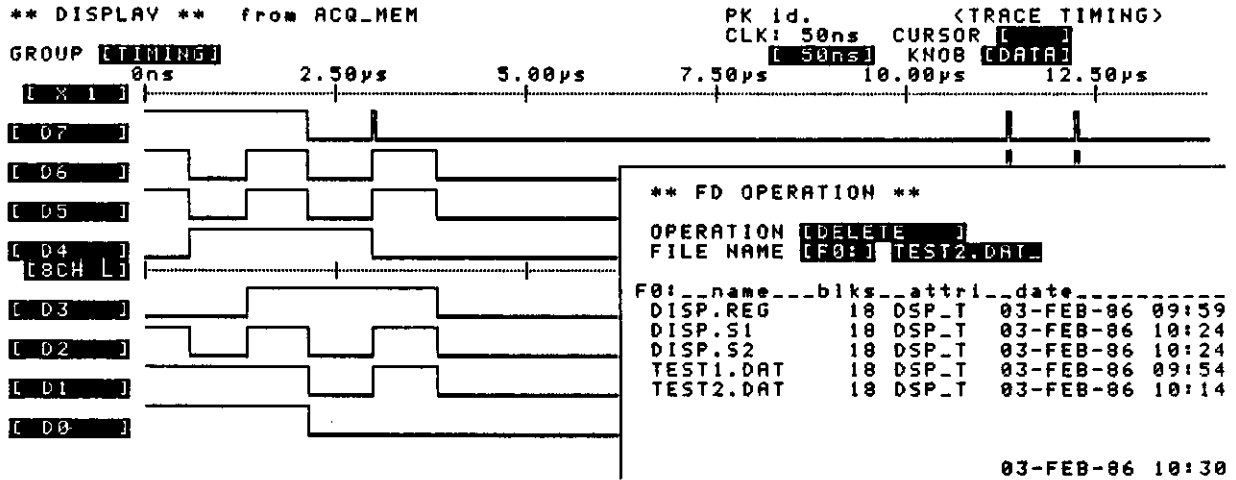
Figure 5-24   DELETE Function: Example of Inputting the Desired File Name

```
** DISPLAY **  from ACQ_MEM                          PK  id.              <TRACE TIMING>
                                                      CLK: 50ns   CURSOR [        ]
GROUP [TIMING]                                             [ 50ns]   KNOB [DATA]
         0ns        2.50ps       5.00ps       7.50ps      10.00ps     12.50ps
[  X  1 ]
[  D7   ]
[  D6   ]
[  D5   ]                                    ** FD OPERATION **
[  D4   ]
[8CH L]                                      OPERATION [DELETE      ]
                                             FILE NAME [F0:] TEST2.DAT_
[  D3   ]                                    F0:__name___blks__attri__date_____
[  D2   ]                                      SYMBOL.1      4  SYMDEF  03-FEB-86  09:33
                                               TEST1.CNF     3  CONFIG  03-FEB-86  09:31
[  D1   ]                                      TEST1.DAT    18  DSP_T   03-FEB-86  09:54
                                               TEST1.PRG     2  PROG    03-FEB-86  09:34
[  D0   ]                                      TEST1.TRC     3  TRACE   03-FEB-86  09:32
                                               TEST2.CNF     3  CONFIG  03-FEB-86  09:32
                                               TEST2.PRG     2  PROG    03-FEB-86  09:34
                                               TEST2.TRC     3  TRACE   03-FEB-86  09:32
                                                        +scroll       03-FEB-86  10:31
```

Figure 5-25   DELETE Function: Example of the Display After Execution

5.8 FORMAT FUNCTION AND ITS OPERATIONS

FORMAT function creates the user disk (refer to Section 5.1.3). The
purchased floppy disk (blank disk) cannot be used without being formatted
by the TR4725. For formatting the disk to make it applicable to the
TR4725, necessary data must be written. The disk obtained from formatting
a blank one is called the user disk. The capacity of a blank disk (the
un-formatted capacity) is 1MB; the capacity of the user disk (the
formatted capacity) becomes 632.5KB (1KB = 1024B).

The user disk created by FORMAT function can be uniquely identified by
DISK ID and DESCRIPTION. DISK ID means that the user disk is confined to
the standard imposed upon it by its creator - the system disk. For
instance, the DISK ID of the user disk, which is formatted by the system
disk with a DISK ID of "TR47250 SYSTEM DISK", shall have a DISK ID of
"TR47250 USER DISK". Data between the system and user disks of different
DISK IDs cannot be used together.

DESCRIPTION is a user-defined string of 20 or fewer alphanumeric
characters used to identify a disk.

Press ⬜ and the FD sub-menu screen is displayed on the right of the CRT
display; the main menu screen becomes half-tone display; the data entry to
the menu item is temporarily inhibited; and the input prompt moves to the
command selection menu item of the sub-menu screen. Since the

DIRECTORY-of-MENU command has been selected, press ⬜ or ⬜ four

times to change it into FORMAT (refer to Figure 5-26).

Next, press ⬆ to move the input prompt to the menu item of either DRIVE
or DESCRIPTION. Disk drive is specified in the DRIVE menu item (F0: the
defaulted built-in drive; F1: auxiliary drive). Input a statement or a
name for disk identification by pressing any of the ENTRY key group into
the DESCRIPTION menu item. The input statement or name is written into
the disk and can be displayed any time by STATUS-of-DISK function (refer
to Section 5.11.2). An input example is shown in Figure 5-27.

Next, press ⬜ to start execution (refer to Figure 5-28). Once FORMAT
function is mistakenly executed, the entire file in the disk can be
destroyed; thus, for security, a display for checking the desired
formatting disk is provided. Input "Y" when formatting (press ⬜ (the
green shift key) and ⬜ keys).

The user disk cannot be formatted when the system disk is in write protect
condition.

At the end of execution, the status of the created user disk is displayed
(refer to Figure 5-29). The format of this display is identical with that
of the STATUS-of-DISK function. There are 2530 blocks of the available
area which equals 632.5KB, since 1 block equals 256B.

Press [STOP] or any of the MENU key group to erase the FD sub-menu screen.

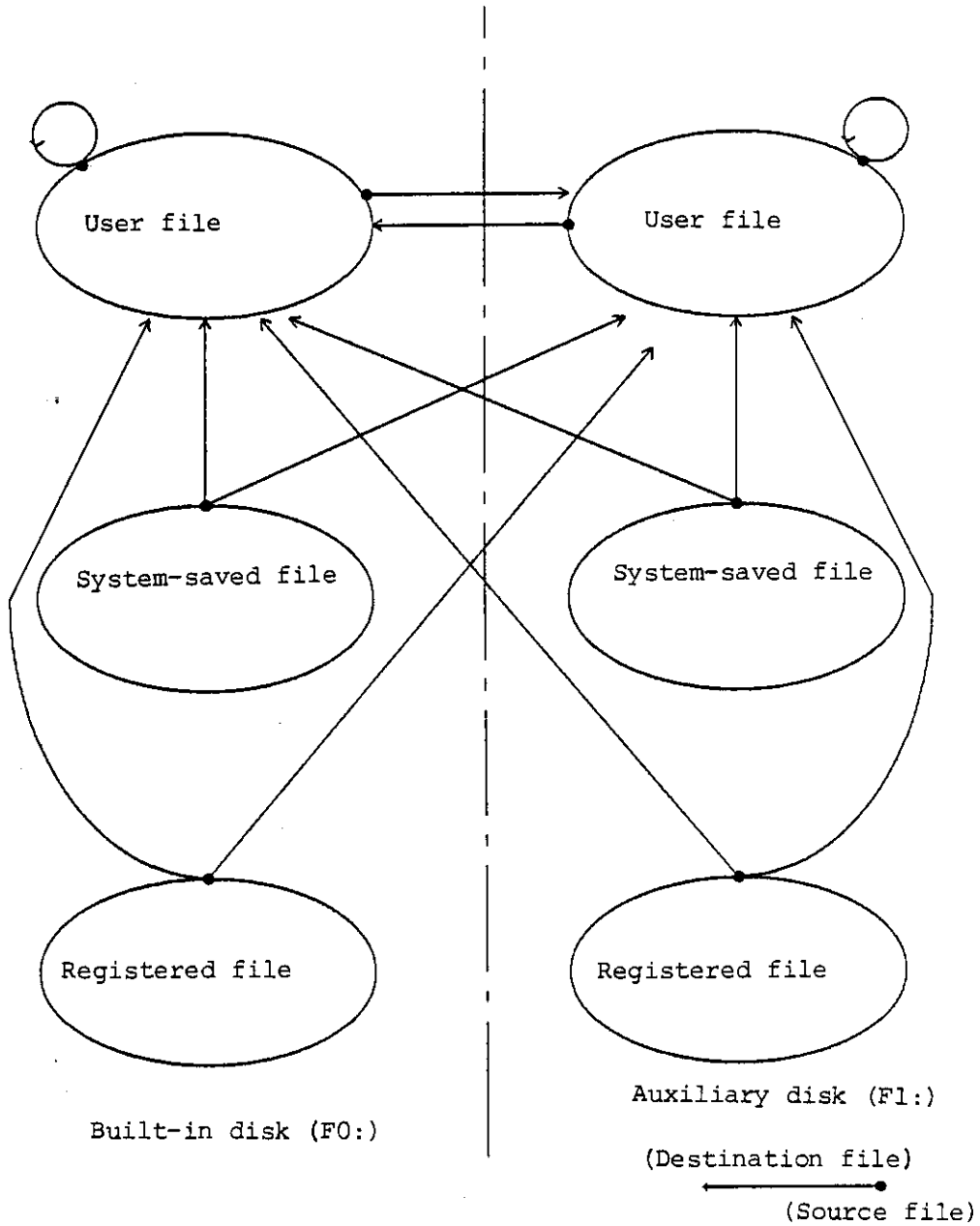The sub-menu screen can be erased when [EXT] or [SAVE] is pressed and its execution is completed.
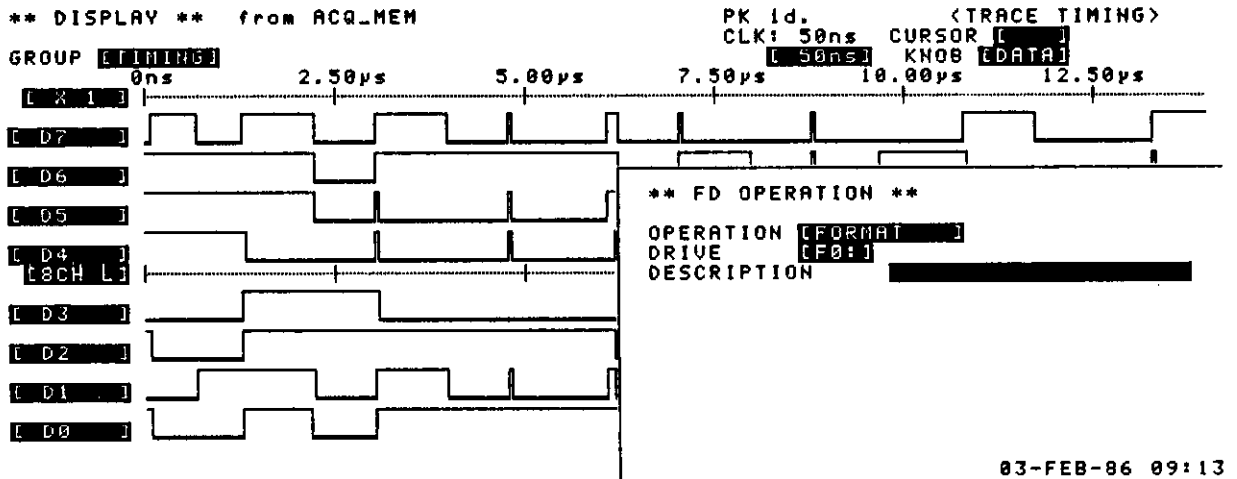
Figure 5-26 FORMAT Function: Initial Menu Screen
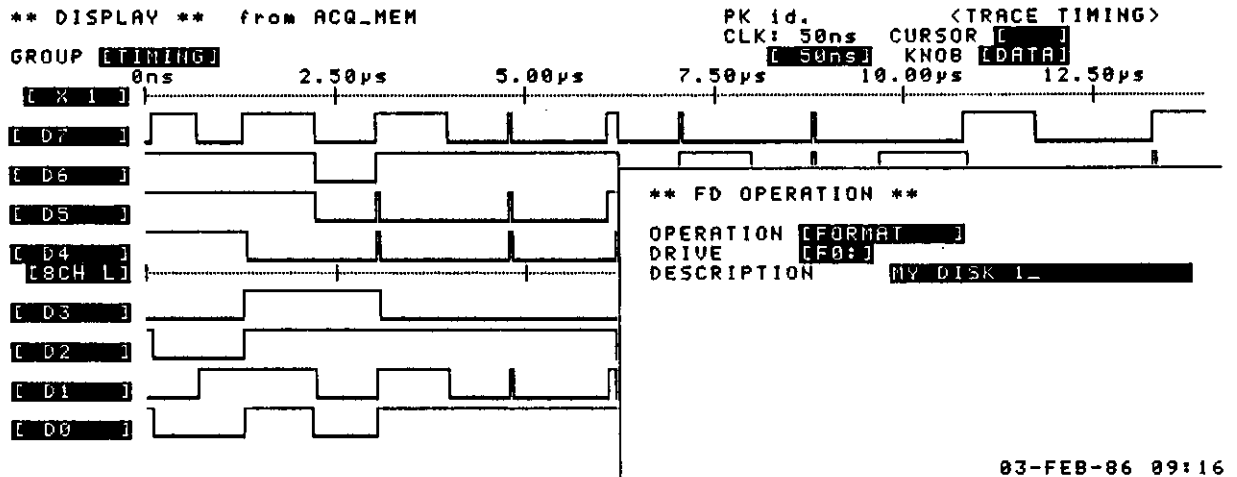
Figure 5-27 FORMAT Function: DESCRIPTION Input Example
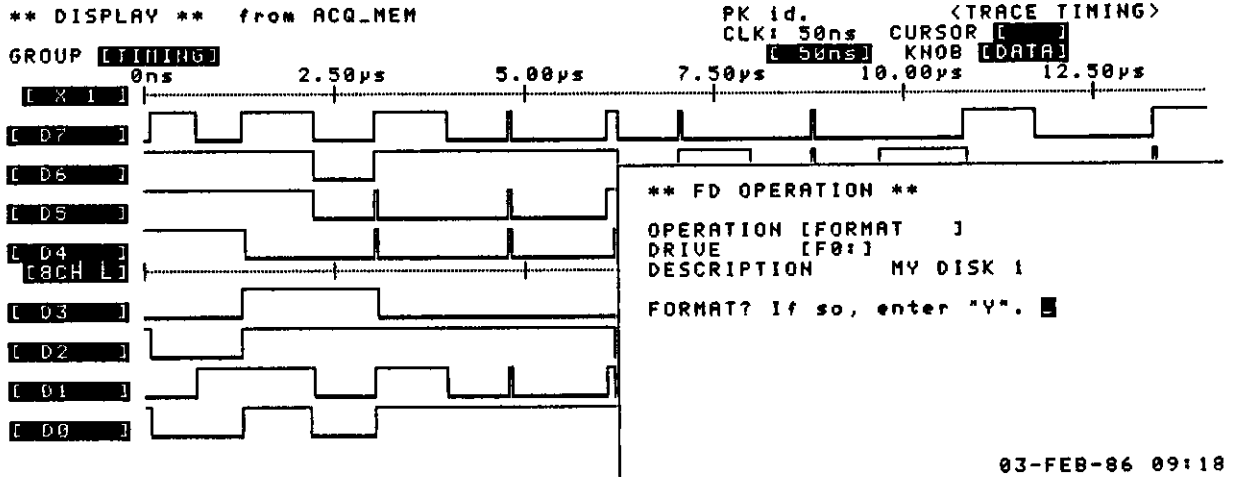
Figure 5-28   FORMAT Function: Check Before Execution
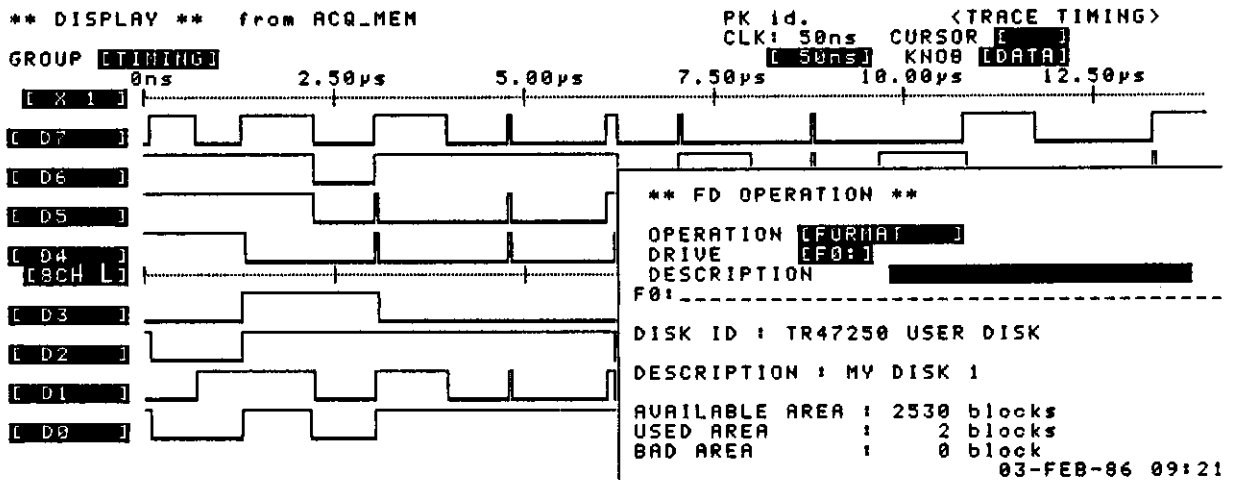
Figure 5-29   FORMAT Function: Example of the Display After Execution

5.9 RENAME FUNCTION AND ITS OPERATIONS

RENAME function renames all the created user files (refer to
Section 5.1.4). The file names of the system-saved file and registered
file cannot be renamed. Use COPY function (refer to Section 5.10) to
create the file with the same contents as the system-saved file or
registered file.

Press ⬚ and the FD sub-menu screen is displayed on the right of the CRT
display; the main menu screen becomes half-tone display; the data entry to
the menu item is temporarily inhibited; and the input prompt moves to the
command selection menu item of the sub-menu screen. Since the

DIRECTORY-of-MENU command has been selected, press ⬚ three times to
change it into RENAME.

It is more convenient to check the file name with the directory display
before renaming a file. That is, after DIRECTORY-of-MENU function (refer

to Section 5.4.1) is executed, press ⬚ three times to change it into

RENAME (refer to Figure 5-30). When the DIRECTORY-of-MENU function is
executed on the built-in drive, press ⬚ twice; for the auxiliary
drive: set the DRIVE specification to F1: before pressing ⬚ a second
time.

Scrolling is permitted when the scroll mark is displayed on the bottom
line of the FD menu screen with the directory display (which means that
there are more than 8 files).

Next, press ⬚ to move the input prompt to the menu item of the file name
entry, and enter the file name using any of the ENTRY key group (current
file name to OLD NAME and new file name to NEW NAME). Next press ⬚ to
start execution. At the end of execution, the result is displayed as the
directory display (refer to Figure 5-31).

The RENAME function cannot be executed when the disk is in write protect
condition (refer to Section 5.1.2).

Press ⬚ or any of the MENU key group to erase the FD sub-menu screen.

The sub-menu screen can be erased when ⬚ or ⬚ is pressed and its
execution is completed.

```
** DISPLAY **   from ACQ_MEM                    PK id.            <TRACE TIMING>
                                                CLK: 50ns   CURSOR [      ]
GROUP [TIMING]                                      [ 50ns]  KNOB [DATA]
       0ns        2.50μs       5.00μs      7.50μs       10.00μs      12.50μs
[ X 1 ]
[ D7  ]
[ D6  ]
[ D5  ]                              ** FD OPERATION **
[ D4  ]
[8CH L]                              OPERATION [RENAME    ]
                                     OLD NAME  [F0:] 1
[ D3  ]                              NEW NAME            TEST2.DAT_
                                     F0:__name___blks__attri__date_____
[ D2  ]                              1.              18 DSP_T  03-FEB-86 12:42
                                     DISP.REG        18 DSP_T  03-FEB-86 09:59
[ D1  ]                              DISP.S1         18 DSP_T  03-FEB-86 10:24
                                     DISP.S2         18 DSP_T  03-FEB-86 10:24
[ D0  ]                              TEST1.DAT       18 DSP_T  03-FEB-86 09:54

                                                        03-FEB-86 12:45
```
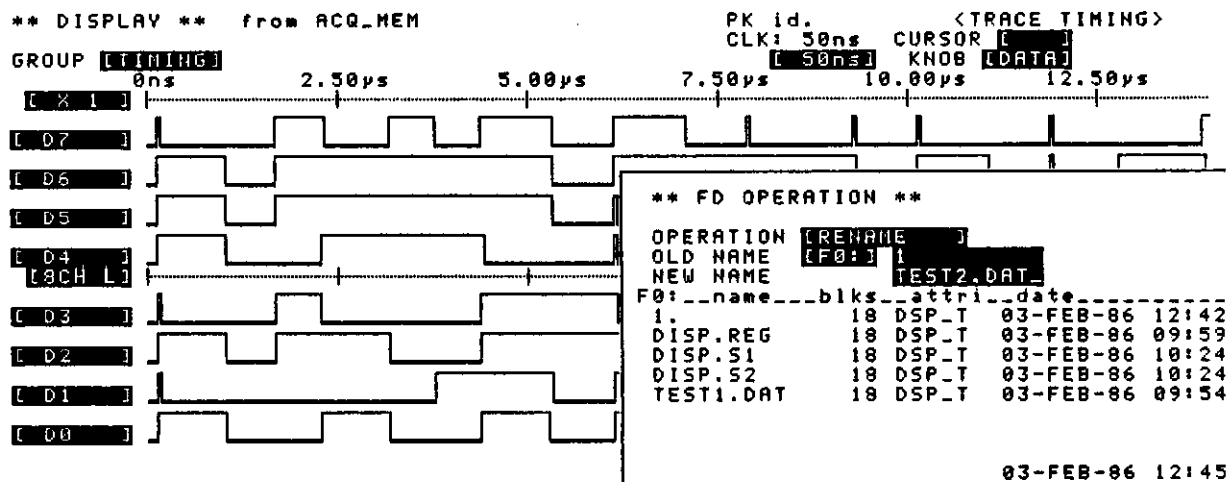
Figure 5-30 RENAME Function: Initial Menu Screen

```
** DISPLAY **   from ACQ_MEM                    PK id.            <TRACE TIMING>
                                                CLK: 50ns   CURSOR [      ]
GROUP [TIMING]                                      [ 50ns]  KNOB [DATA]
       0ns        2.50μs       5.00μs      7.50μs       10.00μs      12.50μs
[ X 1 ]
[ D7  ]
[ D6  ]
[ D5  ]                              ** FD OPERATION **
[ D4  ]
[8CH L]                              OPERATION [RENAME    ]
                                     OLD NAME  [F0:] 1
[ D3  ]                              NEW NAME            TEST2.DAT_
                                     F0:__name___blks__attri__date_____
[ D2  ]                              TEST1.CNF        3 CONFIG 03-FEB-86 09:31
                                     TEST1.DAT       18 DSP_T  03-FEB-86 09:54
[ D1  ]                              TEST1.PRG        2 PROG   03-FEB-86 09:34
                                     TEST1.TRC        3 TRACE  03-FEB-86 09:32
[ D0  ]                              TEST2.CNF        3 CONFIG 03-FEB-86 09:32
                                     TEST2.DAT       18 DSP_T  03-FEB-86 12:42
                                     TEST2.PRG        2 PROG   03-FEB-86 09:34
                                     TEST2.TRC        3 TRACE  03-FEB-86 09:32
                                                  ↓scroll     03-FEB-86 12:46
```

Figure 5-31 RENAME Function: Example of the Display After Execution

5.10 COPY FUNCTION AND ITS OPERATIONS

COPY function copies the contents of a file to another file and is used to backup files of all the measuring conditions and measurement data that have already been created.

The file with data that can be copied is called a source file; the file that the data is copied into is called a destination file. If the file name specified by the destination file can be found in the disk, the old data is destroyed and the new data is stored to the file. If the file name specified by the destination file cannot be found in the disk, a new file is created with the data written in the new file.

The user file can be specified either as the source file or destination file.

System-saved file or registered file can be specified as the source file, but not be specified as the destination file.

The possible combination of files in which COPY can be executed is shown in Figure 5-32.

Press ⌊ ⏦ ⌋ and the FD sub-menu screen is displayed on the right of the CRT display; the main menu screen becomes half-tone display; the data entry to the menu item is temporarily inhibited; and the input prompt moves to the command selection menu item of the sub-menu screen. Since

DIRECTORY-of-MENU command has been selected, press ⌊ ᴹᵛ ⌋ twice to change it to COPY.

It is safer to check the file name by using the directory display before

copying a file. This can be done by pressing ⌊ ᴹᵛ ⌋ twice after

DIRECTORY-of-MENU function is executed to change it to COPY (refer to Figure 5-33). When the DIRECTORY-of-MENU function is executed on the built-in drive, pressed ⌊ ⏦ ⌋ twice; for the auxiliary drive, the DRIVE specification must be set to F1: before pressing ⌊ ⏦ ⌋ a second time.

Scrolling is permitted when the scroll mark is displayed on the bottom line of the FD menu screen by the directory display (which means there are more than 8 files in the disk).

Next, press ⌊↓⌋ to move the input prompt to the menu item of the file name input, and input the file name by pressing any key of the ENTRY key group. Input the file name to be specified in the source file into the FROM column, and the file name to be specified in the destination file to the TO column.

Then, insert into the floppy disk drive the disk which has become the destination file and press ⬚ to start the execution. At the end of execution, the result is displayed as the directory display (refer to Figure 5-34).

COPY function cannot be executed when the disk is in write protect condition (refer to Section 5.1.2).

Press ⬚ or any of the MENU key group to erase the FD sub-menu screen.

The sub-menu screen can be erased when ⬚ or ⬚ is pressed and its execution is completed.

User file

User file

System-saved file

System-saved file

Registered file

Registered file

Auxiliary disk (F1:)

Built-in disk (F0:)

(Destination file)

(Source file)

Figure 5-32   COPY Function and Files
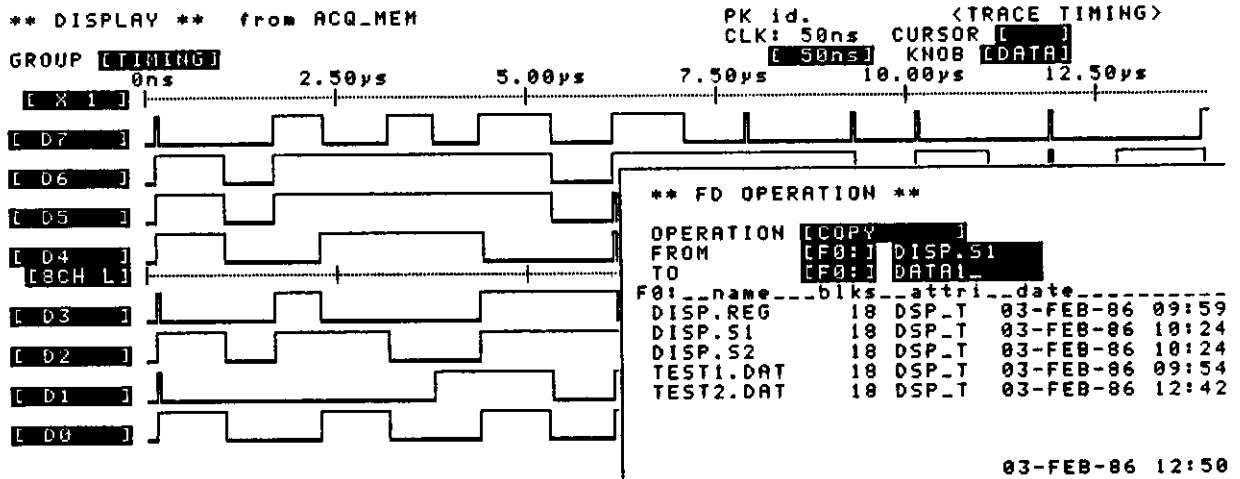
Figure 5-33   COPY Function: Initial Menu Screen
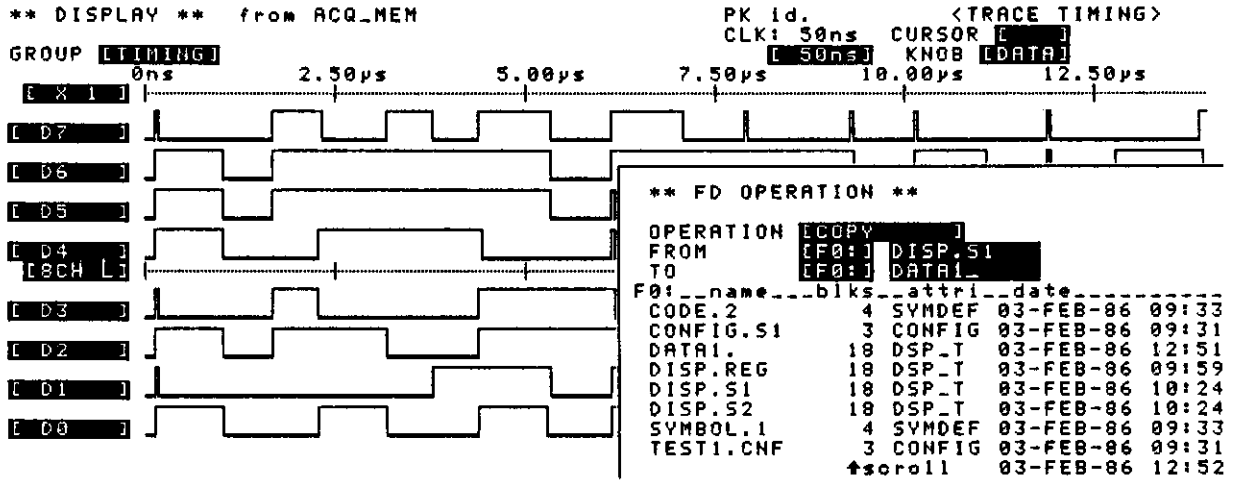
Figure 5-34   COPY Function: Example of the Display After Execution

5.11 STATUS FUNCTION AND ITS OPERATIONS

5.11.1 STATUS-of-FILES Function and Its Operations

STATUS-of-FILES function displays the use condition of the file (file attributes; refer to Section 5.1.4) which is related to the currently displayed main menu screen. The use conditions displayed include each file number and the total size of the registered file, system-saved file and user file.

Press ⟦ 〠 ⟧ and the FD sub-menu screen is displayed on the right of the CRT display; the main menu screen becomes half-tone display; the data entry to the menu item becomes temporarily inhibited; and the input prompt moves to the command selection menu item of the sub-menu screen. Since the DIRECTORY-of-MENU command has been selected, press

⟦ MNV ⟧ and it is changed to STATUS-of-FILES (refer to Figure 5-35).

Next, press ⟦↓⟧ to move the input prompt to the DRIVE menu item. After the desired disk drive (F0: the defaulted built-in drive, F1: the auxiliary drive) is set, press ⟦ 〠 ⟧ again to start execution (refer to Figure 5-36).

The size of the file is indicated in block units (1 block = 256B). Up to 199 files can be created in one user disk (refer to Section 5.1.3). However, since the total file size cannot exceed 2530 blocks, if the created file is large, it is impossible to accommodate 199 files in one disk (pay special attention to files with the DSP_ST file attribute, since their file size is extraordinarily large).

Press ⟦ STOP ⟧ or any in the MENU key group to erase the FD sub-menu

screen. The sub-menu screen can be erased when ⟦ UIT ⟧ or ⟦ SAVE ⟧ is pressed and its execution is completed.

Figure 5-35   STATUS-of-FILES Function: Initial Menu Screen
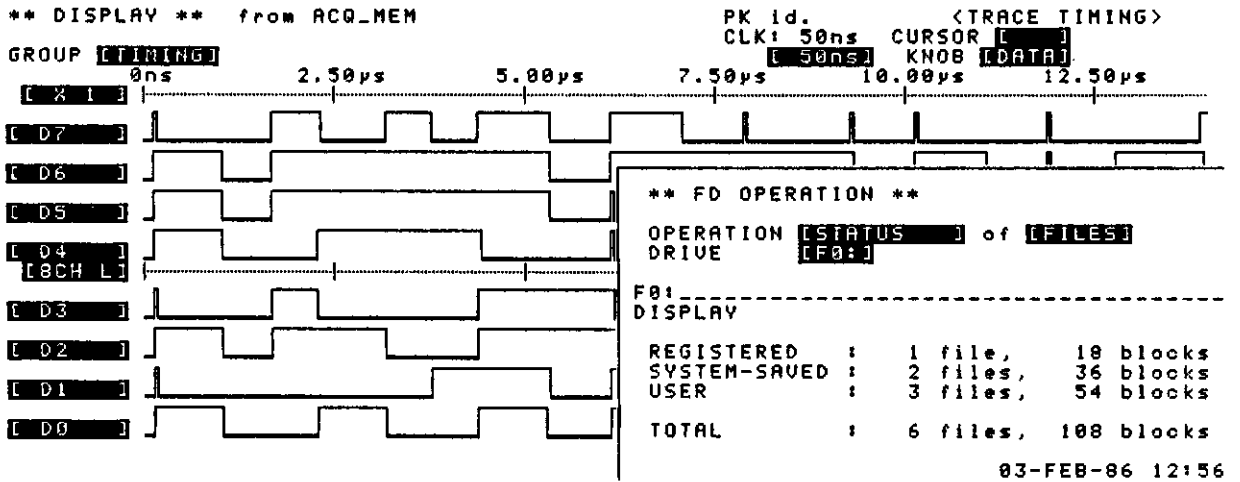
Figure 5-36   STATUS-of-FILES Function: Example of the Display After Execution

5.11.2 STATUS-of-DISK Function and its Operations

STATUS-of-DISK function indicates the disk identification information
and the use condition of the user disk (and the system disk).

Press [ⁱⁿ] and the FD sub-menu screen is displayed on the right of the
CRT display; the main menu screen becomes half-tone display; the data
entry to the menu item is temporarily inhibited; and the input prompt
moves to the command selection menu item of the sub-menu screen.

Since the DIRECTORY-of-MENU command has been selected, press [ᴵᴺᵛ] ,

[◰] , [ˢᴬᴷ] in that order to change it to STATUS-of-MENU (refer to

Figure 5-37).

Next, press [⬇] to move the input prompt to the DRIVE menu item. After
the desired disk drive (F0: the defaulted built-in drive, F1: the
auxiliary drive) is set, press [ᴵⁿ] again to start execution (refer to
Figure 5-38).

The contents of the display on the user disk is as follows: The DISK
ID column contains the data written when formatting by FORMAT
function; the personality kit that is applicable to the user disk is
decided depending on the system disk used then (so that no data of
different personality kits can be mixed in the one user disk). The
DESCRIPTION column contains the information which the user writes for
formatting and can be used for disk control.

The use condition of the disk is displayed in the order of available
area, used area, and bad area (here, 1 block = 256B). The bad area
indicates that there is some portion of the disk which cannot be used
for reasons such as damage on the disk surface. In such a case, the
file system continues the execution skipping this portion, and the
size of the bad area is displayed.

The user disk after formatting contains 2530 blocks of the available
area and 2 blocks of the used area.

Press [ˢᵀᴼᴾ] or any of the MENU key group to erase the FD sub-menu
screen. The sub-menu screen can be erased when [ᴰᴵᴿ] or [ˢᴬᴷ] is
pressed and its execution is completed.
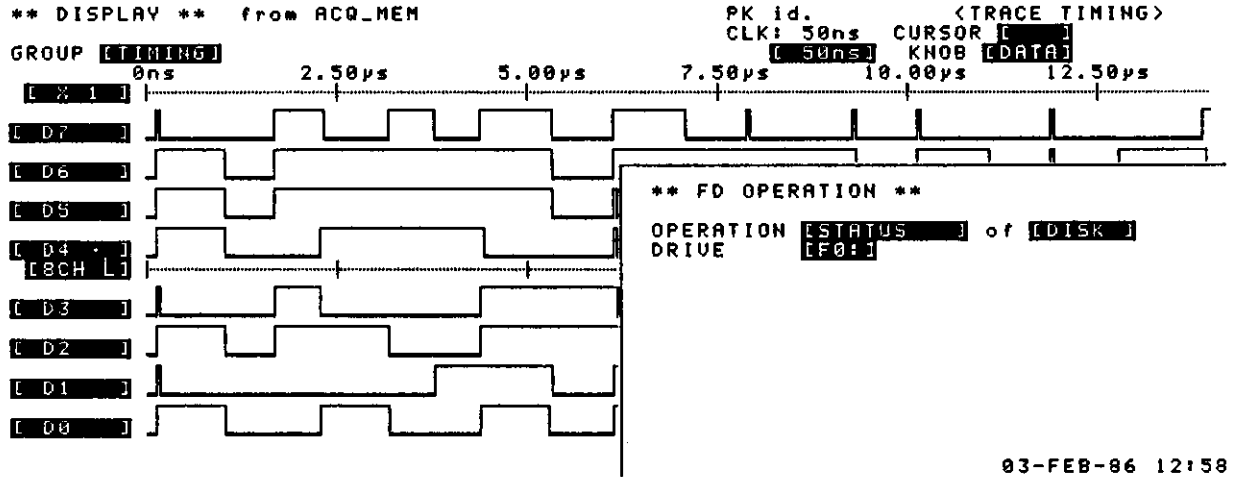
Figure 5-37   STATUS-of-DISK Function: Initial Menu Screen
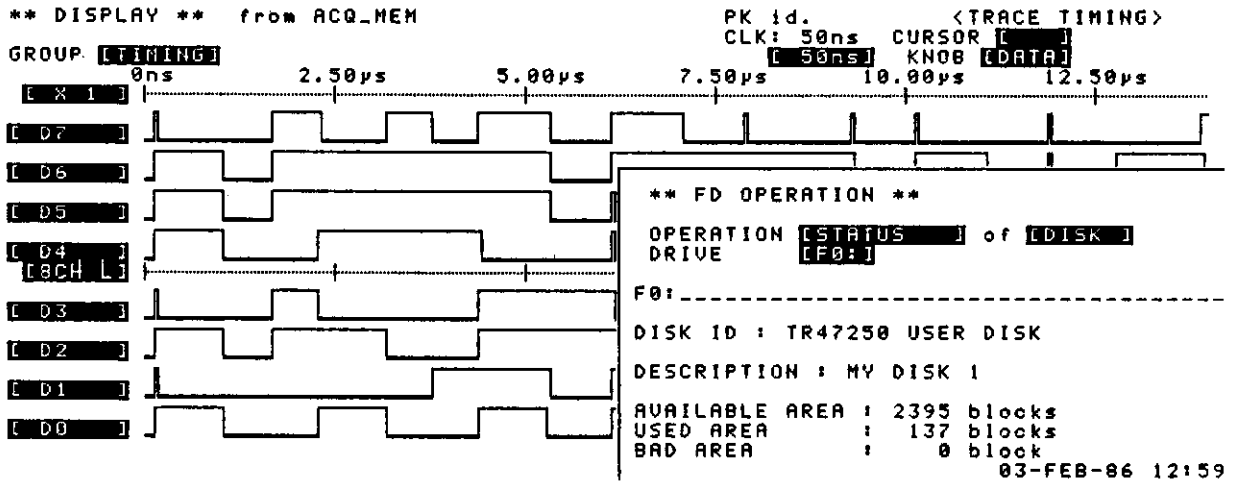
Figure 5-38   STATUS-of-DISK Function: Example of the Display After Execution

6. PROGRAM CREATION AND EXECUTION (PROGRAM/AUTO FUNCTION)

6.1 INTRODUCTION

The use of each basic function of TR4725 has been simplified by providing flexibility to each menu screen and simplifying the data storage/use with the file SAVE/GET function.

The PROGRAM/AUTO function is vital for labor-saving, automation, and standardization of measurement procedures by combining these basic functions. The REPEAT function which can repeat measurement and the COMPARE function which compares the reference data with captured data are also provided.

PROGRAM function (editor) programs the execution order of command corresponding to each basic function. Programs can be created by simply selecting the needed commands from several command groups by pressing the SELECT key. Therefore, program creation is not as complicated as the conventional programming languages (for instance: BASIC). Just as for data, programs created can be saved/retrieved by the SAVE/GET function.

The file containing these programs is specially called the command file. A program is executed by pressing [AUTO] . Usually, the created command file is executed by specifying the file name. It is also possible to execute the created program without the command file specification.

6.2 PROGRAM CREATION (PROGRAM)

6.2.1 Editor Operating Procedures

Press ⬚ key to activate the editor. The editor, using a line

editor, can create or modify a program line by line (this line is
called the menu item line).; The initial menu screen is shown in
Figure 6-1 and is one of the menu item lines which contains the input
prompt as shown in the figure.


```
** PROGRAM **                                    PK id.        <TRACE S&T(S+T)>
LN___COMMAND_____COMMENT_____
00 [        ]                                            ;
01   END
```


                                                         03-FEB-86 13:02

Figure 6-1 <u>PROGRAM</u> Initial Menu Screen

The following inputs can be executed only when the input prompt is found
in the menu item of the menu item line:

- COMMAND: Inputs the desired command by the <u>SELECT</u> key. Commands are
  constructed in a hierarchy to prevent an increase in the selection
  quantity.
- COMMENT: Can input a string of no more than 20 alphanumeric characters
  as a command. The programming language grammar is as follows:

  - A statement consists of commands and comments.
  - An empty statement (a blank in the command column) is permitted.
  - There are 24 commands with present version (intended to increase).
  - There are two control flowchart statements: "IF - THEN GOTO - " and
    "GOTO". Line number (LN) can be used for jump destination.
  - Program ends with the END statement.
  - Up to 25 program steps are possible with the present version (the END
    statement is not included).

⬇, ☐ , and ☐ are used to add or delete menu item lines.

⬇ is used for creating new programs. When it is pressed with the input prompt on the menu item line before the END statement, the new menu item line is added before the menu item line with the input prompt and the input prompt moves to the new menu item line.

When ☐ is pressed, a new menu item line is added before the menu item line in which the input prompt can be found and then the input prompt moves to the new menu item line.

When ☐ is pressed, the menu item line with the input prompt is deleted and the lines after the deleted menu item line advance one line. The input prompt does not move as it is seen virtually.

If the END statement is found following the menu item line with the input prompt, press ☐ and the input prompt moves to the upper line as soon as the line in which it was before is deleted.

6.2.2 Types of Command

There are 24 types of commands in the present version as shown in Figure 6-2. The commands in the figure are lined up one by one for clear understanding, with no actual programming meaning. Commands are structured hierarchically. For instance, for the command called DISPLAY, four various meanings are contained.

Each command is explained in the order selected by ☐ . The underscore of the title indicates the menu item. When the input prompt is found in the menu item line, it means that the menu items are displayed inversely.

```
** PROGRAM **                                    PK id.        <TRACE S&T(S+T)>
LN___COMMAND_____COMMENT_____
00 [TRACE]                                                   ;COMMAND LIST_
01 [CONFIG]
02 [SYMDEF]
03 [DISPLAY] [ ]
04 [DISPLAY] [REF_MEM + DISPLAY] INSERT
05 [DISPLAY] [REF_MEM + DISPLAY] INSERT
06 [DISPLAY] [ACQ_MEM + DISPLAY] INSERT
07 [GET] [F0:] FILE.1      GET
08 [SAVE] [ ] [F0:] FILE.2    SAVE
09 [SAVE] [QUICK] [F0:] SAVE
10 [RUN]
11 [IF] [ACQ_MEM = REF_MEM] THEN GOTO LN[00]
12 [IF] [ACQ_MEM + REF_MEM] THEN GOTO LN[00]
13 [IF] [I=] 00 THEN GOTO LN[00]
14 [IF] [I+] 00 THEN GOTO LN[00]
15 [IF] [J=] 00 THEN GOTO LN[00]
16 [IF] [J+] 00 THEN GOTO LN[00]
17 [COUNT+1] [I]
18 [COUNT+1] [J]
                                              +scroll   03-FEB-86 13:08
```

Figure 6-2 Program Command List

(1) [TRACE]:
Calls for TRACE menu screen

(2) [CONFIG]:
Calls for CONFIG menu screen

(3) [SYMDEF]:
Calls for SYMDEF menu screen

(4) [DISPLAY] [____]:
Calls for DISPLAY menu screen. [ ] indicates the subcommand
selection menu item.

(5) [DISPLAY] [REF_MEM + DISPLAY] INSERT:
Transfers the currently displayed data (data of the acquisition memory
if captured immediately after RUN; data of a file if immediately after
GET, etc.) to the reference memory. This command does not change the
display data.

(6) [DISPLAY] [REF_MEM + DISPLAY] INSERT:
Transfers the contents of reference memory to the display buffer. The
CRT display becomes the data of the reference memory.

(7) [DISPLAY] [ACQ_MEM + DISPLAY] INSERT:
Transfers the acquisition memory contents to the display buffer. The
CRT display becomes the data of the acquisition memory. Automatically
this command is executed immediately after RUN.

(8) [GET] [F0:] _____ GET:
Retrieves the specified file from the disk in the specified disk drive. The file name must be input. Before the GET command, the command specifying the menu screen is required.

(9) [SAVE] [_____] [F0:] _____ SAVE:
Saves the currently displayed data into the disk of the specified disk drive as the file with the specified file name. The file name must be input. Before the SAVE command, the command specifying the menu screen is required. [ ] indicates the menu item specifying QuickSAVE function.

(10) [SAVE] [QUICK] [F0:] SAVE:
Quickly saves the currently displayed data to the disk in the specified disk drive. The file name must be created and controlled by the TR4725 (as the system-saved file). Before the SAVE command, the menu screen specifying command is required.

(11) [RUN]:
Starts the execution of measurement.

(12) [IF] [ACQ_MEN=REF_MEM] THEN GOTO LN [00]:
Compares the contents of the acquisition memory and reference memory. If identical, moves the control to the specified line number. The line number initial value is set to 00. The upper limit is the maximum line number created.

(13) [IF] [ACQ_MEM≠REF_MEM] THEN GOTO LN [00]:
Compares the contents of the acquisition memory and reference memory. If different, moves the control to the specified line number. The line number initial value is set to 00. The upper limit is the maximum line number created.

(14) [IF] [I =] 00 THEN GOTO LN [00]:
If the control variable value I equals the specified value, the control is moved to the specified line number. The initial value for comparison is set at 0 to 99 (decimal). The line number initial value is set to 00. The upper limit is the maximum line number created.

(15) [IF] [I ≠] 00 THEN GOTO LN [00]:
If the control variable value I differs from the specified value, the control is moved to the specified line number. The initial value for comparison is set at 0 to 99 (decimal). The line number initial value is set to 00. The upper limit is the maximum line number created.

(16) [IF] [J =] 00 THEN GOTO LN [00]:
If the control variable value J equals the specified value, the control is moved to the specified line number. The initial value for comparison is set at 0 to 99 (decimal). The line number initial value is set to 00. The upper limit is the maximum line number created.

(17) [IF] [J ≠] 00 THEN GOTO LN [00]:
If the control variable value J differs from the specified value, the
control is moved to the specified line number. The initial value for
comparison is set at 0 to 99 (decimal). The line number initial value
is set to 00. The upper limit is the maximum line number created.

(18) [COUNT + 1] [I]:
The new I value is created by incrementing 1 to the control variable I
value. The initial value for I is the value set by [DEFINE] [I]
command. When the [DEFINE] command is not used, the initial value is
set to 00. This command can also be used for loop frequency control.

(19) [COUNT + 1] [J]:
The new J value is created by incremented 1 to the control variable J
value. The initial value for J is the value set by [DEFINE] [J]
command. When the [DEFINE] command is not used, the initial value is
set to 00. This command can also be used for loop frequency control.

(20) [GOTO] LN [00]:
Moves the control to the specified line number unconditionally. The
line number initial value is set to 00. The upper limit is the
maximum line number created.

(21) [WAIT] 001 sec:
No operation except waiting for the specified time. The initial value
for waiting time is 1 s. Any time between 1 to 999 s (136 min 39 s)
can be specified.

(22) [DEFINE] [I =] 00:
Sets the initial value of the control variable I.

(23) [DEFINE] [J =] 00:
Sets the initial value of the control variable J.

(24) [DEFINE] [COMPARE_RANGE] : GROUP [1], [2], [3], [4], [5], [6]:
Compares data in state analysis. The GROUP numbers to be compared can
be specified by this command. The GROUP number is the number
displayed on the left of the GROUP name of the CONFIG menu screen.
When a blank is input in place of a GROUP number, the GROUP can be
excluded from comparison.

6.3 PROGRAM EXECUTION (AUTO)

The program can be executed in any screen except for the screen in which
measurement is under execution by [RUN] or is on the UTILITY menu screen.
Only [STOP] which aborts the program execution is valid during execution of
the program.

There are two activation procedures depending on the source of the program
to be executed:

(1) Command file execution
Press [AUTO] and the input prompt for inputting the command file name which
needs to be executed is displayed as shown in Figure 6-3. The main menu
screen becomes half-tone display. When the registered file (PROG.REG) on
the PROGRAM menu screen is created and [AUTO] is pressed again, the
execution of the command file starts (refer to Section 5.5 for REGISTER
function). If required, press [AUTO] after any file name has been input,
and the execution of the specified command file starts.

(2) Execution without the command file
When creating a program in the PROGRAM menu screen, it is also created in
the TR4725 internal memory. This created program can be executed by
creating the command file. All blank is set to the menu item for

inputting the file name displayed with [AUTO] (simply by pressing [DEFAULT]).

Press [AUTO] again to start the execution of the program in memory (refer to
Figure 6-4).

```
** PROGRAM **                                        PK id.        <TRACE S&T(S+T)>
LN___COMMAND_____COMMENT_____
00 [            ]                                            ;▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
01  END


AUTO: enter file name > [F0:] TEST1.PRG_                              03-FEB-86 13:16
```

Figure 6-3 Command File Execution

```
** PROGRAM **                                          PK id.        <TRACE S&T(S+T)>
LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                    :TEEST1 SEQUENCE
01 [GET] [F0:] TEST1.CNF   GET
02 [TRACE]
03 [GET] [F0:] TEST1.TRC   GET
04 [RUN]
05 [SAVE] [ ] [F0:] TEST1.DAT   SAVE
06 END




AUTO: enter file name > [F0:] _

                                                               03-FEB-86 13:15
```

Figure 6-4 Execution without the Command File

6.4 SAVE/GET OF THE MEASUREMENT PROCEDURE PROGRAM

The measurement procedure program (only a portion is displayed on the menu screen can be stored at any time (for SAVE function, refer to Section 5.3). This file is specially called the command file.

The measurement procedure program can be displayed at any time on the menu screen. (For GET function, refer to Section 5.2.) Both cases can be executed simply.

Press ⌷ , and the main menu screen becomes half-tone display, and the

SAVE sub-menu screen as shown in Figure 6-5 is displayed.

The TR4725 names and controls the file named PROG.Sn (n = 1 to 99) (for the system-saved file, refer to Section 5.1.4). If the user-defined file name is used (for instance: TEST1.PRG), input by ENTRY key is available.

Press ⌷ again after file name entry, and the execution starts. At

the end of the execution, the SAVE sub-menu screen disappears and the originally displayed main menu screen resumes.

When the file name controlled by the TR4725 is used, simply press ⌷

twice to write the measurement procedure program into the file (this function is called the QuickSAVE function). The created command file can be executed by pressing ⌷ (refer to the previous section).

The files in the disk can be referenced by pressing ⌷ twice. The main menu screen becomes half-tone display. The FD sub-menu screen as shown in Figure 6-6 is displayed. (For DIRECTORY-of-MENU function: refer to Section 5.4.1.) Executing the SAVE or GET function or pressing ⌷ erases the sub-menu screen.

Press ⌷ to display the GET sub-menu screen as shown in Figure 6-7. The main menu screen becomes half-tone display. The file name is not usually displayed (when the registered file is found, "PROG.REG" is displayed; refer to Section 5.1.4). Turn the knob clockwise and the file names are displayed in alphabetical order. Stop turning the knob when the

desired file name appears. After this, press ⌷ again to start the

execution. At the end of execution, the GET sub-menu screen disappears and the originally displayed main menu screen resumes.

For the GET function, entering the file name with ENTRY key is not required (this function is called the QuickGET function). The measurement procedure program displayed belongs to the specified command file and the file name is displayed on the upper most line as shown in Figure 6-8.

```
** PROGRAM **                                      PK id.        <TRACE S&T<S+T>>

LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                 ;TEST1 SEQUENCE
01 [GET] [F0:] TEST1.CNF   GET
02 [TRACE]
03 [GET] [F0:] TEST1.TRC   GET
04 [RUN]
05 [SAVE] [ ] [F0:] TEST1.DAT   SAVE
06  END




SAVE: enter file name > [F0:] PROG.S1
                                                            03-FEB-86 13:21
```

Figure 6-5 SAVE Sub-menu Screen (TRACE Function)

```
** PROGRAM **                                      PK id.        <TRACE S&T<S+T>>

LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                 ;TEST1 SEQUENCE
01 [GET] [F0:] TEST1.CNF   GET
02 [TRACE]
03 [GET] [F0:] TEST1.TRC   GET
04 [RUN]
05 [SAVE] [ ] [F0:] TEST1.DAT   SAVE         ┌──────────────────────────────────
06  END                                      │  ** FD OPERATION **
                                             │
                                             │  OPERATION [DIRECTORY] of [MENU]
                                             │  DRIVE     [F0:]
                                             │
                                             │  F0:__name___blks__attri__date_____
                                             │  PROG.S1        2  PROG   03-FEB-86 13:22
                                             │  TEST1.PRG      2  PROG   03-FEB-86 13:23
                                             │  TEST2.PRG      2  PROG   03-FEB-86 09:34
                                             │
                                             │
                                             │
                                             │                          03-FEB-86 13:25
```

Figure 6-6 FD Sub-menu Screen (TRACE Function)

```
** PROGRAM **                                          PK id.        <TRACE S&T(S+T)>

LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                      ;TEST1 SEQUENCE
01 [GET] [F0:] TEST1.CNF   GET
02 [TRACE]
03 [GET] [F0:] TEST1.TRC   GET
04 [RUN]
05 [SAVE] [ ] [F0:] TEST1.DAT   SAVE  ┌──────────────────────────────────────────
06  END                               │  ** FD OPERATION **
                                      │
                                      │  OPERATION [DIRECTORY] of [MENU]
                                      │  DRIVE      [F0:]
                                      │
                                      │  F0:__name___blks__attri__date_____
                                      │    PROG.S1        2 PROG    03-FEB-86 13:22
                                      │    TEST1.PRG       2 PROG    03-FEB-86 13:23
                                      │    TEST2.PRG       2 PROG    03-FEB-86 09:34
                                      │
                                      │
GET : enter file name > [F0:] _       │              03-FEB-86 13:27
```

Figure 6-7   GET Sub-menu Screen (TRACE Function)

```
** PROGRAM **  from F0:TEST2.PRG                        PK id.        <TRACE S&T(S+T)>

LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                      ;TEST2 SEQUENCE
01 [GET] [F0:] TEST2.CNF   GET
02 [TRACE]
03 [GET] [F0:] TEST2.TRC   GET
04 [RUN]
05 [SAVE] [ ] [F0:] TEST2.DAT   SAVE
06  END
```

```
       F0:TEST2.PRG, gotten                              03-FEB-86 13:33
```

Figure 6-8   Program Display After GET Function

7. SERIAL COMMUNICATION FUNCTION AND OPERATION (COMM)

7.1 INTRODUCTION

The TR4725 can communicate with the external computer system (hereafter called the host computer) or execute serial communication with terminal devices via RS-232C connector in the rear panel. The COMM sub-menu screen can be displayed on all the main menu screens except the UTILITY menu screen.

There are two operation modes: the printer mode which only executes output (using [PRINTER] sub-menu screen) and the remote control mode which controls the TR4725 Input/Output (using [REMOTE] sub-menu screen).

For the RS-232C interface specifications, refer to Section 11.3.1.

7.2 PRINTER CONNECTION AND ITS OPERATIONS

The TR4725 can be connected to any printer that has RS-232C interface.

Press $\boxed{\text{COMM}}$ and select the [PRINTER] sub-menu screen by $\boxed{\text{NXT}}$ or $\boxed{\text{PRV}}$.

(Refer to Figure 7-1; the [PRINTER] sub-menu screen is chosen immediately after power-on.)

This sub-menu screen contains two features: SETUP_H which executes hardware related setting and SETUP_S which executes software related setting. SETUP_H is commonly used by any main menu screen and the contents of SETUP_S depends on the main menu screen. Also, there are features that cannot be output because special characters are used depending on the main menu screen (that is, SETUP_S cannot be found either). These features are shown in the following table:

Sub-menu screen Main menu screen	SETUP_S	SETUP_H
CONFIG	-	o
SYMDEF	o	o
TRACE	-	o
DISPLAY	o	o
PROGRAM	o	o

o indicates existence and - indicates nonexistence

After the setting for SETUP_H or SETUP_S, press $\boxed{\text{COMM}}$ again and the printing starts. Printing can be aborted by $\boxed{\text{STOP}}$.

```
** CONFIGURATION **   from F0:TEST1.CNF        PK id.         <TRACE S&T(S+T)>
-LABEL-
      PROBE            r-PROBE_F-,                  r-PROBE_E-,
      DATA CHANNEL     7654 3210                    7654 3210
                       ↓↓↓↓ ↓↓↓↓                    ↓↓↓↓ ↓↓↓↓
      THRESHOLD        [ECL] [ECL]                  [TTL] [TTL]
      LABEL    POL                    LABEL   POL    ↑↑↑↑  ↑↑↑↑
      DATA7    [+]                    FLAG7
      DATA6    [+]                    FLAG6         ** COMMUNICATION **
      DATA5    [+]                    FLAG5
      DATA4    [+]                    FLAG4         [PRINTER ]____[SETUP_H]_____
      DATA3    [+]                    FLAG3
      DATA2    [+]                    FLAG2         BAUD RATE    [   9600]
      DATA1    [+]                    FLAG1         CHAR LENGTH  [8 BITS]
      DATA0    [+]                    FLAG0         PARITY       [   OFF]
                                                    STOP BIT     [1 BIT ]
-VARIABLE THRESHOLD-
      V3 = [   1.4V]         V4 = [  -1.3V]
-SAMPLING-
      CLOCK RATE [  10ns]    MODE [SAMPLE]
                                                    03-FEB-86 13:52
```

Figure 7-1   [PRINTER] Sub-menu Screen (SETUP_H)

(1) SETUP_H
    Data entry into each menu item is as follows:

● BAUD RATE : Selects the suitable baud rate for the printer to be
                 connected. Nine choices of the range of 19200 baud to
                 75 baud is provided. The default value is 9600 baud.

● CHAR LENGTH: Selects the suitable character length for the printer to
                 be connected. Two types, 7- and 8-bit are provided. The
                 default value is 8 bits.

● PARITY   : Selects the suitable parity for the printer to be
                 connected. Three parity types of EVEN, ODD, and OFF are
                 provided. The default setting is OFF.

● STOP BIT   : Selects the stop bit number suitable for the printer to be
                 connected. Two types, 1- and 2-bit, are provided. The
                 default value is 1 bit.

● PIN NO.2   : Specifies the 2-pin signal name of RS-232C connector at
                 the TR4725 rear panel. Two types of TxD (transmitted
                 data: the original signal name of RS-232C specification)
                 and RxD (received data) are provided. TxD is the default
                 setting. The signal names of 3, 6, 20 pins can also be
                 set with this setting (refer to Section 11.3.1).

(2) SETUP_S in SYMDEF menu screen
    The SETUP_S in the SYMDEF menu screen as shown in Figure 7-2 inputs YES or
    NO to the output to the GROUP name existing in the table.

(3) SETUP_S in <u>DISPLAY</u> menu screen

    SETUP_S in the <u>DISPLAY</u> menu screen is shown in Figure 7-3.
    The header specifies whether the header information (GROUP name and <u>RADIX</u>)
    is on each output page. LINE specifies the line number to be output.
    There are 50 lines in one printer page. A printing example is shown in
    Figure 7-4.

(4) SETUP_S in <u>PROGRAM</u> menu screen

    The SETUP_S in the <u>PROGRAM</u> menu screen is shown in Figure 7-5.
    The entire program is output without any specification here. The printing
    example is shown in Figure 7-6.

```
** SYMBOL DEFINITION **                          PK id.          <TRACE S&T(S+T)>

GROUP [ADRS  ]    TYPE [SYMBOL]
RADIX [HEX   ]
                    [RANGE  ]
LN___NAME___VALUE___LOW:HIGH__USE------------------------------------------------
00  TIMER    FC98C  FC98C:FCA49 [+]
01   TIMESUB FC402  FC402:FC41D [+]
02   LEVEL   09078              [+]
03   JPTABLE FC132  FC132:FC13D [ ]         ----------------------------------------
04  PAUSE    FC7A4  FC7A4:FC7AD [+]        |** COMMUNICATION **
05   SETQUE  FCABE  FCABE:FCACB [+]        |
06  SCHEDULE FC5FC  FC5FC:FC6B4 [+]        |[PRINTER ]____[SETUP_S]_____
07     STACK 08862  08462:08862 [ ]        |
                                           |GROUP  ADRS      DATA       STATUS
                                           |PRINT [YES    ] [NO      ] [NO      ]
                                           |
                                           |
                                           |
                                           |
                                           |                        03-FEB-86 13:47
```

Figure 7-2 SETUP_S in <u>SYMDEF</u> Menu Screen

```
** DISPLAY **   from F0:DISP.REG              PK id.          <TRACE S&T(S+T)>

GROUP [ADRS  ] [DATA  ] [STATUS] [      ] [     ] [     ] [      ] [     ]
RADIX [HEX   ] [HEX   ] [HEX   ] [HEX   ] [HEX  ] [HEX  ] [HEX   ] [HEX  ]
[LN ]-+--------+--------+--------+--------+-------+-------+--------+-----------
0000  0909E    0000     4
0001  FCA48    CBFB     4
0002  090A1    0000     4
0003  FCA4A    5153     4
0004  FCA4C    9B55     4
0005  0885E    0674     4
0006  09860    FC00     4       ----------------------------------------
0007  FC674    96EB     4      |** COMMUNICATION **
0008  FC676    1E8B     4      |
0009  FC678    1072     4      |[PRINTER ]____[SETUP_S]_____
0010  FC5FC    88FA     4      |
0011  FC5FE    0800     4      |HEADER [YES]
0012  FC600    D88E     4      |
0013  FC602    D08E     4      |LINE from 0000 to 1023
0014  FC604    62BC     4      |
0015  FC606    8B00     4      |
0016  FC608    6C1E     4      |                        03-FEB-86 13:50
```

Figure 7-3 SETUP_S in <u>DISPLAY</u> Menu Screen

** DISPLAY ** from F0:DISP.REG

| GROUP [ADRS] | [DATA] | [STATUS] [|] [|] [|] [|] [|] [|] |
| RADIX [HEX] | [HEX] | [HEX] [HEX |] [HEX |] [HEX |] [HEX |] [HEX |] |
| [LN]-+--------+--------+--------+--------+--------+--------+--------+-------- |
0000 079000	90E0	C4						
0001 F6CCAB	4F8B	84						
0002 079000	A010	C4						
0003 F6C5A1	45A3	84						
0004 F6C8AB	45C5	84						
0005 058086	57E4	A4						
0006 058F8C	6000	A4						
0007 F6C866	7E4B	84						
0008 F6C16E	786B	84						
0009 F6C160	7782	84						
0010 F6CB58	FFCA	84						
0011 F6C058	F0E0	84						
0012 F2CD68	080E	84						
0013 F2CD60	082E	84						
0014 F2C662	0B4C	84						
0015 F2C86B	0068	84						
0016 F2C66C	018E	84						
0017 F2CE68	01A0	84						
0018 F2C061	02C5	84						
0019 039008	66C4	A4						
0020 F2C06B	0EE9	84						
0021 F2CF6A	1000	84						
0022 F2CA71	3F3D	84						
0023 018086	600E	C4						
0024 F2C170	3644	84						
0025 F2C077	3869	84						
0026 039008	6744	A4						
0027 F2C17E	3889	84						
0028 F2C170	36A4	84						
0029 F2C076	3FCF	84						
0030 038088	6744	C4						
0031 F2C170	36EA	84						
0032 F2C97C	4C03	84						
0033 039008	6644	C4						

Figure 7-4 Printing Example of DISPLAY

```
** PROGRAM **                                    PK id.        <TRACE S&T(S+T)>
LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                ;TEST2 SEQUENCE
01 [GET] [F0:] TEST2.CNF   GET
02 [TRACE]
03 [GET] [F0:] TEST2.TRC   GET
04 [RUN]
05 [SAVE] [ ] [F0:] TEST2.DAT   SAVE      ┌──────────────────────────────────
06  END                                   │ ** COMMUNICATION **
                                          │
                                          │ [PRINTER ]____[SETUP_S]_____
                                          │
                                          │
                                          │   All commands will be printed out.
                                          │
                                          │
                                          │
                                          │                   03-FEB-86 13:37
```

Figure 7-5   SETUP_S in PROGRAM Menu Screen

```
** PROGRAM **   from F0:TEST2.PRG

LN___COMMAND_____COMMENT_____
00 [CONFIG]                                                ;TEST2 SEQUENCE
01 [GET] [F0:] TEST2.CNF   GET
02 [TRACE]
03 [GET] [F0:] TEST2.TRC   GET
04 [RUN]
05 [SAVE] [ ] [F0:] TEST2.DAT   SAVE
06  END
```

Figure 7-6   Printing Example of PROGRAM

7.3 HOST COMPUTER CONNECTION AND ITS OPERATIONS (Remote Control Function)

7.3.1 Operations for Remote Control Execution

The TR4725 can be connected to any computer system that has RS-232C interface (hereafter called the host computer) which controls the TR4725 from outside of the system. The communication between TR4725 and the host computer is executed interactively by commands and command responses.

To execute remote control in the host computer, a created program must satisfy the specifications of: the protocol (regulations for communication) in Section 7.3.2, the command in Section 7.3.3, and the command response in Section 7.3.4. The following describes the operation of the TR4725 on the assumption that the aforementioned program has already been created:

Press [CONN] and select the [REMOTE] sub-menu screen by using [MNU] or [MNV] (refer to Figure 7-7).

Only the [REMOTE] sub-menu screen differs from the [PRINTER] sub-menu screen.

Enter the data to each menu item as follows:

● BAUD RATE	:	Selects the suitable baud rate of the host computer to be connected. Nine types of the baud rate can be chosen from 19200 baud to 75 baud. The default value is 9600 baud.
● CHAR LENGTH	:	Selects the suitable character length for the host computer to be connected. Two types of 7- and 8-bit are provided. The default value is 8 bits.
● PARITY	:	Selects the suitable parity for the host computer to be connected. Three parity types of EVEN, ODD, and OFF are provided. The default setting is OFF.
● STOP BIT	:	Selects the stop bit number suitable for the host computer to be connected. Two types of 1- and 2-bits are provided. The default value is 1 bit.
● PIN NO.2	:	Specifies the 2 pin signal name of the RS-232C connector at the TR4725 rear panel. There are two types of TxD (transmitted data: the original signal name of RS-232C specification) and RxD (received data). The default setting is TxD. By this setting, the 3-, 6-, 20-pin signal names can also be set (refer to Section 11.3.1).

● DELIMITER TO TR4725   :   Specifies the delimiter (delimiting symbol)
                             for transmitting commands from the host
                             computer to the TR4725. Three delimiter
                             types, CR+LF, CR, and LF, are provided. The
                             default setting is CR+LF.

● DELIMITER FROM TR4725:   Specifies the delimiter for transmitting
                             command response from the TR4725 to the host
                             computer. Three delimiter types, CR+LF, CR,
                             and LF, are provided. The default setting
                             is CR+LF.

Press ⌊COMM⌋ again at the end of the sub-menu screen setting, and the
TR4725 is set to the remote control mode and waits for commands from
the host computer. Next, activate the host computer control program.
Once the command is sent along with the protocol, remote control
starts.

When the TR4725 is set to the remote control mode, no key entry except
⌊STOP⌋ is allowed. Usually, the host computer sends EN command to
terminate the remote control. ⌊STOP⌋ can also abort the remote
control. The remote control mode is released by pressing ⌊STOP⌋ with
"REMOTE: aborted!" displayed on the screen.

```
** DISPLAY **   from F0:DISP.REG                  PK id.          <TRACE S&T(S+T)>

GROUP [ADRS  ] [DATA  ] [STATUS] [     ] [     ] [     ] [     ] [     ]
RADIX [HEX   ] [HEX   ] [HEX   ] [HEX  ] [HEX  ] [HEX  ] [HEX  ] [HEX  ]
[LN]--+-------+--------+--------+--------+--------+--------+--------+--------
0000   07900   090E    0C
0001   F6CCA   B4F8    B8
0002   07900   0A01    0C
0003   F6C5A   145A    38
0004   F6C8A   B45C    58         +----------------------------------------
0005   05808   657E    4A         | ** COMMUNICATION **
0006   058F8   C600    0A         |
0007   F6C86   67E4    B8         | [REMOTE  ]------SETUP-----------------
0008   F6C16   E786    B8         |
0009   F6C16   0778    28         | BAUD RATE    [  9600]
0010   F6C85   8FFC    A8         | CHAR LENGTH  [8 BITS]
0011   F6C05   8F0E    08         | PARITY       [   OFF]
0012   F2CD6   8080    E8         | STOP BIT     [1 BIT ]
0013   F2CD6   0082    E8         | PIN No.2     [  TXD ]
0014   F2C66   2084    C8         | DELIMITER
0015   F2C86   8006    88         |   TO TR4725  [CR+LF ]
0016   F2C66   C018    E8         |   FROM TR4725[CR+LF ]
                                  |
                                             01-APR-86  10:19
```

Figure 7-7   [REMOTE] Sub-menu Screen

7.3.2 The Protocol for Remote Control

The protocol is the convention set for use of the interactive communication between the host computer and the TR4725. To accurately execute remote control, it is necessary to create and execute the program (remote control program) on the host computer which satisfies the protocol. Three types of protocols are provided: normal sequence, abortive sequence, time-out sequence.

(1) Normal sequence
In normal sequence, as shown in Figure 7-8, the commands and command responses occur interactively. The occurrence order with operation is described below:

① Press 〔COMM〕 and the <u>COMM</u> sub-menu screen is displayed. Execute the required setting (refer to Section 7.3.13).

② Press 〔COMM〕 again and the TR4725 is set to the remote control mode. The operation from the keyboard in the front panel becomes inhibited (which equals the terminal online condition).

③ Activate the remote control program in the host computer. It is necessary to send of one dummy delimiter (symbolized with @) in the beginning.

④ Send out the R@ which corresponds to the delimiter from the TR4725 (R indicates that the TR4725 is in command receivable condition).

⑤ Send out commands from the host computer.

⑥ The TR4725 interprets the command received and sends out the status report of either R@, E@, or T@ at the end of the execution. If the command is data transmission request command (DS/DT command), one of R@/E@/T@ is sent of at the end of data transmission.

⑦ Repeat procedures ⑤ and ⑥ to execute remote control, if required.

⑧ The host computer sends out the EN@ command to end the sequence normally.

⑨ Upon receiving the EN@ command, the TR4725 sends out R@ to the host computer to release the remote control mode.

TR4725   Host computer

① COMM key

    Parameter
    setting

② COMM key   ③ Remote control command
                                                    activation
                    @ (dummy)

                    ④ R@

                    ⑤ Command @

Remote control
mode

(no key opera-   ⑥ R@/E@/T@
tion allowed)

                    Repeat ⑤ and ⑥
                ⑦ procedures

                    ⑧ EN@

                    ⑨ R@

Key operation
is permitted
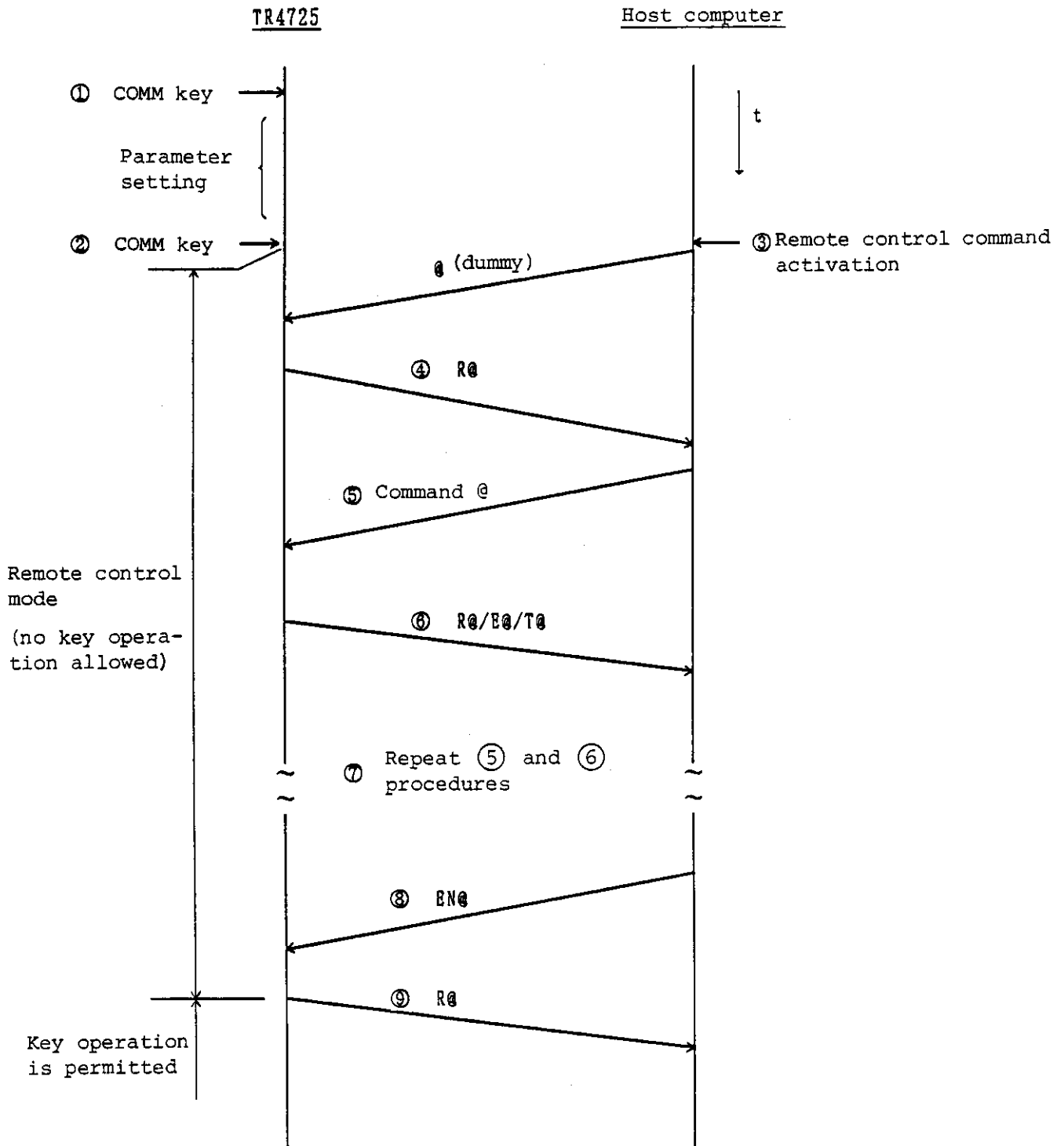
Figure 7-8 Normal Sequence

(2) Abortive sequence
   The normal sequence can be aborted by pressing [STOP] and the state of abortive sequence as shown in Figure 7-9.

   ① Press [STOP] during the execution of normal sequence. !@!@ is sent out to the host computer and the remote control mode is released.
   ② It is necessary for the host computer to execute processing against the execution abortion.
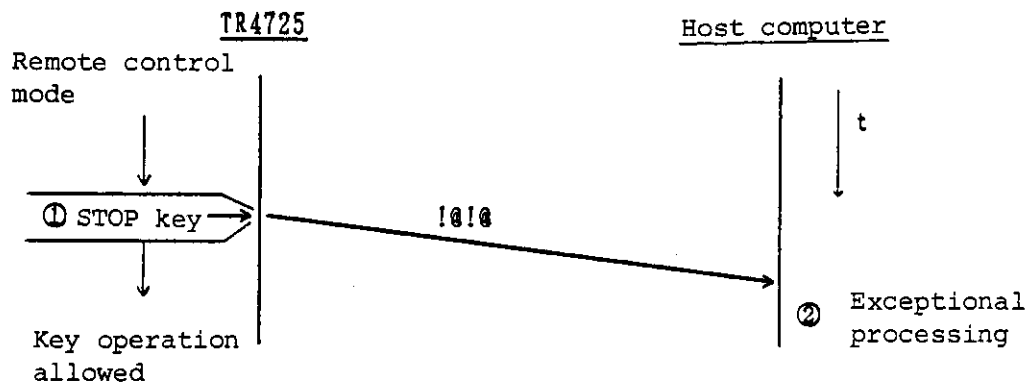
Figure 7-9 Abortive Sequence

(3) Time-out sequence
   When trouble occurs in the host computer or circuits during normal sequence and the communication is interrupted, after a pre-determined period of time, as shown in Figure 7-10, a time-out sequence is formed and the TR4725 will cut off the communication.

   ① When a delimiter is not detected in the command as received from the host computer within five seconds during normal sequence execution, !@!@ is sent to the host computer and the remote control mode is released.
   ② It is necessary for the host computer to execute processing against the execution abortion.

TR4725   Host computer
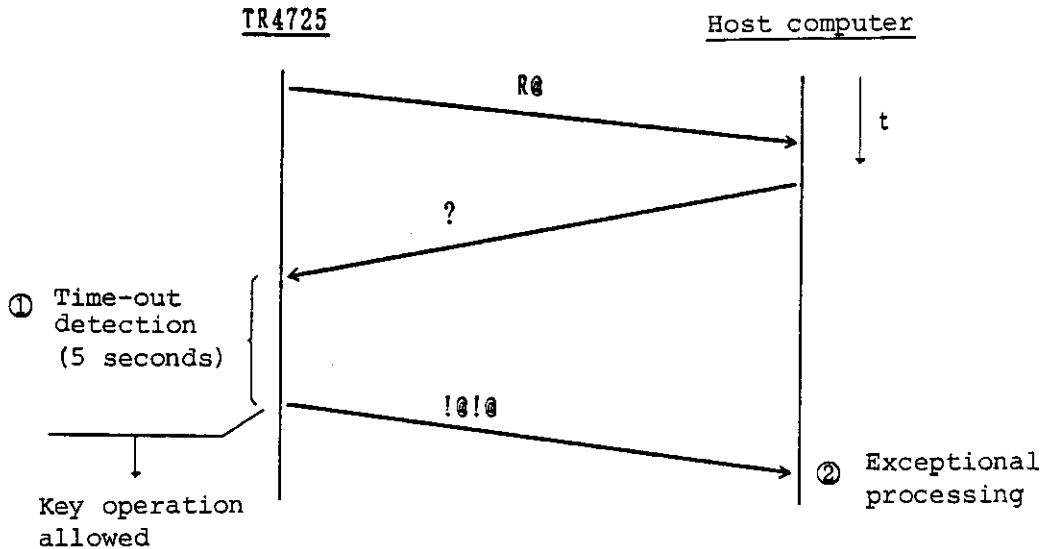
Figure 7-10   Time-out Sequence

7.3.3 Remote Control Commands

Remote control command (hereafter called the command) is the command
which is sent from the host computer to the TR4725 to control the
operation of TR4725 from outside the analyzer. There are 3 types of
commands: data transmitting command, menu-related command, and direct
setting command.

For the explanations below, the following restrictions are imposed:

● Commands are sent in upper or lower cases of ASCII code (included
  with "and").
● The command and its argument are separated by more than one blank
  (marked with ⌴).
● A command ends with a delimiter (marked with @).
● Symbols for arguments are as follows (all ASCII codes):
    b   : 1 binary digit (including "don't care" and "x")
    d   : 1 decimal digit
    h   : 1 hexadecimal digit
    file: File name (maximum 6 characters)
    ext : File extension (maximum 3 characters
    +/0 : + sign or - sign
    U   : Unit
    Whatever is included in { } means optional.
● The preceding 0 and + sign can be omitted in decimal.

(1) Data transmitting command

   ① DS command

      Upon receiving this command, the TR4725 transmits ACQ_MEM
      measurement data in the state analyzer to the host computer.
      When RS command in ② specifies the entire ACQ_MEM data (maximum
      1024 states) in default condition, only the needed data is
      transmitted to the host computer.
      Format: "DS"@

   ② RS command

      Specifies the DS command transmission range by two line numbers.
      The values from 0000 to 1023 (decimal) are adopted as the line
      number. The initial line number must be smaller or equivalent to
      the line number of the second line. The line number is ignored
      when there is no data in the specification range.
      Format : "RS⌴dddd,dddd"@
      Example: "RS⌴0000,0099"@ ... It specifies that the first 100
                   lines be transmitted.

   ③ DT command

      Upon receiving this command, the TR4725 transmits the ACQ_MEM
      measurement data in the timing analyzer to the host computer.
      When the entire ACQ_MEM measurement data in default condition is
      specified by the RT command in ④, only the needed data is
      transmitted to the host computer.
      Format : "DT"@

   ④ RT command

      Specifies the DT command transmission range in channel numbers.
      When PRB_F7 (Channel 7 of probe F) is treated as MSB (most
      significant bit), the channel in which the data to be transmitted
      is set to 1 in binary and the channel that is not transmitted is
      set to 0 in binary.
      Format : "RT⌴hhhh"@
      Example: "RT⌴FF00"@ ... Specifies that only the upper 8 channels
                   are transmitted.

(2) Menu-related command

   ⑤ CO command

      When this command is received by the TR4725, the CONFIG menu
      screen is displayed.
      Format : "CO"@

   ⑥ TR command

      When this command is received by the TR4725, the TRACE menu screen
      is displayed.
      Format : "TR"@

   ⑦ SY command

      When this command is received by the TR4725, the SYMDEF menu
      screen is displayed.
      Format : "SY"@

⑧ DI command
When this command is received by the TR4725, the DISPLAY menu
screen is displayed.
Format : "DI"@

⑨ GE command
When this command is received by the TR4725, data can be retrieved
(GET function) from the specified file in the disk of F0:
(built-in drive) or F1: (auxiliary drive).
Drive default: F0:
Format   : "LGE⌴{Fb: } file.ext"@

⑩ SQ command
When this command is received by the TR4725, data can be
"QuickSAVEd" into the system-saved file in the F0: or F1: disk.
The drive default is F0:.
Format : "SQ{⌴Fb:}"@

⑪ SA command
When the command is received by the TR4725, data can be saved into
the specified file in the F0: or F1: disk. The drive default is
F0:.
Format : "SA⌴{Fb: } file.ext"@

⑫ RU command
When this command is received by the TR4725, measurement execution
starts. When the measurement does not end after the time period
specified by the argument at the beginning of the measurement, it
becomes time-out failure. Then the TR4725 sends out "T"@ signal
to abort the execution of the measurement.
dddd indicates the value of 1 to 255. U specifies S (second), M
(minute), and H (hour). The default value is 255S (4 minutes
16 seconds).
Format : "RU{⌴dddU}"@

(3) Direct setting command

⑬ TC command
When this command is received by the TR4725, the specified value
is set to the sampling clock of the timing analyzer (Opt.70). The
value is specified in 1-2-5 step in the range of 10 ns to 50 ms.
Format : "TC⌴ddUU"@
Example: "TC⌴20ns"@

⑭ TD command
When this command is received by the TR4725, the specified value
is set to the delay of the timing analyzer. The value can be
specified in the range of -2044 to +2048.
Format : "TD⌴+/-dddd"@
Example: "TD⌴-100"@

⑮ TE command
When this command is received by the TR4725, the specified value
is set to the ENBL_T pattern of the timing analyzer. The first
digit is the PRB_F7 (Channel 7 of probe F) which is the MSB (most
significant bit).
Format : "TE⌴bbbbbbbbbbbbbbbb"@
Example: "TE⌴10101111xxxxxxxx"@

⑯ TT command
When this command is received by the TR4725, the specified value
is set to the TRIG_T pattern in the timing analyzer. The first
digit is PRB_F7 of MSB.
Format : "TT‿bbbbbbbbbbbbbbbb"@
Example: "TT‿xxxxxxxxxxxx1001"@

⑰ T3 command
When this command is received by the TR4725, the specified value
is set to the threshold voltage V3 in the timing analyzer. The
value can be specified in the range of -12.7 V to +12.7 V for
every 0.1 V.
Format : "T3‿+/-dd.dU"@
Example: "T3‿1.4V"@

⑱ T4 command
When this command is received by the TR4725, the specified value
is set to the threshold voltage V4 in the timing analyzer. The
value can be specified in the range of -12.7 V to +12.7 V for
every 0.1 V.
Format : "T4‿+/-dd.dU"@
Example: "T4‿-1.3V"@

7.3.4 Remote Control Command Responses

The remote control command responses (hereafter called command
response) correspond to the commands in Section 7.3.3, and are sent
from the TR4725 to the host computer to notify the results of the
command execution.

Command response includes data transmission and status message.

For the explanation below, the following restrictions are imposed:

● All the command responses are sent in upper case ASCII code.
● The command response ends with more than one delimiter (marked with
@)
● All those entered with digit numbers are of fixed length (characters
are also counted in digits).
● "+/-" indicates either + or - sign (+ sign cannot be omitted).

(1) Data transmission

① Transmitting ACQ_MEM data of the state analyzer
In response to the DS and RS commands, transmission is executed
according to the following formats:
Formats:
"$" [the number of lines of the data transmitted] [the digit
number of one line] [PK related data] @
"#" [line number] [data transmitted] [trigger flag] [window flag]
@ .... (this format is repeated until the line number which is the
upper limit specified by the RS command)
"&" [check data] @

[the number of lines of the data transmitted]: This indicates the
number of the lines of the acquisition memory data which is 4
decimal digits with the maximum of 1024 lines. (state number)
[the digit number of one line]: The digit which constructs the
line of the transmitted data. It should be 2 decimal digits. The
maximum number is 12 (depends on the personality kit; refer to
Figure 7-11).
[PK related data]: Such as the data to be measured, sampling mode,
etc. (depends on the personality kit; refer to Figure 7-12).
[line number]: 4 decimal digits. The oldest number should be set
to "0000". The maximum line number is 1023.
[data transmitted]: Indicating the data itself (the maximum 48 bit
data is set to 1 hexadecimal digit with delimiting every 4
bits) which contains a maximum of 12 hexadecimal digits (the
actual digit number is specified in [the digit number of one
line]).
[trigger flag]: 1 digit for characters. "T" for the trigger word
and "N" for others.
[window flag]: 1 digit for characters. "W" for the last data of
the trace window and "N" for others.
[check data]: 5 decimal digits. The "0" of the transmitted data
can be used for transmission check.

|←——— PRB_C (16) ———→|←——— PRB_B (16) ——→|←— PRB_A (16) ——→|

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

MSB

|←——————————— 12 hexadecimal digits ———————————→|
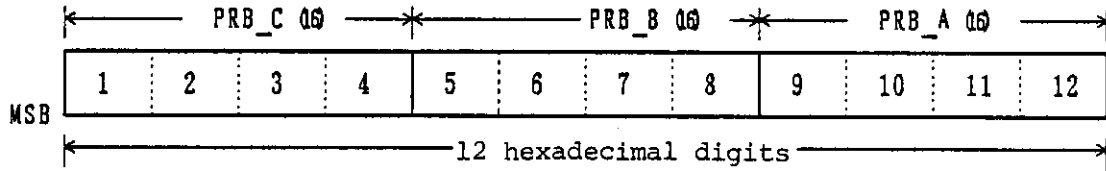
Figure 7-11 (a) Configuration of One Line of the Transmitting Data
(TR47250)

8086

|←——— ADRS(20) ———→|←— DATA(16) —→| |— STATUS(3)|

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ▨▨▨ |

MSB

|←————— 10 hexadecimal digits ————→|

S2, S1, S0, 0

Not transmitted

↑
0 is padded in this
area to fill up the
space for 4 bits.
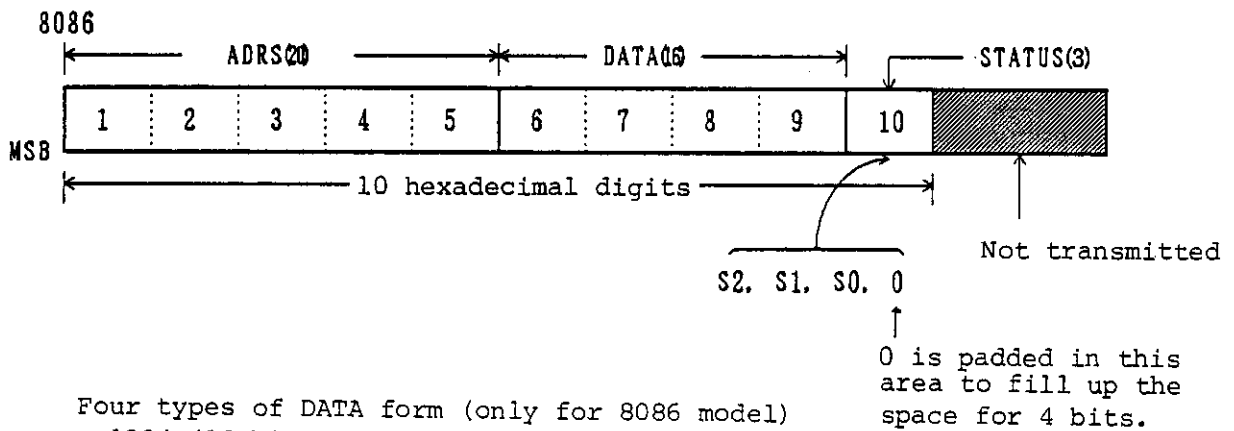
Four types of DATA form (only for 8086 model)
  1234 (16-bit number)
  xx34 (the upper byte is invalid)
  12xx (the lower byte is invalid)
  ⊔⊔34 (the instruction of QUEUE model)

8088

|←——— ADRS(20) ———→| DATA(8) |— STATUS(3)|

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | ▨▨▨ |

MSB

|←——— 8 hexadecimal digits ———→|
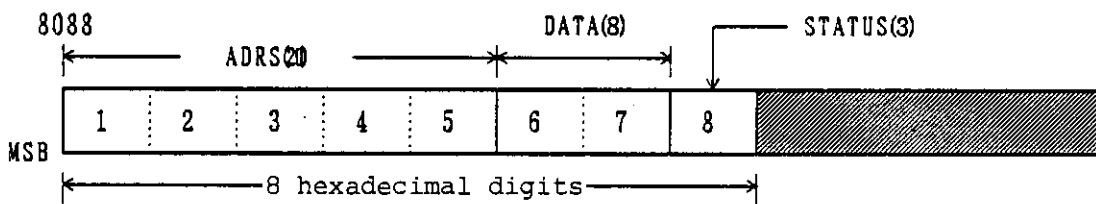
Figure 7-11 (b) Configuration of One Line of the Transmitting Data
(TR47251)

68000/68010

```
         |<----------- ADRS(24) ----------->|<------- DATA(16) ------->|       STATUS(4)
         +----+----+----+----+----+----+----+----+----+----+----+////+
         | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 |////|
MSB      +----+----+----+----+----+----+----+----+----+----+----+////+
         |<---------------- 11 hexadecimal digits ----------------->|
```
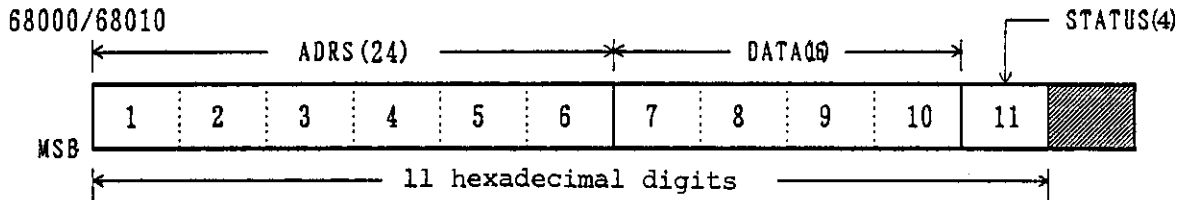
Three types of DATA form
  1234 (16-bit number)
  xx34 (the upper byte is invalid)
  12xx (the lower byte is invalid)

Figure 7-11 (c) Configuration of One Line of the Transmitting Data
                 (TR47252)

```
                        DATA(8)      STATUS (2/3)
         |<---- ADRS(16) ---->|<---->|
         +----+----+----+----+----+----+----+/////////////////////////+
         | 1  | 2  | 3  | 4  | 5  | 6  | 7  |/////////////////////////|
         +----+----+----+----+----+----+----+/////////////////////////+
         |<-------7 hexadecimal digits ----->|

                            Z80  : M1, IO/M, R/W, 0
                            8085 : IO/M, S1, S0, 0
                            6800 : R/W, OP, 0, 0
```
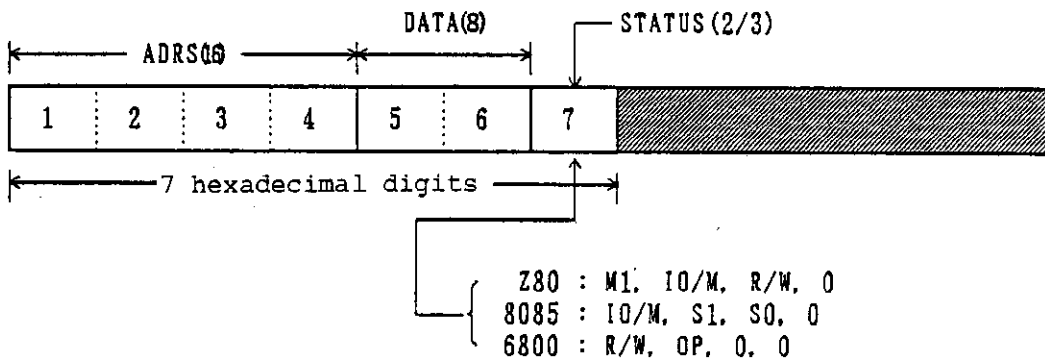
Figure 7-11 (d) Configuration of One Line of the Transmitting Data
                 (TR47241/2/3)

Note: ● The transmission is executed in the order of numbers.
       ● The part with the slash is not transmitted.
       ● 0 is padded in the LSB to make up 4 bits.

┌─ Target ID

┌────────────────────┐
│   │
└────────────────────┘
|◄──── 10-digit ────►| 例 ：　"GENERAL␣␣␣␣"
       character
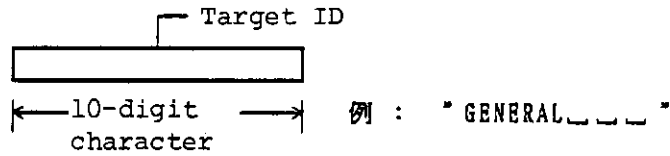
Figure 7-12 (a)   PK-related Data (TR47250)

┌── Processor name (4 digits)
│ ┌─ Sampling mode (3 digits)
│ │ ┌─ Sampling mode (3 digits)

┌──────┬─────┬──────┐
│   │   │   │
└──────┴─────┴──────┘
|◄──── 10-digit ────►| Example: "8086MAXQUE"
       character   "8088MINBUS"
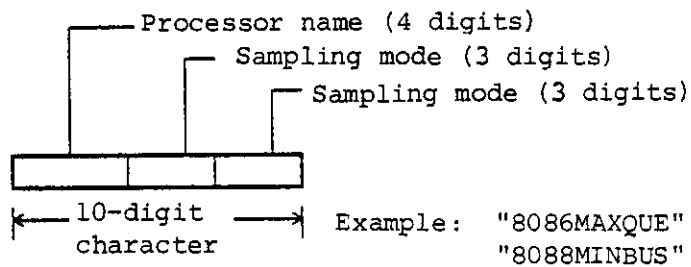
Figure 7-12 (b)   PK-related Data (TR47251)

┌──Processor name (5 digits)
│ ┌─ Operation mode (3 digits)

┌──────────┬────────┐
│   │   │
└──────────┴────────┘
|◄─ 8-digit ─►| Example: "68000QUE"
    character   "60810BUS"
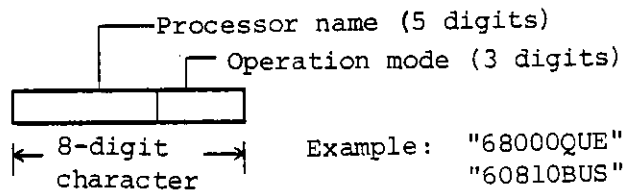
Figure 7-12 (c)   PK-related Data (TR47252)

┌─────┐
│ Z80 │
└─────┘
|◄───►| 3-digit character
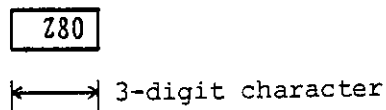
Figure 7-12 (d)   PK-related Data (TR47241)

┌──────┐
│ 8085 │
└──────┘
|◄────►| 4-digit character
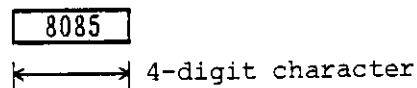
Figure 7-12 (e)   PK-related Data (TR47242)

Processor name

Example: "6800" (MOTOROLA)
4-digit character "8861" (FUJITSU)
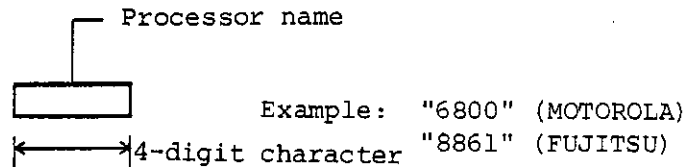
Figure 7-12 (f) PK-related Data (TR47243)

② Transmitting ACQ_MEM data of the timing analyzer
Transmission is executed in the following formats in response to the
    DT and RT command:
"%" [transmitted data size] [trigger position] [clock] [delay] @
"#" [channel number] [Whether there is transmitted data or not]
    [transmitted data block size] [transmitted block number] @
[transmitted data] @ ... [transmitted data] @ "&" [check data] @
... (repeat the transmission operation for each of the 16 channels)

[transmitted data size]" The size in the direction of the time
    axis (sampling number); 4-digit decimal with the maximum size
    of 2048.
[trigger position]: "+/-"; 4 decimal digits. When the oldest data
    is set to "0000", the trigger position for the data after
    execution interruption should be "?????" (which means there is
    no relation with the trigger).
[clock]: 3 decimal digits + 2-digit character (the unit). The
    sampling clock value when the data is acquired.
[delay]: "+/-"; 4 decimal digits. The delay value when the data
    is acquired.
[channel number]: 2-digit character; a fixed channel name (for
    instance: F7). The channel number is sent in 16-channel units
    even if there is no transmitted data.
[Whether there is transmitted data or not]: 1-digit character. If
    there is data corresponding to the RT command, A is set; if
    not, N is set.
[transmitted data block size]: 3 decimal digits. Indicates the
    size of the data in one channel which is divided into several
    portions for transmission (default value: 064).
[number of data transmitted]: 1 decimal digit. The number of
    blocks transmitted in one channel (usually 8 blocks are sent).
[transmitted data]: Maximum 64 hexadecimal digits. Indicates the
    data itself (from the old data, every 4 bit is treated as 1
    digit hexadecimal). When there is not enough data to fill up
    the transmitted block, if it has more than 4 bits, the "-" sign
    of ASCII code is used to fill up the space; if it has less than
    4 bits, 0 in binary is used to fill up the space to send out
    the pre-determined block size data.

```
┌──────────────────────── CAUTION ────────────────────────┐
│                                                          │
│ (1) Upon receiving DS/DT command, the TR4725 sends out a dummy @
│     signal.  When this signal is received by the host computer, it sends
│     out R@ signal and thus starts the data transmission.  The host
│     computer is compelled to return the R@ signal whenever a data
│     delimiter (@) is received.
│ (2) When the B@ signal, instead of the R@ signal, is sent from the host
│     computer, the DS/DT command may become invalid during data
│     transmission.
│                                                          │
└──────────────────────────────────────────────────────────┘
```

(2) Status message

③ Command sending is permitted (Ready)
The TR4725 issues message to the host computer that the previous
command has ended normally and the further command is ready to
receive.
Format: "R"@

④ Error occurrence (Error)
The TR4725 issues message to the host computer that an error with
the TR4725 occurs.
Format: "E"@

⑤ Time-out occurrence (Time-out)
The TR4725 issues message to the host computer that the specified
time-out on the TR4725 occurs.
Format: "T"@

⑥ Execution abortion (Abort)
The TR4725 issues message to the host computer that the normal
sequence is aborted depending on the abortive sequence or time-out
sequence on the TR4725.
Format: "!"@

8. UTILITY FUNCTIONS AND ITS OPERATIONS (UTILITY)

8.1 LOADING UTILITY COMMANDS

The utility function is a collection of service functions which do not directly relate to the measurement. It consists of several utility commands.

Differing from the programs which control other TR4725 blocks, these utility commands are executed by being loaded from the system disk every time they are to be used (that is, transient commands).

There are two types of commands currently provided for this utility function. One is the [SET TIME] command which sets the calendar clock, and another is the [DISK COPY] command which copies the overall files in the disk including the system disk. (Some personality kits are provided with other commands. Other command operations are described in the respective PK instruction manual.

Pressing ⬜ displays the screen as shown in Figure 8-1. ([SET TIME] command is selected immediately after power-on.)

Pressing ⬜ after selecting the command with ⬜ or ⬜ loads the command program from the system disk.

Note that the valid keys are restricted to the above-mentioned keys and one which belongs to the <u>MENU</u> key group.

When no proper system disk is inserted in either F0: (built-in disk drive) or in F1: (external auxiliary disk drive) when ⬜ is pressed, an error message, "enter PK SYSTEM DISK" appears on the screen. In response to this, insert a proper system disk to the drive, and press ⬜.

Note that, however, the last-loaded utility command program remains in the TR4725 system. Accordingly, no loading is required when the user uses the same command. (No system disk insertion is required.)

** UTILITY **   PK id.   〈TRACE S&T〈S→T〉〉

[SET TIME]

Please push RUN key to load the program.

valid keys: SELECT,MENU group

01-APR-86 10:21

Figure 8-1 UTILITY Initial Menu Screen

8.2 SETTING CALENDAR CLOCK

The TR4725 is provided with the calendar clock which has been backed up
with Ni-Cd battery. This section describes how to set its time and date.

First, select the [SET TIME] command at the menu screen given in
Figure 8-1. Then, press 〔⚊〕 to load the program, and the display shown
in Figure 8-2 appears on the CRT.

Next, enter date, month, year of century, and hour:minute in this order by
using the keys of the ENTRY key group. Use the English abbreviation forms
for months as follows: January – JAN, February – FEB, March – MAR, April
– APR, May – MAY, June – JUN, July, JUL, August – AUG, September – SEP,
October – OCT, November – NOV, and December – DEC. Next, press 〔⚊〕 to
set that value. This value is then displayed in the lowermost right
corner. To return the screen to the original menu screen as shown in
Figure 8-1, press 〔stop〕. Pressing a key of the ENTRY key group displays
the menu screen which is specified by that key.

When the TR4725 POWER switch is ON, the Ni-Cd battery is always charged.
This battery lasts for more than two weeks, counting from the time when it
is fully charged.

** UTILITY **   PK id.   <TRACE S&T(S+T)>

[SET TIME]

        Enter date and time (DD-MMM-YY HH:MM)
                            01-JAN-80 00:00
        Then, push RUN key to set date and time.

                                                  03-FEB-86 14:09

                    Figure 8-2 Setting Time of Date

8.3 COPYING SYSTEM/USER DISKS

The [DISK COPY] command copies all the files in the system and user disks at one time to create back-up disks.

Pressing [▪▪] to load the program, after selecting the [DISK COPY] command at the menu screen shown in Figure 8-1, displays the screen which is shown in Figure 8-3.

First, set whether or not to perform verification at the time of copy operation. Selecting [VERIFY] verifies the data written to the disk every time the files are copied. Therefore, this selection ensures higher reliability. Note that, however, the time required for copying becomes approx. twice as much as the [NON VERIFY] command. The default setting is [NON VERIFY].

```
** UTILITY **                                      PK id.          <TRACE S&T(S→T)>

[DISK COPY ] with [NON VERIFY]


         Please set up disks:

                   source disk      → F0:
                   destination disk → F1:

         And push RUN key to check DISK ID.




               valid keys: SELECT,STOP,MENU group


                                                          01-APR-86 10:23
```

Figure 8-3 DISK COPY Command: Disk Insertion Specification

Next, insert the original disk to be copied (termed a source disk) to F0: (built-in disk drive), and the copying disk (termed a destination disk) to F1: (external auxiliary disk drive; can be separately purchased).

System and user disks can be used as a source disk. (Both can be used for the probe which is different from the currently operated personality kit.)

A blank disk (unused disk) and a user disk can be used as a destination disk. The system disk can be used only when the source disk is used as a system disk. (Can be used even for the another personality kit. This will prevents the system disk from being destroyed by mistakes.)

Next, press [ᴿᵁᴺ] to read and display the current DISK ID and DESCRIPTION
of the disks inserted in F0: and F1:. (The current destination disk data
is displayed being enclosed by parentheses.) When the system disk is used
as a source disk, it is displayed as shown in Figure 8-4. In this case,
the data which is identical to that in the source disk is copied to the
destination disk.

When the user disk is used as a source disk, it is displayed as shown in
Figure 8-5. In this case, the data which is identical to that in the
source disk can be copied to the destination disk. Or, only the display
of DESCRIPTION can be changed. (Enter an alphanumeric of up to 20
characters by using keys of the ENTRY key group.)

```
** UTILITY **                                PK id.        <TRACE S&T<S→T>>
[DISK COPY ] with [NON VERIFY]


      Please push RUN key to execute.

                      DISK ID                         DESCRIPTION
   source disk     (F0:) TR4725 TIMING ONLY SYSTEM DISK  P4725-7071FJ U2.0
        ↓
   destination disk (F1:) TR4725 TIMING ONLY SYSTEM DISK  P4725-7071FJ U2.0
                    (now: blank disk                                        >


      valid keys: STOP,MENU group


                                                    01-APR-86 10:39
```

Figure 8-4 DISK COPY Command: DISK ID Display (for the System Disk)

```
** UTILITY **                                PK id.        <TRACE S&T<S→T>>
[DISK COPY ] with [NON VERIFY]


      Please push RUN key to execute.

                      DISK ID                         DESCRIPTION
   source disk     (F0:) TR4725G USER DISK            MY DISK
        ↓
   destination disk (F1:) TR4725G USER DISK           MY DISK
                    (now: blank disk                                        >


      valid keys: ENTRY group,STOP,MENU group


                                                    01-APR-86 10:40
```

Figure 8-5 DISK COPY Command: DISK ID Display (for the User Disk)

When an error message is displayed, and the display in Figure 8-3 remains on the screen instead of that in Figures 8-4 or 8-5, insert the correct disk, and press ⬚ again. The error messages are as follows:

● enter disk ... no disk is inserted.
● SYSTEM DISK in F1: ... The system disk is used as a destination disk
                                  even if the source disk is used as a source disk.
● blank disk in F0 : ... A blank disk is used as a source disk.

Pressing ⬚, after the display as in Figures 8-4 or 8-5 appear, displays a message, "in progress", and starts the disk copy operation. (First, the destination disk is formatted, and then all the files are copied successively.) After the [DISK COPY] command execution is completed, the screen shown in Figure 8-7 appears on the CRT. The user can execute the [DISK COPY] command successively.

When the [DISK COPY] command is not executed correctly, an error message is displayed on the screen, and the display shown in Figure 8-3 appears. The error messages are as follows:

● write-protected disk ... The destination disk is a write-protected one.
                              (Refer to Figure 5-1.)
● DISK COPY error .... An error occurred during DISK COPY operation.

```
** UTILITY **                              PK id.        <TRACE S&T(S+T)>
[DISK COPY ] with [NON VERIFY]


    Please push RUN key to execute.


                    DISK ID                     DESCRIPTION
source disk      (F0:) TR47250 USER DISK        MY DISK
   +
destination disk (F1:) TR47250 USER DISK        MY DISK
                 (now: blank disk                                    )


        valid keys: ENTRY group,STOP,MENU group


            in progress                         01-APR-86 18:41
```

Figure 8-6 DISK COPY Command: Display During Command Execution

```
** UTILITY **                               PK id.        <TRACE S&T<S+T>>
[DISK COPY ] with [NON VERIFY]


     Please set up disks:
                 source disk      + F0:
                 destination disk + F1:

     And push RUN key to check DISK ID.




            valid keys: SELECT,STOP,MENU group


            DISK COPY ended                      01-APR-86 10:42
```

Figure 8-7   DISK COPY Command: Display after Command Execution

It might seem to the user that complicated operations are required to
perform manual operations and error checking. However, to duplicate a
disk, the user only has to load the program, insert the disk, and then
press [**] twice in a row.

9. OPERATION CHECKS AND ADJUSTMENT

9.1 SELF-DIAGNOSTICS FUNCTION

Setting the TR4725 POWER switch to ON automatically operates the
self-diagnostic program to check the internal functions. When an error is
not detected, the system displays "Self-test ended" on the screen, and
starts the system software loading.

If "Error in XX" is displayed on the screen, contact your nearest
ADVANTEST representatives. Their addresses and telephone numbers are
given in the end of this manual.

9.2 PROBE TESTING FOR STATE ANALYSIS

To perform probe testing for state analysis, the probe test adapters are
supplied with each personality kit. First, install the adapter on the
PROBE TEST connector on the rear panel of the TR4725. Then, perform probe
testing. Note that the operating method differs according to the type of
the personality kit. Therefore, refer to Section 5.1 in the PK
instruction manual for details.

9.3 PROBE TESTING FOR TIMING ANALYSIS

For the S&T analyzer, the signal (500 kHz at TTL level) to test the probe
E/F is output to the above-mentioned probe test adapter. Therefore,
connect the probe E/F to this adapter terminal by using the probe hook.

For the timing-only analyzer, no test signal is output from the TR4725.
Therefore, prepare an appropriate oscillator first, and connect the probe
E/F to it.

When 500 kHz signal is output, set the sampling clock to 100 ns to perform
measurement. This manipulation displays the measurement data as shown in
Figure 9-1.

When the measurement data contains an error, contact your nearest
ADVANTEST representatives.
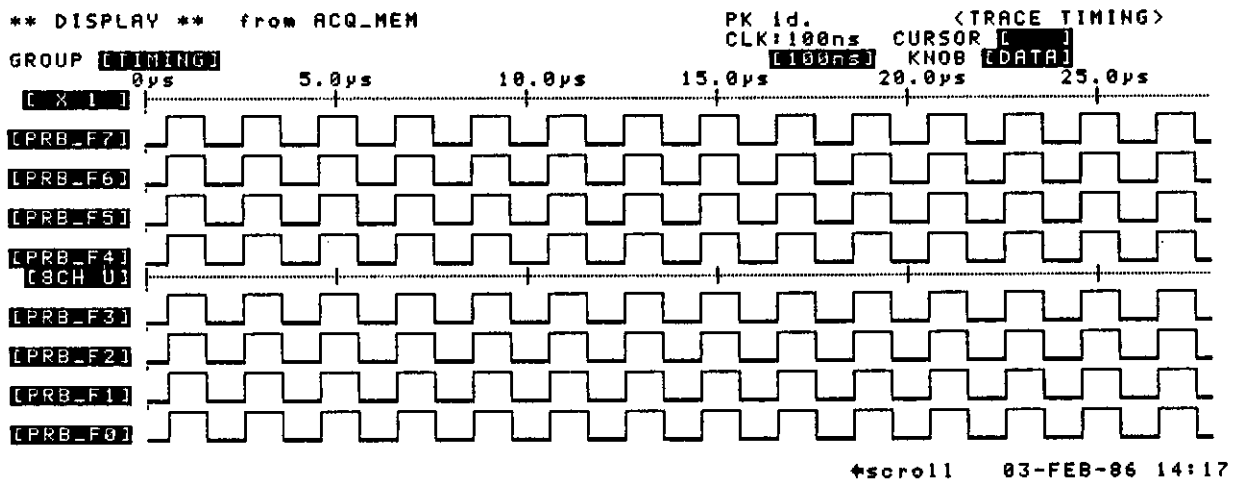
Figure 9-1 Probe E/F Test Result (with 500 kHz Signals)

9.4 ADJUSTING CRT

The CRT's knobs such as CONTRAST, HALF-TONE CONTRAST, and BRIGHTNESS, have already been adjusted at the time of delivery. If re-adjustment is required for the TR4725 according to the brightness of the room, perform the following procedure to adjust the knobs:

① Remove the four Phillips-head screws (3 mm; +) on the TR4725 mainframe top cover to remove the top cover.
② Adjust the BRIGHTNESS control of the CRT unit with the minus driver to set to the desired brightness (so as not to expose the raster).
③ Adjust the CONTRAST control to set to the desired contrast.
④ Press either one key of the I/O key group to display the main menu screen in the half-tone display mode. Then, adjust the HALF-TONE CONTRAST control to differentiate the normal display from the half-tone display. Note that there is an interdependent relationship between HALF-TONE CONTRAST and CONTRAST.

10. PRECAUTIONS ON STORING, CLEANING, AND TRANSPORTING TR4725

10.1 STORAGE

The ambient temperature for storage is between $-10^{O}C$ and $+60^{O}C$. When the TR4725 is not used for a long period, cover it with a vinyl cover or similar. Place the TR4725 in a carton box away from direct sunlight and damp.

Note that the ambient temperature for storage for the floppy disk is between $+10^{O}C$ and $+60^{O}C$.

10.2 CLEANING THE CRT DISPLAY

Remove the protection filter for the CRT display periodically to clean the inside of the filter and the CRT display itself with a soft cloth containing alcohol. Do not use anything other than alcohol.

Refer to Figure 10-1 to remove the filter by the following procedure:

① Remove the belt cover with the minus driver.
② Remove the two screws on the CRT upper panel.
③ Remove the two screws on the bezel.
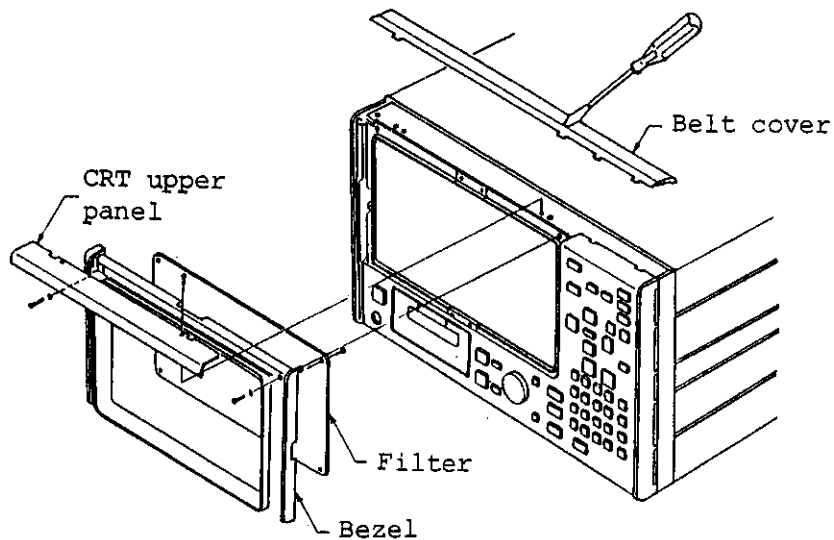
Figure 10-1 How to Remove the CRT Filter

10.3 TRANSPORTING THE TR4725

When transporting the TR4725, use the original packaging materials. If
these have already been lost, pack as follows:

① Wrap the TR4725 with a vinyl sheet.
② Ready a carton box with walls more than 5 mm thick. Place cushioning
  materials more than 50 mm thick inside of the box so that the TR4725
  is wrapped up in them.
③ After wrapping up the TR4725 with the cushioning materials, put the
  accessories in the box. Then, close the box, and fix the outside of
  the box with packaging strings.

A floppy drive has been installed in the TR4725; therefore, insert the
protection sheet which was inserted for delivery, to prevent the drive
from being damaged from vibration shock.
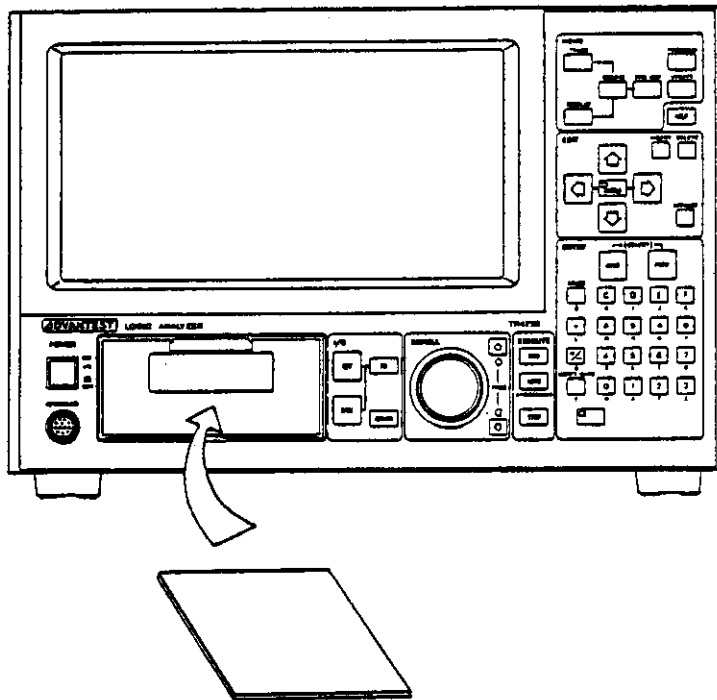
Figure 10-2 Inserting the Protection Sheet

11. SPECIFICATIONS

11.1 TR4725 PERFORMANCE CHARACTERISTICS

Measurement function

Trace state	: Operates as a 48 ch. state analyzer.
Trace S&T (S → T) and trace S&T (T → S)	: Operates as a 16 ch. timing analyzer (optional).
Trace timing	: Operates as a 16 ch. timing analyzer (optional).

Main menu screen

CONFIG : Sets data according to the input specifications.
SYMDEF : Sets data according to the symbol code specifications.
TRACE   : Sets data according to the trace control specifications.
DISPLAY: Sets data according to the display specifications.
PROGRAM: Sets data according to the program specifications.

Sub-menu screen

FD/GET/SAVE: Sets data according to the disk file operation
              specifications; displays data in multi-window mode.
COMM   :   Sets data according to the communication specifications;
              displays data in multi-window mode.

State analyzing block
Input specifications

Input group	: Defined as a collection of input channels.
Number of input groups:	6 or less
Input group name	: An alphanumeric of up to 6 characters Others conform to the personality kit input specifications.

Memory specifications

Acquisition memory width	: 48 chs.
Acquisition memory depth	: 1024 states
Acquisition memory write operation speed:	20 MHz max.
Reference memory width	: 48 chs.
Reference memory depth	: 1024 states

Symbol code specifications

Symbol	: The symbol name corresponds to numeric strings.
Symbol name	: An alphanumeric of up to 8 characters
Number of symbols definition:	Up to 100 codes for each input group; up to 200 codes for the overall input groups

Number of symbols in use : Up to 50 symbols for each input group for
trace control; all the defined symbols can be
used for display operation.
Code   : The code name corresponds to numeric value.
Code name   : An alphanumeric of up to 8 characters
Number of code definition: Up to 256 codes for each input group having 8
or fewer channels; up to 512 codes for the
overall input groups
Number of codes in use   : Up to 50 codes for each input channel for
trace control; all the defined codes can be
used for display operation.

Trace control specifications
Store, enable, trigger, disable, trigger path, and delay functions make up
a set of trace window condition. A maximum of four sets of this condition
and four trace window conjunctions perform trace control.
Store   : Uses 0, 1, 2, ... 1024 states (power of two)
Enable   : Uses patterns, symbols, codes, or ASCII codes, all of
which can be specified using binary, octal, or
hexadecimal numbers, or the "don't care" key.
Trigger   : Uses patterns, symbols, codes, ASCII codes, logical NOT,
or logical OR, all of which can be specified using
binary, octal, or hexadecimal numbers, or the "don't
care" number.
Trigger path : Uses states ranging from 1 to 256.
Delay   : - (store value - 1) - 0 - +3072 states
Trace window conjunction
   THEN   : Moves to the next trace window condition.
   AGAIN   : Repeats the same trace window condition.
   TOP   : Moves to the first trace window condition.
   STOP   : Stops the measurement execution.
Trigger arming: Trace S&T (S→T) disarms the timing analyzer arming state
by using the state analyzer trigger.
Trace S&T (T→S) disarms the state analyzer arming state
by using the timing analyzer trigger.

Display specifications
Display data source: Acquisition memories, reference memories, files
Display item   : 8 items; input group display order can be changed;
the same input group overlap display is possible; a
specific input group can be deleted.
Display format   : Uses a state which is expressed by binary, octal,
decimal, or hexadecimal numbers, symbols, codes, or
ASCII codes.
Data transmission operation between memories:
Transfers the display data to the reference memory,
displays the reference memory data, and displays the
acquisition memory data.
Data scroll   : The scroll knob scrolls data up and down. The page
scroll key scrolls data up and down page by page.

Special display   : Trigger is displayed in the trigger mode, and the
                        memory division boundary is displayed between trace
                        windows.
Others conform to the personality kit display specifications.

Timing analyzer
Option Opt.4725+70 is required. See Section 11.2.

Data processing block
Disk file operation specifications

Disk capacity	:	632.5KB when formatted (1MB when unformatted)
Number of disk types	:	Two types are available per personality kit (system and user disks)
Number of files	:	199 max. (user disk)
Number of file types	:	3 types
System saved file	:	99 max. for each menu screen
Registered file	:	1 max. for each menu screen
User file	:	199 max.
Number of operation types	:	12
DIRECTORY-of-MENU operation:		Displays its name, sizes, attributes and date and time of creation, for a file which is related to the menu screen.
DIRECTORY-of-ALL operation	:	Displays their names, sizes, attributes and date and time of creation, for all the files.
REGISTER operation	:	Creates a registered file.
PURGE operation	:	Purges the system-saved files at one time.
DELETE operation	:	Deletes the user files.
FORMAT operation	:	Formats a user disk; a disk description message of up to 20 alphanumerics can be written in the disk.
RENAME operation	:	Renames the user file name.
COPY operation	:	Copies the files.
STATUS-of-FILES operation	:	Displays the number of the registered files, system-saved files, and user files; and their file sizes.
STATUS-of-DISK operation	:	Displays the disk ID, disk description sentence, and current disk status.
GET operation	:	Displays the data in the file on the menu screen.
SAVE operation	:	Saves the data displayed on the menu screen to the file.

Program specifications

Number of program steps	:	25 max.
Statement configuration	:	Consists of commands and comments; a comment consists of up to 20 alphanumeric characters.
Command	:	24 types
[TRACE]	:	Sets the TRACE menu screen.
[CONFIG]	:	Sets the CONFIG menu screen.
[SYMDEF]	:	Sets the SYMDEF menu screen.
[DISPLAY]	:	Sets the DISPLAY menu screen.
[DISPLAY] [REF_MEM ← DISPLAY]	:	Transfers the display data to the reference memory.
[DISPLAY] [REF_MEM → DISPLAY]	:	Displays the reference memory data.
[DISPLAY] [ACQ_MEM → DISPLAY]	:	Displays the acquisition memory data.
[GET]	:	Displays data in the file.
[SAVE]	:	Saves the display data to the file.
[SAVE] [QUICK]	:	Saves the display data to the system-saved file.
[RUN]	:	Starts the measurement execution.
[IF] [ACQ_MEM = REF_MEM]	:	Compares the data in the acquisition memory with that in the reference memory.
[IF] [ACQ_MEM ≠ REF_MEM]	:	Compares the data in the acquisition memory with that in the reference memory.
[IF] [I=]	:	Checks the control variable value I.
[IF] [I≠]	:	Checks the control variable value I.
[IF] [J=]	:	Checks the control variable value J.
[IF] [J≠]	:	Checks the control variable value J.
[COUNT + 1] [I]	:	Increments the control variable value I by one.
[COUNT + 1] [J]	:	Increments the control variable value J by one.
[GOTO]	:	Moves control unconditionally.
[WAIT]	:	Waits for a specified time (1 to 999 seconds)
[DEFINE] [I=]	:	Sets the initial value to the control variable I.
[DEFINE] [J=]	:	Sets the initial value to the control variable J.
[DEFINE] [COMPARE_RANGE]	:	Specifies the range for comparing data in the acquisition memory with that in the reference memory.
Programming method	:	Selected by using the SELECT key.
Executable function	:	Repeat function, restart function by comparison, and functions made up of a combination of commands.
Program execution	:	Can be executed directly, or by using the command file.

Remote control specifications

Unit which can be connected: Any computers with RS-232-C interfaces
Codes used   : ASCII codes
Protocol   : Uses interactive sequences issuing command
                                 responses to command receptions; can
                                 forcibly be aborted.
Command : 18 types
  DS   : Requests the acquisition memory data transmission at the state
          analyzer.
  RS   : Specifies the DS command transmission range with the command
          line number.
  DT   : Requests the acquisition memory data transmission at the timing
          analyzer (Opt.4725+70).
  RT   : Specifies the DT command transmission range with the channel
          number.
  CO   : Displays the CONFIG menu screen.
  TR   : Displays the TRACE menu screen.
  SY   : Displays the SYMDEF menu screen.
  DI   : Displays the DISPLAY menu screen.
  GE   : Displays the data in the file.
  SA   : Saves the display data to the file.
  SQ   : Saves the display data to the system-saved file.
  RU   : Starts the measurement execution.
  TC   : Sets the sampling clock (at the timing analyzer).
  TD   : Sets the delay (at the timing analyzer).
  TE   : Sets the ENBL_T pattern (at the timing analyzer).
  TT   : Sets the TRIG_T pattern (at the timing analyzer).
  T3   : Sets the threshold voltage V3 (at the timing analyzer).
  T4   : Sets the threshold voltage V4 (at the timing analyzer).
Command response: 6 types
  Data transfer at the state analyzer:
                    Performs data transfer operation for the DS/RS commands
                    in a specified format.
  Data transfer at the timing analyzer:
                    Performs data transfer operation for the DT/RT commands
                    in a specified format.
  R   : Reports the ready status of the command reception.
  E   : Reports the error generation.
  T   : Reports the time-out error generation of the RU command.
  !   : Reports the generation of execution abortion.

Printer specifications

Unit which can be connected:		Any computers with RS-232-C interfaces
Output data	:	Data on menu screens such as SYMDEF, DISPLAY and PROGRAM (data which can be printed only)

Disk copy specifications

Copy function	:	Copies the overall files in the F0: drive to the destination disk in the F1: drive at one time. (An external auxiliary disk is required)
Source disk	:	System and user disks
Destination disk	:	Blank, system, and user disks

Clock specifications

Setting item	:	Year of century, month, day, hour, and minute
Clock usage	:	The clock is always displayed on the CRT display. The current time is written in the file when the file is created.
Time required for backup (recharge):		More than 2 weeks after it is fully recharged.

Help specifications

Help (menu item) function:		Displays the contents of the menu item which can be set.
Help (key) function	:	Displays simple descriptions, and update news concerning the functions.

I/O specifications

State analyzer trigger pulse output :		BNC connector, TTL level, negative pulse, approx. 50 ns width; is output by being synchronized with the internal clock after trigger generation.
Timing analyzer trigger pulse output:		BNC connector, TTL level, negative pulse, approx. 50 ns width; is output by being synchronized with the internal clock after trigger generation.
Video signal output	:	BNC connector, and conforms to EIA RS-170 standards.
External floppy disk drive interface:		For 36-pin amphenol connectors, or the accessory drive units.
Serial communication interface	:	25-pin D-subminiature connector, and conforms to EIA RS-232C standards.
External keyboard interface	:	For the 12-pin cylindrical connectors, or the accessory keyboards.

Probe test output   :   50-pin amphenol connector, and outputs the test
patterns for probe testing.

General specifications
CRT   :   5 x 9 inches electromagnetic deflection CRT, B31
phosphor, 80 characters x 24 lines per screen
Floppy disk drive   :   3.5 inches, dual sided-double density, 1M bytes
when unformatted
Operating temperature: +5°C to +40°C
Operating humidity   :   20%RH to 80%RH (no dew condensation should occur.)
Power source   :   90 V to 132 VAC, 180 V to 249 VAC, 50/60 Hz
Dimensions   :   Approx. 350 (width) x 220 (height) x
500 (depth) mm Weight: 20 kg max.
Power supply option   :

Option No.	Standard	Option 40
Power supply	90 V to 132 VAC	180 V to 249 VAC

11.2 Opt.4725+70 PERFORMANCE CHARACTERISTICS

This option, Opt.4725+70, operates as a timing analyzer in combination with the TR4725.

Input specifications

Number of input channels	:	16 channels (8 ch., probe x 2)
Input impedance	:	Approx. 1 MΩ//8 pF max.
Input sensitivity	:	200 mVp-p max.
Threshold voltage	:	TTL (approx. 1.4 V), ECL (approx. -1.3 V), V3 or V4 (-12.7 V to +12.7 V in steps of 100 mV)
Threshold voltage accuracy	:	±140 mV
Common use of threshold voltage	:	Every 4 input channels
Operating input voltage range	:	±10 V when the threshold voltage is considered as a reference point.
Breakdown input voltage	:	±50 V
Sampling clock frequency	:	20 Hz to 100 MHz (in steps of 1-2-5)
Sampling mode	:	Sample or latch mode
Glitch detecting capacity	:	5 ns min.
Logic polarity	:	+ or -
Label	:	Can be defined per input channel
Label name	:	An alphanumeric of up to 6 characters
Number of labels	:	16 max.

How to connect the probe to SUT (system under test):
(1) Connect the probe to a specified point of SUT by using the probe hook (per channel).
(2) Connect the probe to the SUT pin, whose maximum diameter is 0.76 mm, by using the pin socket (per channel).
(3) Connect the probe to the SUT by using the 34-pin header socket at one time (per 8 channels).

Memory specifications

Acquisition memory capacity	:	16 channels x 2048 samples
Memory data write operation speed	:	100 MHz max.

Trace specifications

Trigger	:	Uses 16-bit patterns which can be specified by binary numbers, or the "don't care" key.
Enable	:	Uses 16-bit patterns which can be specified by binary numbers, or the "don't care" key.
Delay	:	-2044 - 0 - +2048 clock
Trigger arming	:	Trace S&T (S→T) disarms the timing analyzer arming state by using the state analyzer trigger. Trace S&T (T→S) disarms the state analyzer arming state by using the timing analyzer trigger. (These are valid only when the personality kit for state analysis is installed.)

Display specifications

Display format	:	Displayed in timing mode.

Number of display channels   : 16 channels, 8 channels (When displayed in 16 channel mode, either upper or lower 8 channels can be selected.)

Time axis magnification ratio: x1/10, x1/5, x1/2, x1, x2, x5, x10

Time axis magnification ratio	1/10	1/5	1/2	1	2	5	10
Number of display data (samples)	2048	1400	560	280	140	56	28
Number of data (samples) per page	-	1250	500	250	125	50	25

(x1 is the highest resolution display mode with no data missing due to the compact data display.)

Channel display order: Can be displayed in a specified order according to the label selection. A specified input channel can be deleted.

Scale display   : The distance from the trigger point is displayed with the time scale.

Time axis magnification ratio	1/10	1/5	1/2	1	2	5	10
Number of data (samples) between scales	500	250	100	50	25	10	5

Data display range marker: The data display range is displayed with the bar graph (using the HELP key).

Cursor display   : Nil, A, B, or A&B

Cursor data display   : The data pointed by the cursor is displayed by using binary numbers, and the time differential between cursors is displayed (A-B).

Cursor operation   : Single operation of A or B, and synchronized operation of A and B.

Scroll operation   : Can be scrolled to the left and to the right by the scroll knob manipulation. Can be scrolled to the left and to the right page by page by the scroll key manipulation.

QuickVIEW specifications : When repeating measurement execution, the user may, by using the scroll knob, concurrently change the following four points at a specified time during that execution: (1) sampling clock frequency, (2) delay, (3) threshold voltage V3, and (4) threshold voltage V4. This manipulation enables the QuickVIEW specifications when the system is in the TRACE S&T (S → T) and TRACE TIMING where rapid real-time timing analysis can be performed.

	Knob counterclockwise adjustment (lower limit value)	Knob clockwise adjustment (upper limit value)	Default value
Clock	To the lower-speed direction (1 ms)	To the higher-speed direction (10 ns)	10 ns
Delay	To the negative direction (−2044 clock)	To the positive direction (+2048 clock)	0 clock
V3	To the negative direction (−12.7 V)	To the positive direction (+12.7 V)	1.4 V
V4	To the negative direction (−12.7 V)	To the positive direction (+12.7 V)	−1.3 V

Module configuration:

Item	Model No.	Q'ty	Remarks
Asynchronous module control board		1	Installed on the TR4725 mainframe
Asynchronous module input board		1	Installed on the TR4725 mainframe
Data acquisition probe E	TR14702-01	1	
Data acquisition probe F	TR14702-02	1	
Probe hook	A04701-11	2	10 pieces per set; 20 pcs. in total
System software package	P4725-7071FJ	2	
Blank disk	OM-D4440	2	Sony brand
Disk housing case		1	

11.3 I/O INTERFACE SPECIFICATIONS

This section describes the specifications of the signals which are input
and output to and from the TR4725 Logic Analyzer.

11.3.1 RS-232C Interface Specifications

The TR4725 uses the 25-pin D-subminiature connector (female; DB-25S)
as an RS-232C connector.

The specifications of this connector conform to the RS-232C standards.

Its pin connection is divided into two types, which can be selected
according to the inter-unit cable to be used.

(1) Setting the PIN No.2 menu item with TxD at the COMM menu screen
signifies as follows:

Pin No.	Symbol	Descriptions
1	FG	Protective ground
2	TxD	Transmission data
3	RxD	Reception data
6	DSR	Data set ready
7	SG	Signal ground
20	DTR	Data terminal ready

(2) Setting the PIN No.2 menu item with RxD at the COMM menu screen
signifies as follows (reverse connection of RS-232C standard):

Pin No.	Symbol	Descriptions
1	FG	Protective ground
2	RxD	Transmission data
3	TxD	Reception data
6	DTR	Data terminal ready
7	SG	Signal ground
20	USR	Data set ready

TxD and DTR are sent via SN75188N (the applied power is ±12 V), and
RxD and DSR are received via SN75189AN.

11.3.2 Video Signal Interface

The BNC connector inscribed as VIDEO OUT, which is installed on the
TR4725 rear panel, outputs the same compound video signal as that
displayed on the CRT display. By using this video signal, this
compound video signal can be displayed on the external large-size CRT
unit, or be hardcopied on the video printer.

The video signal conforms to the EIA RS-170 standards.

   Horizontal synchronization signal frequency: 15750 Hz
   Vertical synchronization signal frequency : 60 Hz
   Non-interlace method

At the 75 Ω termination, the output level has been adjusted so that it
is set as illustrated in Figure 11-1 when the instrument is shipped.

1.0 V (video signal)

0V

-0.4 V (synchroni-
zation signal)
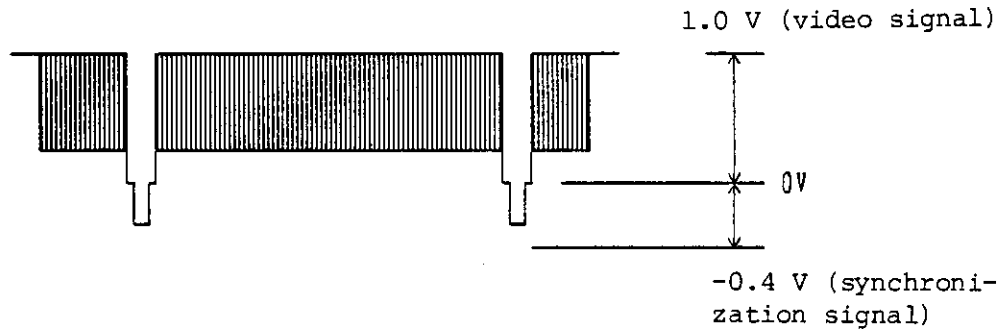
Figure 11-1 Compound Video Signal Output Level (at 75 Ω Termination)

113.3.3 Outputting Stater Analyzer Trigger Pulse

The BNC connector inscribed as TRIG OUT (SYNC), which is installed on
the TR4725 rear panel, outputs the state analyzer trigger pulse.

To output the trigger pulse, the user should set the desired TRIG OUT
(SYNC) menu item of the trace window condition to [ON] in advance.
(See Section 4.4.2.) When trigger is generated during measurement
execution, the BNC connector outputs the setting trigger pulse. By
using this trigger pulse, the user can synchronize other logic
analyzers or oscilloscope.

Negative pulse of 50 ns width is generated at TTL level.

11.3.4 Outputting Timing Analyzer Trigger Pulse

The BNC connector inscribed as TRIG OUT (ASYNC), which is installed on
the TR4725 rear panel, outputs the timing analyzer trigger pulse.

When trigger is generated during measurement execution, the BNC
connector outputs the trigger pulse. By using this trigger pulse, the
user can synchronize other logic analyzers or oscilloscope.

Negative pulse of 50 ns width is generated at TTL level.

LIST OF FIGURES

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LIST OF FIGURES (Cont'd)

LIST OF FIGURES (Cont'd)

LIST OF FIGURES (Cont'd)

LIST OF FIGURES (Cont'd)

LIST OF TABLE

TR4725
LOGIC ANALYZER
INSTRUCTION MANUAL

LIST OF EXAMPLES

Example No. _____ Title _____ ___Page___

(No example numbers are assigned in this manual.)

ALPHABETICAL INDEX

ALPHABETICAL INDEX (Cont'd)

ALPHABETICAL INDEX (Cont'd)

```
405
350
```

```
221
```

```
11
```

FRONT VIEW

```
548.5
3.5          500          45
```

```
200
```

SIDE VIEW

REAR VIEW

TR4725
EXTERNAL VIEW

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LIMITED WARRANTY

1. Unless otherwise specifically agreed by Seller and Purchaser in writing, Advantest will warrant to the Purchaser that during the Warranty Period this Product (other than consumables included in the Product) will be free from defects in material and workmanship and shall conform to the specifications set forth in this Operation Manual.

2. The warranty period for the Product (the "Warranty Period") will be a period of one year commencing on the delivery date of the Product.

3. If the Product is found to be defective during the Warranty Period, Advantest will, at its option and in its sole and absolute discretion, either (a) repair the defective Product or part or component thereof or (b) replace the defective Product or part or component thereof, in either case at Advantest's sole cost and expense.

4. This limited warranty will not apply to defects or damage to the Product or any part or component thereof resulting from any of the following:

    (a) any modifications, maintenance or repairs other than modifications, maintenance or repairs (i) performed by Advantest or (ii) specifically recommended or authorized by Advantest and performed in accordance with Advantest 's instructions;

    (b) any improper or inadequate handling, carriage or storage of the Product by the Purchaser or any third party (other than Advantest or its agents);

    (c) use of the Product under operating conditions or environments different than those specified in the Operation Manual or recommended by Advantest, including, without limitation, (i) instances where the Product has been subjected to physical stress or electrical voltage exceeding the permissible range and (ii) instances where the corrosion of electrical circuits or other deterioration was accelerated by exposure to corrosive gases or dusty environments;

    (d) use of the Product in connection with software, interfaces, products or parts other than software, interfaces, products or parts supplied or recommended by Advantest;

    (e) incorporation in the Product of any parts or components (i) provided by Purchaser or (ii) provided by a third party at the request or direction of Purchaser or due to specifications or designs supplied by Purchaser (including, without limitation, any degradation in performance of such parts or components);

    (f) Advantest's incorporation or use of any specifications or designs supplied by Purchaser;

    (g) the occurrence of an event of force majeure, including, without limitation, fire, explosion, geological change, storm, flood, earthquake, tidal wave, lightning or act of war; or

    (h) any negligent act or omission of the Purchaser or any third party other than Advantest.

5. **EXCEPT TO THE EXTENT EXPRESSLY PROVIDED HEREIN, ADVANTEST HEREBY EXPRESSLY DISCLAIMS, AND THE PURCHASER HEREBY WAIVES, ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, (A) ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND (B) ANY WARRANTY OR REPRESENTATION AS TO THE VALIDITY, SCOPE, EFFECTIVENESS OR USEFULNESS OF ANY TECHNOLOGY OR ANY INVENTION.**

6. **THE REMEDY SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER FOR BREACH OF WARRANTY WITH RESPECT TO THE PRODUCT.**

7. **ADVANTEST WILL NOT HAVE ANY LIABILITY TO THE PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, WITHOUT LIMITATION, LOSS OF ANTICIPATED PROFITS OR REVENUES, IN ANY AND ALL CIRCUMSTANCES, EVEN IF ADVANTEST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE. TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

8. **OTHER THAN THE REMEDY FOR THE BREACH OF WARRANTY SET FORTH HEREIN, ADVANTEST SHALL NOT BE LIABLE FOR, AND HEREBY DISCLAIMS TO THE FULLEST EXTENT PERMITTED BY LAW ANY LIABILITY FOR, DAMAGES FOR PRODUCT FAILURE OR DEFECT, WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLEGENCE), STRICT LIABILITY, INDEMNITY, CONTRIBUTION OR OTHERWISE.**

CUSTOMER SERVICE DESCRIPTION

In order to maintain safe and trouble-free operation of the Product and to prevent the incurrence of unnecessary costs and expenses, Advantest recommends a regular preventive maintenance program under its maintenance agreement.

Advantest's maintenance agreement provides the Purchaser on-site and off-site maintenance, parts, maintenance machinery, regular inspections, and telephone support and will last a maximum of ten years from the date the delivery of the Product. For specific details of the services provided under the maintenance agreement, please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest 's sales representatives.

Some of the components and parts of this Product have a limited operating life (such as, electrical and mechanical parts, fan motors, unit power supply, etc.). Accordingly, these components and parts will have to be replaced on a periodic basis. If the operating life of a component or part has expired and such component or part has not been replaced, there is a possibility that the Product will not perform properly. Additionally, if the operating life of a component or part has expired and continued use of such component or part damages the Product, the Product may not be repairable. Please contact the nearest Advantest office listed at the end of this Operation Manual or Advantest's sales representatives to determine the operating life of a specific component or part, as the operating life may vary depending on various factors such as operating condition and usage environment.

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