

PICTURE TUBE REPLACEMENT

Removing the defective picture tube

Attention

WARNING: CRT HANDLING

The picture tube encloses a high vacuum and care must be taken not to bump or to scratch the picture tube as this may cause the tube to implode resulting in personal injury and property damage. Shatterproof goggles must always be worn by individuals while handling the CRT or installing it in the projector. Do not handle the CRT by the neck.

How to access the picture tubes for removal

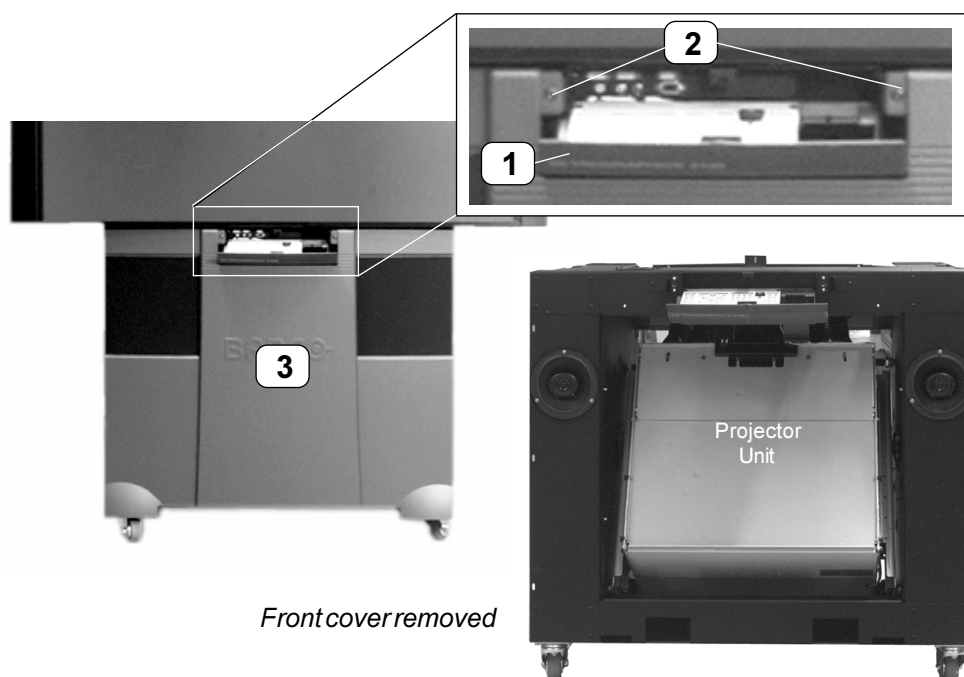
The following parts of the Retroprojector have to be removed to gain access to the picture tubes:

- front panel removal.
- removing the Convergence module.
- Two Cover plates, covering the picture tube assembly.

How to remove front panel

To remove the front panel, proceed to the following step:

| Step | Action |
|------|--|
| 1 | Power down the projector and pull out the power cord from the wall outlet. |
| 2 | Open the local keypad by pressing gently the keypad cover (1). |
| 3 | Turn the two lock screws (2) with a screwdriver or a coin a half turn counter clockwise. |
| 4 | Remove the front cover (3). |



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Preparations before CRT removal

Before starting the CRT replacement, remove the:

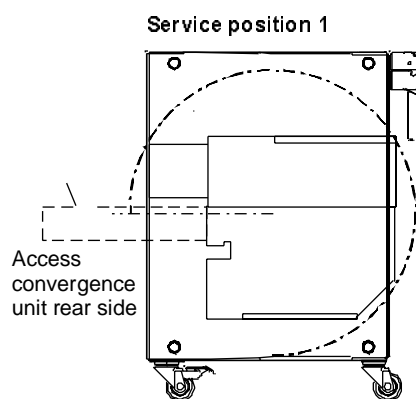
- **Convergence module**
- the **Shields**, covering the CRT units and
- the support for the lens dust cap (only for Green CRT replacement)

How to remove the Convergence module

To remove the Convergence Module, proceed to the following steps:

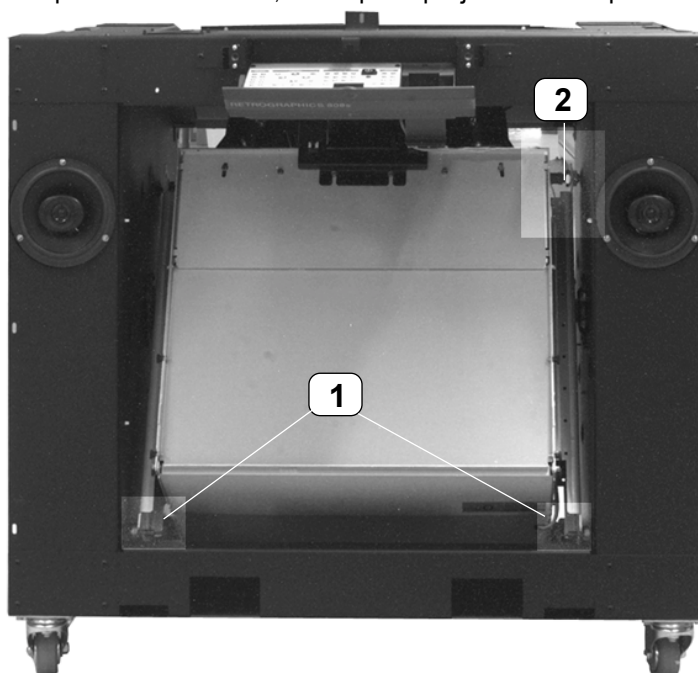
| Step | Action |
|------|--------|
|------|--------|

- | | |
|---|--|
| 1 | Rotate the Projector Unit in 'Service Position 1', proceed to the following steps: |
|---|--|

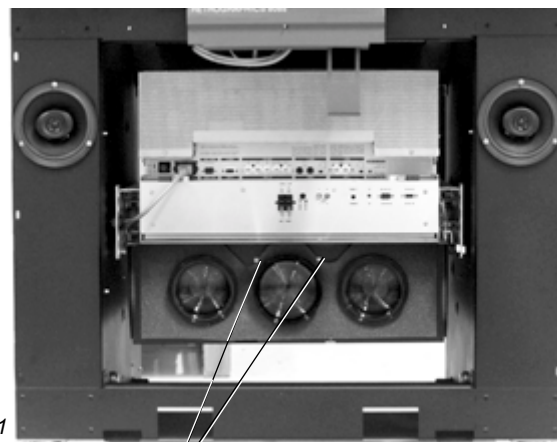


| Step | Action |
|------|--------|
|------|--------|

- | | |
|---|---|
| 1 | Loosen both rotation lock screws (1) on the bottom of the projector unit. |
| 2 | Pull the projector unit Lock pin (2) towards the projector unit and turn the projector unit until 'Service position 1' is reached. The lock pin jumps in the provided holes in the cabinet when the Service position is reached, to keep the projector unit in position. |



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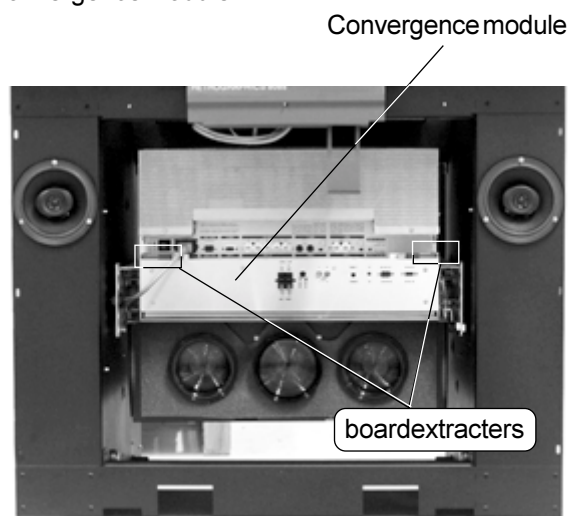
*Projector unit in
Service Position 1*

Important: if you have to replace the **GREEN CRT**, remove also, in this projector position, the two nuts, holding the dust support to the lens of the green CRT.

Step Action

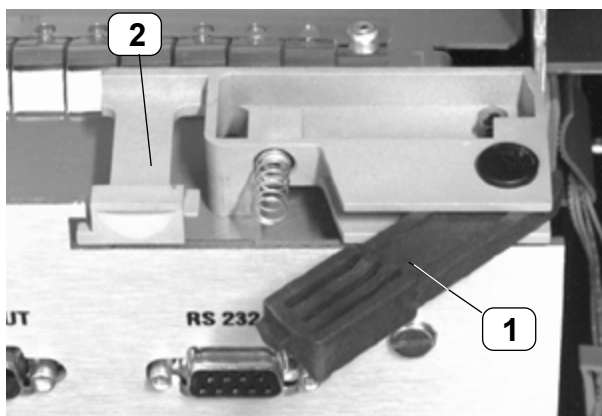
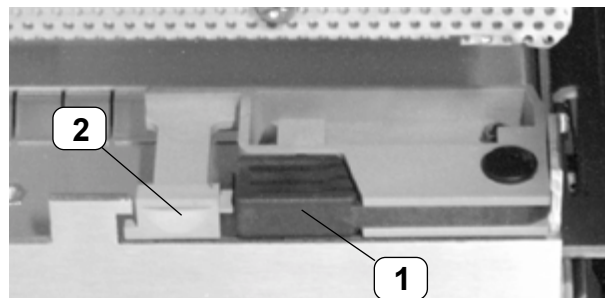
- 2 Remove the **Convergence module**, proceed to the following steps:

| Step | Action |
|------|--|
| 1 | Unlock both boardextracters (1) (on both sides of the module) by pushing the respective boardextracter lock (2) upwards. |
| 2 | Pull both boardextracters simultaneously towards you to disconnect the module from its connectors. |
| 3 | Remove the Convergence module |



see next page for details about the boardextracters

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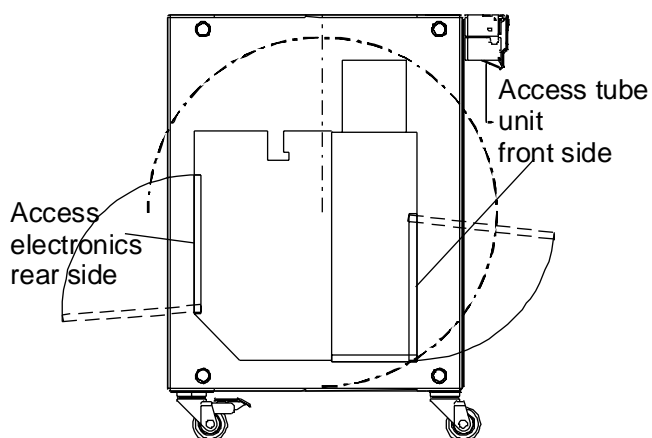
How to remove the shields

Removing the **Shields**, covering the CRT units , proceed to the following steps:

Step Action

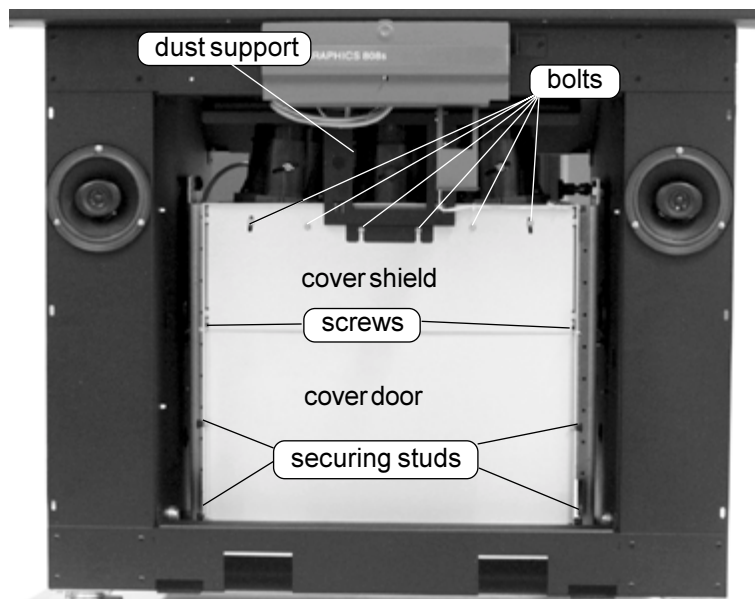
- 1 Rotate the Projector Unit in 'Service Position 2', proceed to the following steps: (see page 2 for procedure)

Service position 2



- 2 Remove the two screws, securing the friction pads of the cover door, and loosen the 4 securing studs of the cover door. Remove the cover door.

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- 3 Remove the 6 bolts, holding the CRT blocs to the cover shield. Remove now the cover shield by pulling it out the side frame.

Attention: only in case of the replacement of the GREEN CRT: the dust cap support becomes free when the two bolts of the green CRT block are removed (see also page 3).



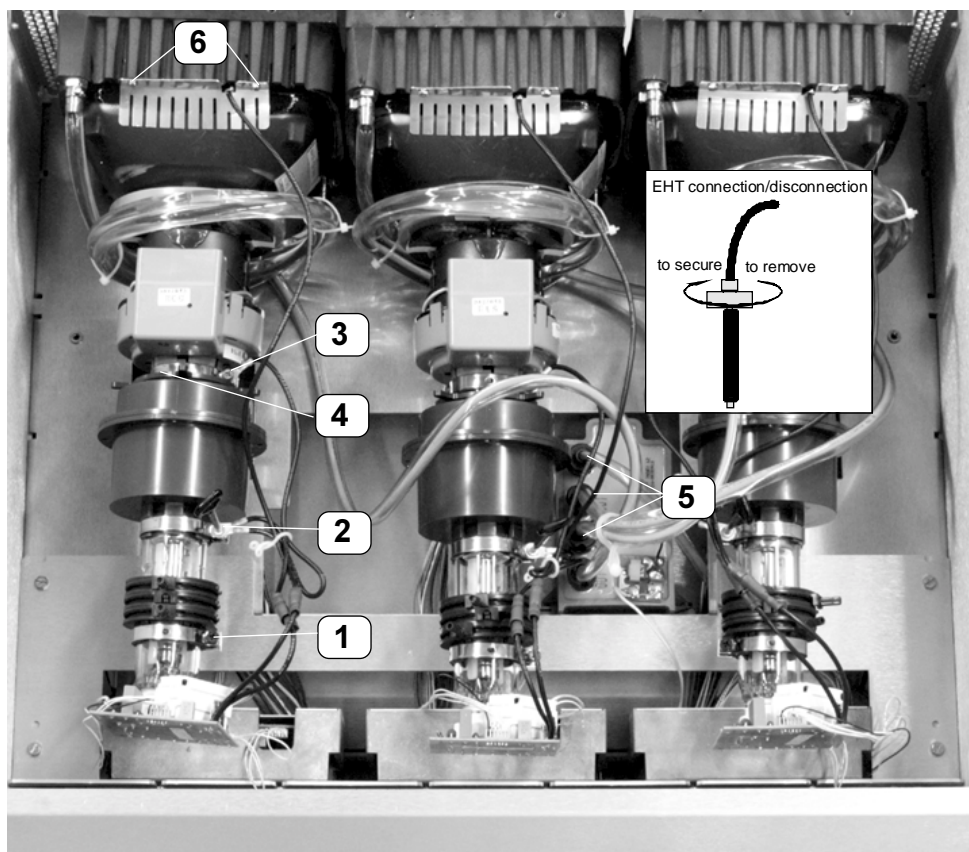
Cover door and Cover shield removed

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How to remove the CRT components

Losing the **CRT components**, proceed to the following steps:

The components on the neck of the CRT, to be replaced, have only to be loosened and further to be slid from the neck when removing the picture tube.



The Units on the picture tube are clamped on the neck of the picture tube by means of a gear clamp. Follow the next steps to loosen:

| Step | Action |
|--|---|
| 1 | Loosen the gear clamp (1) of the Magnetic unit |
| 2 | Loosen the gear clamp (2 & 3) of the Focus and Deflection unit and the clasp ring (4) of the Focus unit . |
| 3 | Pull out on the EHT splitter the respective EHT lead (5) of the defective CRT. |
| 4 | Remove the two screws (6) , securing the Aquadag shield to the CRT heatsink. |
| <i>numbers refer to illustration above</i> | |

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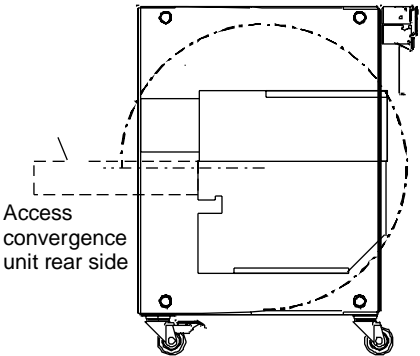
How to remove the defective lens

To remove the lens of the defective CRT, proceed to the following steps:

| Step | Action |
|------|--------|
|------|--------|

- | | |
|---|--|
| 1 | Rotate the Projector Unit again in the 'Service Position 1', proceed to the following steps: |
|---|--|

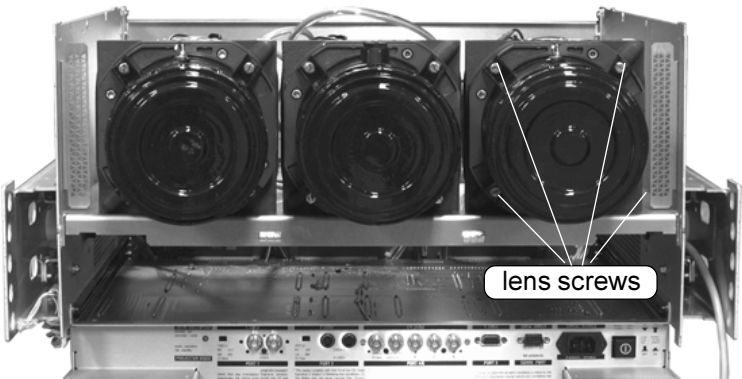
Service position 1



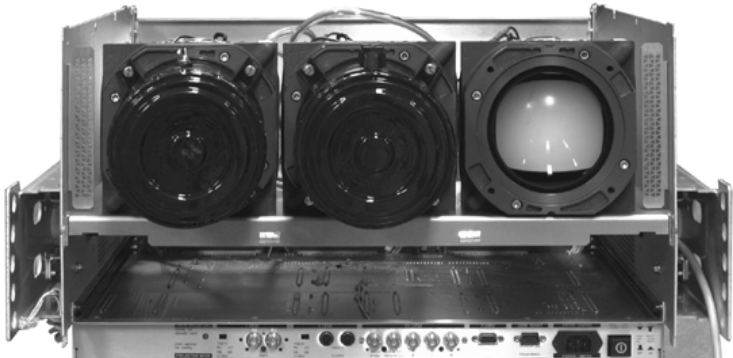
| Step | Action |
|------|--------|
|------|--------|

- | | |
|---|--|
| 1 | Pull the projector unit Lock pin (2) towards the projector unit and turn the projector unit until 'Service position 1' is reached. The lock pin jumps in the provided holes in the cabinet when the Service position is reached, to keep the projector unit in position. |
|---|--|

- 2 The lens is fixed to the CRT block by 4 screws, 2 on top and 2 on bottom of the lens. Support the lens with one hand and remove the 4 screws. Put the lens on the table watching not to scratch the lens.



lens removed



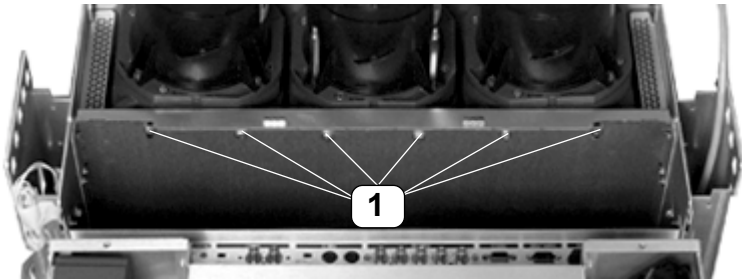
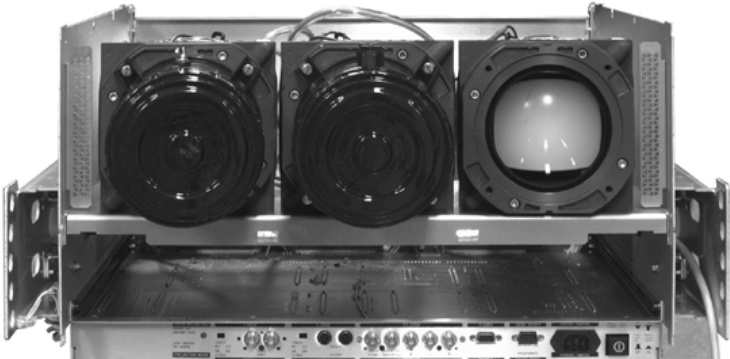
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How to remove the defective CRT

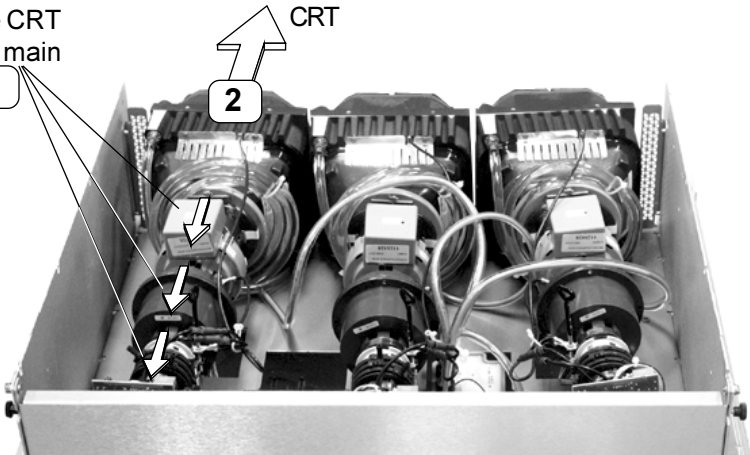
The picture tube is still fixed to the main frame by two screws, accessible in the area of the removed Convergence module.

To remove the defective CRT, proceed to the following steps:

| Step | Action |
|------|--|
| 1 | Remove the two bolts (1) securing the defective picture tube to the main frame. |
| 2 | Remove the defective CRT (2) from the main frame, sliding the neck components (3) off of the CRT neck. |



Components on the neck of the CRT stay in the main frame (3)



CRT

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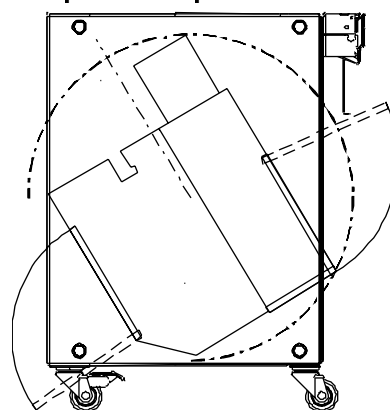
Mounting the new picture tube

Installing the new CRT

To install the new CRT, proceed to the following steps:

| Step | Action |
|------|---|
| 1 | Insert the CRT (2) in the frame, simultaneously sliding the neck components (2) onto the neck of the picture tube (see page 8). |
| 2 | Secure the position of the CRT with two bolts (1) (see page 8). |
| 3 | Place back the lens on the CRT block and secure with the 4 lens screws (see page 7). |
| 4 | Rotate the projector unit into Service position 2 (see page 2 for procedure) |
| 5 | Secure the position of the neck components on the CRT, insert the EHT lead in the EHT splitter and mount the aquadag shield on the CRT heatsink (see page 6). |
| 6 | Reinstall the Cover shield (+dust cap support) and the Cover door (see page 5). |
| 7 | Rotate the projector unit into Service position 1 (see page 2 for procedure). |
| 8 | Put back the Convergence module (see page 3). |
| 9 | Rotate the projector unit into Operation position and secure the operation position (see page 2 for procedure). |
| 10 | Put back the front cover (see page 1). |

Operational position

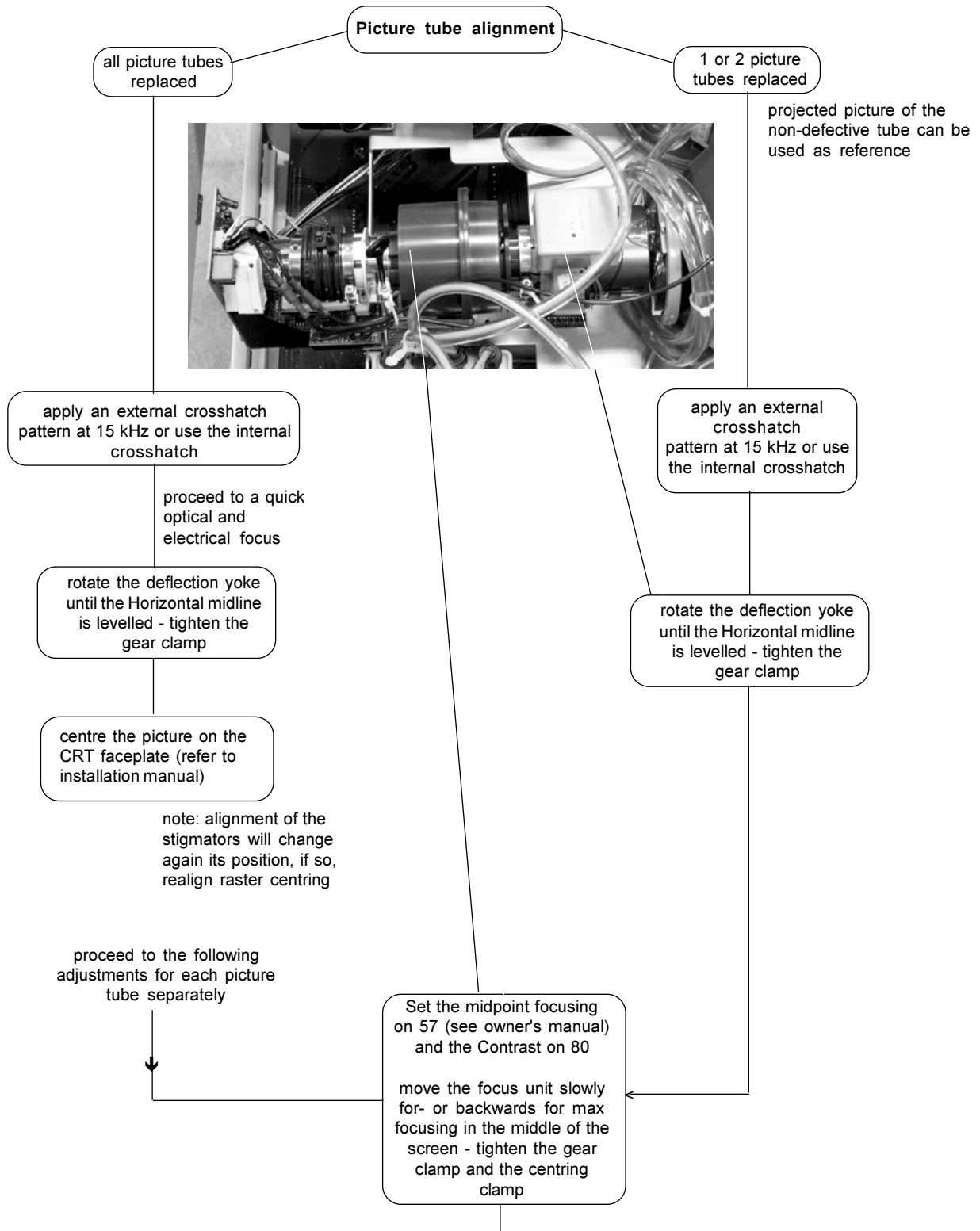


Proceed now to the adjustment of the replaced picture tube (see next pages)

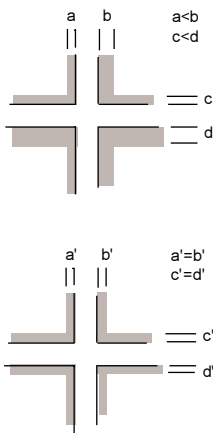
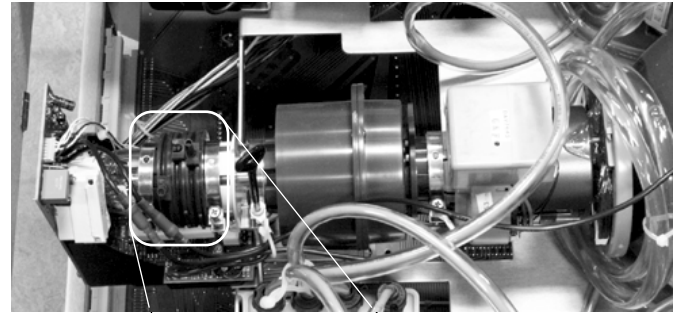
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Picture tube alignment

Before starting the alignment of the new picture tube, the projector must warm up for at least 15 minutes at a medium brightness and contrast.



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lower the Brightness and
put the Contrast on its max
with the RCU
Set the midpoint focusing
on 0

adjust the 2-pole magnets rings by
rotating one or both up to a point
where 'shading' of both sides of
the vertical and horizontal lines is
equal.

realign the electrical and
optical focus

select a source that
generate a field of small
dots and crosshairs

Set the midpoint focusing
on 100

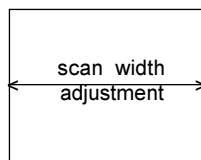
adjust the 4-pole rings until the
defocused dots are circular.

realign the electrical
and optical focus

reposition the raster as
described earlier

due to mutual influence between the
stigmators, focus and centring, it is
advised to repeat above a couple of
times

decrease the Contrast and
Increase the Brightness to
reveal the background raster



see service sheet 'Deflection
switching/Hor Amplitude' in this
manual for the alignment of the
image width coils

Note: when only one tube has
been replaced, the image width
of one of the other tubes as a
reference, and obviously limit
the adjustment to the core of the
corresponding replaced tube

