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4.1 PREVENTIVE MAINTENANCE

4.1.1 Replacing Cabinet Air Filters

Figure 4.1-1

Once a year, or when otherwise required, the air filter should be replaced. In the TCs 6810-6814 the filters are pulled out/pushed in at the rear of the cabinets' base section. In TC 6824 the filter is placed at the rear of the back cover and is loosened by pressing the holder down and tilting it backwards.

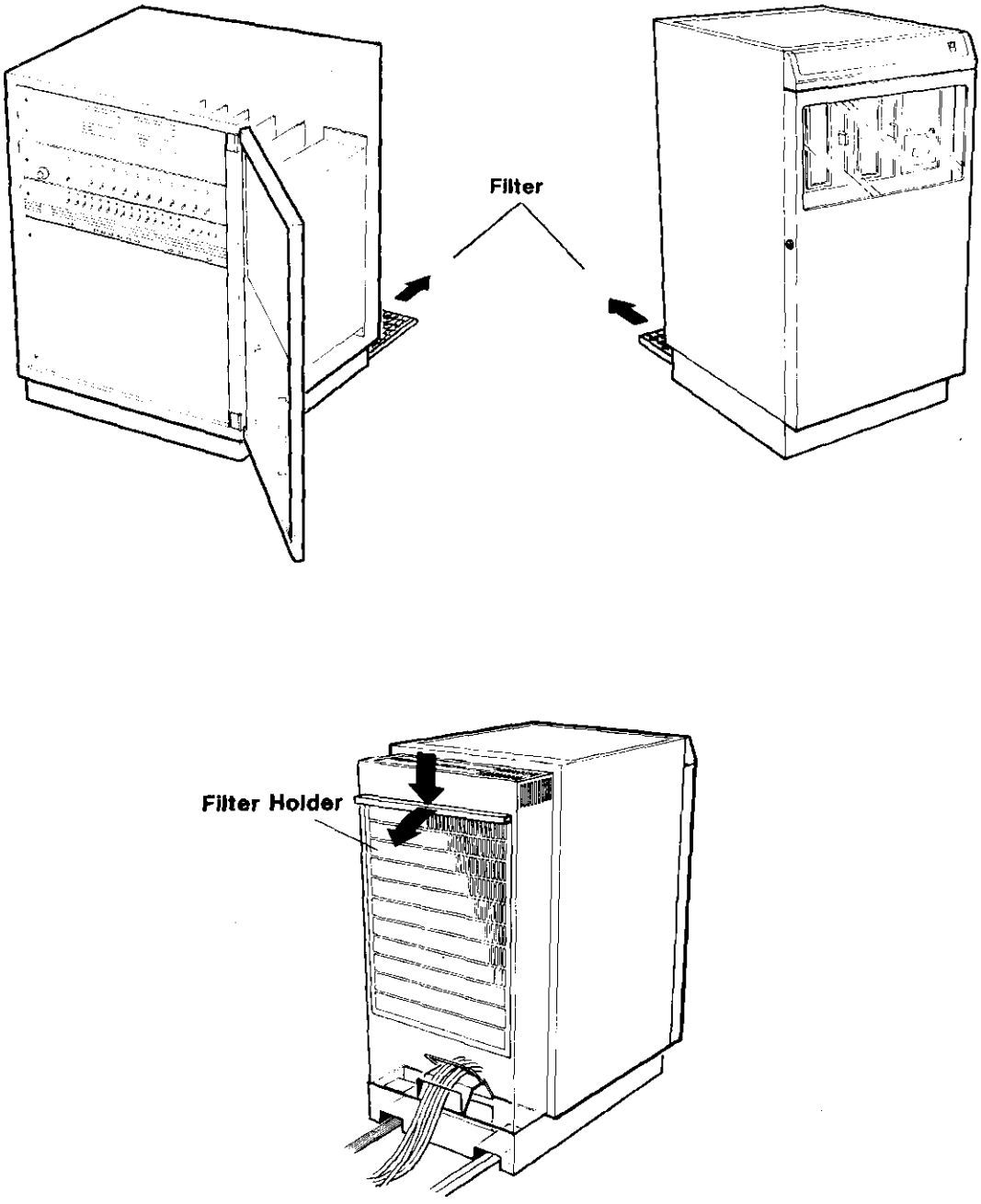


Figure 4.1-1 Replacing Air Filters

4.1.2 Preventive Actions to DCR 6861

Figure 4.1-2

Every Week

Clean the head and the capstan, the tape guides and the pinch rollers with Philips wet cleaning cassette (5322 397 34004). This cleaning operation should be a part of the operators' working routines and not a business of service technicians!

Every 6 Months

- Clean the capstan, the pinch rollers and the read/write head; all with cotton wool buds or chamois leather cloth and isopropanol.
- Clean the chassis from wear and dust particles with a brush.
- Clean the BOT/EOT detector (49) with a dry brush and replace the BOT/EOT lamp assembly (69).
- Clean the gear wheels (78) with a brush.
- Clean the belt (62) with isopropanol and check the condition (if necessary; replace the belt).
- Grease the following points with Molycote BR2:

  a) The contact-faces of the retrieval segment (107) and latch assembly (96) with the cassette holder top section (106).

  b) The contact-faces of the retrieval arm (102) with the A-side lever (112) and write-enable lever (113).

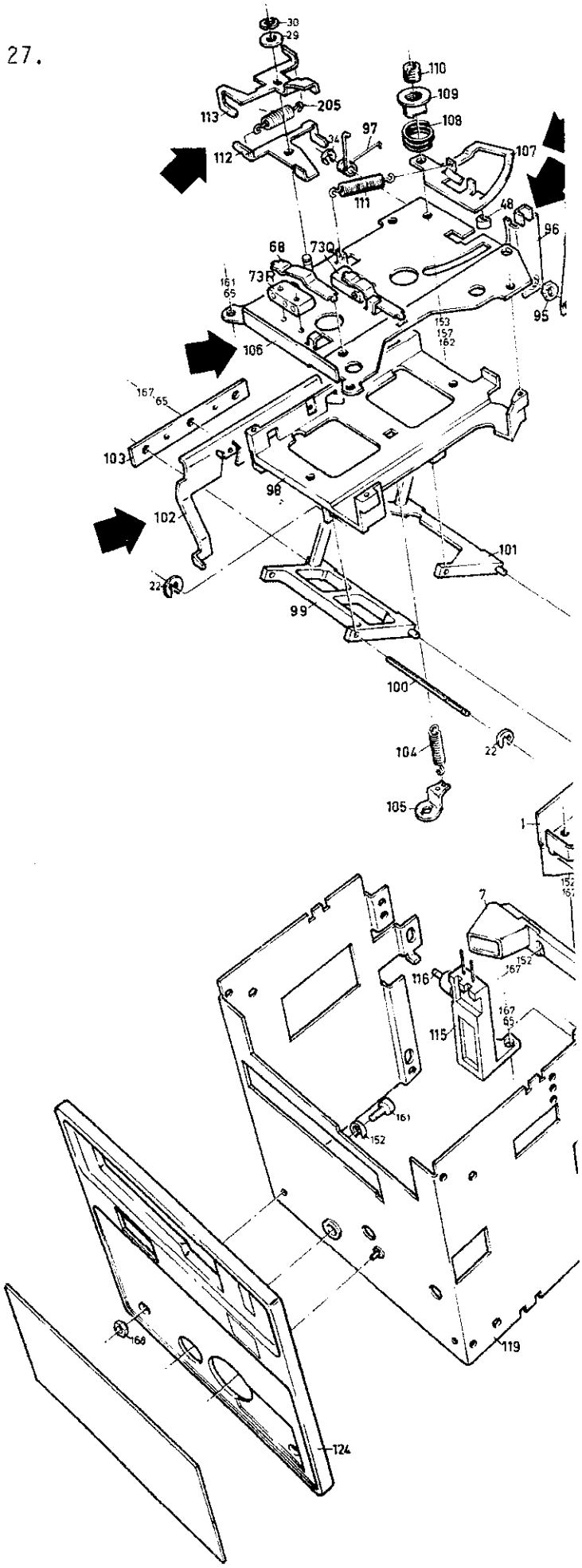
  c) The contact-faces of the two clamps (58A,B) with the nipples (56A,B).

Every 12 Months

Grease (with Molycote BR2) the following pivots of the cassette holder lift section:

- lift levers (99) and (101) with the cassette holder bottom section (98),
- lift levers (99) and (101) with the chassis (1),
- two guides (76A) and (76B),
- contact-face of the retrieval lever (2) with the chassis (1),
- contact-face of the lock slide (8) with the chassis (1),
- contact-face of the lever (51) with the chassis (1),
- pivots of the four solenoid flap assemblies (11A), (11B), (11C) and (12),
- pivot of the rod (33) with the rocker arm assembly (35),
- contact-face of the nipple (26) with the rod (33).

Lubricate the spindles (39,40) with Tegula 27.



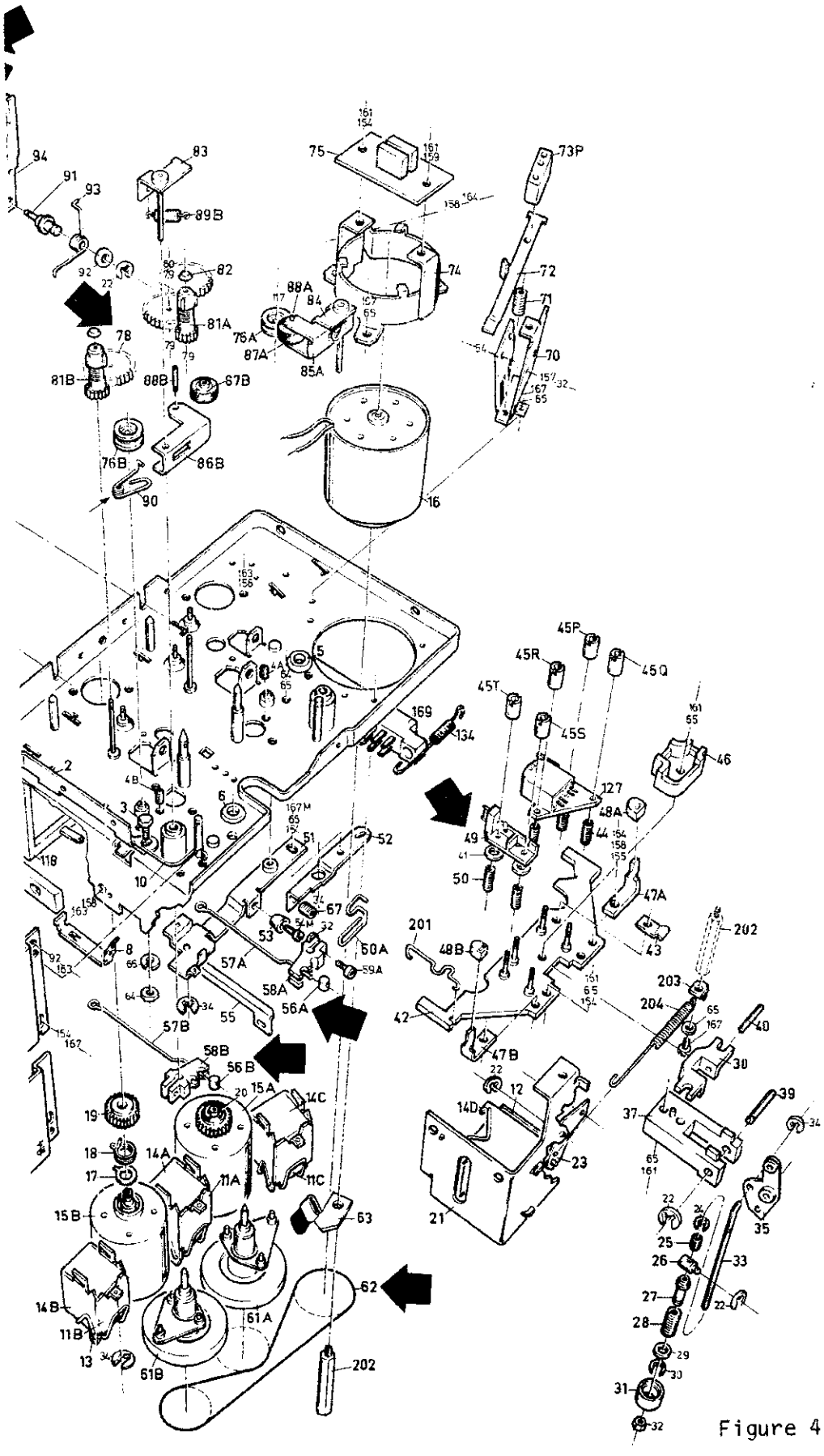


Figure 4.1-2 Exploded View of DCR

4.1.3 Preventive Actions to DCR 6865

Every Week

Clean the head and the capstan, the tape guides and the pinch rollers with Philips wet cleaning cassette (5322 397 34004). This cleaning operation should be a part of the operators' working routines and not a business of service technicians!

Every 5000 Hours

- Clean the chassis from wear and dust particles with a dry brush.
- Clean the pulleys, the head, the capstan and the pinch rollers with isopropanol.
- Clean the openings for the BOT LED and the photocell by means of a soft brush.

4.1.4 Preventive Actions to FDD 6867

Every 600 Hours Figure 4.1-3

Inspect the head load pad. If pad is worn, dirty, torn or loose it should be replaced as follows:

CAUTION

Do not raise the head-load arm to the 90-degree position and then release it; damage to the load-arm spring and/or to the head (core and ceramics) could result.

a. Remove power from the unit.

b. Move the carriage assembly to its rear most position (towards the stepper motor) by turning the back part of the stepper motor shaft. This will provide clearance for lifting the head load arm.

c. Lift the head load arm until the head load pad is visible.

d. If head load arm is a 77603108 (the type shown in Figure 4.1-3) proceed to step h, if not go to step e.

e. Remove the used pad with a sharp tool, if necessary, and discard. Be sure to remove all of the old pad and adhesive. Alcohol may be used to remove the old adhesive.

f. Remove the protective backing from the new head load pad and position pad in centre of recess of head load arm. Press pad firmly to insure adhesion with a clean tongue depressor or with thumb using a lint free cloth to protect the pad from grease or dirt.

g. Go to step n.

h. Loosen clamping screw holding rim of head load pad.

i. Insert screw driver and rotate head load pad so flattened side will clear clamping screw.

j. Remove Pad Holder Assembly.

k. Insert new Assembly, with flat side towards clamping screw.

l. Assuring that head load pad is fully seated, rotate pad 180°.

m. Tighten clamping screw to hold pad in place.

n. Lower arm gently onto head.

Inspect the read/write head. If cleaning is required, proceed as follows:

CAUTION

Do not smoke while cleaning. Do not touch a head surface with fingers. Do not leave residue or lint on the head surfaces. Residual particles can result in a scored disc and/or loss of a head.
Do not raise head-load arm to the 90-degree position and then release it; damage to the load-arm spring and/or to the head (core and ceramics) could result.

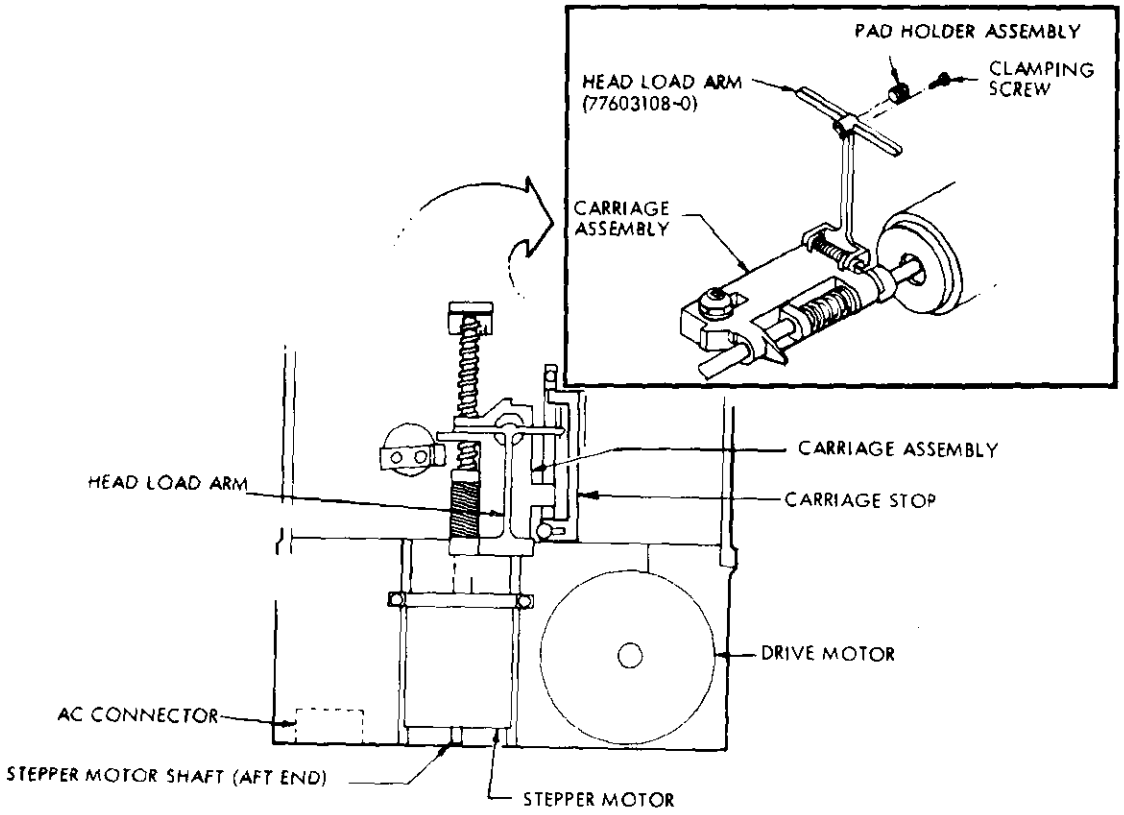


Figure 4.1-3 Head Load Pad Replacement

a. Use lint-free cloth to lightly drybuff head surface. Cleaning is completed if deposits are removed.

b. If oxide deposits were not removed in step (a), dampen (do not soak) cloth with cleaning solution (91% isopropyl alcohol) and wipe head surface. Finish by lightly dry buffing again to ensure that the head is dry and no alcohol residue is left.

4.1.5 Preventive Actions to Battery Modules (TC 6824)

Approved Battery Types

There are three types of 12V-batteries approved for use in TC 6824:

- Chloride - Gates X016 ABS Case
- SAFT PA 1204
- Sonnenshein Dryfit A300

Two batteries in series are required to build up the 24V module used in the computer.

Maintaining Stored Batteries

The battery module should be kept separately until the computer is delivered to customer. The batteries should not be left without charge for more than 4 weeks to prevent excessive discharge and/or increased internal resistance.

A charging voltage of 2.3V per cell or 13.8V for a 12V battery (common for all types) is recommended. The recommended batteries are completely sealed and no gas is emitted when under charge. A charging unit where the batteries in store can continously be charged is convenient.

Before delivery the batteries should be checked with a load of about 0.5A. The battery voltage should then be at least 2.05V per cell or 12.3V for a charged 12V battery.

Adjusting Charging Voltage in PSU

When changing computer-installed batteries from the Chloride type to the SAFT/ Sonnenschein type, or vice versa, it is necessary to adjust the charging voltage supplied by the PSU. The adjustment is made by means of potentiometer R153, see chapter 7! The charging voltage should be 28.4V for a Chloride module, and 27.0V for SAFT/Sonnenschein modules.

4.2 TROUBLESHOOTING

4.2.1 General

The aim of corrective field service is to find and replace faulty subunits in the shortest time possible. It is useless to try to create any kind of fault finding scheme, because every service technician has developed his own methods of troubleshooting. However, mind the following basic rules:

- Ask operators for symptoms; same or similar symptoms at several work stations indicate computer error.
- Use your eyes, ears and nose!
- Where available; run the diagnostics programs built into the equipment (subsections 4.2.2 & 4.2.3).
- If necessary; simplify the system by unplugging all unnecessary subunits. Load a few instructions via a service control panel and test the system instruction by instruction (chapter 3).
- Mind U-links and switches on subunits and on computer rack backpanels.
- Inspect "weak" components; fuses, switches, cables and lamps.
- After repair; run rest programs (chapter 5) to verify proper functions.

CAUTION

Switch off power before unplugging subunits. Bus transceivers are otherwise easily blown and may block the complete bus!

****
* THE BEST SERVICE TECHNICIAN IS NOT THE ONE WHO CAN IN DETAIL EXPLAIN THE *
* CAUSE OF A TROUBLE, BUT THE ONE WHO REPAIRS IT IN THE SHORTEST TIME! *
****

The service policy is: KEEP THE CUSTOMER SATISFIED!

4.2.2 Diagnostics Aids in TC 6813

General

Figure 4.2-1

To make use of the diagnostics aids of the TC 6813 (CPU P857), it is necessary to have access to an Extended Full Panel (EFP) and to set the CPU in diagnostics mode.

The diagnostics mode is set by moving the upper U-link on backpanel 1C from position NORM to position DIAGNOS.

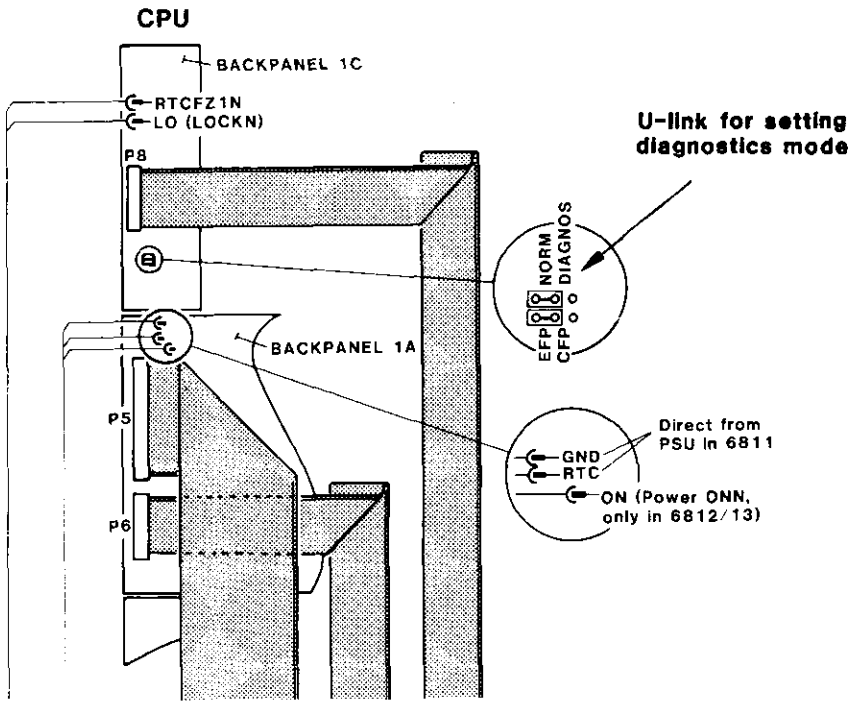


Figure 4.2-1 U-Link for Diagnostics Mode in TC 6813

Basic Test

With the U-link in position DIAGNOS:

a. Operate each DATA switch and check that corresponding indicators are lit.

b. Press the LR button, operate each DATA switch and check that corresponding indicators are lit.

c. Repeat actions according to b.

d. Repeat the b-actions another time.

These tests exercise all switch- and indicator positions of the panel, as well as the data path. Some functions are also tested in the registers L, M and Q, in the ALU and in the selectors C and D.

Go/No-Go Test

With the U-link in position DIAGNOS:

a. Set DATA switch 0 to position 0 and press the RUN button.

b. Wait for the DATA display: 0000 0000 0000 ●000 (● = dark indicator).
   If expected display, proceed with c, otherwise; replace the CPU board.

c. Set address of existing control unit (channel unit) on DATA switches 02-07, press the LM button.

d. Wait for the DATA display: 0000 0000 0000 0000 (all indicators lit).
   Expected display indicates correct memory operations and correct communications with the addressed control unit (channel unit).

4.2.3 Diagnostics Aids in TC 6814 & TC 6824

Full refreshed Control Panel, FRCP

To make use of the diagnostics aids of the TCs 6814 and 6824 (CPU 857R/857RA), it is necessary to have an FRCP connected to P10 on backpanel 1C.

Automatic Power-On Test

An automatic test is executed at the power-on time. It tests the major part of the CPU, the FRCP interface, a part of the FRCP itself and its cable. A correct test result is indicated by the code FFFC on the righthand part of the display, provided that the panel is not in LOCK state.

This automatic part of the test is of "go-no go" type. If the expected code is not displayed it is not possible to distinguish if the problem is due to the CPU, to the FRCP or its cable, and it is not possible to run further tests.

Operator-Controlled Test

Further tests can be started by the operator, provided that the automatic test indicated correct function. These additional tests are started by pressing the FRCP buttons TEST and 0 simultaneously. The result of these tests is indicated by one of five possible codes, shown on the righthand part of the display:

```
Code 0001  =  CPU Error
     0002  =  Bus or Control Unit Error
     XX03  =  Bus or RAM Error
     YY04  =  Correct Function
     0010  =  MMU/IOP Error (or absent)
```

Note: XX = 8 most significant bits of the memory address causing the error

YY = 8 most significant bits of the last memory address

The address causing the bus/memory error can be read from A1 by the operator, and the contents of this address can be read from A2 by the CPU.

4.3 REPLACEMENT INSTRUCTIONS

4.3.1 Cabinet & Rack Assemblies, TC 6812/13/14/24

Removing Back- and Top Covers Figure 4.3-1

The back- and top covers of the cabinets are removed in the following way:

- Open the front door.
- Pull forward the release lever of the back cover (at the underpart of the nose section).
- Disconnect the earth wire from the back cover and lift it off. ENSURE THAT THE WIRE IS RECONNECTED WHEN THE COVER IS REFITTED!
- Pull down the two snap locks of the top cover (inside the rear of the cabinet).
- Lift the rear edge of the top cover and pull it backwards.

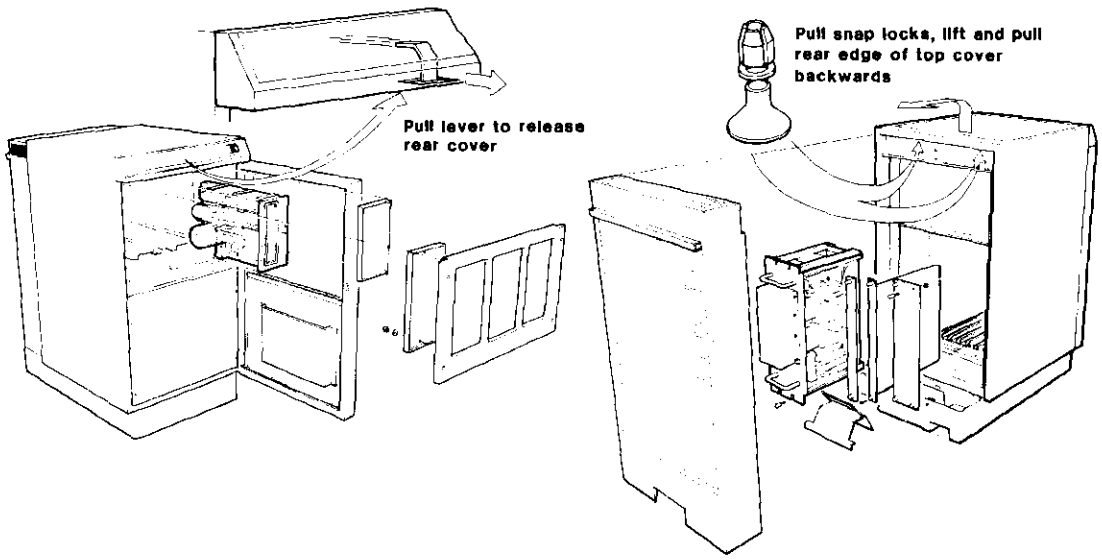


Figure 4.3-1 Removing Back- and Top Covers

Removing Nose Section

The nose section, containing the mains switch (magnetic circuit breaker), removed in the following way:

- Remove the back- and top covers according to description above.
- ENSURE THAT THE CABINET IS DISCONNECTED FROM MAINS SOURCE!
- Loosen the nose section by removing the six screws from inside.

> CAUTION!
>
> HOLD THE FRONT DOOR FIRMLY DURING THE FINAL PHASE, BECAUSE ITS UPPER HINGE PIN IS FITTED INTO THE NOSE SECTION AND WILL NOW BECOME LOOSE.

- Lift off the door and disconnect the wires from the mains switch in the n section. ENSURE THAT ALSO THE EARTH WIRE IS RECONNECTED WHEN THE NOSE SECTI IS REFITTED!

Removing the Rack

The main rack of the cabinets is removed in the following way:

- Remove the back- and top covers according to previous description.
- ENSURE THAT THE CABINET IS DISCONNECTED FROM MAINS SOURCE!
- Disconnect and remove the control panel(s) together with the blind panel(s)
- Disconnect all external cables screwed onto the rack front, or plugged PCB front panel connectors.
- Remove the rear grid or plate behind the FDDs (and the DCRs).
- Disconnect and remove the heavy submodules, i.e. PSU, FDDs and DCRs.
- Loosen the rack by removing the six screws along the vertical front edg and carefully pull the rack out of the cabinet.

Removing the Fan Unit (TC 6812/13/14)

The fan unit, fitted in the base section of the cabinets, is removed following way:

- Remove the rack according to description above.
- Loosen the fan unit by removing the six screws that fix the chassis t base section.
- Disconnect the earth wire, the mains cables and lift up the fan unit. PL THAT THE EARTH WIRE IS RECONNECTED WHEN REFITTING THE FAN UNIT!

Replacing the DCR Backpanel (TC 6812/13/14)

The backpanel at the rear of the DCR sub-rack is replaced in the following way:

- Remove the back- and top covers according to previous description.
- Remove the rear grid or plate behind the FDDs and DCRs.
- ENSURE THAT THE CABINET IS DISCONNECTED FROM MAINS SOURCE!
- Disconnect the cables from the backpanel and loosen it by removing the nuts from the rear.

Replacing the Rack Backpanels 1B, 1C and 1D

Pull out all boards plugged into the rack and remove the rack according to previous description. Remove all interconnections between the backpanels and loosen panels by removing their top and bottom brackets inside the rack.

Replacing the Rack Backpanel 1A

- Remove backpanel 1B (bottom one) according to instructions above.
- Unscrew and remove the edge connector guide along the bottom of backpanel 1A (inside the rack), and take care of the washers fitted.
- Slide down the backpanel and lift it out (if necessary; loosen also the top guide - but do not remove it).
- When refitting a new backpanel - do not forget the washers!

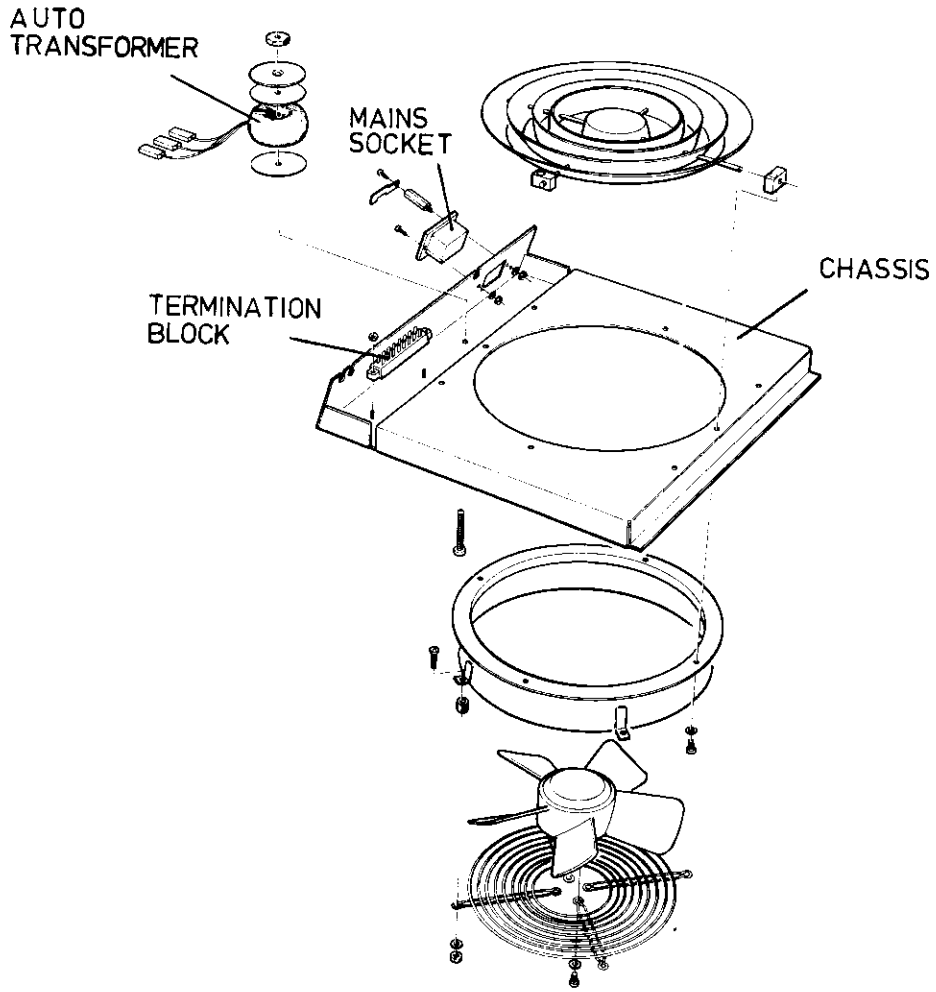


Figure 4.3.2 FAN-UNIT & FILTER