SETTING-UP PROCEDURE

SETTING-UP PROCEDURE

Before the camera chain is put into operation the entire system will be tested and adjusted in the setting-up procedure.
Operation of the camera after this procedure is described in chapter OPERATION.
The individual controls are to be found at the REGISTRATION PANEL and are identified by symbols which have the following meaning:


hor. alignment

LIN hor. linearity


Skew


hor. amplitude


hor. centering

i beam current

i = 0
beam switch


Gain


BL-level

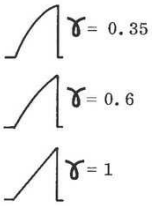

vert. alignment


LIN vert. linearity


vert. amplitude


vert. centering

FOC individual focus


γ = 0.35
γ = 0.6
γ = 1


1 bridge in VIDEO IN module


2 bridge in encoder

A. SWITCHING ON (Position Stand-by)

1. Apply the mains voltage to the camera chain. The pilot lamp in the "OFF" button will then light up.
   Set the beam current switches to position i = 0, the filter selector "NEUTRAL" to position "3" and the remote control switch to position "OFF" (lamp extinguished).
2. Set the cable length correction switch on the "VIDEO INPUT" module to a position corresponding to the camera cable employed.
   Warning: Do not use the positions of the switch where no numbers are mentioned.
3. Depress button "STAND-BY"; the camera will then be in the "STAND-BY" position.
   Lamps SUPPLY-FAILURE-SCAN on the control panel and the "REMOTE" module will then blink briefly, after which they extinguish if everything is correct.

B. GETTERING

Allow the camera to operate for approx. 15 minutes in the "STAND-BY" position, while the beam currents of the plumbicons are switched off. The residual gass will be absorbed by the "GETTER" electrode so that no ions can be formed by the beam current. It is advisible to repeat this procedure when a new plumbicon is fitted in the camera or when the camera has been inoperative for more than a week.

C. CHECKING THE OSCILLOSCOPE UNIT AND THE MONITOR

For all adjustments to the monitor and the oscilloscope unit reference is made to the instructions for use of the relevant instruments.

1. The picture size and the linearity of the monitor should be adjusted by means of the test signal applied to input EXT2 at the rear of the CCU.
   The signal can be selected by setting video selector Ext on the control panel to position 2.
   During the entire adjusting procedure the monitor should be set to small picture size.
2. Check the oscilloscope unit by means of the internal calibration signal. The amplitude of this signal should be 0.7 V.
   The pulses of the oscilloscope unit should then lie between 0 and 100 %.
3. If more than one camera is used the calibration pulses of the oscilloscope units should be equalised. For this, one oscilloscope unit should be used as a reference and the calibration pulses of the other units should be made equal to that of the reference unit.

D. CHECKING THE VIEWFINDER

See under "CAMERA HEAD", chapter 12 (viewfinder).
To the viewfinder an R, G, B, Y and external signal may be applied. The green signal can be selected by means of the green button underneath the viewfinder. The blue signal can be selected with the blue button (E) and the red signal with the red button (Y), provided that the black button YE is not depressed.
If the latter button is depressed the Y signal is displayed when the red button (Y) is depressed, and the E signal when the blue button (E) is depressed.

E. TARGET VOLTAGE

The target voltage of the plumbicon should be approx. 45 V. This voltage can be adjusted by turning the potentiometers on the video pre-amplifier fully clockwise (the potentiometers are accessible by means of a screw-driver via the black screening of the amplifiers).
This screwdriver is situated inside the camera head on the rear panel.

F. SWITCHING ON (Position operation)

Depress the "OP" button. The yellow "STAND-BY" lamp is then extinguished, while the green lamp "OP" lights up.

G. PRELIMIANARY ADJUSTMENT OF THE VIDEO AMPLIFIERS

When a headset is employed for communication between camera and CCU this headset should be connected to one of the sockets on the camera at the right of the camera cable and, on the CCU side, to the socket on the left of the control panel or the socket on the INTERCOM module. The volume control on the camera is marked by the symbol 🎧
On the control panel it is marked "VOLUME".

1. Set the TEST selector to position 2 (sawtooth signal for the CCU). The sawtooth signal is now applied to the "VIDEO OUT" modules via the outputs of the "MATRIX" module.
2. Set the switch on the "PULSE" module to position "INT". Measure the amplitude of the test signal on socket "INT". The amplitude should be 0.7 V and can be adjusted by means of control "TEST" at the front of the module. The signal can be measured by connecting a test probe to the oscilloscope unit (position "PROBE").
3. Connect the oscilloscope to test socket "OUT" of the pulse module. Set the oscilloscope to position "LINE" and check whether the delayed H-pulse is present. If not, turn the "TIMING" potentiometer at the front of this module until the pulse appears and is displayed symmetrically on in horizontal direction the

oscilloscope screen.

If it appears later on that a white vertical line is displayed on the right-side of the picture the timing should be readjusted until this line is not affected (clamping).

4. Set the black selector switch on the oscilloscope to the mid-position.

   Set the "INPUT" selector of the oscilloscope unit to position B, the time base to position "LINE" and select the R, G, B signals on the oscilloscope.

   Adjust the black levels by means of the overall black level control (approximately to position "5") and the individual black level controls.

   The black levels should be exactly on the zero line.

5. Place the "VIDEO OUT" modules one by one on an extension module (for the use of the extension modules see CAM. CHAIN, chapter 6).

   Turn the white clipper at the front of the module fully anti-clockwise. Turn potentiometer (right-hand potentiometer $\gamma = 0.35$) fully clockwise.

   Adjust the Gain Input potentiometer approx. 30^{o} before max. After this potentiometer "PRE-SET GAIN" (R24 on the p. c. board of the module) should be adjusted so that the amplitude of the output signal is the same at $\gamma = 1$ and $\gamma = 0.35$.

   For this adjustment switch the gamma selector on the registration panel to and fro between the extreme positions and check the signal on the oscilloscope unit.

   When the linear signal is larger than the $\gamma = 0.35$ signal, the linear signal should be reduced by means of R24. If the linear signal is smaller, it should be increased by means of R24.

   N.B. Re-adjustments should only be effected with the Gain in potentiometer instead of R24.

   Subsequently adjust potentiometer "GAIN" at the front of the module so that the output signal is 0.7 V.

   By means of potentiometer R82 on the p. c. board adjust the amplitude of the output signal so that it is 0.7 V at outputs R2, G2 and B2 at the rear of the CCU.

   For this connect the B inputs of the oscilloscope unit temporarily to outputs R2, G2 and B2. After this adjustment connect the oscilloscope unit again to outputs R1-G1 and B1 and slide the module back into the rack.

6. Set switch "TEST" on the control panel to position 1 (a sawtooth signal is now applied to the video pre-amplifier in the camera head).

   Set the oscilloscope to position "field" and turn potentiometer "GREEN TILT" on the registration panel till the peak white of the green signal is flat. After this set the oscilloscope to "LINE".

   Measure the amplitude of the sawtooth signal on the yellow test socket "G" of the sawtooth generator in the camera; the amplitude of this signal should be 225 mVp-p.

   If required, adjust the signal by means of the centre potentiometer R25 on the p. c. board of the sawtooth generator (unit DC is accessible after hinging away the viewfinder).

   As a sawtooth signal is applied to the video pre-amplifier via a 1 MΩ resistor the signal current will be 225 nA (= 0.225 μA).

   Adjust the dynamic focus by means of potentiometers R19 and R42 on the horizontal generator and blanking p. c. board in the camera so that the parabolic voltage (both horizontal and vertical) on the collector of TS8 is approx. 10 Vp-p.

7. Warning: This adjustment should be effected using a short (25 or 50 m) camera cable.*

   . Place the hinged-out Video-In module on the hook-extenders and, subsequently, on a normal extender.

   . Connect the oscilloscope probe to the test input of the green channel of the Video-In module.

   . Turn white-clipper control R24 fully clockwise.

   . Adjust the gain of the 2nd pre-amplifier in the camera so that the sawtooth amplitude is 0.5 V.

   . Subsequently, connect the oscilloscope probe to the test input of the red channel of the Video-In module and adjust the gain of the 2nd pre-amplifier so that the sawtooth amplitude is 0.5 V.

     Carry out the same procedure for the blue channel (arbitrary setting of the red and blue test-sawtooth potentiometers on the test generator).

   . Switch on channels "A" on the Waveform Monitor. The output signals of the Video-In module are now displayed. Check that the three individual gain controls on the Local Control panel are in the zero position.

   . Now adjust potentiometers R12, R112 and R212 on the hinged-out Video-In module so that the three output signals are 0.7 V.

   . Consecutively, connect the oscilloscope probe to test input M1 of the red, green and blue Video-Out modules and adjust the sawtooth amplitude to 0.7 V with gain controls R, G and B on the matrix module.

   . Switch on channels "B" on the waveform monitor. Set potentiometers "Pulse Compensation" on the Video-In module to the mid-position. On the registration panel set the gamma switch to the mid-position and the switch next to it to position "Contour-off"; adjust the black levels to 0 % with the three individual black level controls.

   . Check whether the amplitude of the green signal is 100 %; if necessary, re-adjust with the gain control on the 2nd pre-amplifier in the camera.

8. Remove the lens cover.

   Set filter selector "NEUTRAL" on the control panel to position "N", set the aperture to position F/4 and the switch for the colour filter to position 3.

   Illuminate a black-white object, e. g. test chart ETV 348, with approx. 1500 lux.

   The colour temperature of the light should be approx. the

same as for the definitive scenes (within 100°) otherwise the camera gain has to be readjusted afterwards.

9. Set the beam current switches on the registration panel from position i = 0 to position operation (forward position). Stabilise the red, green and blue picture (on the oscilloscope unit) by means of the beam current controls. Set "IRIS" to such a position that a 100 % signal is obtained at the output of the green channel. By means of the "GAIN" controls on the red and blue second preamplifiers in the camera, adjust the red and blue output signals so that they are identical to the green output signal.
10. Display the "green" picture on the black-white monitor by setting the colour selector on the panel to position "G". Focus the picture by means of the optical focusing of the lens. Set the individual focus control for green on the control panel to position "4". Focus the picture with the overall focus control. This control is located at the front of the "FOCUS-ALIGN" module.

✱ For other cable lengths, see table

Cable length	Input voltage test socket Video In module	Output voltage (test socket matrix)
0 m	500 mV	700 mV
25 m	500 mV	700 mV
50 m	490 mV	700 mV
100 m	490 mV	700 mV
150 m	460 mV	700 mV
200 m	420 mV	700 mV
250 m	390 mV	700 mV
300 m	340 mV	700 mV
600 m	340 mV	700 mV
1000 m	340 mV	700 mV

H. ADJUSTING THE POSITION OF THE LENS WITH RESPECT TO THE PLUMBICONS (BACK FOCUS)

1. For an accurate adjustment it is advisable to reduce the light level so that the "IRIS" lens is completely open. In this situation the depth of focus is most critical. Set the switches at the front of the "VIDEO OUT" modules to position "AP". Turn controls "AP" and "LEVEL" clockwise. If excessive noise is introduced in the picture, turn "AP" slightly anti-clockwise.
2. Shift the green deflection unit with respect to the prism until there is some clearance between the deflection unit and the prism. The rubber bellows, however, should still press against the prism. Set the lens to max. focal distance (close-up) and adjust the green picture to optimum sharpness by means of the lens focus control.
3. Set the lens to minimum focal distance. Now focus the image by means of the control on the lens unit.
4. Repeat procedures 2 and 3; the picture should remain sharp throughout the zoom control range.
5. Set the lens to minimum focal distance (long shot) and adjust the red and blue pictures to optimum sharpness with the controls on the deflection units and the individual electrical focusing controls on the control panel. If one of the controls is at the end of its control range, shift the green unit by means of the knob on the unit and repeat the entire procedure. If, for instance, the red unit is slid as far as possible to the rear, the green unit should be shifted slightly forward.
6. Set the iris to approx. F/4 and illuminate the scene until the output signal on the oscilloscope unit is 100 %.
7. Close the side covers of the camera.

SATURATION OF THE PLUMBICONS

The following procedure is recommended for plumbicons which have been out of operation for a week or more.

1. Place a uniformly illuminated white surface in front of the camera. Adjust the aperture so that the output signal is 100 % and focus the picture by means of the lens focus.
2. Increase the deflection amplitudes by means of the overall horizontal and vertical controls, which are located at the front of the "SCAN" module, in such a way that the outline of the plumbicon target is displayed as a circle. The camera should remain in this condition for approx. 1 hour. The target will then be saturated with electrons so that the risk of burning-in is reduced to a minimum.

PRELIMINARY ADJUSTMENT OF THE PICTURE SIZE

1. Place a test chart e.g. ETV 348 in front of the camera (perpendicular to the optical axis of the lens), select the green picture on the picture monitor and focus this picture optically.
2. Adjust the overall, vertical and horizontal amplitudes so that the circumference of the plumbicon target is displayed (these overall controls are located at the front of the "SCAN" module).
3. Adjust the focal distance of the lens and the position of the camera so that the corners of the test pattern fall exactly within the circumference of the target.
4. Set the following green controls to the mid-position: the individual horizontal amplitude control, the individual

vertical amplitude control, the individual linearity controls and the skew correction control.
Adjust the overall controls for horizontal and vertical amplitude and linearity so that the test pattern fills the blanking frame on the picture monitor, and ensure that the linearity deviation is not too high.
Also use the potentiometers for horizontal and vertical shift. If the picture cannot be centred properly, adjust the beam alignment controls until the centring is correct. Final adjustment is effected during adjustment of the beam alignment and registration.
If required, position the picture by means of the screwdriver control on the side of the deflection unit until it is horizontal.

K. OVERSTABILISATION PROCEDURE

1. Adjust the "IRIS" so that a 100 % signal is obtained in the green channel. The "GAIN" control should be at 0 dB.
2. Set the "GAIN" control to position -6 dB. Open the IRIS until the output signal of the green channel is 100 % again. If required, stabilise the picture by means of the beam current control.
3. Check whether the green picture is just stabilised at the 100 % level.
4. Repeat procedures 1, 2, 3 for red and blue.
5. Set the "GAIN" control on the control panel to position "0" and set the aperture control to such a position that the signal of the green channel is 100 %.
   The picture is now overstabilised for one iris stop (= 6 dB). Excessive overstabilisation may give rise to lag.

L. BEAM ALIGNMENT

1. Check that the test chart, e. g. ETV 348 is properly centred (the arrows at the top of the test pattern should just touch the blanking frame on the monitor).
2. Switch on the "focus wobble" on the registration panel. Adjust the beam currents for the red, green and blue channels by means of the "BEAM ALIGNMENT CONTROLS" until the centre of the test pattern is stationary. Switch off the focus wobble.
3. If required, shift the red, green and blue pictures by means of the shift controls until the test pattern fits exactly in the blanking frame.

M. FINAL ADJUSTMENT OF THE GREEN PICTURE

1. Set the individual green controls for horizontal and vertical linearity to the mid-position. Set the overall horizontal and vertical amplitude controls to such a position that the circumference of the plumbicon target is displayed.
   Adjust the zoom lens so that the test pattern falls just within the circumference of the target.
   Adjust the horizontal and vertical amplitude controls until the picture exactly fills the monitor screen.
2. Focus the picture both with the lens focus control and the overall electrical focus control (the individual control for green focus should be in position 4). If necessary, rotate the picture until it is horizontal by means of the screwdriver control on the green deflection unit.
3. Check the picture geometry with the aid of a ring test pattern and a grid pattern test signal applied to input "EXT2" at the rear of the CCU. Select the external signal by setting switch "EXT" on the control panel to position 2.
   Adjust the linearity with the overall horizontal and vertical amplitude and linearity controls; the individual green controls should be in the mid-position. If required, adjust the green skew correction control unit til the central vertical row of circles is exactly perpendicular ot the central horizontal row of circles.

N. STREAKING CORRECTION

1. Place a RETMA test card in front of the camera.
2. Select the green picture, and adjust control "CORRECTION" on the second green video amplifier in the camera so that the streaks behind the horizontal bars in the circle of the test pattern are minimised. Check that the brightness of the viewfinder is not set to too low a value. Also check the narrow white horizontal lines just outside the circle.
3. Repeat this procedure for the red and blue channels.

O. REGISTRATION

For this, only the red and blue individual controls are used. The red and blue pictures are compared with the green picture which serves as a reference. If the red or blue individual controls have to be set practically to the end of their control ranges it is advisable to use the relevant individual green control and to adapt the red and blue controls afterwards.
When the registration errors are excessive use the +G signal. If the errors are only slight use the -G signal. The green signal is then displayed negatively which results

in a clear distinction between the green, red and blue pictures. Slight errors are then clearly visible.
Electrical focusing should be effected with care. The focusing control not only affects the sharpness of the image but also the geometry to some extent. The adjustment is correct when the picture remains sharp (e. g. the picture remains sharp between position 3 and 4 of the focusing control, the correct setting is then 3. 5).

1. Place a proper registration chart in front of the camera and adjust focal distance so that it corresponds to the dimensions of the test chart.
2. Commence with the red picture and compare this with the green picture. Adjust the aperture correction (AP) and the level potentiometers for the aperture of the red and green channels so that the picture is as sharp as possible. The potentiometers are located at the front of the "VIDEO OUT" modules.
   Check that the switch inside the MATRIX module for contour adjustment "OPER. BY-PASSED" is in the lowest position (OPERATE).
3. Check that the red image shows optimum electrical focusing. If required, correct this by means of the individual focus control. By shifting the horizontal lines in the centre of the picture it is possible to check whether the red picture is shifted with respect to the green picture. The simplest way to check this is to shift the red picture with respect to the green picture by means of the vertical shift control.
   When the two horizontal lines are not exactly parallel, the red deflection unit should be rotated (screwdriver adjustment at the side of the unit) until they run exactly in parallel. Subsequently, shift the red picture.
   The two lines should now exactly coincide. The skew correction control should be adjusted so that the vertical lines in the centre of the picture run in parallel. This can also be checked by slightly shifting the red picture with respect to the green picture by means of the horizontal shift control. Subsequently, centre the red picture until the two lines coincide precisely.
4. Now adjust the horizontal registration. When the vertical central lines of the two pictures coincide the horizontal amplitude should be adjusted so that the red vertical lines at the left of the picture coincide with the green lines. By means of the red linearity control the vertical lines at the right of the picture should be made to coincide. When the linearity control is adjusted it will appear that the red picture is also shifted; therefore, the horizontal shift should always be readjusted before the result is examined. The linearity and shift controls should then alternately be turned slightly. Check whether the lines at the left still coincide, when the picture in the centre is correct. If not, adjust the amplitude control until the lines at the left coincide.
   In the case of slight residual errors, the horizontal linearity and horizontal shift should be adjusted carefully with the aid of the -G signal.
5. The registration of the picture in the vertical direction is adjusted with the aid of the vertical centring, amplitude and linearity controls.
   Follow the same procedure described for horizontal registration; the upper lines can be made to coincide by means of the amplitude control and the lower lines by means of the linearity control.
6. Adjust the blue picture in the same way.
7. Now select the three pictures together and check the registration. The permissible registration errors are stated in chapter 2 "TECHNICAL DATA".

P. PULSE COMPENSATION

Set filter selector switch "NEUTRAL" to position 3, and set the "TEST" switch to position 2.
Adjust the black levels to 10 % by means of the individual black controls $\Lambda_{\leftarrow}$, while the black level master control is set to 5. Now set the "TEST" switch to the mid-position (no signal).
Adjust potentiometers "PULSE COMPENSATION" at the front of the "VIDEO IN" module so that the black level lies at 10 % (10 % = centre of noise band). If the "GAIN" is set from -6 dB to +6 dB the black level should not change.
If required, readjust "PULSE COMPENSATION". Set the test switch to position 2 and adjust the black level to zero by means of the individual black level controls $\Lambda_{\leftarrow}$.
Set the "GAIN" switch to 0 dB.
Set filter selector "NEUTRAL" to position N and the test selector to the mid-position.

Q. AUTOMATIC BLACK LEVEL COMPENSATION

1. Select test signal no. 2 on the control panel and check the position of the black level.
2. Place a RETMA test chart with ultra-black in front of the camera. Illuminate this chart with 1500 lux and set the iris to F/4.
   By means of the controls for automatic black level compensation which are located on the "VIDEO IN" module adjust the black level so that it has the same position as the black level of sawtooth test signal "Test 2".
3. Check the automatic black level compensation by zooming

the picture in and out; the black level should remain the same. The automatic black level compensation is determined by the average picture contents. Therefore the setting will remain a comprbmise. It is possible that for certain scenes the automatic black level compensation has to be readjusted.

R. LINE TILT

1. Place the "VIDEO IN" module on 2 extension modules.
2. Set the "NEUTRAL" filter selector on the control panel to position 3. The time base selector on the oscilloscope unit should be set to position "LINE".
3. The black level should be horizontal and can be corrected by means of potentiometers R1-R101 and R201 on the "VIDEO IN" module. If the oscilloscope trace slightly sags at the black level, adjust the potentiometers so that the centre of the sagging part lies in the centre of the black level.

S. WHITE CLIPPER

1. Set filter selector "NEUTRAL" to position "N".
   Place a gamma test pattern in front of the camera and open the iris until a 100 % signal is obtained in the green channel. Set γ-switch on the L. C. P. in position $\gamma = 1$.
2. Place the "VIDEO IN" on the extension modules.
   Adjust the iris so that the signal amplitude on the oscilloscope unit is 130 %. To display this signal the time base line should be shifted to the -20 level with the aid of the vertical shift control on the oscilloscope unit.
   If the 130 % level cannot be reached potentiometer R41, which is located at the top of the "VIDEO IN" module, should be turned until a value of 130 % is obtained. After this adjust potentiometer R14 so that the signal is clipped at 120 %.
   The three clipping levels will not be the same, the lowest value should lie at 120 %.
3. Slide the "VIDEO IN" module back into the CCU.
4. Place the green "VIDEO OUT" module on the extension modules.
   Adjust the potentiometer for the white clipper (at the front of the module) so that the signal is clipped at 110 %. Adjust potentiometer R64 so that clipping takes place horizontally (slope). Refit the module in the CCU.
5. Place the red "VIDEO OUT" module on the extension module. Select the red and green signals by means of the selector switch on the oscilloscope unit.
   Adjust the clipping potentiometer on the "VIDEO OUT" module so that the clipping level coincides with that of the green signal.
   By means of potentiometer R64 adjust the slope of the clipping level so that it coincides with that of the green signal. If required, the white-clipping potentiometer may be readjusted. Refit the red "VIDEO OUT" module in the CCU.
6. Repeat procedure 5 for the blue channel.

T. GAMMA

The gamma controls are located at the front of the "VIDEO OUT" module. The left-hand control serves for the 1-0.6 range and the other one for the 0.6-0.35 range.
The first control is selected by means of the gamma selector on the registration panel in the mid-position; the second potentiometer is selected with the selector in the fully clockwise position.
Suppose that we want to select a gamma correction of 0.6. For this set the gamma selector to the mid-postion and commence the adjustment of the gamma correction with the potentiometer on the left of the module.

1. Place a suitable gamma test chart in front of the camera. If such a test chart is not available, test chart C337 42 in the envelope at the back of these Service Notes may be used. Illuminate the test chart with approx. 1500 lux at approx. 3200 ^{o}K. Check that filter selector "COLOUR" on the control panel is in position 3.
   Adjust the iris so that the output signal of the green channel is 100 %. (Check that the timebase line of the oscilloscope unit coincides with the zero line of the graticule.)
2. To permit proper adjustment of the three gamma controls, the gamma potentiometer on the green "VIDEO OUT" module should be turned fully clockwise. Adjust the gamma correction controls of the two other "VIDEO OUT" modules so that the correction is identical for the three controls; i.e. the grey steps of the gamma chart should be reproduced identically for each channel.
   For this proceed as follows.
3. Check that the black levels are exactly zero by means of test signal 2. Select the red and green signals by means of the selector switch on the oscilloscope unit. Set the switches on the "VIDEO OUT" module to position F.
   The 100 % levels should be equalised with the ind. gain potentiometer on the C. C. P.
   Now adjust the gamma correction potentiometer on the red "VIDEO OUT" module so that the gamma correction is the same for red and green; in other words the grey steps should coincide. If for a proper gamma adjustment the red controls have to be turned fully clockwise, and should in fact be turned further, the green gamma control should be turned slightly anti-clockwise. After this readjust the red control.
   The black levels can be equalised with the aid of the individual black controls R, G, B which are located on the

registration panel.

4. Repeat procedure 3 for the blue channel.
   If correct gamma adjustment is impossible with the blue control fully clockwise, turn the green gamma correction control slightly anti-clockwise until the blue and green oscillograms exactly coincide. However, the red gamma adjustment should then be repeated.
5. Observe the gamma test chart on a properly adjusted colour monitor. Switch the colour monitor a few times from colour reproduction to black-and-white reproduction and back, and check that the steps of the gamma test pattern have the correct colour in position colour reproduction. If the colours are not correct, the gamma and black level controls should be slightly readjusted. Set the switches on the "VIDEO OUTPUT" modules to "AP" again.

U. ADJUSTMENT OF CONTOUR AND APERTURE CORRECTION

1. Aperture correction.
   Set the switch on the registration panel to position "CONT. OFF".
   Place an RMA test chart in front of the camera. Check that the switches on the "VIDEO OUT" modules are in position "AP" and that potentiometers "LEVEL" are turned clockwise. Turn potentiometers "AP" on the "VIDEO OUT" modules until an acceptable compromise is obtained between sharpness and noise in the picture. Turn potentiometers "LEVEL" on the "VIDEO OUT" modules until the noise in the dark parts is minimum while the definition in the brighter parts is maintained.
2. Contour correction
   Apply the three signals to the black-white monitor.
   Set the selector switch to position "NORMAL".
   Turn the "LEVEL" potentiometer ⌐¬ on the contour processor fully anti-clockwise.
   Turn potentiometer C on the "MATRIX" module until an acceptable compromise is obtained between sharpness and noise. Turn the "LEVEL" potentiometer ⌐¬ until the dark parts show minimum noise, while the sharpness in the brighter parts is maintained.
3. To improve the signal-to-noise ratio the aperture correction on the red and blue "VIDEO OUT" modules may as a rule be switched off; this is done by turning potentiometers "AP" and Level fully anti-clockwise.
   For a further reduction of the noise in the blue signal the switch on the "VIDEO OUT" module may be set to position "F".
4. With potentiometer R31 in the "CONT. PROC." module the balance between the vertical and horizontal contour signals can be adjusted.
   For this adjustment the "CONT. PROC." module should be placed on an extension module.
5. Connect the oscilloscope unit (position PROBE) to test socket M2 and earth of the "CONT. PROC." module.
   The contour signal is now displayed. Adjust the "ZERO BALANCE" potentiometer on this module so that the d. c. component is zero.

V. SENSITIVITY OF THE PLUMBICONS

The value of 225 nA for the green gun is an approximation. Should the picture contain excessive noise, this may be caused by the spread in sensitivity of the plumbicons, even if it remains within the specification. If the green plumbicon has a sensitivity which is higher than average, the red and blue plumbicons will have a proportionally lower sensitivity. If in such a case the green plumbicon is adjusted to a peak signal current of 225 nA, the amount of light on the plumbicons will be insufficient, so that the red and blue picture will contain too much noise.
In order to reduce this noise level the amount of light on the target of the plumbicons should be increased so that the signal current in the green channel will have a value of e. g. 300 nA. The sawtooth generator should then supply a signal amplitude of 300 mV.
It is obvious that if this adjustment is carried out the sawtooth voltages in the red and blue channels should also be recalibrated; for this see the following paragraph.
Check PULSE CANCELLATION.

W. ADJUSTMENT OF THE SAWTOOTH VOLTAGE IN THE RED AND BLUE CHANNELS (TEST I)

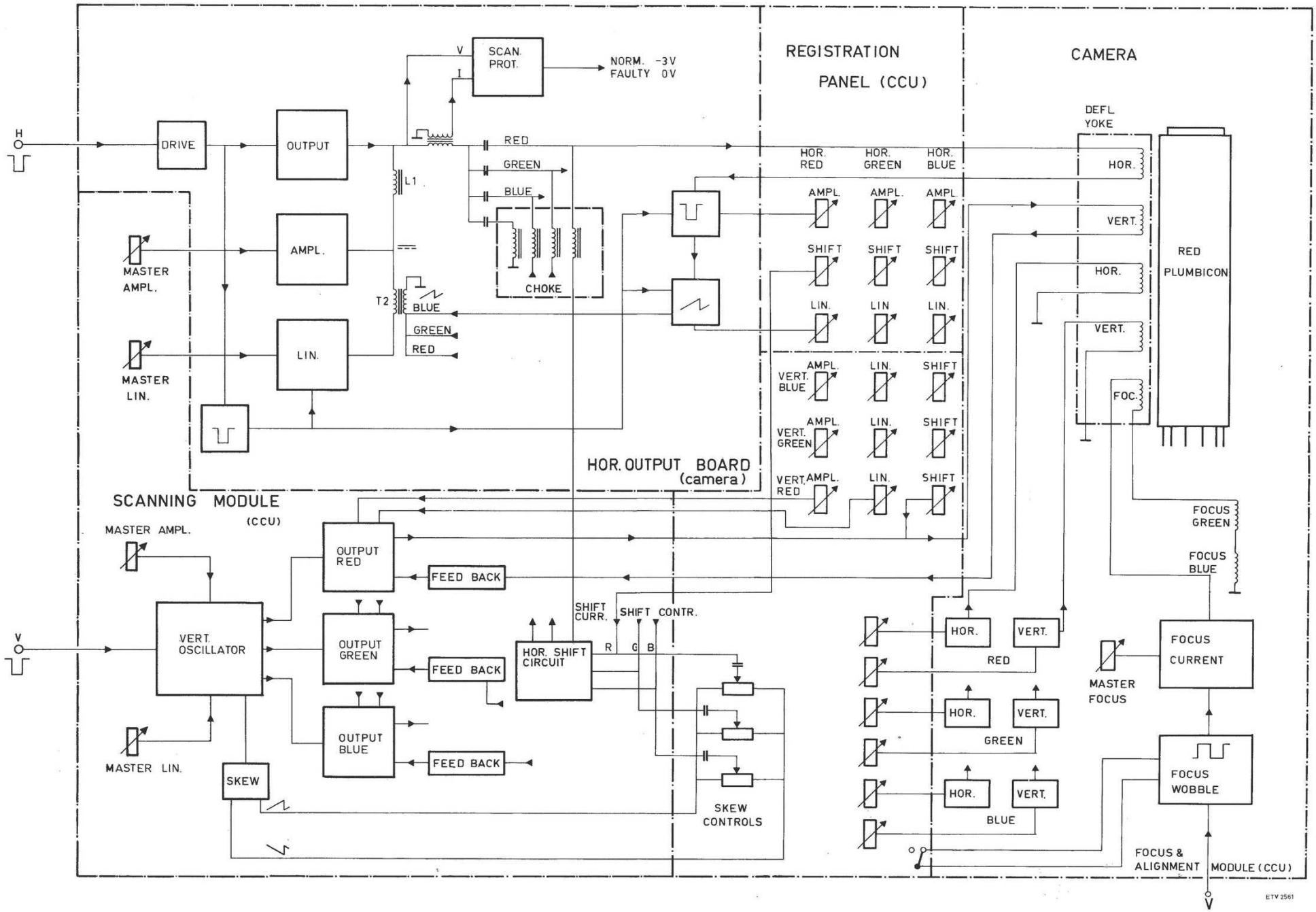
Set filter selector "NEUTRAL" to position 3 and set the test switch to position 1.
By means of R26 and R24 of the sawtooth generator in the camera head for red and blue, adjust the amplitude of the sawtooth signal so that the amplitude on the oscilloscope is 100 %.

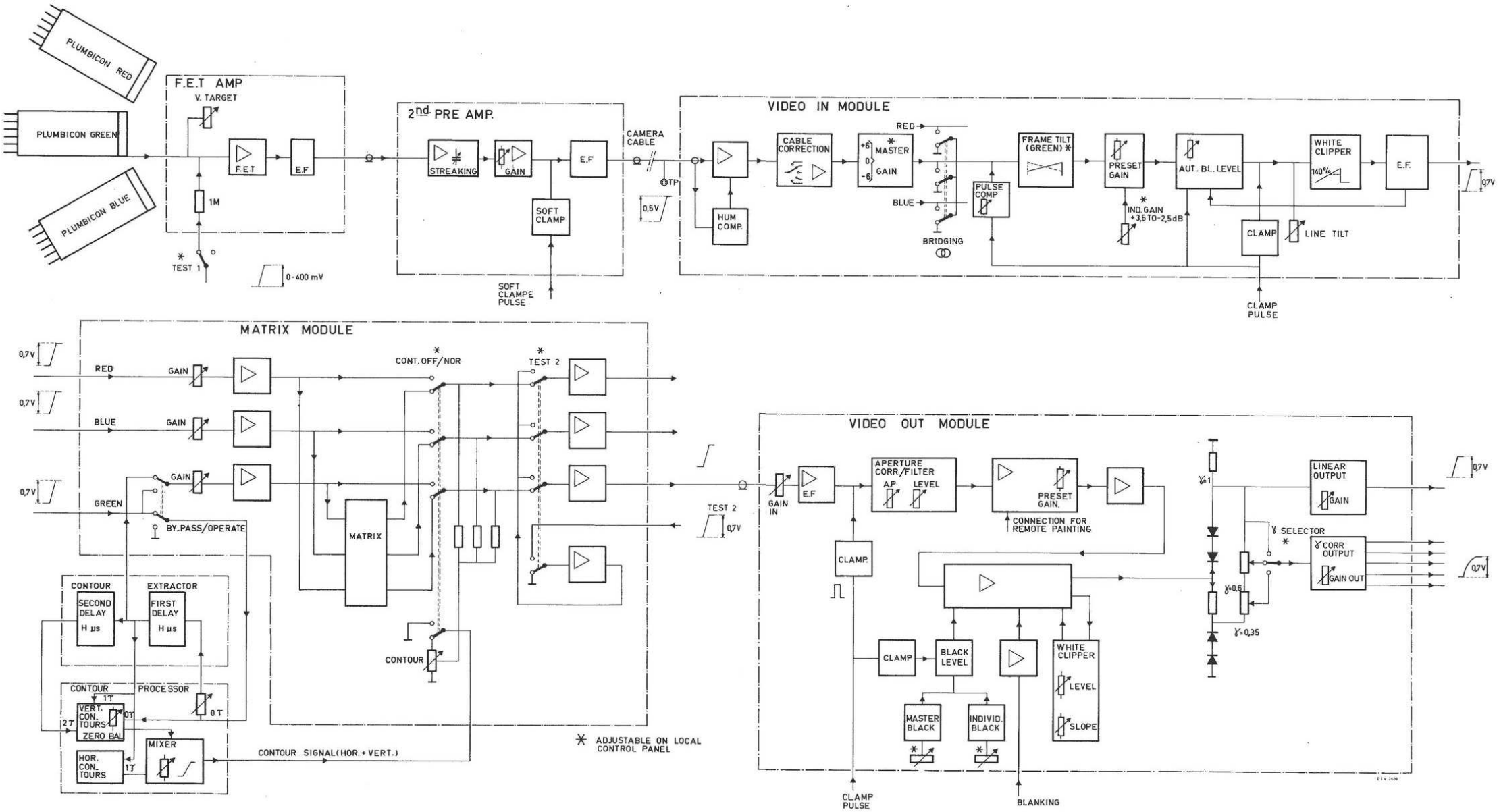
X. GREEN "TILT"

1. Place a uniform by white test chart in front of the camera.
   Check that this test chart is uniformly illuminated.
   Zoom in as far as possible (large focal distance) and use only a small part of the test chart. Therefore, place the camera as close as possible to the test chart; the optical focus is not of importance in this case.

Adjust the iris for 100 % amplitude.

2. Connect a properly adjusted colour monitor (flat background) to CCU.
   Set the monitor to colour reproduction and check that the picture shows no discolouring at the top and bottom.
   If discolouring occurs the "GREEN TILT" potentiometer on the registration panel should be adjusted so that the picture shows minimum discolouration.
3. If the oscilloscope is used for this adjustment, its time base should be set to "FIELD". Adjust the green "TILT" so that the green oscillogram has the same tilt as the red and blue oscillograms.


REGISTRATION
PANEL (CCU)
CAMERA
SCAN.
PROT.
V
I
NORM. -3V
FAULTY 0V
H
DRIVE
OUTPUT
RED
GREEN
BLUE
L1
CHOKE
T2
BLUE
GREEN
RED
AMPL.
LIN.
MASTER
AMPL.
MASTER
LIN.
HOR.
RED
HOR.
GREEN
HOR.
BLUE
AMPL.
SHIFT
LIN.
VERT.
BLUE
VERT.
GREEN
VERT.
RED
DEFL.
YOKE
HOR.
VERT.
FOC.
RED
PLUMBICON
HOR. OUTPUT BOARD
(camera)
SCANNING MODULE
(CCU)
MASTER AMPL.
MASTER LIN.
VERT.
OSCILLATOR
OUTPUT
RED
OUTPUT
GREEN
OUTPUT
BLUE
FEED BACK
SKEW
SHIFT
CURR.
SHIFT CONTR.
R
G
B
HOR. SHIFT
CIRCUIT
SKEW
CONTROLS
V
FOCUS
GREEN
FOCUS
BLUE
FOCUS
CURRENT
MASTER
FOCUS
FOCUS
WOBBLE
FOCUS &
ALIGNMENT
MODULE (CCU)
ETV 2561


PLUMBICON RED
PLUMBICON GREEN
PLUMBICON BLUE
F.E.T AMP
V. TARGET
F.E.T
E.F
1M
TEST 1
0-400 mV
2nd PRE AMP.
STREAKING
GAIN
E.F
SOFT CLAMP
SOFT CLAMPE PULSE
CAMERA CABLE
TP
0,5V
VIDEO IN MODULE
HUM COMP.
CABLE CORRECTION
+6
0
-6
MASTER GAIN
RED
BLUE
BRIDGING
PULSE COMP
FRAME TILT (GREEN)
PRESET GAIN
IND. GAIN +3,5 TO -2,5 dB
AUT. BL. LEVEL
CLAMP
LINE TILT
WHITE CLIPPER
140%
E.F
0,7V
CLAMP PULSE
MATRIX MODULE
0,7V
RED
GAIN
BLUE
GREEN
BY-PASS/OPERATE
CONT. OFF/NOR
TEST 2
MATRIX
CONTOUR
CONTOUR EXTRACTOR
SECOND DELAY H µs
FIRST DELAY H µs
CONTOUR PROCESSOR
VERT. CON. TOURS ZERO BAL
HOR. CON. TOURS
MIXER
1T
2T
0T
CONTOUR SIGNAL (HOR. + VERT.)
ADJUSTABLE ON LOCAL CONTROL PANEL
TEST 2
0,7V
VIDEO OUT MODULE
GAIN IN
E.F
APERTURE CORR./FILTER
A.P
LEVEL
PRESET GAIN
CONNECTION FOR REMOTE PAINTING
CLAMP
BLACK LEVEL
MASTER BLACK
INDIVID. BLACK
WHITE CLIPPER
LEVEL
SLOPE
CLAMP PULSE
BLANKING
γ=1
γ=0,6
γ=0,35
γ SELECTOR
LINEAR OUTPUT
GAIN
γ CORR OUTPUT
GAIN OUT
0,7V