

4 Power-On Test, Error Messages, Software Configuration

4.1 Normal SNA Boot-Up Behavior (Series A to E)

The power-on (boot-up) behavior of the SNA-20/-23 is described below. The following conditions must be fulfilled for the instrument to behave as described:

- Instrument must be from series A through E (fitted with CPU "STANDARD SYSTEM MODULE 386_WGR" (3011.9305.006)).
- Instrument is OK (no faults detected during switch-on (BIOS) test).
- There is no (bootable) disk in the SNA-20/-23 floppy drive.
- No key is pressed on the built-in or external keyboard during the boot-up procedure.

The following messages are displayed on the screen after switching on if these conditions are met. Short descriptions of the actions currently being performed by the SNA are shown to the right of the screen messages.

Note: The messages displayed may differ slightly from those depicted here, as they depend on the display board and AT-CPU BIOS versions used.

```

Wandel & Goltermann
Spectrum und Network Analyzer SNA XY
*****
*****
  
```

After power-on, the AT-CPU loads the VGA BIOS (BSK-3) and the extended BIOS for the memory board (17). If the memory board extended BIOS loads successfully, the AT-CPU can access drives C: (Flash ROM disk) and B: (battery-buffered SRAM segment on the memory board). This automatically starts the BIOS test (POWER-ON TEST).

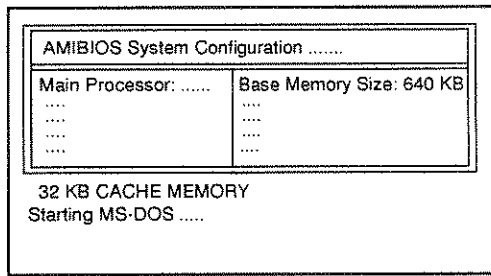
The crossover switch on the display control board (BSK-3) is set to VGA ---> EL. This means that all output to the built-in EL display is generated by the VGA module on the display control board (BSK-3). Output to any externally connected monitor is via the graphics processor (TI processor) of the BSK-3.

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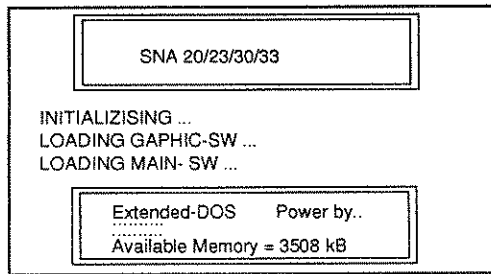
AMIBIOS (C) 1992 American Megatrends Inc.
Standard System Module BIOS, BN 9306-9397.01
Wandel & Goltermann Technologies, Inc
003712 KB ok
Wait .....

*****
  
```

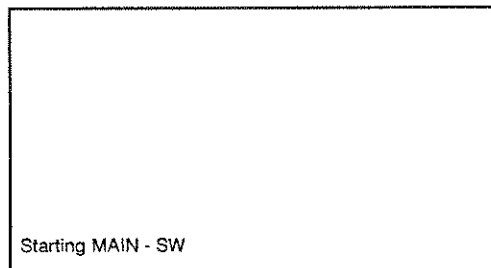
The BIOS test takes about 10 s to complete. If no faults are detected, a single long beep is output. If errors have been detected, appropriate error messages are displayed if this is possible. Otherwise, audible warning is given (see chapter 4.2).



The AT-CPU configuration detected during the BIOS tests and as set in the CMOS setup is displayed. The operating system (DOS) is then loaded from the memory board (flash ROM).

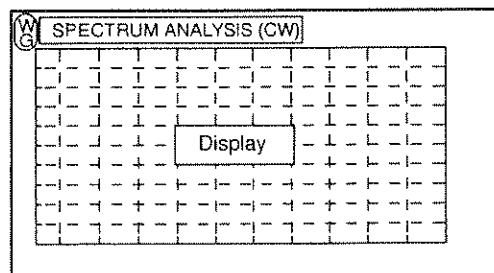


The AUTOEXEC.BAT file on drive C: is processed. The graphics software and instrument software are then loaded from the memory board (flash ROM). A memory manager (extended DOS) is loaded to allow the the operating system and instrument software to use the memory area above 640 kB.



The instrument (measurement) software is started. If the instrument software starts correctly, a beep is output.

After starting the "main" software, the crossover switch on the display control board (BSK-3) is switched to the VGA --> CRT setting. This means that the subsequent output to the EL display is generated by the graphics processor (TI processor of the BSK-3). The output to any externally connected monitor is via the VGA module of the BSK-3 from now on.



The measurement display is shown. The instrument is ready for use.

Fig. 4-1 Screen displays during normal boot-up (power-on) of the instrument

4.2 BIOS-Test (Power-On Test) Error Messages [Series A to E]

A power-on test (AT-CPU BIOS test) is performed when the instrument is switched on (compare chapter 4.1, "Normal SNA Boot-Up Behavior (Series A to E)"). The tests performed and the error messages which may be displayed depend on the AT-CPU (BIOS version and manufacturer) used in the SNA. The following refers to the AT-CPU "STANDARD SYSTEM MODULE 386_WGR" (3011.9305.006) used in instruments from series A through E.

The BIOS test checks practically all of the functions of the AT-CPU. The basic functions of the following modules are also tested:

- Display control board
- Keyboard controller
- Floppy disk drive

The value of the BIOS TEST is somewhat limited due to the bus system used (CONTROL BUS). In addition to the above-mentioned boards, the memory and interface boards are also connected to this bus. If one of the boards causes a bus conflict, the result of the BIOS test does not allow identification of a defective module.

If an error occurs during these tests, audible and visual warnings are output. These are useful for tracing faults in the control unit. Attention should be paid to the audible warnings (duration and sequence of beeps) which may occur during the boot-up procedure (immediately after switching on).

The self test (BIOS TEST) has been completed successfully when a long BEEP is heard (see "Normal SNA Boot-Up Behavior (Series A to E)" on page 4-1)

After this, the instrument software is loaded automatically.

The following indicates how faults in the control unit can be traced; examples of possible error conditions and their causes are used for this.

Note: It is assumed that the supply voltages for the instrument are correct for the following troubleshooting procedure. It is therefore a good idea to check the supply voltages to the control unit circuit boards first (see block diagram in Service Manual Annex).

Electroluminescent display remains blank after switch-on - audible warnings

Beep sequence: 1 x long beep approx. 10 seconds after switching on

The beep indicates that the BIOS has been completed successfully. The fault is therefore either in the display control board (BSK-3) or in the EL display. The function of the display control board can be checked by connecting an external monitor. If the monitor screen also remains blank, the display control board is faulty. Otherwise, the EL display DS1 must be checked for faults or the complete unit (16) exchanged.

Important: The external monitor only shows a display if the crossover switch on the display control board (BSK-3) switches from the VGA module to the TI graphics processor (GSP) for the EL display. This occurs when the measurement display is or would normally be shown on the built-in EL display (see "Normal SNA Boot-Up Behavior (Series A to E)" on page 4-1).

Beep sequence: 1 x long and 3 x short; 1 x long and 8 x short

A fault was detected on the display control board during the test (e.g. the VGA BIOS for the BSK-3 could not be loaded). Clear the fault by replacing the display control board (BSK-3).

Beep sequence: 3 x long

A fault occurred during the test of the first 64 kB of the RAM on the AT CPU. Clear the fault by replacing the AT CPU.

***Electroluminescent display lights up (normal boot-up)
- audible warnings*****Beep sequence: continuous sequence of short beeps**

The instrument boots-up normally until the message "Starting MS-DOS" appears. The long beep (indicating a successful BIOS test) is **not** output and the instrument software is **not** loaded.

This fault condition indicates an error during the keyboard test. Possible causes are a stuck key or a fault in the keyboard controller.

Other possible fault conditions

The BIOS test displays an error message on the EL display. Most of the tests apply to the AT CPU itself. The remaining tests apply to the display control board, the keyboard controller and the floppy disk drive. The error messages indicate which of these modules is the likely source of the fault.

4.3 Error Messages / Faulty Behavior After Successful BIOS Test (Series A to E)

Introduction

After the BIOS test, first the operating system (DOS) and then the instrument software will be loaded and started. The operating system and the instrument software are both stored on drive C:, which is the memory board (FLASH ROM DISK). The SNA's AT-CPU configuration has this drive (C:) set as the BOOT drive (set in the extended BIOS which is also loaded from the memory board FLASH ROM DISK). If the AT CPU cannot "find" the extended BIOS, e.g. due to a defect on the memory board, the operating system can be loaded from a bootable floppy disk.

If the AT CPU loads the extended BIOS, the operating system can only be loaded from a floppy disk if this is labelled "WAGO_BOOT". The service disk can be used in such cases.

Note: If errors occur during loading of the instrument software or during measurements, first check the settings in the CMOS setups for the AT CPU (see chapter 4.5 on page 4-9).

Operating system/instrument software does not load

Operating system does not load

If the memory board (17) is not detected during the BIOS test (extended BIOS is not loaded), drive C: does not exist for the SNA. The instrument behaves like a normal PC and attempts to load the operating system from the floppy drive (drive A:).

Error message:	DRIVE NOT READY ERROR insert BOOT diskette in A: Press any key when ready
Possible causes:	Memory board (17) defective, FLASH EPROMS U400, U401 on memory board (17) completely or partially erased or defective. Error in control unit (e.g. CONTROL BUS conflict)
Remedy:	To locate the error, first boot the SNA from a floppy disk (e.g. service disk). If the operating system loads from the disk, the prompt A:\ is displayed. Next, try to re-install the instrument software from the floppy disks. If this is not possible, the memory board (17) should be repaired or replaced and the software re-installed. If the SNA will not boot from the floppy disk, the fault is in the control unit.
Error message:	General failure reading drive B Abort, Retry, Fail?
<i>Note:</i>	This error message indicates that the data and compensation tables stored on drive B: are faulty or have been erased (see chapter 4.7 on page 4-15).
Possible causes:	SRAM (drive B:) on the memory board (17) defective, lithium battery on the memory board (17) defective.
Remedy:	To locate the fault, first check the lithium battery on the memory board. Then place the "Compensation Data" disk in drive A: and switch on the SNA. The operating system is loaded from the disk and the compensation data are copied into the RAM disk (drive B:). If this is not possible, the memory board should be replaced or repaired, after which the compensation data and the instrument software should be reinstalled (see chapter 4.6 on page 4-14). If the SNA will not boot from the disk either, the fault is located in the control unit.

Operating system/instrument software does not load

If the memory board (17) is detected during the boot-up procedure (extended BIOS is loaded), the SNA attempts to load the operating system and then the instrument software from drive C:. If errors occur, various error messages may be output or the SNA may lock up completely. As a check that the extended BIOS has loaded, attempt to access drives C: and B: from the DOS prompt by entering the DOS commands <C:> or <B:> followed by <dir>. If the drive directory is displayed, the extended BIOS has been loaded from the memory board.

Possible causes: Memory board defective, FLASH EPROMS on memory board (17) partly or completely erased or defective.

Remedy: To locate the fault, first boot the SNA from a disk (e.g. service disk). If the operating system loads from the disk, the prompt A:\ is displayed. Now try to reinstall the instrument software from disk (see chapter 4.6 on page 4-14). If this is not possible, repair or replace the memory board and then reinstall the instrument software. If the SNA will not boot from the disk either, the fault is located in the control unit.

Note: The above error scenario indicates that at least part of the memory board is working correctly as the extended BIOS could be loaded from U400 and U401 on the memory board. If this were not the case, the error message DRIVE NOT READY ERROR would appear.

4.4 Error messages during measurements

If a major hardware fault occurs after the instrument software has been loaded or during measurements, the measurement program is aborted and appropriate error messages are displayed on the screen ("2101 Debug Output" is displayed). The error messages allow localization of the fault in a limited sense.

4.4.1 2101 Debug Output

If a so-called Fatal Error occurs during operation of the SNA, the instrument software aborts and the message "2101 Debug Output" is displayed. Figure 4-2 shows an example of the 2101 Debug Output message. The error messages are shown in boldface type. The SNA is in DOS mode after exiting from the operating software.

```

                BN2101 debug output
selector of main() = 0x017F                                14:34:31
2194316 Bytes of memory available
main: starting
1663956 Bytes of memory available

INTERNAL ERROR <0>: Download error ZF-DSP 0x3000
CommunicationError from ZF-DSP in ZF_Get_PegKorrLoc. ErrorCode = 3005
Error 3005: ZF_Get_PegKorrLoc
Error 3005: WriteRam from daten_tablog not ok!
Error 3005: WriteRam from daten_tablin not ok!
INTERNAL ERROR <0>: Download error Synthe 0x3000
CommunicationError from ZF-DSP in ZF_Set_Vbw. ErrorCode = 3005
FATAL ERROR <3005>: ZF_DSP_Error in ZF_Handler
program terminated at                                    14:34:42
C:\

```

Fig. 4-2 Example "2101 Debug Output" display

A large number of Internal Errors may occur and be displayed before the instrument software is terminated by a "Fatal Error". These Internal Errors are useful in tracing the cause of a fault as they can indicate the cause of the subsequent Fatal Error and hence the cause of program termination. The events leading up to a Fatal Error are therefore of interest in troubleshooting. Evaluation of the 2101 Debug Output message must always begin with the first error message displayed.

Note: The display of the SNA cannot be scrolled in this mode. If a large number of errors have occurred, it is possible that the screen will only display the last error messages before the fatal error. The header line of the 2101 Debug Output page indicates whether some messages have been overwritten or not. If the header "2101 Debug Output" is still visible at the top of the display, this means that all of the error messages are displayed. If this header is no longer displayed, some of the messages have been overwritten and cannot be displayed.

The entire contents of the 2101 Debug Output message are also stored in the file B:\SNA.ERR so that all of the error messages can be read even if they do not fit onto a single display page.

Displaying the contents of the file B:\SNA.ERR

The instrument is in DOS mode when the instrument software is aborted by an error. The "2101 Debug Output" message is displayed, followed by the DOS prompt C:.

Important: Connect an external keyboard for making the following entries.

Now make the following entries in the order given, confirming each entry by pressing Return:

- B: Switch to drive B (RAM disk, battery buffered RAM on the memory board).
- TYPE SNA.ERRIMore This displays the complete contents of the file SNA.ERR page by page on the display.
The character | is obtained by simultaneously pressing [Alt Gr] + [<,>] on the external keyboard.

Caution!

The contents of SNA.ERR will be overwritten by the error messages occurring during the new boot-up if the SNA is switched off and then on again. The original error messages will be lost if different errors occur during the new boot-up procedure.

The contents of SNA.ERR can be displayed more conveniently by using the DOS editor. Enter EDIT to load the editor. Open the file B:\SNA.ERR to display it. The file can be printed out from the editor.

You can also save the file B:\SNA.ERR to a disk in drive A: by using the "SAVE AS" command in the "FILE" menu of the DOS editor.

This file can then be read and printed out using any PC with a word processor program.

Important: See the DOS manual for details of how to use the editor function.

4.5 AT CPU CMOS Setup (Series A to E)

4.5.1 Introduction

The correct CMOS setup is necessary for the SNA's processor (AT CPU) to operate correctly. The settings are stored in a battery-buffered RAM module in the AT CPU (the RAM module and battery are part of the AT-CPU clock module). The setup program uses menus (in English). The following settings are possible (required) for the STANDARD CMOS SETUP for the CPU used in the SNA:

- Date: mn (month)
 date (the day of the week is entered automatically from the date)
 year
- Time: hour
 min
 sec
- Hard Disk C: Type: } Number from a table predefining the hard disk parameters.
 Hard Disk D: Type: } Enter no. 47 to select a user-defined hard disk.
 If this is done, all disk parameters (CylIn, Head, WPcom etc.) must be entered manually.
- Floppy Drive A: }
 Floppy Drive B: } Type (capacity) of the floppy drive installed
- Primary Display: Type of graphics board installed.
- Keyboard: Selects whether keyboard test is performed during boot-up or not.

The size of the DRAM on the CPU (BASE MEMORY, Ext. Memory) is determined during booting of the CPU and is entered in the appropriate menu fields. These values cannot be altered.

Settings affecting the hardware for the AT-CPU must be made using the ADVANCED CMOS SETUP program. The SNA only allows setting of the "Shadow RAM Option".

4.5.2 Invoking the CMOS Setup Program

The AT CPU CMOS setup program can be started in various ways. Different methods are used to access the CMOS setup menu, depending on whether an external keyboard is connected to the SNA or not.

Invoking the CMOS setup program using an external keyboard

With the SNA switched off, connect an external keyboard to the SNA. Press and hold down the Delete key on the external keyboard, and switch on the SNA. Hold the Delete key down until the setup menu appears (see fig. 4-3).

Invoking the CMOS setup program using the built-in instrument keyboard

Switch on and wait until the message "Wandel & Goltermann, Spectrum and Network Analyzer SNA XY" is displayed. Then press and hold down the the DEL key of the instrument until the setup menu appears (see fig. 4-3).

Note: The message "Hit If you want to run SETUP" appears briefly. DEL must be pressed before this message disappears, otherwise the instrument will not branch to the setup program and the instrument software will be loaded (see "Normal SNA Boot-Up Behavior (Series A to E)"). If the instrument software loads, switch off the SNA and try again.

Setup menu display

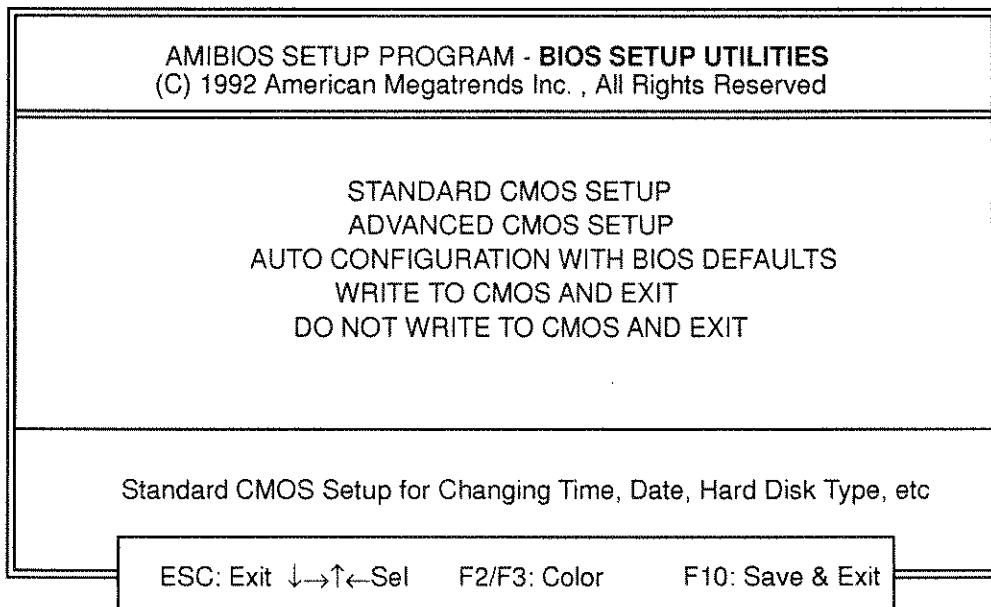


Fig. 4-3 Screen display after invoking the setup program

Figure 4-3 shows the (initial) setup menu. The bottom line of the menu containing the operating hints is not visible on the built-in EL display of the SNA. For this reason, all of the more important setup menu displays are reproduced in the figures which follow.

4.5.3 Using the CMOS Setup Program

Using an external keyboard

See chapter 4.10 for connecting an external keyboard.

If the setup menu is displayed (see fig. 4-3) the cursor keys ↓→↑← can be used to select the various menu items (STANDARD CMOS SETUP, ADVANCED CMOS SETUP etc.) When the RETURN key (↵) is pressed, the program branches to a warning menu which indicates the consequences of making an incorrect entry in the setup. Pressing RETURN (↵) again displays the sub-menu which was selected.

The keys have the following functions when an external keyboard is used to operate the setup program:

Cursor keys ↓→↑← :	Select menu item / field
PgUp, PgDn:	Change field content / Select option
ESC:	Return to initial menu
Return ↵ :	Invoke / confirm selection made

Using the built-in keyboard

The keys have the following functions when the built-in keyboard is used to operate the setup program:

↓↑ :	Select menu item / field
ZOOM ⇄ :	Change field content / Select option
ESC:	Return to initial menu
Enter:	Invoke / confirm selection made
SWEEP:	Y (YES)
HOLD:	N (NO)

4.5.4 SNA-20/23 CMOS Setup Settings

STANDARD CMOS SETUP

AMIBIOS SETUP PROGRAM - STANDARD CMOS SETUP
(C) 1992 American Megatrends Inc. , All Rights Reserved

Date (mn/date/year) : Sun, Oct 30 1994
 Time (hour/min, sec): 07 : 02 : 28

Hard Disk C: Type : **Not Installed**
 Hard Disk D: Type: **Not Installed**
 Floppy Drive A : **1.44 MB, 3 1/2 "**
 Floppy Drive B : **Not Installed**
 Primary Display : **VGA/PGA/EGA**
 Keyboard : **Installed**

Base Memory : 640 KB
 Ext. Memory: 3072 KB

Cyln Head WPcom LZone Sect Size

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

This field shows possible values for the field selected with the cursor (help texts)

ESC: Exit ↓→↑←Sel F2/F3: Color PU/PD:Modify

Fig. 4-4 Standard CMOS Setup values and options (Series A to E)

Figure 4-4 shows the STANDARD CMOS SETUP sub-menu. The values entered in the menu (shown in boldface type) are the values prescribed for the SNA and must be set to these values for the SNA to function correctly, with the exception of the date and time values which should be set to the appropriate current date and time.

The help text window shows possible settings, options and explanantions for the field selected by the cursor.

ADVANCED CMOS SETUP

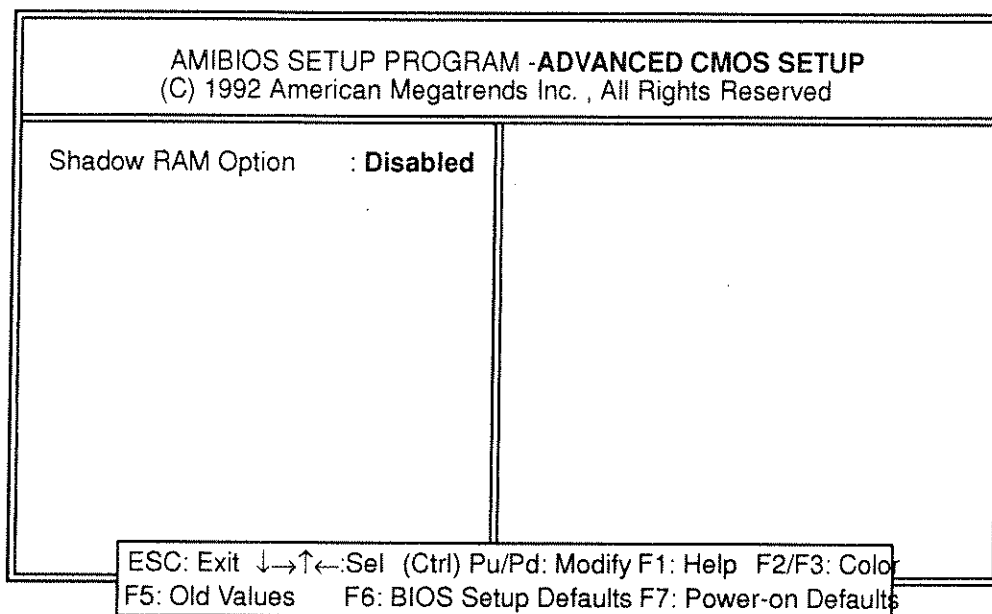


Fig. 4-5 Advanced CMOS Setup values and options (Series A to E)

The SNA ADVANCED CMOS SETUP (see fig. 4-5) only allows setting of the "Shadow RAM Option". The "Disabled" setting must be selected to ensure that the instrument operates correctly.

4.5.5 Ending the Setup Program

Once all the settings are correct, the program can be terminated. If setup settings were changed (corrected), terminate the program using the **"Write to CMOS and Exit"** command.

Exit without saving

If no settings were altered, exit the program using the **"DO NOT WRITE TO CMOS AND EXIT"** command. Press the ESC key to return to the initial menu and then select this menu item (see below under "Using a country-specific external keyboard").

Exit and save

If settings were altered, you must exit the program using the **"WRITE TO CMOS AND EXIT"** command to write the changes to the CMOS RAM of the CPU for them to become effective (see below under "Using a country-specific external keyboard").

Using a country-specific external keyboard

When exiting from the setup program, the program requests a N (No) or Y (Yes) response before the program can be ended. The setup program uses the US-standard keyboard driver. If you are using a non-US keyboard, some of the key functions may be different (e.g. on a German keyboard, the positions of the "Z" and "Y" keys are reversed). Press the key on your keyboard which corresponds to the "N" or "Y" key on the US keyboard to respond to the exit query. This does not affect the use of the built-in keyboard (see "Using the built-in keyboard" on page 4-11).

Please also refer to chapter 4.10.

4.6 Installing the Instrument Software / Updating Software

The instrument software will need to be installed if the memory board is replaced or repaired. Insert disk no.1 in the floppy drive (A:) of the SNA and switch the instrument on. The software is installed automatically. From time to time during the installation, you will be asked to confirm various messages by pressing a key. The screen also indicates when the next floppy disk is to be inserted (the disk number will be displayed). The instrument software is stored on drive C: (Flash ROM disk).

Use the same procedure for installing software updates.

The compensation data for the instrument (see chapter 4.7) and any user-specific settings or setups are not affected by loading the instrument software, as they are stored on drive B:\ (battery-buffered SRAM on the memory board (17)) of the SNA. If these files are lost or damaged, they must also be reinstalled (see chapter 4.7).

4.7 Installing the Compensation Data

The extreme accuracy of the SNA-20/-23 can only be achieved by calibration of various circuit modules and subassemblies. This compensation data is stored in the form of tables in the instrument and is used to correct measurements during operation of the SNA. A floppy disk containing a backup copy of the the compensation data specific to the instrument is included with each SNA.

The following compensation data is determined and stored for each individual SNA:

- Frequency response correction, Band 0 File: SNA\DATA\ fckor_b0.tab
- Frequency response correction, Band 1 File: SNA\DATA\ fckor_b1.tab (SNA-23)
- Frequency response correction, Band 2 File: SNA\DATA\ fckor_b2.tab (SNA-23)
- Frequency response correction, Band 3 File: SNA\DATA\ fckor_b3.tab (SNA-23)
- Logarithmizer correction, linear File: SNA\DATA\ pkor_lin.tab
- Logarithmizer correction, logarithmic File: SNA\DATA\ pkor_log.tab

Instruments with memory board (17) [Series A to E]

The specific compensation data are stored on RAM disk (battery buffered SRAM on the memory board (17)). The RAM disk is drive B:\. The compensation data will need to be reinstalled if this board is repaired or replaced, or if the Lithium battery on the board fails. Insert the "Compensation Data" disk in floppy drive A:\ of the SNA and switch on the instrument. The installation of the files is then automatic. During installation, a message appears to indicate that all user-specific settings have been lost. Once you confirm this message by pressing any key, drive B:\ is formatted and the required data are copied from drive A:. Once this has been completed, remove the floppy disk from drive A: and press any key to reboot the SNA automatically.

Caution!

Loading the compensation data deletes all user setups. If such information is stored in the instrument, make a back-up copy of it before installing the compensation data (see chapter 4.8 on page 4-15).

4.8 Saving User Setups on Floppy Disk

Before making repairs to the instrument, user-specific instrument settings (setups) should be backed up to floppy disk. This is particularly important if the memory board (17) is to be repaired or replaced or if the Lithium battery on this board is replaced.

Insert a formatted disk in drive A:\ of the SNA. In the MODE/DOS UTILITIES menu, press the BACKUP RAM SETUPS TO FLOPPY softkey to save the user setups to the floppy disk.

Once repairs have been completed, the setups can be restored to the RAM from the same menu. Switch on the instrument and insert the floppy disk containing the saved setups into drive A:\. Press the RESTORE RAM SETUPS FROM FLOPPY to read the setups from the disk and write them back to the battery-buffered RAM in the SNA.

4.9 Making a Back-Up Copy of RAM Disk B:\

(Applies only to instruments fitted with memory board (17) [Series A to E])

If the "Compensation Data Disk" is not available, a back-up copy of the complete contents of RAM disk (B:) can be made on a floppy disk. Data can then be restored from this disk e.g. when the battery is replaced. To make the back-up copy, do the following:

- Connect an external keyboard to the SNA
- Switch on and wait until the measurement display appears on the SNA screen
- Press <ALT>+ <F10> simultaneously to switch back to DOS mode. Press <RETURN> to display the DOS prompt C:\>.
- Insert an empty, formatted disk in drive A: of the SNA
- Use the external keyboard to enter the DOS command XCOPY B:*.* A:\ /e and then press RETURN. The entire contents of drive B: including all subdirectories will be copied to the disk in drive A:.

This disk now contains all compensation data and the user setups contained in drive B:. This procedure should be followed whenever data might be lost during repair of the instrument and the "Compensation Data Disk" for the particular instrument is not available. This is particularly the case if the battery is to be replaced during repairs or if repairs are made to the AT CPU, display control board, interface board or memory board.

Retrieving the back-up to the RAM disk (B:)

- Insert the service disk in drive A:\ and switch on the SNA (the instrument boots from the disk and the DOS prompt A:\> is displayed).
- Enter the following from the external keyboard: FORM_B. Then press RETURN.
The message

Escape with "ENTRY OFF"
Continue with any key

(Press ENTRY OFF on the built-in keyboard
to stop the procedure)

is displayed. Press any key (except ENTRY OFF) to format drive B:.

- Switch off the SNA and remove the disk from drive A:. Then switch the instrument on again.
- Insert the disk containing the back-up of the RAM disk into drive A: of the SNA.
- Press <ALT>+ <F10> simultaneously to switch back to DOS mode. Press <RETURN> to display the DOS prompt C:\>.
- Use the external keyboard to enter the DOS command XCOPY A:*.* B:\ /e and then press RETURN. The entire contents of drive A: including all subdirectories will be copied to the RAM disk drive B:.
The message "Overwrite B:\ <Filename> (Yes/NO/All) may appear on the display. Each time this happens, enter <N> <RETURN> to continue the process.

This completes restoration of the files to the SNA. Switch the instrument off, remove the disk from drive A: and switch on again. The user setups and the compensation data are now stored in the RAM drive.

4.10 Connecting an External Keyboard to the SNA

The SNA is fitted with a jack for connecting an external MF-2 keyboard (on the front panel of the instrument; EXT. KEYB, [1]). An external keyboard is useful or is required for running the SETUP program and service programs and when using the instrument in DOS mode. The default keyboard driver loaded with the instrument software is for a US standard keyboard. This means that if a non-US keyboard is used, some keys may not have the expected functions.

4.10.1 Loading a Country-Specific Keyboard Driver

The external and built-in keyboards use the same keyboard driver. The default driver is for the US-standard keyboard. If a driver for a non-US keyboard is installed, the key functions of the built-in keyboard may not be as expected (different functions or not recognized).

Permanent installation of a country-specific keyboard driver

The US keyboard driver is defined in the file B:\AUTO2.bat by the command "set KEYBXX=us". This file is executed automatically during boot-up of the SNA (assuming drive B: is correctly recognized).

The DOS editor can be used to change the file B:\AUTO2.bat. With the SNA in DOS mode, enter EDIT. Refer to the DOS handbook for details of how to use the editor function. The non-US driver can be permanently set by changing the line "set KEYBXX=us" to (e.g. for a German keyboard) "set KEYBXX=gr" (see figure 4-6 on page 4-18). The abbreviations for other keyboard drivers are found in the DOS handbook.

Note: Make a back-up copy of the file B:\AUTO2.bat before making any changes (see DOS handbook for details of how to do this).

Temporary installation of a country-specific keyboard driver

Another keyboard driver which will remain loaded until the instrument is switched off again can be installed in place of the US driver as follows (example is for a German keyboard):

- Switch on and wait until the measurement display appears on the SNA screen
- Press <ALT>+ <F10> simultaneously to switch back to DOS mode. Press <RETURN> to display the DOS prompt C:\>.
- Type <ke**z** b **gr**> and press RETURN to load the German driver. (The display shows [keyb gr] as the positions of the letters z and y on the US and German keyboards are reversed). The abbreviations for other keyboard drivers are found in the DOS handbook (note that the positions of some keys may be different!).

Note: The US keyboard driver is always loaded for the SETUP program for the AT CPU. It is not possible to load a different driver for operating this program.

```

@echo off
rem -----
rem * This file is executed when the SNA boots up.
rem * User-specific commands may be entered.
rem -----

rem -----
rem Parameter for DOS command MODE.
rem Settings also apply to hard copy output via
rem the serial interface.
rem -----
set PCOM1=com1:96,n,8,1
set PCOM2=com2:96,n,8,1

rem -----
rem KEYBXX sets the country-specific keyboard code XX.
rem "keyb XX" is set on boot up.
rem -----
set KEYBXX=us          "set KEYBXX=gr" for German keyboard
                      "set KEYBXX=us" for US keyboard

rem -----
rem CALOUT=1: CAL OUT can be switched on/off in the SPECTRUM/CAL menu
rem CALOUT= : CAL OUT isonly switched on during calibration
rem -----
set CALOUT=

rem -----
rem NOAUTOCAL=1: AUTO CAL is set to OFF on power-up
rem NOAUTOCAL= : AUTO CAL is set to ON on power-up
rem -----
set NOAUTOCAL=

rem -----
rem INIT_RST=1: USER MEM displays a menu for generating a Preset
rem              and Restart Setup ( writes the files
rem              %dlw%\sna\setups\s_*.000 and %dlw%\sna\setups\rst\s_*.000)
rem INIT_RST= : No menu for Preset Setup
rem -----
set INIT_RST=

rem -----
rem AUTO sets the procedure after this file has been executed.
rem AUTO=weiter: SNA software is started
rem AUTO=ende:  Help screen is displayed
rem AUTO=stop: No further action
rem -----
set AUTO=weiter

rem SY- AND ZF-DSP MUST BE LOADED FIRST (MEMORY SPACE)
rem set sy=noboot
rem set zf=noboot
rem zfdnam=sna\dzc_scw
rem -----

```

Fig. 4-6 Changes can be made to B:\AUTO2.bat to permanently install another keyboard driver

4.11 Switching from Instrument Software to DOS Mode and Vice-Versa

When the instrument is in measurement mode, pressing <ALT>+<F10> simultaneously on the external keyboard switches from the instrument software to DOS mode.

To revert to the instrument software, enter <k> and press the ENTER key.

You can also switch to DOS mode from the MODE menu. Press the MODE key and then press the DOS-UTILITIES softkey. Now press <ALT>+ <F1> simultaneously on the external keyboard to switch to DOS mode. Type <EXIT> press the ENTER key on the external keyboard to revert to the instrument software (in the DOS-UTILITIES menu item).

