ADVANTEST
ADVANTEST CORPORATION

R3752 SERIES

NETWORK ANALYZER

OPERATION MANUAL

MANUAL NUMBER OEA00 9403

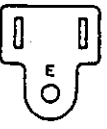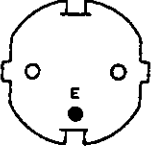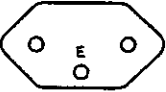*Applicable Instruments*
R3752A
R3752B
R3752E
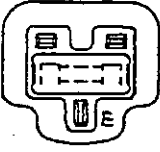
NOTICE

ADVANTEST provides the following power cables for each country. If there was any inconvenience on your use, please contact our subsidiaries or ADVANTEST representatives.

	Plugs	Standards/Countries	Ratings/Color/Length	Accessory Codes
1		JIS : JAPAN	Rating :125V 7A Color :Black Length :2m	A01402 A01412
2		UL : USA CSA : CANADA	Rating :125V 7A Color :Black Length :2m	A01403 (Opt.95) A01413
3		CEE : EUROPE VDE : FRG OVE : AUSTRIA SEMKO : SWEDEN DEMKO : DENMARK KEMA : NETHERLANDS FIMKO : FINLAND NEMKO : NORWAY CEBEC : BELGIUM	Rating :250V 6A Color :Gray Length :2m	A01404 (Opt.96) A01414
4		SEV : SWITZERLAND	Rating :250V 6A Color :Gray Length :2m	A01405 (Opt.97) A01415
5		SAA : AUSTRALIA NEWZELAND	Rating :250V 6A Color :Gray Length :2m	A01406 (Opt.98)
6		BS : UK	Rating :250V 6A Color :Black Length :2m	A01407 (Opt.99) A01417

Note : "E" shows earth (ground).

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1. OVERVIEW

1.1 Product Outline

The R3752 Series network analyzer (hereinafter, simply called the network analyzer) is a new 500MHz vector network analyzer that has been developed under the concept of "optimum tools for individual applications." They realized a high throughput such as high-speed measurement of 0.1ms/point at resolution bandwidth (RBW) of 10kHz, dynamic-range measurement at 115dB, and parallel measurement for two devices by 4-trace display.

Besides the conventional user sweep functions, the program sweep functions are added which allows to define the RBW, output level, input attenuator (ATT) for each segment during sweeping.

Semiconductor switches are used for adjustment of output level and input ATT, enabling high-speed level sweeping best suitable for oscillator drive level tests.

The built-in BASIC controller functions allow to easily construct a high-speed ATE system for adjustment through verification processes without using external controllers.

For the GPIB and built-in BASIC, refer to the related programming manuals.

Features:

(1) High throughput

- High-speed frequency sweep at 0.1ms/point, short blanking time of 5ms, and four traces (amplitude and phase) with two channels at RBW 10kHz
- High-speed level sweep of 0.1ms/point
  High speed and long life enabled by use of semiconductor switches

(2) Wide dynamic range

- Wide dynamic range of 115dB allowed by automatic change of input ATT
  High speed and long life enabled by use of semiconductor switches for ATT change

(3) Program sweep functions

- The frequency, output level, input ATT, RBW, and settling time can be set for individual segments.

(4) MS-DOS formatted disk

- Because the floppy disks are in the MS-DOS format, program generation and data analysis can be easily done on MS-DOS personal computers.
- Three format types are available: DD (720KB), HD (1.2MB), and HD (1.44MB).

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2. PREPARATION FOR USE

2.1 Inspecting Appearance and Accessories

Before using this network analyzer, inspect the following:

① Check the network analyzer frame and controls for damages.

② Check that the standard accessories listed in Table 2-1 are all provided.

If the network analyzer is damaged or any accessories are missing, please contact the ATCE or the nearest sales office or agent. Their addresses and phone numbers are listed at the back of this manual.

When ordering accessories, specify their model names or stock numbers.

Table 2-1 Standard Accessories

Name	Model name	Part code	Quantity	Remarks
Power cable	A01402	DCB-DD2428X01	1	Power cable with 3-prong plug
		JCD-AL003EX03	1	AC adapter
BNC-BNC cable	-	DCB-FF4894X01	2	30cm
	-	DCB-FF4894X04	1	60cm
BNC through connector	BNC-A-JJ	JCF-AB001EX05	1	
Fuse	-	DFT-AA6R3A	2	6.3A/250V
Operating manual	-	JR3752	1	Japanese version
	-	ER3752		English version
Programming manual	-	JR3752/3753(P)	1	Japanese version
	-	ER3752/3753(P)		English version

2.2   Environment Conditions

(1)   Do not install the network analyzer in the following places:

- Places under direct sunlight
- Places generating corrosive gas
- Dusty places
- Vibrating places

(2)   Use the network analyzer under the following operating conditions:

- Ambient temperature;   0°C to 50°C
- Relative humidity;   85% or less (No dews are permitted.)

(3)   Noise

Though the network analyzer has been designed considering the noise from the AC power line, use it in an environment with least noise.
If the network analyzer is to be used in noisy environment, use a line filter to eliminate the noise.

・Do not use the network analyzer in the following environment:

Direct sunlight

Dust

Corrosive gas

Vibration

・ If the power line picks up heavy noise, connect a line filter to it.

Noise source

Line filter
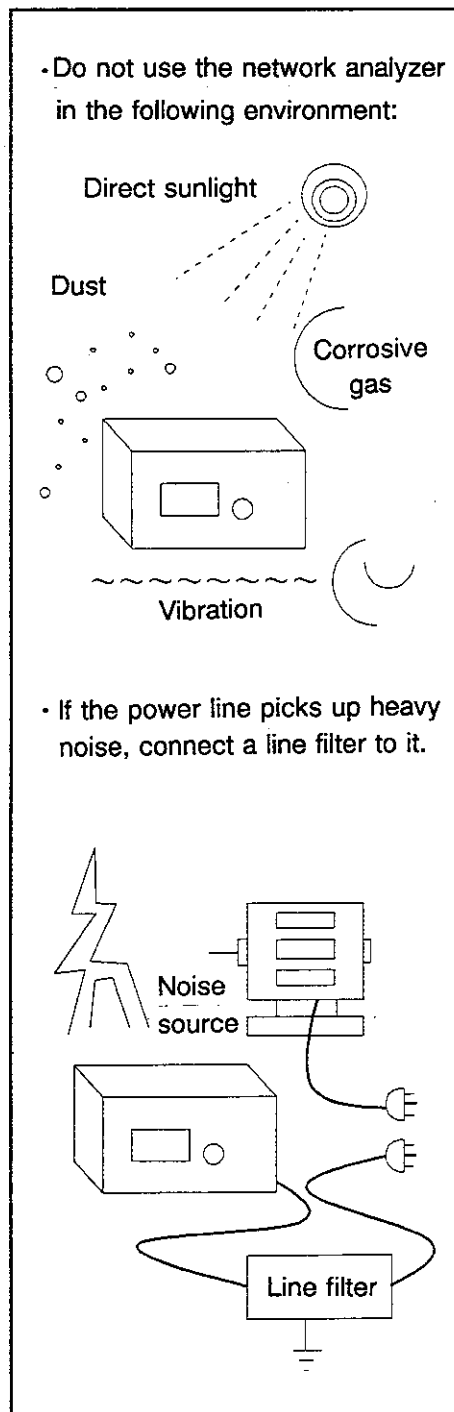
Figure 2-1   Ambient Conditions

2.3 Before Turning the Power On

```
┌─────────────────────── CAUTION ───────────────────────┐
│                                                        │
│  1. If the power connected to the network analyzer is outside the ranges listed in Table │
│     2-2, it may damage the network analyzer.           │
│  2. If a fuse not meeting the rated value is used, it may damage the network analyzer.    │
└────────────────────────────────────────────────────────┘
```

(1) Power requirements

The power requirements to operate the network analyzer are listed in Table 2-2.

Table 2-2   Power Requirements

Power	Requirements
Input voltage	90V to 250Vrms
Frequency	48Hz to 66Hz
Power consumption	350VA or less

(2) Fuse

The fuse for the AC power line is 6.3A/250V regardless of the input voltage.
Make sure that the fuse is placed in the power connector in the rear panel.

Pull out to the front side using a standard screwdriver.
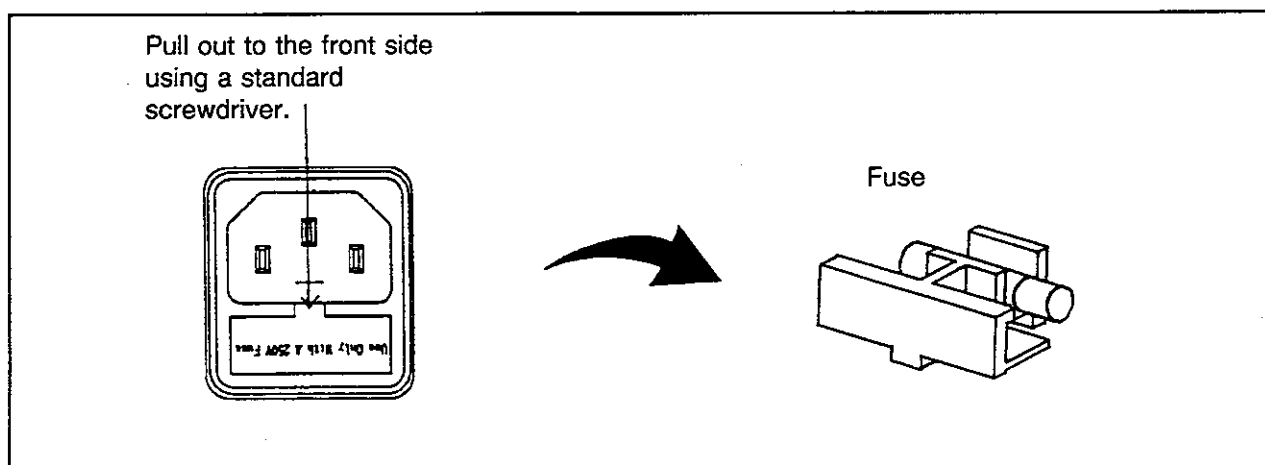
Fuse

Figure 2-2   Checking the Fuse

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(3) Power plug and cable used in Japan

The power plug and cable attached to the network analyzer are in conformity with the Japanese electric product regulation law.

A 3-prong to 2-prong conversion adapter (AC adapter) is included in the accessories because few 3-prong power connectors are used in Japan. When using this conversion adapter, be sure to connect the ground pin of the adapter or the ground terminal of the rear panel to an external ground.

When connecting the adapter to the power receptacle, be careful of the plug and receptacle directions.

If the adaptor is not applicable to the receptacle, use an optional adaptor (KPR-13).
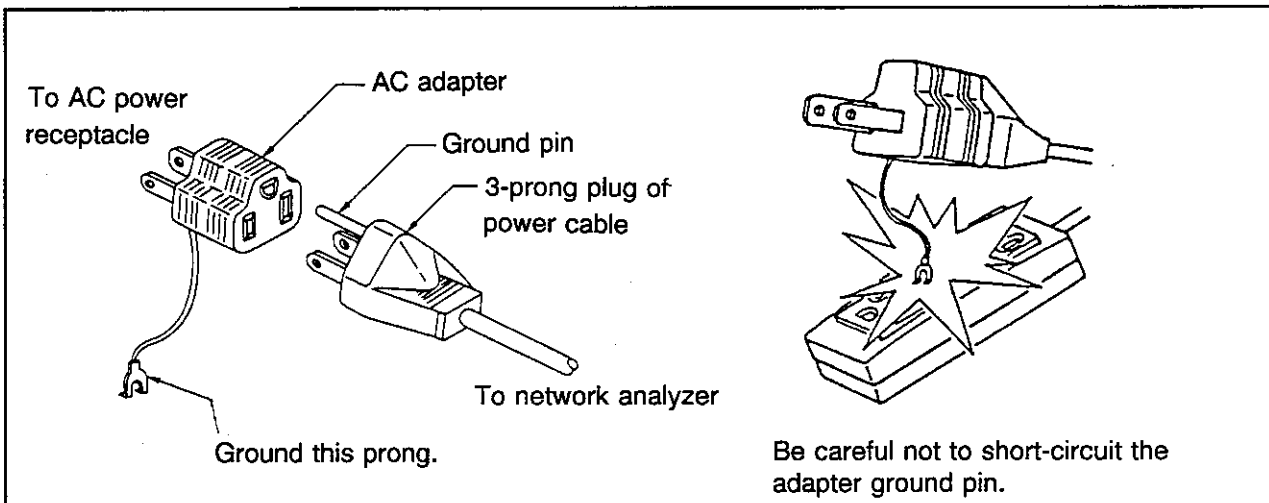
Figure 2-3 Power Cable and Plug

(4)   Power plugs for use overseas

The power plugs listed in Table 2-3 are optionally available. When other plugs are necessary, contact us.

Table 2-3   Power Plugs to be Used Overseas

Straight type	A01402 (Standard)	A01403 (Opt.95)	A01404 (Opt.96)	A01405 (Opt.97)	A01406 (Opt.98)	A01408
Angle type	A01412	A01413	A01414	A01415	-	-
Applicable Standards	JIS: Japan Law on Electrical Appliances	UL: US CSA: Canada	※	SEV: Switzerland	SAA: Australia New Zealand	
Rating and Color	125 V/7 A, black, 2m	125 V/7 A, black, 2m	250 V/6A, grey, 2m	250 V/6A, grey, 2m	250 V/6A, grey, 2m	250 / 6A
Plug						

※   CCE: Europe; VED: W. Germany; OVE: Australia; SEMKO: Sweden; DEMKO: Denmark;
KEMA: Holland; FIMKO: Finland; NEMKO: Norway; CEBEC: Belgium

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2.4 Storing, Cleaning, and Transporting of Network Analyzer

(1) Storing

When the network analyzer is to be unused long time, place a vinyl cover over it or put it in a cardboard box, and then store it in a dry place unexposed to direct sunlight.

Temperature range for storage: -20°C to +60°C

(2) Cleaning

```
┌─────────────────────────── CAUTION ───────────────────────────┐
│                                                                │
│  Do not use organic solvent which may deteriorate plastics (such as benzene or acetone)  │
│  for maintenance or cleaning of the network analyzer.          │
│                                                                │
└────────────────────────────────────────────────────────────────┘
```

(3) Transporting

When transporting the network analyzer, pack it in the cardboard box used for delivery or having a better quality (using cardboard with thickness of 5mm or more).

Packing steps:

① Wrap the network analyzer with cushioned packing materials and put it inside the cardboard box.

② Put accessories in the cardboard box and fill the space with cushioned packing materials.

③ Close the cardboard box cover and tie up the box with packing straps.

3. PANELS
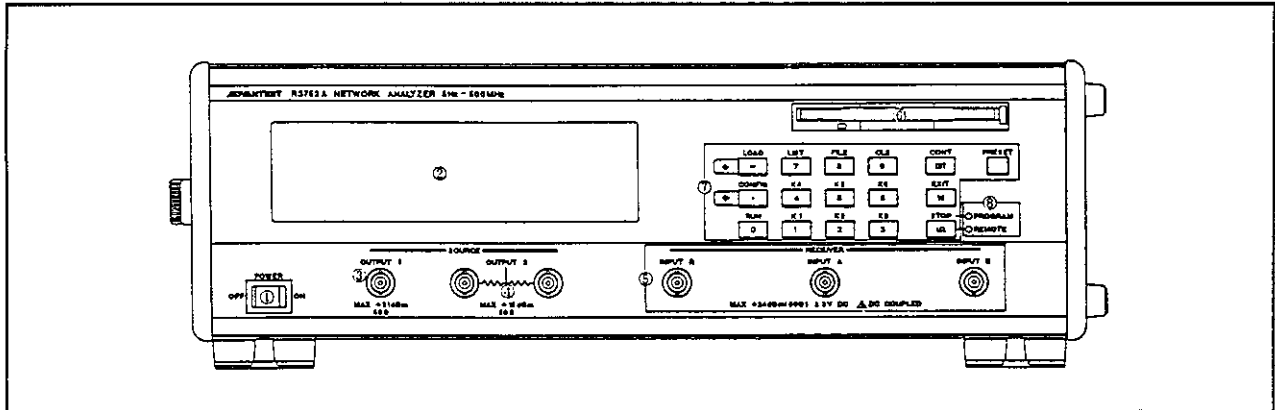
3.1   Front Panel

Figure 3-1   Front Panel (R3752A)

No.	Name	Description
①	POWER switch	Turns on/off the power.
②	Fluorescent display	Displays the FDD and RAM disk file contents and the program execution results in the area of 32 characters × 8 digits.
③	Signal output connector ①	Connects a power divider for absolute or parallel measurement.
④	Signal output connector ②	Used for ratio measurements.
⑤	Input connectors	Used for reference and measurement inputs. The supplied input connectors vary by the models: R3752A; INPUT A, B, and R . R3752B; INPUT A and R R3752E; INPUT A
⑥	Floppy disk drive	Used to save programs and measurement data. This drive is available in three modes and the format type is 720KB for DD and 1.2 or 1.44MB for HD.
⑦	Panel keys	0 to 9, ·, -, BS, ENT: Used to input numeric data. K1 to K6: Used as function keys. LOAD, LIST, FILE, CLS, CONT, EXIT, RUN, and STOP: Used for program load, execution, stop, and so forth.

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No.	Name	Description
⑧	LED	Indicates the BASIC execution and GPIB operating states.
		● PROGRAM LED
		Goes on when loading a program or saving or loading a file. This LED remains on while the program is being paused.
		● REMOTE LED
		Goes on when the network analyzer is in remote mode. It goes off after the network analyzer has exited the remote mode.

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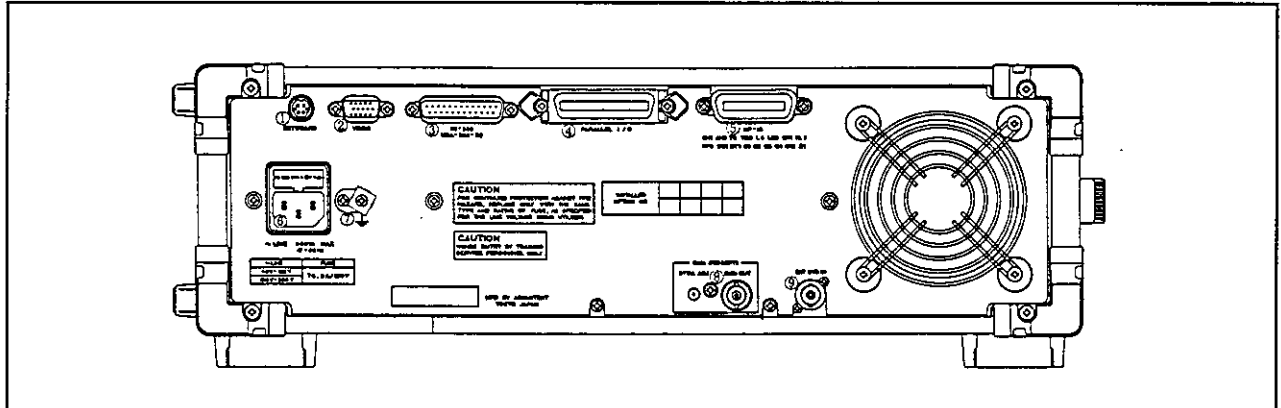
3.2 Rear Panel

Figure 3-2   Rear Panel (same for all R3752 Series)

No.	Name	Description
①	Keyboard connector	Connects an IBM-PC keyboard. (The application software is necessary.)
②	Video signal output	Video signal output for VGA
③	Serial input/output	RS-232 input/output connector
④	Parallel I/O connector	I/O port used for communication with external devices such as automatic unit or foot switch. (Output: two 8-bit channels, input/output: two 4-bit channels) EXT TRIGGER input (negative logic, pulse width $1\mu s$ or more, 18 pins)
⑤	GPIB connector	Used for remote control of external devices or by an external controller.
⑥	AC power connector	3-pole receptacle. The center pole is a ground terminal. To remove the fuse, pull out the cover above the connector.
⑦	Ground terminal	Used to ground the network analyzer when the power cable 3-prong connector or 2-prong adapter are unavailable.

No.	Name	Description
⑧	Highly stable reference frequency output connector (Option 20)	Outputs highly stable reference frequency when Option 20 is equipped.
⑨	External reference frequency input connector	Used to input external reference frequency. Input frequency: 1, 2, 5, 10MHz of 0dBm or more Input frequency accuracy: ± 10ppm or less

4. OPERATIONS

4.1 Basic Key Operations

This section explains the functions of the panel keys (except the PRESET key) of each mode and how to use these keys.

Basically, the panel keys have four modes: BASIC, LOAD (file load), FILE (file operations), and CONFIG (CONFIG file edit). The BASIC mode is at the base of the other three independent modes (see Figure 4-1). The keys except the PRESET key function differently according to the modes.
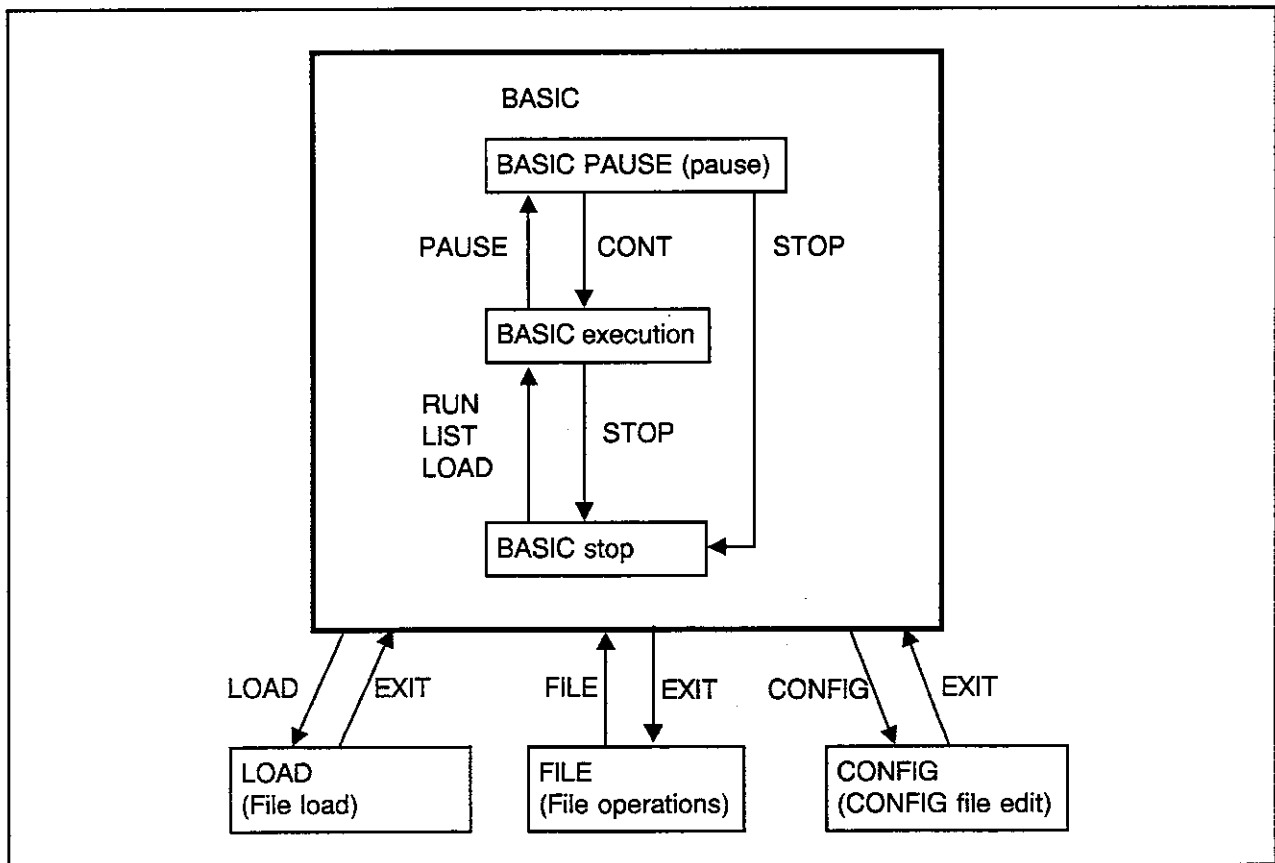
Figure 4-1 Panel Mode Transitions

4.1.1 Key Names and Functions

The keys on the panel except the PRESET key function differently according to the network analyzer mode. This section gives the key names and outlines their functions. (For the functions in individual modes and operations, see the explanation of mode operations.)
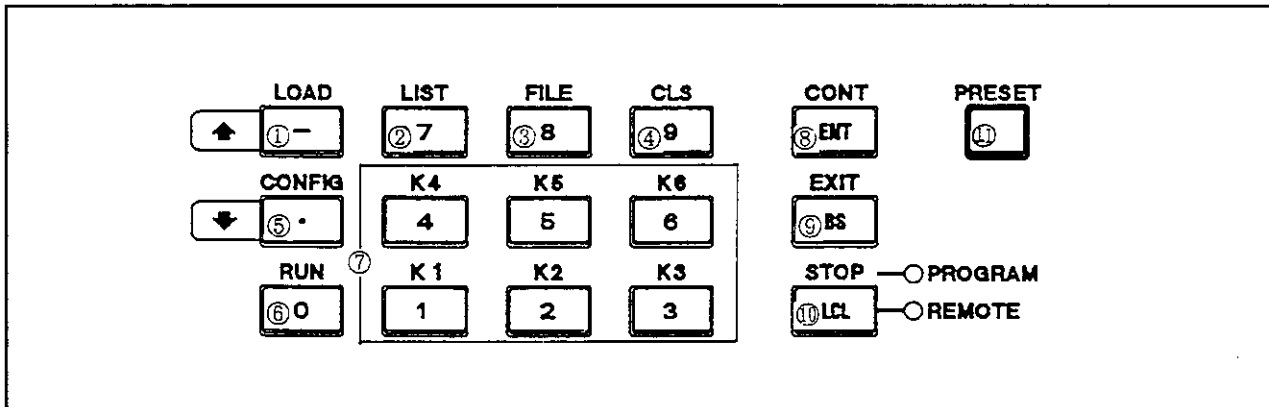
No.	Name	Function
①	LOAD key	Used to select the LOAD mode (selecting the BASIC LOAD file). In the LOAD or FILE (file operations) mode, this key moves the cursor upward. During execution of a BASIC program, this key functions as a minus (-) key.
②	LIST key	Used to display program list in BASIC. During execution of a BASIC program, this key functions as a numeric key (7).
③	FILE key	Used to select the FILE (file operations) mode. During execution of a BASIC program, this key functions as a numeric key (8).
④	CLS key	Clears the screen in the BASIC mode.
⑤	CONFIG key	Used to select the CONFIG.SYS edit mode. In the LOAD (BASIC LOAD file selection) or FILE (file operations) mode, this key moves the cursor downward. During execution of a BASIC program, this key functions as a period (.) key.

No.	Name	Function
⑥	RUN key	Executes the program loaded in memory. During execution of a program, this key function as a numeric key (0).
⑦	K1 to K6 key	In the FILE (file operations) mode, these keys are used as function keys. During execution of a BASIC program, these keys are used as function keys (K1 to K6) or numeric keys (1 to 6).
⑧	CONT·ENT key	Functions as an ENTER key to execute or determine various functions. In the BASIC PAUSE mode (temporary program stop), this key functions as the CONT key to continue the program.
⑨	EXIT·BS key	Functions as the EXIT key to cancel the function. During execution of a BASIC program, this key functions as the BS (Backspace) key.
⑩	STOP/LOCAL key	When the network analyzer is in the Remote On mode, the REMOTE LED is on. In this case, the STOP/LOCAL key functions as the LOCAL key. It allows the user to control from the front panel. When the network analyzer is under control of an external computer (Remote On·mode), all keys except the LOCAL key are unavailable. To allow the user to access to the network analyzer from the keys on the panel, the network analyzer must be in the Remote Off mode. In the Remote Off mode, the REMOTE LED is off. During execution of a BASIC program, the PROGRAM LED is on. In this case, the STOP/LOCAL key functions as the STOP key which stops the program currently running. When the program stops, the PROGRAM LED goes off. ※ While the REMOTE LED is on, the STOP/LOCAL key functions as the LOCAL key even if the PROGRAM LED is on.
⑪	PRESET key	Initializes the states of the network analyzer. For details of initialization, see Section A.1 "Initialization."

4.1.2 BASIC Mode

When the power is turned on, the network analyzer is initialized and enters the BASIC mode. The BASIC mode is further divided into three modes: BASIC stop, BASIC execution, and BASIC pause modes. The keys on the panel have different functions according to the mode.

(1) BASIC stop

In this mode, BASIC is doing nothing. The names and functions of the keys available in this mode are described below.
Figure 4-2 shows the key arrangements in the BASIC stop mode.
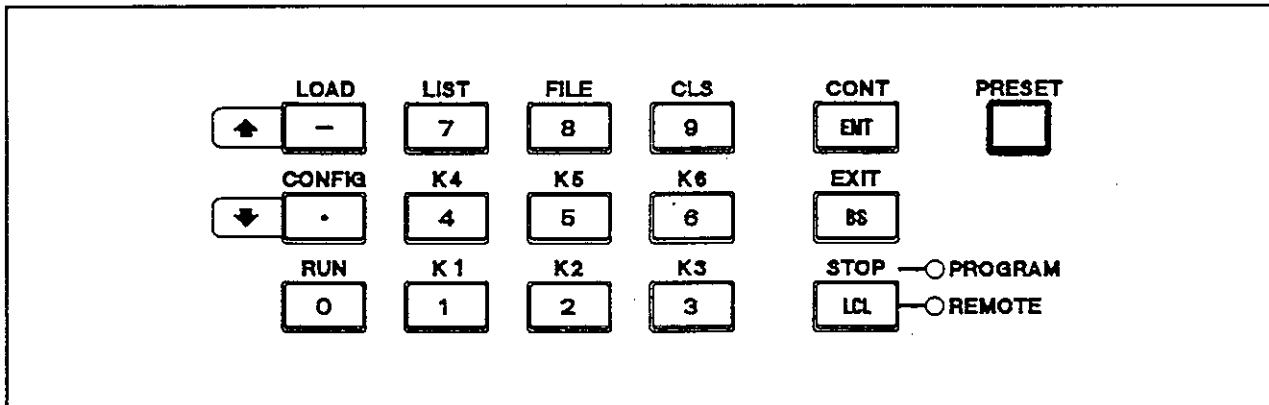
Figure 4-2   Key Arrangements in BASIC (BASIC stop) Mode

Name	Function
LOAD key	Places the network analyzer in the LOAD (file load) mode and displays file names, etc. (See Section 4.1.3 "LOAD Mode.")
LIST key	Lists the program loaded in memory.
FILE key	Places the network analyzer in the FILE (file operations) mode and displays file names, etc. (See Section 4.1.4 "FILE Mode.")
CLS key	Clears the screen.
CONFIG key	Places the network analyzer in the CONFIG (CONFIG file edit) mode and displays the system set values. (See Section 4.1.5 "CONFIG Mode.")

Name	Function
RUN key	Executes the program loaded in memory. The network analyzer enters the BASIC execution mode and the PROGRAM LED goes on. (For program loading from the panel, see Section 4.1.3 "LOAD Mode.")
STOP key	Stops the current operation (list display, etc.) and the PROGRAM LED goes off. If the PROGRAM LED is on but the REMOTE LED is still on, this key functions as the LOCAL key.

(2) BASIC execution

A BASIC program is being executed in this mode. The names and functions of the keys available in this mode are described below.

Figure 4-3 shows the key arrangements in the BASIC execution mode.
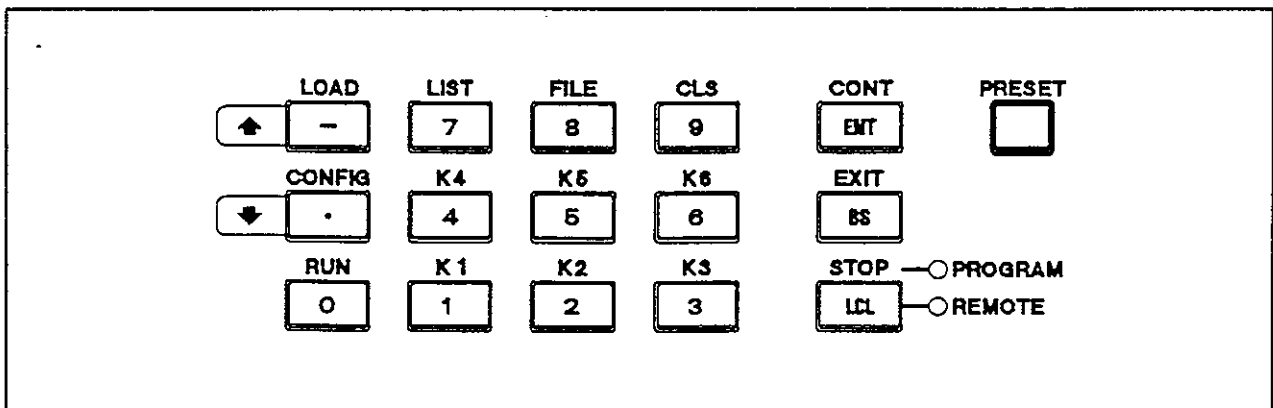
Figure 4-3   Key Arrangements in BASIC (BASIC execution) Mode

Name	Function
Ten key, ENT key, BS key	Used to input numeric or key values for BASIC INPUT instructions, etc.
STOP key	Causes the program currently running to be stopped and the PROGRAM LED to go off. If the PROGRAM LED is on but the REMOTE LED is still on, this key functions as the LOCAL key.

(3) BASIC PAUSE (pause)

Execution of a BASIC program is temporarily stopped (paused) in this mode. The names and functions of the keys available in this mode are described below.
Figure 4-4 shows the key arrangements in the BASIC PAUSE mode.
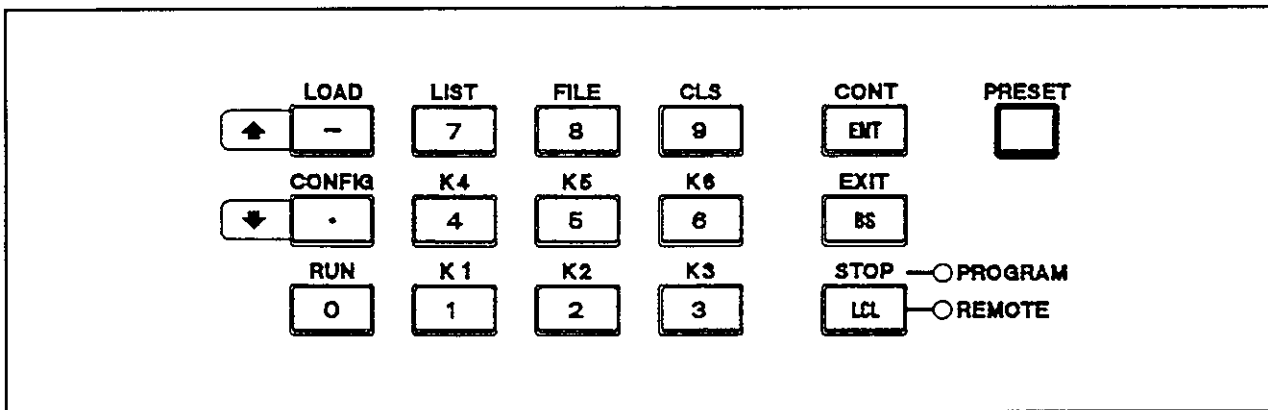
Figure 4-4   Key Arrangements in BASIC PAUSE Mode

Name	Function
RUN key	Executes the paused program from the beginning. The network analyzer enters the BASIC execution mode.
CONT key	Restarts executing the paused program from the current paused position. The network analyzer enters the BASIC execution mode.
STOP key	Causes the paused program to be terminated and the PROGRAM LED to go off. If the PROGRAM LED is on, but the REMOTE LED is still on, this key functions as the LOCAL key.

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4.1.3 LOAD Mode

The LOAD mode allows displaying the files in the drives (drives A to D) and loading BASIC files. Pressing the LOAD key in the BASIC stop mode causes a screen like that shown in Figure 4-5 to appear.

①: Path name
  (current drive + directory name)
②: Drive type of current drive
③: File name
④: File attribute
⑤: Drive information
⑥: Scroll bar

Figure 4-5   LOAD Mode Screen

The first line shows the current path name (①) and the current drive type (②). The path name means the drive + directory name, indicating which directory of which drive is currently used as the working directory.

The second through seventh lines show the file names (③) and attributes (④) in two columns (one screen shows the data for 12 files). The cursor is indicated by reversing the display of a file name. The file at the cursor position is currently being processed.

The eighth line shows the number of files and free area (⑤) in the current drive.

On the right end is a scroll bar (⑥). It indicates the ratio of the displayed files to all of the files included in the current directory.

- Drive type:
  [FDD];   Floppy Disk Drive
  [RAM];   RAM drive
  [ROM];   ROM drive

● File attributes:

RW; Read/Write file (allowing both read and write)

R-; Read Only file

--; System file (inhibiting both read and write)

<D>; Directory (sub directory)

Figure 4-6 shows the keys available in this mode.

Figure 4-6 Key Arrangements in LOAD Mode

Name	Function
↑, ↓ key	Used to move the cursor.
ENT key	If the file indicated by the cursor is a sub directory, makes this directory the working directory and displays the files in the directory. If the file indicated by the cursor is a text file, pressing this key loads this file to memory and places the network analyzer in the BASIC mode. (Even if the text file is not a BASIC file, the network analyzer enters the BASIC mode instead of the LOAD mode.)
EXIT key	If the current working directory is the root directory, the network analyzer exits the LOAD mode and returns to the BASIC mode. If the working directory is a sub directory, this key moves the working directory to the previous parent directory and displays the files in the directory.

※ The LOAD mode does not allow to change the drive. The drive can be changed only in the FILE mode. To change the drive in the LOAD mode, once enter the FILE mode, change the directory, and then return to the LOAD mode.

4.1.4 FILE Mode

This mode is used for file and drive operations such as file deletion and file copy between drives. Pressing the FILE key in the BASIC stop mode causes a screen like that shown in Figure 4-7 to appear.

①: Path name
  (current drive + directory name)
②: Drive type of current drive
③: File name
④: File attributes
⑤: File size (bytes)
⑥: File creation date (year-month-day)
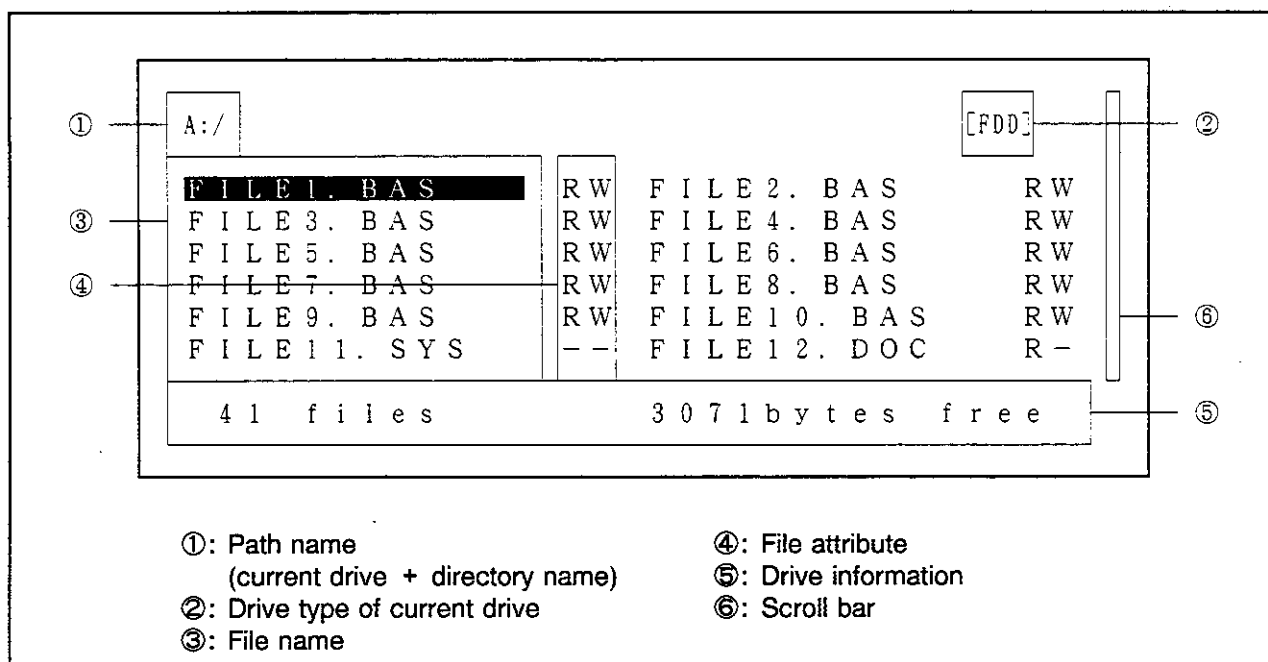⑦: Function key list
⑧: Scroll bar
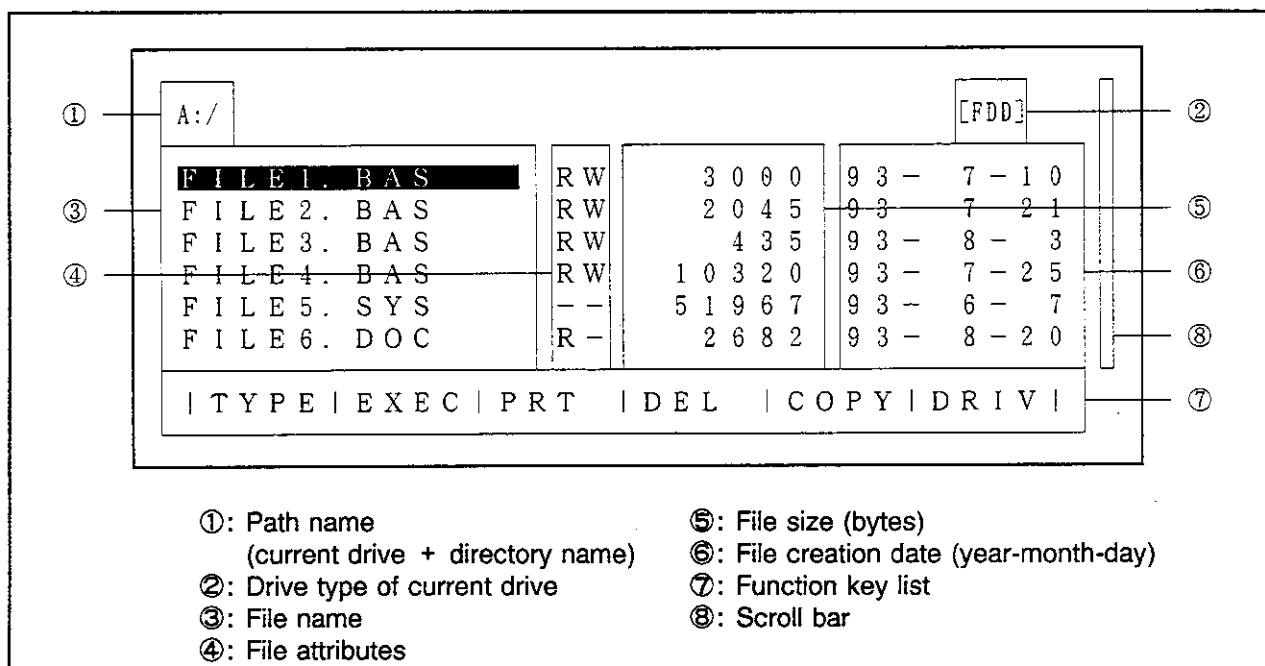
Figure 4-7　FILE Mode Screen

The first line shows the current path name (①) and the current drive type (②). The path name means the drive + directory name, indicating which directory of which drive is currently used as the working directory.

The second through seventh lines show the file name (③), attributes (④), file size in bytes (⑤), and file creation date (⑥: year-month-day) in one column (one screen shows the data for six files). The cursor is indicated by reverse display of a file name. The file at the cursor position is currently being processed.

The eighth line shows the functions available in the FILE mode which are allocated to function keys K1 to K6 (⑦).

On the right end is a scroll bar (⑧). It indicates the ratio of the displayed files to all of the files included in the current directory.

- Drive type:
  [FDD];　Floppy Disk Drive
  [RAM];　RAM drive
  [ROM];　ROM drive

● File attributes:

RW;   Read/Write file (allowing both read and write)

R-;   Read Only file

--;   System file (inhibiting both read and write)

<D>; Directory (sub directory)
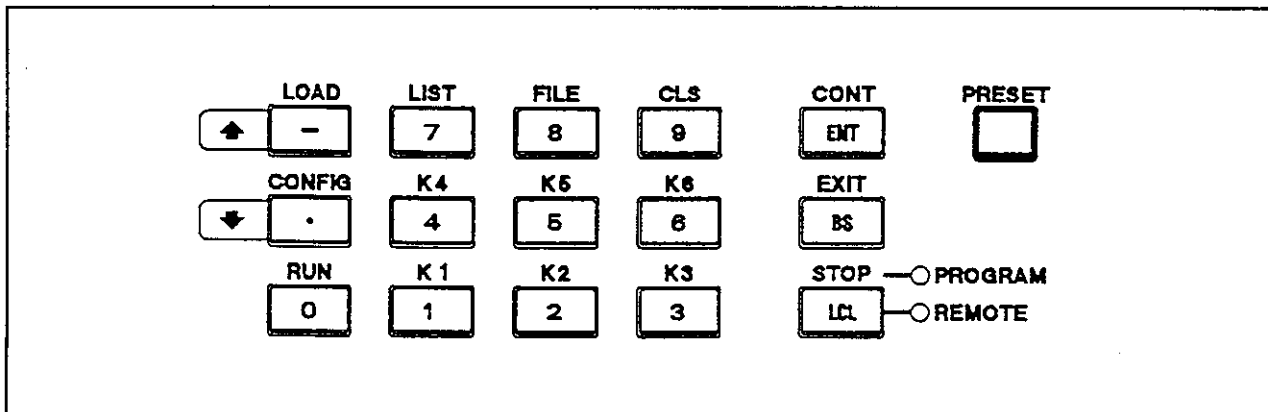
Figure 4-8 shows the keys available in this mode.
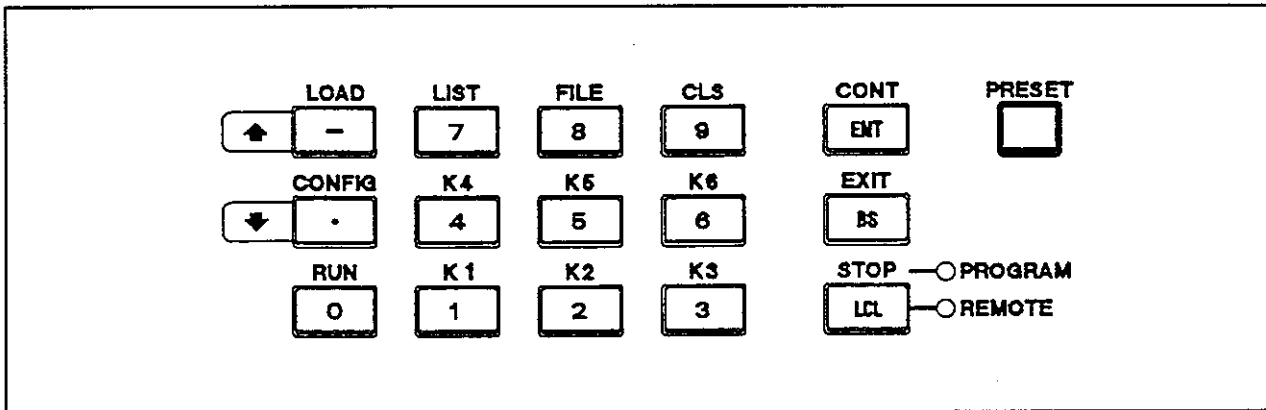
Figure 4-8   Key Arrangements in FILE Mode

Name	Function
↑ , ↓ key	Used to move the cursor. In the FILE mode, pressing the ↑ key moves the cursor upward and pressing the ↓ key moves the cursor downward.
ENT key	If the file indicated by the cursor is a sub directory, this key makes this directory the working directory and displays the files in the directory.
EXIT key	If the current working directory is the root directory, the network analyzer exits the LOAD mode and returns to the BASIC mode. If the working directory is a sub directory, this key moves the working directory to the previous parent directory and displays the files in the directory.
TYPE (K1) key	If the file indicated by the cursor is a readable text file, this key displays the file contents. (For details, see (1) below.)
EXEC (K2) key	If the file indicated by the cursor is a text file, it is assumed to be a BASIC file and the BASIC temporarily executes the file. The network analyzer exits the FILE mode and enters the BASIC mode regardless of whether the files have been loaded or the execution has succeeded.
PRT (K3) key	If the file indicated by the cursor is a readable text file, this key outputs the file contents to the printer connected to the RS-232C or GPIB connector. (For details, see (2) below.)

Name	Function
DEL (K4) key	If the file indicated by the cursor is a writable file (the file attribute is "RW"), this key deletes the file. (For details, see (3) below.)
COPY (K5) key	If the file indicated by the cursor is a readable file, this key copies the file between drives. (For details, see (4) below.)
DRIV (K6) key	This key is used to change the current drive or to initialize the floppy disk. (For details, see (5) below.)

(1) TYPE (file contents display) function

The TYPE key displays the file contents on the screen.
Pressing the TYPE (K1) key in the FILE mode causes a screen like that shown in Figure 4-9 to appear if the file indicated by the cursor is a readable text file.

①: File name
    (current drive + directory name + file name)
②: Program list
③: Function key list
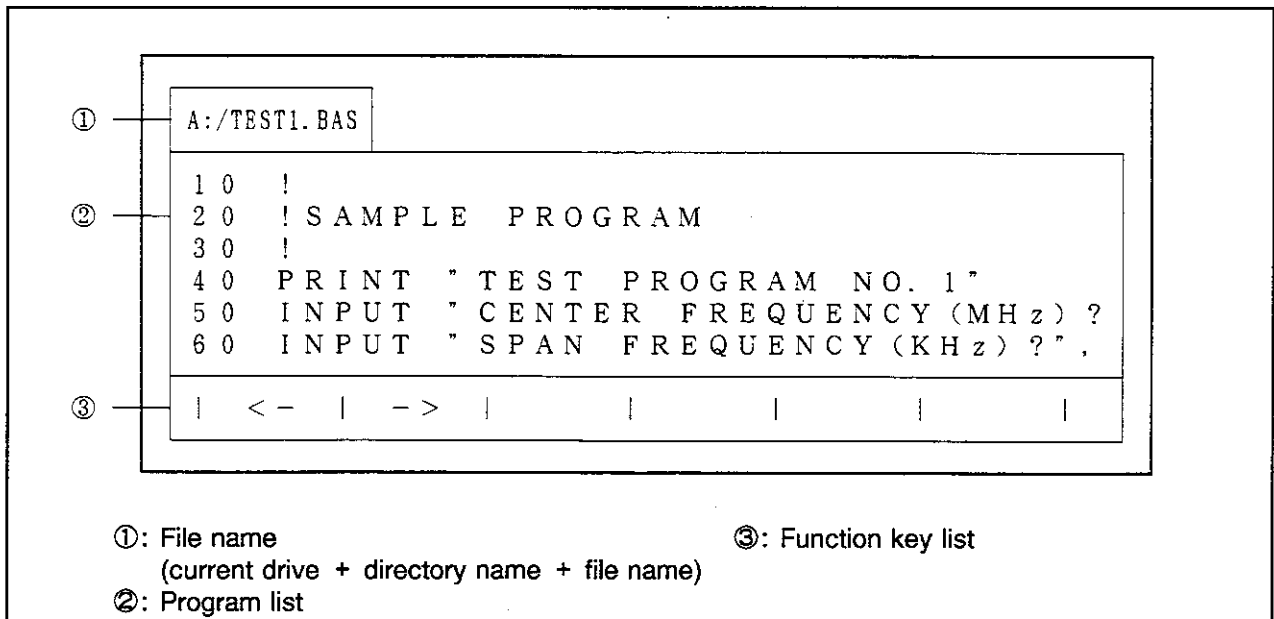
Figure 4-9 TYPE (file contents display) Screen

The first line shows the current path name (①). The path name means the drive + directory name + current file name.

The second through seventh lines show the file contents (②). One line can display a maximum of 32 characters. If it contains more than 32 characters, the exceeding characters can be displayed by shifting the screen horizontally with function keys.

The eighth line shows the functions available in TYPE mode (file contents display) (③). (Function keys shown as blank are allocated no function.)

Figure 4-10 shows the keys available in this mode.
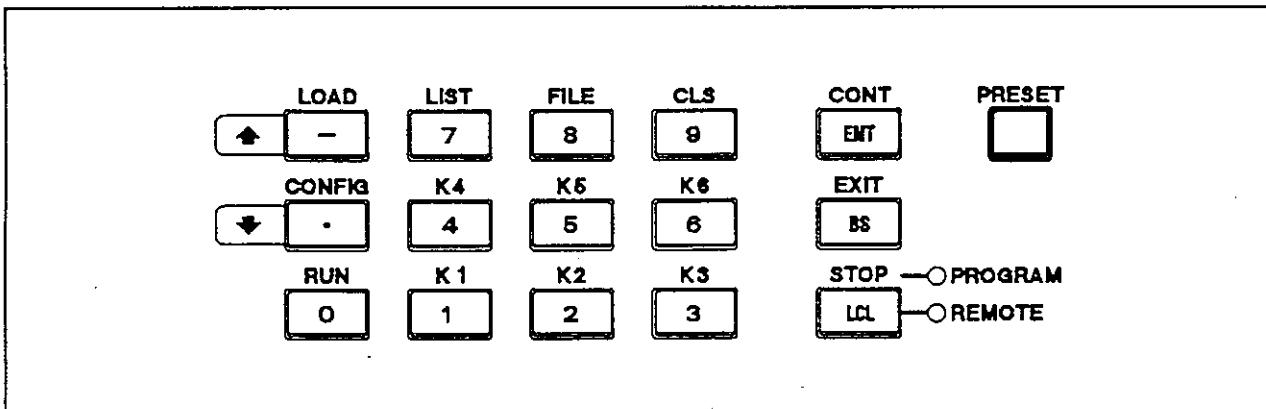
Figure 4-10   Key Arrangements in TYPE (file contents display) Mode

Name	Function
↑, ↓ key	Used to scroll the list display of file contents. Pressing the ↑ key scrolls the display upward and pressing the ↓ key scrolls the display downward.
<- (K1), -> (K2) key	If more than 32 characters are contained in one line, these keys can be used to display the exceeding data. One line can contain a maximum of 256 characters. Characters after the 256th character, if any, are not displayed (that is, ignored).
EXIT key	The network analyzer exits the TYPE (file display) mode and returns to the FILE mode.

(2)   EXEC (BASIC file execution) function

When the file indicated by the cursor is a text file, the EXEC key temporarily executes that file. When the program executed by EXEC completes or stops, it is removed from memory.

(3) PRT (file contents print) function

The PRT function outputs the contents of a text file to a printer.
If the file indicated by the cursor is a readable text file, pressing the PRT (K3) key in the FILE
mode causes a screen like that shown in Figure 4-11 to appear.

①: Path name
  (current drive + directory name)
②: Drive type of current drive
③: File name
④: File attribute

⑤: File size (bytes)
⑥: File creation date (year-month-day)
⑦: Function key list
⑧: Scroll bar

Figure 4-11   PRT (file contents print) Screen

The first through seventh lines are the same as those for FILE mode screen (see Figure 4-7).
The function keys displayed in the eighth line are those for a printer. (Function keys shown as
blank are allocated no functions.)

Figure 4-12 shows the keys available in this mode.

Figure 4-12   Key Arrangements for PRT (file contents print)

Name	Function
232C (K1) key	Outputs the contents of the file indicated by the cursor through RS-232C. To use RS-232C, the following settings are necessary: 1. Baud rate 2. Parity 3. Character length 4. Stop bits These settings must be the same as those of the output destination. They may be set in the CONFIG mode. (For details, see Section 4.1.5 "CONFIG Mode.")
GPIB (K2) key	Outputs the contents of the file indicated by the cursor through GPIB. Before using GPIB, set CONTROLLER = ON in the CONFIG mode and set the printer address. (For details, see Section 4.1.5 "CONFIG Mode.") To stop the output through GPIB, press the PRESET key.

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(4) DEL (file deletion) function

If the file indicated by the cursor is a writable file, pressing the DEL (K4) key in the FILE mode causes a message like that shown in Figure 4-13 to appear on the screen.

```
      D e l e t e    f i l e
①─── A : / T E S T 1 .   B A S


      P r e s s    Y e s < E N T >    o r    N o < E X I T > ?
```

①: File name
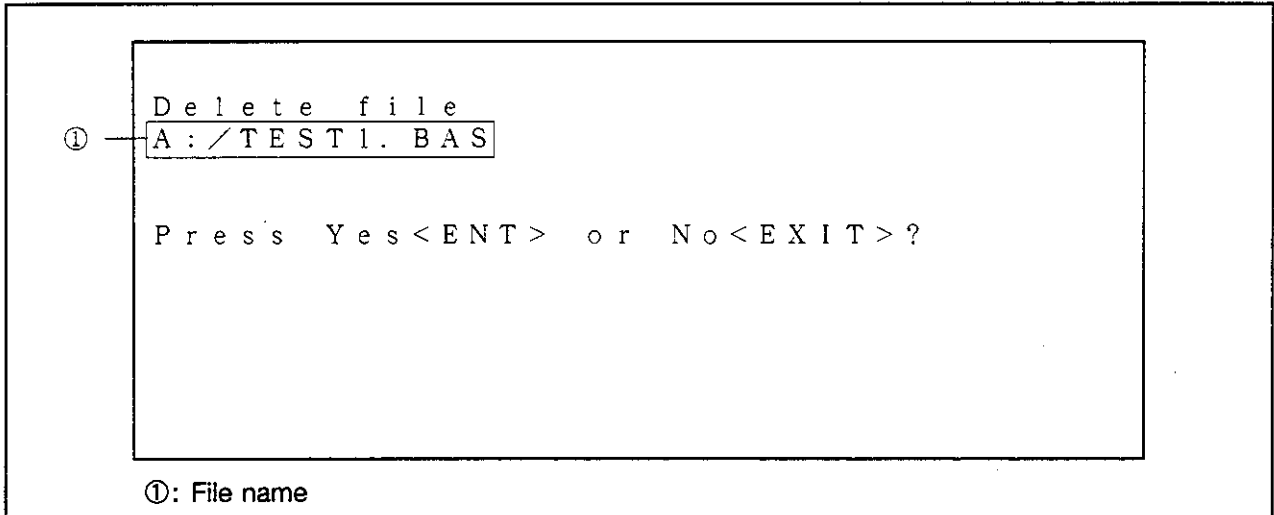
Figure 4-13 DEL (file deletion) Screen

Figure 4-14 shows the keys available in this mode.
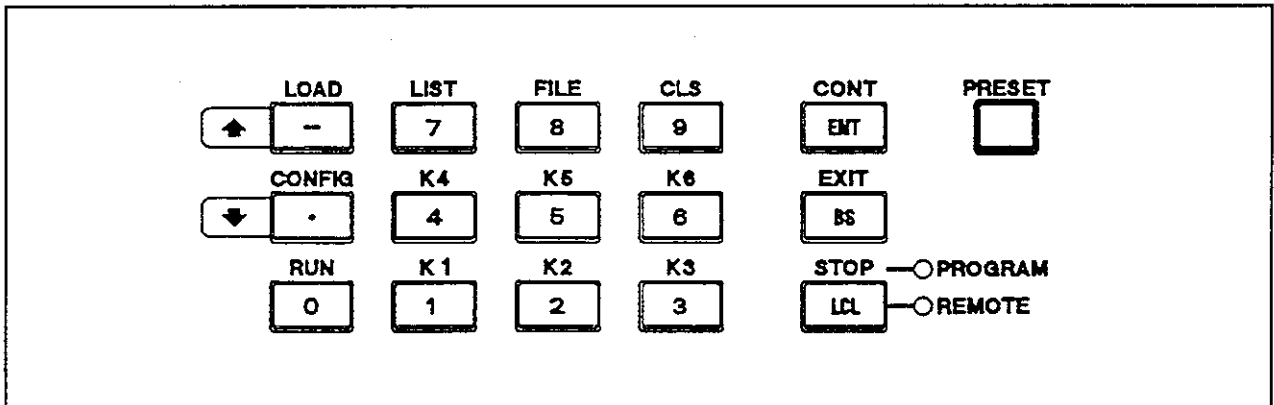
Figure 4-14 Key Arrangements for DEL (file deletion)

Name	Function
ENT key	Deletes the file indicated by the cursor.
EXIT key	Returns to the FILE mode without deleting the file.

(5) COPY (file copy between drives) function

The COPY key is used to copy files between drives. That is, it copies the specified file to the root directory in the copy destination drive.

If the file indicated by the cursor is a readable file, pressing the COPY (K5) key in the FILE mode causes a screen like that shown in Figure 4-15 to appear.

①: Path name
　　(current drive + directory name)
②: Drive type of current drive
③: File name
④: File attribute

⑤: File size (bytes)
⑥: File creation date (year-month-day)
⑦: Function key list
⑧: Scroll bar
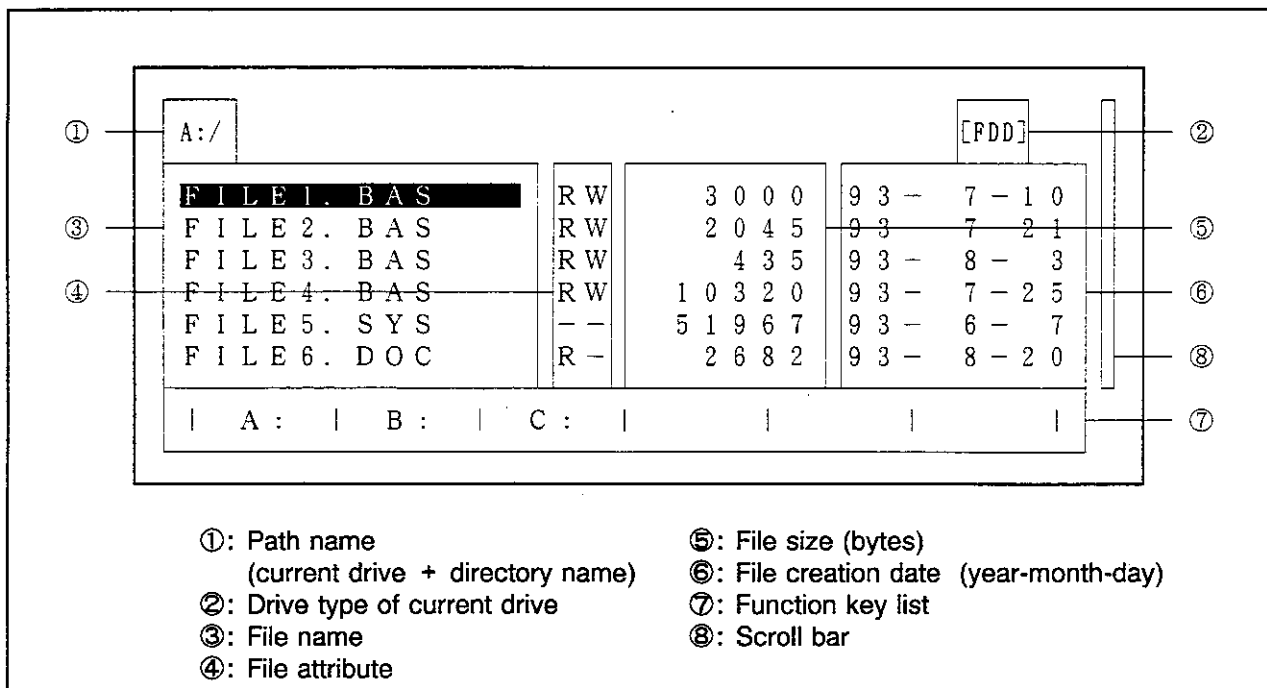
Figure 4-15   COPY (file copy between drives) Screen

The first through seventh lines are the same as those for FILE mode screen (see Figure 4-7). The function keys displayed in the eighth line are those for COPY. (Function keys shown as blank are allocated no functions.)

Figure 4-16 shows the keys available in this mode.

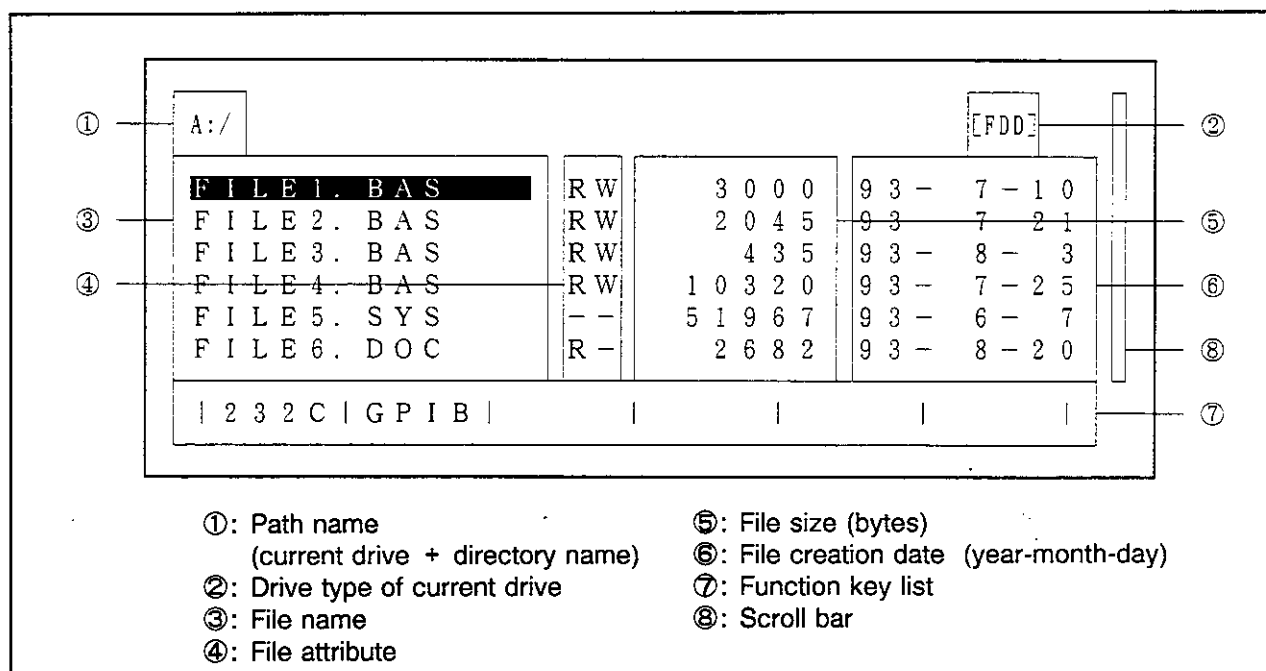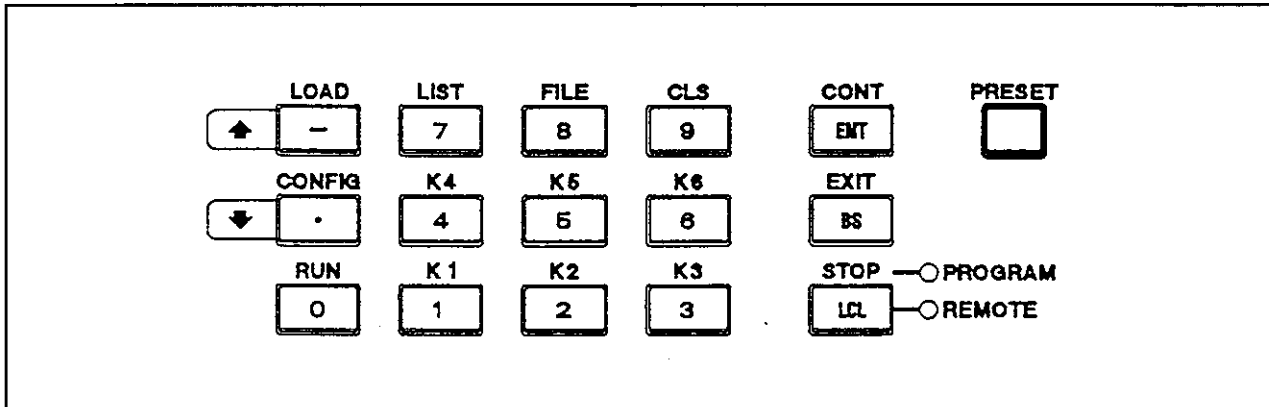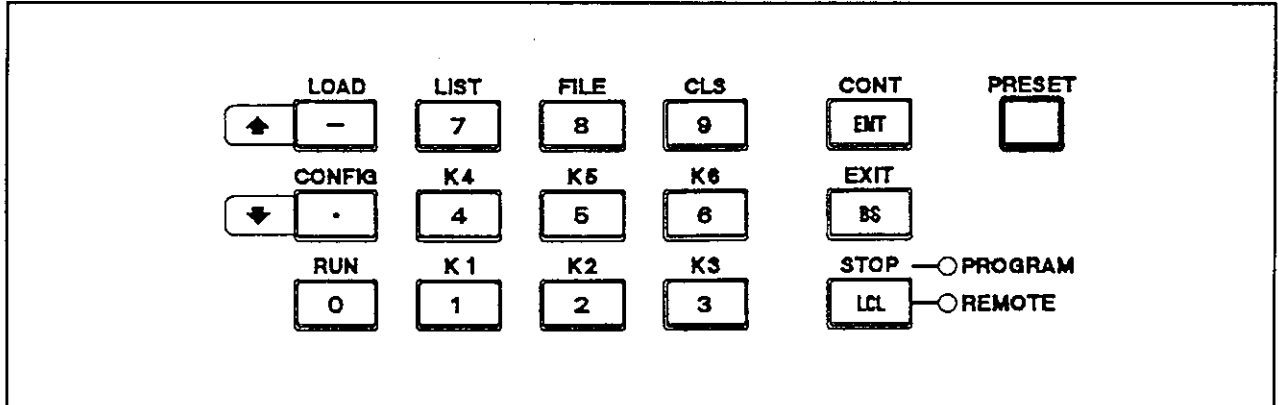Figure 4-16   Key Arrangements in COPY (file copy between drives) Mode

Name	Function
A: (K1), B: (K2), C: (K3) key	These keys specify the copy destination drive. Files cannot be copied within the same drive. Directories cannot be copied.
EXIT key	Stops copying and returns to the FILE mode.

Specifying the drive causes a message like that shown in Figure 4-17 to appear.

①: Current file (COPY source file)
②: Copy destination drive (drive specified by the function key)
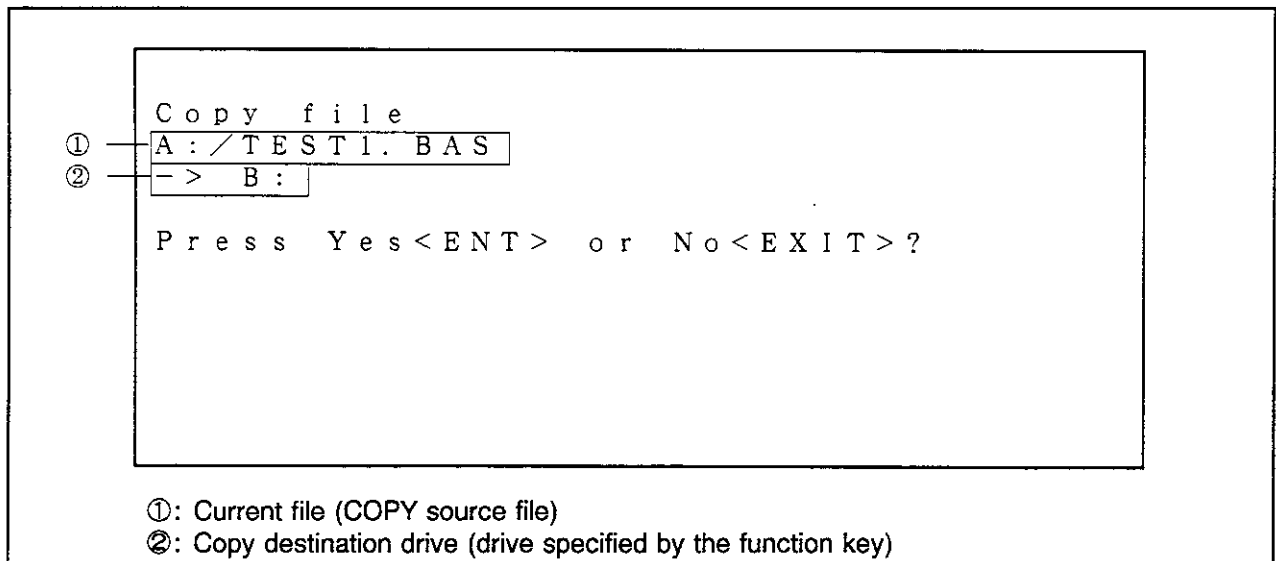
Figure 4-17   COPY (file copy between drives) Check Screen

In this screen, check the source file (①) and copy destination drive (②). The source file is the file indicated by the cursor in the FILE mode.

Figure 4-18 shows the keys available in this mode.
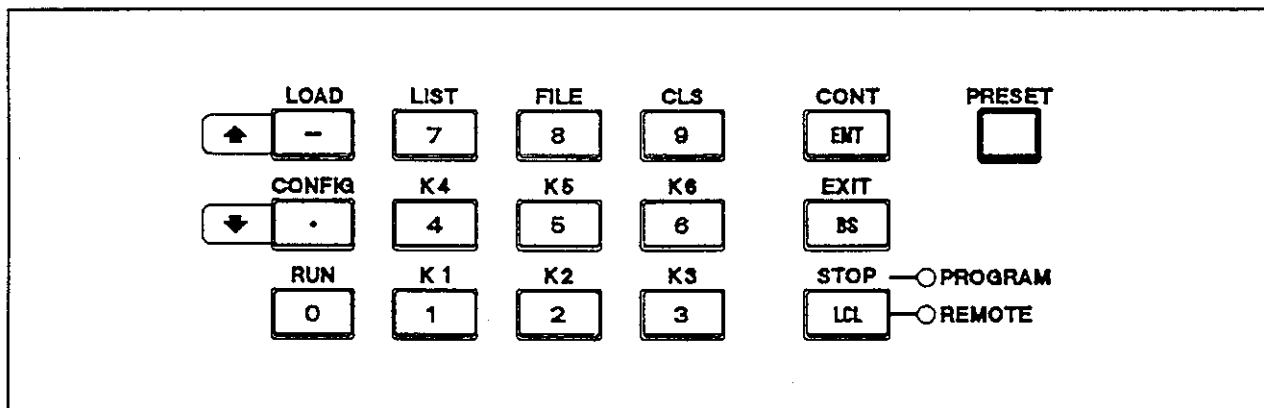
Figure 4-18   Key Arrangements for COPY (file copy between drives)

Name	Function
ENT key	Executes copy and then returns to the FILE mode.
EXIT key	Stops copying and returns to the FILE mode.

(6)   DRIV (drive operation) function

The DRIV key is used for drive operations such as changing the current drive or initializing the floppy drive.

Pressing the DRIV (K6) key in the FILE mode causes a screen like that shown in Figure 4-19 to appear.

① : Path name
    (current drive + directory name)
② : Drive type of current drive
③ : File name
④ : File attribute
⑤ : File size (bytes)
⑥ : File creation date (year-month-day)
⑦ : Function key list
⑧ : Scroll bar
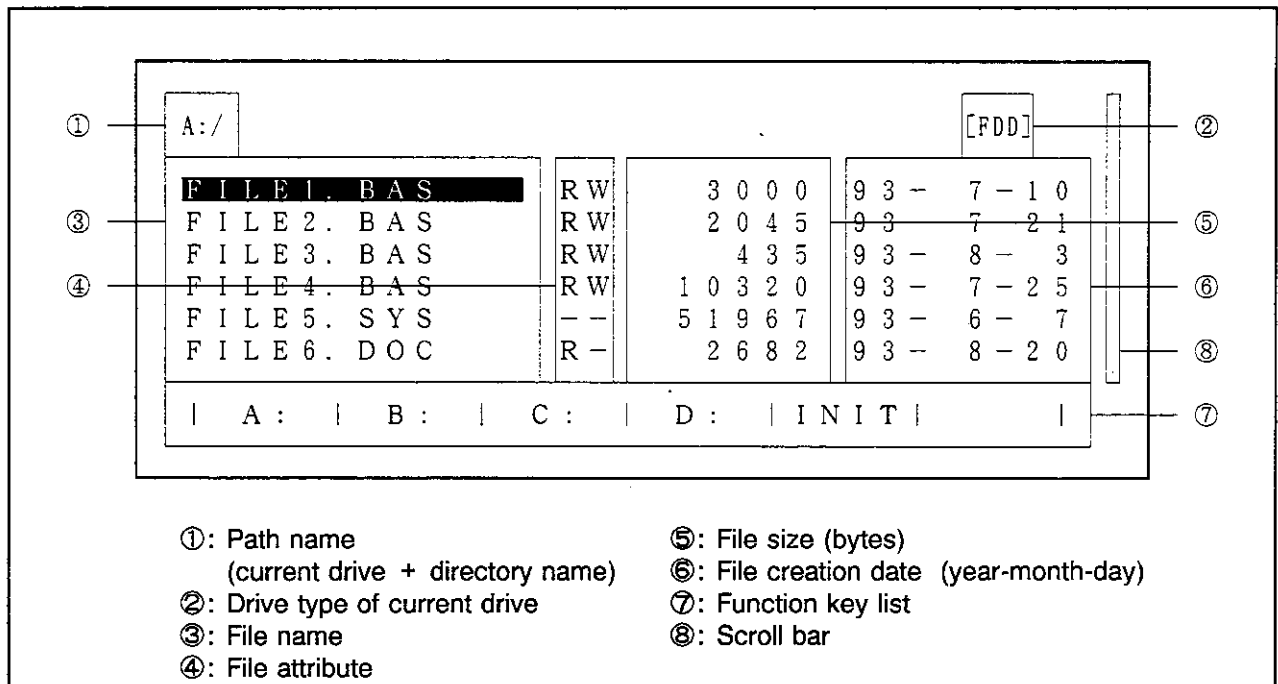
Figure 4-19   DRIV (drive operation) Screen

The first through seventh lines are the same as those for FILE mode screen (see Figure 4-7). The function keys displayed in the eighth line are those for DRIV.

Figure 4-20 shows the keys available in this mode.
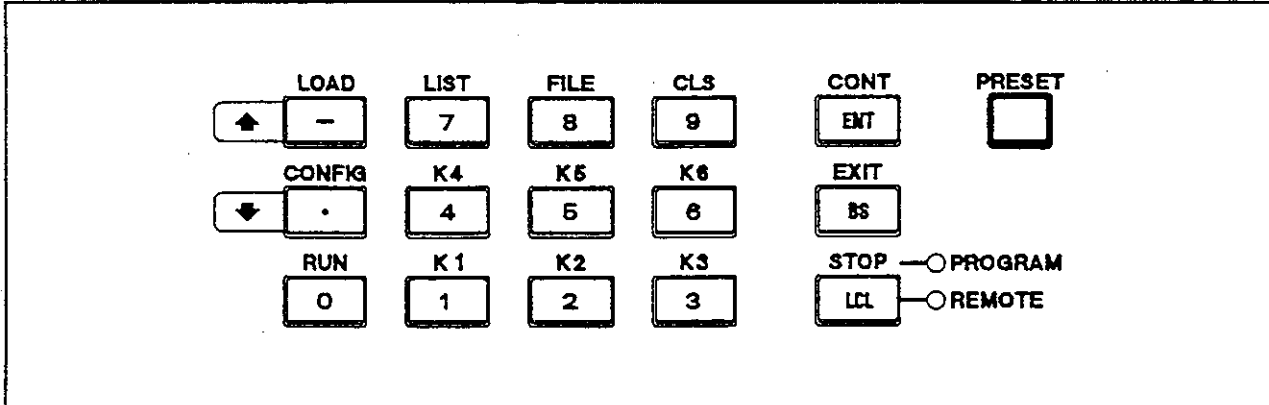
Figure 4-20   Key Arrangements for DRIV (drive operation)

Name	Function
A: (K1), B: (K2), C: (K3), D: (K4) key	These keys are used to change the current drive. After changing the drive, the network analyzer returns to the FILE mode. (This is the only way to change the drive from the panel.)
INIT key	Initializes the floppy disk. (For details, see (7) below.)
EXIT key	Stops the DRIV operation and returns to the FILE mode.

(7) INIT (floppy drive initialization) function

The INIT key is used to initialize the floppy disk (drive A).
Pressing the INIT (K5) key from DRIV (drive operation) causes a message like that shown in
Figure 4-21 to appear.

```
Initialize  Floppy  Disk

Initialize  Type  - > ?




       | I B M  | N E C  | I B M  | I B M  |        |        |
       | 7 2 0 K| 1 . 2 M| 1 . 2 M| 1 . 4 M|        |        |
```
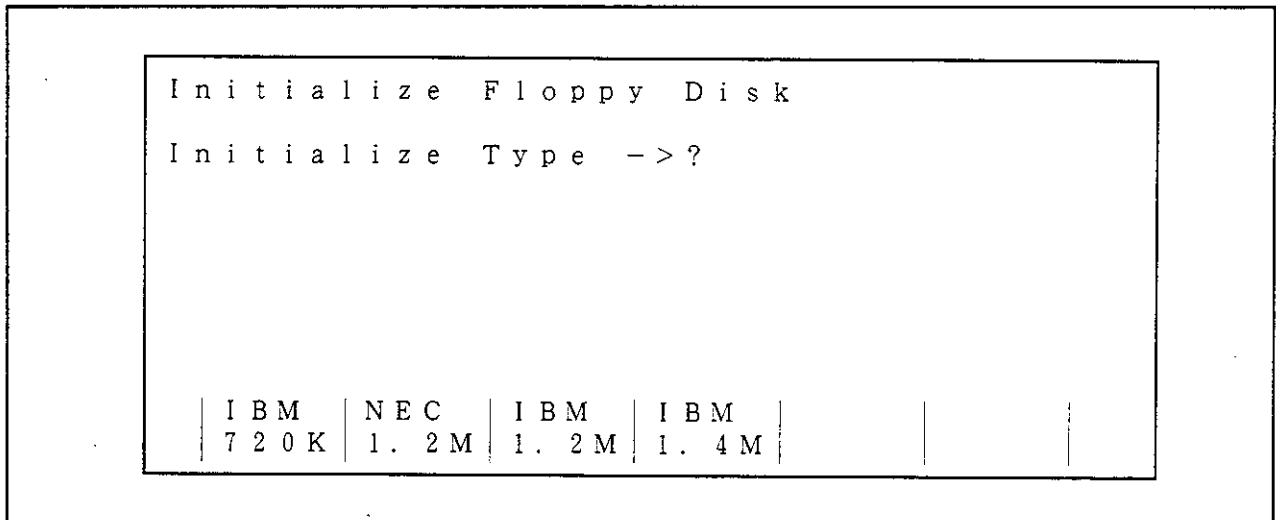
Figure 4-21   INIT (floppy disk initialization) Selection Screen

First, select the initialization mode (format type) of the floppy disk.

Figure 4-22 shows the keys available in this mode.
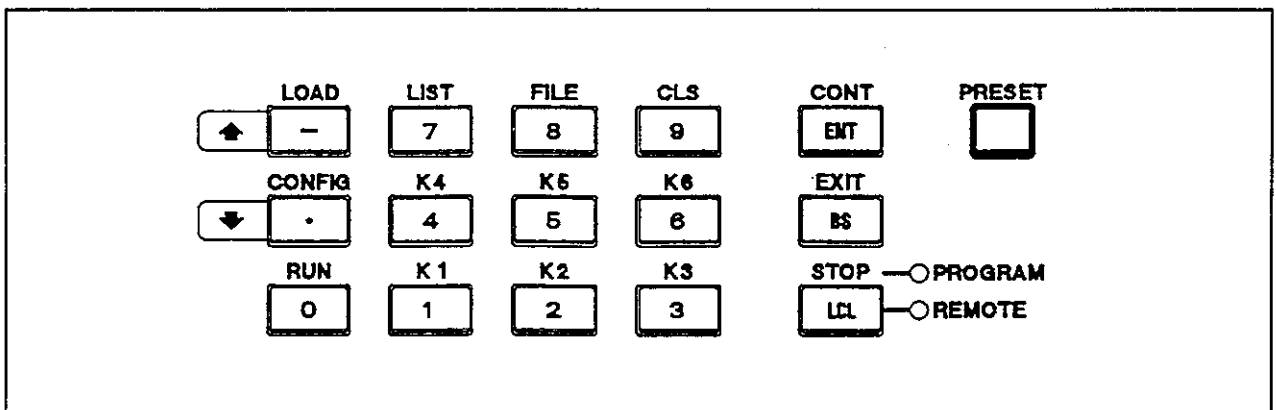
Figure 4-22   Key Arrangements for Selecting Initialization Size

Name	Function
IBM 720K (K1) key	Initializes a 2DD floppy disk in the 720K-byte 9-sector/track format (same as the IBM 2DD floppy disk format).
NEC 1.2M (K2) key	Initializes a 2HD floppy disk in the 1.2M-byte 8-sector/track format (same as the NEC PC-9801 Series 2HD floppy disk format).
IBM 1.2M (K3) key	Initializes a 2HD floppy disk in the 1.2M-byte 15-sector/track format.
IBM 1.4M (K4) key	Initializes a 2HD floppy disk in the 1.4M-byte 15-sector/track format.
EXIT key	Returns to the FILE mode without executing initialization.

When the 720K-byte, 1.2M-byte, or 1.4M-byte format is selected, the screen displays a message like that shown in Figure 4-23.
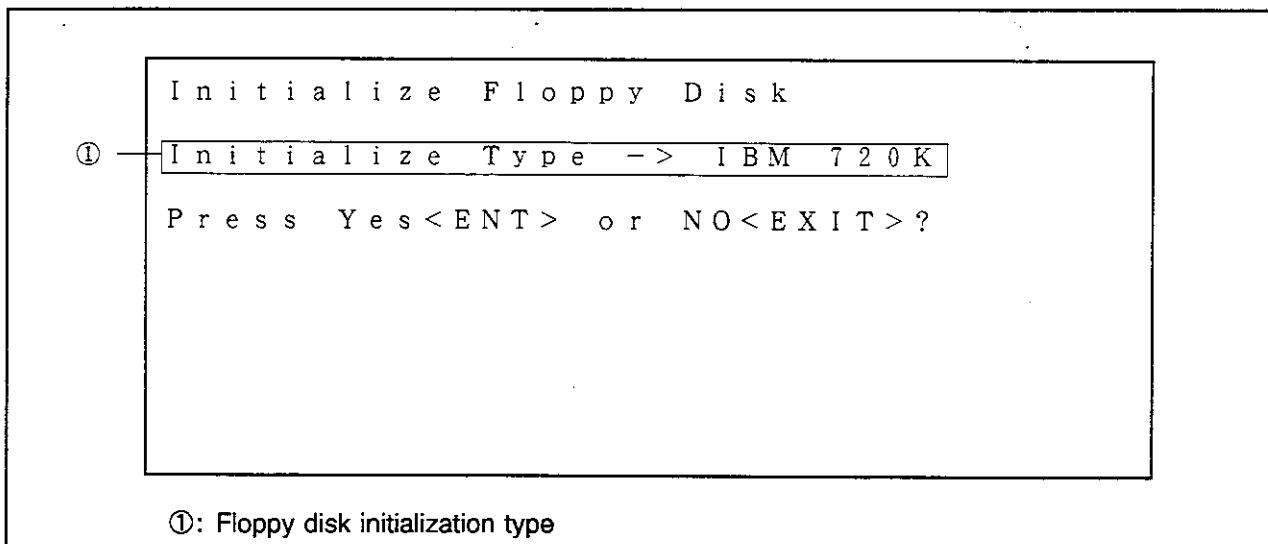
Figure 4-23   INIT (floppy disk initialization) Check Screen

In this screen, check the floppy disk initialization size (①).

Figure 4-24 shows the keys available in this mode.
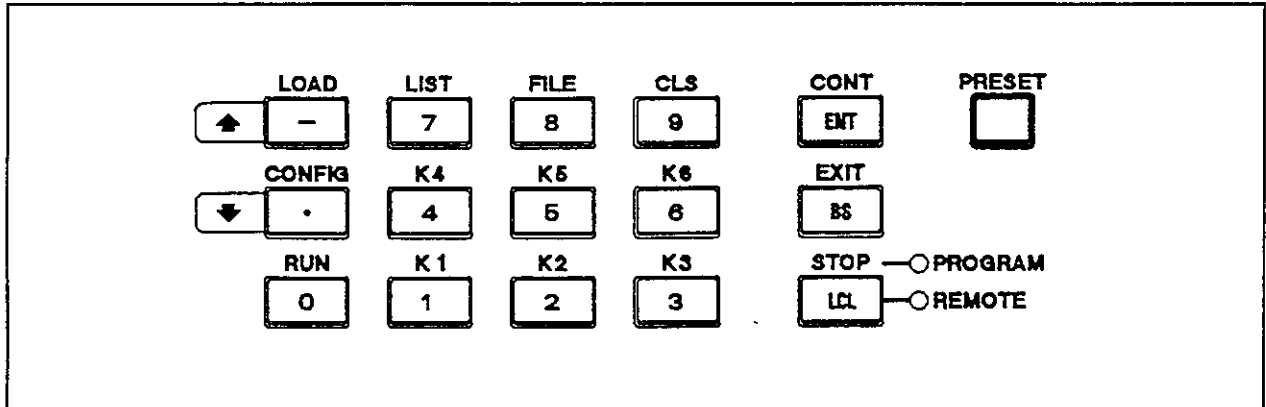
Figure 4-24 Key Arrangements for Checking Initialization

Name	Function
ENT key	Executes initialization. After that, the network analyzer returns to the FILE mode.
EXIT key	Returns to the FILE mode without executing initialization.

4.1.5   CONFIG Mode

This mode allows the GPIB and serial settings. Pressing the CONFIG key while the BASIC is being stopped causes a screen like that shown in Figure 4-25 to appear.

```
①──    D A T E              =    1 0 ╱ 0 1 ╱ 9 3
       T I M E              =    1 0 : 0 0 : 0 0
       A D D R E S S        =    1 1
       C O N T R O L L E R  =    O F F
       P R I N T E R        =    1 2
②──    P L O T T E R        =    1 3
       B A U D              =    9 6 0 0

③──    t e n   k e y   m o d e .
```

①: Set items
②: Current set values
③: Input method
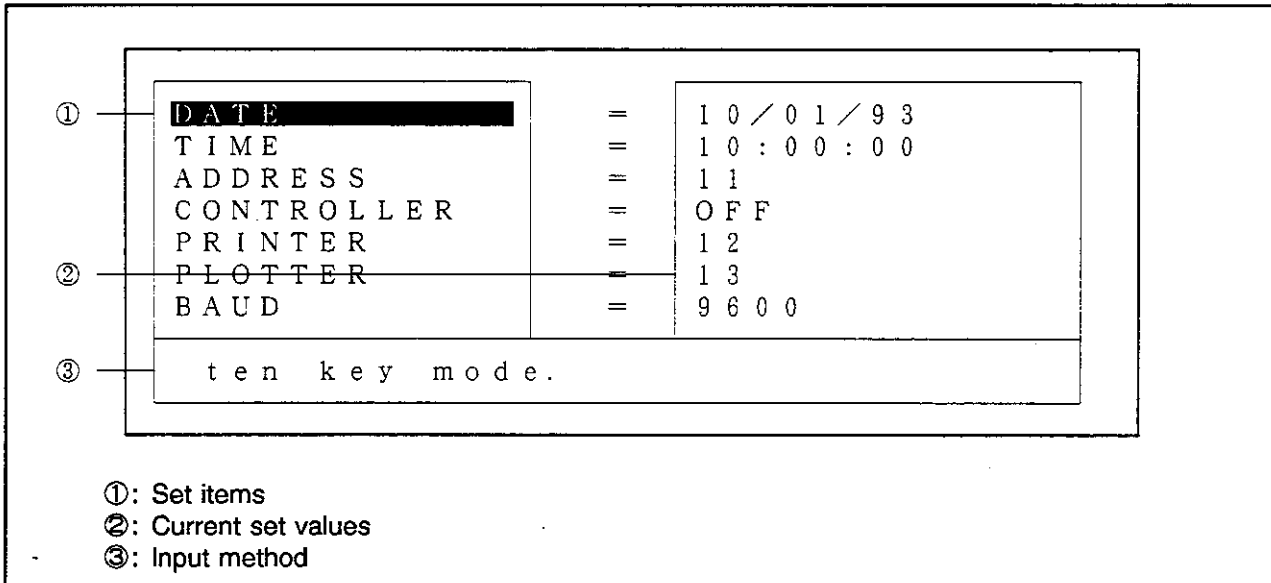
Figure 4-25   CONFIG Mode Screen (for ten-key input)

```
       P R I N T E R           =    1 2
       P L O T T E R           =    1 3
       B A U D                 =    9 6 0 0

    | 2 4 0 0 | 4 8 0 0 | 9 6 0 0 | 1 9 2 0 0 |         |         |

        ↓         ↓         ↓         ↓         ↓         ↓
        K1        K2        K3        K4        K5        K6
```
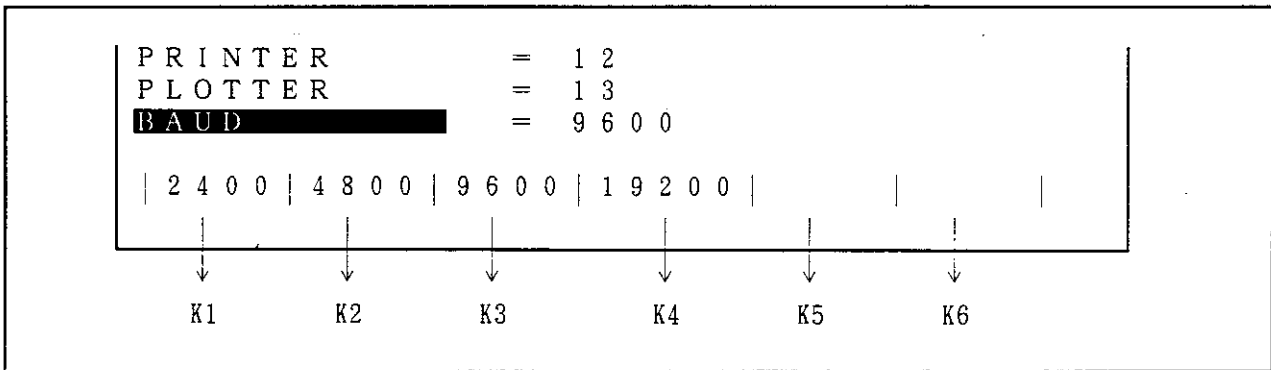
Figure 4-26   CONFIG Mode Screen (for function key input)

The first through seventh lines show the set items (① in Figure 4-25) and the current set values (② in Figure 4-25). The current item is indicated by the cursor.

The eighth line shows the input method (③ in Figure 4-25). When the method is shown as "ten key mode.", input numeric values with the ten keys. For other methods, use function keys K1 to K6 for input (see Figure 4-26). The function keys are K1 through K6 from the leftmost one. The numeric values shown correspond to these function keys. Select the set values from these numeric values. Function keys shown as blank are unavailable. (In Figure 4-26, the K5 and K6 keys are unavailable.)

Figure 4-27 shows the keys available in this mode.
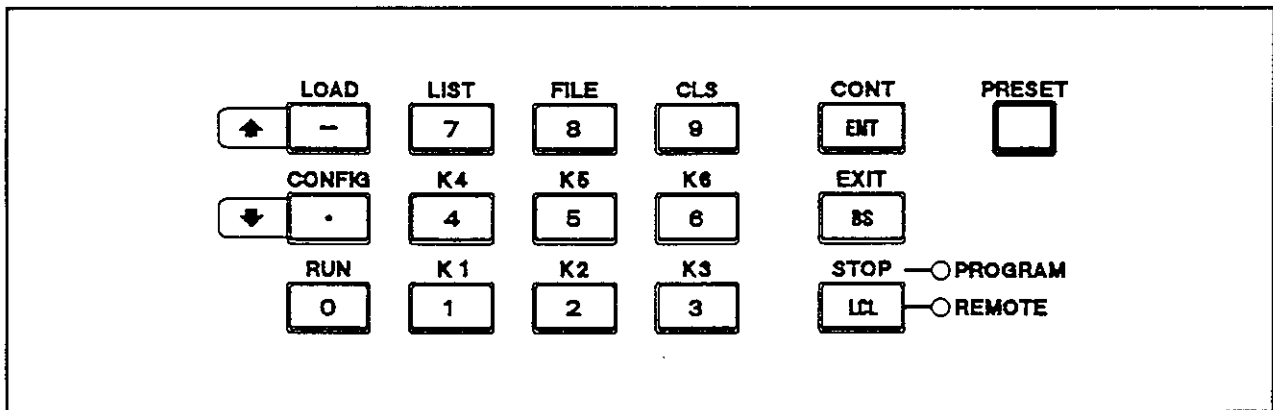
Figure 4-27   Key Arrangements in CONFIG Mode

Name	Function
↑, ↓ key	Used to move the cursor upward or downward. Pressing the ↑ key moves the cursor upward and pressing the ↓ key moves the cursor downward. While inputting values (a cursor appearing at the end of input data), pressing one of these keys stops the input and moves the cursor. The data currently being input is discarded.
ENT key	Used to determine or save the set value. While inputting a set value (a cursor appearing at the end of input data), pressing the ENT key determines the set value. If the set value is correct, the network analyzer changes its set value and completes the set operation. If the set value is incorrect, the network analyzer prompts re-input. When not inputting a set value (no cursor indicating data input at the end of the current set value), pressing the ENT key causes the set value to be saved. A file is generated in C:/CONFIG.BAT. If the file already exists, it is overwritten. If the file contents are valid, the saved set values are used for the next start-up. Before saving to the file, a screen like that shown in Figure 4-28 appears.

Name	Function
BS key	Available as the BS (Backspace) key while inputting set values with the ten keys. While inputting with function keys, the BS key is unavailable. When not inputting set values, pressing the BS key causes to return to the BASIC screen without saving the set values in the file.
Ten key	Used to input numeric values for set items.
Function key (K1 to K6)	When the set values are specific values, use function keys instead of ten keys.

Before set values saving to the file, a screen like that shown in Figure 4-28 appears.

```
Save  file.
C:/CONFIG.BAT
Press  Yes<ENT>  or  No<EXIT>  key.
```
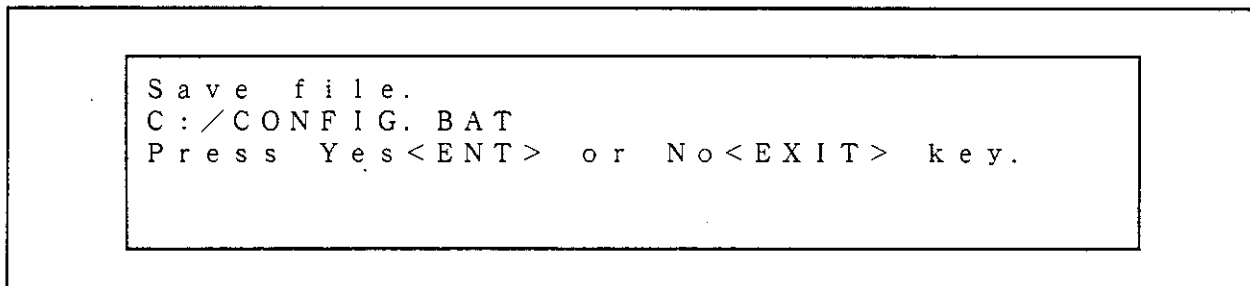
Figure 4-28   Save Check Screen in CONFIG Mode

In the save check screen in CONFIG mode, check whether to execute saving. Press the ENT key to execute saving and the BS (EXIT) key not to execute saving.

(1) CONFIG mode set items

In the CONFIG mode, the following items can be set:
※ (T) of the item names indicates to use ten keys for input and (F) indicates to use function keys (K1 to K6).

① DATE(T)

Set the date by inputting data as month-day-year. Determine the input with the ENT key for each data.
Example: Set the date of October 1, 1993.

[1] + [0] + [ENT] + [0] + [1] + [ENT] + [1] + [9] + [9] + [3] + [ENT]

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(When the month or day value consists of one digit, "0" may be omitted.)
The allowable ranges are: 1 to 12 for the month, 1 to 31 for the day, and 1991 to 2989 for the year.

② TIME(T)

Set the time by inputting data as hour-minute-second. Determine the input with the ENT key for each data.
Example: Set the time of 15:05:30.

| 1 | + | 5 | + | ENT | + | 0 | + | 5 | + | ENT | + | 3 | + | 0 | + | ENT |

(When the value consists of only one digit, "0" may be omitted.)
The allowable ranges are: 0 to 23 for the hour, 0 to 59 for the minute, and 0 to 59 for the second.

③ ADDRESS(T)

Set the GPIB address of the network analyzer. The allowable range is 0 to 30. Make sure the set values do not overlap.

④ CONTROLLER(F)

Set on/off the GPIB controller of the network analyzer. For details of the controller, refer to the programming manual.

⑤ PRINTER(T)

Specify the address of the GPIB printer used for the network analyzer. The allowable range is 0 to 30. Make sure the set values do not overlap.

⑥ PLOTTER(T)

(Currently, no plotter functions are supported.)

⑦ BAUD(F)

Sets the RS-232C interface baud rate of the network analyzer. The baud rate indicates the communication rate, that is, the number of data bits which can be sent and received between the units connected through RS-232C. Select one of 2400, 4800, 9600, or 19200 bps.

⑧ CHARBIT(T)

Set the character length of the RS-232C interface of the network analyzer. The character length means the number of bits of an individual character to be transmitted. Select one of 5, 6, 7, or 8 bits.

⑨ PARITY(F)

Set the parity check mode of the RS-232C interface of the network analyzer. A parity check is a way to see whether the transmitted data contains errors. Each piece of binary-noted data is added another bit (parity bit). In this method, number of transmitted data and parity bits that are set to "1"s is counted and determined to be even or odd to see whether the data is correctly sent and received.
For an even parity (EVEN), a parity bit is added so that each piece of binary-noted data contains an even number of bits that are set to "1"s. For an odd parity (ODD), a parity bit is added so that each piece of binary-noted data contains an odd number of bits that are set to "1"s. No parity check (NONE) can also be selected.
Select one of EVEN, ODD, or NONE.

⑩ STOPBIT(F)

Set the stop bit length of the RS-232C interface of the network analyzer. The stop bit length means the duration of the stop bits.
Select one of NONE, 1, 1.5, or 2 bits.

⑪ SCREEN(F)

Set the monitor connected to the network analyzer.

VGA: Outputs video signals applicable to 640 x 480 line monitors.
PC98: Outputs video signals applicable to 640 x 400 line monitors for the PC-9801 Series.

```
───────────────────────────── CAUTION ─────────────────────────────

  To use a monitor for the PC-9801 Series, a conversion connector for the VGA connector
  is necessary.
  If a monitor for the PC-9801 Series is used in the VGA setting or a VGA monitor is used
  in the PC98 setting, the normal display will be disabled.
```

⑫ COUNTRY(F)

Select the country code as "81" (Japan).

⑬ HOME(F)

Set the home directory. This must be one of A:, C:, or D:.

※ For the initial values of the items above, see Section A.1 "Initialization."

4.2 Description of Display Screens

4.2.1 Fluorescent Display Screen

The fluorescent screen on the network analyzer front panel is used for BASIC applications and file displays. This section describes about the screen in individual modes.

(1) Display screen in BASIC mode

When the network analyzer starts up, a fluorescent screen(hereinafter called the screen) like that shown in Figure 4-29 appears.
The BASIC mode allows a display in 32 characters x 8 lines. (For details, see "BASIC Mode" in Section 4.1.2.)

```
B A S I C   R e a d y.   (R e v   X. X X)
```
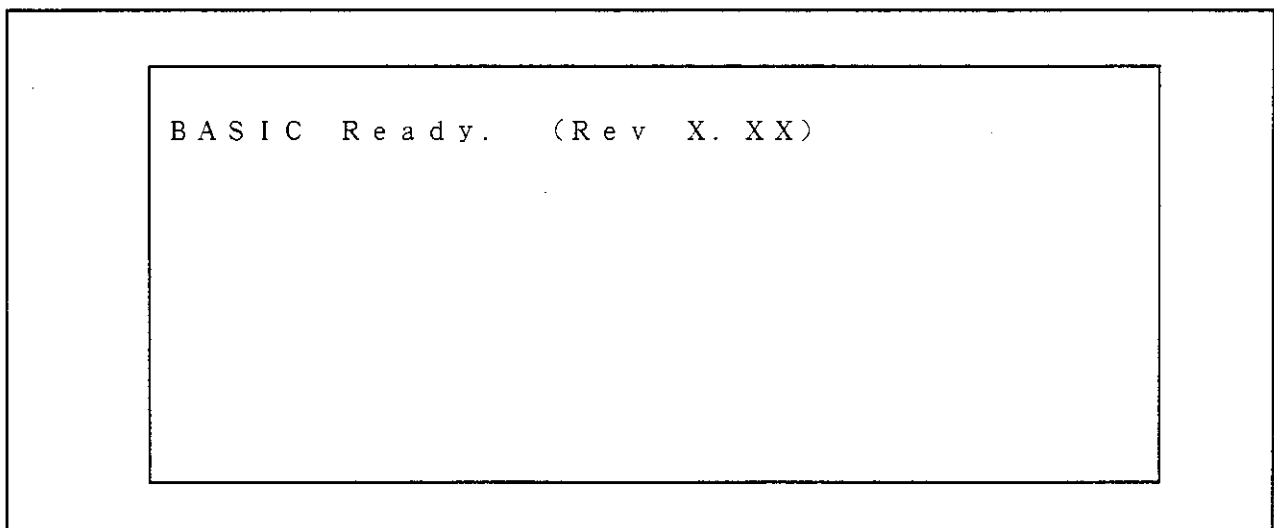
Figure 4-29 BASIC Mode Start-up Screen

(2) Display screen in LOAD mode

When the network analyzer enters the LOAD mode from the BASIC mode, a screen like that shown in Figure 4-30 appears. (For details, See Section 4.1.3 "LOAD Mode.")

```
①──── A : /                                    [FDD]─── ②

③──── F I L E 1 . B A S  R W   F I L E 2 . B A S      R W
       F I L E 3 . B A S  R W   F I L E 4 . B A S      R W
       F I L E 5 . B A S  R W   F I L E 6 . B A S      R W
④──── F I L E 7 . B A S  R W   F I L E 8 . B A S      R W
       F I L E 9 . B A S  R W   F I L E 1 0 . B A S    R W ─── ⑥
       F I L E 1 1 . S Y S  ─ ─  F I L E 1 2 . D O C    R ─

       4 1  f i l e s            3 0 7 1 b y t e s  f r e e ─── ⑤
```

①: Path name   ④: File attribute
   (current drive + directory name)   ⑤: Drive information
②: Drive type of current drive   ⑥: Scroll bar
③: File name

Figure 4-30   Display Screen in LOAD Mode

②: The drive type of the current drive is indicated as follows;
   [FDD]:   Floppy Disk Drive
   [RAM]:   RAM drive
   [ROM]:   ROM drive

④: The file attributes are indicated as follows;
   RW: Read/Write file (allowing both read and write)
   R-:   Read Only file
   --:   System file (inhibiting both read and write)
   <D>:   Directory (sub directory)

⑤: The drive information indicates the number of files and free area in the current drive.

⑥: The scroll bar indicates the ratio of the displayed files to all of the files included in the current directory.

(3) Display screen in FILE mode

When the network analyzer enters the FILE mode from the BASIC mode, a screen like that shown in Figure 4-31 appears. (For details, See Section 4.1.4 "FILE Mode.")

①: Path name
    (current drive + directory name)
②: Drive type of current drive
③: File name
④: File attribute

⑤: File size (bytes)
⑥: File creation date (year-month-day)
⑦: Function key list
⑧: Scroll bar
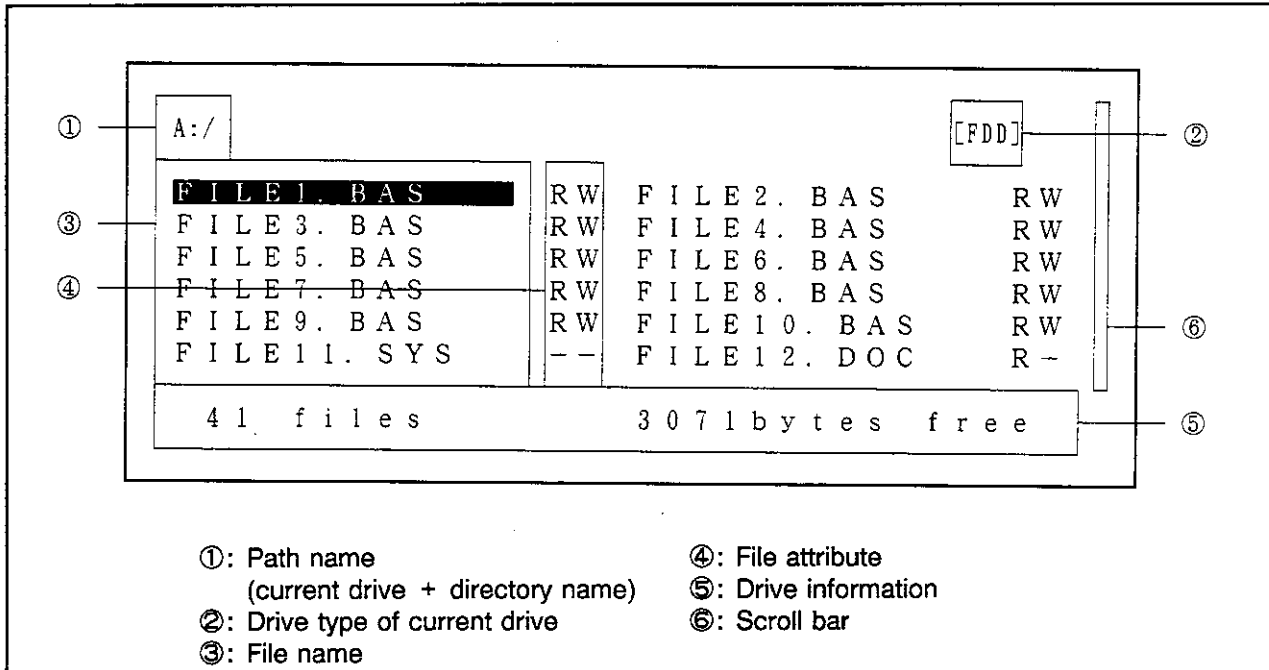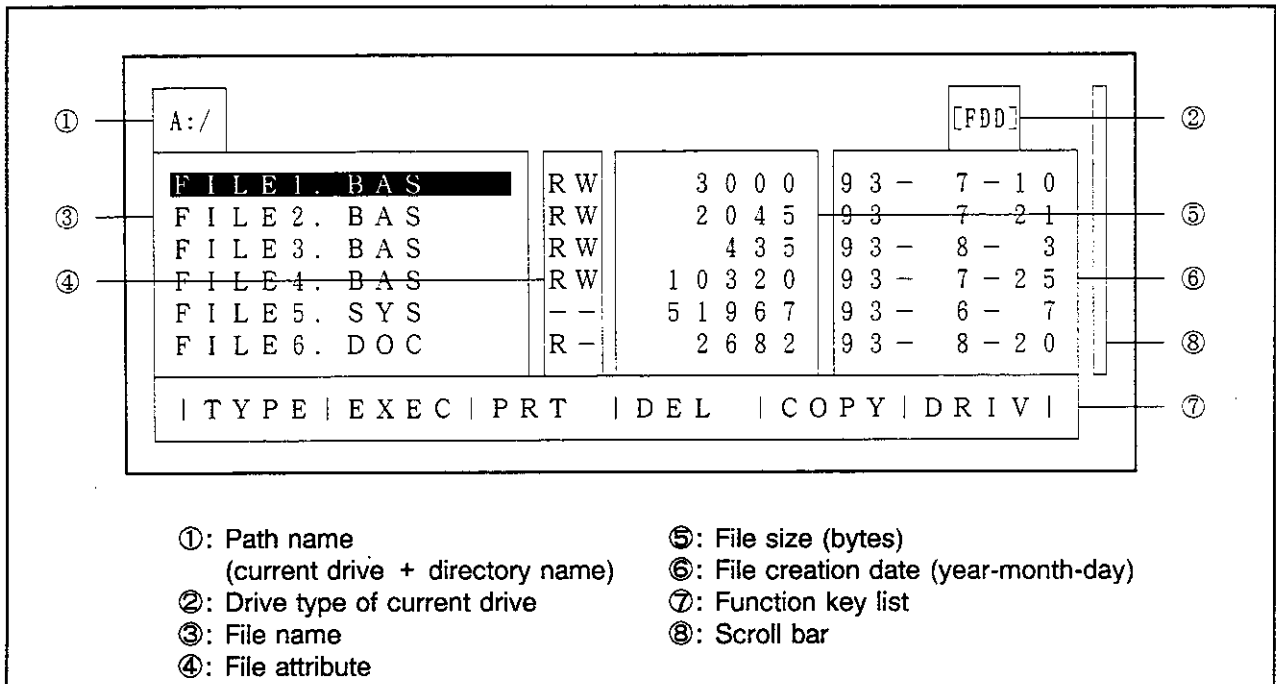
Figure 4-31   Display Screen in FILE Mode

②: The drive type of the current drive is indicated as follows;
    [FDD]:   Floppy Disk Drive
    [RAM]:   RAM drive
    [ROM]:   ROM drive

④: The file attributes are indicated as follows;
    RW: Read/Write file (allowing both read and write)
    R-:   Read Only file
    --:   System file (inhibiting both read and write)
    <D>:   Directory (sub directory)

⑦: The function key list indicates the function keys available in the FILE mode. (For details, see (1) through (7) in Section 4.1.4 "FILE Mode.")

⑧: The scroll bar indicates the ratio of the displayed files to all of the files included in the current directory.

(4) TYPE (file contents display) screen

When TYPE (K1) is selected with the function key from the FILE mode, a screen like that shown in Figure 4-32 appears if the working file is a text file. (For details, see (1) in Section 4.1.4 "FILE Mode.")

```
①  ── A:/TEST1.BAS

        1 0   !
②  ──   2 0   ! S A M P L E    P R O G R A M
        3 0   !
        4 0   P R I N T   " T E S T   P R O G R A M   N O.  1 "
        5 0   I N P U T   " C E N T E R   F R E Q U E N C Y ( M H z )  ?
        6 0   I N P U T   " S P A N   F R E Q U E N C Y ( K H z )  ? " ,

③  ──   |  < –  |  – >  |         |         |         |         |
```

①: File name   ③: Function key list
(current drive + directory name + file name)
②: Program list

Figure 4-32 TYPE Display Screen

②: The program list is displayed in 32 characters x 6 lines. When a line exceeds 32 characters, display the exceeding characters by shifting the screen horizontally with function keys K1 and K2.
A maximum of 256 characters can be contained in one line. (If more than 256 characters are contained in a line, the characters beginning at the 257th characters are ignored.)

③: The function key list indicates the function keys available by TYPE (file contents display).

(5) PRT (printer output of file contents) screen

When PRT (K3) is selected with the function key from the FILE mode, a screen like that shown in Figure 4-33 appears if the working file is a text file. (For details, see (2) in Section 4.1.4 "FILE Mode.")
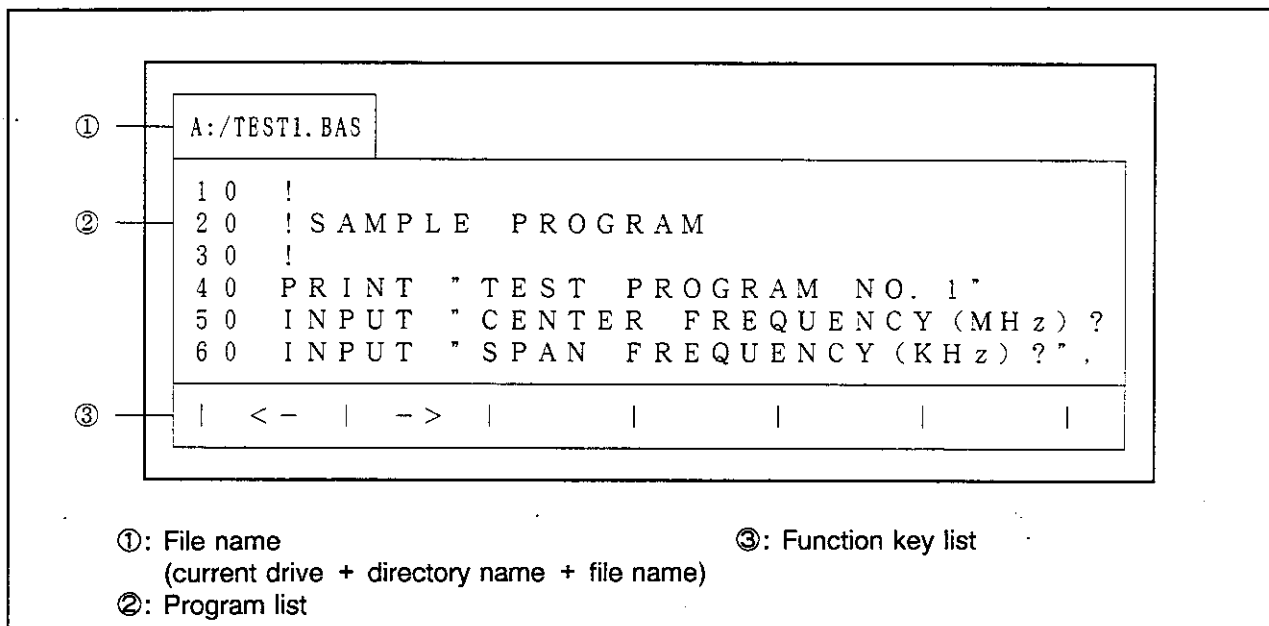


```
 ①——  A:/                                          [FDD]

 ②——  FILE1. BAS      R W      3 0 0 0    9 3 —   7 — 1 0
       FILE 2.  BAS    R W      2 0 4 5    9 3 —   7 — 2 1
       FILE 3.  BAS    R W          4 3 5  9 3 —   8 —   3
       FILE 4.  BAS    R W    1 0 3 2 0    9 3 —   7 — 2 5
       FILE 5.  SYS    — —    5 1 9 6 7    9 3 —   6 —   7
       FILE 6.  DOC    R —      2 6 8 2    9 3 —   8 — 2 0

       | 2 3 2 C | G P I B |      |  ·    |       |       |  ——— ③
```

①: Path name   ③: Function key list
    (current drive + directory name)
②: Current working file

Figure 4-33 PRT Display Screen

②: The file indicated by the cursor will be output.

③: The function key list indicates the function keys available by PRT (printer output of file contents).

(6) DEL (file deletion) screen

When DEL (K4) is selected with the function key from the FILE mode, a screen like that shown in Figure 4-34 appears if the working file is a text file. (For details, see (3) in Section 4.1.4 "FILE Mode.")
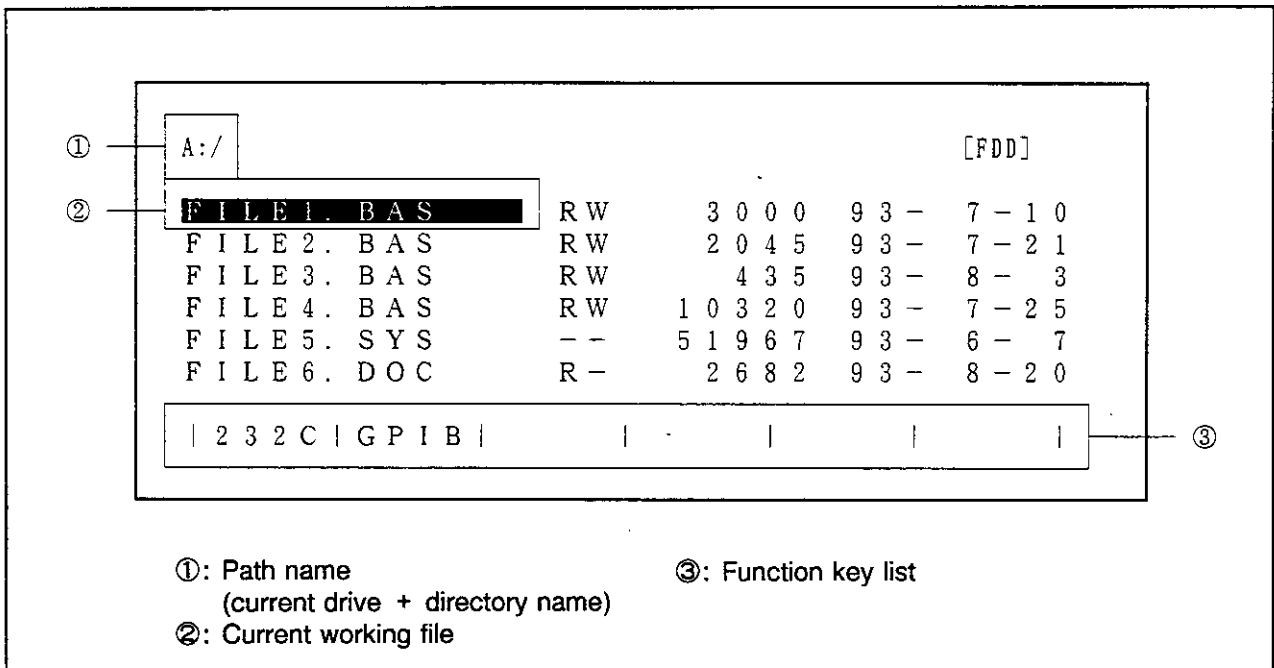
```
        D e l e t e   f i l e
①  ──── A : ╱ T E S T 1 .  B A S


        P r e s s   Y e s < E N T >   o r   N o < E X I T > ?
```

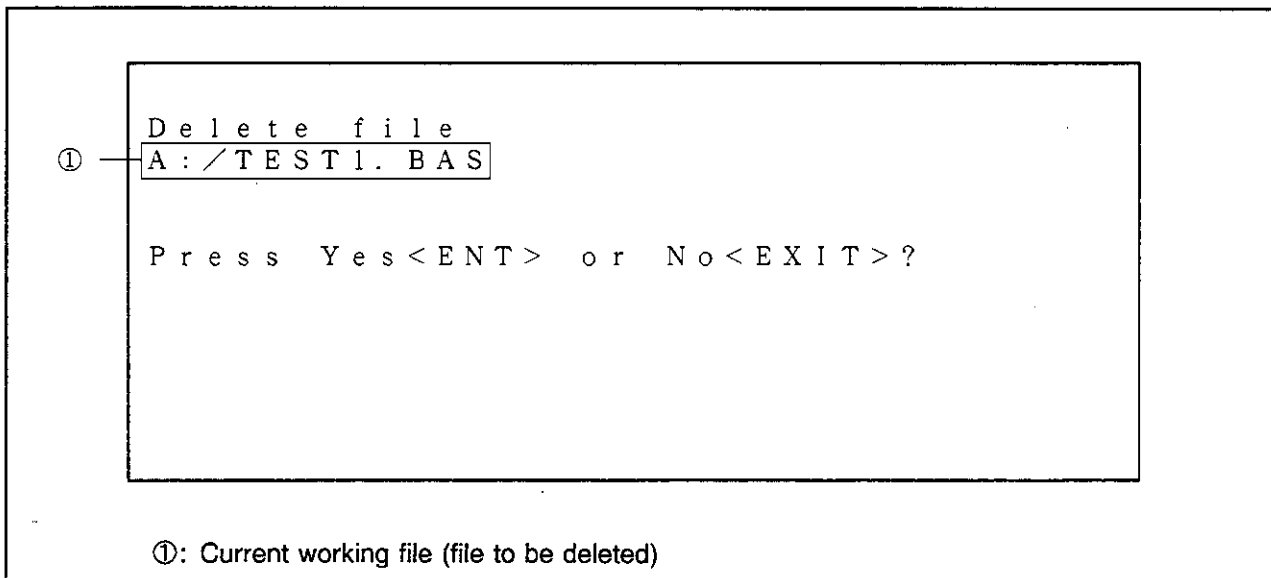①: Current working file (file to be deleted)

Figure 4-34   DEL Display Screen

①: The current working file is the file indicated by the cursor in the FILE mode.

(7) COPY (file contents copy) screen

When COPY (K5) is selected with the function key from the FILE mode, a screen like that shown in Figure 4-35 appears if the working file is a text file. (For details, see (4) in Section 4.1.4 "FILE Mode.")

①: Path name
   (current drive + directory name)
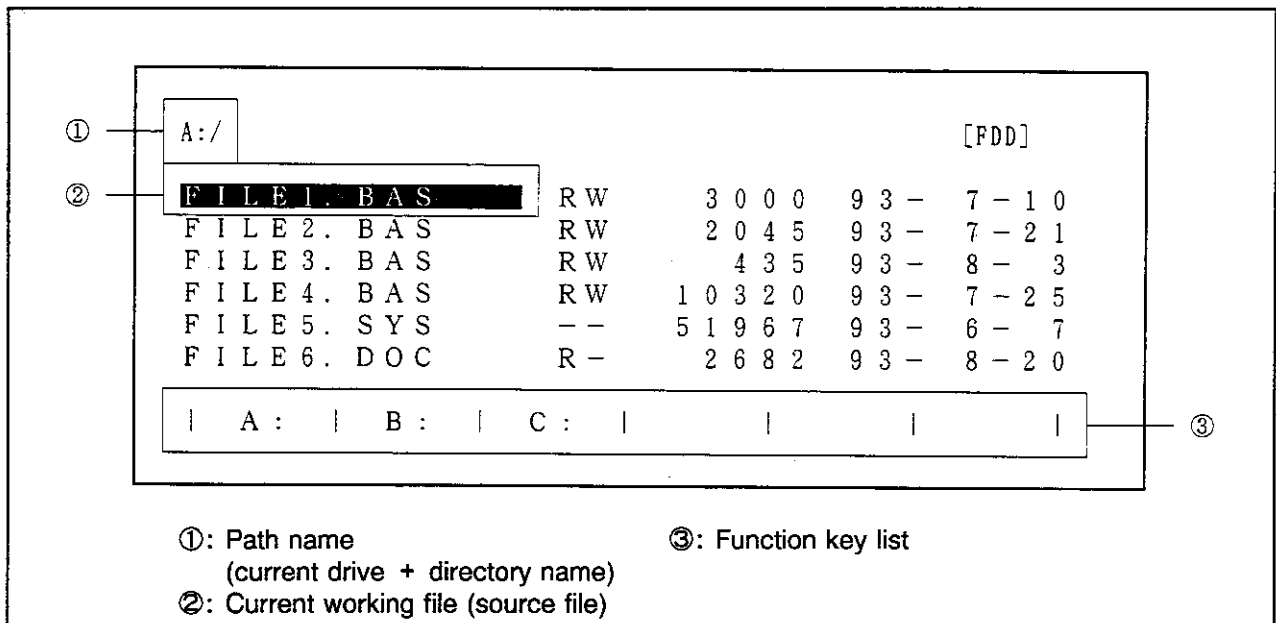②: Current working file (source file)

③: Function key list

Figure 4-35   COPY Display Screen

②: The file indicated by the cursor is used as the source file.

③: The function key list indicates the function keys available by COPY (file contents copy).

When the copy destination drive is specified by the function key, a screen like that shown in Figure 4-36 appears.

```
Copy  file
①─┤A : ∕ T E S T 1 .  B A S ┃
②─┤- >   B :  ┃

Press  Yes < E N T >  o r  No < E X I T > ?
```

①: Current working file (copy source file)
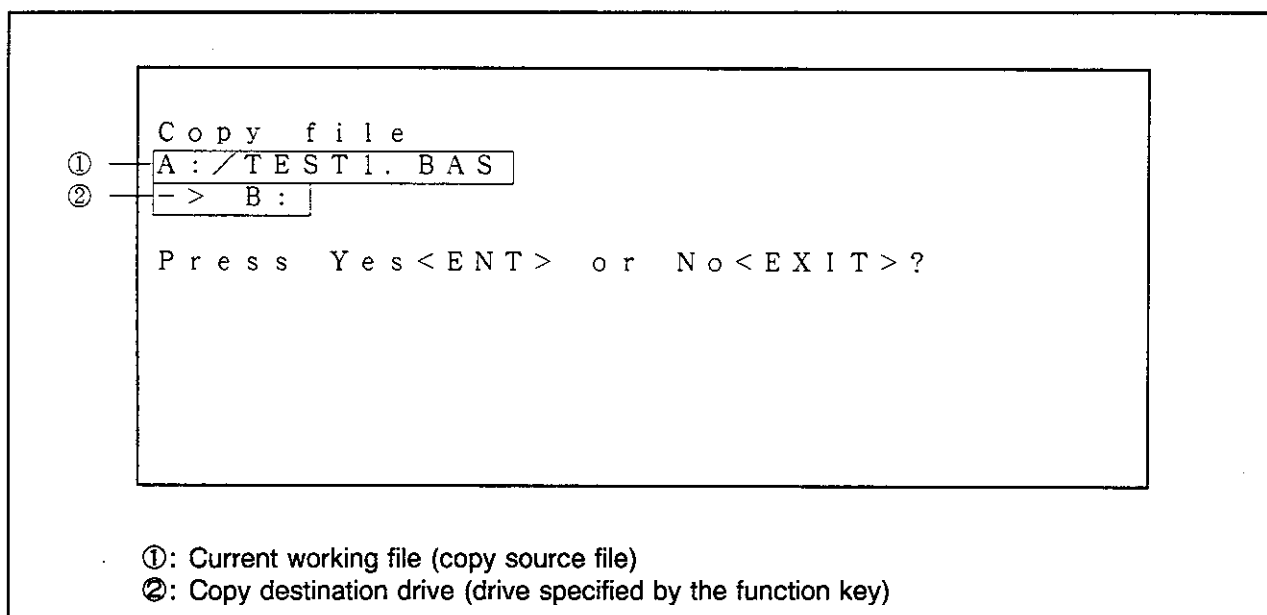②: Copy destination drive (drive specified by the function key)

Figure 4-36 Specifying Copy Destination Drive

(8) DRIV (drive operation) screen

Pressing the DRIV (K6) key in the FILE mode causes a screen like that shown in Figure 4-37 to appear. (For details, see (5) in Section 4.1.4 "FILE Mode.")

```
A : /                                               [FDD]

FILE1. BAS         R W      3 0 0 0    9 3 —   7 — 1 0
F I L E 2 .  B A S         R W      2 0 4 5    9 3 —   7 — 2 1
F I L E 3 .  B A S         R W          4 3 5    9 3 —   8 —    3
F I L E 4 .  B A S         R W    1 0 3 2 0    9 3 —   7 — 2 5
F I L E 5 .  S Y S         — —    5 1 9 6 7    9 3 —   6 —    7
F I L E 6 .  D O C         R —      2 6 8 2    9 3 —   8 — 2 0
```

①—— | A : | B : | C : | D : | I N I T | |
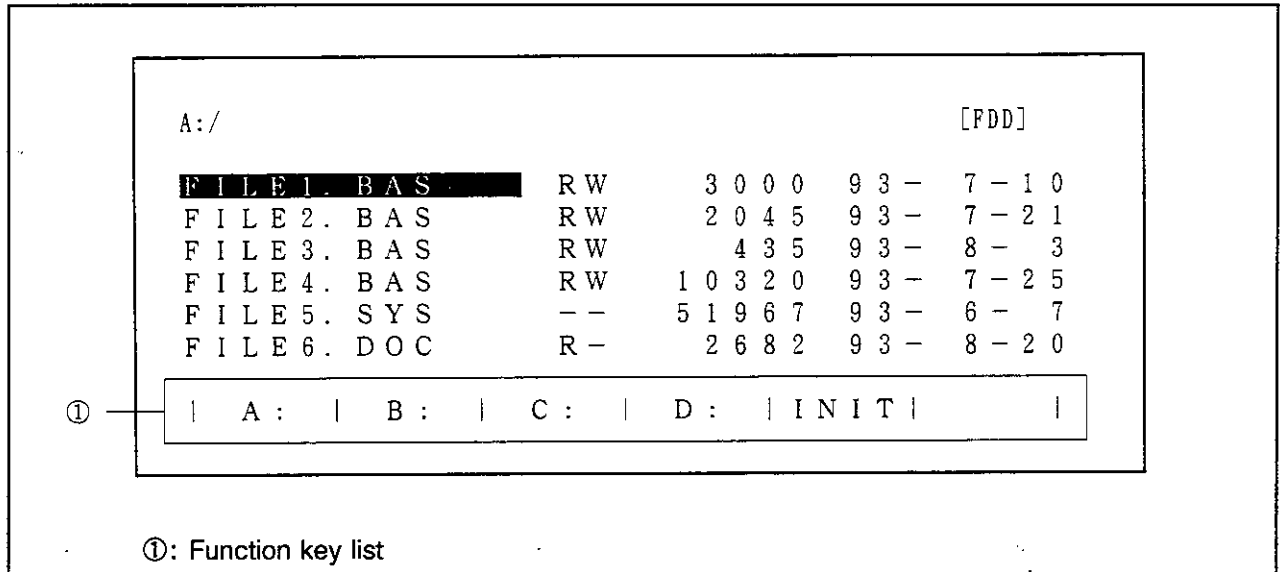
①: Function key list

Figure 4-37   DRIV Display Screen

①: The function key list indicates the function keys available by DRIV (drive operation).

(9) INIT (floppy disk initialization) screen

Pressing the INIT (K5: floppy disk initialization) key in the DRIV mode (see (8) in Section 4.2.1) causes a screen like that shown in Figure 4-38 to appear. (For details, see (7) in Section 4.1.4 "FILE Mode.")

```
      Initialize  Floppy  Disk

      Initialize  Type    ->?




        | I B M  | N E C  | I B M  | I B M  |        |        |
①  ——| 7 2 0 K | 1 . 2 M | 1 . 2 M | 1 . 4 M |        |        |
```
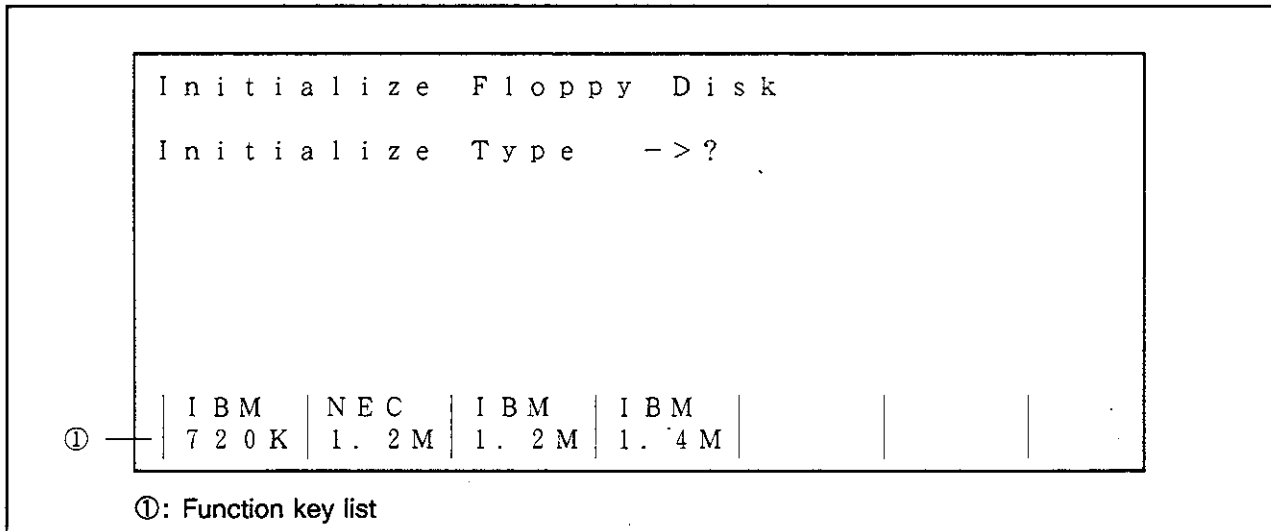
①: Function key list

Figure 4-38 INIT Display Screen

①: The function key list indicates the function keys available by INIT (floppy disk initialization).

When the initialization type is determined by the function key, a screen like that shown in Figure 4-39 appears.
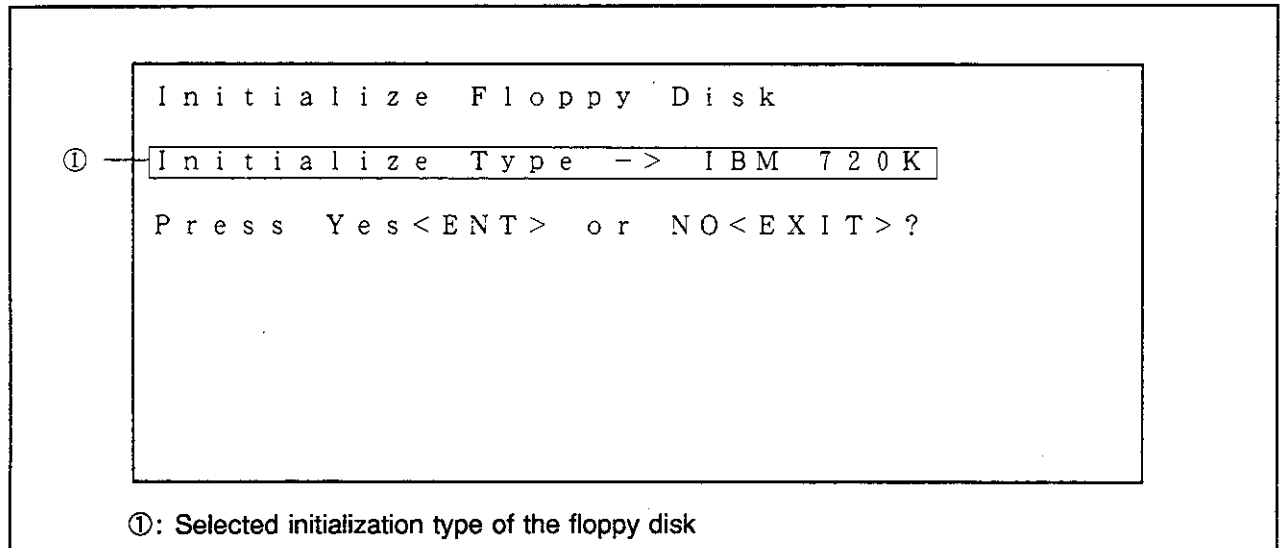
```
  Initialize  Floppy  Disk

① ─┤Initialize  Type  ->  IBM  720K│

  Press  Yes<ENT>  or  NO<EXIT>?




```

①: Selected initialization type of the floppy disk

Figure 4-39   Determining Initialization Size

4.2.2   Display Screen in CONFIG Mode

When the network analyzer enters the CONFIG mode from the BASIC screen, a screen like that shown in Figure 4-40 appears. (For details, See Section 4.1.5 "CONFIG Mode.")
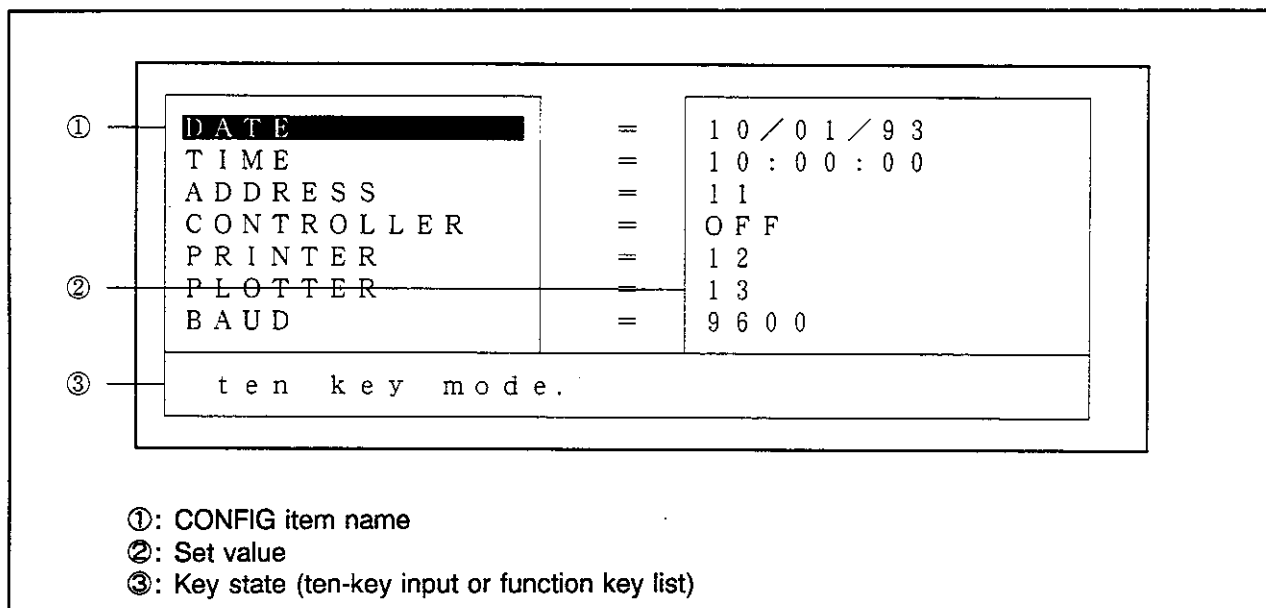
①──── DATE   = 1 0 ／ 0 1 ／ 9 3
        T I M E   = 1 0 ：0 0 ：0 0
        A D D R E S S   = 1 1
        C O N T R O L L E R = O F F
        P R I N T E R   = 1 2
②──── P L O T T E R   = 1 3
        B A U D   = 9 6 0 0

③────   t e n   k e y   m o d e .

①: CONFIG item name
②: Set value
③: Key state (ten-key input or function key list)

Figure 4-40   CONFIG Mode Screen

S a v e   f i l e .
C ：／ J C O N F I G . B A T
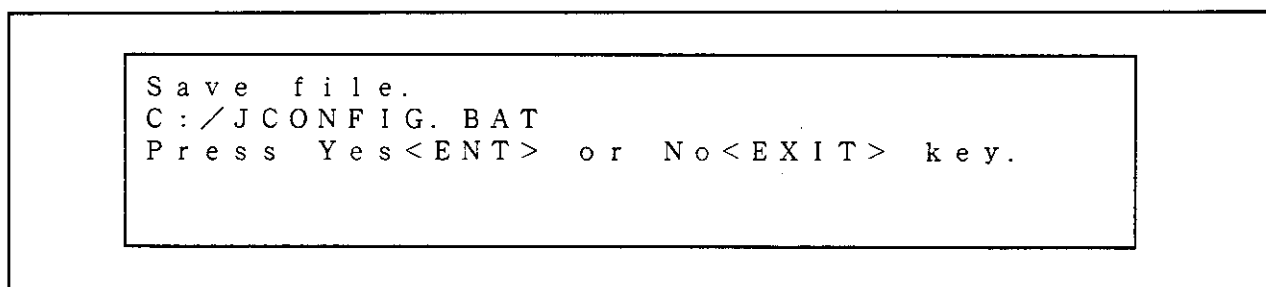P r e s s   Y e s < E N T >   o r   N o < E X I T >   k e y .

Figure 4-41   Save Check Screen in CONFIG Mode

5. PERFORMANCE TESTS

5.1 Preparing for Performance Tests

After turning the power on, wait 30 minutes or more for preheating then perform the performance tests. This section describes the measurement units, cables, and precautions necessary for the performance tests.

5.1.1 Devices Necessary for Performance Tests

(1) Measurement units

Table 5-1   Measurement Units Necessary for Performance Tests

Test item	Measurement units, etc.		Related section
1. Frequency accuracy and range	● Counter Frequency: 5Hz to 500MHz Display: 7 or more digits Accuracy: 0.1ppm or less ● BNC-BNC cable	R5372 (up to 18GHz) or R5373 (up to 26GHz) manufactured by ADVANTEST	Section 5.2
2. Input/Output levels and flatness	● Power meter Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm ● Power sensor Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm	HP436A ⎛HP437B⎞ 　　　　 ⎝HP438A⎠ (This must be calibrated in the national standards.) HP8482A	Section 5.3
3. Output level linearity	● Power meter Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm ● Power sensor Frequency: 100kHz to 500MHz Power range: -63dBm to +21dBm	HP436A ⎛HP437B⎞ 　　　　 ⎝HP438A⎠ (This must be calibrated in the national standards.) HP8482A	Section 5.4

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5.1.2 General Precautions

(1) AC power voltage and frequency

The allowable ranges of AC power voltage and frequency are 90V to 250V and 48Hz to 66Hz, respectively.

(2) Power cable connection

Before connecting the power cable, check that the POWER switch is off.

(3) Ambient conditions

Temperature: $+5°C$ to $+40°C$ (when using FDD)
                 $0°C$ to $+50°C$ (when not using FDD)

Relative humidity: 85% or less

Install the network analyzer in a place free of dusts, vibrations, and noise.

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5.2 Frequency Accuracy and Range

Steps:

① Set up the network analyzer as shown in Figure 5-1.
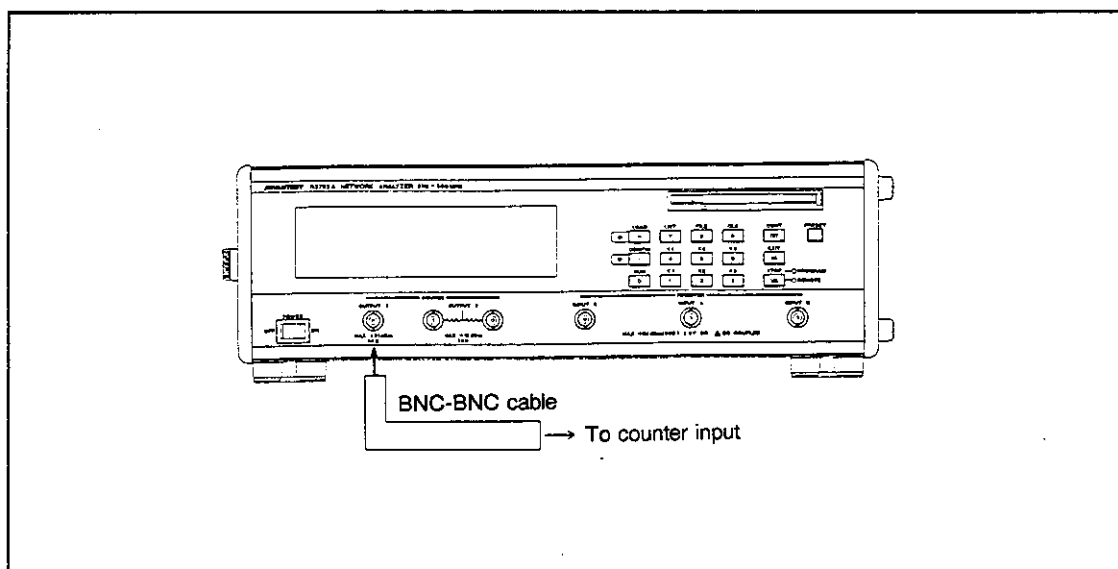
Figure 5-1 Frequency Accuracy and Range

② Set the network analyzer as follows:

Span: 0Hz
Sweep mode: SINGLE

③ Arbitrarily change the center frequency in the range of 5Hz to 500MHz.

④ Check: Counter read frequency < center frequency ± center frequency × 20 × 10^{-6}

Example: When the center frequency is 10MHz
                   10MHz ± 200Hz
                   This means that the allowable frequency range is 9,999,800Hz to 10,000,200Hz.

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5.3   Output Level Accuracy and Flatness

Steps:

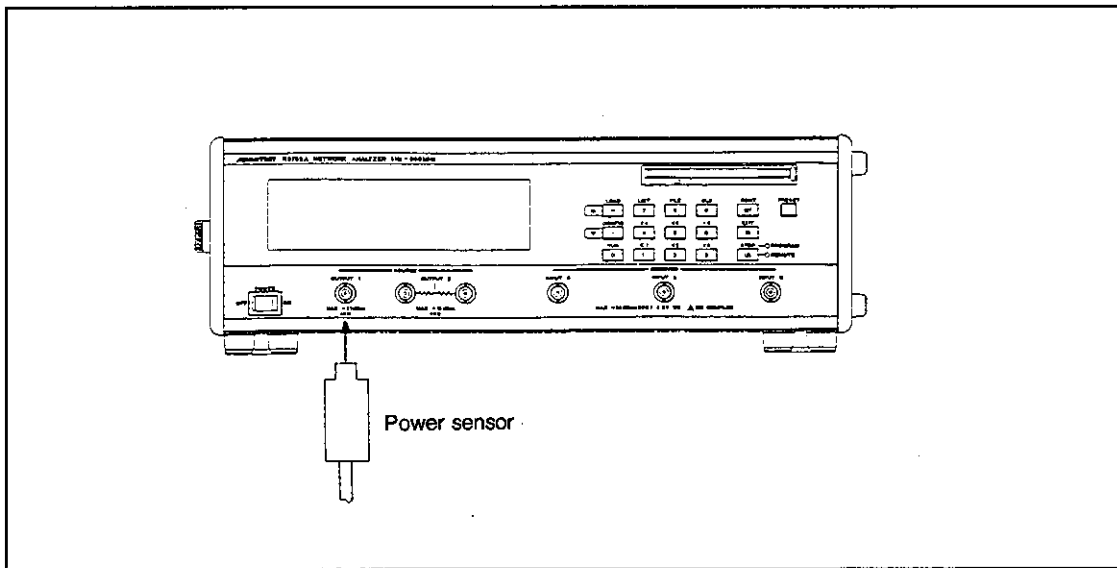   ① Set up the network analyzer as shown in Figure 5-2.

Figure 5-2   Output Level Accuracy and Flatness

(1)   Output level accuracy

    ① Zero-calibrate the power meter.

    ② Set the network analyzer as follows:
       Center frequency: 50MHz
       Span: 0Hz
       Output level: 0dBm

    ③ Connect the power sensor to the output terminal and measure the output level.
       Note: Use the calibration factor applicable to 50MHz.

    ④ Check: Output level accuracy (0dBm, 50MHz) ±0.5dB

(2)   Flatness

    ① Zero-calibrate the power meter.

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② Set the network analyzer as follows, and then press the REL key of the power meter to set
0dB (ratio measurement mode).
Center frequency: 50MHz
Span: 0Hz
Output level: 0dBm

③ Read data from the power meter for various center frequencies with the span and output
level fixed.
Note: Use the calibration factor applicable to the center frequencies.

④ Check: Flatness (at 0dBm); 5Hz to 1MHz   ±2.0dB
                              1MHz to 300MHz   ±1.5dB
                              300MHz to 500MHz   ±2.0dB

5.4 Output Level Linearity

Steps:

   ① Zero-calibrate the power meter.

   ② Set the network analyzer as follows:
     Center frequency: 50MHz
     Span: 0Hz
     Output level: 0dBm

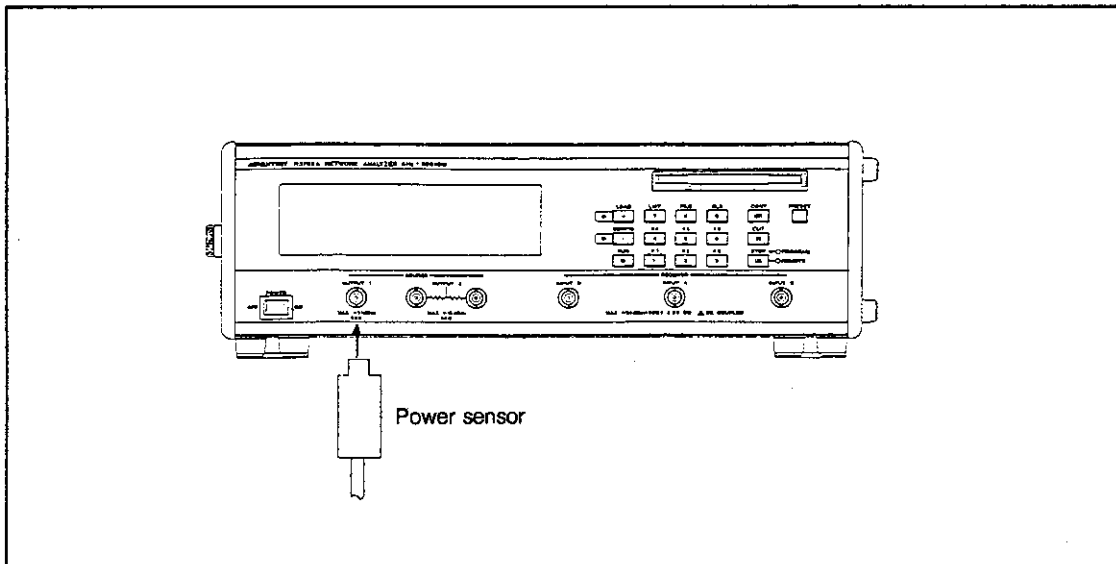   ③ Connect the power sensor to the output terminal. (See Figure 5-3.)

Power sensor

Figure 5-3 Measuring Output Level Linearity

   ④ Press the REL key of the power meter to set 0dB (ratio measurement mode).

   ⑤ Read the linearity data at various output levels.
     Note: Use the calibration factor applicable to 50MHz.

   ⑥ Check: (at reference of 0dBm)
     +21dBm to -35dBm   ±0.5dB
     -35dBm to -63dBm   ±1.5dB

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6. SPECIFICATIONS

The temperature range which satisfy the required performance is 25°C±5°C unless specified otherwise.

(1) Measurement functions

Amplitude ratio	A/R, B/R, A/B (dB, linear ratio) R3752A
	A/R R3752B
Phase	θ (deg)
Group delay time	τ
Absolute amplitude	R, A, B, (V, dBm) R3752A
	R, A R3752B
	A R3752E

(2) Signal source

Frequency	
Range	5Hz to 500MHz
Resolution	0.1Hz
Stability	±5×10^{-6}/day
Accuracy	±20ppm
Output level	
Range	+21.0dBm to -63.0dBm (output port 1)
Resolution	0.1dB
Accuracy	±0.5dB (at 0dBm, 50MHz)
Linearity	+21dBm to -35dBm ±0.5dB
	-35dBm to -63dBm ±1.5dB
Flatness	5Hz to 1MHz ±2.0dB
	1MHz to 300MHz ±1.5dB
Output	300MHz to 500MHz ±2.0dB
Impedance	50Ω
	Return loss: 13dB or more (Typ, at 0dBm output)
Signal purity	
Harmonic distortion	≦-20dBc or less
Non-harmonic spurious	<the highest of -30dBc and -70dBm
Phase noise	<-75dBc/Hz (10kHz offset)

Sweep functions	
Sweep parameters	Frequency and signal level
Maximum sweep range	Frequency: 5Hz to 500MHz
	Signal level: -43dBm to +21dBm
Range setting	Start/stop or center/span
Sweep type	Linear or program sweep
Sweep trigger	Repeat, single, or EXT
Sweep mode	Dual sweep for two channels or alternate sweep
Sweep time	0.1ms/point (RBW 10kHz)
Measurement points	3, 6, 11, 21, 51, 101, 201, 301, 401, 601, 801, or 1201 points
Output format	
Output	Single, dual R3752A/B
	Single R3752E
	(The built-in splitter is used for dual output.)
Connector	50Ω, BNC
Built-in power splitter	
Insertion loss (Typ)	6dB
Output tracking (Typ)	
5Hz to 100MHz	<0.1dB, <1° R3752A/B only
100MHz to 500MHz	<0.2dB, <1°
Equivalent output SWR	<100MHz 1.2
(Typ)	≧100MHz 1.4

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(3) Analyzer section

Input characteristics	
Input terminals	3 channels (Rch, Ach, Bch): R3752A 2 channels (Rch, Ach): R3752B 1 channel (Ach): R3752E

Input impedance
Return loss
	50Ω, 1MΩ/20pF or less
	5Hz to 300MHz: 20dB or more (ATT 0dB)
	                23dB or more (ATT 20dB)
	300MHz to 500MHz: 15dB or more (ATT 0dB)
	                20dB or more (ATT 20dB)

Connector Maximum input level	50Ω, BNC

	Attenuator	
	At 0dBm	At 20dBm
50Ω	-20dBm	0dBm
1MΩ	22.4mV	224mV

Input breakdown level	50Ω: +23dBm or ±0VDC 1MΩ: ±3V ATT, AUTO, RBW 1kHz
Input crosstalk	30Hz to 500kHz: 110dB or more (R3752A/B only) 500kHz to 300MHz: 115dB or more 300MHz to 500MHz: 110dB or more
Input/output crosstalk	Output level +15dBm, ATT 0dB 5Hz to 500kHz: 105dB or more 500kHz to 300MHz: 110dB or more 300MHz to 500MHz: 105dB or more
Resolution bandwidth	10kHz to 3Hz (variable in one or three steps)

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Noise floor	Noise level; (ATT, AUTO, 25±5°C)					
	RBW FREQ	10kHz	3kHz	1kHz	300Hz	100Hz
	5Hz to 500kHz	min f 200kHz -90dBm	min f 60kHz -95dBm	min f 20kHz -100dBm	min f 6kHz -100dBm	min f 2kHz -100dBm
	500kHz to 300MHz	-105dBm	-110dBm	-115dBm	-115dBm	-115dBm
	300MHz to 500MHz	-105dBm	-110dBm	-110dBm	-110dBm	-110dBm
Automatic offset compensation						
Normalizing function Electric length compensation Range	Eliminating frequency characteristics of measurement system Equivalent electric length or delay time added to the measured phase and group delay time -3×10⁹m to +3×10⁹m, or +10s to -10s					

Range -3×10^9m to $+3 \times 10^9$m, or $+10$s to -10s

Amplitude characteristics	
Measurement range (RBW 1kHz)	ATT AUTO, 0dBm to -120dBm
Absolute amplitude	ATT 0dB, -20dBm to -120dBm
	ATT 20dB, 0dBm to -100dBm
Amplitude ratio	0±120dB
Amplitude resolution ratio	0.001dB
Frequency response	(When the input impedance is 50Ω)
Absolute value	50Ω input: 2dBp-p (5Hz to 300MHz)
measurement	3dBp-p (300MHz to 500MHz)
(R, A, B)	1MΩ input: 1.5dBp-p (5Hz to 100MHz)
Ratio measurement	50Ω input: 1.0dBp-p (5Hz to 100MHz)
(A/R, B/R, A/B)	2.0dBp-p (100MHz to 300MHz)
(for the same attenuation)	3.0dBp-p (300MHz to 500MHz)
	1MΩ input: 1.5dBp-p (5Hz to 100MHz)
Dynamic accuracy	0 to -10dB ±0.10dB
	-10 to -50dB ±0.05dB
	-50 to -60dB ±0.05dB
	-60 to -70dB ±0.10dB
	-70 to -80dB ±0.30dB
	-80 to -90dB ±0.90dB

Phase characteristics	
Ratio measurement	Valid for A/R, B/R, and A/B
Measurement range	±180°
	(Continuous display enabled for outside of ±180° by display continuation function)
Phase resolution	0.01°
Frequency response	50Ω input: 5°p-p (5Hz to 100MHz)
(for the same attenuation)	15°p-p (100MHz to 300MHz)
	20°p-p (300MHz to 500MHz)
	1MΩ input: 10°p-p (10Hz to 100MHz)
Dynamic accuracy	0 to -10dB ±1.0°
	-10 to -50dB ±0.3°
	-50 to -60dB ±0.5°
	-60 to -70dB ±1.0°
	-70 to -80dB ±3.0°
	-80 to -90dB ±8.0°
Group delay characteristics (Valid for linear frequency sweep, ratio management, 50Ω input)	
Range	Calculating expression $$\tau = \frac{\Delta\phi}{360 \times \Delta f}$$ $\Delta\phi$: Phase Δf: Aperture frequency (Hz)
Measurement range	1ps to 250s
Group delay time resolution	1ps
Aperture frequency	Equivalent to Δf: 0.01% to 50%
Accuracy	$$\frac{\text{Phase accuracy}}{360 \times \text{aperture frequency (Hz)}}$$

(4) Display section specifications

Display section	
Fluorescent display	Graphic display, green
Resolution	256×64dots
Display mode	Character display only

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(5) Others

System functions	

Error compensation function
    Normalization
 	
    1-port calibration
 	
    Data averaging
	
	Compensating the frequency response (both the amplitude and phase) for transmission measurement.
	Compensating errors due to bridge directions, frequency responses, and source match for reflection measurement. Short, open, and load are necessary to compensate errors.
	Averaging the data (victor values) for every sweep. The allowable averaging factor range is 2 to 999.

Connection with external devices
    External monitor output
    GPIB
 	
    24-bit input/output
    RS-232
	
	Conforming to VGA
	Supporting IEEE488.2 common commands.
	SCPI applicable
	TTL level
	Serial output conforming to RS-232

Programming function BASIC controller function	Supplied in standard model including built-in functions

(6)   General specifications

External trigger	PIO 18 pins, TTL level, enable by low		
External reference frequency input	Frequency: 1, 2, 5, 10MHz Connector: BNC Input level range: 0dBm to 20dBm		
Operating conditions	When using FDD:	Temperature;	+5°C to 40°C
		Relative humidity;	85% or less
	When not using FDD:	Temperature;	0°C to 50°C
		Relative humidity;	85% or less
Temperature conditions for storage	-20°C to 60°C		
Power supply	90V to 250V 48Hz to 66Hz 350VA or less		
Outside dimensions	Approx. 424 (W) × 132 (H) × 400 (D) mm		
Weight	Approx. 15kg or less		

MEMO

APPENDIX

A.1 Initialization

(1) Initialization

Function	Initialization type	
	Power-on or preset	*RST
Stimulus		
Sweep type	Linear frequency sweep	Linear frequency sweep
Continuous sweep	ON	OFF
Trigger source	Internal (free-running)	Internal (free-running)
Trigger delay	OFF (0sec)	OFF (0sec)
Sweep time	30msec (Manual)	120msec (Auto)
Number of measurement points	201	1201
Starting frequency	5Hz	5Hz
Stopping frequency	500MHz	500MHz
Center frequency	250.0000025MHz	250.0000025MHz
Frequency span	499.999995MHz	499.999995MHz
Frequency display	Start/stop	Start/stop
Fixed frequency for level sweep	100MHz	100MHz
Output level	0dBm	0dBm
Start level	-43dBm	-43dBm
Stop level	0dBm	21dBm
Trip	Clear	Clear
2-channel coupling	ON	ON
Program sweep segment	All clear	All clear
Output port	Port 2 *1	Port 2 *1

*1: Port 1 for R3752E

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Function	Initialization type	
	Power-on or preset	*RST
Response		
Dual channels	OFF	OFF
Active channel	1	1
Resolution bandwidth	10kHz	10kHz
Input port selecting conditions	A/R *2	A/R *2
Average	OFF (count: 16)	OFF (count: 16)
Trace calculation	NONE	NONE
Conversion	NONE	NONE
Characteristic impedance Z0	50Ω	50Ω
Measurement format	LOGMAG&PHASE	LOGMAG&PHASE
Group delay aperture	10%	0.01%
Smoothing	OFF (aperture 10%)	OFF (aperture 0.01%)
Display	Data	Data
Split or overlap	Overlap	Overlap
Label	None	None
Calibration		
Compensative measurement	OFF	OFF
Calibration data	Clear	Clear
Electric length compensation	OFF (0sec)	OFF (0sec)
Phase offset	OFF (0°)	OFF (0°)
Measurement end extensive compensation	OFF	OFF
R input	0sec	0sec
A input	0sec	0sec
B input	0sec	0sec
Port 1	0sec	0sec
Port 2	0sec	0sec
Propagation constant	1	1

*2: "A" for R3752E

Function	Initialization type	
	Power-on or preset	*RST
Y-axis scale unit		
Logarithmic amplitude	10dB	10dB
Phase	90°	90°
Group delay	0.1μsec	0.1μsec
Smith chart	-	-
Polar coordinates	-	-
Linear amplitude	0.1	0.1
SWR	1	1
Real part	1	1
Imaginary part	1	1
Continuous phase	360°	360°
Reference position		
Logarithmic amplitude	100%	100%
Phase	50%	50%
Group delay	50%	50%
Smith chart	-	-
Polar coordinates	-	-
Linear amplitude	0%	0%
SWR	0%	0%
Real part	100%	100%
Imaginary part	100%	100%
Continuous phase	50%	50%
Reference values		
Logarithmic amplitude	0dB	0dB
Phase	0°	0°
Group delay	0sec	0sec
Smith chart	1	1
Polar coordinates	1	1
Linear amplitude	0	0
SWR	1	1
Real part	10	10
Imaginary part	10	10
Continuous phase	0°	0°

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Function	Initialization type	
	Power-on or preset	*RST
Input attenuator		
R input	AUTO	AUTO
A input	AUTO	AUTO
B input	AUTO	AUTO
Input impedance		
R input	50Ω	50Ω
A input	50Ω	50Ω
B input	50Ω	50Ω

(2) Backup memory setting (set at factory)

Network analyzer GPIB address	11
System controller or addressable	Addressable
Printer GPIB address	12
Plotter GPIB address	5
Serial port setting	Baud rate: 9600
	Character length: 8 bits
	Parity: None
	Stop bit length: 1 bit
Save register	All clear

ALPHABETICAL INDEX

R3752A EXTERNAL VIEW

Unit: mm

(33)

400

(11)

SIDE VIEW

(10)

132

(13)

424

(10)

FRONT VIEW

REAR VIEW

R3752A FRONT VIEW

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Unit: mm

SIDE VIEW

(33)

400

(11)

FRONT VIEW

(10)

132

(13)

424

(10)

REAR VIEW

R3752B FRONT VIEW

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R3752E EXTERNAL VIEW

Unit: mm

(33)

400

(11)

SIDE VIEW

(10)

132

(13)

424

(10)

FRONT VIEW

REAR VIEW

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R3752E FRONT VIEW

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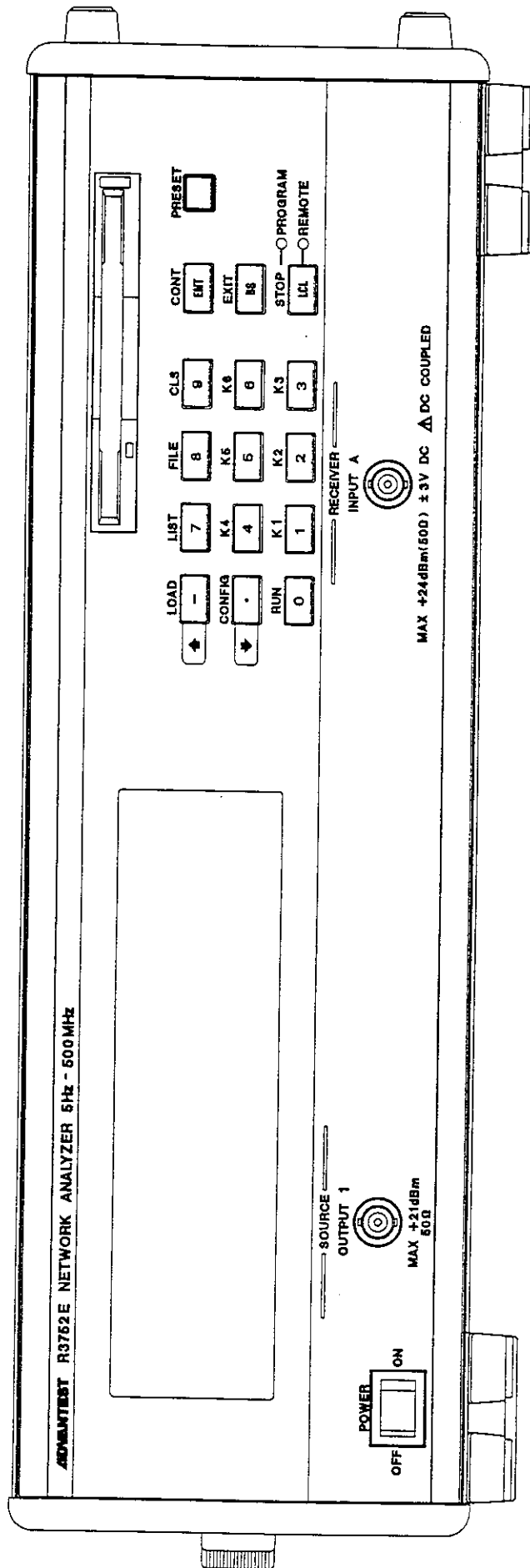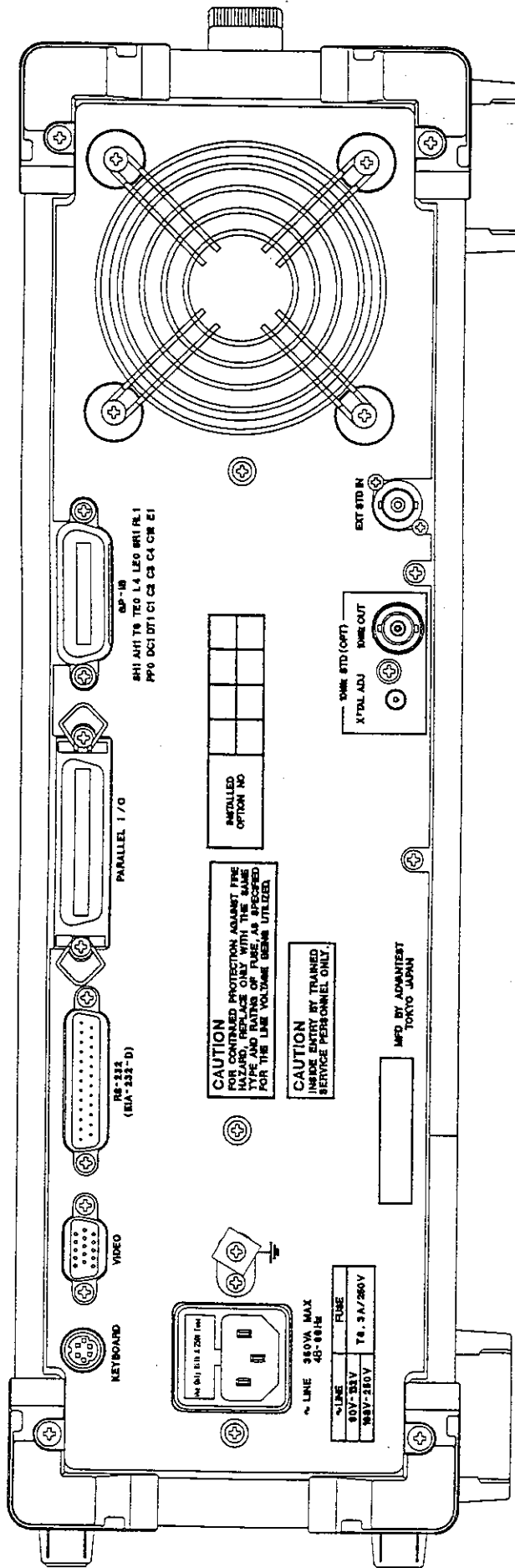
R3752A/B/E REAR VIEW

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(1) You may not use the SOFTWARE for any purpose other than for the use of the PRODUCTS.

(2) You may not copy, modify, or change, all or any part of, the SOFTWARE without permission from Advantest.

(3) You may not reverse engineer, de-compile, or disassemble, all or any part of, the SOFTWARE.

Liability

Advantest shall have no liability (1) for any PRODUCT failures, which may arise out of any misuse (misuse is deemed to be use of the SOFTWARE for purposes other than it's intended use) of the SOFTWARE. (2) For any dispute between you and any third party for any reason whatsoever including, but not limited to, infringement of intellectual property rights.

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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