Colour television

Service
Service
Service

FL '93-'94

Training Manual

Contents

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PHILIPS

NEW SEGMENTATION

LOW	50 Hz	FL1 Styling National Brand PIP-Vision ML-Styling
MEDIUM	100 Hz	
TOP	DIGITAL SCAN	FL2 Styling

FLX-'93 1.CHP

ELECTRICAL CHANGES

New Combfilter

ECO 100 Hz

Software

DNR per program

Habit watching TXT

MECHANICAL CHANGES

FL2 Styling

FLX-'93 2.CHP

FL2 styling only for Digital Scan

FL1.10 Succesor of FL1.0

- No external speaker connections
- No surround sound outputs
- No SVHSin on the front
- No SVHSoutput at the rear
- External sources are named: EXT1, EXT2, Front
- RC remote without LCD display
- Switching to external is done by a toggle function using the button
- Habit watch TXT (50Hz DVTB teletext) on the remote
- NEW combfilter

SSP changes

New control board for Habit watch TXT.

The new combfilter has a different position from the old one.

LSP changes

The +5 Volt has a new stabilization circuit, for supplying the new 900 frontend. The +5 is now adjustable. The surround sound output amplifiers are no longer present.

FLX-'93 3.CHP

FL1.17 Succesor of FL1.7

- No external speaker connections
- No surround sound outputs
- No SVHSin on the front
- No SVHSoutput at the rear
- External sources are named: EXT1, EXT2, Front
- RC remote without LCD display
- Switching to external is done by a toggle function using the button on the remote
- New (small) 100Hz box

SSP changes

New control board for Habit watch TXT.

LSP changes

The +5 & +13 Volt have a new stabilization circuit, for supplying the new 900 frontend.

The surround sound output amplifiers are no longer present.

The Line Output Stage uses a FET (TS7501).

FLX-'93 4.CHP

FL1.10 = low, FL1.17 = medium

FL1.16 / FL2.16 — Succesor of FL1.6

For FL1.16

- External sources are named: EXT1, EXT2, Front
- Switching to external is done by a toggle function using the button on the remote
- Habit watch TXT

Extra for FL2.16

- FL2 Styling

Mains switch at left side
Controls at right side
LSP and SSP in plastic bracket
New picture tube fixation
Only 2 LEDs in the front
ON/Standby

Superflat 29"

- In FL2 Styling
- North-South correction (flatter tube)
- SCAVEM

FLX-'93 5.CHP

FL2.14 — Succesor of FL1.2 BB

- External sources are named: EXT1, EXT2, Front
- Switching to external is done by a toggle function
- Habit watch TXT
- SCAVEM, DAF & Frame rotation in 32"
- Panoramic view
- FL2 Styling

Mains switch at left side
Controls at right side
LSP and SSP in plastic bracket
New picture tube fixation
Only 2 LEDs in the front
ON/Standby

LSP & SSP changes

- Panorama panel in bracket above sound outputs
- Frame rotation circuit on SCAVEM panel
- Only 50Hz PIP module (no 16:9 PIP)

FLX-'93 6.CHP

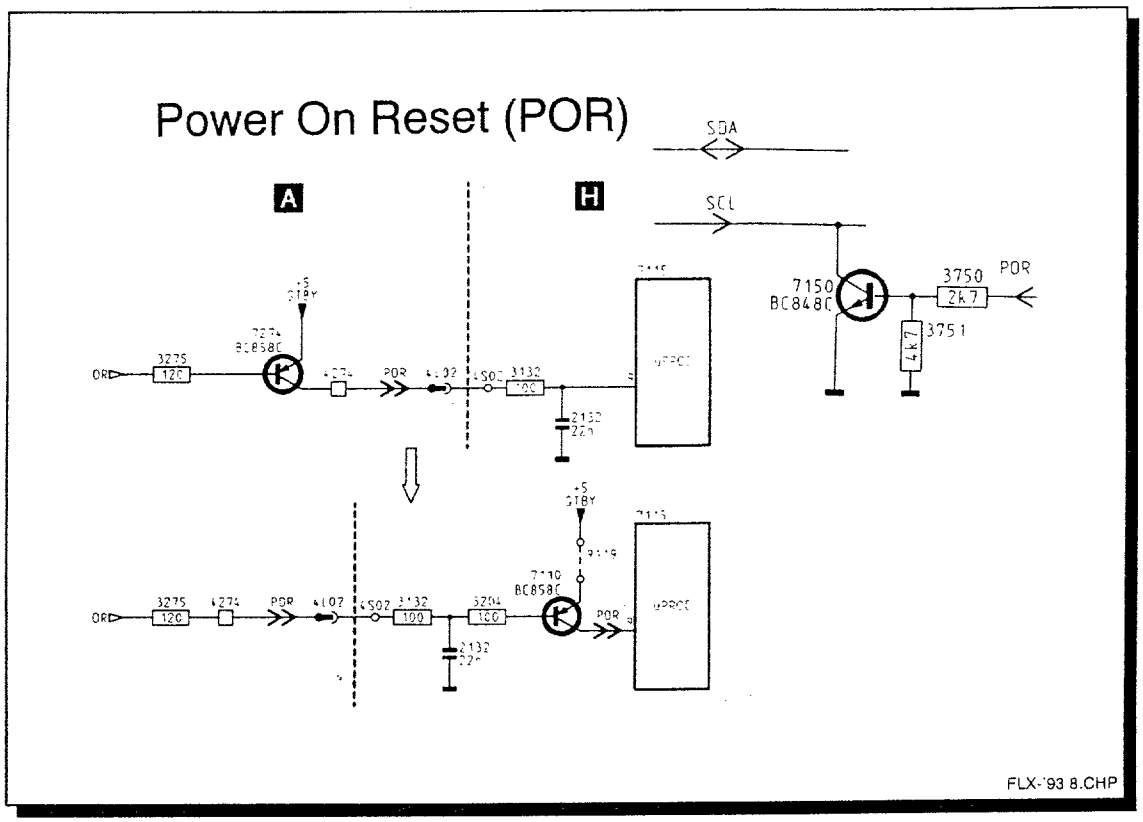
FL2.16 = FL1.16 + FL2-styling

FL1 PTV

- Introduction of 4:3 46"
  - No satelite box
  - New 4:3 Screen box (no doors/speakers)
- No more 41"
- No '93 electronics/software

FLX-'93 7.CHP

Personal notes:



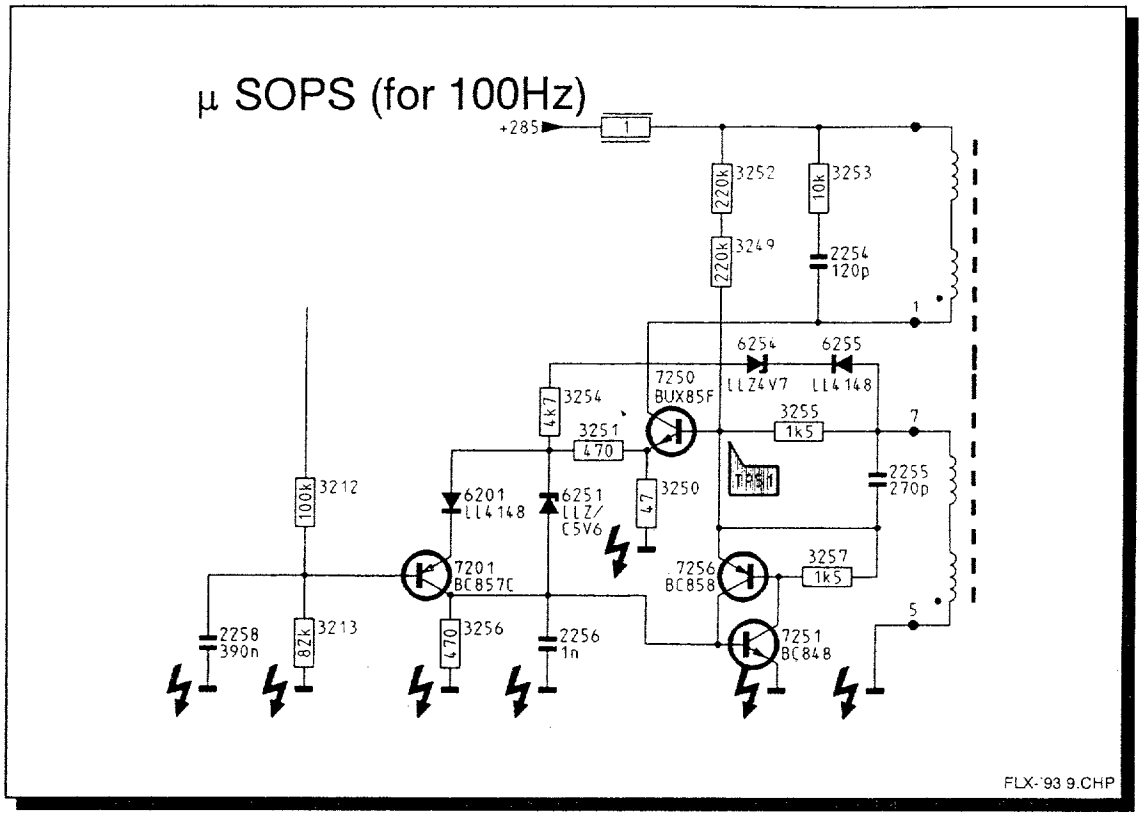
In FL1 sets of '91 en '92, it occurred that a part of the memory got wrong data. Especially faulty option codes are in this respect very annoying. To improve this the POR circuit has been changed.

The P.O.R. pulse has not changed, however the P.O.R. circuit has changed:

1. The circuit has changed to the figure above.
2. As the P.O.R. transistors are placed on the LSP, the distance to the µ processor is big (long copertracks making an antenna for EMC). Especially Picture Tube flashes caused problems. Therefore P.O.R. transistor TS7274 has been moved to the SSP. The transistor has now position number TS7110.
3. If the POR is high, TS7150 will conduct, so that the SCL line of the I2C bus is shortcircuited, and no information is passed through over the I2C bus, until the supply voltages have reached the correct levels.

Personal notes:

I^2C bus pulled down during start up



To improve the switch -off behaviour of the μSOPS, the circuit has been changed.

Via R3252 and R3249 a start current is fed to TS7250. TS7250 will start to conduct, causing the voltage on pin 1 of T5255 to drop on pin 7 of T5255 to rise. This will increase the voltage on the base of TS7250, which will be fully conducting. The increasing current through TS7250 results in an increasing voltage across R3250. If the voltage across R3250 rises over 6.2 volts, D6251 will conduct. The thyristor circuit around TS7256 and TS7251 will conduct, and TS7250 will be switched of very fast.

The collectorvoltage of tS7250 will rise to more than +300V. Pins 14 and 17 of T5255 will become positive and energy is transformed to the secondary side. If no energy is left in the transformer, C2454 will oscillate with winding 1-3 of T5255. If pin 1 of T5255 becomes more positive than pin 3, pin 7 will become positive, which will cause TS7250 to conduct again.

Personal notes:

Reliability improvement

900 Tuner

- More current from 5V
- More output signal

- FQ916
  Less IF Bandwith
  - Not suitable for SECAM DK
  - Not suitable for NICAM-I

FLX-'93 10.CHP

Starting with the '93 program a new series of tuners is introduced in FL1; the 900 tuner range. These tuners are not compatible with the 800 range tuners.

- The new tuners need more current, therefore the +5V has been adapted on the LSP.
- The output signal are bigger, so that the SSP has also been modified.

The 900 tuner/frontend are available with built in PIP-splitter for the full-PIP sets.

NICAM-I / SECAM DK

The sound -IF bandwidth of the FQ916 frontend is not sufficient for SECAM DK or PAL-I NICAM. For these purposes a special /42 set is in production, which still uses the FQ816 front-end.

Personal notes:

800 front-end still for /07 and /42

ERROR MESSAGES

- No error messages during normal operation
- In the service mode error messages via the LED's

MUTE

- Mute function no longer via TDA8417
- Mute function via hardware mute in sound output
- Mute controlled by I/O expander on SSP (IC7175)

FLX-'93 11.CHP

Error messages

From the '93 sets onwards, the error messages are no longer displayed in the normal TV mode. Only in the Service mode, the error codes will be given on the LED's.

Mute

The mute function is no longer activated in the TDA8417 audio processor. The hardware mute on the LSP, already in use for "anti-plop" mute is now also controlled by the µ-processor for normal muting. The control is done via pin of I/O expander IC7175 (PCF8574), already on the SSP for checking the status signals of the euroconnector inputs.

Personal notes:

FL2 Styling

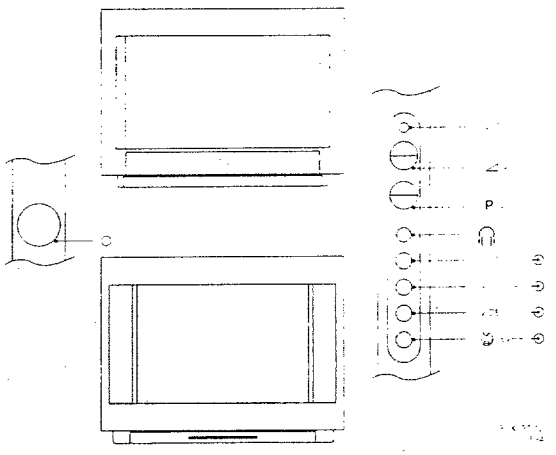
Service features

Chassis bracket
- Stable service position
- Accesibility of PWB sides

Error indication via LED's

Separate exchangable mask

Prepared for future additions
- FL2G
- GFL



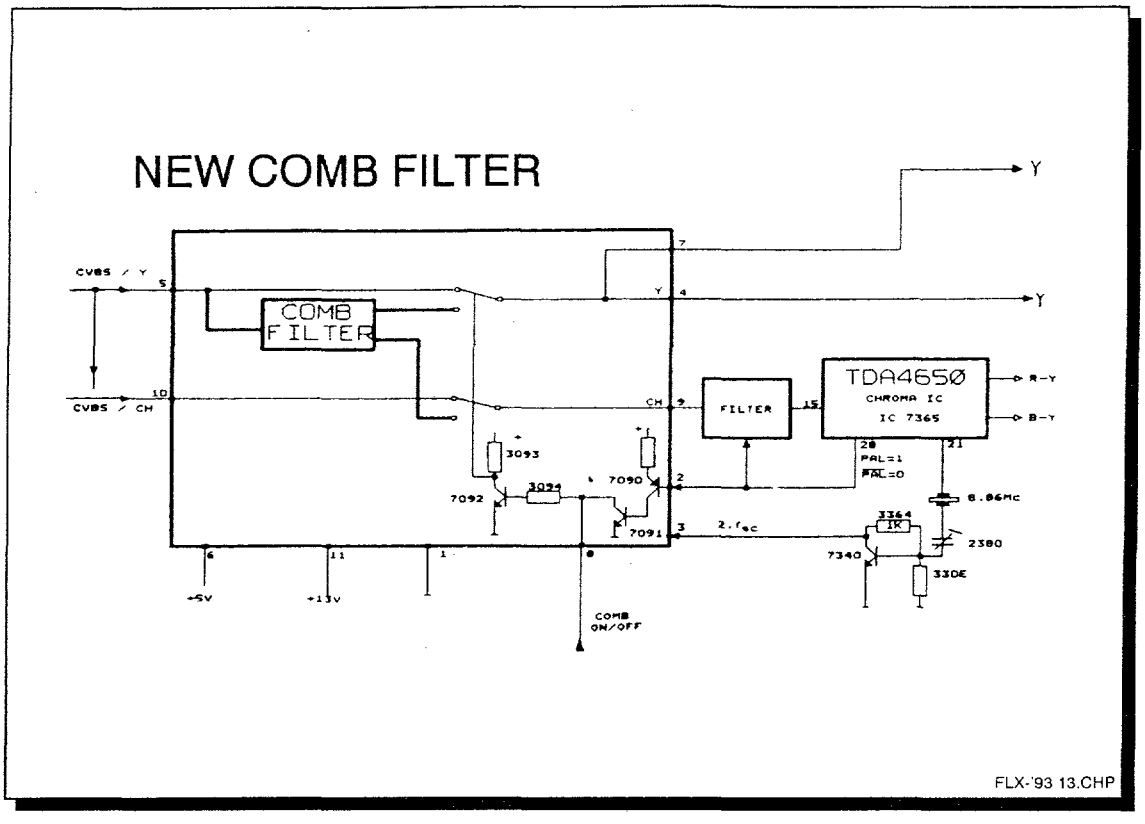
FLX-'93 12.CHP

The FL2 is mainly in styling different from FL1.

The mains switch, the controls and the "front" inputs are now on the sides. To make this possible, these parts are mounted onto new PWB's.
Only 2 LED's are left in the front. For the displaying of error messages, service LED's are mounted on the control panel at the inside of the set.

Personal notes:

Service position improvement



The new comb-filter is a single chip PAL comb-filter. The same filter is also used in the GR2 sets.

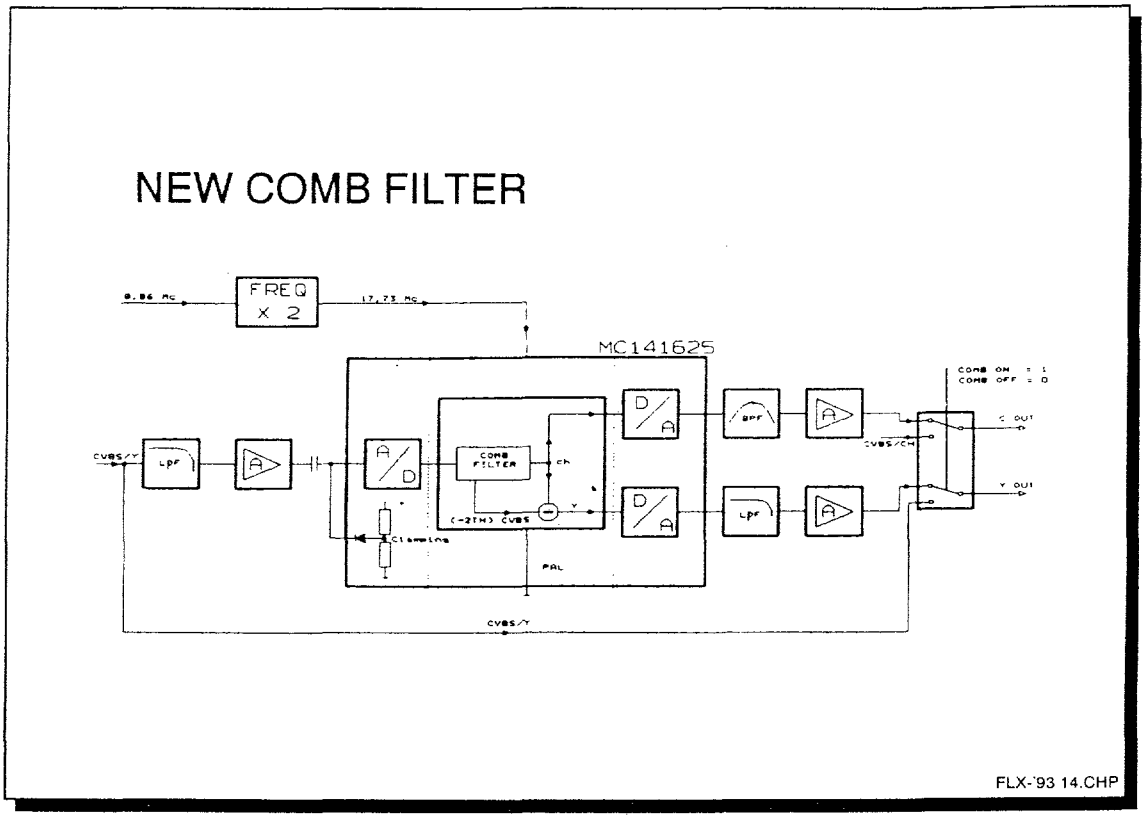
The comb filter filters the chrominance and luminance signal from the CVBS signal. For the timing it uses the 8.86 MHz clock of the subcarrier oscillator of the chrominance decoder.

With the PAL signal from the chrominance decoder (IC7365) and the SVHS signal from the microprocessor the Comb filter is only switched on in case of PAL-CVBS signal processing.
In this case the luminance filter in the chrominance path is also switched off.

Personal notes:

Smaller, Simpler, Universal (also for GR2)

Comb filter



FLX-'93 14.CHP

Comb filter

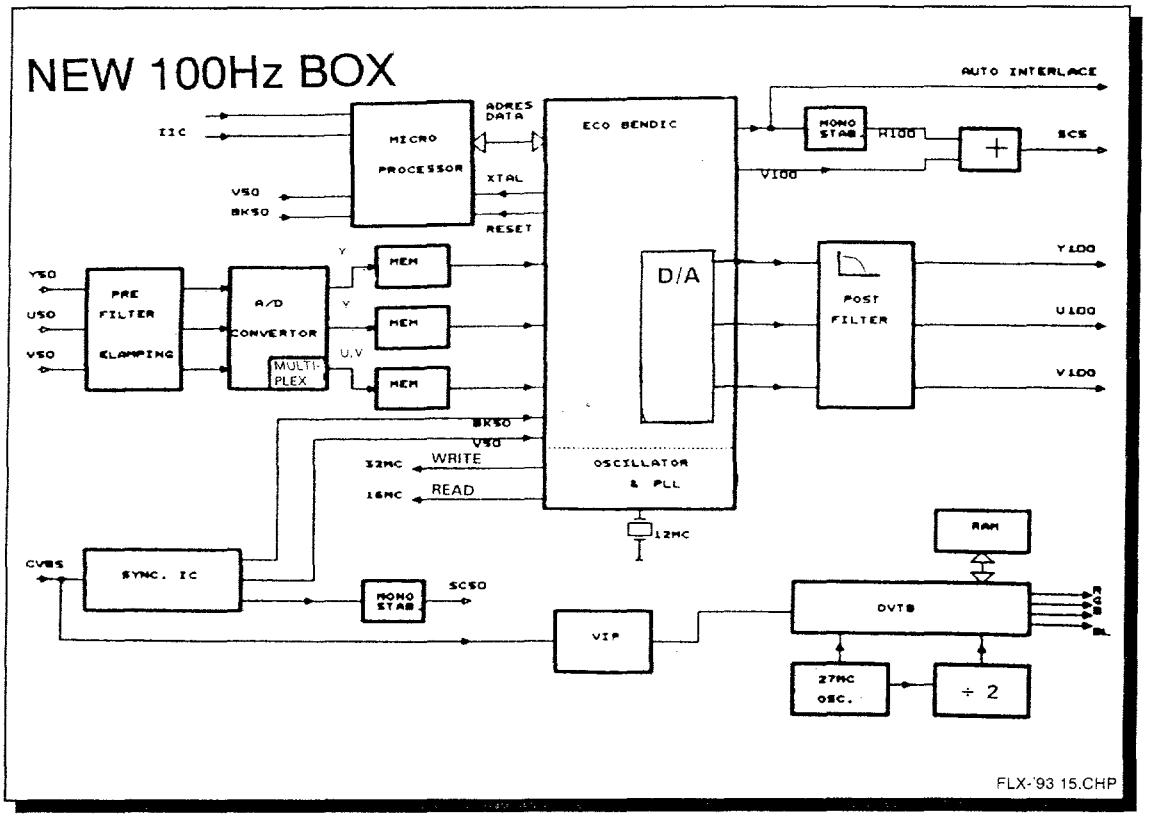
The input CVBS signal passes a low-pass filter. This is to avoid distortion when the comb filter digitizes the signal. At the input the signal is clamped, after which it is fed to a D/A converter. The digitized CVBS is then com-filtered. The comb-filtered chrominance is made analogue again and is fed out via pin 8.
The comb-filtered chrominance subtracted from the CVBS signals gives the luminance signal, this is also made analogue again and is fed out via pin 4.

The output signals are filtered and fed to the Comb-filter on/off switch. In case of PAL-CVBS the comb-filtered signals are fed to the outputs. In all other cases the CVBS/Y and CVBS/C signals will be fed to the outputs.

Personal notes:

Only for PAL

New 100 Hz box



The new 100Hz box gives standard 50-100Hz scan rate conversion. It is based on the Digital Scan box, where several functions are combined into 1 IC, the ECO-Bendic (Back END IC).

The Y, U and V signals are fed through 3 low-pass filters to avoid aliasing. The signals are then fed to 3 triple A/D converter. The digitized information is then written into the memories with a 16MHz clock frequency and read out again with a 32 MHz clock. The digital 100Hz Y, U and V signals are the fed to the ECO bendic.

The ECO bendic also controls the timing of the conversion. It runs on a clock frequency of 12 MHz, from which it generates a 32MHz read clock. This read clock is divided by 2 and also used as a write clock. The oscillator is via a PLL circuit locked to the 50Hz burst key. The ECO bendic is synchronised by the line and frame pulses from the sync IC. The 100Hz synchronization signals for the large signal panel are directly generated by the ECO bendic.

The digital video information is made analogue again in the ECO bendic and is via Post-filters fed to the small signal panel.

The ECO-bendic also has a simple multi-PIP function. By writing only one in every 3 samples in a line, and only one in every 3 lines, 9 "PIP" pictures can be written into the memory. These PIP pictures are always "still picture".

Therefore every set with this new 100 Hz box has multi PIP, even without a PIP unit. If also a PIP unit is present, it works separate from the 100Hz box.

The new 100Hz box also contains a teletext decoder, which generates a 100Hz teletext signal. As the box can have the 64k RAM for habbit watch TXT.

Personal notes:

Derived from digital scan box

SOFTWARE CHANGES

- LFR On/Off via menu
- DNR selection per program
- Habit Watching TXT
- EXT selection via toggle function

FLX-'93 16.CHP

Personal notes:

HABIT WATCH TXT

- New TXT control system
- Makes the TXT more userfriendly
- Reducing the waiting times
- 64k memory

Page look up table

- Table which pages are available
- Only available pages are stored
- Last page and the next 9 pages are stored

Page catching

- Looks for page numbers
- 3 digit numbers are located
- If page number available ---> stored in memory
- 17 memory pages
- FIFO (First in first out) principle

FLX-'93 17.CHP

Habit watch TXT is a new control system that makes the TXT more userfriendly. Main target is reducing the waiting times. Ideally all pages should be available directly, this would however need too much memory.

The Habit watch system reduces the waiting time significantly with 64k memory.

WORKING PRINCIPLES

Page look up table
Habit watch makes a table (Program look up table (PLUT)) which tells the system which pages are available. Only available pages are from now on stored. The last page and the next 9 pages are stored in the memory.

Page catching
The Habit watch system looks through a whole page for page numbers. If on the page on the screen 3 digit numbers are found. If that page is available, it stored in the memory. 17 memory pages are available for this. These pages are filled using the FIFO (First in first out) principle. If more pages are found, the first ones are deleted.

Personal notes:

Habit Watch TXT

HABIT WATCHING

- A list is kept of pages requested
- Requested pages are added to list
- If already in table, put in top
- 19 memory pages
- FIFO principle

ROLLING PAGES

- 9 rolling pages can be stored
- Available pages in top of screen
- Selected with menu+ and menu

USER MESSAGES

- Wrong number: use 1..8
- Page not present
- Requested page is looked up
- No teletext transmission
- Page is being shown

FLX-'93 18.CHP

Habit watching
A list is kept of all pages requested by the user in the past. Pages are only added if they are not already present in one of the other memory places. If a page is already in the table, it is put in the top of the list. 19 memory pages are available for this. These pages are also filled using the FIFO (First in first out) principle. If more pages are found, the first ones are deleted.

Rolling pages
Up to 9 rolling pages can be stored in the memory. The available pages are shown in the top of the screen, and can be selected with menu+ and menu-.

User messages
The habit watch system can display a number of messages to the user. The messages will be shown in the language the customer has installed.

- Wrong number: use 1..8
- Page not present
- Requested page is looked up
- No teletext transmission
- Page is being shown

Personal notes:

HABIT WATCH TXT

USE OF MEMORY	
Display page	1
OSD	1
Page look up table	10
History list	2
Page catching	17
Habit watcher	19
Rolling pages	8
TOP/FLOF	5
AVAILABILITY CHANCE	
Present 15 page memory TXT	20%
Habit watch 63 pages memory	88%

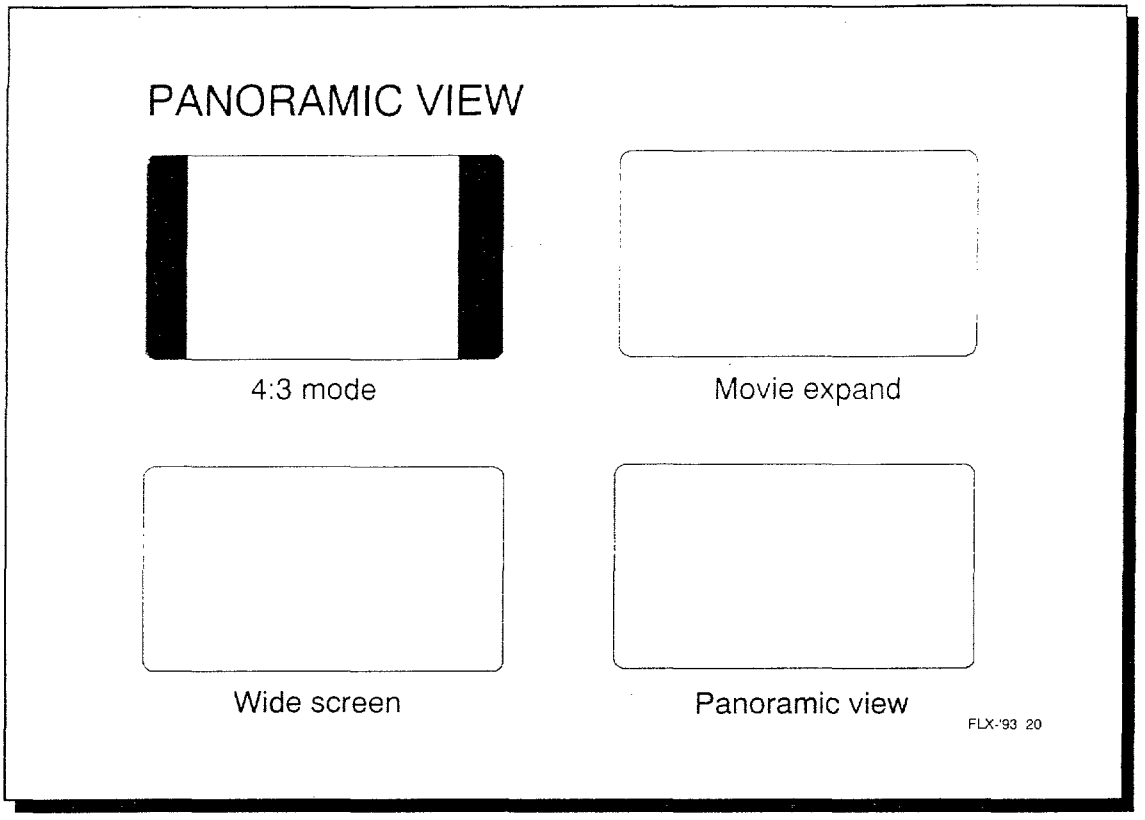
FLX-'93 19.CHP

USE OF MEMORY

Display page	1
OSD	1
Page look up table	10
History list	2
Page catching	17
Habbit watcher	19
Rolling pages	8
TOP/FLOF	5
Total	63
Availability chance	
Present 15 page memory TXT	20%
Habit watch 63 pages memory	88%

Personal notes:

+ 68% with only 4 times more memory

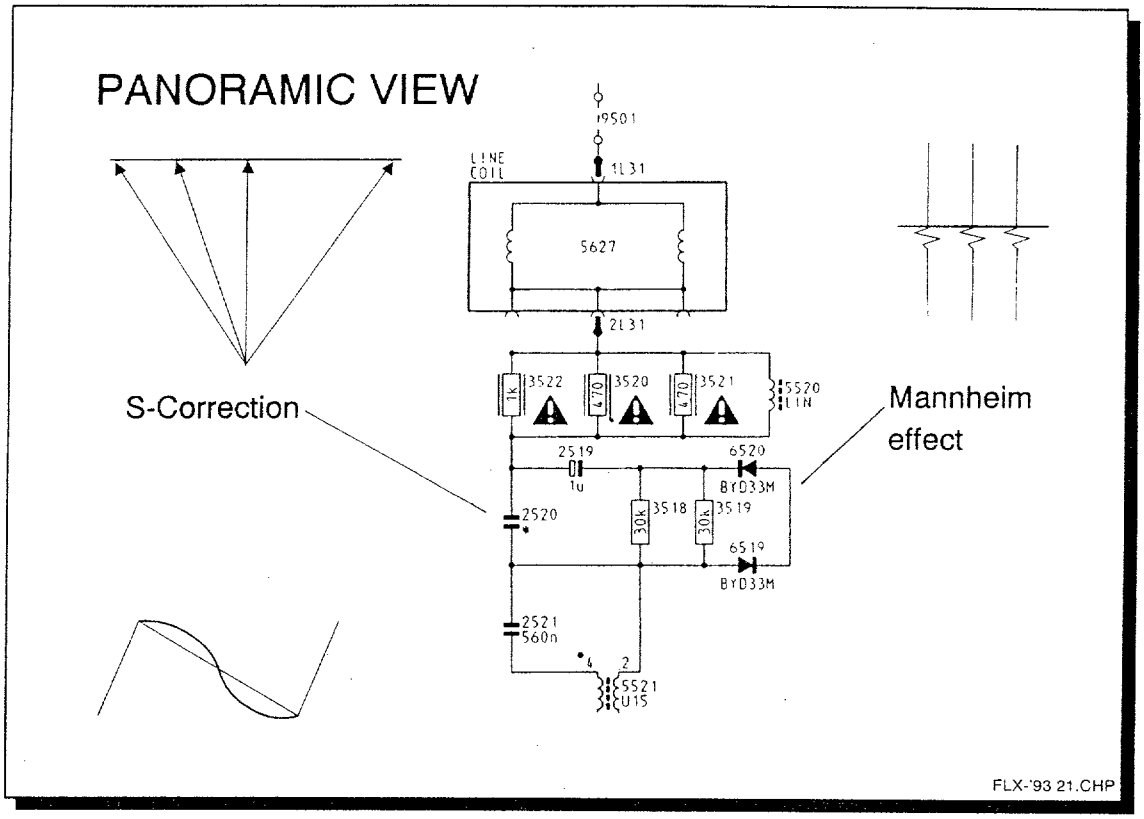


The panoramic view system is a new way to display a 4:3 picture "full-screen" on a 16:9 set.
The uptil now used movie expand system has the advantage that the picture contents is not distorted, but the disadvantage that a part of the picture contents gets lost. This can be very annoying, specificly when the program is subtitled.

Panoramic view "expands" the 4:3 image to a 16:9 size, by a little vertical expansion (so that only little information is lost) and a larger non-linear horizontal expansion. The non-linearity gives a horizontally distorted picture, but by having no expansion in the centre of the screen, and more expansion to the sides, this distortion is in most cases not disturbing as the most important parts are always in the middle of the screen.

Personal notes:

16:9 from a 4:3 picture

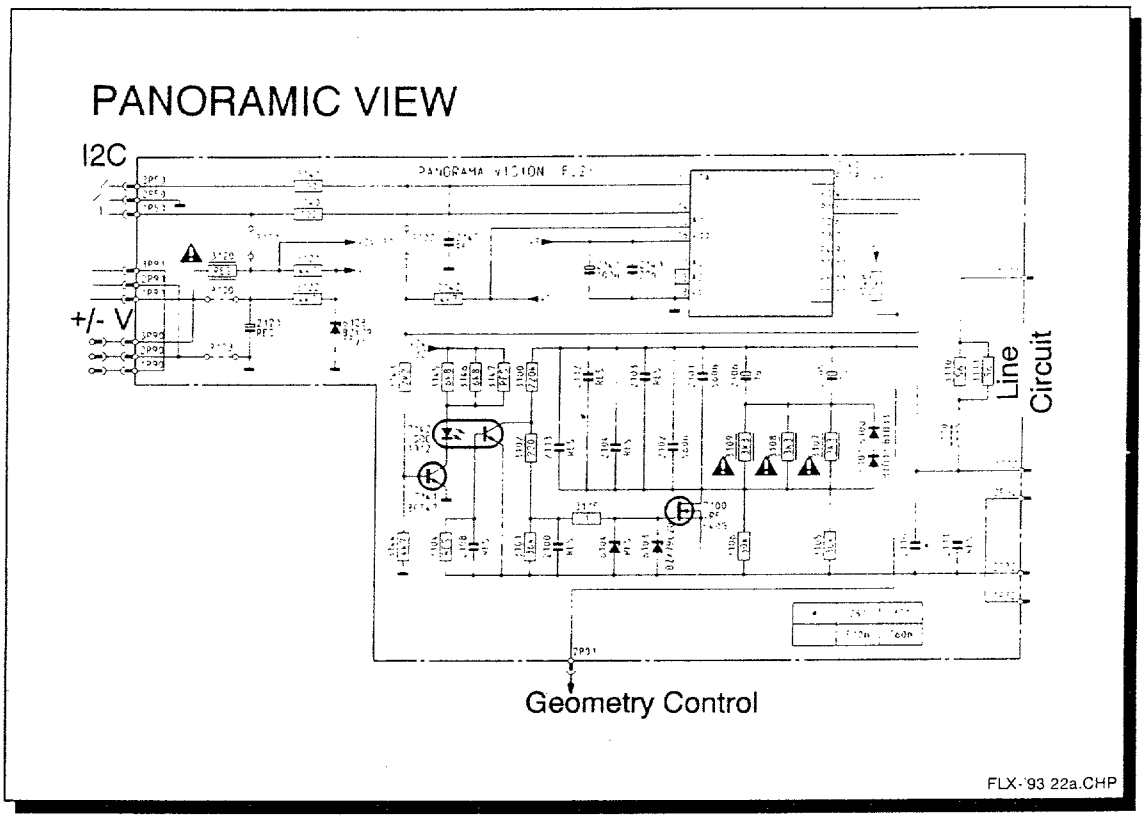


To generate the horizontal non-linear expansion, use is made of the circuit already present in a TV-set to compensate horizontal non-linearity: The S-correction.

As parallel to the S-correction circuit a second circuit is connected which compensates for the "Mannheim effect". (Distortion of vertical lines after bright horizontal lines because of high load for the high-tension by these lines).

Therefore both circuits will have to be modified in panorama mode.

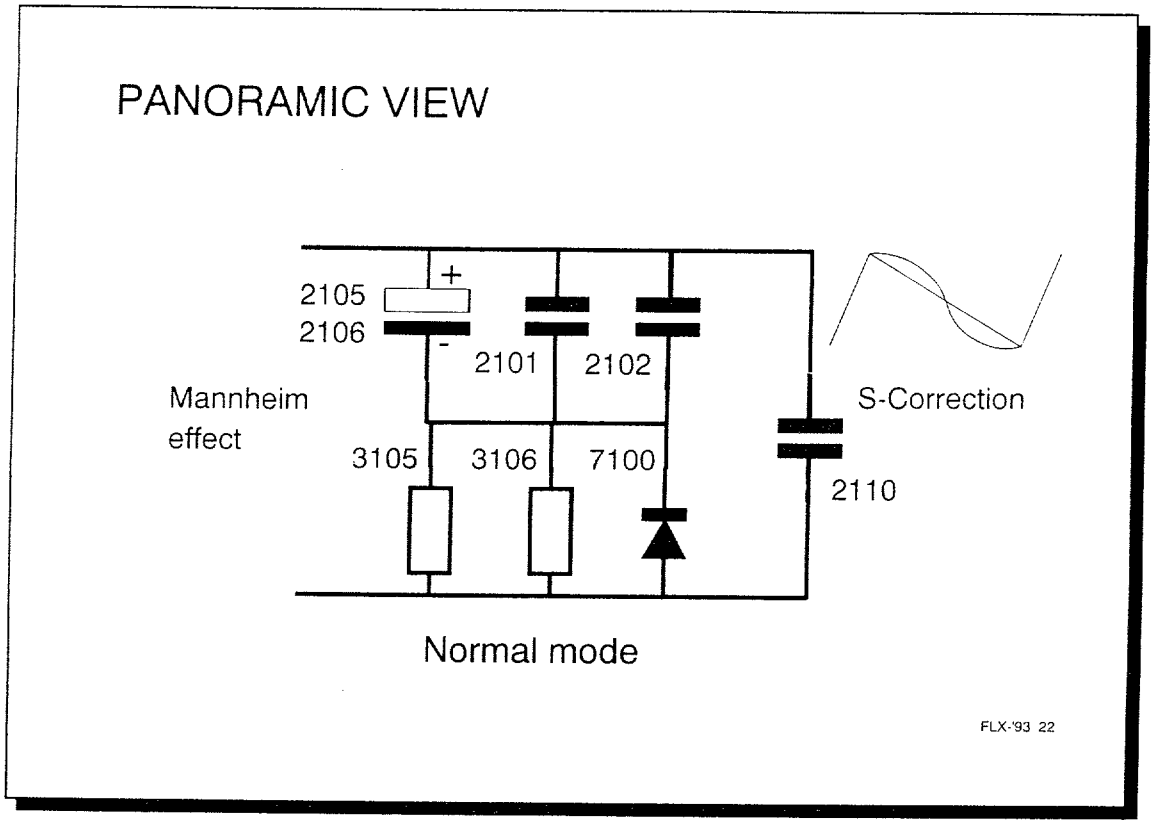
Personal notes:



The horizontal effect of the panorama mode is switched on/off by FET7100, in which case both the S-correction and Mannheim correction circuit are changed.

As these are both circuits in the line deflection part, the drive signal is optically isolated by optocoupler IC7142. The circuit is controlled via I/O expander IC7140.

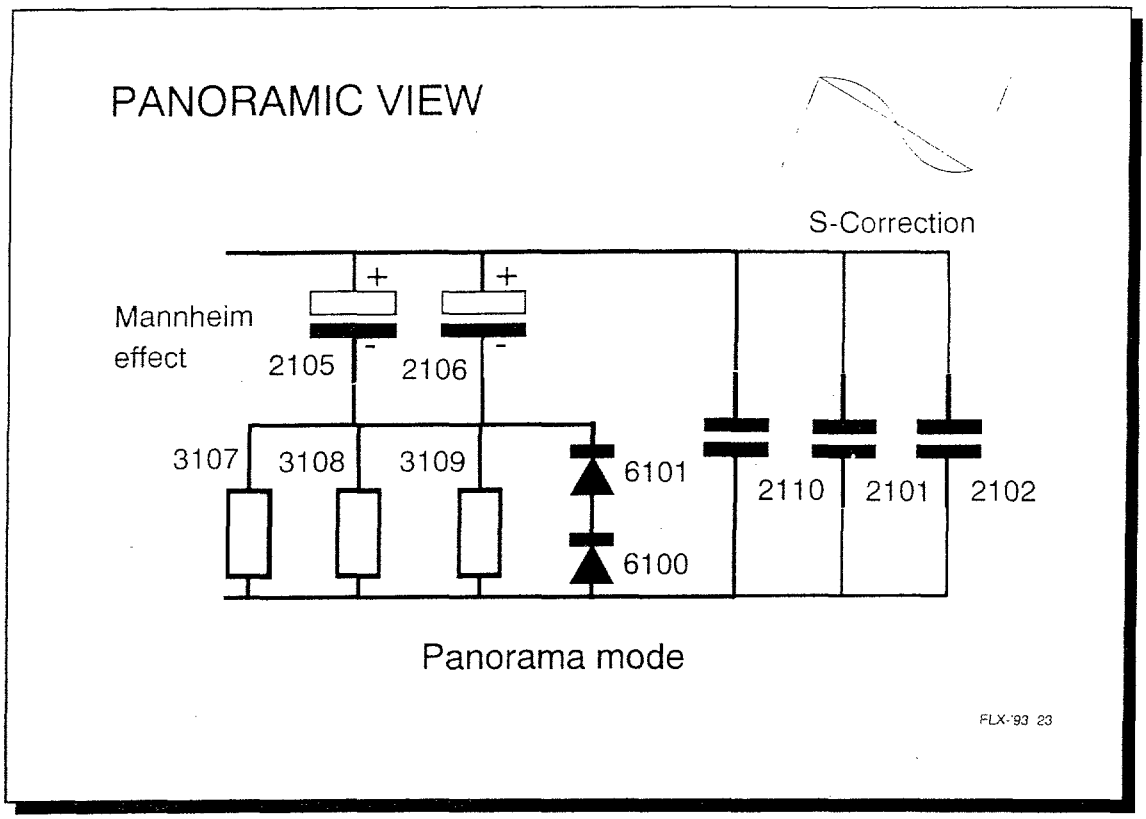
Personal notes:



In "normal" mode (including widescreen and movie expand) the circuit as given above is formed.

The S-correction is formed by C2110, the Mannheim-correction circuit is C2105, C2106, C2101, C2102, R3105, R3106 and TS7100.

Personal notes:



In "panorama" mode the circuit as given above is formed.

For the S-correction C2101 and C2102 are now parallel to C2110. The Mannheim-correction circuit is formed by C2105, C2106, R3107, R3108, R3109, D6100 and D6101.

Personal notes:

FL1 '94 Program

SSP 94 Named FLX.2X

Medium:	FL 4.27
Only top:	FL2.24, FL2.26, FL4.27

I.P.Q. Package: Improved Picture Quality
A Y-processing print, which enhances contrast when the picture content is dark.
An ECO comb filter, which is already in use in certain 50Hz sets.
Improved Scavem

SSP 93"

Low:	FL1.10
Medium:	FL1.17, FL4.17
Top:	FL2.14 and FL2.16

FLX-'94 1.CHP

In the 1994 FL production all sets will be provided with 100 pre-selections. A hardware protection device has to avoid overwriting of storage. Certain versions will be provided with a third scart, EXT3. We can divide the FL-range into two main groups:

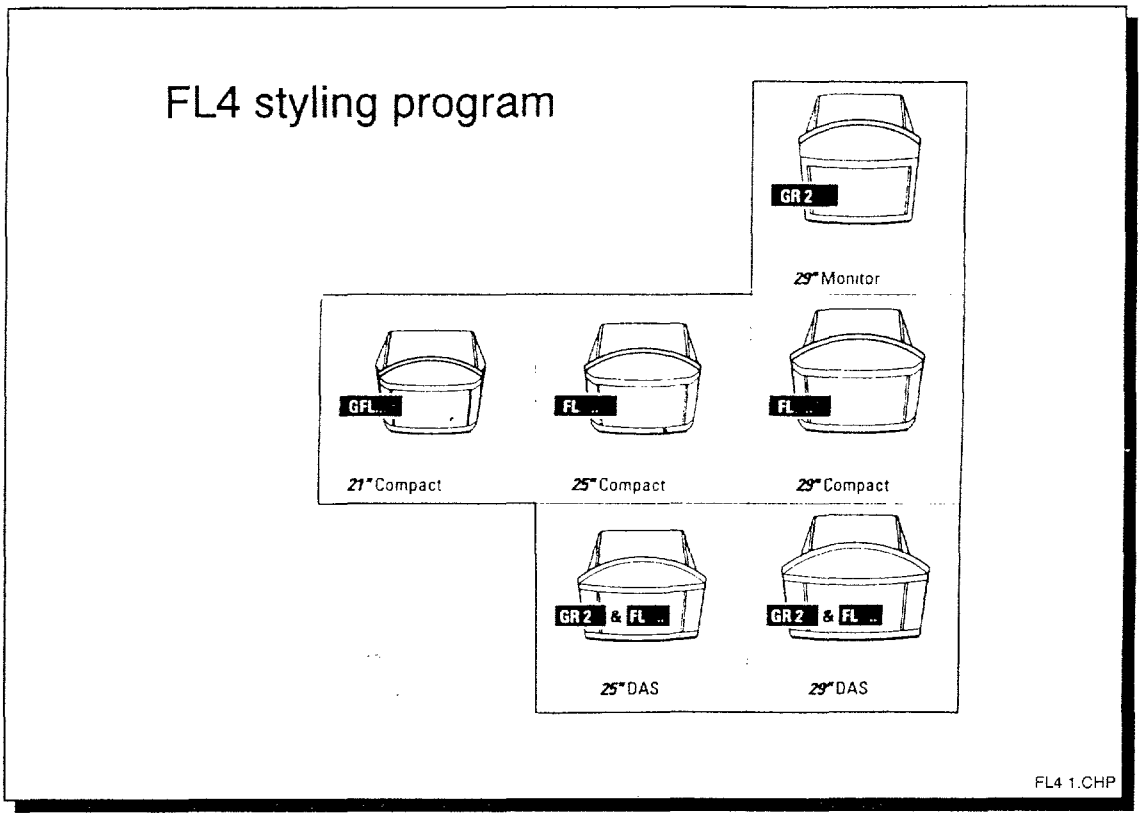
1. The '94 program set contains the SSP 94, which received a thorough alteration in its lay-out as compared to the '93 SSP.We can recognize those sets by the FLX.2x instead of FLX.1x. Extra picture improvement is obtained by the I.P.Q. packet: Improved Picture Quality.
   This is the combined input of:
   - a Y-processing print, which enhances contrast when the picture content is dark.
   - a comb filter, already in use in certain 50Hz sets.
   - an improved scavem.

2. The '93 program is taken over in a slightly modified form.:
   - low: FL1.10
   - medium: FL1.17
   - top: FL2.14 and FL2.16

   As most changes can be found on the SSP, this panel's lay-out will undergo a small change and become the SSP '93". In addition to the FL1 the medium will be provided with the FL4 cabinet, forming the FL4.17 and FL 4.27.

'94 program is mainly I.P.Q.

Personal notes:



The FL4 styling can be seen as the successor of the PiPvision (PV) and Standard-Luxe (SL) stylings. The cabinet has to cover the lower part of the Match-line range in the 4:3 aspect ratio.

There will be 3 versions available:
- Monitor
- Compact
- DAS

→ They have different speaker positions.

The cabinet will be used for 21", 25" Conventional and 25" and 29" Super Flat (SF) screensizes.

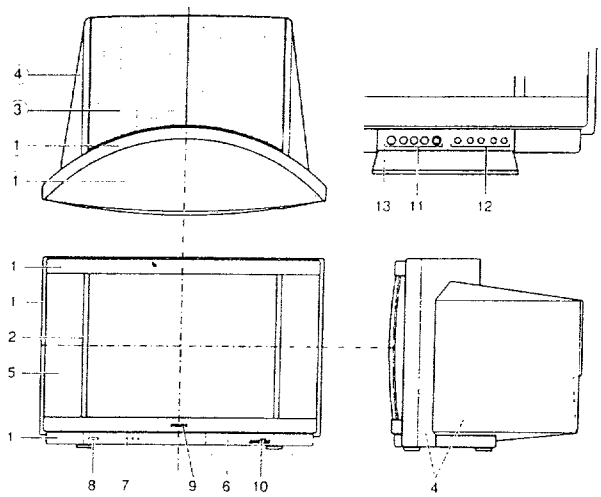
The FL4 cabinet offers the possibility to contain different chassisranges:
- GR2
- FL
- Future chassis range

Personal notes:

FL4, The new Matchline styling

FL4 DAS (Double ASsymetric)

1. Cabinet
2. Tube strips
3. Subwoofer cover
4. Backcover
5. Grills
6. Door
7. Lenses
8. Powerknob
9. Philips logo
10. Matchline logo
11. Connectors
12. Local controls
13. Graphics



FL4 2.CHP

The FL4 compact has a modern slimline look.

The (front) loudspeaker grilles are metal.

Only two LED's are in front of the set. The service LED's for FL are inside the set.

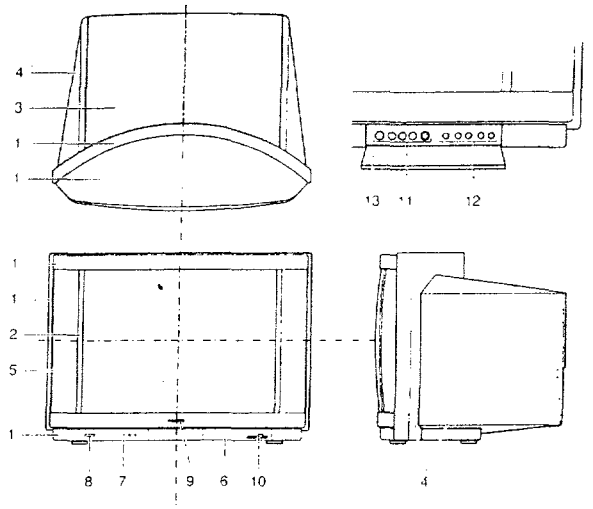
All front connections and local control buttons are hidden behind a hydrolic damped door.
The hinges of the door have a rigid construction and are easy to replace.

Personal notes:

FL4, The first step to home service...

FL4 Compact

1. Cabinet
2. Tube strips
3. Subwoofer cover
4. Backcover
5. Grills
6. Door
7. Lenses
8. Powerknob
9. Philips logo
10. Matchline logo
11. Connectors
12. Local controls
13. Graphics



FL4 3.CHP

The FL4 DAS has a more traditional look because of the speakers at both sides.

The speaker system is built up around a subwoofer in the back cover and two sqeeters at both sides of the screen.

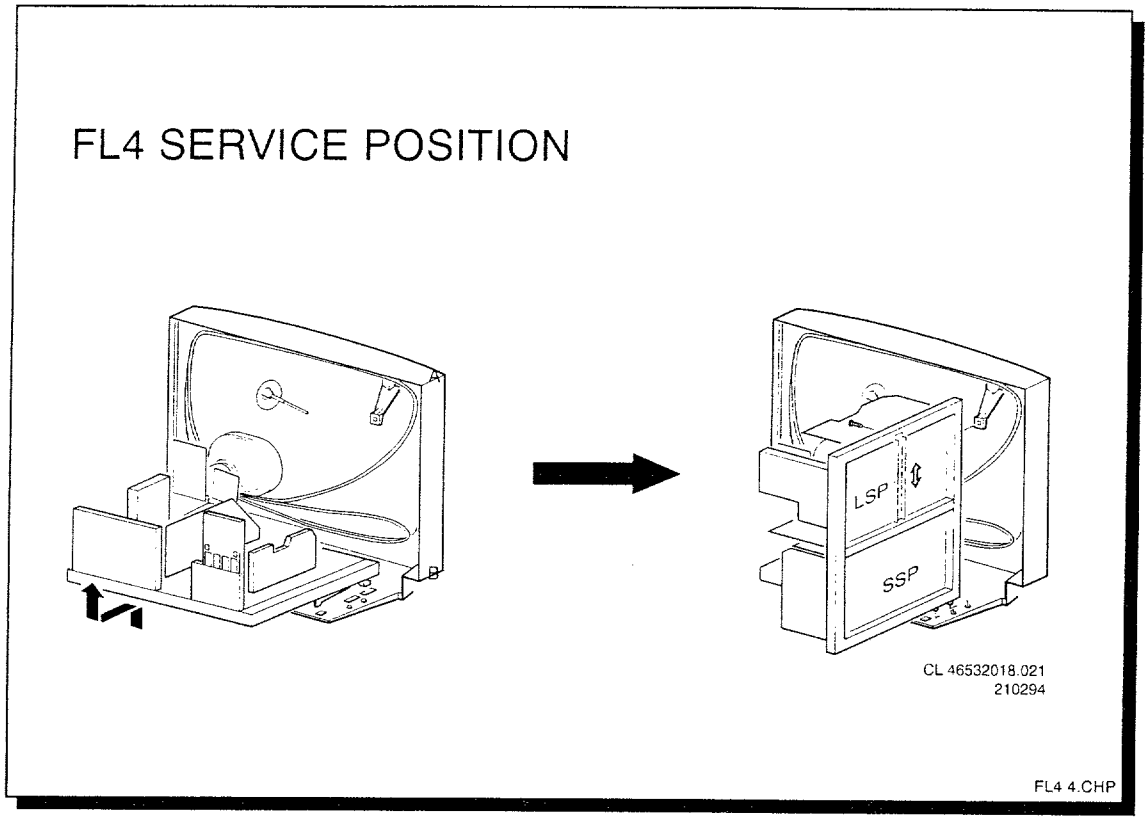
Reserved space under the screen can contain two centre speakers for DOLBY prologic applications.

The service position of FL2 can be reached by use of the FL2-service legs (not included in the set).

The FL4 service position is vertical, through tilting the whole chassis and fixing it with the hook at the top of the cabinet. The position is stable and no extra desktop space is neccesary.
All carrier solder spots are reachable from the right hand side, while removing the components at the left hand side.

Personal notes:

FL4, ... through a service position independent of the environment.



By turning the whole chassis bracket, it can be fixed by the 2 holes in the bottom plate and the hook above the picture tube.

Personal notes:

FL4, with a vertical chassis service position

CONTROL

STATION PROGRAMMING

Automatic programming with the "easytune system"

100 PRESETS

Numbered from 0 to 99

Name for each preselection

VCR functions in PRO and PR50 -99

3RD SCART (EXT3)

Only input CVBS & LR

4 STEPS DNR

Off, minimum, medium and maximum

DATA PROTECTION

Part of the information stored in the memory is protected, e.g. option codes, white adjustment, etc...

FLX-'94 2.CHP

100 PRESETS
The number of pre-selections has been raised to 100, numbered from 0 to 99. Each pre-selection can contain a name of 5 characters maximum. The A.F.C. for the VCR functions in PRO and PR50-99.

3RD SCART
When the 3rd scart is present, the name EXT3 is included at:
- Higher or lower program
- PiP selection
- Recording selection EXT2
- Multi PiP scanning

4 STEPS DNR
In dig-scan sets the Dynamic Noise Reduction can be regulated in 4 steps: off, minimum, medium and maximum.

DATA PROTECTION
Part of the information stored in the memory is protected, e.g. option codes, white adjustment, etc... This protection is described in the chapter on SSP '93".

Personal notes:

100 Presets to choose from

CONTROL

Easy Tune System

Special TXT pages transmitted by the cable company:
- Preselection number
- Name (7 characters)
- Frequency
- System

Page is addressed as 1 BE hex

Cannot be read by the user

Special code in header of each page

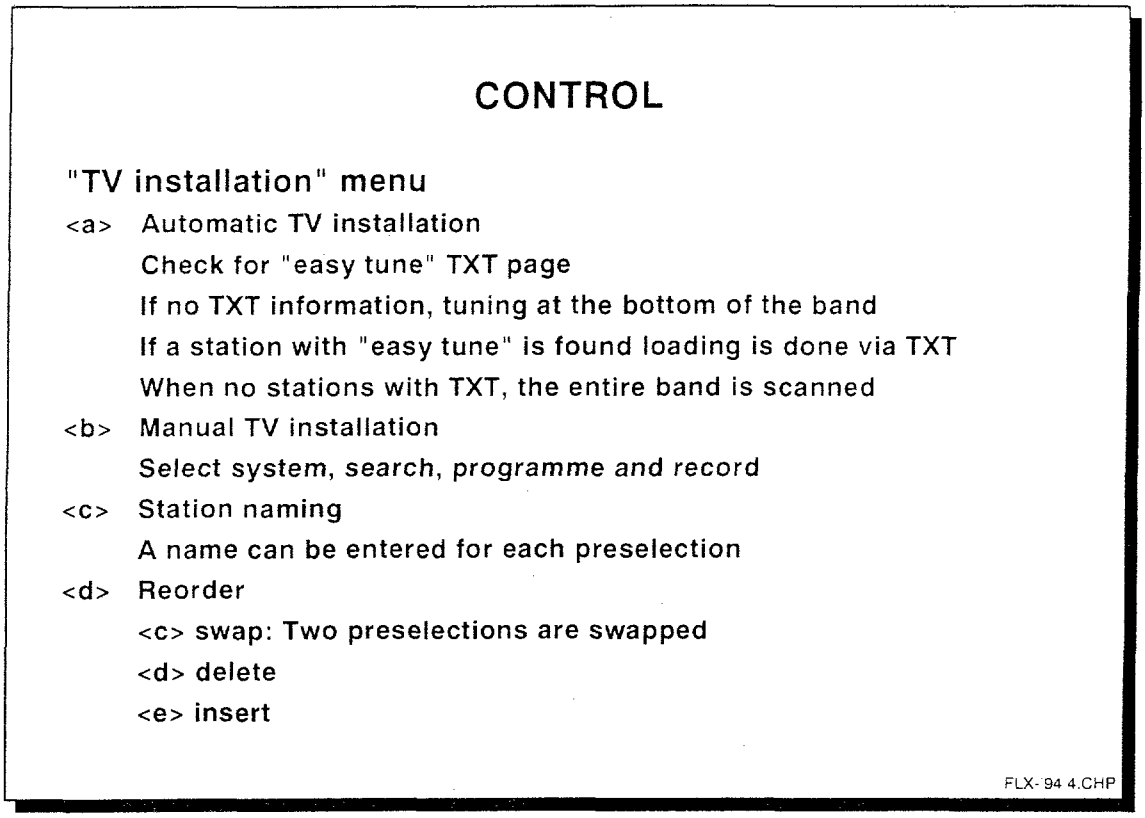
One TXT page contains 45 preselections

FLX-94 3.CHP

Easy tune system
In this system one or several special TXT pages are transmitted by the cable company, showing the pre-selection number, the name, the frequency and the system of each station on the cable. This page is addressed as 1 BE hex and cannot be read by the user. The header of each page contains a special code when this page is filled in. In this manner a TXT station that is used for this system can be quickly recognized. Once the page has been found, the information is loaded into memory and the set is programmed. One TXT page may contain the information for 45 pre-selections with a name of 7 characters.

Personal notes:

That's easy!



Automatic TV Installation

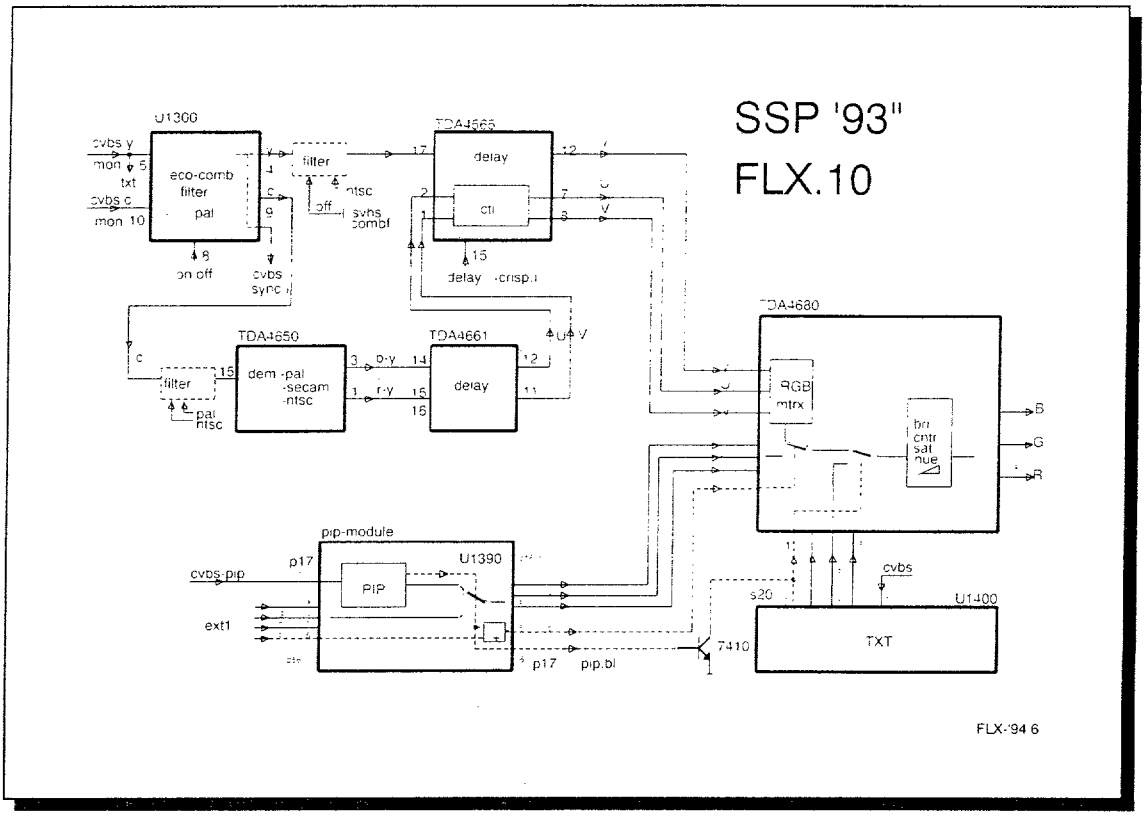
The automatic installation is started up. Operation tests when the special TXT page is present on the tuned station. The page is then loaded into memory. If several stations contained a different table, the required table can be selected by selecting the required station first. E.g. one table could put Dutch stations at the top and another table French ones.

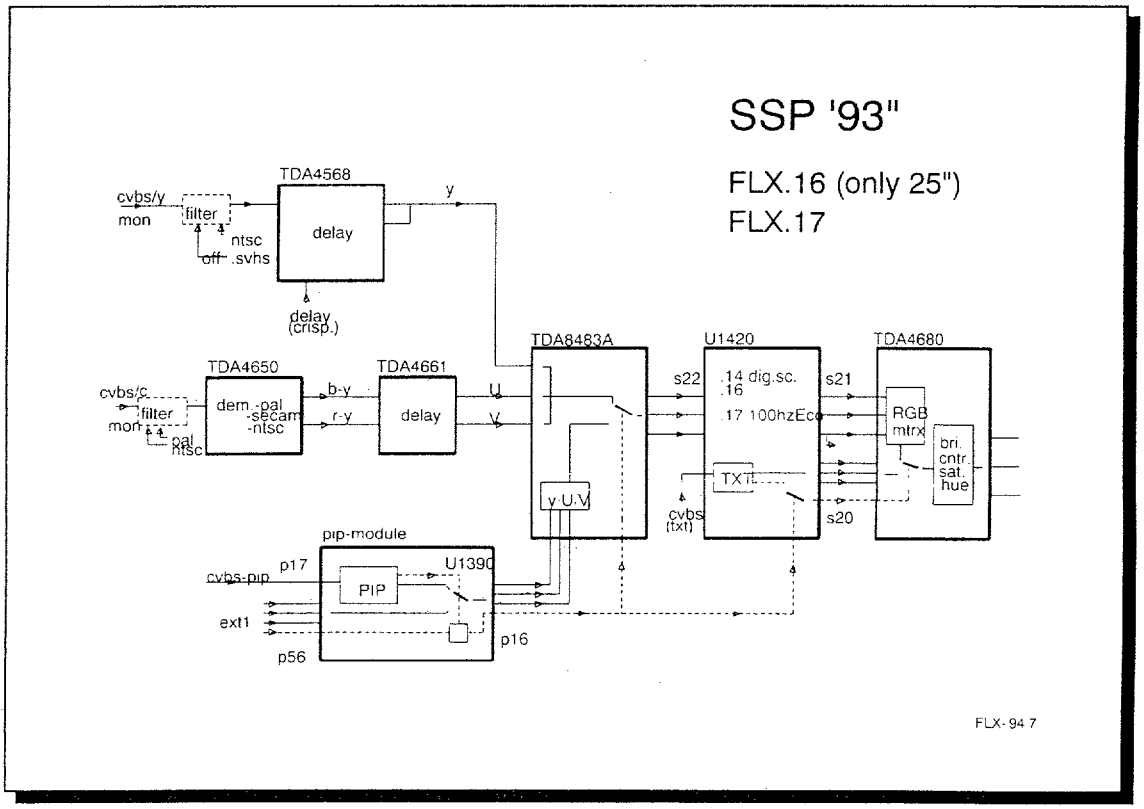
If there is no TXT information on the tuned station, tuning will start at the bottom of the band. The frequency of the first station is stored at PR1, the second at PR2, etc.. This data is stored in RAM memory for the time being. The display shows a bar from 0 to 100%, on which the tuning position can be seen. All stations on which TXT is present are tested via the header when the special page is present. If a station is found which has all its transmission data in TXT, the table in RAM memory will be rejected. Loading is done via TXT.

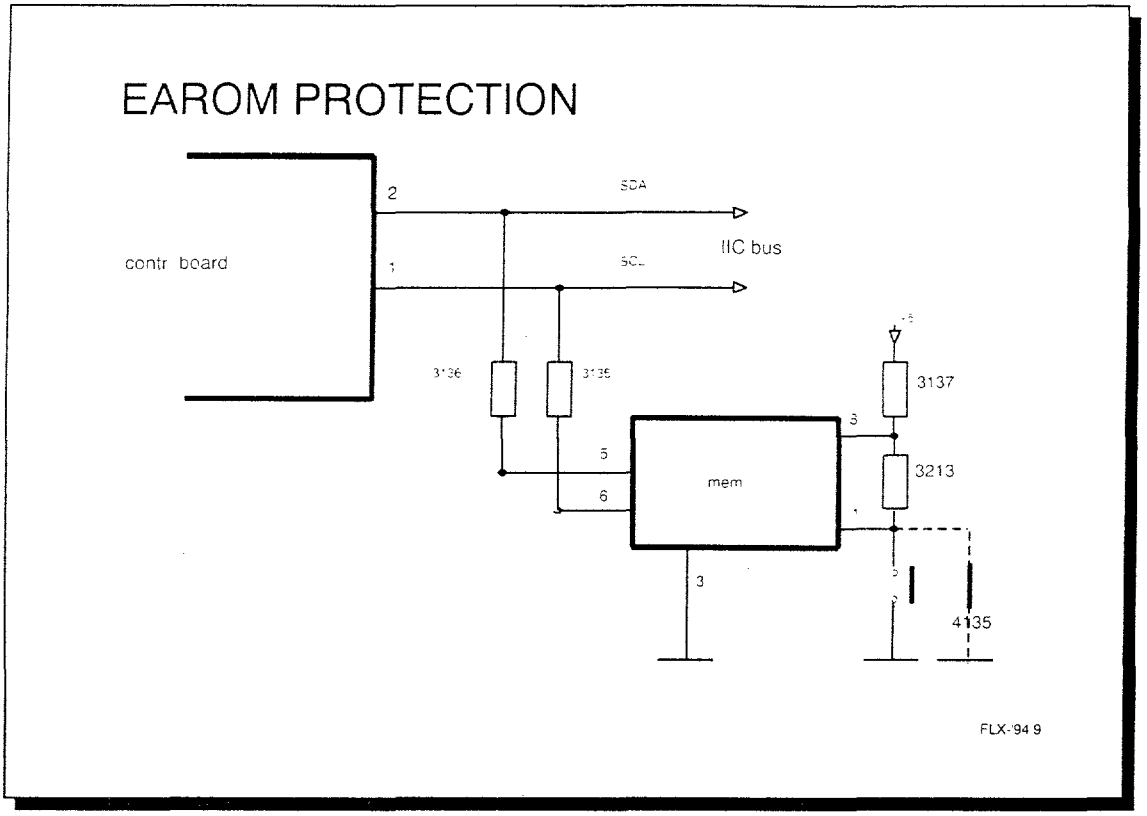
When there are no stations with TXT information the entire band will be scanned. All frequencies of stations in the PAL system will be stored when the band is scanned once more for secam stations. In French sets the order is reversed.

Once a TXT page with station information has been tuned or found, the bar remains on screen at 100% for approximately 3 seconds. In the meantime the pre-selections in the EAROM are cleared. An empty programme list is then displayed on the screen. The data that has been stored in the RAM or the TXT page during tuning, is loaded into the EAROM. Each time a pre-selection is loaded, it is filled in on the screen. Aut-installation can be stopped by selecting **"menu"** or **"off"**. When this happens before the programme list is visible, the EAROM's contents will not have been modified. The set will be on PR1 following aut-installation.

Block diagram







EAROM PROTECTION

Principle

It is possible to protect a part of the EAROM from undesired overwriting. This protection system only functions when .1 of the IC is in the high position. When this point is connected to earth, it is possible to write again in the protected zone.

In FL1 the protected zone contains 16 bytes:
- cut off G and B
- white adjustment G and B
- option code 1 to 5
- identification FL1
- write protection byte
- three bytes are not used

Realisation (fig. 3.4)

Pin 1 of memory IC is in high position with R3213. Via the two pins on the SSP this point can be lowered. When a BD4135 is mounted instead of an R3213 the previous situation without protection is obtained.

Programming of the protection byte:

When a new EAROM is installed, the protection will be automatically active when the menu is exited after the option codes have been entered.

Personal notes:

PROTECTION MESSAGES

"N.V.M. write protected"
If the alignment menu is entered with the protection switched on
> Shortcircuit 2 pins

"Remove N.V.M. write enable connection"
If the alignment menu is exited and pin 1 is still connected to earth
This message disappears after 3 seconds

"N.V.M. not protected"
If the set is switched on and the protection is not active
This message will disappear when one enters the alignment menu

All messages are displayed in English

FLX-'94 10.CHP

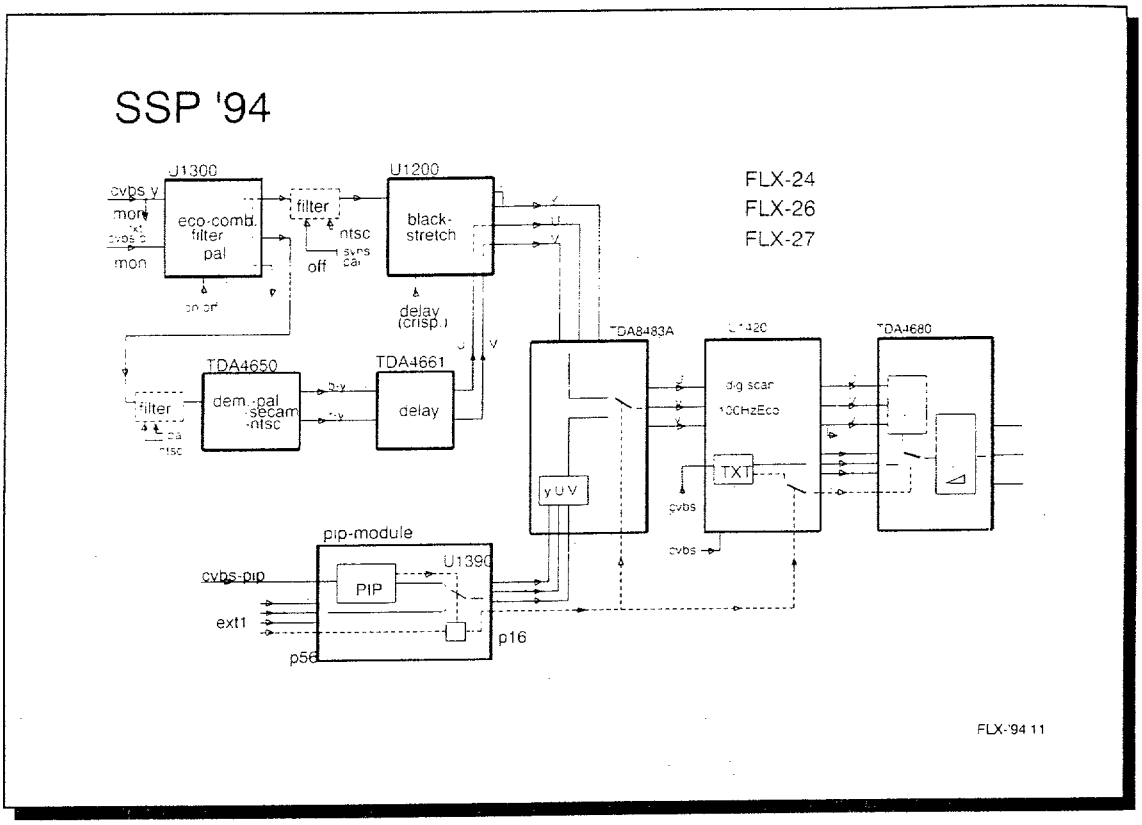
Protection messages:
The following messages can be displayed on the screen:

1 "**N.V.M. write protected**" when the alignment menu is entered with the protection switched on. This message will disappear when the menu is exited or when the two pins on the SSP are short-circuited, switching off the protection.
(N.V.M. = Non Volatile Memory).
2 "**Remove N.V.M. write enable connection**" when the alignment menu is exited and the EAROM is not protected because point 1 is still connected to earth. This message will disappear after 3 seconds.
3 "**N.V.M. not protected**" when the set is switched on and the protection is not active. This message will disappear when one enters the alignment menu.
Messages 2 and 3 will only appear when the bit that switches off the set in case of noise has been set. In this manner the appearance of the message in production is avoided, as the bit has been reset by the "**set to factory**" command before the first checks of the encasing band. All messages are displayed in English.

Personal notes:

Messages only in English

Block diagram

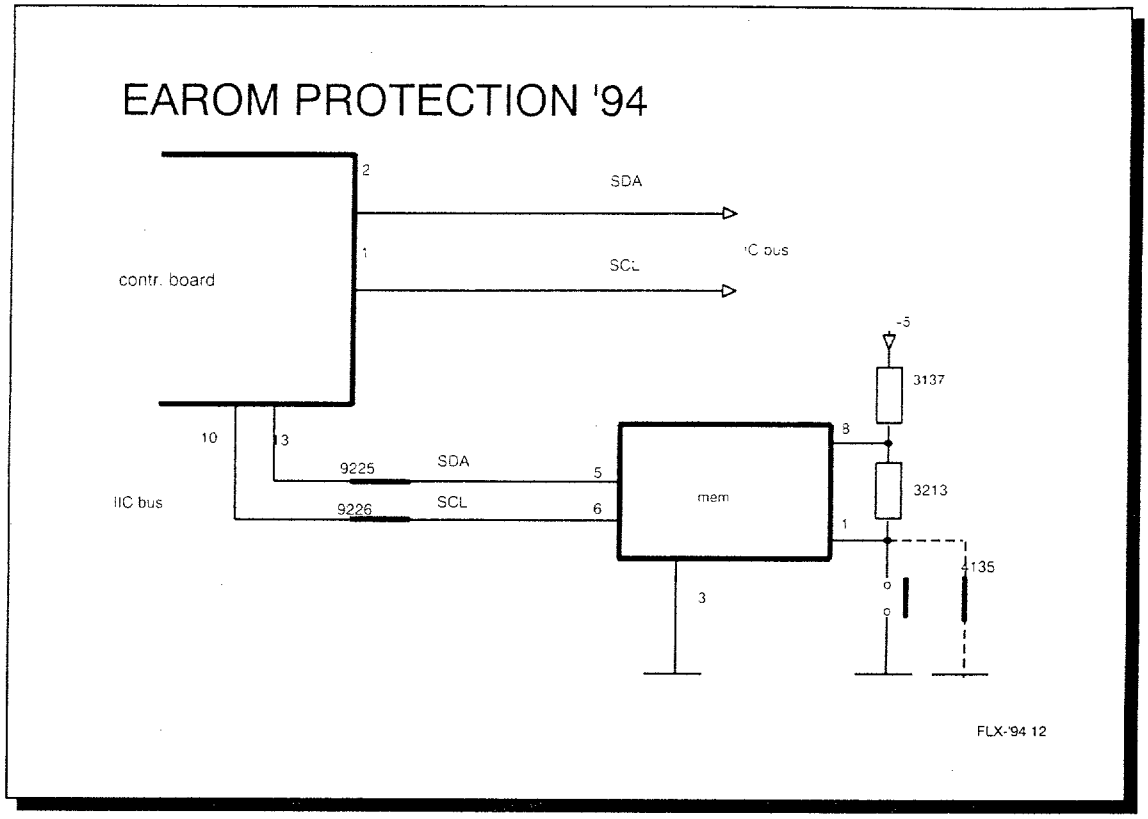


In the SSP '94, the lay-out has been thoroughly changed in comparison to the SSP '93. The SSP '94 is used in sets that can be recognized by FLX.2x instead of FLX.1x. The SSP '94 contains as described for SSP '93. Next to that the SSP '94 contains the I.P.Q. (Improved Picture Quality) packet. This implies the combined input of:

- a Y-processing print
- the ECO comb filter
- an improved scavem.

A block diagram of the FL2.24, FL.2.26 and the FL4.27 is shown above.

Personal notes:

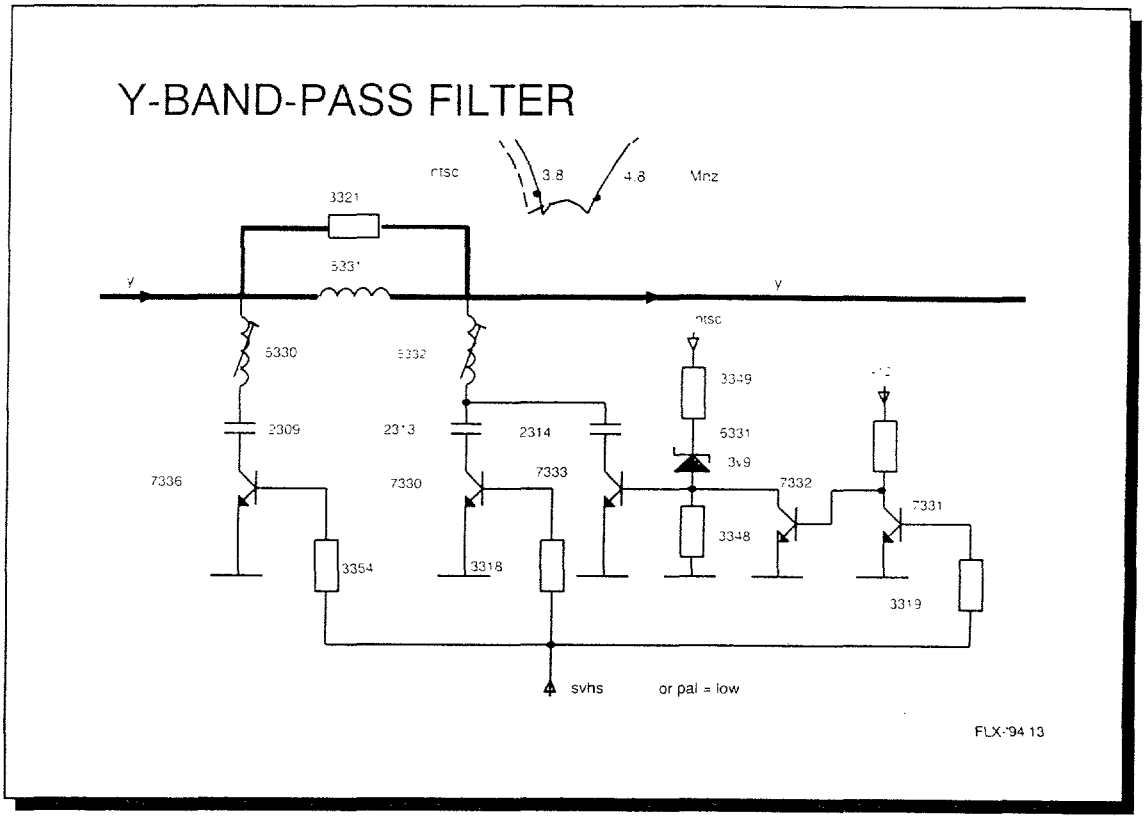


The SSP'94 has the same EAROM protection as described for the SSP '93".

Next to this the panel contains an extra i²c bus
The IC memory has an extra I²c bus which is connected to pin 10 and pin 13 of the control board. BD9225 and BD9226 are mounted in that case. The software itself detects when this extra I²C bus is operational. In addition to the hardware protection this modification forms an extra protection against the overwriting of memory.

Personal notes:

Even safer with extra I^2C bus



THE Y-BAND-PASS FILTER
Due to the use of the comb.filter 4.43Mc suppression is no longer necessary. The filter has therefore been modified to suppress the secam and NTSC carriers.

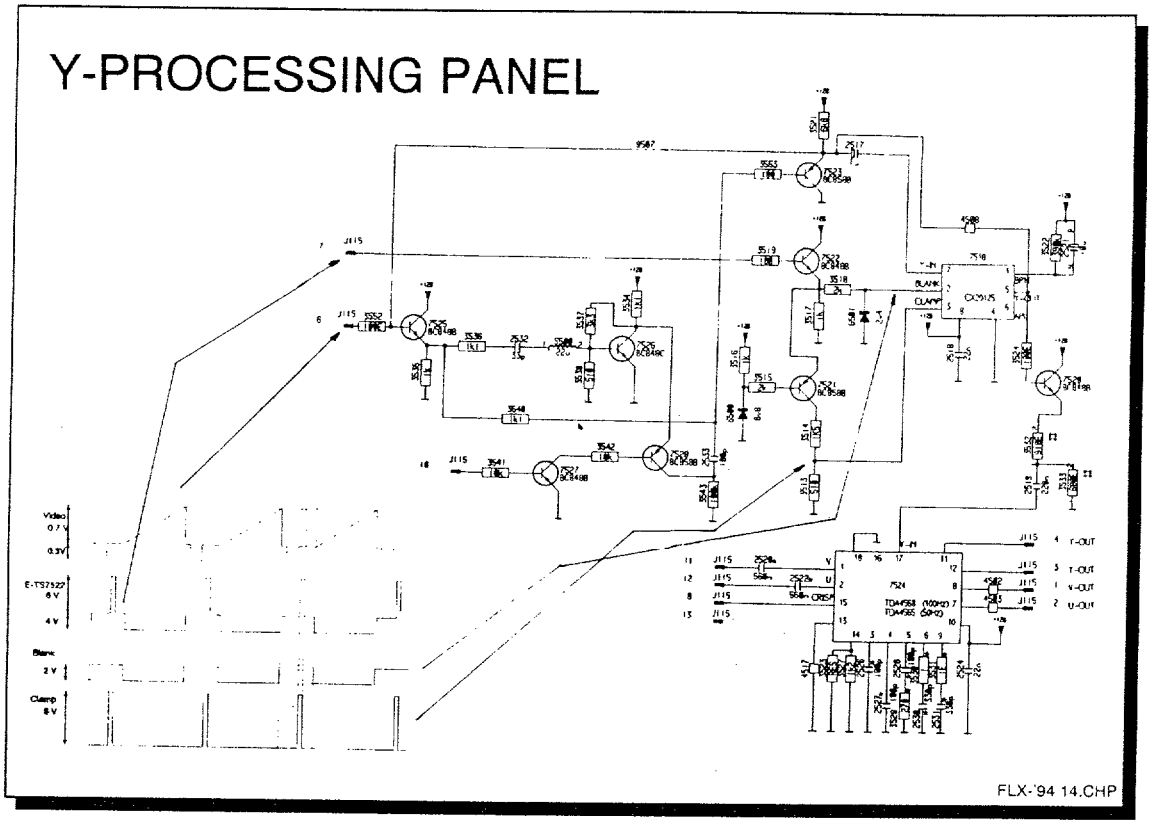
SECAM
TS7336 and TS 7330 conduct, so that two adjustable absorption circuits are obtained with S5330, C2309 and S5332, C2313. The suppression ranges from 3.8 to 4.8Mc.

NTSC
In NTSC TS7333 starts to conduct via R3349 and D6331. C2314 runs parallel over C2313, causing the suppressed frequency band to be lower than in secam. The NTSC carrier on 3.58Mc is suppressed. TS7331 conducts, causing TS7332 to block and have no effect.

PAL and SVHS
The suppression circuits are switched off in PAL and SVHS. TS7336 and TS7330 block. TS7331 blocks, causing TS7332 to conduct. This short-circuits the NTSC line, so that TS7333 blocks and C2314 is not activated.

Personal notes:

No Y-filtering for SVHS and PAL



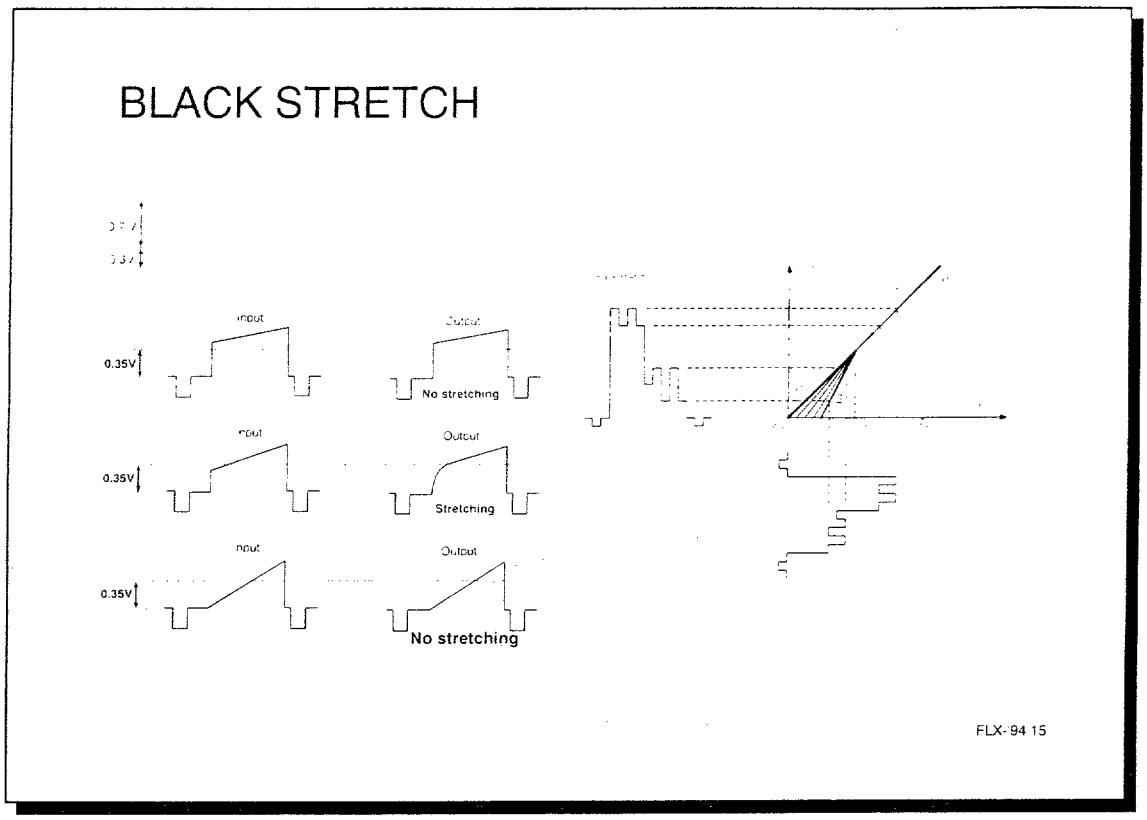
GENERAL

The Y-processing panel replaces the Y-delay IC. This panel contains two circuits:

- the blackstretch part built up around IC CX20125, This is a new circuit the function of which we will explain a little further.
- the Y-delay with TDA4568 or TDA4565. This is the original circuit.

Personal notes:

Black stretch is one main features of IPQ

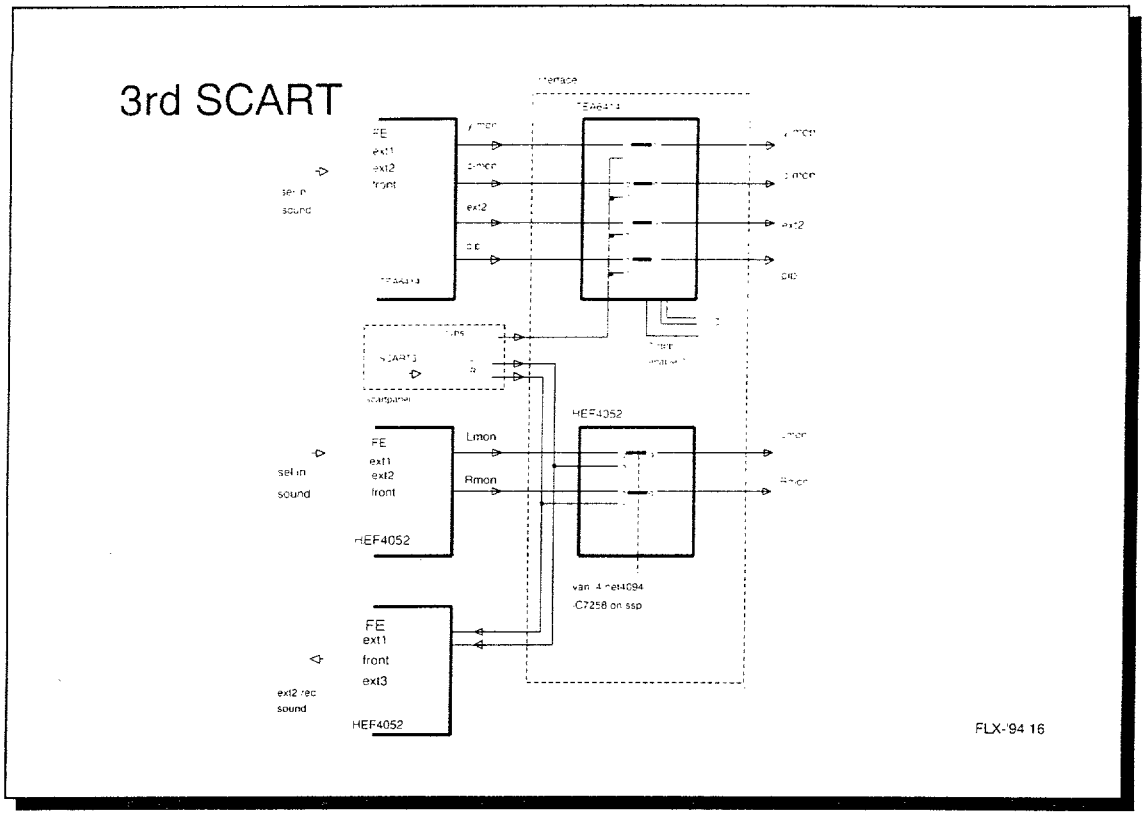


BLACKSTRETCH

Blackstretch provides a stronger contrast impression in the darkest areas of the picture. The darkest level in the Y-signal is measured. Depending on the value obtained a specific amplification is activated that only influences the bottom half of the Y-signal. We can distinguish three possibilities:

- the deepest grey value is above 0.35V (fig. 5.2). No stretching takes place.
- the deepest grey value lies between 0 (black) and 0.35V (fig. 5.3). The lower grey values are amplified further.
- the deepest grey value is black (equals back porch sync.) (fig. 5.4). Neither will any stretching occur in this case.

Personal notes:



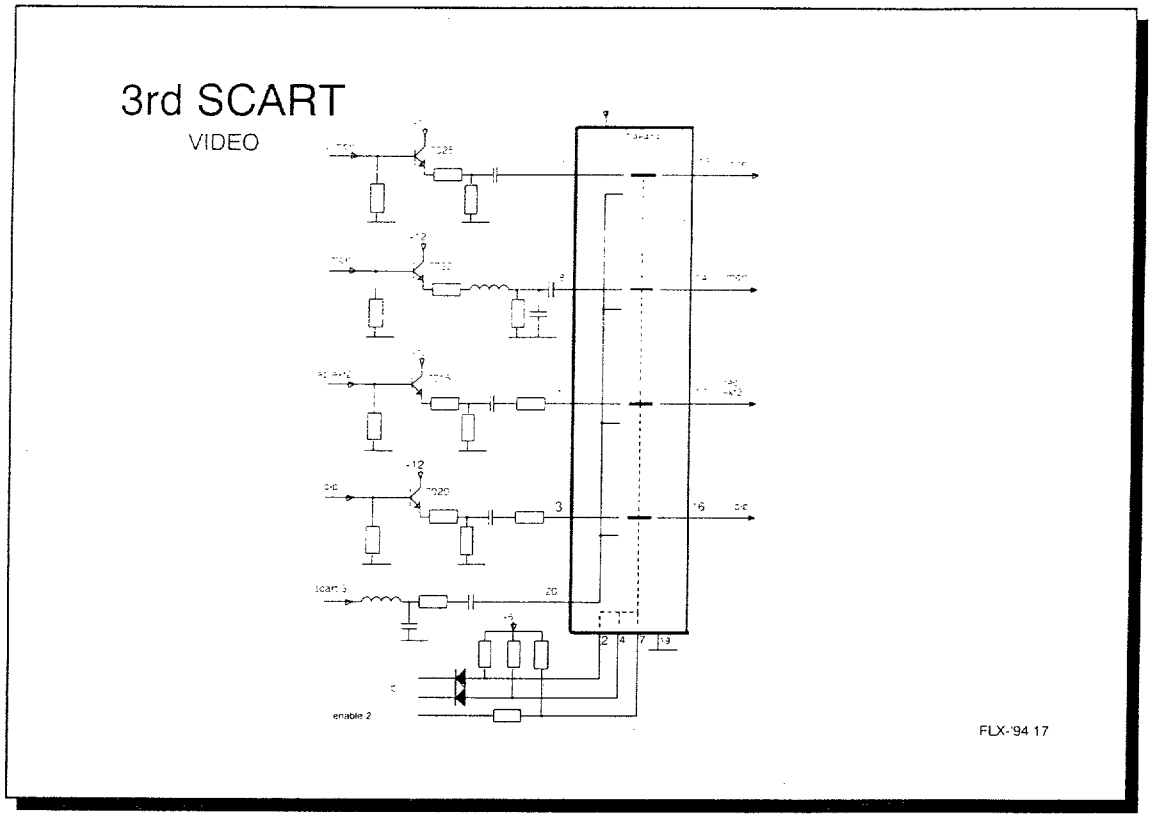
THIRD SCART

GENERAL

In addition to scart connections EXT1, EXT2 and the FRONT input, a third scart, EXT3, has been added to certain versions. It only has a CVBS input with sound on the left and the right. The scart is installed on an individual panel. The necessary switch-overs are carried out on the scart-interface panel.

Personal notes:

To connect your 3rd VCR



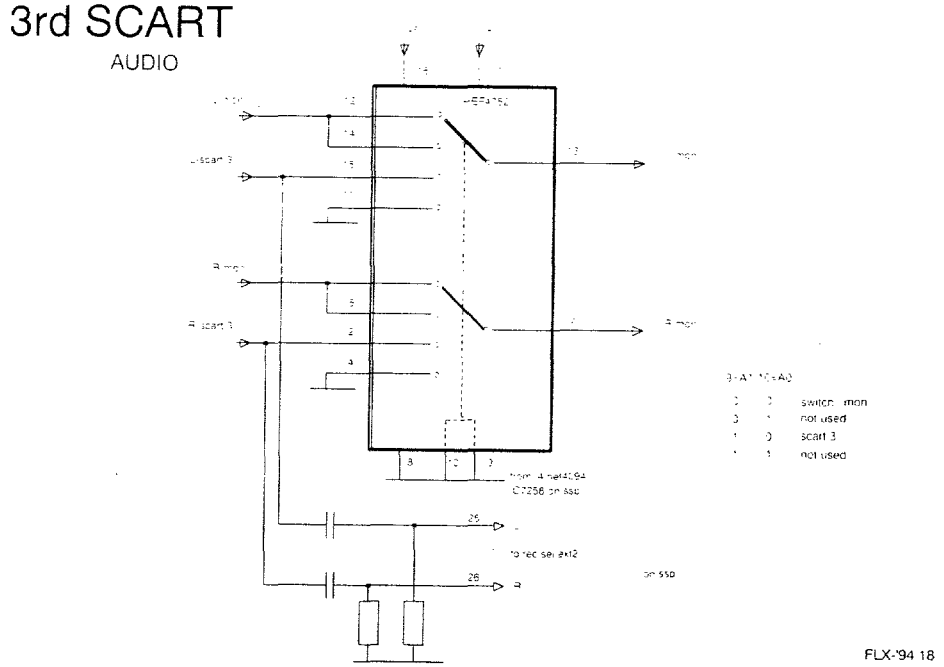
BLOCK DIAGRAM
Picture

After the input selection on the SSP, where a choice is made between FE, EXT1, EXT2 or FRONT, four signal paths are obtained:
- Y monitor to screen
- C monitor to screen
- recording output to EXT2
- wire to the PiP.

These four circuits are interrupted on the interface and each of them can switch individually to the CVBS of the 3rd scart.

The switch-over of the 4 signal paths occurs, as in the input selection, by means of a TEA6414. This can switch 8 inputs to 6 outputs. The output signal is amplified by 6.5dB and it is clamped on 3.2V, bottom sync.. Inputs Y, C, PiP and REC2 are divided by two by the emitter follower after a buffer. CVBS scart 3 comes from the scart panel. The switch-over is carried out by a triple bus with clock, data and enable 2. For clock and data the I^2C bus is used. The IC is operated when the enable is low. As this is the second TEA6414 within the set, a second enable line will be used. This comes from pin 7 on the control board.

Personal notes:



Sound

The input selection on the SSP panel enables a choice between sound coming from FE, EXT1, EXT2 or FRONT. Outputs L and R, going to the amplifier of the set, are interrupted on the interface and are switched to the sound coming from the 3rd scart. The record selection of EXT2 on the SSP has one input left. Via the interface this input receives the sound of the 3rd scart.

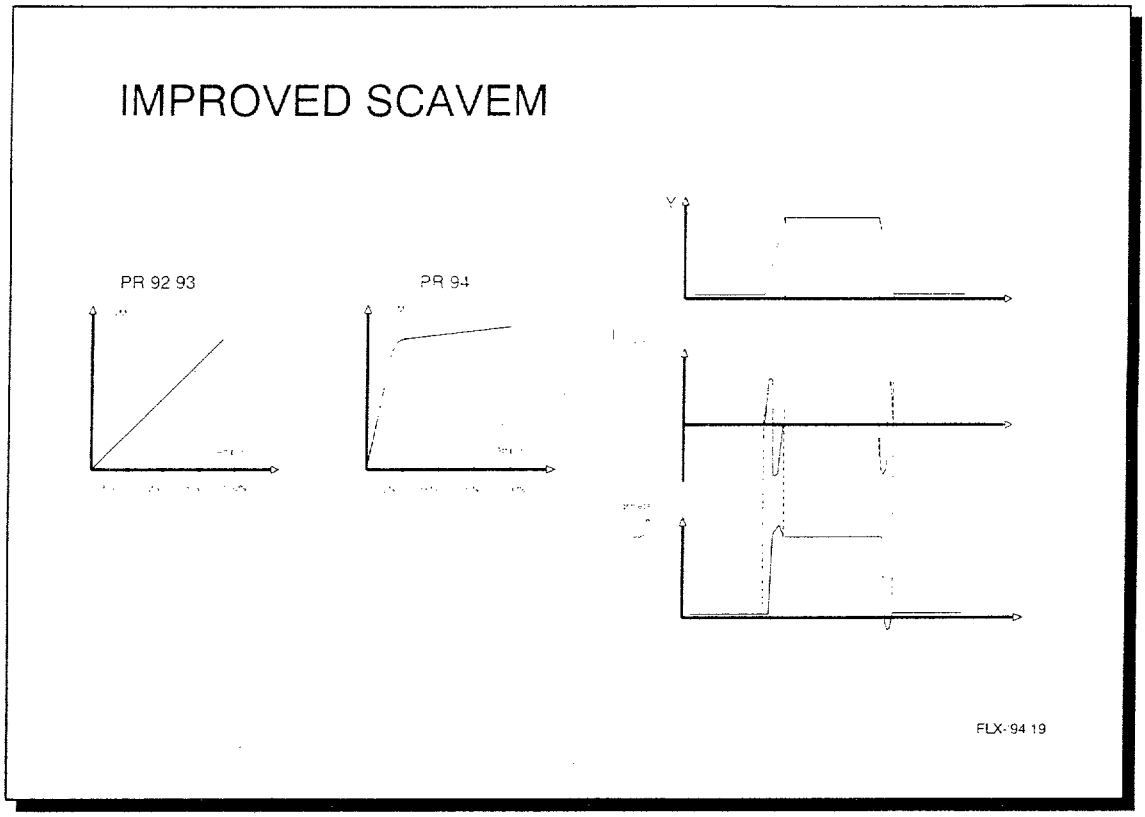
The switch-over of sounds L and R of the set to the 3rd scart takes place by means of an HEF4052. This IC contains two switches with 4 inputs each, of which only 2 are used.

- pin 6 enable = 0
- pin 10 address bit 0 = 0
- pin 9 address bit 1 = 0 = switch through
  = 1 = 3rd scart

The pin 9 control comes from the I^2C interface IC on the SSP: IC7258, HEF4094, pin 4.

The sound of scart 3 is switched through to recording selection EXT2 on the SSP via C2005, C2007, R3003 and R3005.

Personal notes:

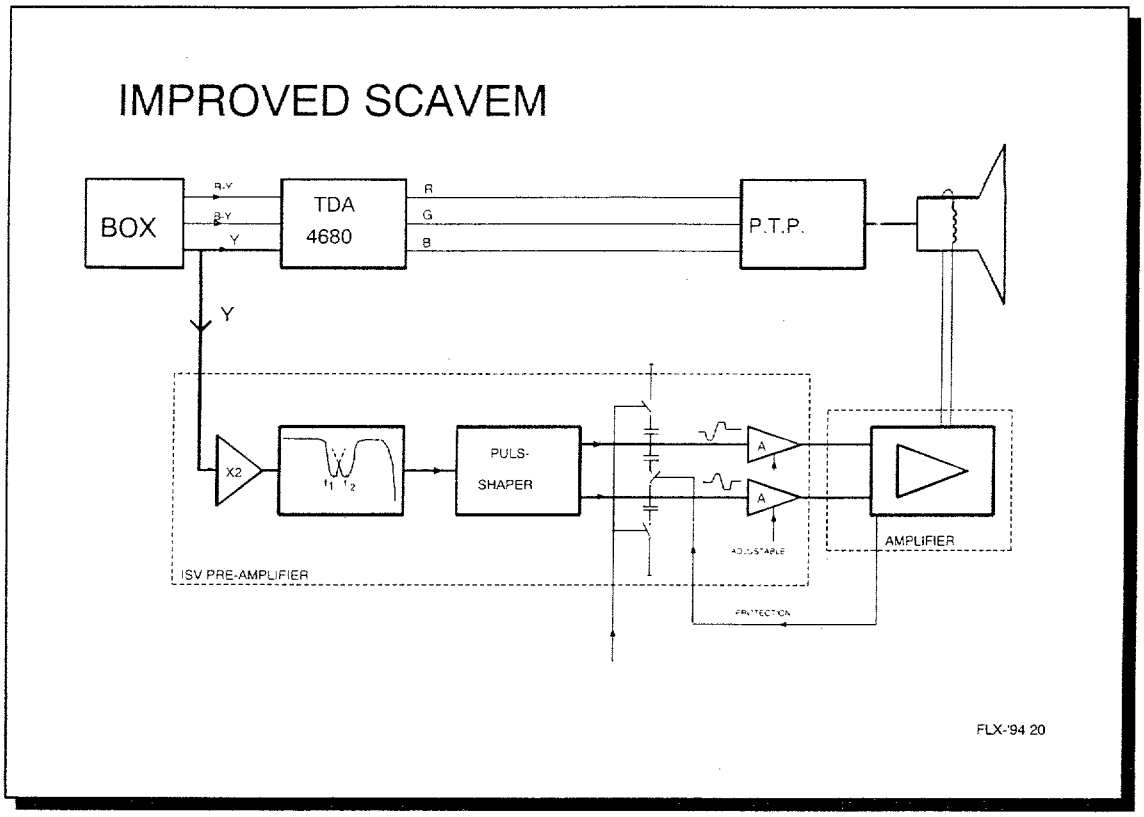


DIFFERENCE BETWEEN S.V.M. 92/93 AND I.S.V.M.
S.V.M. 92/93 only worked a little or practically not at all at a small Y-jump. This has been improved in I.S.V.M..

PRINCIPLE
Scavem stands for SCAn VElocity Modulation (deflection velocity modulation). This means that the horizontal deflection is influenced by the picture contents. Starting out as an ideal square wave its pitches are limited in sharpness by the limited band width, viz. 5MHz. In a 100Hz set the information is written in 32µsec. This doubles the band width to 10 MHz. The picture tube cannot show this, the pitches become even less sharp.

Scavem improves sharpness as follows:
- In a rising pitch first a deflection current is generated which helps the horizontal deflection. The spot will move faster, the picture becomes less clear. After that a pulse is generated which opposes the horizontal deflection. The spot will move slower and the picture becomes clearer.
- In a dropping pitch the spot is first delayed and then accelerated.
- The deflection coil has been provided with an extra winding which is controlled by the scavem pulses. Scavem works only on Y-transitions, not on R-Y or B-Y transitions, large colour jumps usually go together with black-and-white jumps.

Personal notes:



BLOCK DIAGRAM

- After the box the Y-signal is also fed to the I.S.V.M. filter. The signal is controlled by a double notch filter. This filter, which is built up around 7.159MHz and 8.86Mc, mutes all residual cross-luminance information. The filter prevents the residual cross-luminance from becoming extra amplified.

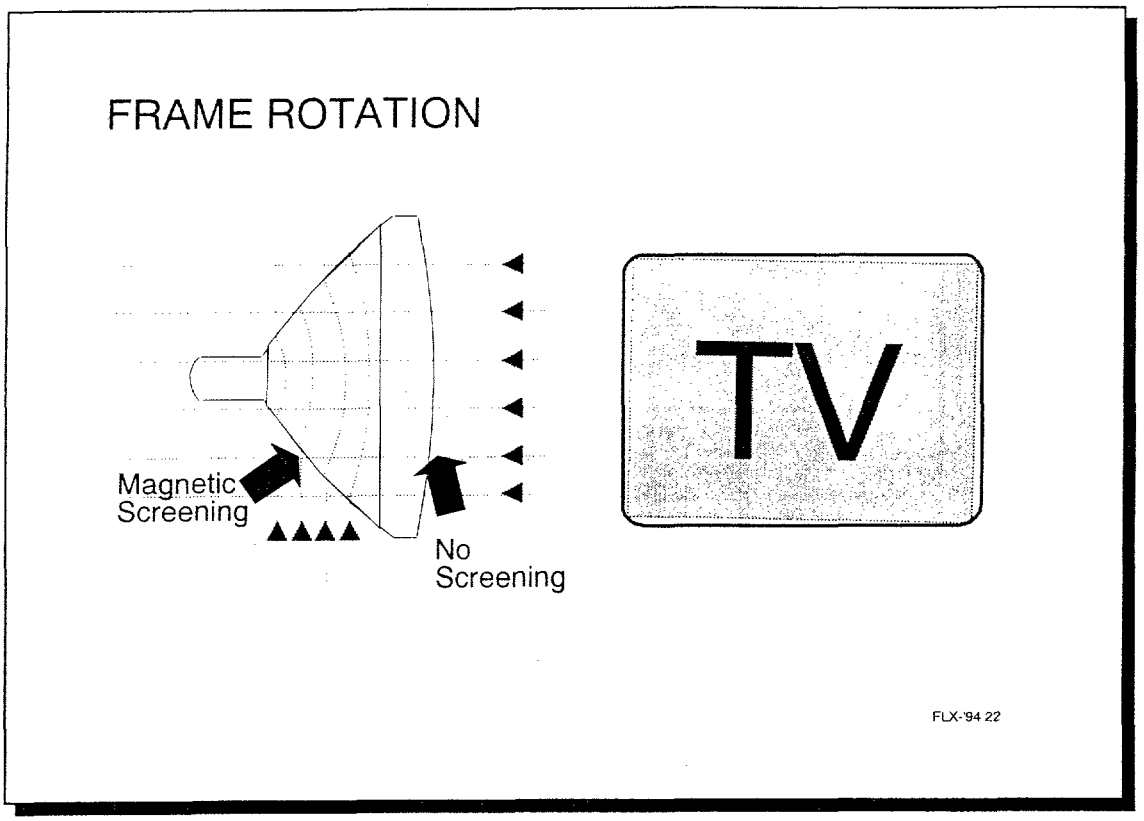
- During blanking (TXT or MENU) the I.S.V.M. is switched off. If this was not done we would be looking at TXT (RGB-signals), for instance, while the I.S.V.M. would remain active on our main screen (Y-signal).

- The Y-signal is then supplied to a pulse shaping unit. This unit consists of 2 differentiators and an amplifier which gives off 2 symmetrical pulses for the I.S.V.M. output amplifier.

- The I.S.V.M. output amplifier amplifies the symmetrical signals and controls the I.S.V.M. winding on the deflection coil.

- When there are too many transitions the maximum capacity of the output transistor may be exceeded. A protection switch becomes active and reduces the amplification of the I.S.V.M. filter.

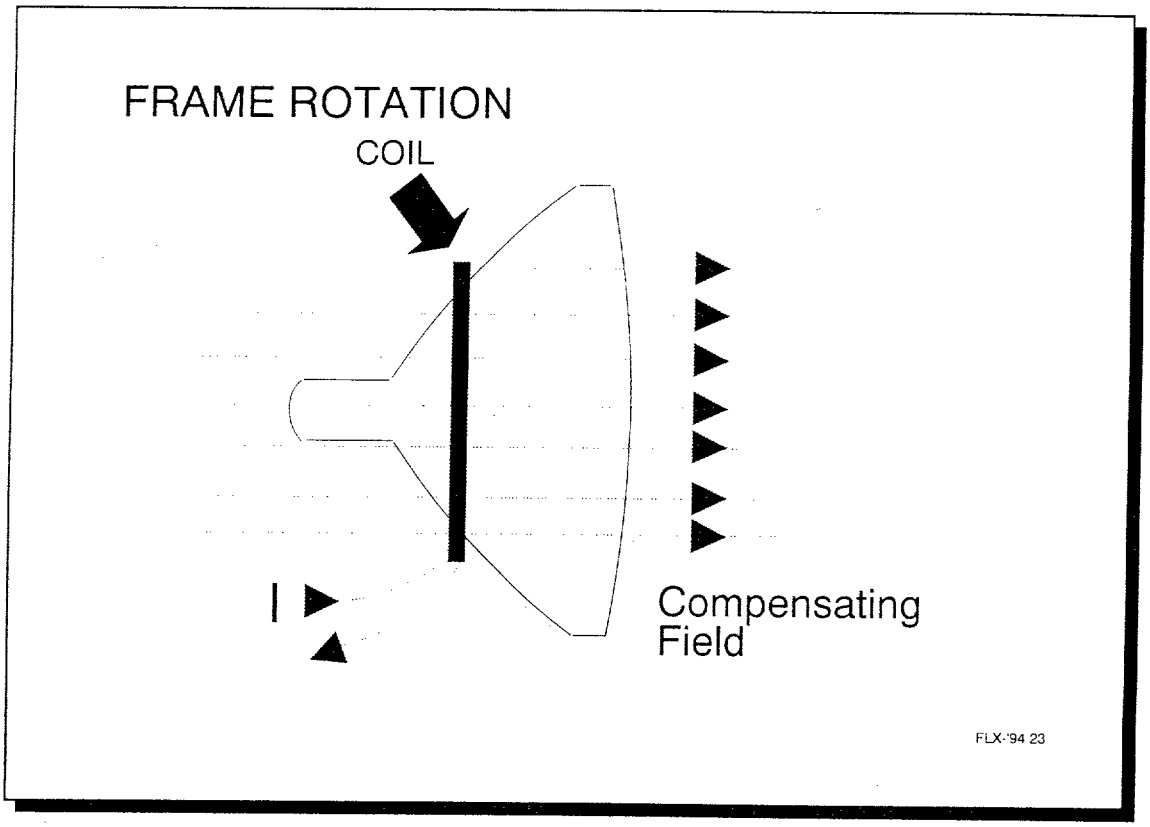
Personal notes:



The rear of the picture tube is well shielded against magnetic fields. The shadow mask however does not give sufficient shielding.
The magnetic field traveling from front to back or visa versa gives a rotation of the picture.
For smaller screensizes this effect is normally not visible. For larger screensizes, and specificly in wide-screen, this may become visible dependent on the location on earth.

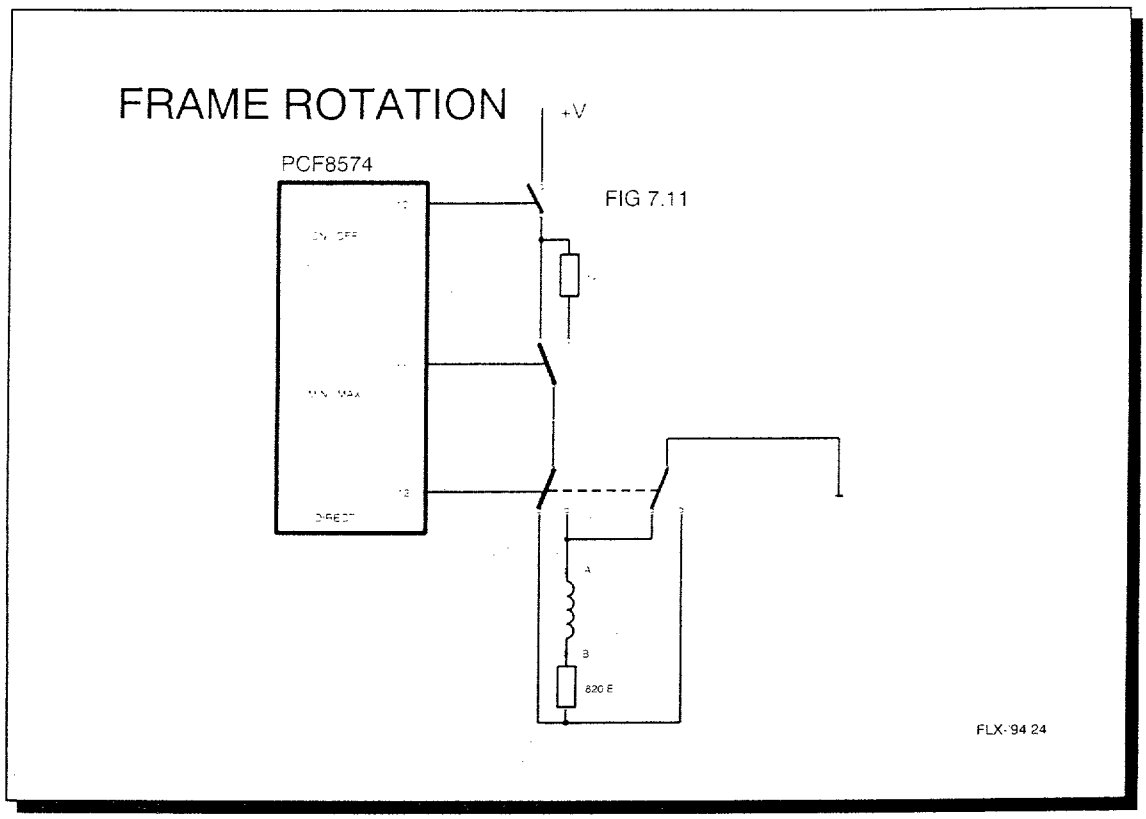
Personal notes:

To compensate for picture rotation because of the earth magnetic field



Principle
In order to compensate frame rotation which is caused by the earth's magnetism, an external field will be generated that will counteract the earth's magnetism with a magnetic opposite power of the same size.
In this case a coil is mounted on the deflection unit, through which a current is passed whose intensity and direction are adjustable.

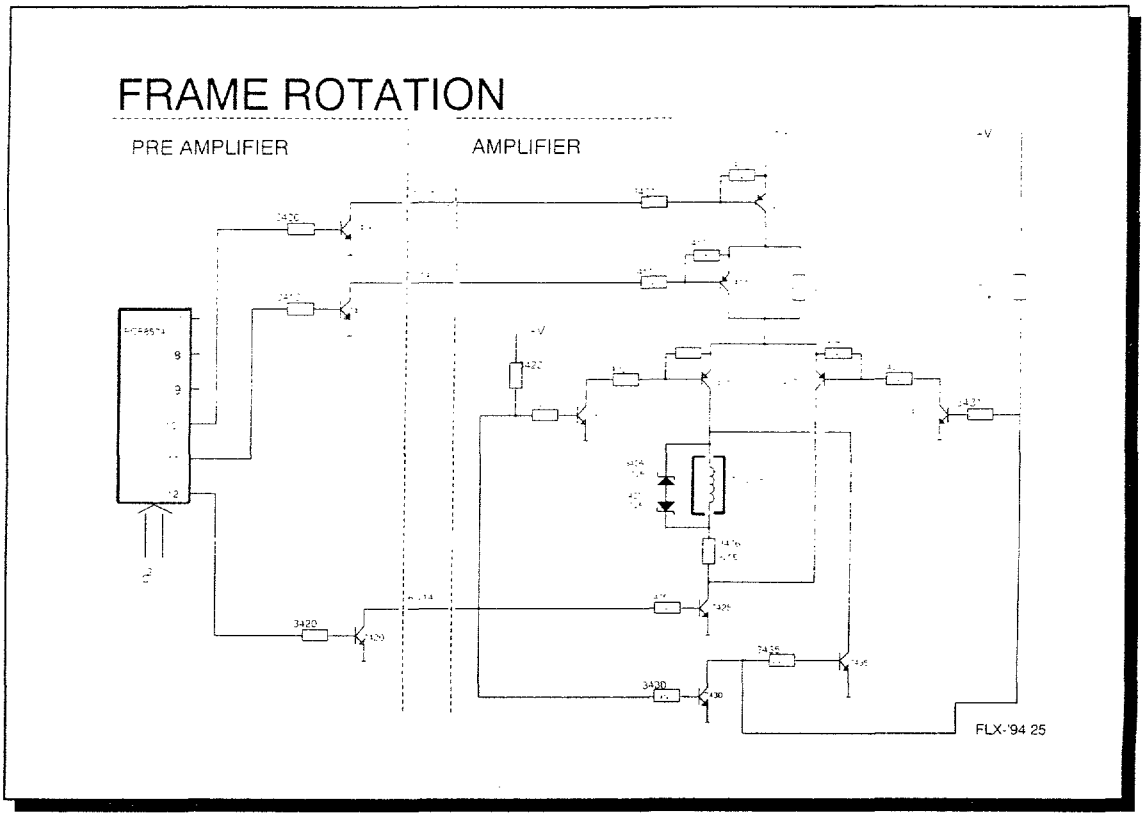
Personal notes:



The figure above shows the principle circuit of the frame rotation. A DC-current can be fed through the compensation coil.

- The current can be switched on and off by the switch controlled by pin 10/PCF8574.
- At pin 11/PCF8574 a series resistor of 1kΩ can be switched on, making the correcting current smaller.
- At pin 12/PCF8574 the current direction can be determined. In the down one position of the switch the current flows from B to A.
  When we reverse the current will flow from A to B.
  It is therefore possible to switch in 5 different positions.

Personal notes:



Circuit

Via I^2C pin 10, 11, 12 of IC7440 can be made high or low. If pins 10, 11, 12 are in high position. Pin 10 controls TS7400, causing it to conduct; TS7401 also conducts, the V+ is switched through. On the collector 29V is read. As pin 11 is high TS7410 will conduct thereby controlling TS7411; we can read the full supply voltage (29V) on the collector of TS7411.

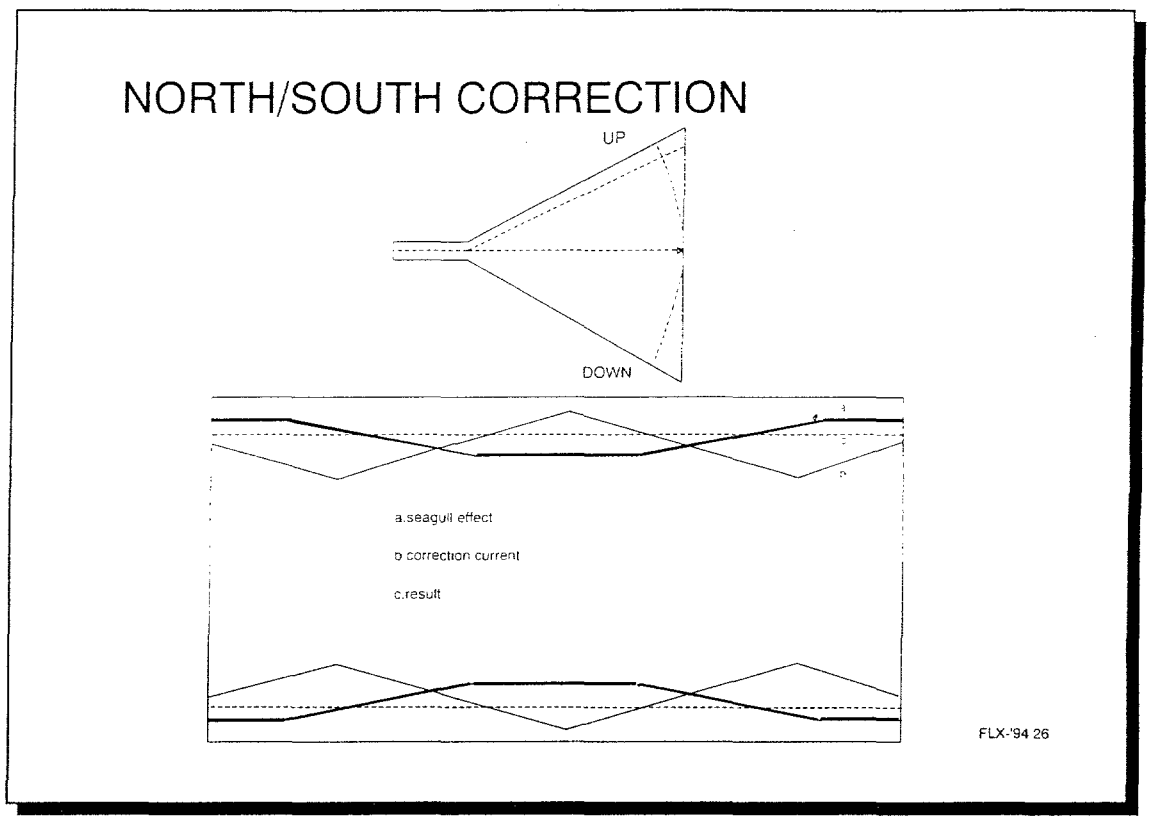
Pin 12 of IC7440 is in a high position, causing TS7420 to conduct, the collector is in low position. This will cause TS7421, TS7423, TS7425 and TS7430 to block. As TS7430 blocks, TS7431 and TS7435 start to conduct, just as TS7433. Due to the conduction of TS7433 and TS7435 current will flow from the bottom to the top through the frame rotation coil, and will be maximum positive.

By making pin 11 low, TS7410 and TS7411 will block. The current then flows via R3413. The current through the coil will then flow from bottom to top, but will be reduced:

By making pin 10 low, TS7400 and TS7401 will block, so it is impossible for the current to flow through the frame rotation coil. At that moment the coil is de-activated. The direction of the current is determined by pin 12. By making pin 12 high, the current will flow from the bottom to the top.If pin 12 is made low, transistor TS7420 will block, causing TS7421, TS7423, TS7425 and TS7430 to conduct and TS7435, TS7431 and TS7433 to block. The current then flows via emitter TS7423 through the coil to TS7425, which is also conducting. A current is obtained that flows from top to bottom.

This current is also adjustable by means of pin 11 IC7440:

Diodes 6426 and 6427 are placed in anti-parallel across the frame rotation coil and will limit the induction voltage to approximately 8V. Induction voltage is created at each current reversal in the coil.



WHY

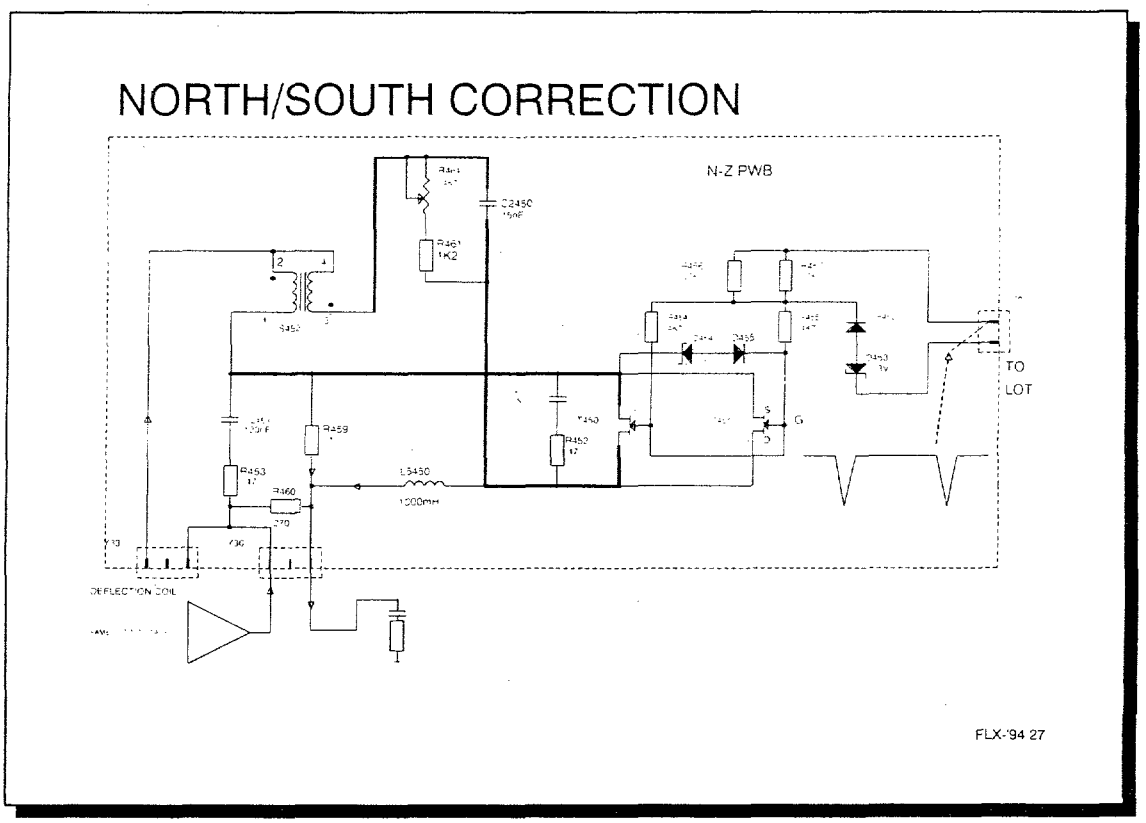
At the introduction of the SUPER FLAT picture tube (29") it appeared to be necessary to install an extra north-south correction. As the tube is now completely flat the distance covered by the spot becomes bigger at the top and at the bottom, in the middle the distance remains the same. After correction of the N-S pin-cushion distortion by the deflection coil, a seagull effect remains.

PRINCIPLE

A frame saw-tooth current flows from 2.5A through the vertical deflection coil. By modulating this frame saw-tooth current by means of a line parabolic current the seagull effect is largely neutralized.

Personal notes:

Only for super flat



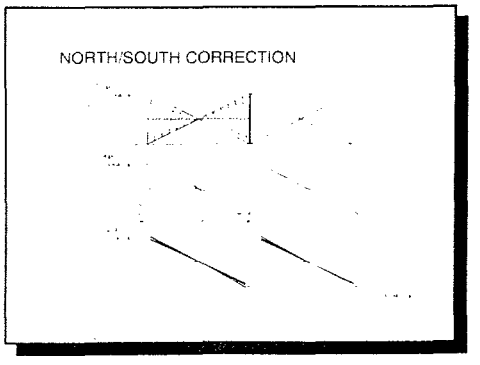
FUNCTIONING

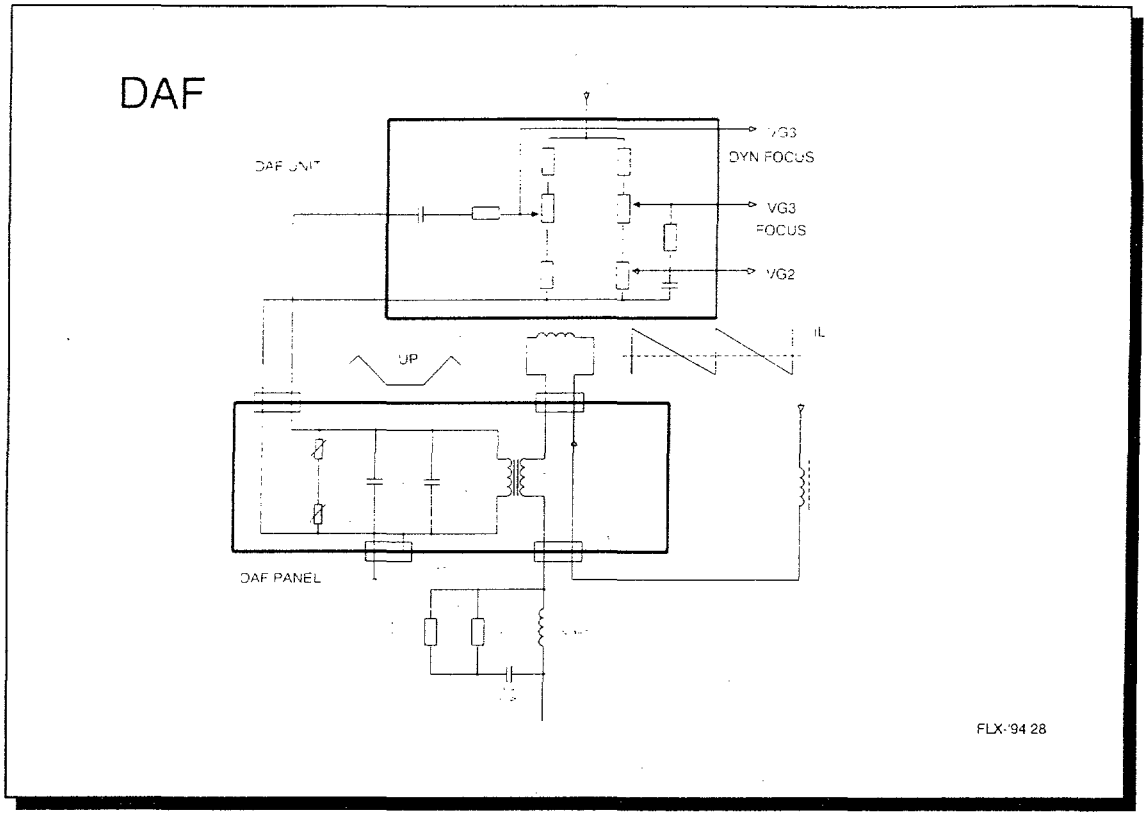
Vertical deflection during horizontal fly-back.
The frame information is supplied to pin 1 of Y30 on the N-S PCB, via pin 5 of frame IC7450. The frame deflection coil is connected to plug Y33 pin 1 and pin 3. The current flows via the deflection coil through windings 1 and 2 of T452, R459 and via pin 3 of plug Y30 back to the LSP. C2450 (15nF) forms a large resistance for frame frequency. In this situation the frame output stage is dimensioned in the same way. Both junction fets T5450 and T5451 are blocked.

Parabolic correction

Via pin 2 of plug Y68 a line pulse is supplied which originated from pin 18 and pin 16 of the LOT. Both junction fets are activated to conduct via R3456, R3467, R3454 and R3455 during the scan. When both fets are conducting, C2450 and winding 3-4 of transformer 452 are connected in parallel to windings 1-2 of auto-transformer T5452. The circuit then forms a resonator with a resonance frequency of approximately 48Kc. The resonator decays 1.5 times during the scan of a line (32µsec). The obtained line parabolic current will flow through T5452, C2450, S5450 and R3459. Depending on the frame saw-tooth current through windings 1-2 a modulated current of approximately 300mA is flowing through C2450.

By means of potentiometer R3461 muting of the resonator can be adjusted. The amplitude of the correction signal is controlled by means of that adjustment. This current also flows through S5450, which means resistance for the horizontal frequency. This signal is composed by means of the frame saw-tooth current through R3459 and supplied in that way to pin 3 plug Y30. C2452 and R3452 limit resonant rises when the FETS are switched off. C2453 and R3453 limit the horizontal blow-in on the frame.
Via pin 2 plug Y68 a horizontal fly-back pulse is supplied. The negative fly-back is limited to approximately -4V by D452 and D453. Two fets are used to enable a larger current. D454 and D455 limit the maximum gate-source current to -20V. R3460 is the frame muting resistance which is moved from the deflection coil to the N-S PCB.





PRINCIPLE
In order to keep the spot well-focused over the entire width of the 16/9 picture tube dynamic focus is used. The parabolic on a horizontal frequency with the correct amplitude is superimposed on a DC focusing voltage.

The 16/9 picture tube has 2 focus connections. An adjustable DC-voltage of approximately 8KV is connected to the Vg3 (static focus). An adjustable DC-voltage plus parabola are connected to the Vg3' (dynamic focus).

FUNCTIONING
The primary of T5860 is in series with the horizontal deflection. C2860 and C2861 are placed parallel across the secondary of T5860, the circuit is tuned to a high frequency, the circuit acts capacitively. For that reason the saw-tooth current causes a parabolic current, which is added to the Vg3' current via pin PLA02.

Two VDR resistors, R3301 and R3302 limit the parabolic amplitude to approximately 840V. In reality Vg3 adjustment has the largest impact on vertical lines and Vg3' adjustment has the largest impact on horizontal lines.

Personal notes:

As in 92/93