3 Mechanical Construction

3.1 Instrument Codes

The following instrument codes should be stated when you make enquiries about the instrument or order spare parts:

Type designation, serial number, special version designation, software version number and fitted options.

e.g.: RFS-1, series C-123, BN 2112/03, software (master) V 04.01

When ordering spare parts, the item number given in the parts list in the Annex must also be stated.

e.g.: 1 transistor BCY 59 D, item no.:0001-0016.518

The serial number will be found on the front panel below "RFS-1".

The version number is on the back panel.

3.1.1 Determining the Hardware and Software Status

The hardware and software status of the SNA can be displayed on the screen using the MODE/ CONFIGURATION menu. The hardware and software status must be quoted in all queries regarding the instrument. The menus for displaying the hardware and software status are shown in figure 3-1 and figure 3-2.

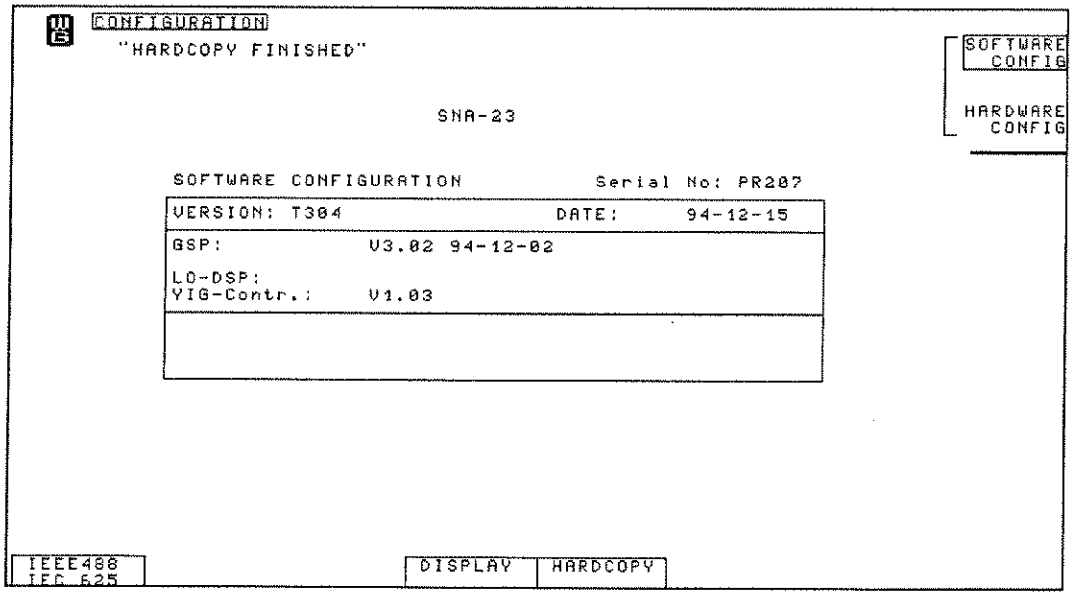

Fig. 3-1 Menu for displaying SNA software status (Example: SNA-23)

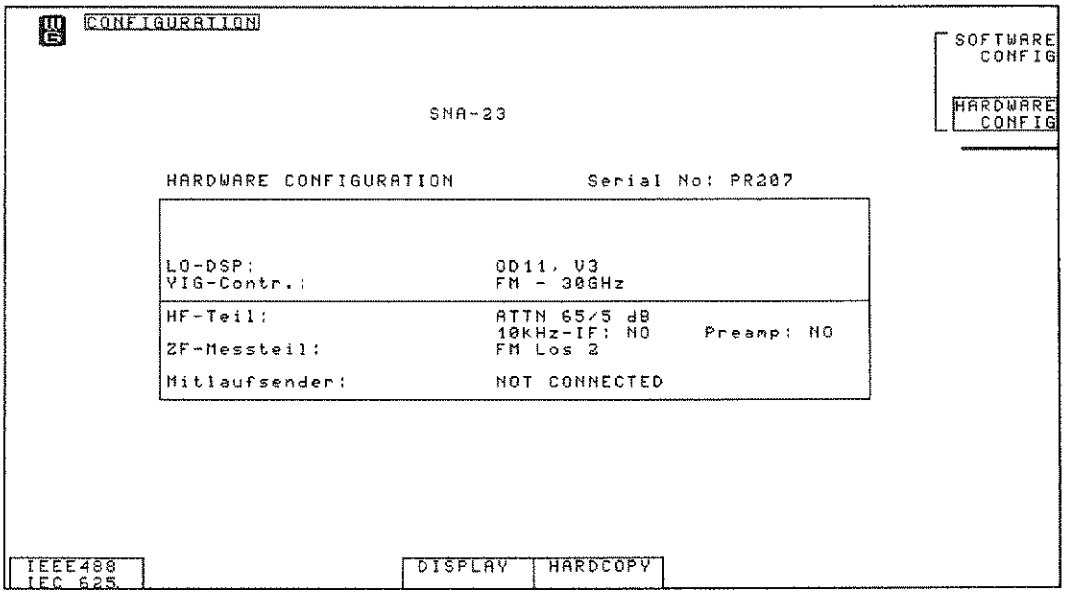

Fig. 3-2 Menu for displaying SNA hardware status (Example: SNA-23)

Some hardware errors may make it impossible to display the software and hardware status of the instrument using the menu, e.g. when the instrument software crashes directly after starting (2101 Debug Output appears in the display). In such cases, the software status can be determined by displaying the files B:\123Time and C:\123Time. C:\123Time contains the information for the instrument software status (AT-CPU and BSK-3 graphics software). B:\123Time contains the information regarding the "layout" of the correction data tables contained on the COMPENSATION DATA DISK and which are copied in the SRAM of the memory board (17).
When the DOS prompt is displayed on the screen, the file contents can be displayed by selecting the drive (B:\ or C:\) and then entering <Type 123Time> (using an external keyboard). This will only work if the AT-CPU is working correctly and drives B:\ and C:\ (board (17), Memory) can be accessed properly. Example displays of these files are shown in figure 3-3 and figure 3-4.

```
GSPV:     3.02          [Graphics software version]
GSPD:     94-12-02      [Graphics software date]
ATV:      T304          [Instrument software version (AT-CPU)]
ATD:      94-12-15      [Instrument software date (AT-CPU)]
```

Fig. 3-3 Display of C:\123Time (example)

```
94-05-11

released: 94-05-11 (2.5)
released: 94-04-22 (2.4)
released: 94-03-28 (2.2)
```

Fig. 3-4 Display of B:\123Time (example)

3.2 Assembly/Disassembly Instructions

3.2.1 Disassembling the Instrument Chassis

Removing the casing cover

To remove the casing cover, unscrew the six hex-key (allen) screws (M4, SW3). Then push back and remove the two impact protector corner pieces. The casing cover can now be removed carefully.

Removing the chassis from the casing

Remove the casing cover as described above and place the instrument top side down on the workbench. Carefully lift the casing off the chassis.

> ***Caution!***
>
> Make sure that the input sockets and rotary control of the instrument are not subjected to strain. Never hold or lift the instrument using these parts, as damage is likely to result.

3.2.2 Opening the Fold-Out Chassis

The instrument chassis folds out for servicing and maintenance. This provides access to all circuit parts.
Before opening the chassis, remove the instrument from the casing (see chapter 3.2.1).
To open the fold-out chassis, loosen the two knurled screws (between the power supply/voltage distribution board and the fold-out chassis) and undo the two crosshead screws (M3; on the right-hand side of the instrument). These screws are indicated by "A" in the diagram (see figure 3-5 on page 3-4). The chassis can now be folded out completely. The strut on the right-hand side of the instrument can be used to lock the fold-out chassis in the open position for servicing.

The fold-out chassis can be divided into three separate chassis plates by removing a further eight crosshead screws (4 screws on each side of the chassis). Only the screws on the right-hand side of the instrument are shown in figure 3-5 (marked "B").

> ***Caution!***
>
> When reassembling the fold-out chassis, make sure that the original screws or screws of exactly the same length are used. ***Longer screws will likely result in a short circuit!***

Service position

The instrument can be operated with the chassis folded out when placed normally on the workbench. It can also be operated when placed on its right-hand side with the chassis folded out. It should not be operated for any length of time when placed on its left-hand side (power supply side), as the flow of air to the power supply is hindered: the power supply may overheat and the instrument may switch off automatically.

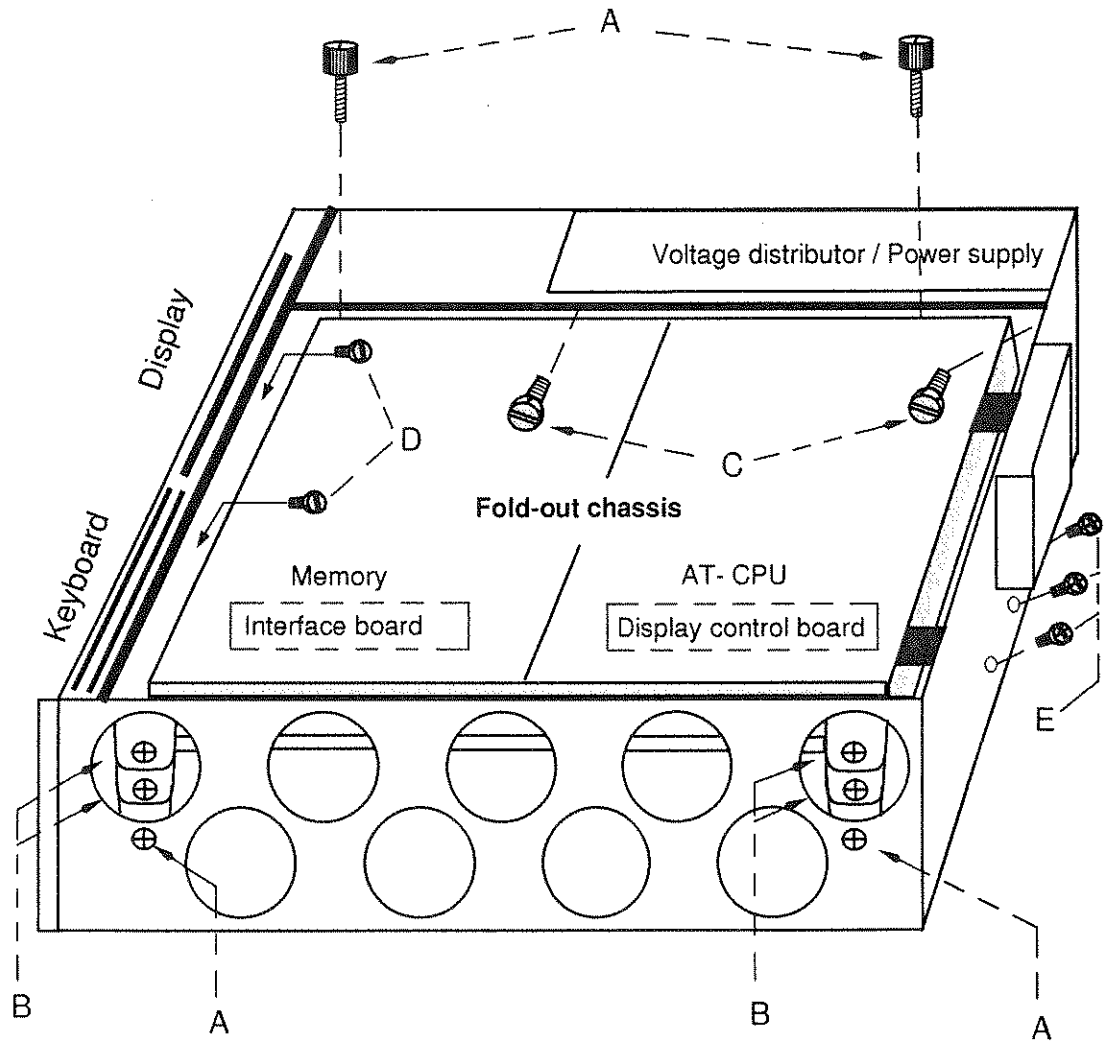

Fig. 3-5 Diagram of instrument showing screws securing the fold-out chassis and the power supply and synthesizer modules (fold-out chassis screening cover removed).

3.2.3 Positions of the Subassemblies

List of boards

Name	Code	For location, refer to
Synthesizer control	2101-A	page 13
Time base/YTO driver	2101-B	page 11
400 MHz VCO	2101-F	page 11
Sync. divider/phase meter	2101-K	page 13
IF selection	2101-L	page 9
Logarithmizer	2101-M	page 9
Calibration generator	2101-N	page 8
IF converter	2101-O	page 8
Measurement module control	2101-P	page 8
10 dB log stage	2101-Q	page 9
LC bandpass	2101-R	page 9
Preamplifier stages	2101-S	page 9
422/22 MHz converter	2101-X	page 10
422 MHz/10 kHz converter	2101-Y	page 10
422 MHz bandpass	IF-1	page 10
Memory board	2101-AF	page 7
Interface board	2101-AG	page 7
Input keypad	2101-AJ	page 7
Rotary control	2101-AK	page 11
Keyboard controller	2101-AL	page 11
Connector board	2101-AO	page 8
Input module control	2101-AR	page 13
YIG filter control	2101-AS1	page 13
12/24 V converter	2101-BE	page 8
Voltage distribution	2101-BD	page 7
Power supply	CG-44	page 7
NFO adapter	2101-C	page 11
Display control board (BSK-3)	4111-A	page 7
Integration band 0	2101-ZA	page 12
Integration band 0 control	2101-CF	page 12
Fundamental mixer	2101-ZC	page 12
Fundamental mixer control	2101-AV1	page 12
IF change-over switch	2101-ZE	page 12
10 MHz crystal oscillator	50 OS101	page 13
Coaxial relay	2K1	page 13
YIG filter	3 FL1	page 13
SHF pre-scaler	2101-ZG	page 13

The current designations (index) are found in the parts list in the Annex to the Service Manual. (Section "Parts Lists")

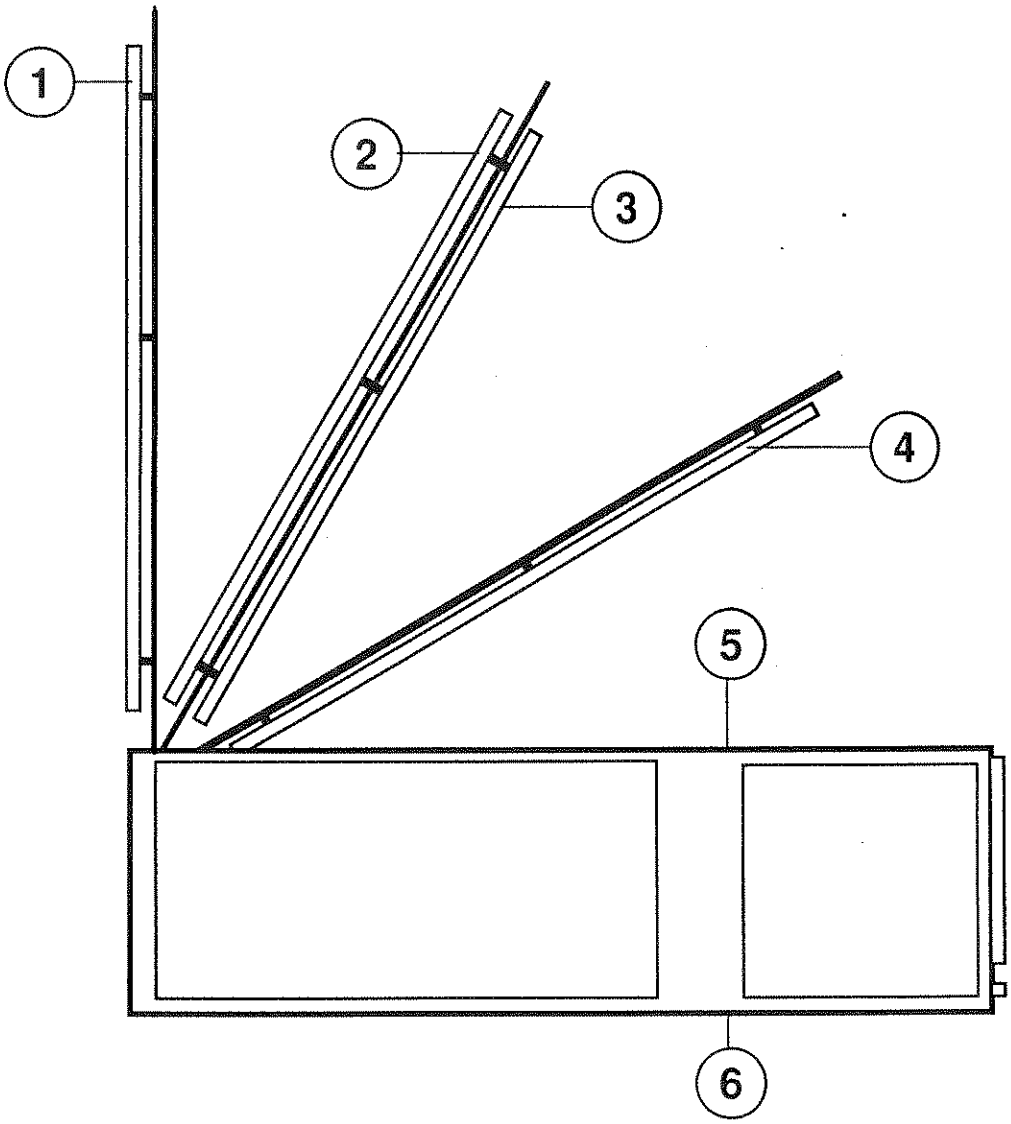

Fig. 3-6 Side view with chassis open

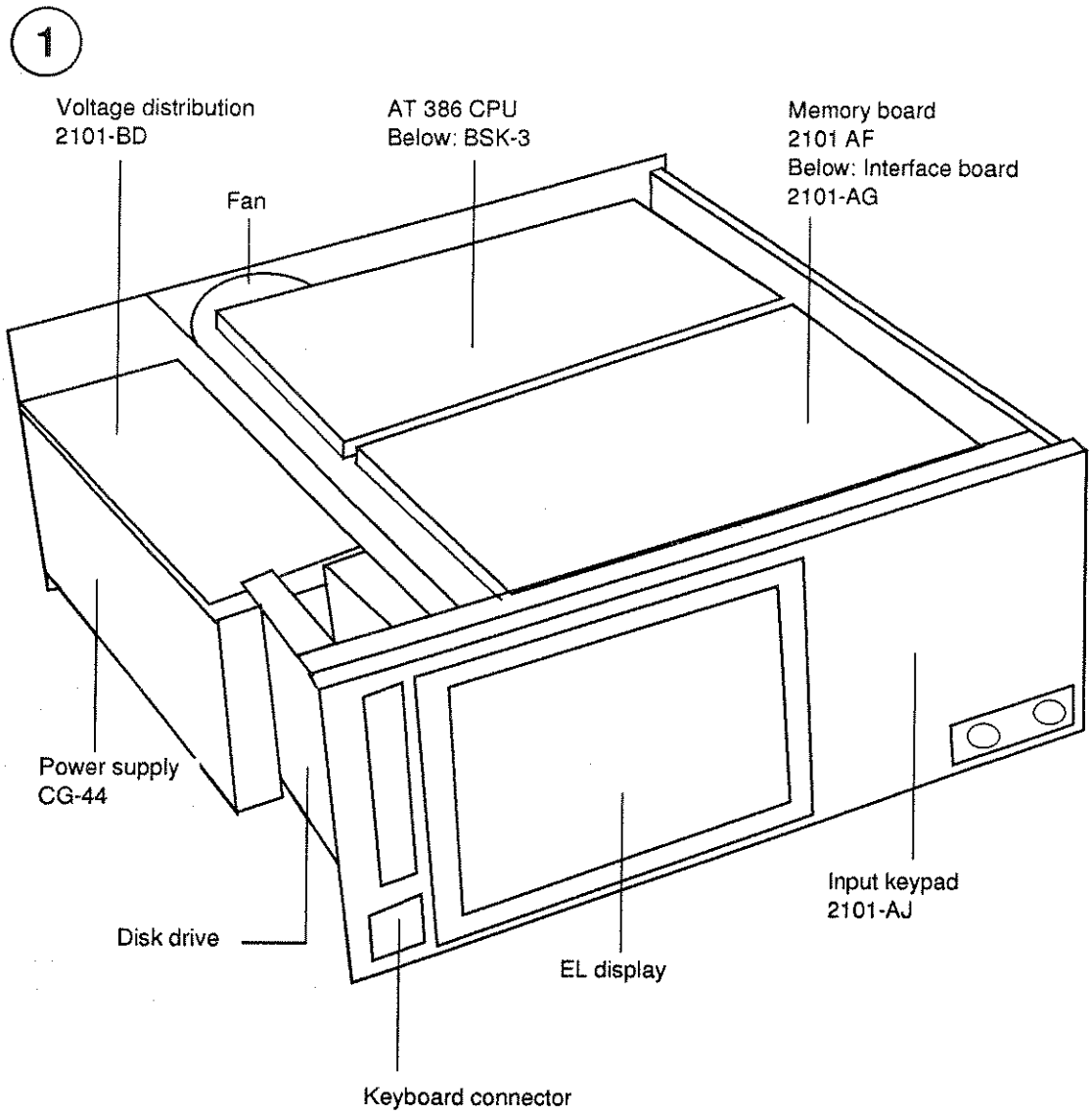

Fig. 3-7 Module positions: AT 386 CPU, Memory board, BSL Interface board, PSU distribution, PSU and Input keypad

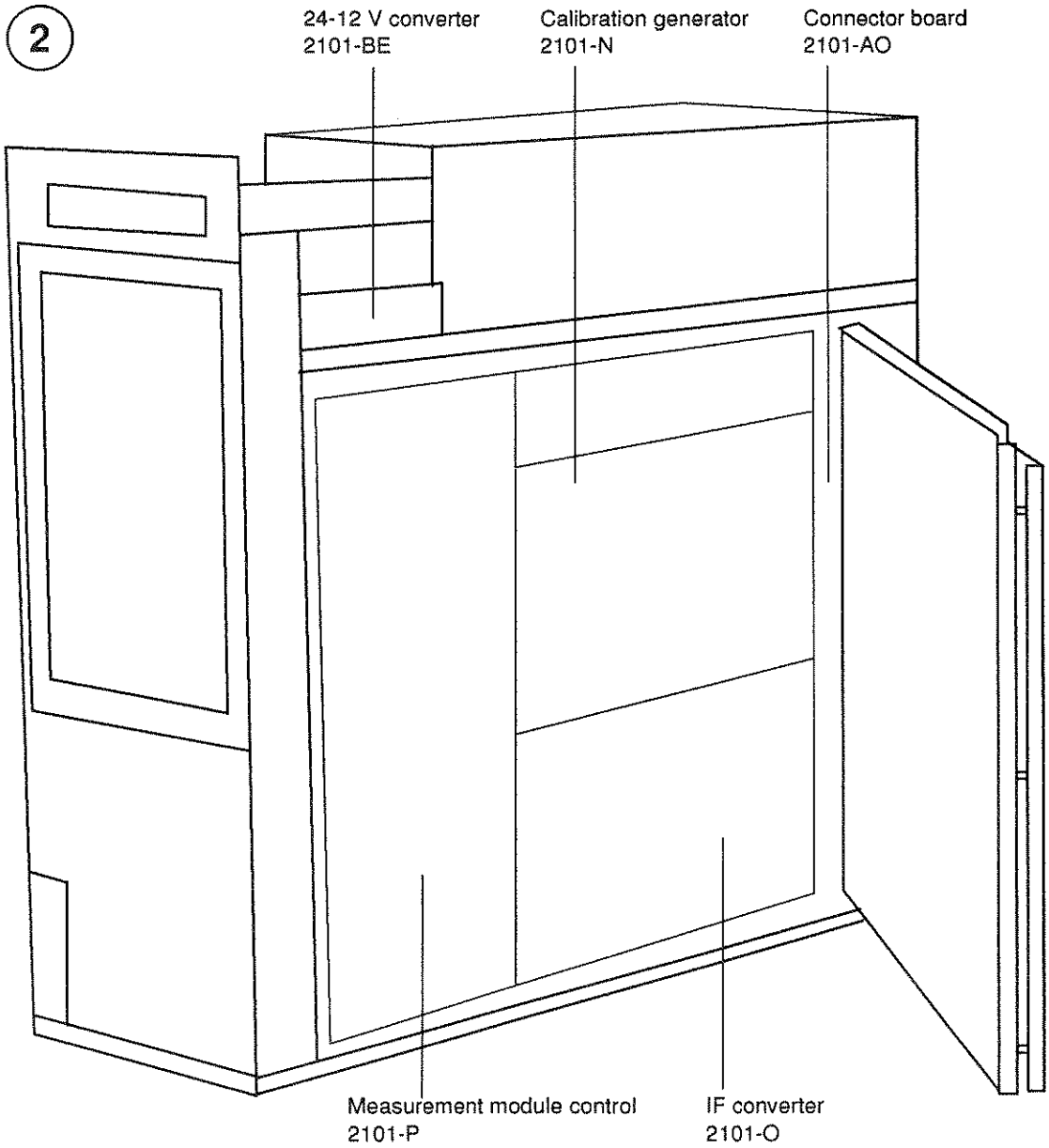

Fig. 3-8 Module positions: Calibration generator, IF converter, Measurement module control and 24-12 V converter

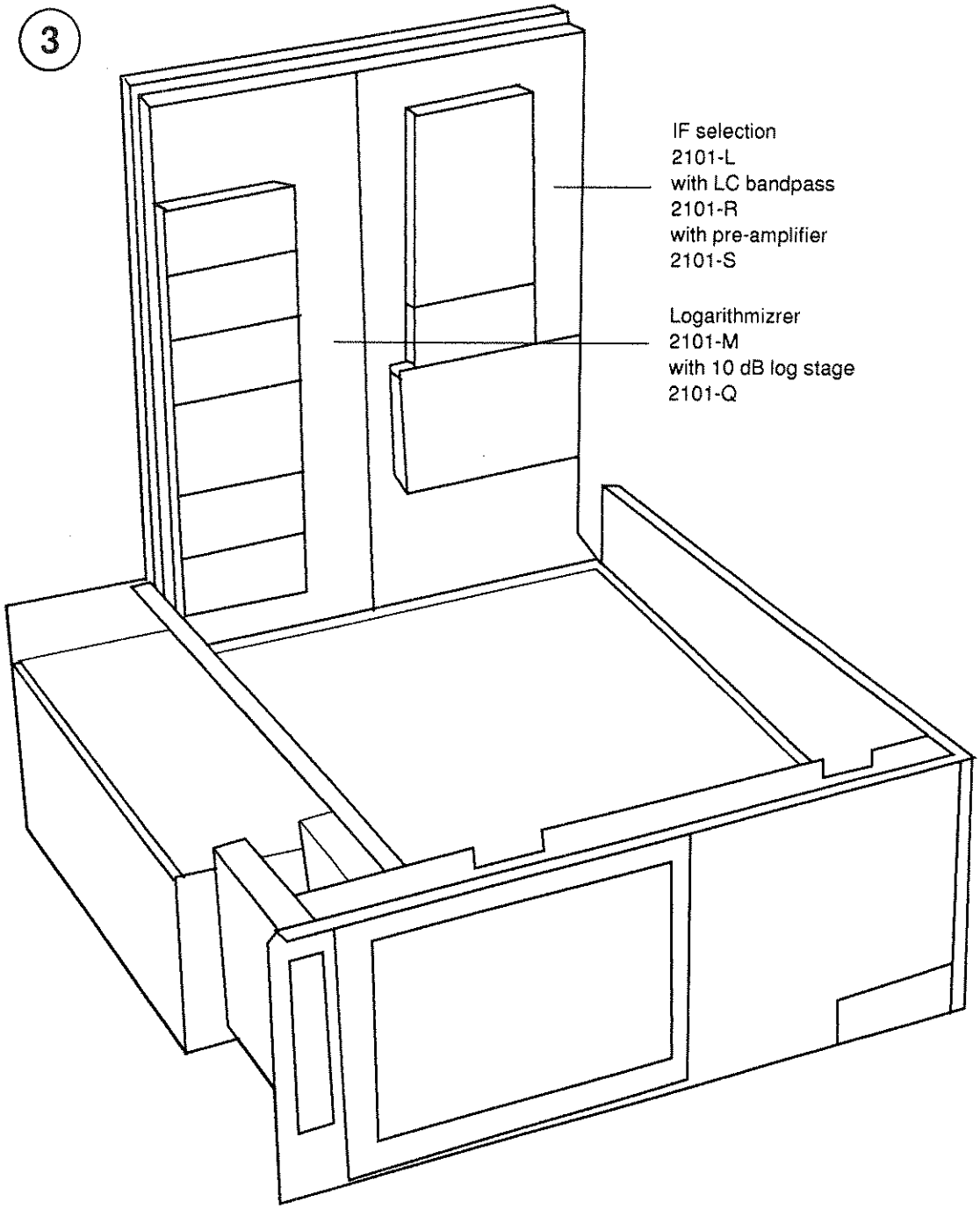

Fig. 3-9 Module positions: Logarithmizer and IF selection

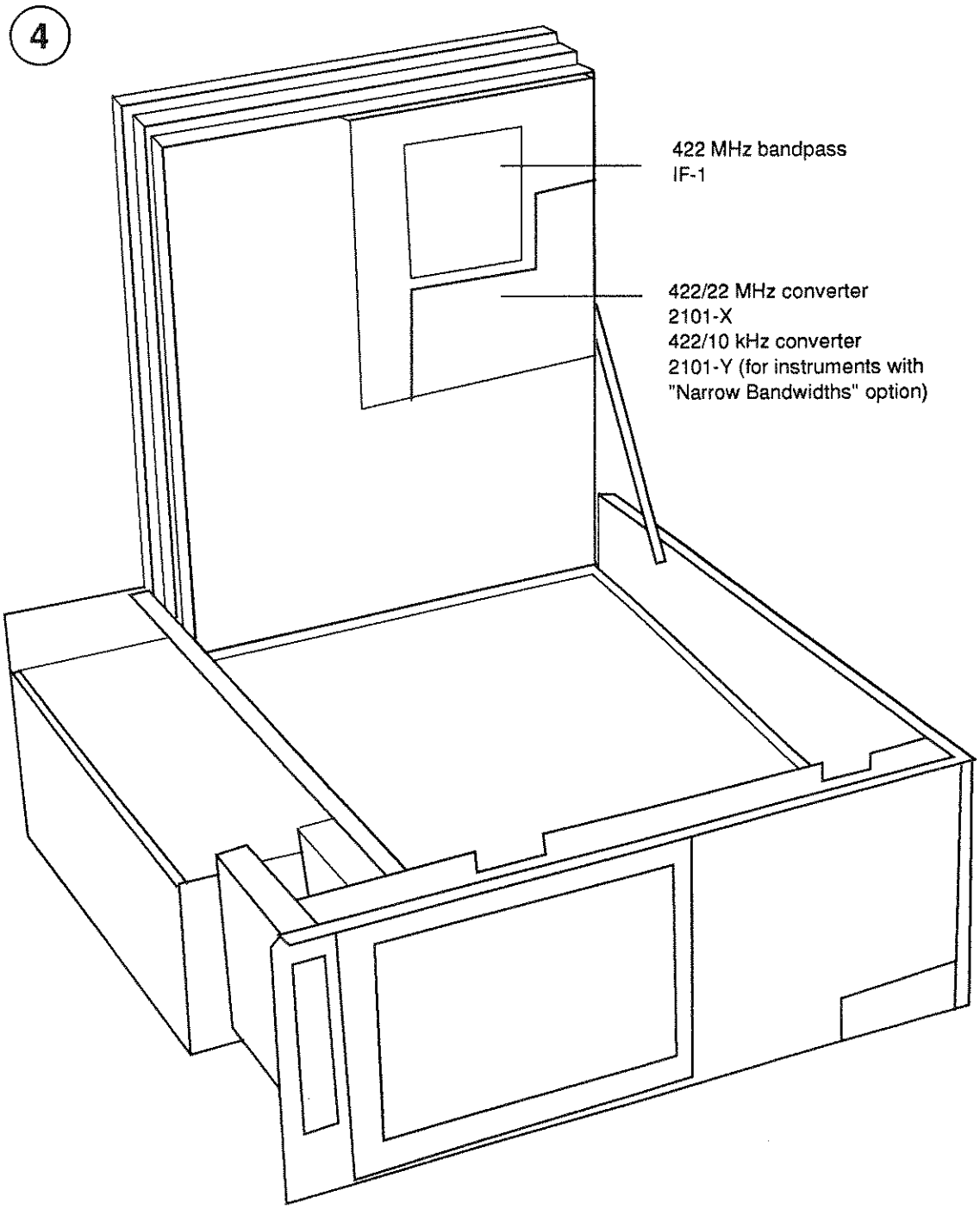

Fig. 3-10 Module positions: 422 MHz bandpass and 422/22 MHz converter

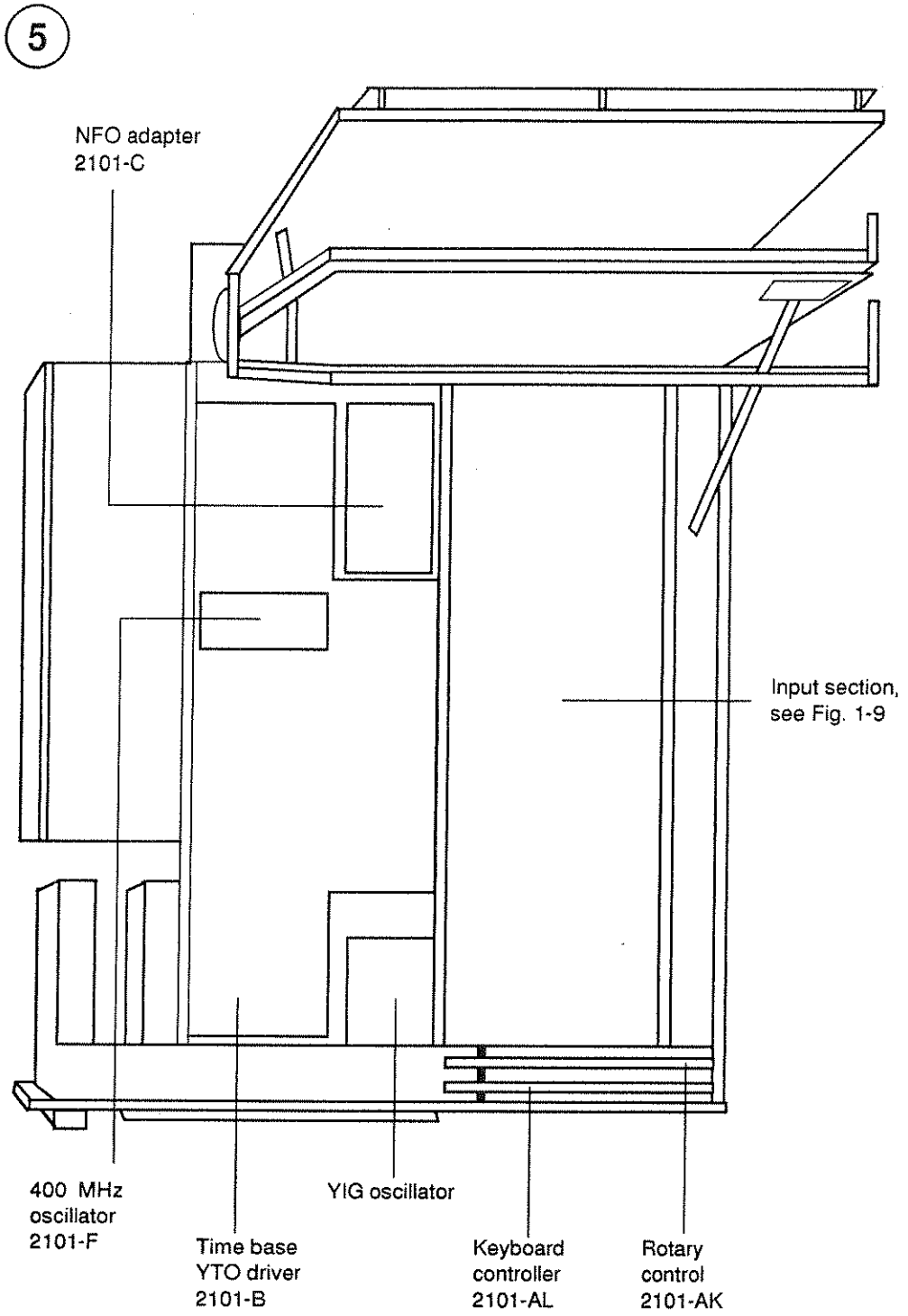

Fig. 3-11 Module positions: OD-11 and input section seen from above

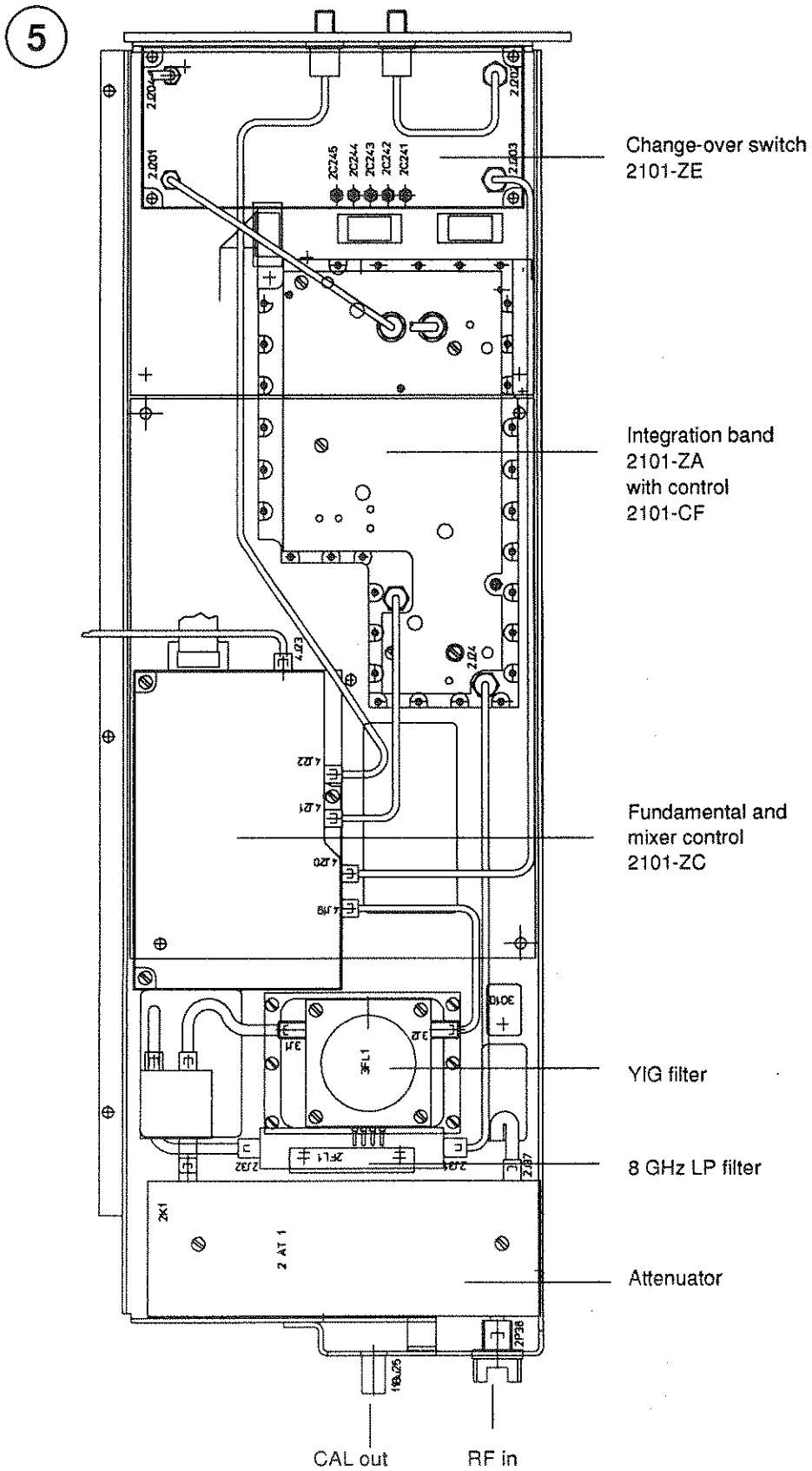

Fig. 3-12 Input section, seen from above

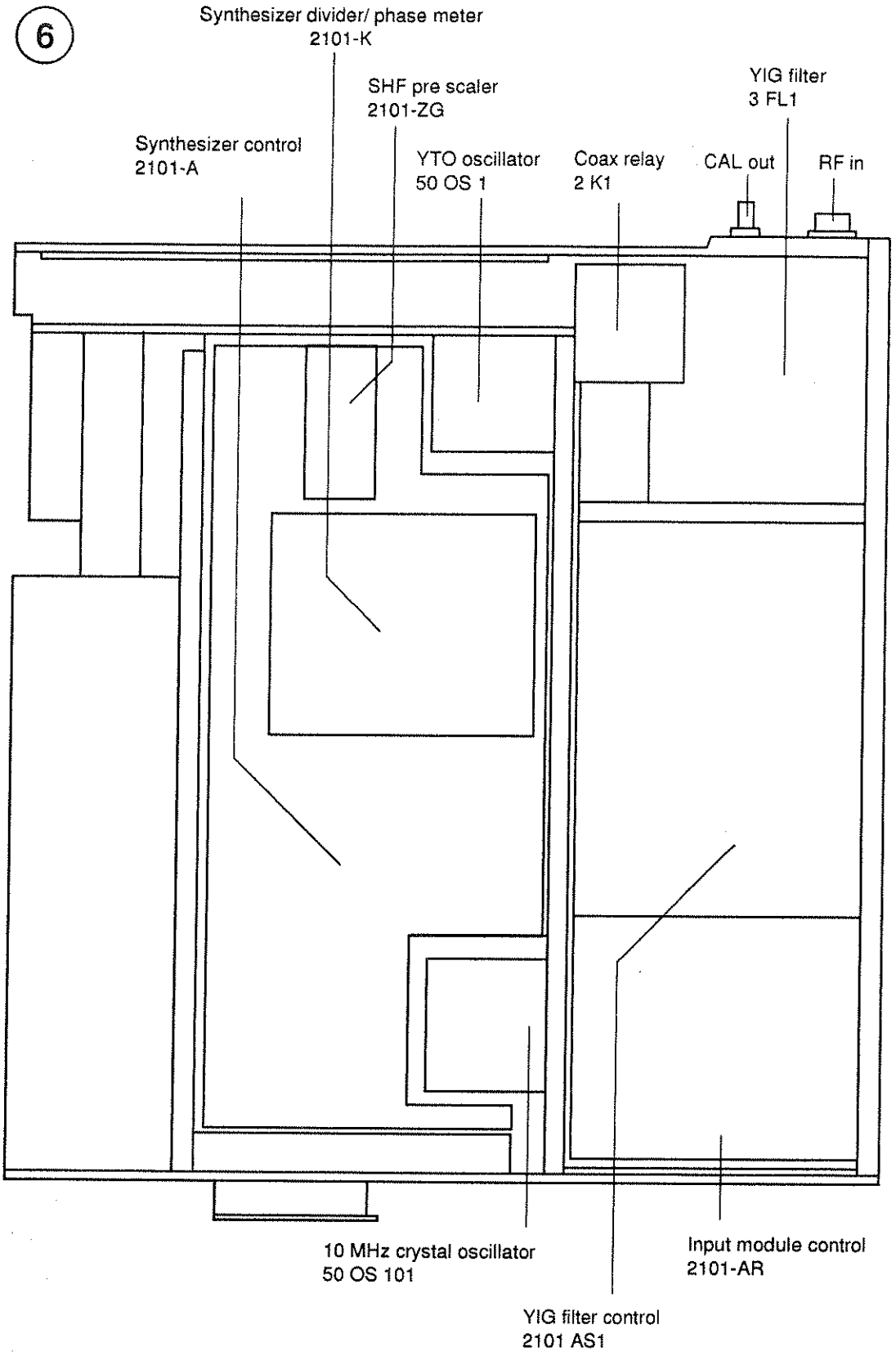

Fig. 3-13 Module positions: OD-11 and input section seen from below

3.2.4 Removing Circuit Boards and Subassemblies

The safety regulations and protective measures described in chapter 2 should be observed when removing circuit boards and subassemblies. In particular, the regulations for "Preventing Electrical Accidents" and the "Anti-static Measures" must be observed.

> ***Caution!***
>
> The memory board contains a battery-buffered RAM in which instrument-specific correction data for the frequency response and logarithmizer are stored along with user setups. A back-up copy of this data must be made before any circuit boards in the region of the memory board are removed, to allow the data to be restored if the RAM power supply is interrupted.

3.2.4.1 Removing Microwave Subassemblies and Modules

When removing microwave subassemblies and modules the following additional measures must be observed:

- "Anti-static Measures" on page 2-3
- "Handling Microwave Subassemblies" on page 2-4
- "Handling the microwave step attenuator line" on page 2-4
- "Handling waveguide lines" on page 2-4

3.2.4.2 Removing the AT-CPU and Memory Boards

Please observe the information in chapter 3.2.4 and chapter 3.2.7.

First remove the aluminium screening cover of the fold-out chassis. To do this, place the chassis in the service position and lock it in position. Then undo a total of 14 cross-head screws. The screen cover can then be lifted off. After this, unplug all the electrical connectors (ribbon cables) connected to the board which is to be removed.
The AT-CPU and Memory boards are connected together electrically only via the two 3-row edge connectors (48-way and 96-way). If one of these boards is to be removed, the screws (spacing bolts) on the other board should also be undone to prevent mechanical stress during the dismantling procedure.
When refitting either of these boards, first mate the dge connectors together carefully and then tighten-up the spacing bolts. This avoids stressing the boards mechanically.

3.2.4.3 Removing the Interface Board and Display Control Board

Please observe the information in chapter 3.2.4 and chapter 3.2.7.

Before either of these boards can be removed, the AT-CPU and Memory boards must be removed (see chapter 3.2.4.2). The interface board and display control board are also linked via two 3-row edge connectors (48-way and 96-way). Use the same procedure for removing these boards as that described in chapter 3.2.4.2.

3.2.4.4 Removing the Power Supply Unit and Voltage Distribution Board

- Remove the instrument chassis from the casing (see chapter 3.2.1)
- Fold out the chassis and lock it in the service position (see chapter 3.2.2)

- Undo the two screws (M4) holding the power supply to the aluminium separator plate (screws C in figure 3-5 on page 3-4)
- Unplug the following connectors from the voltage distribution board:
  ST7, ST8, ST9 St10, BU2, BU3, BU4, BU5, BU6, Bu11 and BU12
- Carefully slide the power supply unit approx. 1 cm towards the front of the instrument, until the steel casing of the power supply is clear of the four tabs on the aluminium separator plate.
- Carefully pull out the power supply unit towards the left-hand side.

To remove the voltage distribution board, first unplug the two connectors ST/BUX1 and ST/BUX2 from the power supply unit and undo the 5 cross-head screws. The circuit board can now be detached from the power supply unit.

3.2.4.5 Removing the Synthesizer

The instrument chassis must first be removed from the casing in order to remove the complete synthesizer or synthesizer subassemblies (see chapter 3.2.1). The subsequent procedures are detailed under the various sub-headings which follow.

Removing the complete synthesizer

To remove the complete synthesizer, including the SHF preattenuator, YTO adapter and NFO adapter, proceed as follows:

- Unscrew and remove the lower part of the printed back panel cover
- Fold out the chassis and lock it in the service position (see chapter 3.2.2 on page 3-3)
- Remove the two cross-head screws on the aluminium separator plate between the Display/Keyboard and Fold-out chassis/Synthesizer (screws D in figure 3-5 on page 3-4)
- Place the instrument on its left-hand side (power supply side)
- Unscrew the waveguide cable between the SHF pre-attenuator (J2) and the fundamental mixer and remove it carefully without bending it.
- Remove the three countersunk screws holding the aluminium fixing brackets between the back panel and the synthesizer (screws located under the previously removed panel cover, screws E in figure 3-5 on page 3-4)
- Unplug the following connectors on the synthesizer control board (51) [2101-A]:
  ST1, ST2, ST3 and ST7
- Unplug ST13 (50ST13) from the time base /YTO driver board [2101-B] (see figure 3-14)
- Unplug the MCX plugs from the following sockets on the time base/YTO driver board [2101-B] :
  BU1, BU3, BU4, BU5, BU7, BU8, BU11 and BU12

The complete synthesizer can now be removed carefully in the direction of the instrument base (first press the synthesizer on the instrument back panel down towards the instrument base).

> ***Important:*** The waveguide between the SHF pre-attenuator (J2) and the fundamental mixer must be unscrewed or reconnected using a torque wrench (e.g. Suhner wrench, order no. 0000-7689.262).

Removing the NFO adapter board [2101-C]

The 10 MHz standard frequency oscillator is mounted (soldered) on the NFO adapter board. The NFO adapter is mounted on the board [2101-B] with three cross-head screws and spacer bolts. Undo the screws (B in figure 3-14) and pull the NFO adapter up to disconnect ST/BU 101.

Removing the time base/YTO driver board [2101-B]

The time base/YTO driver board [2101-B] is mechanically linked to the control board [2101-A]. All of the screws and electrical connectors which must be undone in order to remove the board are shown in figure 3-14 on page 3-17.

- Fold out the chassis and lock it in the service position (see chapter 3.2.2 on page 3-3)
- Remove the NFO adapter.
- Unscrew the three spacing bolts to which the NFO adapter was fitted
- Unplug the connector to the YTO oscillator (ST17)
- Remove the eight cross-head screws (M3, screws A in figure 3-14)
- Unplug ST13 and ST9 from [2101-B]
- Unplug the MCX plugs from the sockets on the time base/YTO driver board [2101-B] (see figure 3-14):
  BU1, BU3, BU4, BU5, BU7, BU8, BU11 and BU12

The circuit board can now be pulled upwards carefully to remove it.

> ***Caution!***
>
> The time base/YTO driver board [2101-B] is stuck to the control board [2101-A] with a strip of conducting aluminium adhesive tape (attached to the screening covers). Lift the tape off carefully on one side when dismantling the assembly. When reassembling [2101-B], make sure that the adhesive tape is stuck back on to the screening covers again.

Removing the synthesizer divider/phase meter board [2101-K]

The synthesizer divider/phase meter board [2101-K] is attached to the control board [2101-K] by eight cross-head screws M3. The electrical connections can only be disconnected when the time base/YTO driver board [2101-B] has first been removed. To remove board [2101-K] proceed as follows:

- Remove the time base/YTO driver board [2101-B].
- Remove the eight cross-head screws on board [2101-K]
- Disconnect the electrical connections to board [2101-K] (MCX plug, ribbon cable and five soldered connections)

Removing the YIG oscillator (YTO)

The oscillator is contained in an aluminium casing for screening purposes. To remove the YTO, this casing must first be removed. To do this, first remove the complete synthesizer, after which the screen and the YTO can be removed.

Removing the 400 MHz oscillator board [2101-F]

The 400 MHz oscillator board [2101-F] is mechanically linked to the time base/YTO driver board [2101-B] by four cross-head screws. The position of the board is shown in figure 3-14 on page 3-17. To remove the board, first remove the screening cover from the frame and undo the four cross-head screws on board [2101-F]. The electrical connection to [2101-B] is by means of 5 solder pins (MT61 through MT65 in figure 3-14). Carefully unsolder these pins before removing board [2101-F].

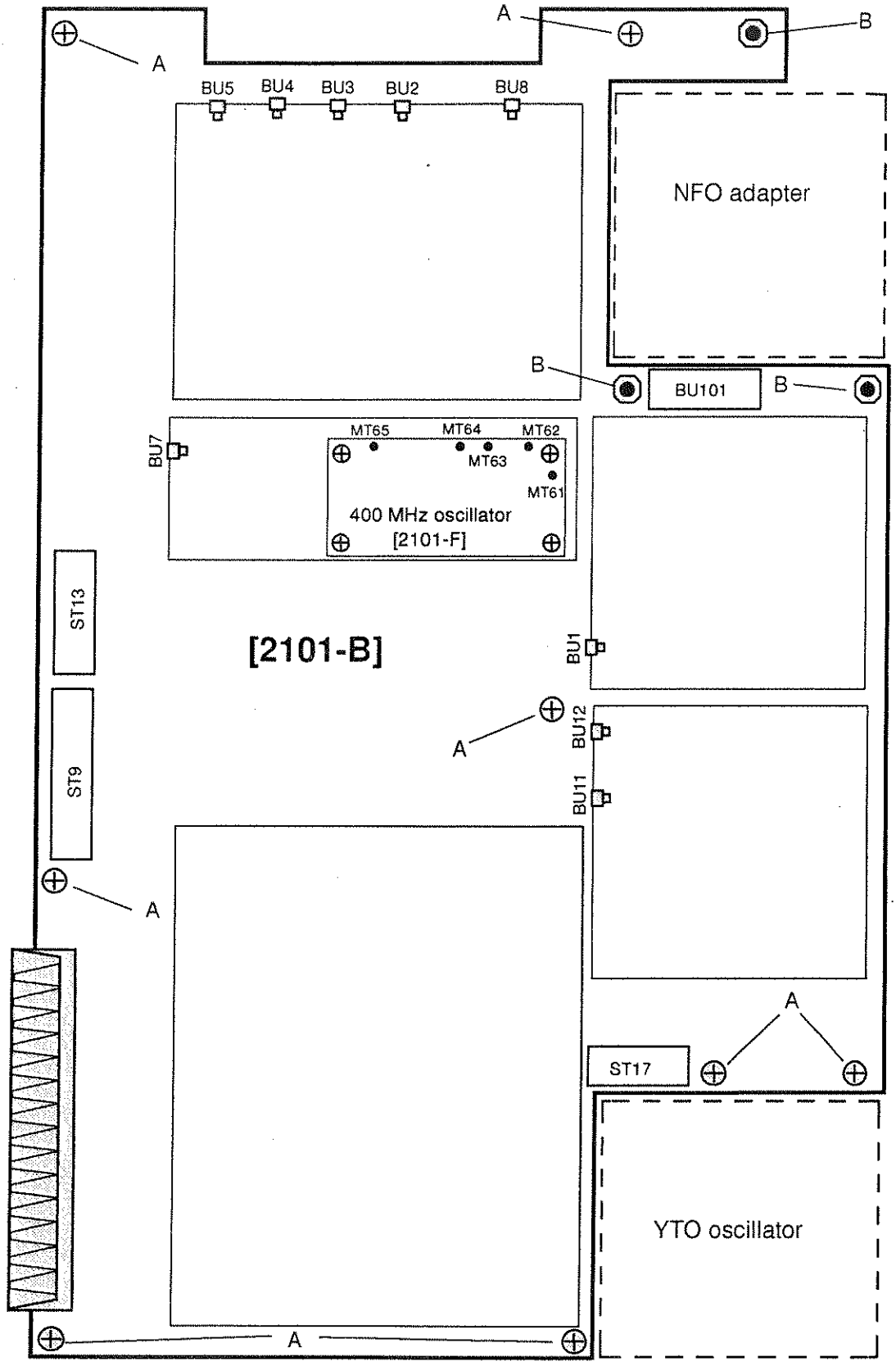

Fig. 3-14 Positions of fixing screws, plugs and sockets on circuit board [2101-B]

3.2.5 Fitting/Removing the Screening Can Covers and Hoods

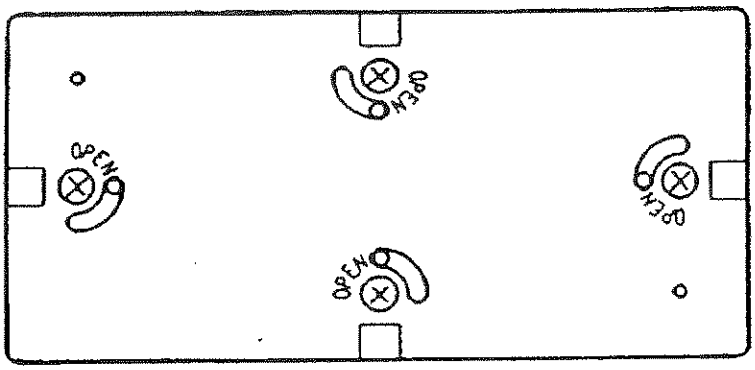

Fig. 3-15 Screening can cover

Opening the cover of the modular screening can

The screening cans are opened with a cross-head screwdriver. The latches are opened by giving the screw about a half turn (pin in the OPEN position).

Caution!

If you turn the screw too far, the locking disks may fall off and cause a short circuit.

Closing the covers of modular screening cans

Before replacing the cover on the can, set all latches to OPEN (pin). This ensures that the cover fits tightly on the can giving effective screening. Then close all latches and screw down with a torque of 100 Ncm ± 5 Ncm (torque screwdriver).

Removing the hoods of the modular screening system

The screws in the hoods are removed with a cross-head screwdriver.

Fitting the hoods of the modular screening system

The screws in the hoods are tightened using a torque of 70 Ncm ± 5 Ncm (torque screwdriver).

Important: If covers and hoods are not fitted correctly, the instrument may malfunction severely.

3.2.6 Replacing the A.C. Line Fuse

Refer to section 8 of the operating manual under the heading "Changing the fuse".

3.2.7 Replacing the Memory Buffer Battery

A lithium battery is plugged on to the memory board (17). This battery provides power for buffering the RAM when the instrument is switched off. The RAM contains the instrument-specific correction data and the user setups, among other things. If the lithium battery is removed when the instrument is switched off, this data will be lost within a few seconds.
If the battery is to be replaced as a precaution during repairs (average battery life is about 5 years) the user setups should first be saved on a floppy disk (see chapter 4.8) .

Caution!

Before replacing the battery, make sure that the "Compensation Data Disk" belonging to the instrument is available and free of errors, so that the correction data tables can be re-loaded into the RAM after the battery has been replaced (see chapter 4.7). If the "Compensation Data Disk" is not available, a back-up copy of the RAM disk (battery-buffered RAM) must be made so that this can be copied back into the RAM disk after replacing the battery (see chapter 4.9).