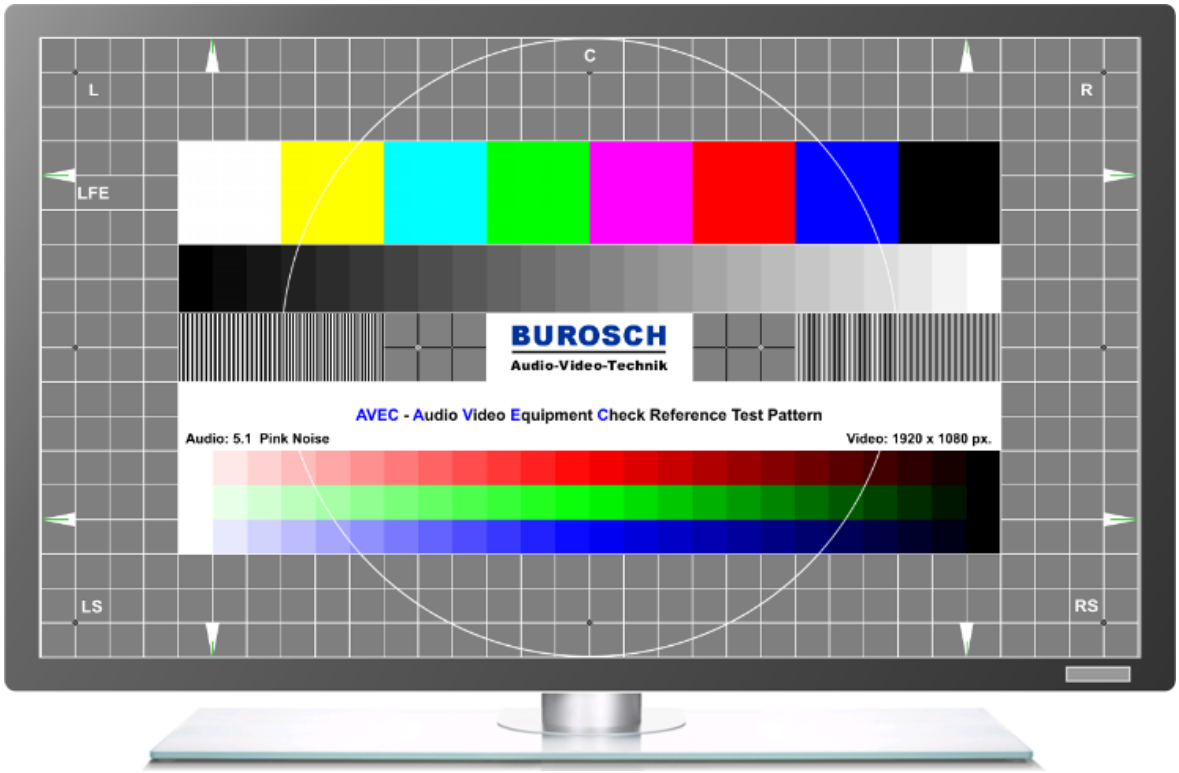
BUROSCH

Audio-Video-Technik

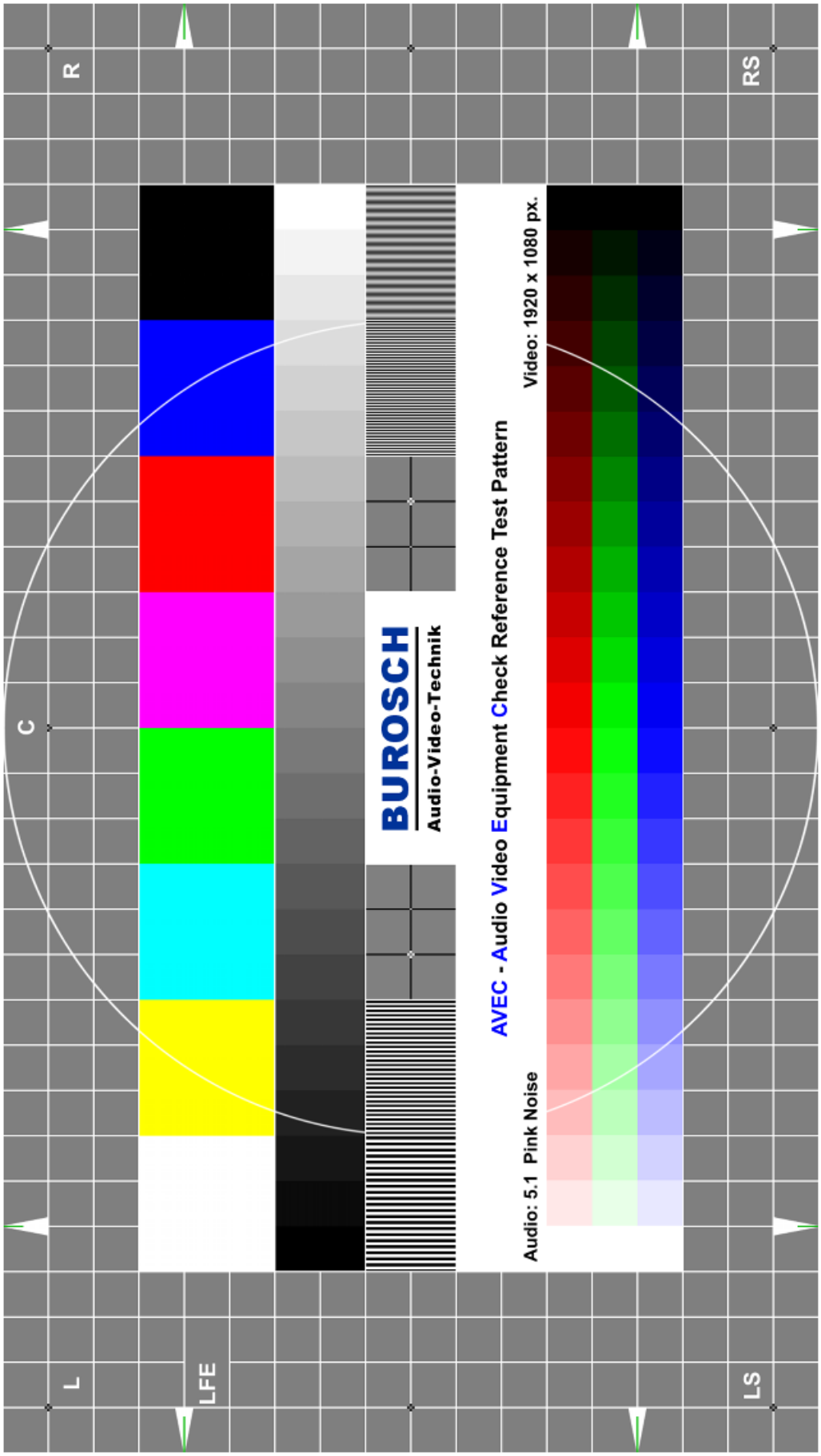


AVEC

Audio Video Equipment Check

Reference Test Pattern

Technical Documentation


R
RS
C
L
LFE
LS
BUROSCH
Audio-Video-Technik
AVEC - Audio Video Equipment Check Reference Test Pattern
Video: 1920 x 1080 px.
Audio: 5.1 Pink Noise

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Audio-Video-Technik

Reference Test Pattern: AVEC (Audio Video Equipment Check)

Content:

Reference Test Pattern: AVEC (Audio Video Equipment Check)

1 General Tips and Notes

Here you see all tips and notes which you implicitly have to keep in mind:

Because of an external backlight a more relaxed watching television for the human eye is possible. Thereby is to mind that the backlight has to be placed behind the display without any glares. For external backlights you can use usual illuminants with small light power.

Please let you and your eye a few minutes time to better detect potentially color differences or display problems. For it this test pattern is optimal applicable because you often don't have enough time for a cognition at quick motions.

The test patterns are optimal adapted for an aspect ratio of 16:9. For other aspect ratios (16:10, 4:3, …) please use the source signal from your corresponding transducer.

Please only use applicable test patterns which are adapted for your individual application:

- SD for resolutions up to 1,366 x 768 Pixel interlaced
- FullHD for resolutions of 1,920 x 1,080 Pixel and 1,280 x 720 Pixel

Please note that static test patterns like this one mustn't be displayed more than one hour without changing pictures of the TV-display because of possible phosphor burn-ins which causes so-called "ghosts", especially on flat screens.

The same effect of "ghosts" can also be caused by broadcasting station icons or black bars which appear when a film is reproduced in another mode than its production mode. These things also cause diverse burn-ins on a display.

Therefore we advise a not so long display of the test signal on the display unit.

Because of printer settings and for clarification of the bad image reproduction the real images will be displayed only symbolical and suggestively.

2 Company Profile

Competence and innovation are the characteristics of the company BUROSCH Audio-Video-Technik. Already in 1948 we produced radios.

Because of this long experience in the topic electronic we are the European leader in reference test signals for quality evaluation and optimizing of displays respectively nowadays.

Already in year 1994 we developed the source code for these test signals which guarantees the specification of our declaration of conformity.

A lot of static and dynamic test sequences for every application, image format and for FullHD displays are stored at our internal server to satisfy the individual requests of our customers.

Of course we also offer you various audio test sounds in different sound formats.

So we offer a lot of audio and video test sequences to a technician for evaluating all components of the playback string professionally and to optimize by the help of these signals if needed.

These sequences developed by us act in many national and international laboratories as reference for comparative product tests. These test signals are also used by leading manufacturers worldwide in development, quality controls and in services, too.

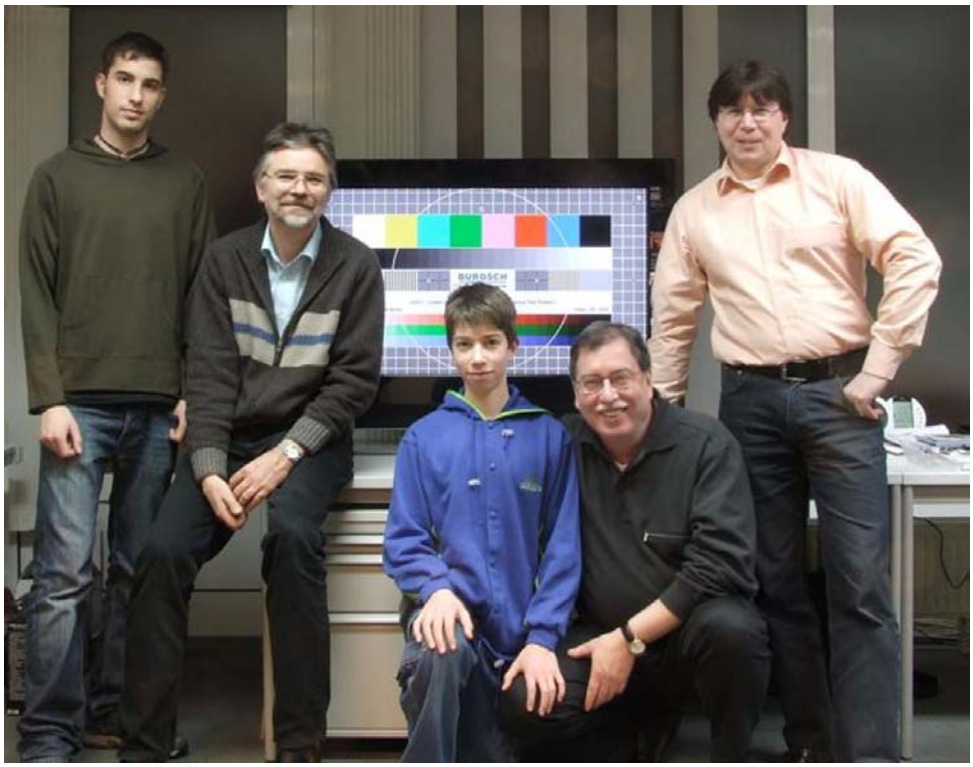
Of course we cultivate the collaboration with various research institutes and technical universities.

Mr. Prof. Dr. Ing. M. Plantholt (domain: display measurement at university of Wiesbaden, Germany) also confirms the quality of our test signals.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

2 Company Profile

Profit by our know-how: Because of our long-time advising activity, also for famous industrial companies we are willingly at yours command for competent assistances and advices e.g. for configurations of look-up-tables over color temperature up to dynamic contrast measurements.



From left:

Steffen Burosch, Eberhard Graf, Andreas Burosch, Klaus Burosch, Paul Gaukler (Year 2007)

Presentation of the AVEC Universal Test Pattern in FullHD format on Philips 47” inch displays.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

2 Company Profile

2.1 Video Labor

By the long experience the company BUROSCH Audio-Video-Technik grown up to the Europe's leader in the area image evaluation and image optimization respectively.

Modern audio and video analyzers are used in our video labor.

The Burosch Company works only with first-class devices made by the most popular manufacturers like Sony, Hewlett Packard, Rohde & Schwarz, Tektronix, Quantum Data, Konica Minolta and many more.

Of course we work with the spectroradiometer CS-2000 from Konica Minolta already to make exact measurements, analyzes and calibrations.

Premium Broadcast Class A monitors from Sony are used in our video labor for a standard of comparison.
But in spite of grave improvements of the LCD and Plasma technique these Broadcast Class A monitors are optimal adapted for evaluation and documentation of the naturalness of colors and motion blurs.

We also arrange our knowledge to labors of famous journals for comparative product tests like Chip, c't Magazin, AVF-Bild and to professional testing laboratories like ASIG or OBL.

Stored at different mediums like CD, Video-DVD and Blu-ray Disc (BD) all test signals are available for you.

Display development departments all over the world of leading manufacturers in consumer electronics like Panasonic and in automotive industry like Daimler AG are also advised competently by us.

We also advise you willingly!
Please profit by our competence!

Reference Test Pattern: AVEC (Audio Video Equipment Check)

2 Company Profile

2.1.1 Reference Measuring Devices

On the following pages we present our measuring devices for professional image analysis.

Professional spectroradiometers like Minolta's CS-2000 are used in the Burosch Video labor. This enables high-precision display measurements and perfect analysis. The following image shows the first-class measuring device from Minolta.

Spectroradiometer CS-2000 from KonicaMinolta

Premium measuring- and indication systems from Rohde & Schwarz, LeCroy, Tektronix and Hewlett Packard and many video display units from Sony are used in the labor of the Burosch company.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

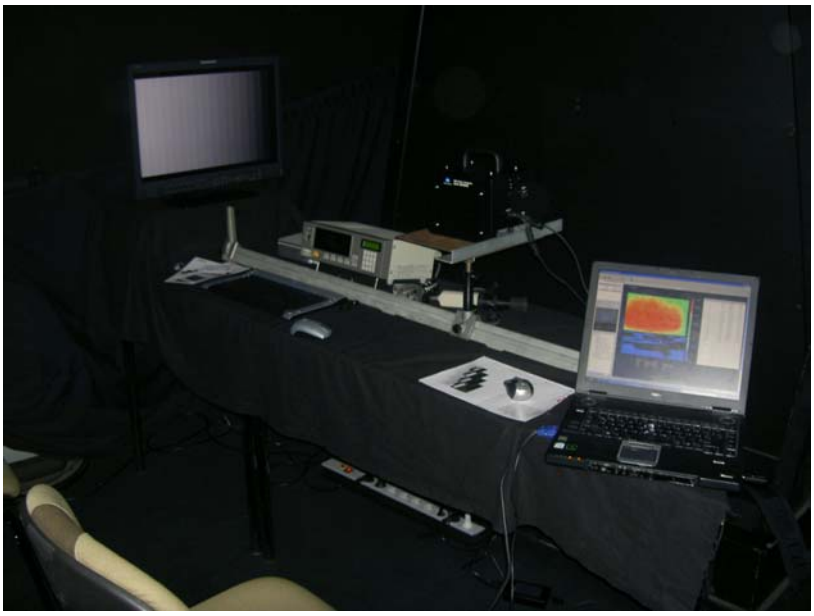
2 Company Profile

Andreas and Klaus Burosch: Image- and Video Analysis with Video Analyzers from Rohde & Schwarz.

Klaus Burosch: Image- and Video Analysis with high-precision measuring devices from Rohde & Schwarz and many more.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

2 Company Profile



Display measurements with spectroradiometers and color analyzers from Minolta (CA-2000 und CS-2000)

Plasma Display Prototype Analysis; from left:

Mr. Wild (Department Manager HDTV Panasonic), Raphael Vogt, Klaus Burosch, Eberhard Graf, Philipp Smoldas

Reference Test Pattern: AVEC (Audio Video Equipment Check)

2 Company Profile

2.1.2 Source Code

For being able to make a professional quality evaluation the quality of the reference signal must be known. Only if the reference and source signal respectively is known a correct image evaluation can be done.

Therefore we developed already in 1994 this source code to ensure the reconvertibleness of our reference test signals and so we guarantee the specifications of the declaration of conformity.

All of our test signals are created based on this source code and so it's an absolute reference for the technical engineer.

This source code is the basis for all further test patterns.

```
for ($frame = 0; $frame < $anzframe; $frame++) {
    #$shift = 1.57079632679489661923132169163 98*4/$anzframe*$frame;
    $shift = 1.57079632679489661923132169163 98*4/$anzframe*$frame;
    $faktor = 1.57079632679489661923132169163 98/$bildbreite*2*$endfreq/37.13733075435203094777562862 6692*(($frame/$anzframe*2)+0.5);
    #BUROSCH Reference Test Patten
    print "Frame $faktor shif $shift \n";
    for ($y = $topmargin; $y < $bildhoehe+$topmargin; $y++) {
        #print "Line $y shif $shift \n";
        for ($x = $leftmargin; $x < $bildbreite+$leftmargin; $x++) {
            $counter = 0;
            #my $color = Imager::Color->new(gray => ((sin($x*log($y/10+1)/50+512)+1) * 128));
            #my $color = Imager::Color->new(gray => ((sin($Kx*$x + $Ky*$y + $Kx2*$x*$x + $Ky2*$y*$y + $Kt*$t + $Kt2*$t*$t))*256));
            my $skala = $y % 50;


            #if(($x == 50) or (($skala == 0) and ($x > 9) and ($x < 91))){
                #$color_wert = 0;
            #}else{
                my $distanz = sqrt(($x-$breite/2)*($x-$breite/2) + ($y-$hoehe/2)*($y-$hoehe/2));
                #$color_wert = (sin(1.70442309765071247746454176610 22*0.000001*$distanz*$distanz)+1)*128;
                $color_wert = (sin($faktor*$distanz*$distanz+$shift)+1)*128;
            #}
            #print "Wert = $color_wert\n";

            $color = Imager::Color->new(gray => $color_wert);

            if($color_wert == 0){
                $counter++;
            }
            $gray -> setpixel( x => $x, y => $y, color => $color); #=
        }
        #$color_new = $gray->getpixel(x=>$x, y=>$y);
        #print "Zeile ",$y,":", $counter*2, "\n";
    }
    $outfilename = $bildpath."/"."ZP"." $breite $hoehe"."H $endfreq $frame.bmp";
```

BUROSCH Reference Test Pattern source code

Only if the signal source is known a competent image evaluation can be done.

Many people often do display comparisons with test patterns without knowing the signal source of them. That's why it's important to know the exact signal source and source code respectively. Correct image analysis and image evaluations can be only done by the help of this source code.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

2 Company Profile

2.2 Basic Tuning

In the speciality store the most flat screens show a good image with a sales-promotional adjustment. The customer hasn't enough time to concentrate on the real image quality because of the quick film sequences. Further the ambient lights at the display presentations in the stores are almost 10 times brighter than at home. The disillusion comes often afterwards. Because of the lower ambient light at home it is necessary to recalibrate the display when you're at home. When you place the bought display at home you see deformations, blurring or false colors mostly. Because of that the customers are often unhappy with the bought product. But mostly this isn't due to the TV-device itself. In fact the most important aspects of the image reproduction were overlooked ruthlessly or not at all attended.

Only a good interaction of the various components of the playback string makes a perfect image possible. Therefore all parameter of the signal source (e.g. DVD-Player, Blu-ray-Player or Sony Playstation 3) and of the reproduction device (TV-display) have to be checked and correct adjusted if needed.

Because of this we advise a check-up of the most important criteria like brightness, contrast, focus, color and gamma correction respectively locally in the store. The seller should afford this. Applicable for this you find the adapted test patterns on our webpage www.burosch.de depending on your later application. You can easily download these free Display Basic Tuning test patterns and burn it on a DVD.

The adjustments of your image sender and signal source respectively you must keep clearly in mind. You should check these adjustments, too. Because only if the adjustments are correctly coordinated to each other a good image and so an optimal home-cinema feeling is warranted.

Digital inputs on your TV-display like HDMI or DVI also arrange for the best image reproduction unlike analogue connections (SCART-RGB, Composite Video…).

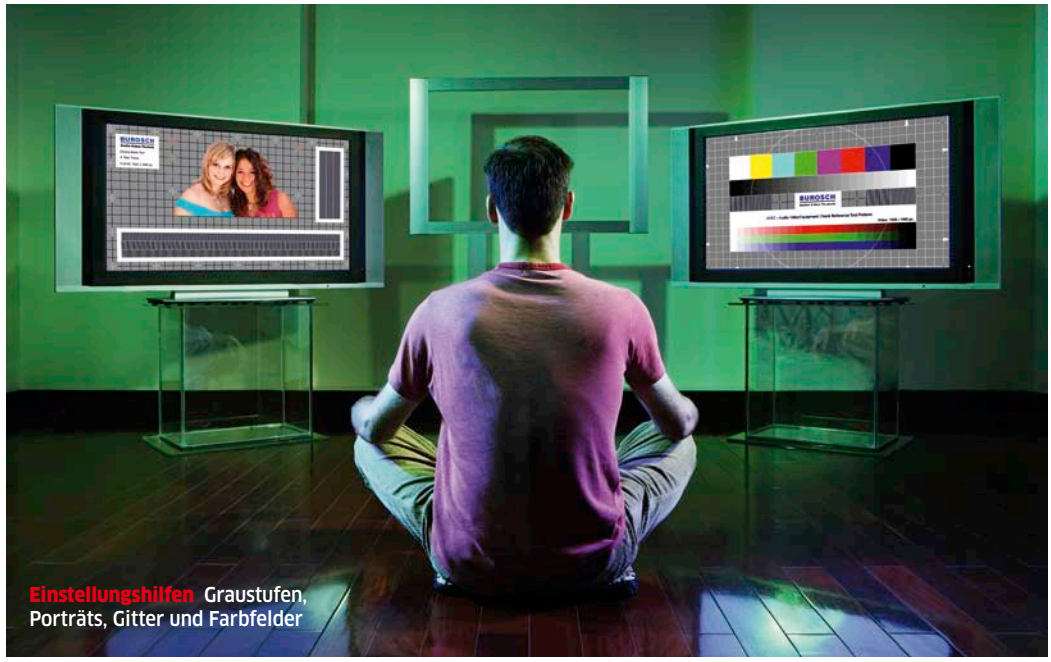
These reference test patterns act as basis for the image evaluation and image optimizing. Technicians of famous test journals for comparative product tests e.g. Chip, c't Magazin, AVF-Bild and further more also work with our reference test patterns.

Please satisfy yourself of our reference test signals and set up your display like a technician!

On the following page you see an abridgment of the test journals Chip and c't Magazin from which you probably can learn more.

In 10 Schritten zum perfekten Bild

Nicht immer ist das fabrikneue LCD-TV **OPTIMAL EINGESTELLT**. Doch mit unseren Tipps holen Sie das Beste aus Ihrem Fernseher heraus



Einstellungshilfen Graustufen, Porträts, Gitter und Farbfelder

1 Erst testen, dann kaufen

Meist hängt das Bild vom Zusammenspiel aller Komponenten ab. Wenn es Ihnen möglich ist, probieren Sie ein TV etwa mit Ihrem DVD-Player im Geschäft aus. Es geht schließlich um viel Geld – da sollte Ihnen der Verkäufer dies ermöglichen. Eventuell finden Sie auch in Internetforen (z.B. bei CHIP Online) andere User, die Geräte in der gleichen Konfiguration nutzen.

2 Die besten Quellen nutzen

Wer mit seinem LCD-TV per DVB-T fernsehen will, hat eigentlich schon verloren. Das Signal beim digitalen Antennenfernsehen ist so stark komprimiert, dass es zu hässlichen Klötzchen und Artefakten kommt. Besser sind digitale Sender per Kabel (DVB-C) oder Satellit (DVB-S). Am besten sind natürlich HD-Signale, doch im TV (außer z.B. Premiere HD) sind sie noch selten. Optimal sind HD-Filme von Blu-ray-Disc bzw. HD-DVD.

3 Die richtigen Eingänge

Meist hat Ihr TV noch Scart-Eingänge für ältere Geräte wie etwa einen Videorekorder. Vergessen Sie das aber lieber. Am besten nehmen Sie HDMI, um das TV mit einem Player oder einem Receiver zu verbinden – die digitale Übertragung sorgt für das beste Bild.

4 Helfen lassen

Einige Hersteller (z.B. Philips) bieten im Menü nützliche Hilfsprogramme zur Justierung des TVs an. Mit deren Hilfe werden Sie dann Schritt für Schritt durch alle Einstellungsoptionen geführt. Bei vielen Beispielbildern können Sie einfach zwischen zwei Varianten wählen. Dies ergibt bereits eine gute Grundeinstellung.

Burosch-Test-DVD Gibt es bei CHIP Online zum Download

5 Test-DVD herunterladen

Unter **www.chip.de** finden Sie eine NRG-Imagedatei für die DVD „Burosch Display Reference Test Suite“. Dieses File-Format lässt sich mit dem Brennprogramm Nero auf DVD brennen. Danach können Sie die Scheibe in Ihren DVD-Player schieben. Sie zeigt dann neun Testbilder zur optimalen TV-Einstellung an.

6 Helligkeit

Mit dem ersten Bild der Burosch-DVD können Sie die Helligkeit einstellen. Sie sehen eine sogenannte Graustufentreppe vor schwarzem Hintergrund: Nur wenn Sie die einzelnen Felder mit unterschiedlichen Graustufen klar unterscheiden können, stimmt die Helligkeit für die Nutzung des Fernsehers in Ihrem Wohnzimmer.

7 Kontrast

Der Kontrast sorgt dafür, dass Sie auch in hellen Bildteilen Details erkennen. Sie können es bei einer Skiübertragung probieren – oder wieder mit Ihrer neuen Test-DVD, die ein Motiv vor weißem Hintergrund zeigt. Optimieren Sie die Einstellung, bis Sie gerade klare Kontraste zwischen den Motiven erkennen können.

8 Farben

Die Test-DVD zeigt einen Farbstreifen, mit dem Sie die Farben einstellen können. Wichtig ist vor allem, dass Hauttöne lebendig wirken. Nutzen Sie zum Abgleich die Testbilder von Personen auf der DVD oder Ihre Lieblingssendung.

9 Schärfe

Meist stimmt die Schärfe ab Werk. Doch ein Gittermuster, wie Sie es ebenfalls auf der Test-DVD finden, hilft, dies zu überprüfen. Sie können gegebenenfalls auch hier justieren.

10 Standort

Stellen Sie das TV nicht gegenüber von Fenstern auf, sonst spiegelt es. Und achten Sie auf den Seh-Abstand: Die doppelte Bildschirmdiagonale ist das perfekte Maß für HD-TV.

FOTO: GETTY IMAGES

Ulrike Kuhlmann

Passend eingestellt

Testbilder zum optimalen Abgleich Ihres Displays

Die wenigsten Fernseher zeigen beim ersten Einschalten nach dem Kauf ein ordentliches Bild. Mit Hilfe unserer fünf Testbilder können Sie das im Handumdrehen ändern.

Das Bild sah im Laden noch super aus: leuchtstark, mit brillanten Farben und toller Schärfe. Zu Hause im Wohnzimmer wirkt die Darstellung am nagelneuen Flachbildfernseher ganz anders – zu grell, reichlich bunt, überzeichnete Gesichter. Schuld ist meist die unpassende Einstellung des Displaybildes, denn die Lichtverhältnisse im Laden unterscheiden sich stark von denen zu Hause. Außerdem werden die Fernseher in vielen Läden übertrieben eingestellt, ganz nach dem Motto: Was gut leuchtet, fällt auch gut auf. Ein optimales Bild erhält man so aber keineswegs.

Mit nur fünf Testbildern von unserer Heft-DVD und ein bisschen Zeit können Sie den neuen – oder den alten – Fernseher und auch den Projektor kinderleicht Ihren Gegebenheiten anpassen. Dafür müssen Sie sich zunächst aus dem ISO-Image auf unserer Heft-DVD eine Video-DVD brennen. Wie das geht, wird im Artikel auf Seite 140 beschrieben.

Legen Sie diese Video-DVD in den Zuspieler, den Sie künftig nutzen wollen. Die Verkabelung zwischen TV und Zuspieler sollte ebenfalls den späteren Bedingungen entsprechen. Für HD-Zuspieler nehmen Sie bitte die fünf Testbilder in HD-Auflösung. Da sie mit den PAL-Bildern identisch sind, gelten dieselben Einstellroutinen.

Die erforderlichen Displayeinstellungen können je nach Signalquelle stark variieren, weshalb Sie die Einstellung für jede Quelle separat durchführen sollten. Wenn ein Umschalter die Signale verschiedener Quellen an den Fernseher weiterleitet, kann das TV-Gerät nicht mehr zwischen den Quellen unterscheiden. Im besten Fall merkt sich der Fernseher dann mehrere Presets pro Signaleingang. Viele Displays speichern aber pro Eingang nur genau eine Einstellung. Dann müssen Sie sich die wichtigsten Parameter notieren und sie später im Betrieb manuell einstellen. Gleiches gilt, wenn es nur einen einzigen Bildspeicher für alle Eingänge gibt.

Licht und Schatten

In guten LCD-TVs kann man die Hintergrundbeleuchtung des Displays anpassen, am eigentlichen Bild ändert sich dadurch nichts. Einige LCD-TVs trennen Backlight und Bildparameter jedoch nicht komplett voneinander; bei Röhrengeräten war dies gar nicht möglich, Plasmadisplays trennen ebenfalls nicht. In diesem Fall können Sie die Schirmhelligkeit nur auf Kosten des Schwarzpegels anheben, die Darstellung wird dann zugleich matter. Besitzt ihr TV einen separaten Leuchtdichteregler – im Menü häufig mit „Hintergrundlicht“ oder dessen Abkürzung bezeichnet –, sollten Sie ihn so einstellen, dass der Schirm in dem normalerweise vorherrschenden Umgebungslicht ausreichend hell leuchtet.

Anschließend sollten Sie die Farbtemperatur – gemeint ist die Darstellung von Weiß – überprüfen: Wählen Sie wenn möglich sRGB, andernfalls eher warme Einstellungen wie 6500 Kelvin; dies ist die Standardtemperatur für Video- und TV-Signale. Wirkt die Darstellung zunächst etwas rötlich, sollten Sie das Bild einen Moment auf sich wirken lassen – unser Sehapparat ist ein bisschen träge.

Grauverläufe

Anhand des ersten Testbildes, es enthält zwei dunkle Grautreppen und das Portrait zweier Frauen, wird der Schwarzpegel eingestellt: Es sollten möglichst alle dunklen Felder in dem 16-stufigen Grauverlauf unterscheidbar sein. Fehlen sehr dunkle Stufen, heben Sie den Schwarzpegel – im Bildschirmmenü zumeist „Helligkeit“ genannt – so lange an, bis sie differenziert werden, die dunkelste Stufe und der Bildhintergrund aber trotzdem schwarz bleiben. Wirkt der Hintergrund grau, liegt der Pegel zu hoch; dann fehlt der Darstellung später die Tiefe. In diesem Fall verzichten Sie besser auf die Unterscheidbarkeit der dunkelsten Graustufen. Auch die Haare der Dame rechts im Bild sollten bis zum Haaransatz differenziert sein, ihr Gesicht darf aber nicht fahl wirken.

Das zweite Testbild zeigt zwei helle Grautreppen sowie die beiden Damen. Hier wird der Kontrast optimiert: Es sollten möglichst alle Stufen unterscheidbar und die blonden Haare der Dame links im Bild bis in die Haarspitzen differenziert sein. Fehlen die hellsten Stufen, wirkt das TV-Bild später überstrahlt. Reduzieren Sie den Kontrast so lange, bis möglichst viele Stufen sichtbar sind, der Hintergrund des Bildes aber immer noch weiß und nicht grau ist. Nimmt man zu viel Kontrast raus, hat das Bild später keine Strahlkraft und wirkt matt.

Mit den drei Farbtreppen im dritten Testbild werden die Farben optimiert. Die Farbstufen sollten auch in der Mitte gleichabständig und gut unterscheidbar sein. Wenn die mittleren Stufen verschwimmen, reduzieren Sie die Farbsättigung im Menü. Dabei sollten Sie nur im Notfall die Farben einzeln verstellen, denn die separate Farbregelung wirft am Ende meist mehr Probleme auf, als sie beseitigt. Die Farben des Displays sollten so satt wie möglich sein, sind sie zu satt, wirkt das Bild unnatürlich und der eigentlich weiße Bildhintergrund gerät farbstichig. Die Gesichter der beiden Damen bekommen bei zu satten Farben einen unnatürlichen Teint.

Anhand des vierten Testbildes kontrollieren Sie die Schärfeeinstellung und die Skalierung Ihres Displays. Es zeigt ein schwarzes Gitter auf grauem Grund, einige hart kontrastierte Streifenmuster (Multiburst) sowie wiederum die beiden Frauen. Besitzen die schwarzen Gitterlinien einen hellen Rand, Schatten oder Doppelkonturen, liegt die Schärfe zu hoch. Reduzieren Sie die Schärfe im Menü so lange, bis das Gitter frei von Randerscheinungen ist. Die Darstellung erscheint dann oft erst mal reichlich weich. Bei Überschärfung wirken die Haare der blonden Dame wie gerastert, ihr Kopf bekommt eine weiße Aura. Sind die grauen Flächen im Bild verrauscht, sollten Sie das Displaymenü nach Parametern zur Rauschunterdrückung durchforsten.

Mit dem fünften Testbild können Sie Ihre Einstellungen überprüfen, denn es fasst die vier vorhergehenden partiell zusammen (Grau- und Farbverläufe, Farbflächen, Streifenmuster, Gitter). Außerdem verdeutlicht es mit einem weißen Kreis, ob das Display die Bilder im korrekten Seitenverhältnis wiedergibt: Ist der Kreis gestaucht, haben später auch die Personen in Filmen Eier- oder Querköpfe. Überprüfen Sie im Menü, ob ein anderes Seitenverhältnis bei der Wiedergabe zum besseren Ergebnis führt. Passermarken an den Bildrändern zeigen zudem, wie viel Ihr Gerät vom Fernsehbild abschneidet – leider ist dieser sogenannte Overscan bei den wenigsten Geräten einstellbar. Mit einem umlaufenden Rauschen in Testbild fünf können Sie zudem einen kleinen Toncheck machen.

Haben Sie alle Einstellungen erfolgreich durchlaufen, sollten Sie mit Testbild eins erneut beginnen und überprüfen, wo weitere Verbesserungen notwendig sind. Je nach Erfahrung und Gerät sind drei und mehr Zyklen nötig, bis die optimale Displayeinstellung gefunden ist. Auf der Heft-DVD finden Sie ein PDF mit weiteren Beschreibungen der Testsequenzen. (uk) c't

So stellen Sie Ihr Fern

Testbilder auf der Heft-DVD

So finden Sie die Testbilder:
Legen Sie die aktuelle AUDIO-VIDEO-FOTO-BILD-DVD in Ihren DVD-Spieler. Nach kurzer Zeit sehen Sie das DVD-Menü. Sollte gleich der Film starten, drücken Sie auf der Fernbedienung des DVD-Spielers die „Menü"-Taste. Im Hauptmenü (Bild oben) rufen Sie den Punkt „Testbilder" auf (Bild unten). Nun können Sie jedes Testbild mit der Fernbedienung direkt aufrufen.

Helligkeit

Helligkeit richtig eingestellt

Rufen Sie das Testbild „Helligkeit" von der Heft-DVD auf. Verändern Sie die Helligkeit Ihres TV-Geräts (siehe Bedienungsanleitung), bis Sie in der linken Bildhälfte zwei senkrechte Balken sehen. Verringern Sie danach langsam die Helligkeit. Ihr TV-Gerät ist optimal eingestellt, wenn der rechte, dunklere Balken 1 gerade verschwindet, der linke, hellere Balken 2 aber noch gut zu sehen ist. Die vier verschiedenen Grautöne in der Fläche rechts 3 müssen gut zu erkennen sein.

Helligkeit zu hoch eingestellt

Ist die Helligkeit zu hoch eingestellt (mittleres Bild oben), sind beide Balken sichtbar. Schwarz wirkt dann wie ein milchiges Grau.

Helligkeit zu niedrig eingestellt

Sehr helle Stellen überstrahlen umliegende dunklere Bereiche. Dadurch gehen in Filmen helle Bilddetails verloren, und dunkle Szenen wirken trüb. Bei zu geringer Helligkeit verschwinden beide Balken im Schwarz (rechtes Bild oben). Dunkle Bildpassagen sind dann im Film nicht mehr zu unterscheiden.

Kontrast

Kontrast richtig eingestellt

Mit dem Kontrast verändern Sie vor allem die Darstellung der hellen (weißen) Bildanteile. Das Kontrast-Testbild auf der Heft-DVD zeigt übereinander zwei „Grautreppen".
Bei optimaler Kontrast-Einstellung sehen Sie in der oberen Bildhälfte 16 Grautöne von Weiß 4 bis Hellgrau 5 und in der unteren Hälfte 16 Grautöne von Schwarz 6 bis Dunkelgrau 7. Die Helligkeit der Balken sollte in der oberen Bildhälfte gleichmäßig ab- und in der unteren gleichmäßig zunehmen.

Kontrast zu hoch eingestellt

Bei zu hohem Kontrast (mittleres Bild oben) verschwinden feine Abstufungen. Sie sehen dann nur eine große weiße Fläche oben 8 und eine große schwarze unten 9.

Kontrast zu niedrig eingestellt

Bei zu niedrig eingestelltem Kontrast (rechtes Bild oben) wirkt das Bild matt und trübe.
Kontrast und Helligkeit beeinflussen sich gegenseitig. Überprüfen Sie deshalb nach der Kontrast-Einstellung noch einmal die Helligkeit und dann erneut den Kontrast.

Mit den Testbildern der Heft-DVD optimieren Sie die Bildqualität in nur fünf Schritten

Ab Werk zeigen Fernsehgeräte nur selten ein optimales Bild: Farbe, Kontrast und Schärfe im Überfluss, von natürlicher und augenfreundlicher Darstellung ist das weit entfernt.

Damit Sie den TV-Apparat optimal einstellen können, liefern Ihnen der Video-Spezialist Klaus Burosch und AUDIO VIDEO FOTO BILD professionelle Testbilder. Mit den Motiven auf der Heft-DVD lässt sich das Bild einfach justieren. Bevor Sie damit beginnen, sollten Sie einige Vorbereitungen treffen:

- Die Testbilder sind im 16:9-Format gespeichert. Haben Sie ein 4:3-TV-Gerät, schalten Sie den Video-Ausgang des DVD-Spielers auf 4:3.
- Halten Sie die Bedienungsanleitungen und Fernbedienungen von DVD-Spieler und TV-Gerät bereit.
- Schalten Sie am Fernsehapparat Bildvoreinstellungen wie „Kino", „Abends" oder „Dynamisch" aus, oder wählen Sie „Standard". Deaktivieren Sie elektronische Bildverbesserungen wie Rauschunterdrückung oder Kammfilter.

sehgerät richtig ein

- Säubern Sie den Bildschirm. Staub oder Zigarettenqualm verschlechtern die Bildqualität.
- Verbinden Sie den DVD-Spieler über den qualitativ besten Video-Ausgang mit dem Fernseher. AUDIO VIDEO FOTO BILD gibt ihn in seinen Tabellen an. Bei einer Scart-Verkabelung müssen beide Geräte die gleiche Signalart beherrschen.
- Lassen Sie Ihr Fernsehgerät eine halbe Stunde „warmlaufen". Danach sind die Bildwerte stabil.
- Vermeiden Sie Lichtreflexe auf dem Bildschirm, zum Beispiel durch direktes Sonnenlicht. Dunkeln Sie den Raum am besten ab. Schalten Sie das Licht ein, mit dem Sie üblicherweise fernsehen.
- Setzen Sie sich so hin, dass Sie möglichst direkt von vorn auf den

Farbflecken im Bild entstehen oft durch Lautsprecher: Rücken Sie dann die Boxen vom TV ab.

Bildschirm schauen. Der Abstand zum Fernsehapparat sollte etwa die dreifache Bilddiagonale sein.

Jetzt können Sie die Bildqualität optimieren. Führen Sie nacheinander die Einstellungen durch, wie sie AUDIO VIDEO FOTO BILD auf diesen Seiten beschreibt. Danach haben Sie das Bild für die DVD-Wiedergabe perfekt eingestellt.

Für Sat-Empfänger oder Videorecorder können etwas abweichende Einstellungen optimal sein.

Die vier Testbilder und 60 weitere Motive zum Einstellen und Testen von DVD-Spielern, TV-Geräten, Videoprojektoren, AV-Receivern usw. finden Sie auf der neuen Test-DVD „AVEC" von Burosch Audio-Video-Technik. Sie bekommen die DVD direkt beim Hersteller: 0711-1618980, www.burosch.de

Farbsättigung

Farbe richtig eingestellt

Die Farbsättigung justieren Sie mit dem Farbbalken-Testbild. Es zeigt die drei Grundfarben Rot, Grün und Blau sowie die daraus mischbaren Farben Weiß, Gelb, Cyan, Magenta, Schwarz. In der unteren Bildhälfte sehen Sie ein mittleres Grau.

Verändern Sie die Farbsättigung oder Farbintensität (siehe Bedienungsanleitung des

Zu viel Farbe eingestellt

Fernsehgeräts) in kleinen Schritten. Bei optimaler Einstellung wirken die Farben frisch und kräftig. Die dargestellten Balken müssen die gleiche Breite haben, die Kanten zwischen den einzelnen Streifen sollten als klare Linien zu erkennen sein 11. Bei zu kräftiger Farbwiedergabe (mittleres Bild oben) strahlt das Rot ins Magenta (Lila).

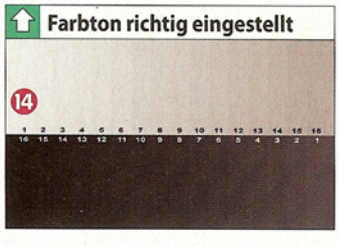
Zu wenig Farbe eingestellt

Die ursprünglich scharfe Kante wirkt ausgefranst 12. Außerdem strahlen einige Farben in die graue Fläche hinein. Im Film würden Gesichter unnatürlich rot aussehen.

Bei geringer Sättigung (Bild oben rechts) wirken die Farben flau 13. Dann sehen die Gesichter fahl und kränklich aus. Außerdem sind feine Strukturen schlecht zu erkennen.

Farbton

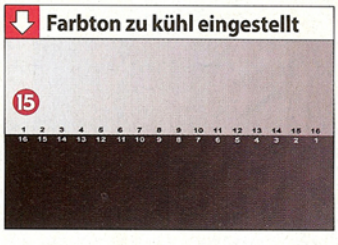
Farbton richtig eingestellt



Nicht an jedem TV-Gerät lässt sich der Farbton oder die Farbtemperatur justieren (siehe Einstellmenü des Fernsehgeräts und Bedienungsanleitung). In solchen Fällen überspringen Sie einfach diesen Punkt.

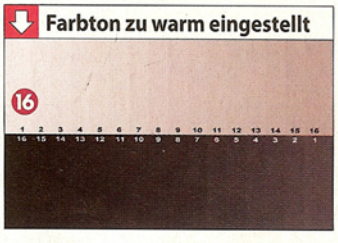
Zur Einstellung vom Farbton verwenden Sie den weißen Streifen links oben vom Kon-

Farbton zu kühl eingestellt



trast-Testbild 14. Zum Vergleich mit neutralem Weiß ist ein weißes Blatt Papier ideal. Befestigen Sie das Papier mit Tesafilm links oben am TV-Gehäuse. Vergleichen Sie dann das Papier und den weißen Streifen vom Testbild. Im Idealfall ist das Weiß vom Fernsehgerät genauso neutral wie das vom Papier.

Farbton zu warm eingestellt



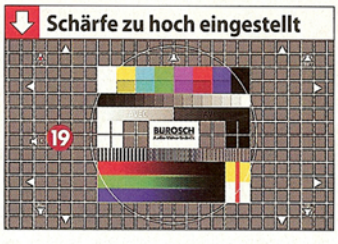
Wirkt das Weiß bläulich 15, ist der Farbton zu kühl eingestellt. Wählen Sie die Farbtemperatur wärmer, oder reduzieren Sie den Blau-Anteil (siehe Anleitung). Hat der weiße Streifen einen Rotstich 16, ist der Farbton zu warm eingestellt. Sie müssen die Farbtemperatur kälter wählen oder den Rot-Anteil reduzieren.

Bildschärfe

Schärfe richtig eingestellt

Mit dem Kombi-Testbild stellen Sie die Bildschärfe ein. Da einige Fernsehgeräte keine Justiermöglichkeiten für die Bildschärfe haben, müssen Sie sie belassen. Sie können aber die Format-Einstellung überprüfen: Der Kreis in der Mitte muss exakt rund sein. Im Idealfall reichen die kleinen Pfeile 17 bis an die Bild-

Schärfe zu hoch eingestellt



schirmkanten. Wenn Sie eine Heimkino-Anlage angeschlossen haben, hören Sie gleichzeitig ein Rauschen, das im Uhrzeigersinn von Lautsprecher zu Lautsprecher wandert.

Für die Bildschärfe erhöhen Sie die Einstellung im TV-Menü so lange, bis die feinen weißen Linien 19 im Kombi-Testbild klar kontu-

Schärfe zu niedrig eingestellt

riert und möglichst schmal aussehen. Wenn Sie das Bild zu scharf einstellen, bekommt das weiße Gitternetz dunkle Schatten 18 („Doppelkonturen", mittleres Bild).

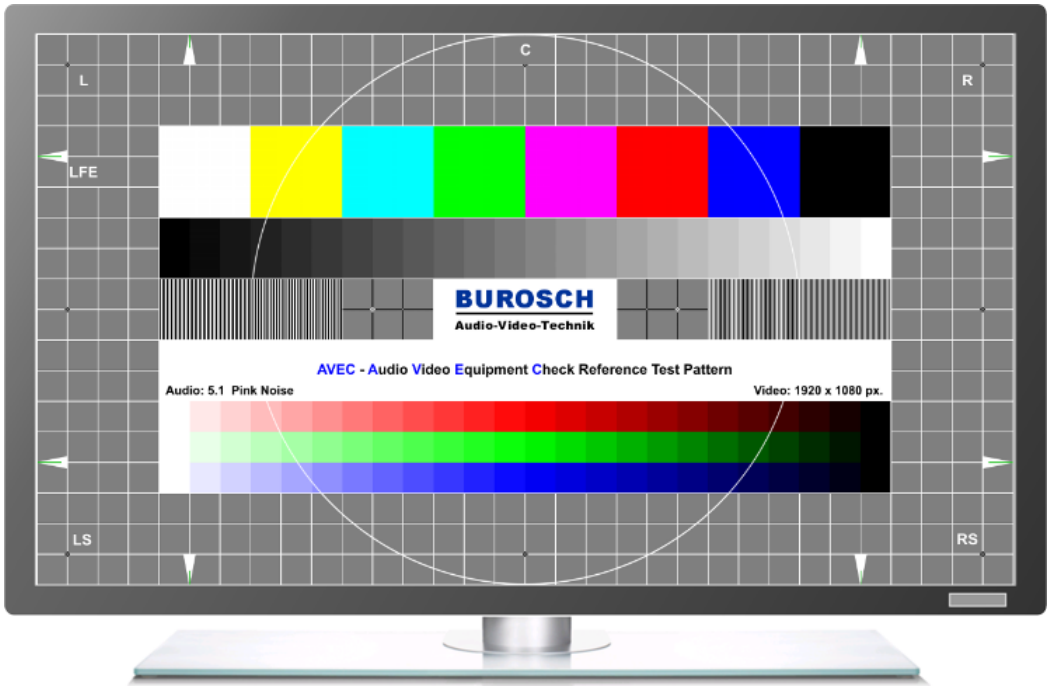
Zu geringe Bildschärfe führt dagegen zu ausgewaschenen Linien. Außerdem verschwimmen die feinen Linien 20 in der Bildmitte.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

3 Description

3 Description

The following image shows the reference test pattern in optimal display.



Reference test pattern AVEC in optimal display

This **AVEC** (**A**udio **V**ideo **E**quipment **C**heck) reference test pattern was developed in 1994 by BUROSCH Audio-Video-Technik under the consideration that the individual test zones have to be displayed as extensive as possible on the display and to be easily to understand and self-explanatory.

Absolute reference quality of the test sequences is secured by our staff member Eberhard Graf who developed the mathematical script.

This test pattern is used in many industrial companies like Daimler, Panasonic, Philips, Sony, Mitsubishi, Rohde & Schwarz, Sharp, Siemens, Zeiss and so on.

Even labors of various broadcasting services like „Bayerischer Rundfunk“ and labours of the most popular test journals of comparative product tests like “AVF-Bild” (Springer Verlag), “c’t Magazin” or “ComputerBild” use reference test signals from the Burosch company, too.

Furthermore “Premiere Fernsehen AG” and “Deutsche Telekom AG” and more Broadcast Studios work also with test patterns and test signals from the Burosch Company.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

3 Description

You are able to detect or if needed optimize the following aspects by the help of the individual test zones of the AVEC Universal test pattern:

- focus
- brightness
- contrast
- color balance (color temperature)
- gamma
- scalings
- geomety (deformations)
- speakers (audio)

This test pattern consists 8 various test zones which are excellent adapted for visual and measuring research. By the help of the extensive display of the individual test zones there are a lot of possibilities for image- evaluation and optimizing.

In the chapter “individual test zones” you find the detailed, separated descriptions of these test zones.

Note: Please note that static test patterns like this one mustn’t be displayed more than one hour without changing pictures of the TV-display because of possible phosphor burn-ins which causes so-called “ghosts”, especially on flat screens.

The same effect of “ghosts” can also be caused by broadcasting station icons or black bars which appear when a film is reproduced in another mode than its production mode. These things also cause diverse burn-ins on a display.

Therefore we advise a not so long display of the test signal on the display unit.

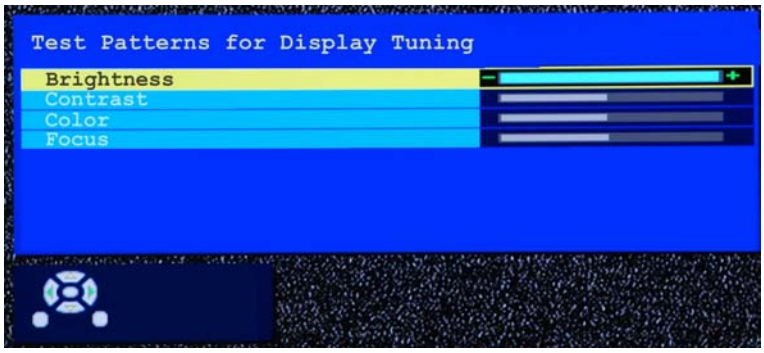
Reference Test Pattern: AVEC (Audio Video Equipment Check)

3 Description

3.1 Panasonic On-Screen Display

Representative for all on-screen displays of TV-devices we show here the Panasonic on-screen display. Please keep in mind that the construction of on-screen displays differs depending on the product.

3.1.1 Brightness



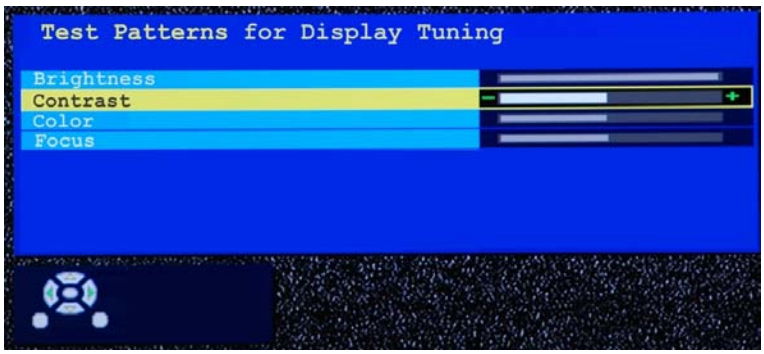
Please note the detailed information about the function of the test zone: 24-stepped Gray Bars / Brightness.

See arrow in the image above which marks the test zone.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

3 Description

3.1.2 Contrast



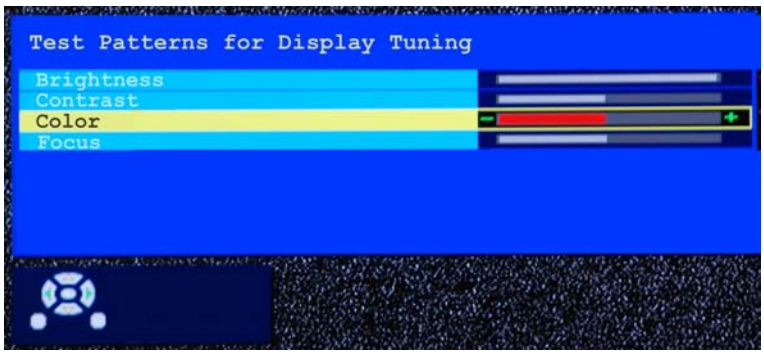
Please note the detailed information about the function of the test zone: 24-stepped Gray Bars / Contrast.

See arrow in the image above which marks the test zone.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

3 Description

3.1.3 Color

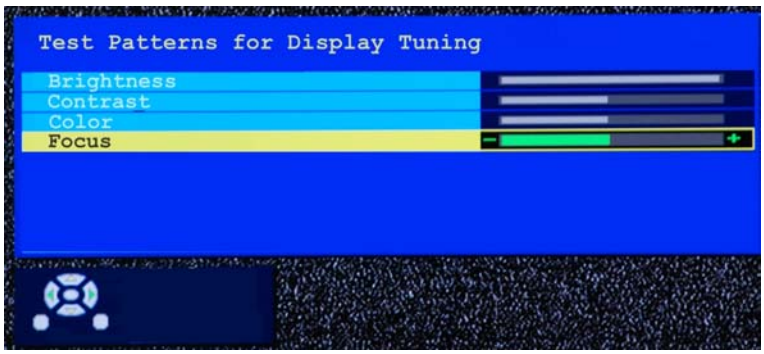


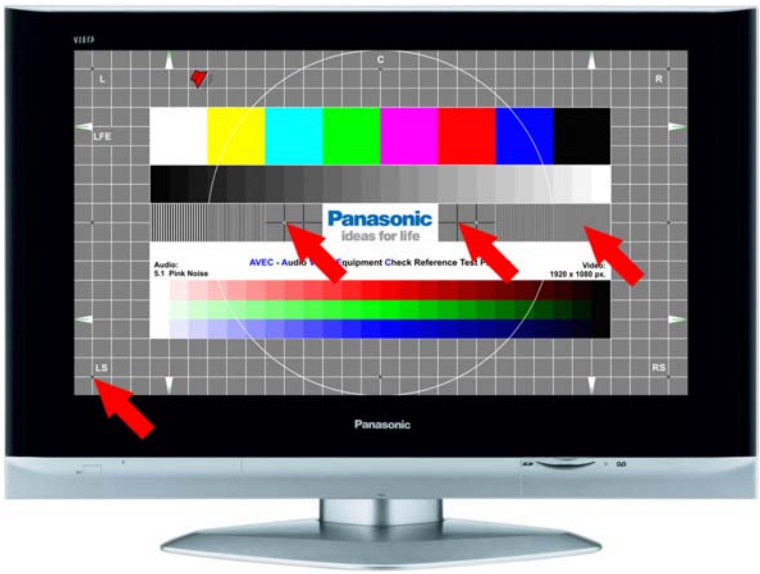
Please note the detailed information about the function of the test zone: Color Bars and RGB-Steps.
See arrow in the image above which marks the test zone.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

3 Description

3.1.4 Focus





Please note the detailed information about the function of the test zone: Focus / Multiburst and Focus lines.

See arrow in the image above which marks the test zone.

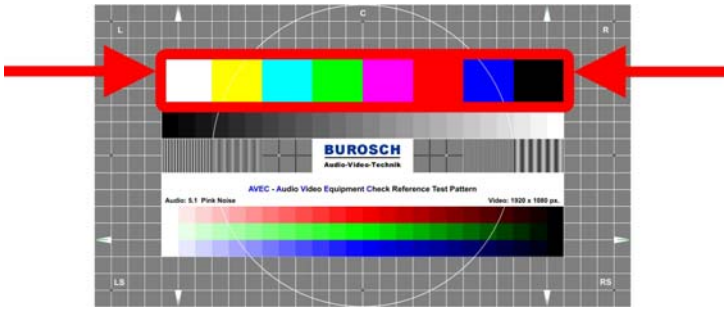
Reference Test Pattern: AVEC (Audio Video Equipment Check)

3 Description

3.2 Overview of the test zones

Here you see an overview of the various test zones. Detailed information you find in chapter “Individual Test Zones”.

3.2.1 Test Zone 1: Color Bars

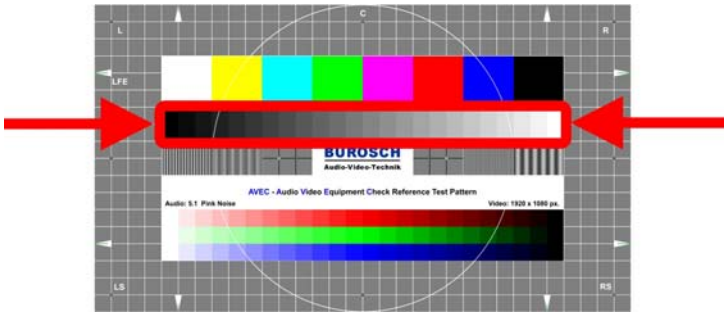


Test Zone 1: Color Bars

The first test zone includes 8 color bars. By the help of this test zone you can check the color playback and the color intensity of the display respectively.

More detailed information for this test zone you find in chapter “Individual Test Zones” in the sub point “Color Bars”.

3.2.2 Test Zone 2: 24-stepped Gray Bars



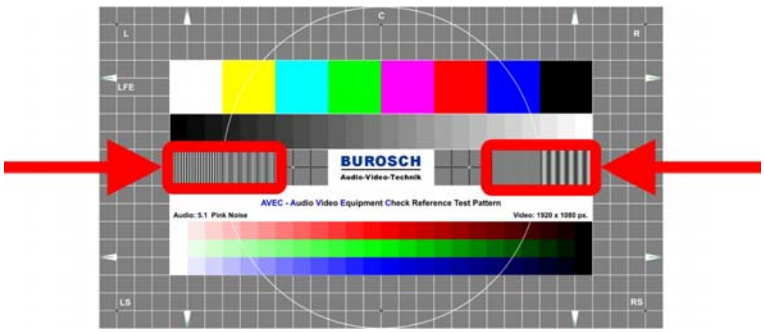
Test Zone 2: 24-stepped Gray Bars

The second test zone shows 24-stepped gray bars. By the help of these gray bars you are able to examine factors like brightness or contrast of the display carefully.

More detailed information for this test zone you find in chapter “Individual Test Zones” in the sub point “24-stepped Gray Bars”.

3 Description

3.2.3 Test Zone 3: Multiburst



Test Zone 3: Multiburst

This third test zone is a so-called Multiburst. This test zone is mainly adapted for analyzing the resolution of the display.

More detailed information for this test zone you find in chapter “Individual Test Zones” in the sub point “Multiburst”.

3.2.4 Test Zone 4: Focus

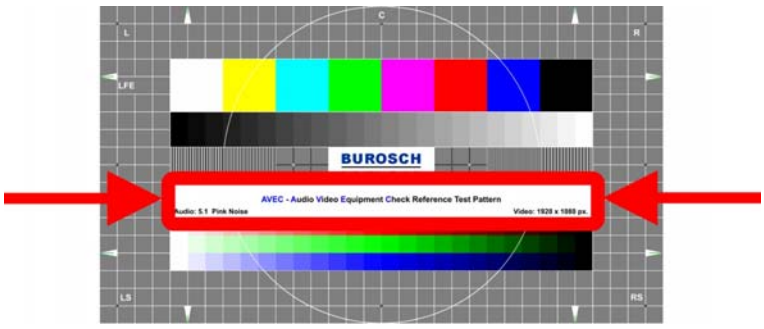
Test Zone 4: Focus

This test zone is made up of black cross hairs on a gray background. The Focus test zone is adapted for the sharpness evaluation of the display.

More detailed information for this test zone you find in chapter “Individual Test Zones” in the sub point “Focus”.

3 Description

3.2.5 Test Zone 5: White Balance

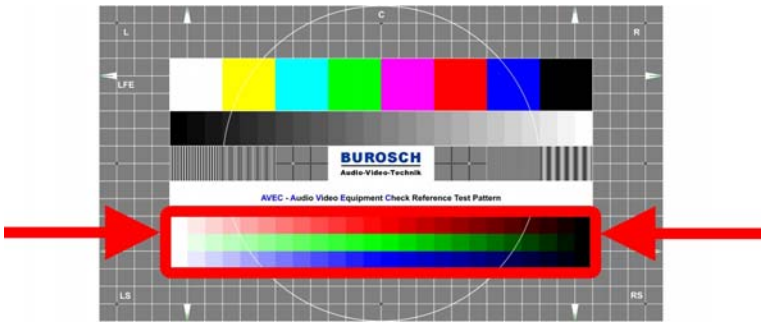


Test Zone 5: White Balance

The white, labeled bar acts as detection of potential false colors and color faults. The special on this test zone is the labeling which shows the resolution the image was produced; in this example it's 1,920 x 1,080 Pixels. The bar is adapted for detecting possibly color faults.

More detailed information for this test zone you find in chapter "Individual Test Zones" in the sub point "White Balance".

3.2.6 Test Zone 6: RGB Steps



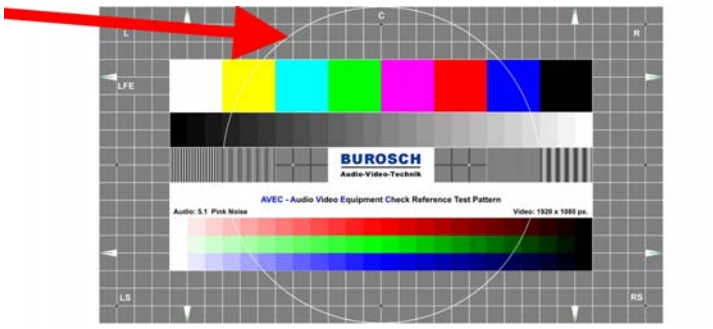
Test Zone 6: RGB Steps

The RGB Steps test zone is made up of 24 same-sized steps and is adapted for checkup and evaluation of the color reproduction and color intensity of the display.

More detailed information for this test zone you find in chapter "Individual Test Zones" in the sub point "RGB Steps".

The object of this test zone is to allow a preferably lifelike reproduction of skin tones in the later film.

3.2.7 Test Zone 7: Geometry

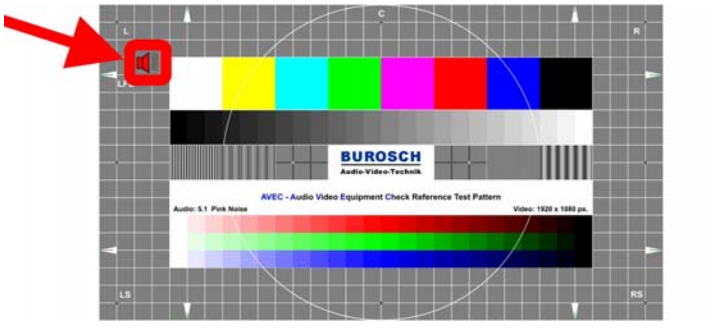


Test Zone 7: Geometry

Test zone 7 is made up of a white circle line and a geometry grid which shows white, same-sized squares; both on a neutral gray background. This test zone is adapted for the image geometry check.

More detailed information for this test zone you find in chapter “Individual Test Zones” in the sub point “Geometry”.

3.2.8 Test Zone 8: Audio Test



Test Zone 8: Audio Test

The last test zone 8 is a general audio test. The audio test checks whether all speakers of the surround system are connected well and exactly.

More detailed information for this test zone you find in chapter “Individual Test Zones” in the sub point “Audio Test”.

4 Preface

This description applies to all products and technologies of displays like PDP (Plasma), LCD, projection or DLP.

The universal test pattern, descried in the following is excellent adapted for visual and measurement evaluation and analysis respectively.
Before using the test patterns please check that all conditions come up with the later appliance, especially check the signal path and the light conditions.

Please pay attention to a normal comfortable brightness of the room and do not arrange the display so that a light source does impact the image on the display negatively caused by possible reflections if procurable. At daylight it could distort the color and brightness sensation because of reflections or the ambient light. The best and the most enjoyable conditions for the human eye are given when the TV display is arranged in a preferably dark room with less light like in a cinema. As a result good colors and brightness differences will come into one's own.

If you modify parameters for improvement of the image quality don't forget to save the modifications so that the changes become permanent.

Please note the options of your image sender (e.g. DVD Player). Also try to get by with as few as possible of so-called image-improving features which distort the original image more than improve it.

Of course the setup in the image sender and image replication device (e.g. TV-display) must be adjusted optimally to make a perfect display possible.

Tip: Please let you and your eye a few minutes time to better detect potentially color differences or display problems. For it this test pattern is optimal applicable because you often don't have enough time for a cognition at quick motions.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

4.1 Gamma (γ)

You need a gamma correction in displayed systems to compensate the non-linear brightness sensation of the human eye. At a double brightness increase the human eye don't react it necessarily as a doubling of the brightness perception. The felt brightness sensation increases steeply in darker areas and not so steep in bright areas. The human eye has a gamma of ca. 0.3 to 0.5.

The sensation of the human vision is not linear. Electronic displays should simulate the human viewing habits. Therefore a correction is necessary because an electronic sensor like a CCD-chip or an electron ray tube work almost linearly.

To solve this problem as good as possible the gamma correction was launched:

$O = I^{\gamma}$ (O: Output signal; I: Input signal).

At the calculation of the output signal O there will be only changed the gray values, the black- and white point don't change if the input signal is in range [0.1] and set on 1 respectively. The correction function is called like the exponent gamma (γ).

At a gamma value of 1 the output signal is all in all a bit darker – brighter steps of gray bars are graded stronger than the darker ones. At a gamma of less than 1 you have a brighter output image overall – darker steps of gray bars are graded stronger than the brighter ones whereat the brightness of the brightest and darkest point (white- and black-point) won't be changed. The white point is unchanged 100% white and the black point is also still 100% black.

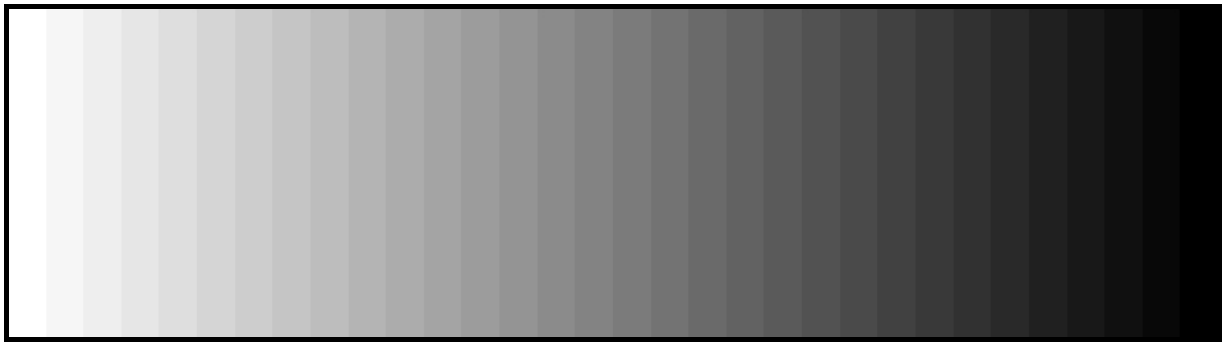
Manufacturer of modern displays use always a gamma value of ca. 2.2 to ensure a real brightness sensation of the human eye.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

Subsequent you find a few marked and adapted examples which show you the meaning of the gamma function practically.

The original image (following image) shows 32-stepped gray bars with linear increasing brightness from left to right – the left field is completely white (100%), the right field is maximum black.



Original image

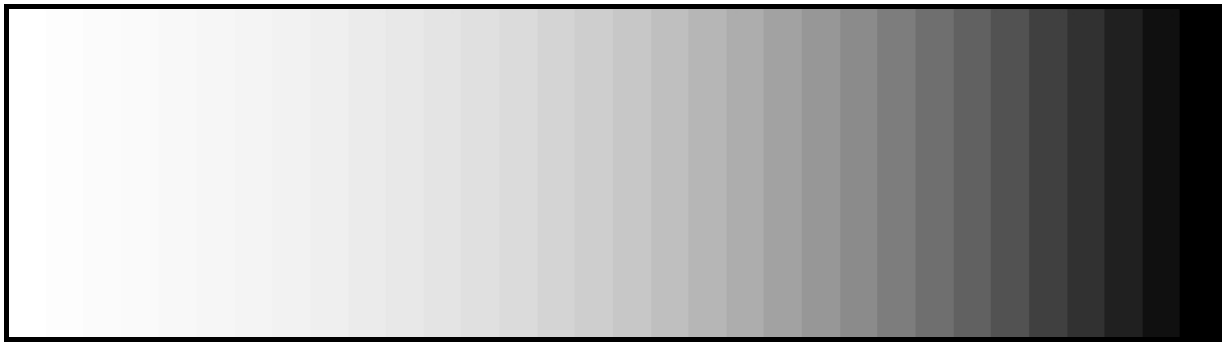
- In case of a too high adjusted gamma the brightest fields are graded stronger than the darker ones. This means you aren't able to distinguish the darker areas in the image (see following image)

Too high adjusted gamma

Reference Test Pattern: AVEC (Audio Video Equipment Check)

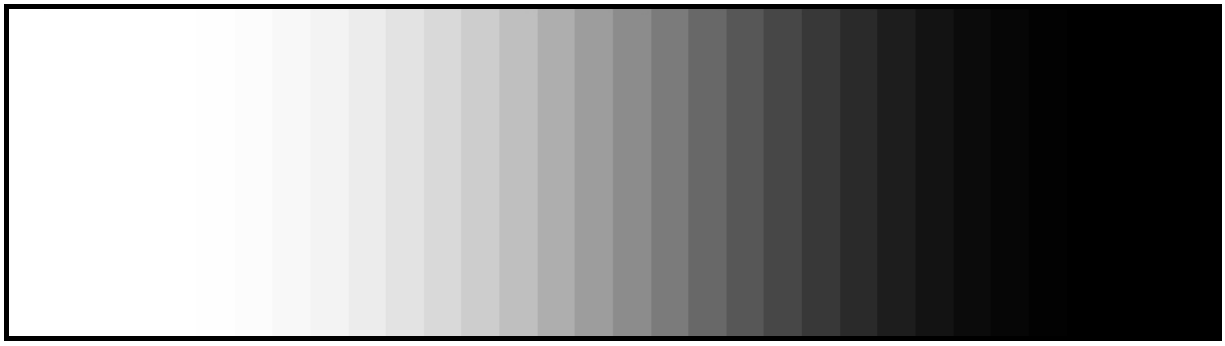
4 Preface

- In case of a too low adjusted gamma the darkest fields are graded stronger than the brighter ones. This means you aren't able to distinguish the bright areas in a image (see following image)



Too low adjusted gamma

- In case of a "S"-deformed gamma the middle gray fields are stronger graded than the outer fields. This means you aren't able to distinguish the brightest and darkest areas in a image (see following image)



"S"-deformed gamma

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

4.2 Standard Illuminant D65 (White)

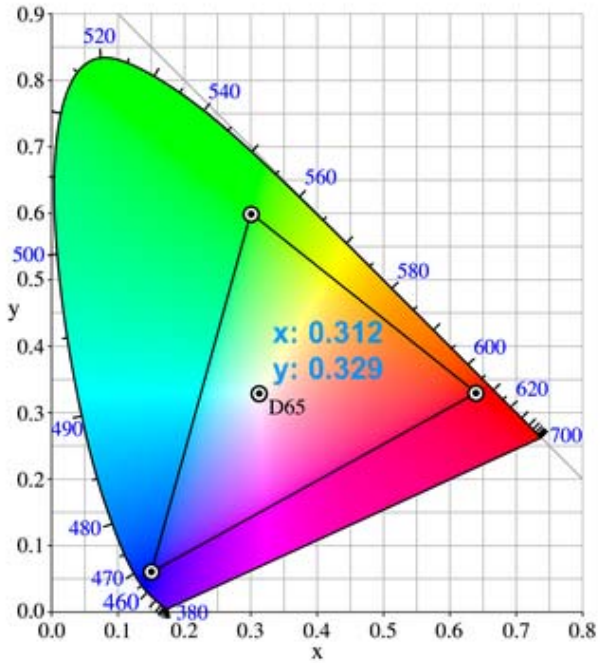
White is the only color which reflects completely and doesn't absorb any light. White contains the whole light energy within the visible spectrum. Further white is a standard for color measurements and television broadcasts which equates to the absolute reflection performance.

D65 (standardized white) is the most famous illuminant with a color temperature of 6,500 Kelvin. Color TV-devices have also this standardized color temperature for white.

D65 was defined by the CIE (International Commission on Illumination). The standardized illuminant D65 is a part of the D-illumination series which try to define the outdoor conditions on different places on the whole earth.

Depending on the color standard the white values differ marginally from each other. Therefore various graphic programs and the PAL standard define "white" in the CIE color space to the xy-coordinates 0.312/0.329 at a color temperature of 6,500 K (D65) which accords to an "average daylight". This illuminant only exists theoretically but it can be approximated.

The following diagram shows the coordinates of the standard illuminant D65 in a CIE 1931 color space.



Standard Illuminant D65 in the CIE 1931 color space

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

4.3 Suitable Resolutions

The AVEC reference test pattern is optimal adapted for different resolutions. Many displays can be checked, evaluated and optimized if necessary, doesn't matter which label, image format or application the display has.

For example you can display this test pattern on small mobile phone displays, digital picture frames, navigation systems to the point of very large TV-Displays over 1.70 meter screen-size smoothly.

The following table gives an overview of the applicable resolutions:

Screen resolutions

Name	Pixel	Aspect ratio
VGA	640 x 480	1.33 : 1 = 4 : 3
SVGA	800 x 600	1.33 : 1 = 4 : 3
WVGA	853 x 480	1.77 : 1 = 16 : 9
XGA	1,024 x 768	1.33 : 1 = 4 : 3
SXGA	1,280 x 1,024	1.25 : 1
WXGA	1,280 x 768	1.66 : 1 = 15 : 9
HDTV	1,280 x 720	16 : 9
WXGA	1,280 x 800	16 : 10
WXGA	1,366 x 768	1.77 : 1 = 16 : 9
SXGA+	1,400 x 1,050	1.33 : 1 = 4 : 3
UXGA	1,600 x 1,200	1.33 : 1 = 4 : 3
Full HD	1,920 x 1,080	16 : 9

Note: The test pattern is optimal adapted for an aspect ratio of 16:9. For other aspect ratios (16:10, 4:3, …) please use the source signal from your corresponding transducer.

Please use only the particular resolution for your individual application:

- SD for resolutions up to 1,366 x 768 Pixels
- Full HD for resolutions of 1,280 x 720 Pixels and 1,920 x 1,080 Pixels

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

4.4 Equation image „Jasmin und Sabrina“

Subsequent you find the description of the individual image elements and parallel the effect of possible image failures on a real image. Exemplary we use a real image portrait with different skin types for comparing.
Afterimage shows the real image in optimal, original exposition.

Real test image in optimal display

In addition to many abstract technical test images this real image shows the typical problems and its effect on real, complex images. To clarify possibly problems there are heightened cut-outs of this image.

Following aspects have to be attended of the real image:

- The whole surface of the background is neutral white
- Real skin types of the light and dark-skinned woman with clearly visible differences to each other.
- Hairs of the women show perfect and clear differences in bright and also dark parts of the image
- Real image is shown completely without any deformations or cuts

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

4.5 Evaluation System

All images are evaluated based to the screen evaluation standard ITU-R BT500-11 and shown as stars. This should give you an intuition for the heaviness of the shown difference to the original image:

Excellent	Good	Fair
★★★★★	★★★★	★★★
Image is equivalent to the original	No visible differences to original image	Visible, uncritical differences to original image

Poor	Bad
★★	★
Highly visible differences to original image	Image is not equal to original, indicates a loss of information

A very good playback string with applicable connections like HDMI or DVI should reach a quality of five or four stars.

Good analogue sources like SCART-RGB or S-Video (Y/C) shouldn't reach less than 3 stars on a good display, doesn't matter which technology – CRT, LCD, Plasma, DLP or projection.

Correct wired, labeled devices should never fall to two or one star niveau at right adjustment. This is typically an unmistakable sign that there is a problem in the signal-string. It could be the configuration, calibration or other wrong adjustment or simply a defect. This needs to be checked once more.

Please keep in mind that not all TV-manufacturers allow complex calibrations on parameters like “gamma” or “color processing”. The typical parameters for calibration which should be possible at all displays are brightness, contrast, color, focus and partly the image geometry settings.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

4.6 Testbed

The optimal image reproduction on the TV-device depends on the individual settings (brightness, contrast, …) and from the correct testbed. The testbed is a really important factor which is often underestimated by many users. In this chapter the factor testbed is described.
Special attention should be paid to the following criteria:

- cabling / wiring
- ambient light
- viewing distance
- viewing angle (90° as possible)

For perfect film enjoyments please keep a preferably vertical (90°) viewing angle on the display. In case of too large difference of the viewing angle for example when you look from far right or far left it could be that brightness, contrast or color becomes falsified. Further you must pay attention to a correct presetting of the signal source (e.g. DVD Player, Sony Playstation 3,…) and your reproduction device (e.g. TV).

Reference Test Pattern: AVEC (Audio Video Equipment Check)

4 Preface

4.6.1 Wiring

For a perfect image and audio signal there have to be a qualitative wiring. Because only with applicable wirings an optimal reproduction and so a perfect home cinema feeling is warranted. In this paragraph the different possibilities for wiring are presented and shortly described. At wirings you distinguish analogue from digital transfer systems.

- Analogue:

Wirings over SCART, S-Video or Component Video over Cinch plugs rank among analogue connections which reproduce a pretty poor image and audio signal respectively. Due to the high annoyances caused by bad shielded cables and/or too log cables such analogue wirings are inadvisable. The following image shows a SCART, Cinch (Component Video) and an S-Video plug successively. From these analogue connections the SCART-RGB possibility is the most reasonable and best one.

Comparison: SCART, Cinch, S-Video

- Digital:

Modern connections via digital interfaces like HDMI, DVI or LVDS make a good playback quality possible and eliminate the out-dated analogue transfer systems in the consumer electronics. The following image shows the usual digital plugs HDMI and DVI which make the best image and audio reproduction possible.

Comparison: HDMI, DVI

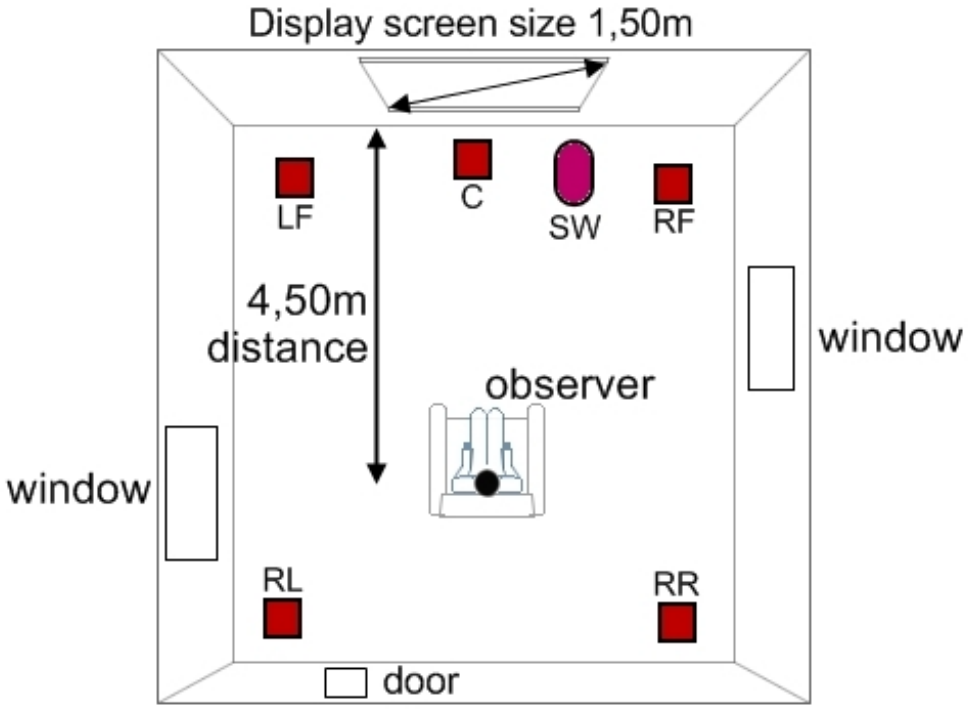
4.6.2 Ambient Light and Viewing Distance

Beside correct wirings you must also pay special attention to the positioning of the TV-display. Please place your TV-device so that various light sources like direct sunlight or the light from a bulb don't have a negative impact on the display itself by reflections if possible.

Further we advise an approximately viewing distance which depends on the size of the display. The viewing distance advised by us you can detect easily: 3 x diagonal screen size of the TV-device. This means if your TV display has a diagonal screen size of 1 meter you have to keep a distance of approximately 3 meter to ensure a sharp and high-contrast image.

The following schematically drawing shows a perfect home cinema system. Please also note the placement of the stereo or Dolby Digital 5.1 speakers.

LF (Left Front)	RL (Rear Left)
C (Center)	RR (Rear Right)
RF (Right Front)	SW: Subwoofer



Schematically drawing of an ideal home cinema system

5 Individual Test Zones

In this chapter the various test zones of the reference test pattern will be shown and described. Also you find a detailed description of possible maladjustments of the test zones in this chapter.

The universal test pattern AVEC is made up of 8 different test zones (see content on second page in this document for particular page numbers):

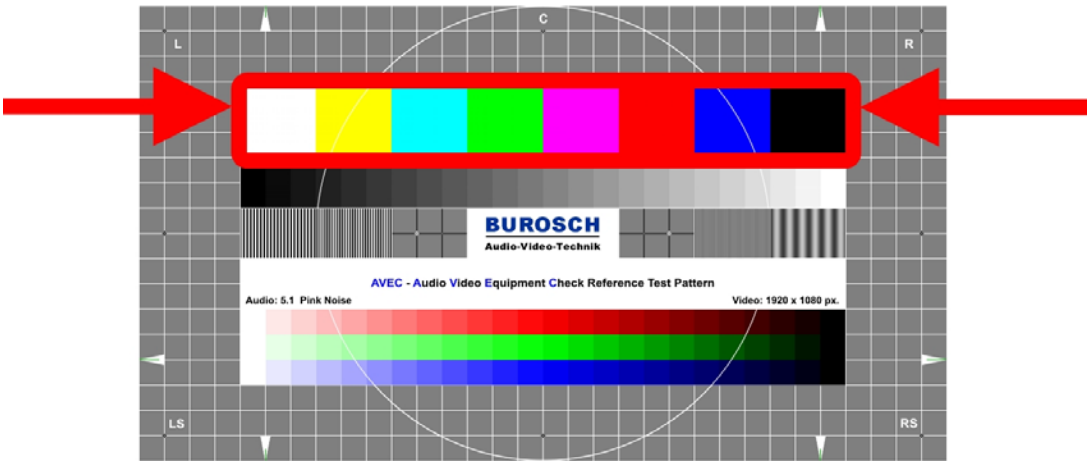
- Color Bars
- 24-stepped Gray Bars
- Multiburst
- Focus
- White Balance
- RGB Steps
- Geometry
- Audio Test

The particular test zone is red marked for definitely clarification.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

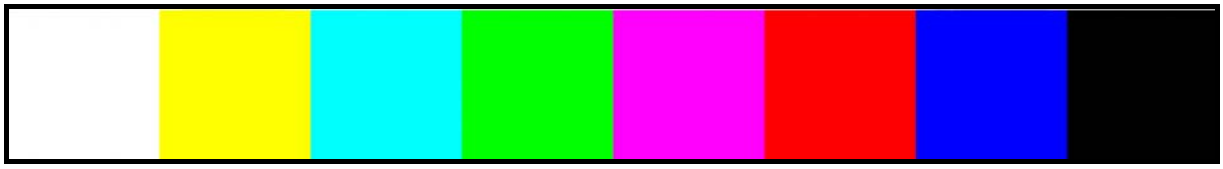
5 Individual Test Zones

5.1 Color Bars



General View: Color Bars

Detail View:



Detail View: Color Bars

The Color Bars are adapted for evaluation of the color reproduction and color intensity. The Color Bars show white, black, all primary and secondary colors in series of its luminance contingent. All fields show a 100-procentual saturation of each color.

5.1.1 Optimal Display

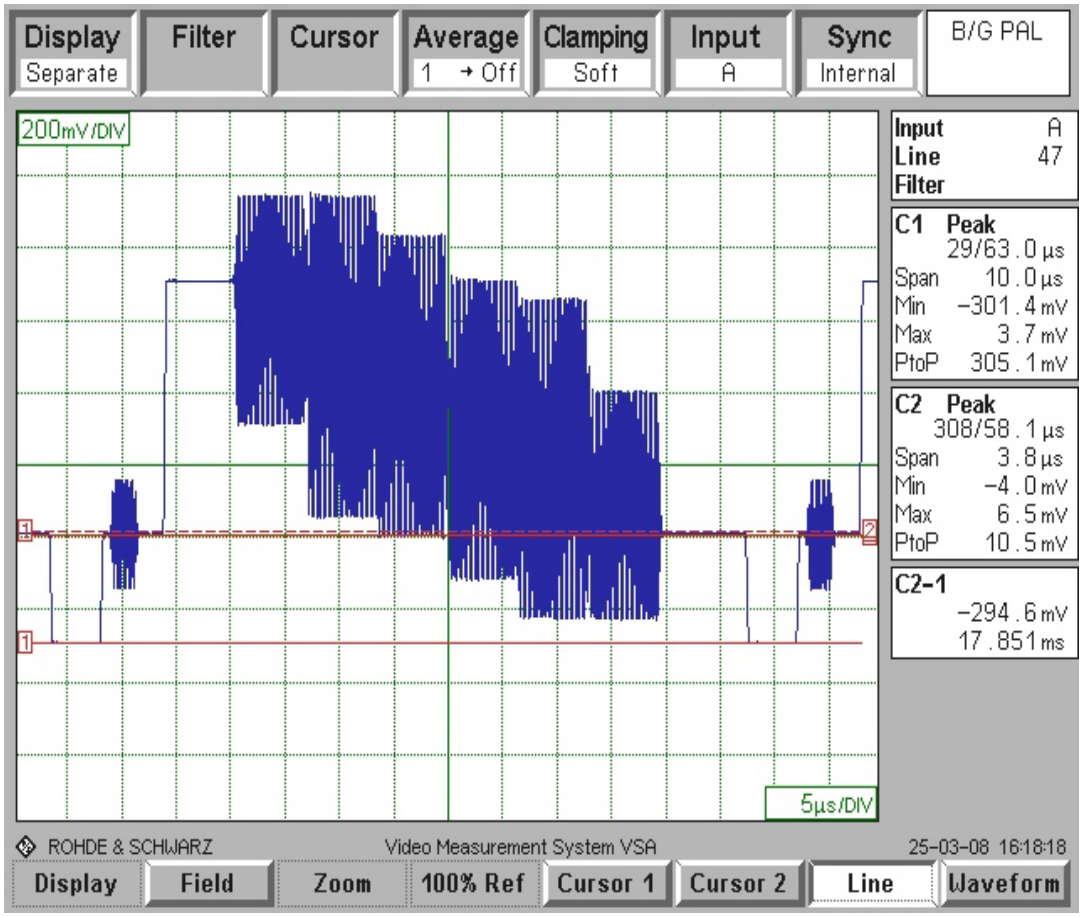
- Left field is maximum white
- Right field is perfect black
- Color sequence: white, yellow, cyan, green, magenta, red, blue, black
- All colors are shown in maximum saturation
- Sharp outline of each fields

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.1.2 Oscillogram

The following image shows the typical oscillogram of the color bars.



Color bars will be displayed like bars on a oscilloscope. The height of the bars depends on the saturation of the colors.

At a correct exposition the white level is exactly 0.7V in difference to the black level

These color bars are used as test- and reference signal for adjustment and checkup of the brightness- or color level at various displaying systems.

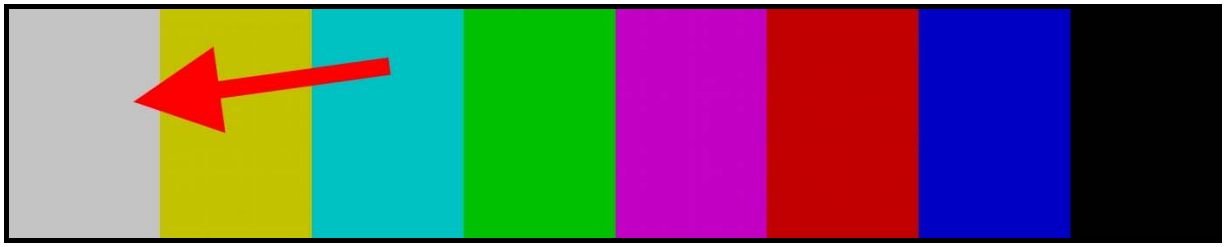
Signals were measured with Rohde & Schwarz Videoanalyzer in the video labor of the Burosch Company.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.1.3 Typical Faults

- The left field is gray instead of white (red arrow), but the right field is complete black – brightness of the display adjusted too low.



The quality of this image is “fair“ ★★★

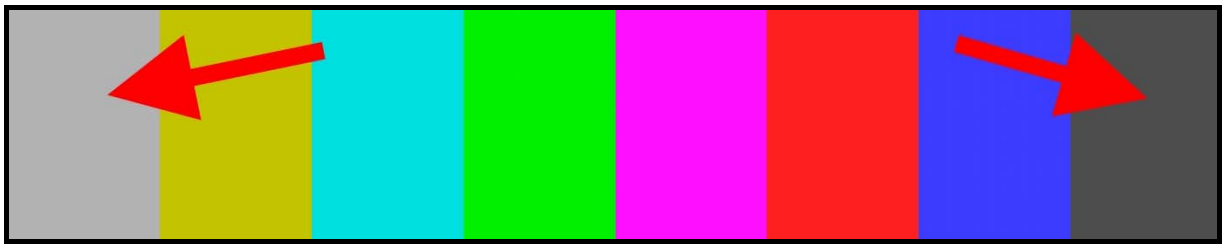
Too low adjusted brightness causes in this example a gray background instead of a neutral white of the comparative real image. In addition differences in darker areas are no more clearly differenced like the hairs of the right woman. With the test zone 2 (24-stepped Gray Bars) this effect shows more to advantage. You see the effect of low brightness in the following real image (red arrows).

The quality of this image is “fair“ ★★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The left and right field are grayish (red arrows) – contrast o the display is adjusted too low



The quality of this image is “poor” ★★

Too low adjusted contrast lightens up dark areas and dims bright areas simultaneous. So the real image has less dynamic. With test zone 2 (24-stepped Gray Bars) this effect shows more to advantage. You see the effect of low contrast in the following real image (red arrow).

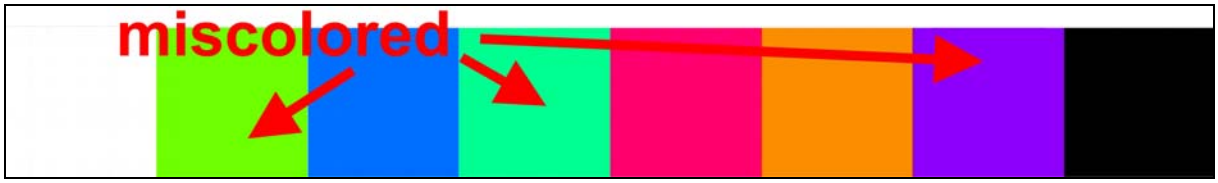
The quality of this image is “poor” ★★

Note: Because of printer settings and for clarification of the bad image reproduction the real images will be displayed only symbolical and suggestively.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- One or more colors are displayed complete wrong – bad color processing of the display is here probably the reason.



The quality of this image is “bad” ★

In the detail view of the real image you see yellowness very clearly. Lacking quantification of the color balance (color temperature) caused by a bad working color processing is here the reason. You see the effect of a wrong color processing of the display very well.

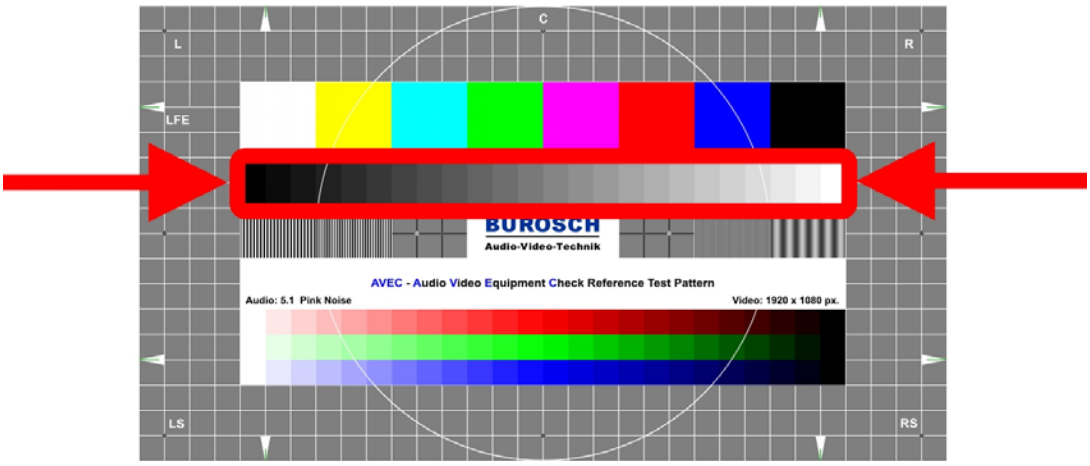
The quality of this image is “bad” ★

Note: Because of printer settings and for clarification of the bad image reproduction the real images will be displayed only symbolical and suggestively.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.2 24-stepped Gray Bars



General View: 24-stepped Gray Bars

Detail View:

Detail View: 24-stepped Gray Bars

This area shows 24 same sized fields with different luminance values from 0 percent white (black) to 100 percent white (white).
At a correct exposition you can see all 24 steps from maximum black to maximum white in the same gap. These steps are useful for calibration and the visual evaluation of the useful contrast amount and of the gamma.

At a correct color balance (color temperature) without brightness addicted drift are all fields same neutral gray.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.2.1 Optimal Display

- Left field is maximum black
- Right field is maximum white
- All steps are clearly separated to each other
- Brightness differences are the same on the whole test zone
- All steps are the same neutral gray

The white field (D65, red arrow) simulates an average daylight. The darkest field on the left side is maximum black and has to be identified as pitch-black absolutely (red arrow).

Detail View: 24-stepped Gray Bars

Please note that especially the first and last two shades have to be clearly visible. Because only when white field is reproduced as D65 and the black field as pitch-black, both without color faults an image correction makes sense.

Because of its properties the human eye keeps a low profile to color faults in the first moment. The human eye quickly adapts to false colors. Due to the fact that you have to pay attention to a real color neutrality of “white D65” we advise to use a white, matt piece of paper which you simply hold beside the white step to check the neutrality this way.

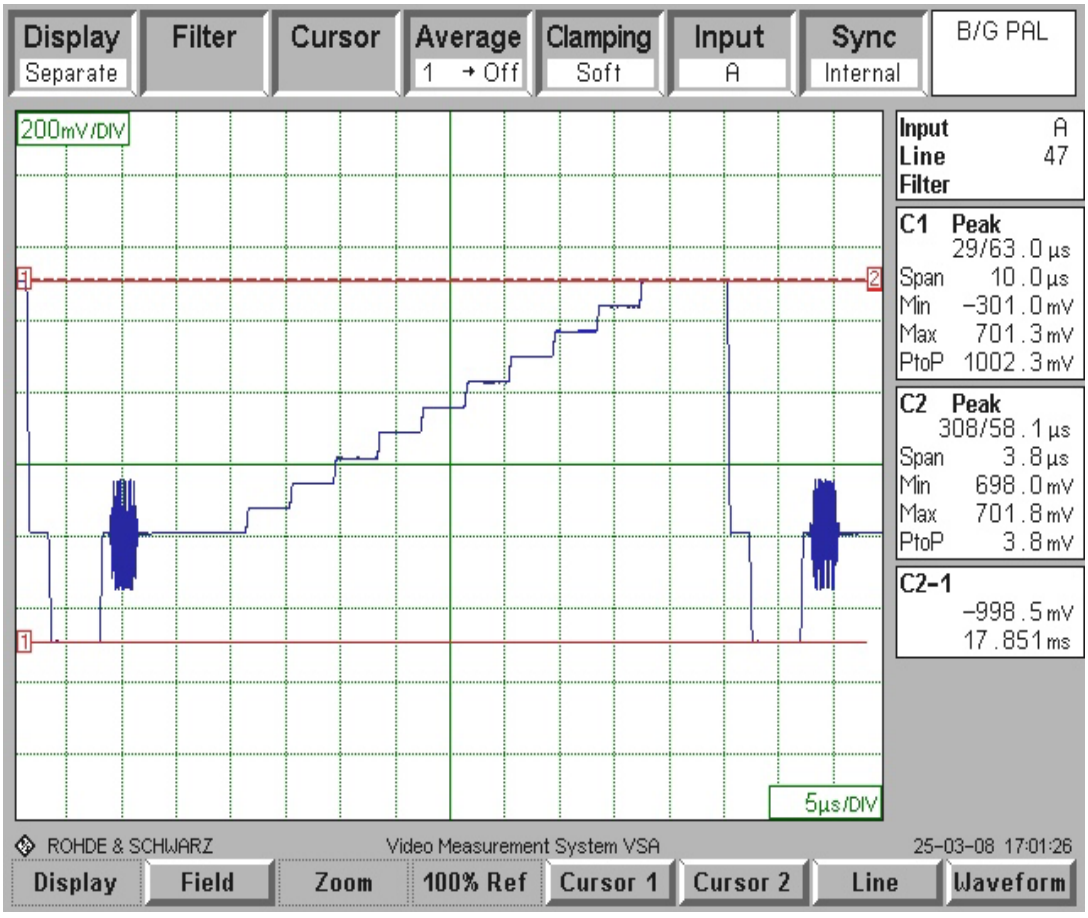
Note: Only in direct comparison e.g. with a piece of paper or different displays you are able to detect color faults in white very well!

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.2.2 Oscillogram

The following image shows the typical oscillogram of a 10-stepped Gray Bars.



Gray bars are displayed as lines on the oscilloscope whose height depend on the brightness.

At a correct exposition the white level is exactly 0.7V in difference to the black level

These gray bars are used as test- and reference signal for adjustment and checkup of the brightness and contrast adjustments of various displaying systems.

Signals were measured with Rohde & Schwarz Videoanalyzer in the video labor of the Burosch Company.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.2.3 Typical Faults

- The right, brighter fields of the gray bars aren't differentiated good enough, the left field is grayish instead of black – brightness of the display adjusted too high

The quality of this image is "poor" ★★

A too high adjusted brightness causes that bright parts in the image aren't differentiated and hard to keep apart, like in this example the face and shoulder area of the left woman. The following real image shows the effect on too high adjusted brightness.

The quality of this image is "poor" ★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The left, darker fields aren't differentiated enough. The white field on the right is dimmed – brightness of the display adjusted too low.

The quality of this image is "poor" ★★

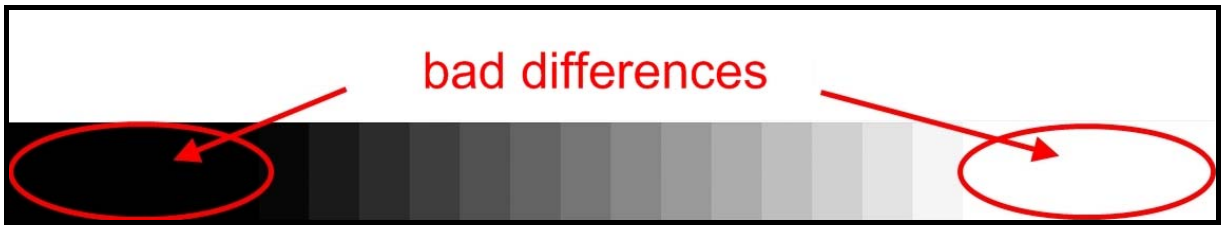
In case of too low adjusted brightness, white image areas like here the background in the following real image becomes darker and dimmed respectively. Further are differences in darker areas no more detectable like the hairs of the right woman. The following real image shows the effect on low brightness (red arrows).

The quality of this image is "poor" ★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The left and right fields practically don't show differences – contrast of the display is adjusted too high.



The quality of this image is "bad" ★

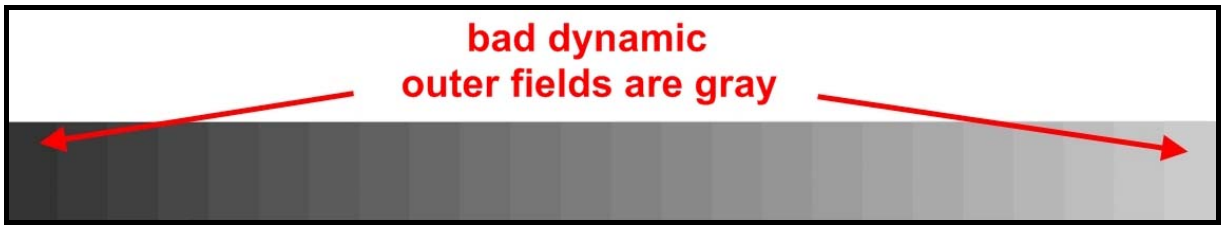
Too high contrast causes no detectable differences in bright and dark areas. You see the effect of too high adjusted contrast in the next image very clearly (red arrows). The shoulder and face area of the left woman and the hairs of the right woman don't show any visible differences.

The quality of this image is "bad" ★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The grading of the fields is detectable but the left and right field seems gray – contrast of the display is adjusted too low.



Die The quality of this image is “bad” ★

The real image becomes low dynamic in case of too low adjusted contrast. Dark areas become brighter and bright areas become unnaturally darker simultaneously. You see the effect of a too low adjusted contrast in the following real image clearly. Please pay attention on the background and the poor image dynamic. The light woman is no more clearly differenced from the other because of her teint.

Die The quality of this image is “bad” ★

Note: Because of printer settings and for clarification of the bad image reproduction the real images will be displayed only symbolical and suggestively.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The left fields don't allow differences barely, however the right field is unchanged perfect white – gamma for red, green and blue is too high.

The quality of this image is "poor" ★★

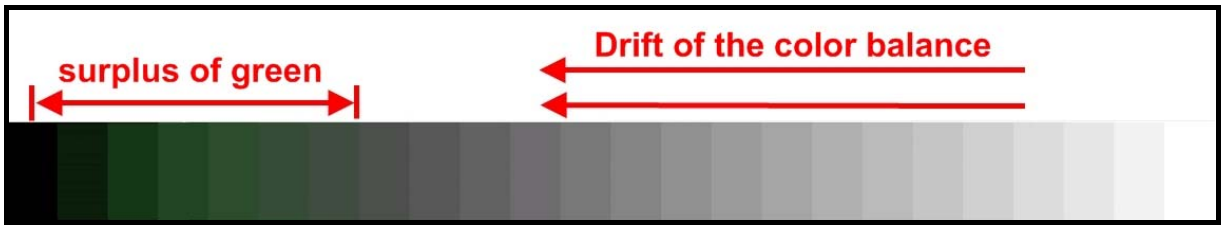
In case of a too high gamma of the display itself no differences in dark areas are visible and detectable respectively. Keeping apart of bright parts in the image is no problem. You see the effect on the following real image "Jasmin und Sabrina" clearly. Bright areas become darker because of the drift of the black value but are clearly differentiable. Dark areas like the hairs of the right woman don't show any differences.

The quality of this image is "poor" ★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The dark fields are colored, in this example greenish – There is a drift in the color balance. Probably a bad color processing is here the main problem.



The quality of this image is “poor” ★★

When the dark fields become colored like in this example is a bad work from the color processing of the display itself probably the reason. Dark areas like in the following detail view of our real image the hairs of the right woman become greenish. The following real image shows this effect and clarifies the surplus of green (red arrow).

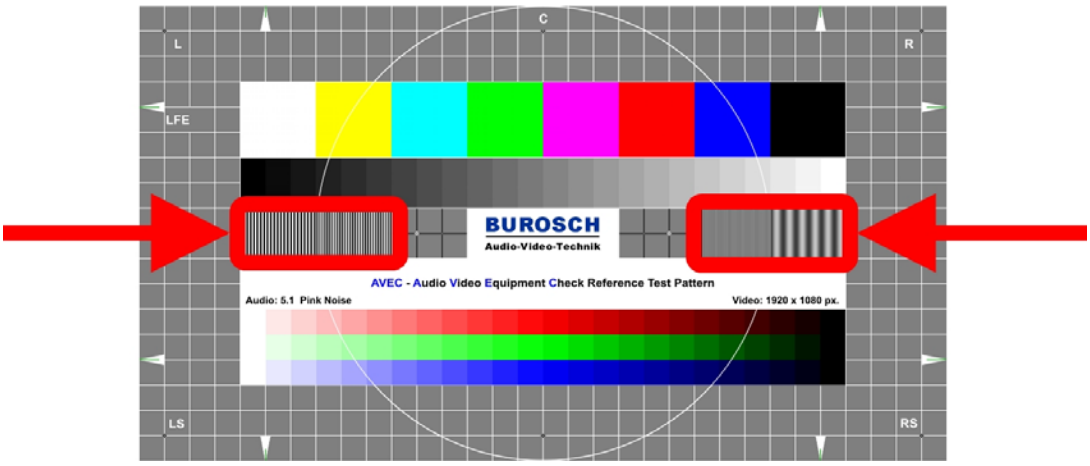
The quality of this image is “poor” ★★

Note: Because of printer settings and for clarification of the bad image reproduction the real images will be displayed only symbolical and suggestively.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

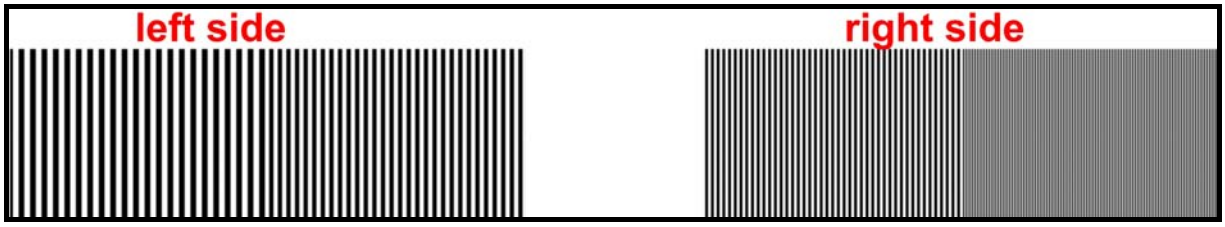
5 Individual Test Zones

5.3 Multiburst



General View: Multiburst

Detail View:



Detail View: Multiburst

This test zone acts for the relative image evaluation of the displayable fine-resolution or probably scaling artifacts of the TV-display.

The test pattern element “Multiburst” shows very sharp separated vertical stripes. The gap between the stripes becomes finer from left to the right side. The stripes change from maximum black to maximum white.

Please note, that especially this test pattern element can be scaled by the printer at potential print out and so it could be wrong displayed.

5.3.1 Optimal Display

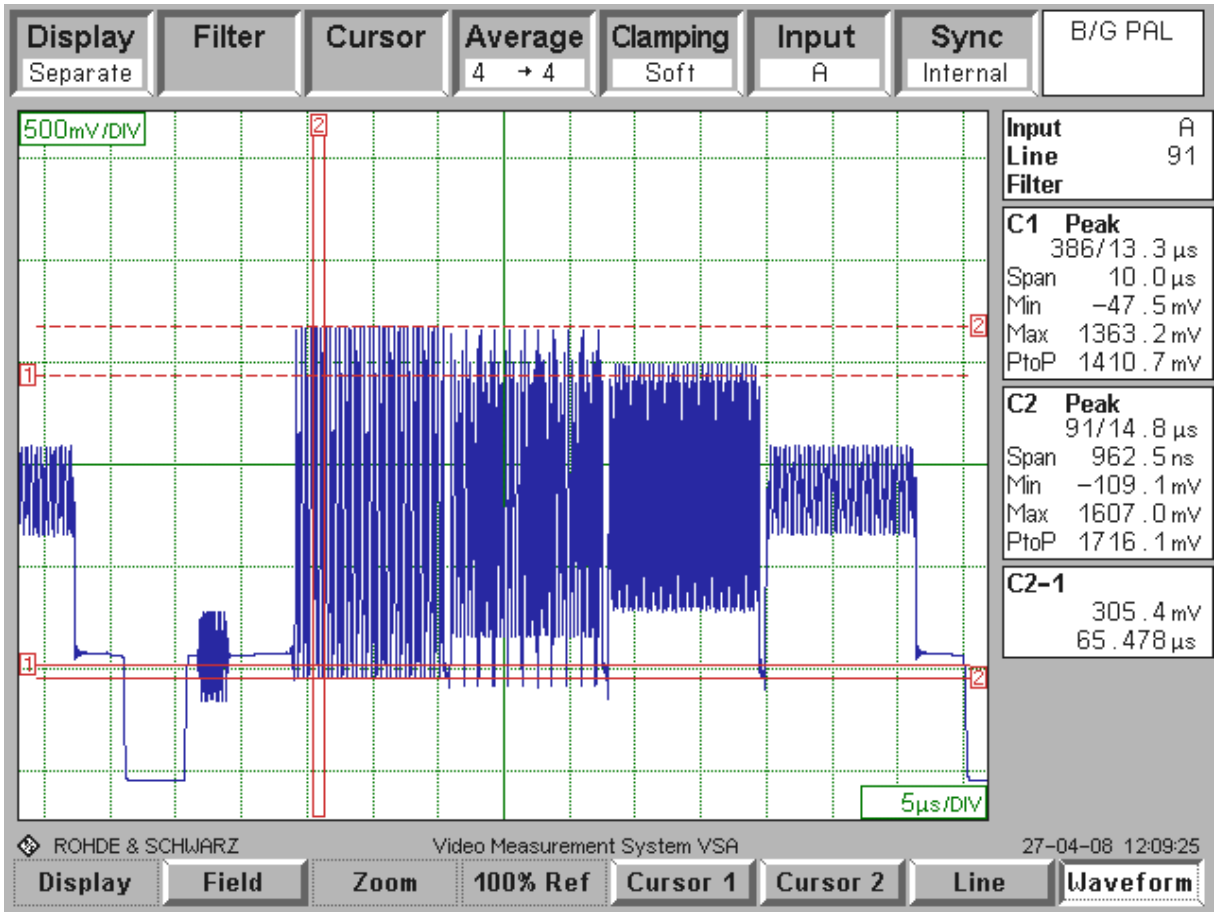
- All Multiburst stripe patterns are clearly separated to each other, even this on right side.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.3.2 Oscillogram

The following image shows an oscillogram of the Multiburst test pattern element.



The Multiburst test signal is displayed as very quick square pulses.

In ideal case the amplitude of the pulses is still the same over the whole surface.

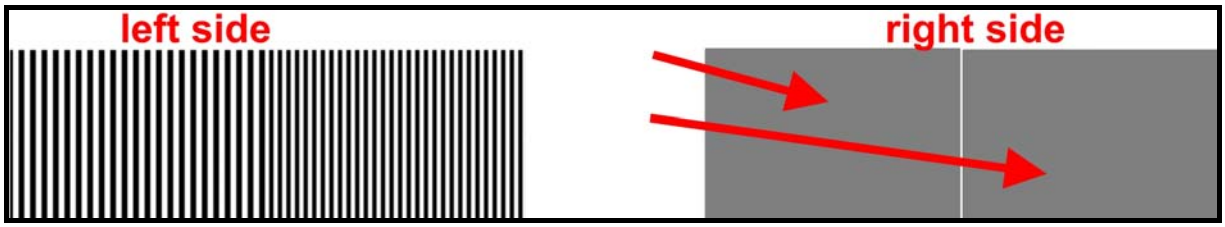
Signals were measured with Rohde & Schwarz Videoanalyzer in the video labor of the Burosch Company.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.3.3 Typical Faults

- One or more parts of the Multiburst test pattern element is displayed as a full gray surface (in this example the 2 last test surfaces on right side) – There is a scaling. Probably the wrong TV-display resolution is set.



The quality of this image is “bad” ★

Such artifacts occur when the resolution of the display is set wrong or maybe the focus control is set too low. This could be also the reason. You see the effect of a too hard scaling in the following detail view of the real image. The image is blurred because of the scaling.

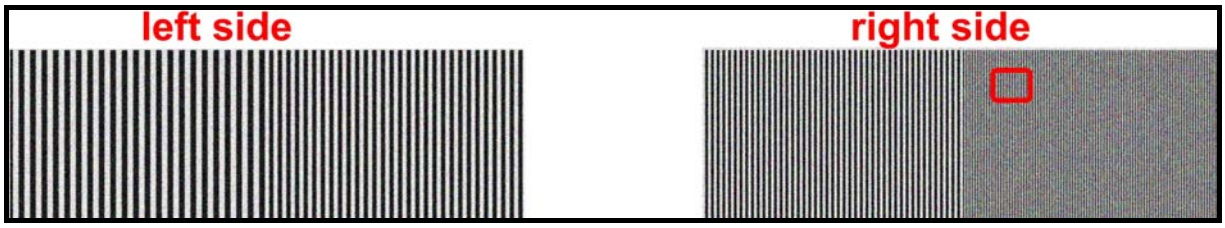
The quality of this image is “bad” ★

Note: Because of printer settings and for clarification of the bad image reproduction the real images will be displayed only symbolical and suggestively.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The test pattern element shows irregularities, black and white stripes are no more clearly differentiated to each other; test zone seems to be noised, especially visible on the finer right side – There is an image noise. Probably bad wiring or a false display resolution is here the reason.

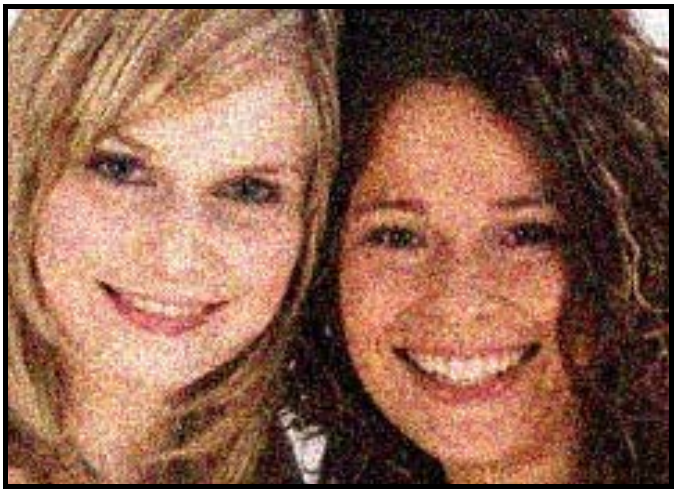


The quality of this image is “poor” ★★

The following image shows a detail view of the red marked area in the image above.

The quality of this image is “poor” ★★

Noise occurs mainly at a bad wiring/cabling with not good shielded cables or if the cables are too long. The detail view of the real image below shows the effect clearly.

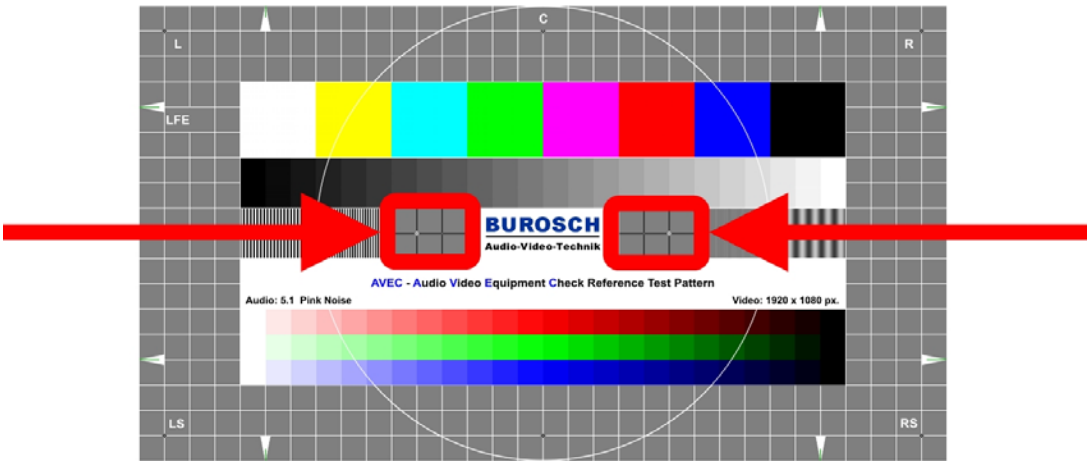


The quality of this image is “poor” ★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.4 Focus



General View: Focus Test Fields

Detail View:

Detail View: Focus Test Fields

The focus test fields show a 50 percent contrast with sharp lines in horizontal and vertical direction respectively. They act as exact dosing of the typical focus control (sharpness, edge-enhancement) for bringing out the angles. You can detect a blurring or an over-focusing by the lines of the test field easily. Over-focusing expresses in form of ringing, double contours as complementary contrast line on the original white or black line of the test pattern.

5.4.1 Optimal Display

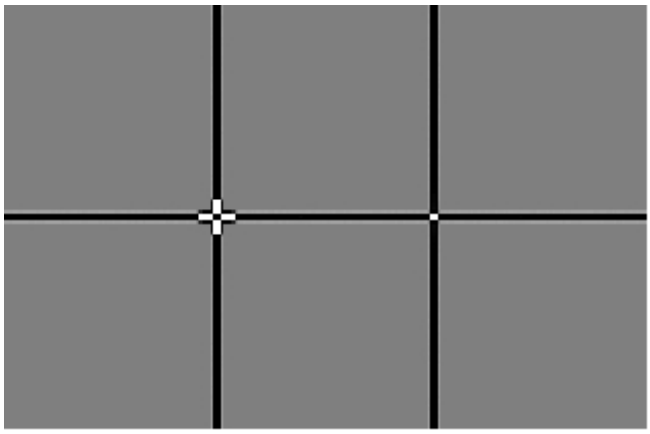
- Clear white and black cross hairs on gray background
- White points are clearly detectable without blurring

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.4.2 Typical Faults

- One or more test pattern lines show one or more complementary „shadows“ - image over-focused, focus control adjusted too strong or generating of ringing in the signal



The quality of this image is “poor” ★★

Clearly over-focusing is detectable. The effect on a real image shows the next image. Over-focusing appears often well focused in the first moment, but produces unnatural annoyances on all image details and accentuate hairs and skin pores unnaturally (red arrows).

The quality of this image is “poor” ★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- Test pattern lines are blurred and show a soft outline, the black point in the middle of the white cross hair is not clearly detectable – focus control adjusted too low.

The quality of this image is “bad” ★

Blurring – focus control adjusted too low or lacking band width in the transfer string cause soft contours and lacking detail sharpness and contour sharpness. The effect of a too low adjusted focus control shows the following detail view of the real image. Fine skin- and hair pores and eyes or teeth becomes completely blurred and differences in such areas are barely visible

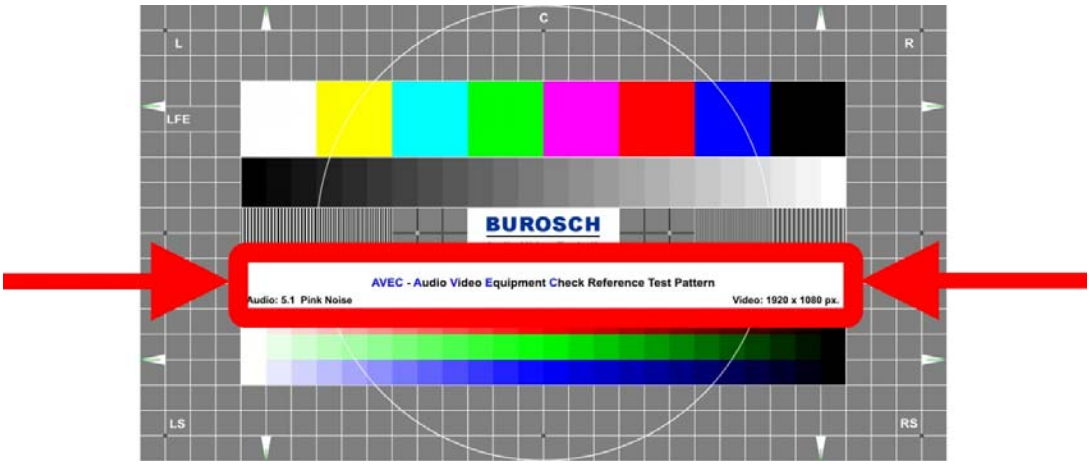
The quality of this image is “bad” ★

Note: Because of printer settings and for clarification of the bad image reproduction the real images will be displayed only symbolical and suggestively.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.5 White Balance



General View: White Balance

Detail View:

Detail View: White Balance

The white, labeled bar acts as detection of potential false colors and color faults. The labeling is insignificant for the main function.

Important at this test zone is the maintenance of the brilliant, color neutral white over the whole surface without any color faults or false colors. It is put the white on a level with the norm illuminant D65, which equates to a cloudy sky.

Tip: To work against illusions of the human eye, which adapt to minimal color differences very quick, we suggest the application of a white paper which you can easily hold beside the test zone to check the neutrality of white by comparing paper with display.

That way you can best check the quality and color-neutrality of white. Please note therefore the following points of the optimal display.

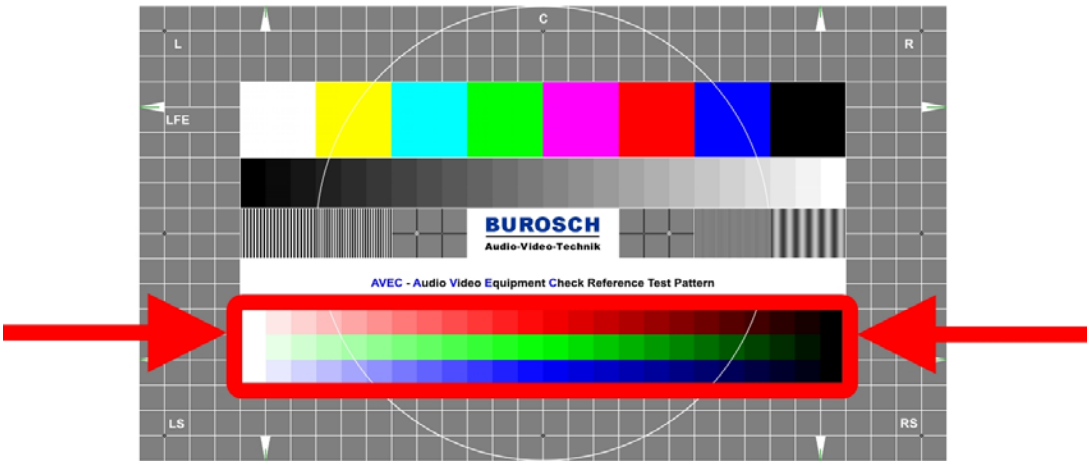
5.5.1 Optimal Display

- Neutral white display over the whole surface
- No color faults in the neutrally white
- No blacking outs

Reference Test Pattern: AVEC (Audio Video Equipment Check)

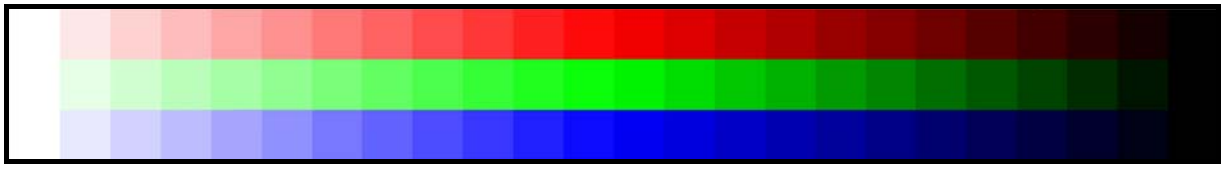
5 Individual Test Zones

5.6 RGB Steps



General View: RGB Steps

Detail View:



Detail View: RGB Steps

The RGB-steps (red, green, blue) show a 24 change-over from 100% white (left) over 100% color saturation (middle) to 0% white (black, right) of the 3 main colors red, green and blue. The steps are same sized and for all colors the same.
These steps are useful to detect lacking color difference and incorrect color balance in relation to each other.

5.6.1 Optimal Display

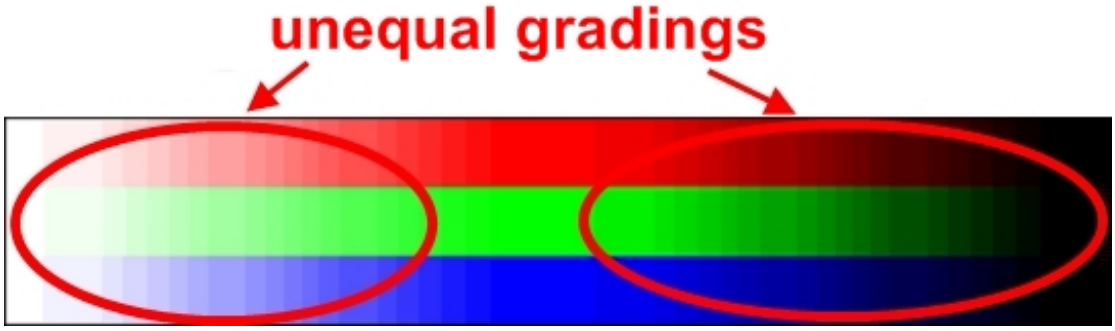
- Left fields of each colors are completely white
- Right fields of each colors are maximum black
- Constant 24-stepped change-over from completely white (left) over 100% saturation of each color in the middle until maximum black on the right side
- Constant grading of the colors to each other over the whole surface
- In every grading the same brightness and saturation of the three colors

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

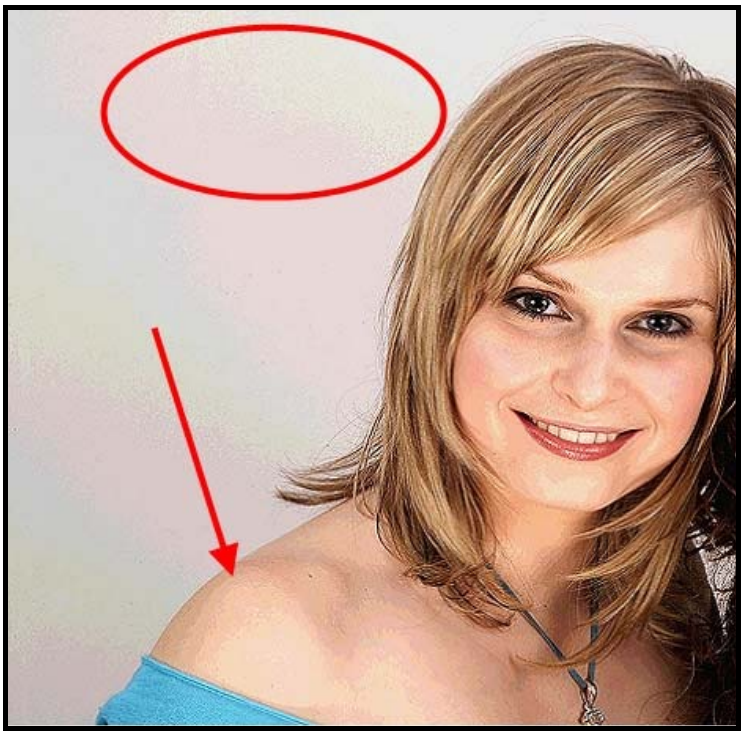
5.6.2 Typical Faults

- unequal grading or lacking (bad) differentiation of the each steps – bad quantification depth, disharmonic color processing



The quality of this image is “poor” ★★

A bad quantification causes less difference of the shading and so too stepped exposition of fine nuances. Lacking quantification also causes false colors and solarization effects, especially visible on the background and shoulder area of the left woman. The following image is a detail view of the real image “Jasmin und Sabrina”.



The quality of this image is “poor” ★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

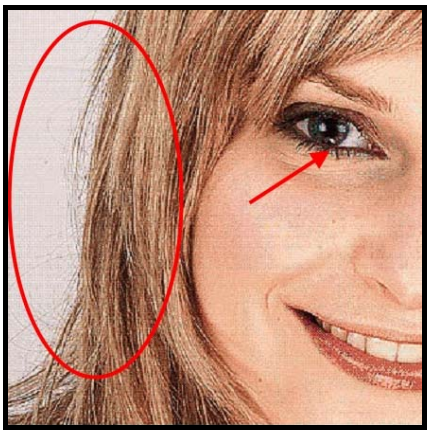
- Generating of patterns in assigned brightness – conspicuous processing (eg. dithering)

Die The quality of this image is “fair” ★★★

The following image shows the detail view of the yellow marked are in the image above.

Die The quality of this image is “fair” ★★★

Because of lacking quantification or as matter of principle dithering mixes non-educible color nuances because of “interweave“ of the nearby areas. Dithering uses the idleness and the blurring of the human eye to mix up the non-educible nuances of the image. You can see the effect clearly on the next image. Fine details of the hairs, eyes and the background become unnaturally patterns.

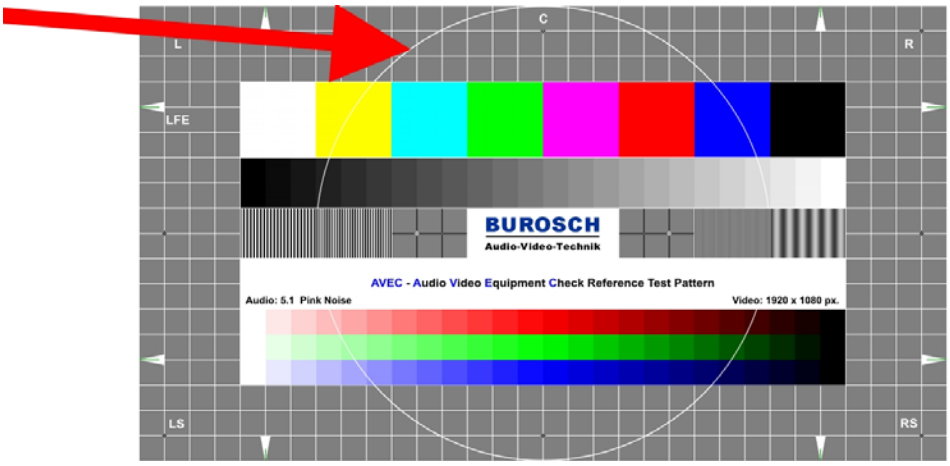


Die The quality of this image is “fair” ★★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

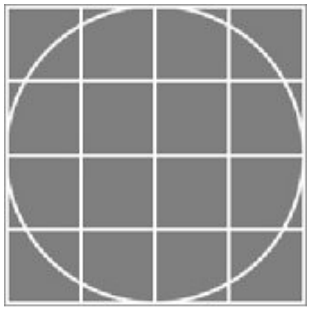
5 Individual Test Zones

5.7 Geometry



General View: Geometry

Detail View:



Detail View: Geometry

This test pattern is consisting of a grid structure – white grid on 50% grey background. In case of correct geometry and correct aspect-ratio (image to page ratio) the grid structure represent exact squares and the circle an exact circle

Tip: To work against illusions of the human eye, which adapt to minimal color or geometry differences very quick, we suggest the application of a simply ruler which you can easily hold on the display to check the linearity of the squares and the horizontal / vertical diameter of the circle respectively.

5.7.1 Optimal Display

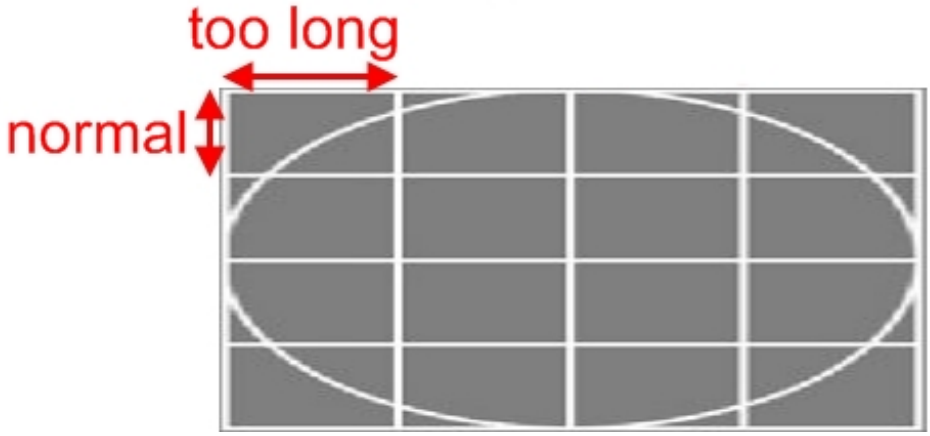
- White grid consist of exact and sharp squares
- Background 50% white (middle gray), homogeneous without any coloring
- Exactly round circle, which cuts the top and bottom border of the image

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

5.7.2 Typical Faults

- The horizontal sides of the squares are longer than the vertical ones – image is deformed horizontally. The geometry of the display is adjusted wrong. Probably adjusted in the wrong mode, e.g. 4:3 instead of 16:9.



The quality of this image is “fair” ★★★

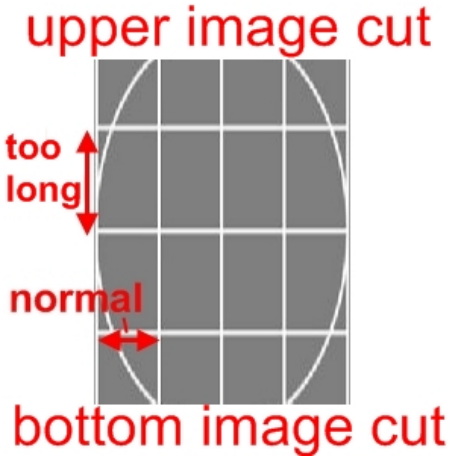
In this example the image is deformed horizontally. In case of doubt please use a simple ruler to check the lines by exact measuring. In this case there is probably the geometry adjusted wrong. Important image material on the left and right become lose by the image cuts. You see the effect clearly in the following real image.

The quality of this image is “fair” ★★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

- The circle is not completely visible, especially at the top and bottom the circle is cut and the squares become rectangular – image is deformed vertically. Probably there is a problem with the image format and with the mode of it respectively.



The quality of this image is “bad” ★

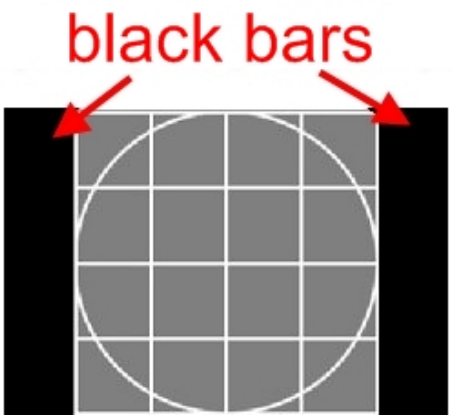
A vertical deformation cuts important image material. In case of doubt please use a ruler and check the squares by measuring. Both women seem unnaturally “deformed”. This effect clarifies the next real image “Jasmin und Sabrina”.

The quality of this image is “bad” ★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

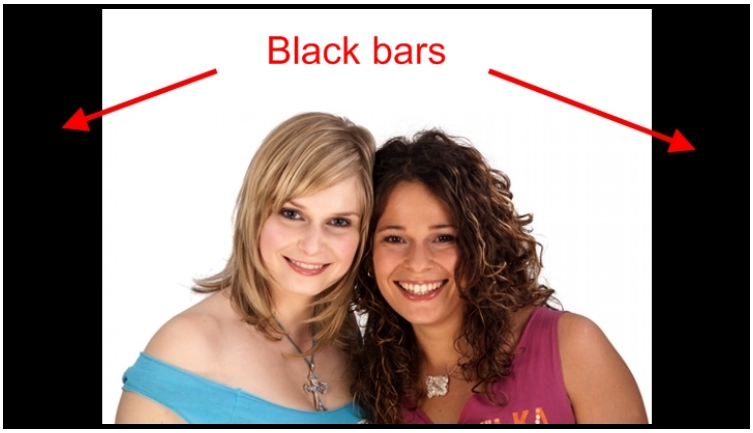
- The circle is perfect circle but on the left and right side black bars occur – such a problem is independent from the display and occur at films, broadcasts or other TV-images which was produced in a different format than they are reproduced.



The quality of this image is “fair” ★★★

Such black bars occur if the film was produced in a format or mode which the display isn’t able to reproduce. The same bars could occur at top or bottom. In this example is the real image “Jasmin und Sabrina” produced in 4:3 format and reproduced on a 16:9 display. The black bars are in such cases only “image fillers”. The image won’t be distorted or compressed. At longer display of the black bars there is a danger of phosphor burn-ins!

Tip: To avoid such burn-ins caused by the black bars or broadcast station icons please check the adjustments of the whole signal string from the DVD-Player or something like that up to the TV-device whether these adjustments compare to the production formats / modes. Burn-ins can cause nasty “ghosts” at the later application.

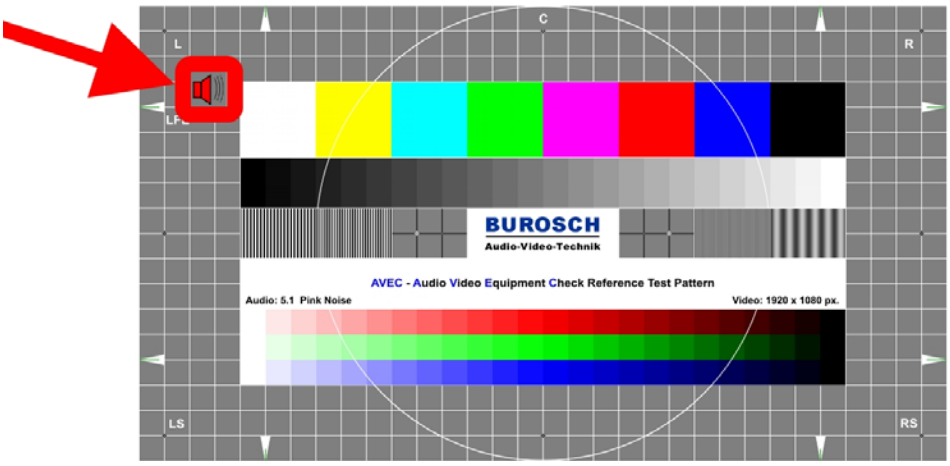


The quality of this image is “fair” ★★★

Reference Test Pattern: AVEC (Audio Video Equipment Check)

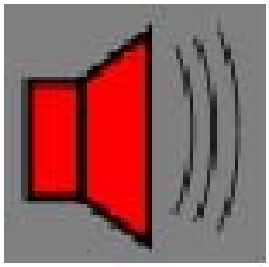
5 Individual Test Zones

5.8 Audio test



General View: Audio Test

Detail View:



Detail View: Audio Test

This audio test is optimized for testing 5.1 Dolby Digital Surround. The audio test is useful for identification of the whole channels, heavy consideration of the configuration of the bass management and the calibration of the playback string. For testing there is a pink noise (reference signal, which makes sure, a naturally reproduction by a middle frequency band) through all channels separated symbolized by a moving red speaker icon and the channel abbreviations:

L=Left
C=Center
R=Right
LS=Left Surround
RS=Right Surround
LFE=Low Frequency Effects.

Reference Test Pattern: AVEC (Audio Video Equipment Check)

5 Individual Test Zones

At a correct playback there is an equal volume in every channel and moves seamlessly to the next channel. Depending on the bass management and the speaker configuration the low frequented LFE-signal comes from the front speakers or optionally from a subwoofer. Both are correct.

5.8.1 Optimal Reproduction

- Same volume of the noise comes from every channel in the graphically visible cycle.
- Same volume of the noise moves seamlessly from one speaker to the other.
- The LFE-signal comes from the front speakers or from the subwoofer if at hand. At speakers with very low tone playback, e.g. PC speakers you will barely hear the sound, but that's normal.

5.8.2 Typical Faults

- The noise comes from an other channel then showed – channels interchanged connected
- The noise is at a change-over between two channels not clearly traceable – one of the speakers is connected reversed in polarity.
- The volume of the noise is different from one channel to another – the compensation level is wrong adjusted
- LFE-signal not hearable – wrong configured bass management don't match with the speaker setup or the subwoofer is off.

6 Norms / Standards

In the analogue technique there was all much regulated. Because of the change to the digital there occur a lot of error sources by the individual shifting of the aspect ratio and the resolutions (16:9, 4:3, etc.).

For a correct playback of a film or a video or even of an image there have to be a neutral transfer. You often hear the argumentation that these aren't necessary because the vision of every human is different and so an objective playback isn't possible. As a matter of principle is this argumentation right. Admittedly there is ignored that it's only possible if the signal transfer acts neutral and straight. Only when the expressed image is similar to the recorded image by the camera, the human is able to perceive what he would saw at location by his individual sensation.

The transfer itself has to behave neutrally. Big worldwide institutes look after the standards so that the neutrality is warranted.

In German speaking countries is the institute for broadcast engineering of the public broadcasting corporation of ARD, ZDF, DLR, ORF and SRG/SSR mainly responsible for the standards:

www.irt.de

For the whole European area the European Broadcast Union, EBU in Switzerland handles super ordinate to the local development institutes:

www.ebu.ch

On international floor established in 1865 in Paris the International Telecommunication Union, ITU is included:

www.itu.int

For best image evaluation and calibration you use the test pictures from this document. It works also with real, filmed motives but with reservations. The big advantage of test patterns from BUROSCH Audio-Video-Technik is the knowledge how the test patterns have to look and the knowledge how to reproduce them. Only this way the neutrality of the transmission and the playback can be measured exactly and if necessary to correct it:

www.burosch.de

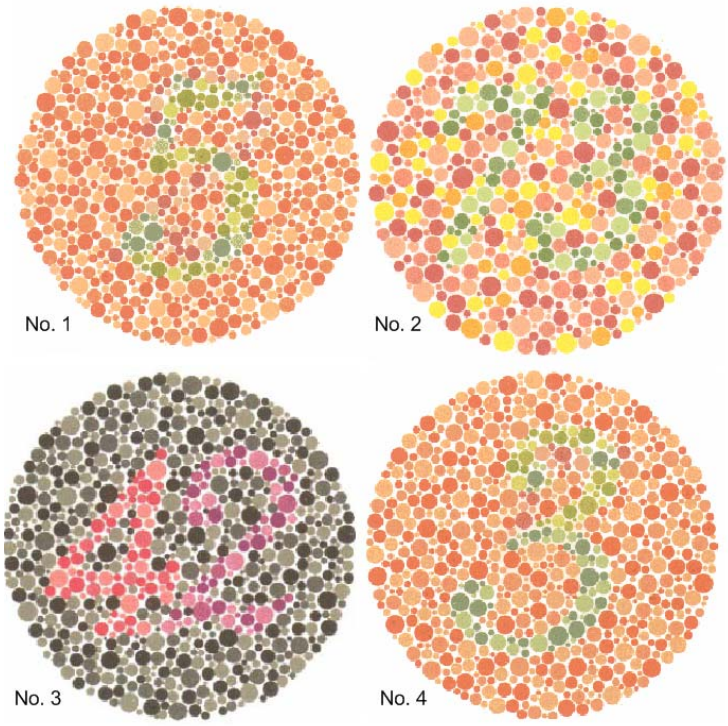
7 Visual Test

The basic prerequisite for an optimal focus and color perception is a good work of the human eye. In this chapter will be tested your vision rudely.

IMPORTANT: Because of scaling artifacts the following tests mustn't be done on your PC screen. Please pay attention to optimal printer settings therefore!

7.1 Colors

Scientifically proven are many people especially men afflicted with color blindness. This means that colors especially red and green are misinterpreted. By the help of "Ishihara Color Test Plates" this amblyopic can be easily detected. On this page you see 4 typical Ishihara Color Test Plates which prove your color perception.



Ishihara Tables

On the left you see 4 numbered Ishihara Color Test Plates for a check-up of potential red-green and yellow-blue weakness.

The numeral "5" should be clearly visible at No.1 to viewers with normal color vision. No. 2 should be visible as "73", No.3 as "42" and the last one clearly as "3".

Please check this fact on yourself.

Congenital color blindness occurs mostly at men and increase or decrease over the years.

Note: These small relative visual tests just show a trend and don't replace the way to the eye specialist!

Reference Test Pattern: AVEC (Audio Video Equipment Check)

7 Visual Test

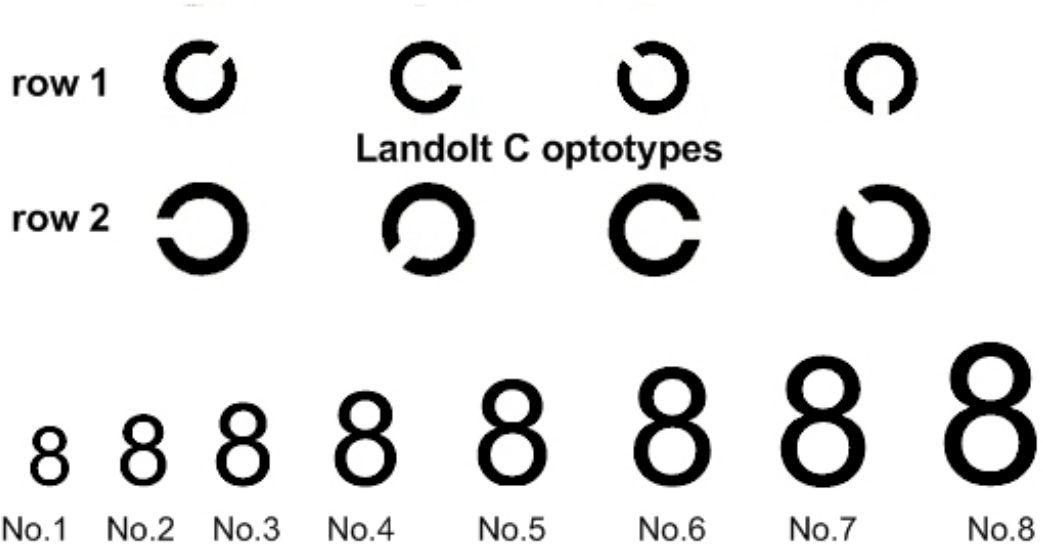
7.2 Visual Acuity

The following visual test is posing a really good challenge to your visual acuity. By the help of the following image on this page which shows two rows of Landolt C optotypes and a numbered increasing number “8” and the image on the next page which shows 3 vertical stripe patterns you can check your visual acuity very easily.

Please print the images out and hang them up at a distance of approx. 4 to 5 meter. The further the distance to the picture the better your visual acuity is.

The ring openings at least from the lower row should be clearly visible. If you don’t see any ring openings we advise a check-up at your eye specialist. The increasing “8” should be also clearly visible from 5 meter in every size. At most the smallest (No.1) could be a little tricky to identify it as an “8” from 5 meter.

This test can’t be arranged on your PC screen because the resolution can affect the perception badly.



Visual Acuity: on top Landolt C optotypes; at the bottom increasing number “8”

At optimal visual acuity all ring openings and all “8’s” are clearly detectable and readable respectively. All black contours of the Landolt C optotypes and of the increasing “8” are clearly distinguishable from the white color of the paper.

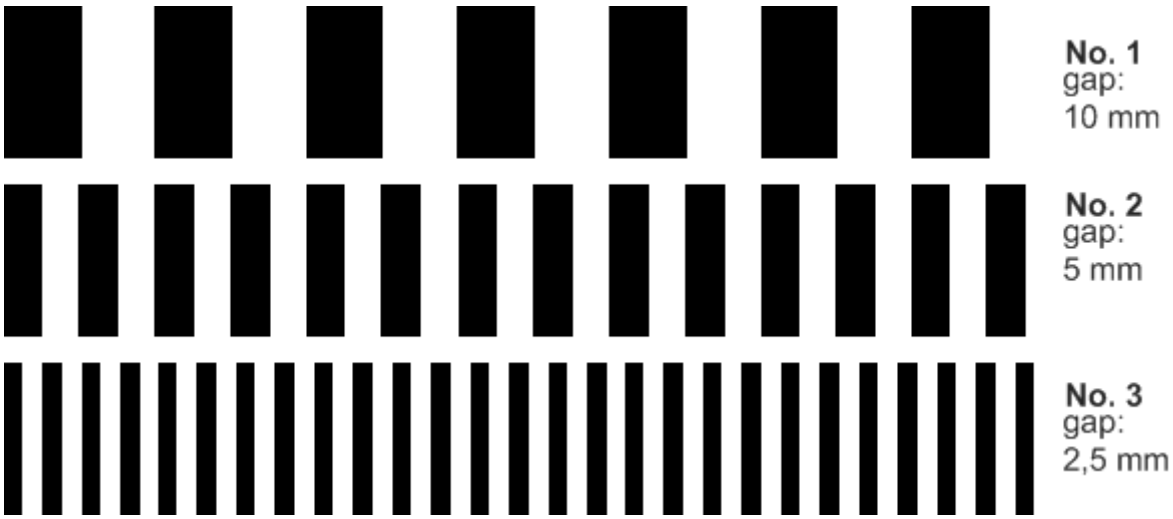
Reference Test Pattern: AVEC (Audio Video Equipment Check)

7 Visual Test

The image on this page shows 3 vertical stripe patterns which are also vitally important for the visual acuity. All gaps between the stripes are over the whole horizontal direction absolutely identical.

The black and white gaps of the upper row are approx. 10 millimeter; the gaps of the middle row are approx. 5 millimeter and the gaps of the bottom horizontal row are about 2.5 millimeter.

Most important at this image are the hard and sharp outlines of the stripes. At least the upper 2 stripe patterns should be clearly visible and distinguishable at a distance of ca. 5 meter.



Visual Acuity: Stripe Pattern

If all visual tests proceeded positively you could emanate from a visual acuity of 90 to 100%.

Note: These small relative visual tests just show a trend and don't replace the way to the eye specialist!

8 Credits

Editor of this technical documentation for the reasonable application of the reference test pattern:

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Reference Test Pattern: AVEC (Audio Video Equipment Check)

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