BUROSCH

Audio-Video-Technik

Display Basic Tuning

Workshop

Technical Documentation

Display Basic Tuning Workshop

Please pay special attention to the order of the test patterns and consistent keep this order:

1. Reference Test Pattern Brightness

2. Reference Test Pattern Contrast

3. Reference Test Pattern Color

4. Reference Test Pattern Focus

5. Reference Test Pattern AVEC

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These five reference test patterns described in this documentation help you adjusting the basic setting of the most important parameters of the image reproduction of your TV-device. The Basic Tuning test patterns act as purchase criterion for initial purchases of TV sets directly in the specialty store. Further the test patterns are adapted for a running quality conformance test. These five reference test patterns are the basis for optimizing and evaluating the image quality of the display. Our test signals are used in display development departments of the industrial companies and in labors of famous test journals for comparative product tests.

We advise to use these five test patterns as one whole compendium.

For an optimal adjustment of your TV-display it is necessary to maintain the particular order. Image evaluations and image optimizing precede always the same principle:

1. Brightness adjustment
2. Contrast
3. Color
4. Focus
5. AVEC Universal test pattern which checks the speakers additionally

We advise to repeat the image calibration by the help of the Basic Tuning test patterns two or three times after the first adjusting to make sure the correct adjustment.

Further you find always actual information around the topics test signals and home cinema on our web site www.burosch.de.

The documentation of the fifth reference test pattern AVEC (Audio Video Equipment Check) you find separate on our website. In this documentation here the AVEC test pattern is described very cursory.

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Display Basic Tuning Workshop

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.

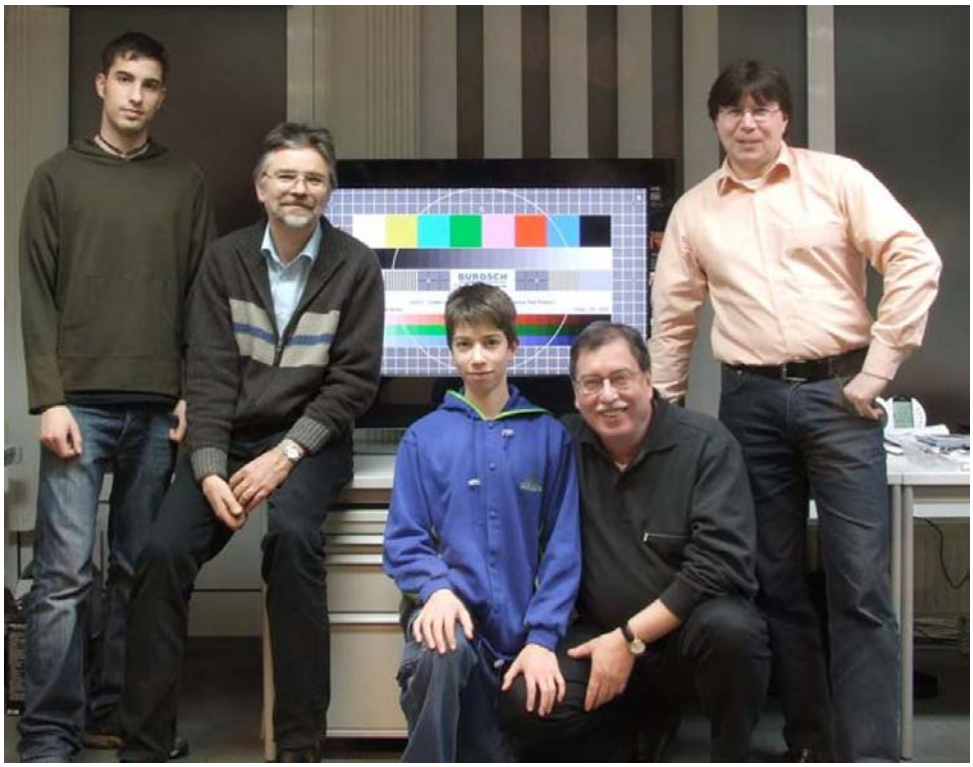
Of course we cultivate the collaboration with various research institutes and technical universities.

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

Display Basic Tuning Workshop

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.

Display Basic Tuning Workshop

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!

Display Basic Tuning Workshop

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.

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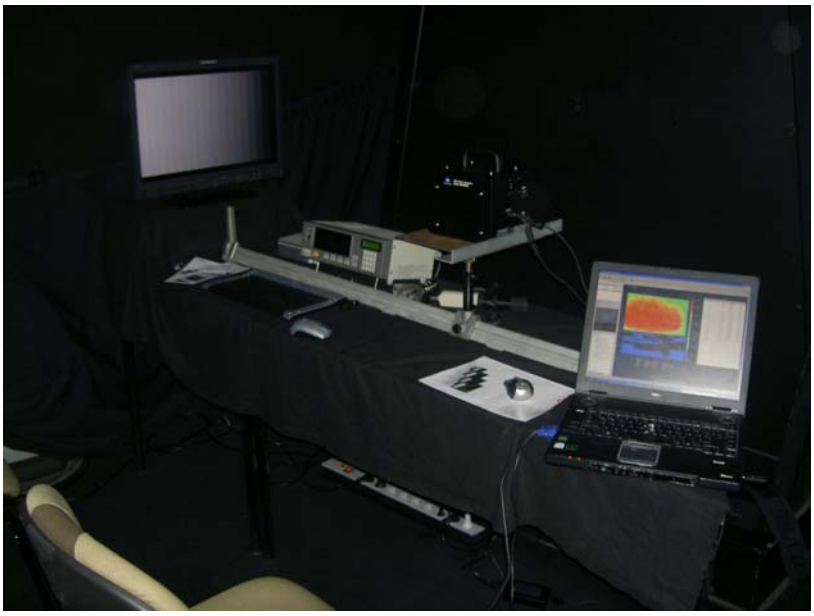
2 Company Profile

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.

Display Basic Tuning Workshop

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

Display Basic Tuning Workshop

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 = 1.57079632679489661923132169163984*4/$anzframe*$frame;
    $shift = 1.57079632679489661923132169163984*4/$anzframe*$frame;
    $faktor = 1.57079632679489661923132169163984/$bildbreite*2*$endfreq/37.137330754352030947775628626692*(($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(1.704423097650712477464541766102 2*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.

Display Basic Tuning Workshop

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…).

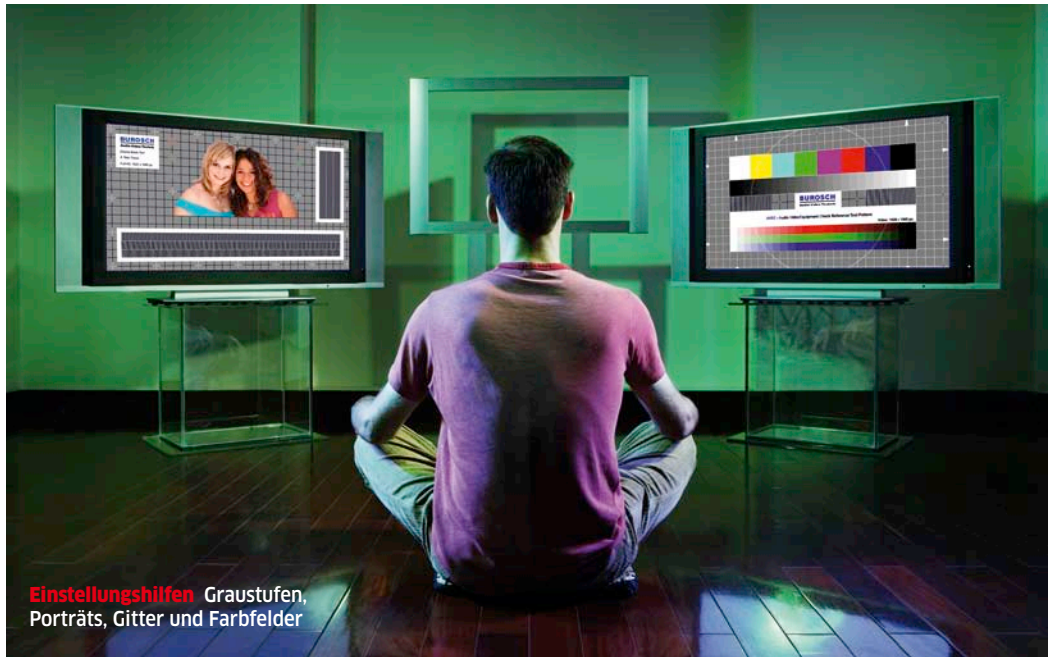
These reference test patterns act as basis for the image evaluation and image optimizing. Technicians of famous test journals for comparative product tests e.g. Chip, c't Magazin, AVF-Bild and further more also work with our reference test patterns.

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).

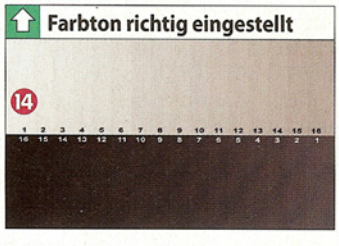
Zu wenig Farbe eingestellt

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

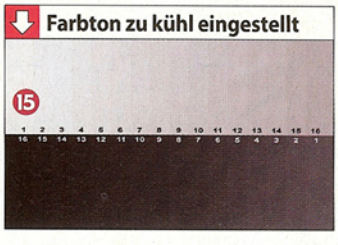
Farbton richtig eingestellt



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.

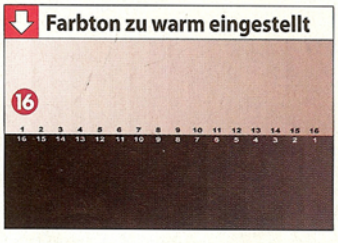
Zur Einstellung vom Farbton verwenden Sie den weißen Streifen links oben vom Kon-

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



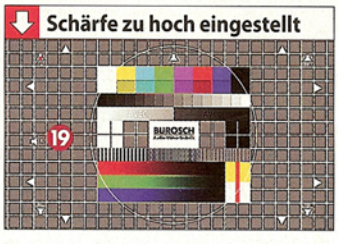
Wirkt das Weiß bläulich 15, ist der Farbton zu kühl eingestellt. Wählen Sie die Farbtemperatur wärmer, oder reduzieren Sie den Blau-Anteil (siehe Anleitung). Hat der weiße Streifen einen Rotstich 16, ist der Farbton zu warm eingestellt. Sie müssen die Farbtemperatur kälter wählen oder den Rot-Anteil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

3 General Basics

In this chapter you find the descriptions of the fundamental basic catchwords around the topic test patterns, optical characteristics and colors. This chapter gives you an instruction you need to know. Knowing this is the main prerequisite! Please read this chapter carefully.

Further in this chapter is described the purpose and function of test patterns generally. Many people use test patterns for evaluating displays but even don't know what function and application the each test pattern has. Because of this fact we advise to read the chapter "Signification and Purpose of Test Patterns" before you use the test patterns.

The following important main topics are described in this chapter:

- RGB-Values
- Gamma
- Standard Illuminant D65
- Signification and purpose of test patterns
- Application of test patterns

Test patterns are the visual basis which best compare with the natural reproduction.

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3 General Basics

3.1 RGB-Values

In manuals of test patterns you often read things like “RGB 255”, “100% white” or “50% white” or “100% saturation” and so on. Here you find the definition of these catchwords.

Colors and brightness are most defined in percent (%). Here you see the meanings of white-values figuratively.

In the upper image you can see that 0% white means completely black and RGB-values of 0 (red), 0 (green), 0 (blue). White is built up of full percentage of the three main colors red, green and blue, so you can say completely white equals 100%white.

40% white for example means that there is more contingent of black than of white.

60% white means that there is more contingent of white than of black. You can say 60% is brighter than 40%white, so the brightness increases by increasing the percentage.

RGB 255 or 100% white is the same. This value simulates the standardized white D65 which is intended to represent average daylight and has a correlated color temperature of approx. 6,500Kelvin. All of our test patterns are developed based on this illuminant. More information about the standard illuminant D65 you find in chapter “Standard Illuminant D65 (White)”.

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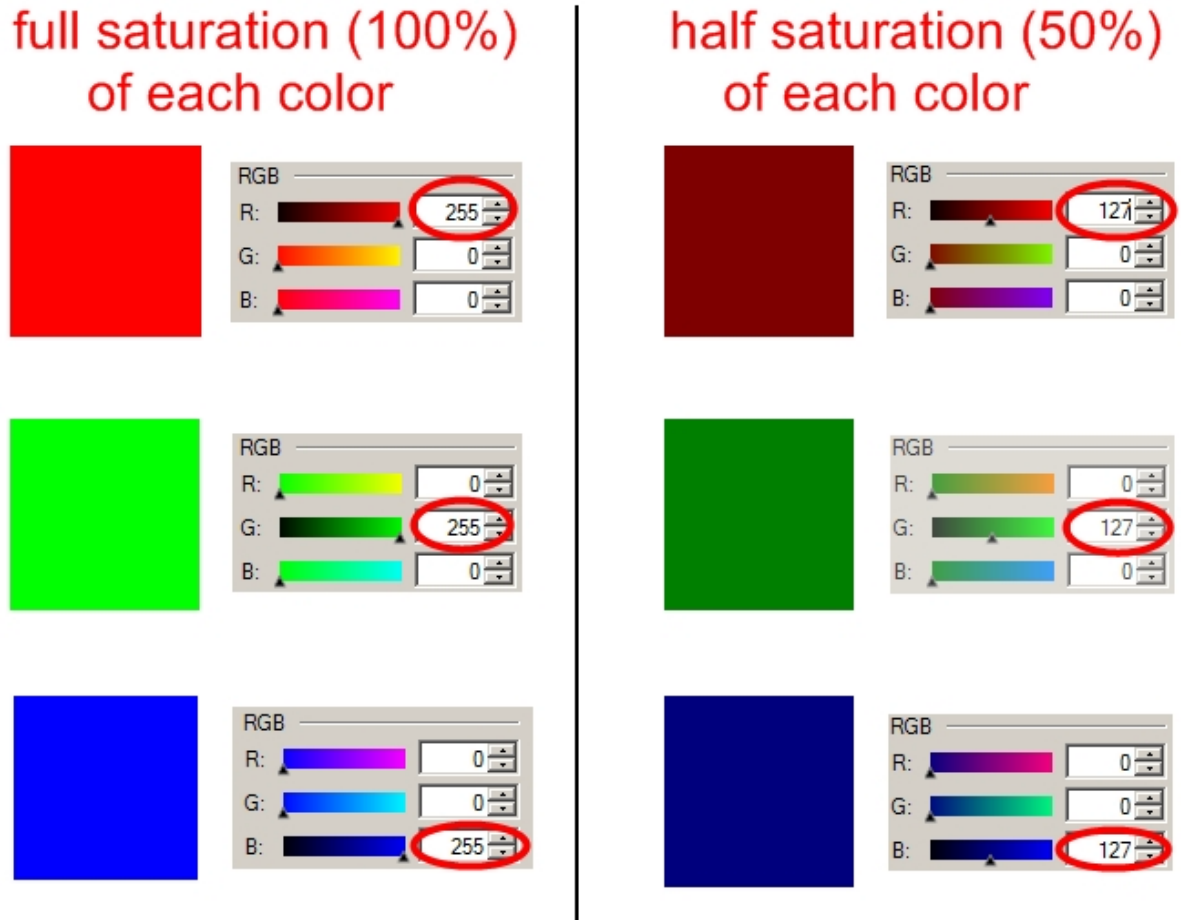
3 General Basics

You use the concept “saturation” to define the intensity of colors. The saturation describes generally the quality of color impressions.

You can also use a percentage for colors to describe its particular saturation. For example 100% red or (R 255, G 0, B 0) is red in full saturation. The same applies to the other colors too.

The following figure shows the meanings of RGB-values in conjunction with the particular saturations of the colors.



You see in the upper figure the three primary colors left in full saturation and in half saturation at the right side. You see that the RGB-values give information about the intensity of the colors. The higher the particular RGB-value the more intensive is the color and reverse.

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3 General Basics

3.2 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.

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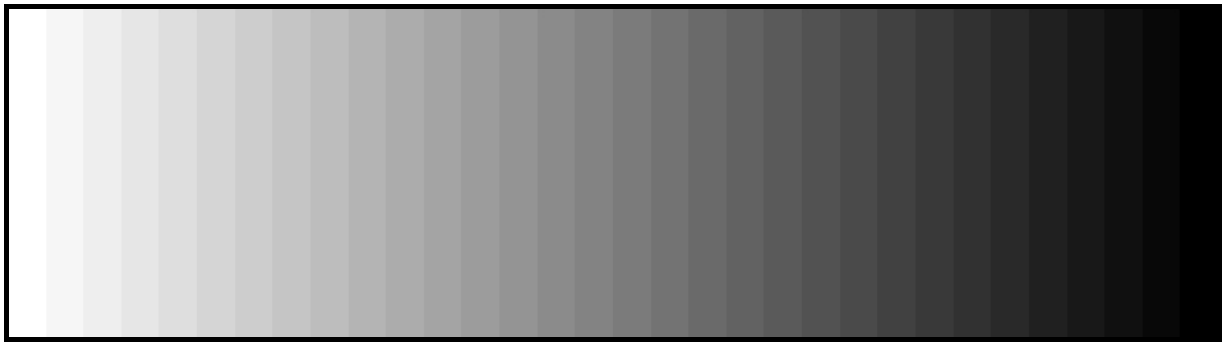
3 General Basics

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

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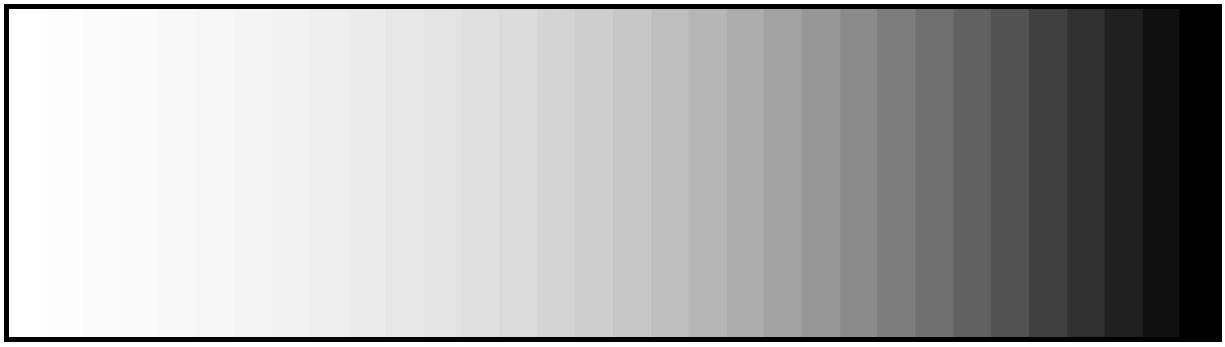
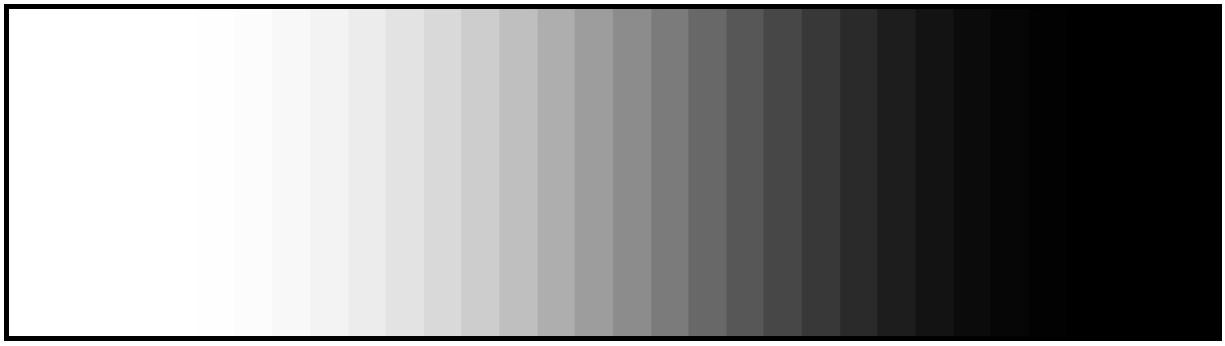
3 General Basics

- 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

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3 General Basics

3.3 Standard Illuminant D65 (White)

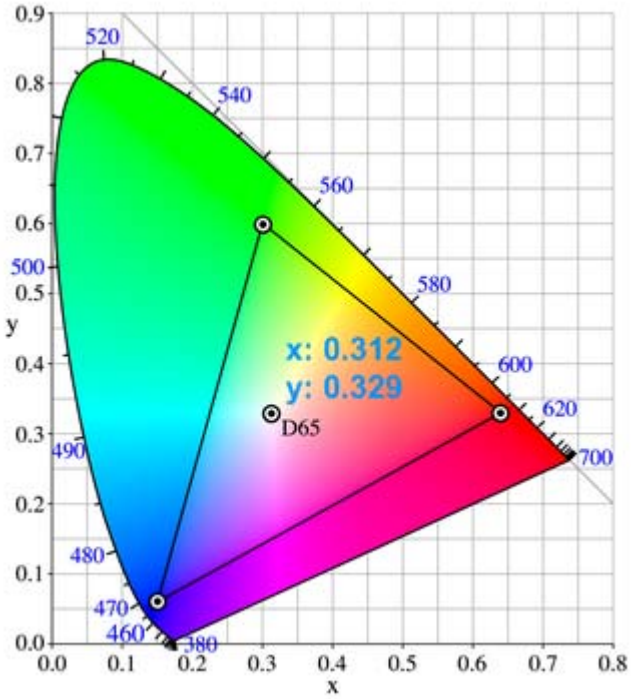
White is the only color which reflects completely and doesn't absorb any light. White contains the whole light energy within the visible spectrum. Further white is a standard for color measurements and television broadcasts which equates to the absolute reflection performance.

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

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3 General Basics

3.4 Signification and Purpose of Test Patterns

Test patterns generally act for evaluation of the image quality of various screens. Further test patterns are optimal adapted for troubleshooting and diagnostics respectively. There are test patterns which are sooner reasonable for LCD-displays or PDP Plasma displays. So the application of test patterns also depends on the display technology you want to check. By the help of test patterns you are able to evaluate, to analyze and to calibrate a lot of important aspects of image reproduction by easy way. We advise evaluating displays in a direct comparison with different TV-devices. Because of the quick customization of the human eye to false colors it's very important to compare displays always in direct comparison.

Reference test patterns are the visual basis. They define the object for the optimal image setting. But small tolerances should be accepted anyhow because of the individual vision of every human.

We differ at test patterns between Basic Tuning and Fine Tuning. Fine Tuning test patterns are most relevant for professional users. The table on the next page shows the possibilities of image evaluation.

At Fine Tuning test patterns we classify the following groups:

- Static test patterns
- Dynamic test patterns
- Video test sequences
- Audio sequences

Especially at new TV devices it's very important to compare the displays directly side by side to train your eye this way.

Basically it's important to give your eye enough time for a real and detailed evaluation of the screen. If possible please compare the reproduced colors with the colors of the nature.

The research of display technologies proceeds very quickly. You find a lot of information on our website www.burosch.de and particularly the latest news round about the topic display technique.

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We differ at test patterns basically between two groups: “Basic Tuning” and “Fine Tuning” test patterns. The following table shows the parameters which you can evaluate and optimize with the particular group:

Basic Tuning Test Patterns	Fine Tuning Test Patterns
Brightness	Motion Blur
Contrast	Gamma
Color	Color Temperature
Focus	Maximal Fine Resolution
AVEC Universal-Test Pattern	Pixel Cropping
	Chrominance Sweep
	Focus
	Luminance Sweep
	Scaling
	Geometry
	Over Scan
	Gamut
	Viewing Angle
	Display Dynamic
	False Contours

It’s important to say that the test patterns described in this manuscript are only adapted for setting the right basics like brightness, contrast, color and focus and after a general check of all main adjustments with the AVEC test pattern. More professional Fine Tuning test patterns you find separated on our website www.burosch.de.

In the equal sub points you find the Basic Tuning and Fine Tuning test patterns respectively. By the help of the Fine Tuning test patterns you are able to analyze all parameters of the image reproduction (see right side of the table).

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.

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4.1 Suitable Resolutions

The reference test patterns are 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

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4.2 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

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4.3 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.

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4 Preface

4.4 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).

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4 Preface

4.4.1 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.

- 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.

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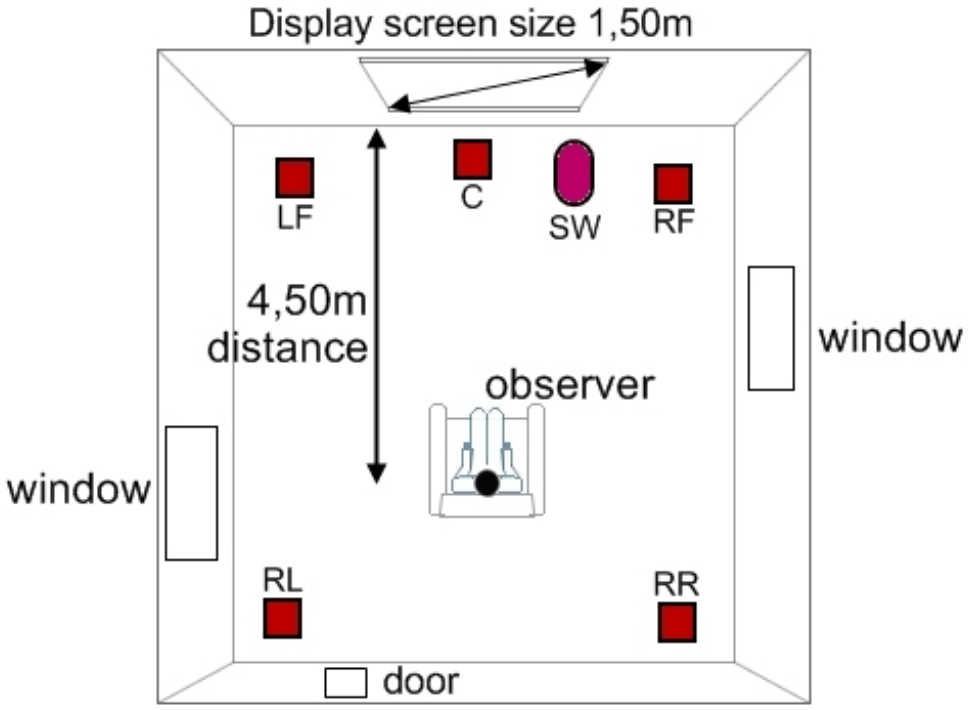
4.4.2 Ambient Light and Viewing Distance

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 Descriptions of Basic Tuning Test Patterns

In this chapter you find the descriptions and applications of the Basic Tuning Test Patterns. There are all in all 4 Basic Tuning Test Patterns and also 1 universal test pattern for a final check of all parameters and the speakers. With this test patterns you are able to evaluate and if needed to calibrate the following parameters on very easy way. These parameters are also very important for image reproduction directly on the display screen and have to be done in the following order:

1. Brightness
2. Contrast
3. Color
4. Focus
5. AVEC

Please always keep in mind this order for all display calibrations! It's independent from the technology of the display.

For each parameter there are different test patterns, you also must pay attention to the order of these test patterns. Always the first adjustment is "brightness" after "contrast" later "color" and finally "focus". It is very important to keep this order. Otherwise you have an unnaturally image in the later home-cinema film. This can turn extremely nasty.

All 5 test patterns described in this chapter are the same principle. In every test pattern you see a real image of two women with different skin types additionally for a easy comparison. The main problem at image reproduction on flat-screens is the displaying of skin types. Often the displays show unnaturally artifacts on the skin. So this is the main reason why there is a comparison image with two women – with different skin types.

With this Basic Tuning Test Patterns you are able to set the basic settings of your display. The test patterns should help you optimizing your TV-display quickly, easily and professionally.

For a final check there is a universal test pattern in which you can see all calibrated parameters from the Basic Tuning test patterns in one.

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!

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.1 Test Pattern No.1: Brightness

Every time the first and most important adjustment and test pattern respectively is the brightness setting. The brightness also called black-value is the most important adjustment for the human eye. Because of a non linear sensibility of a human eye which reacts most sensitively to dark parts it is very important to adjust the black-value correctly. Scientifically proven, the human eye detects more differences in the dark than in bright zones.

The following image shows the test pattern for brightness in optimal display.

First test pattern: Brightness

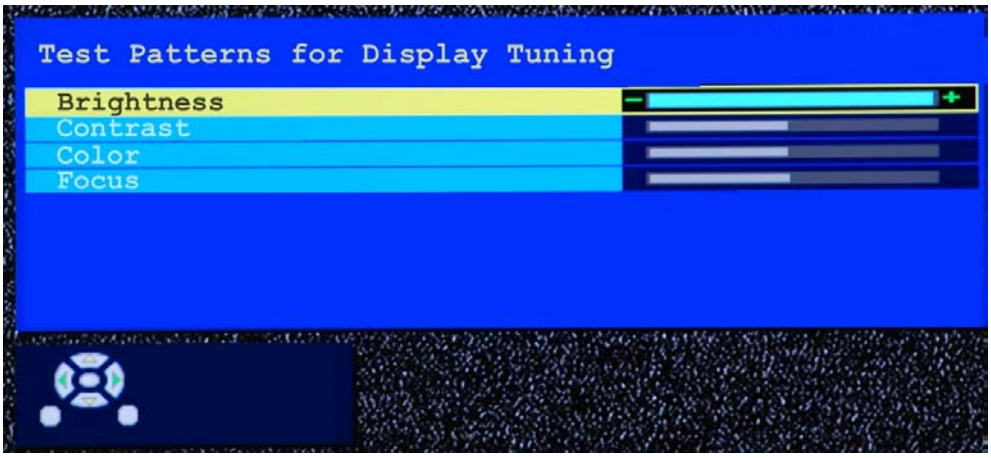
This test pattern shows two gray bars – one with 15 steps at the bottom and one with 8 steps on the right side – on a completely black background. Further there is a real image showing two women with different skin types. The left woman is light-skinned; the right woman is dark-skinned. This portrait of the two women is for check-up of the naturalness of skins.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.1.1 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.



You can evaluate and calibrate the quality of brightness by the help of the vertical and horizontal gray bars (red arrows).

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.1.2 Optimal Display

Please keep the gray bars marked with red arrows in mind which help you calibrating the brightness.

- Background maximum black (0% white)
- Two women with different skin types in the middle of the image
- On the right: vertical 8-stepped gray bars from 100% white (on top) up to 0% white (maximum black)
- At the bottom: horizontal 15-stepped gray bars from maximum black on the left up to middle gray (RGB 116; approx. 45% white) on the right
- All nuances are homogeneous and don't show any color faults.

You find the correct adjustment by following this procedure:

1. Please set the brightness control far down
2. Set the contrast and color control in center position and factory setting respectively
3. Now you can adjust the brightness control slowly up and pay attention to the black background and the horizontal gray bars at the bottom. You have to be able to see as many gray bars you can and the background still must be complete black

At least you have to see all horizontal and vertical gray steps clearly on a maximum black background. Please also pay attention to the naturalness of the two women. Especially the hairs of the right dark-skinned woman must show differences. In case of need rather resign nuances in maximum one gray step than losing the maximum black background. The white points on the darkest gray steps help you identify the darkest gray bars which help you with the adjustment.

IMPORTANT: The background still has to be completely black! Because of the today's technique the PDP Plasma technology displays the black value best.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.1.3 Typical Faults

- The background is still black but there are no or even bad visible differences in the first darkest 4 or 5 horizontal steps, the hairs of the right woman and the darkest 2 or 3 steps at the vertical gray bars (red marked). Further the left woman becomes an unnaturally skin color – The reason here is a too low adjusted brightness. Please try to set the brightness control carefully a bit higher so that at the best all gray bars and the hairs of the right woman show clearly differences at a maximum black background.

The following image shows the effect of a too low adjusted brightness control.

The quality of this image is “poor” ★★

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

- The background becomes grayish and differences in bright areas are no more visible; see the shoulder and face area of the light-skinned woman and the first two bright fields on the right gray bars which don't show any differences of nuances – This problem is caused by a too high adjusted brightness. Please try to set the brightness control carefully a bit lower to reach differences in the red marked areas. Only when the shoulder and face area of the left woman show any fine nuances and the gray bars at right are clearly distinguishable the brightness is adjusted correctly. Of course the most important thing is the background which has to be maximum black.

The following image shows the effect of a too low adjusted brightness control.

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.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.2 Test Pattern No.2: Contrast

The second adjustment defines the maximum brightness of the reproduced image on the display and has to be proceeded by the help of the contrast control of your display.
Usually the parameter “Contrast” impacts only the bright areas in the image and so it acts as a control for the white-value of the display.

The following image shows the test pattern for contrast in optimal display.

Second test pattern: Contrast

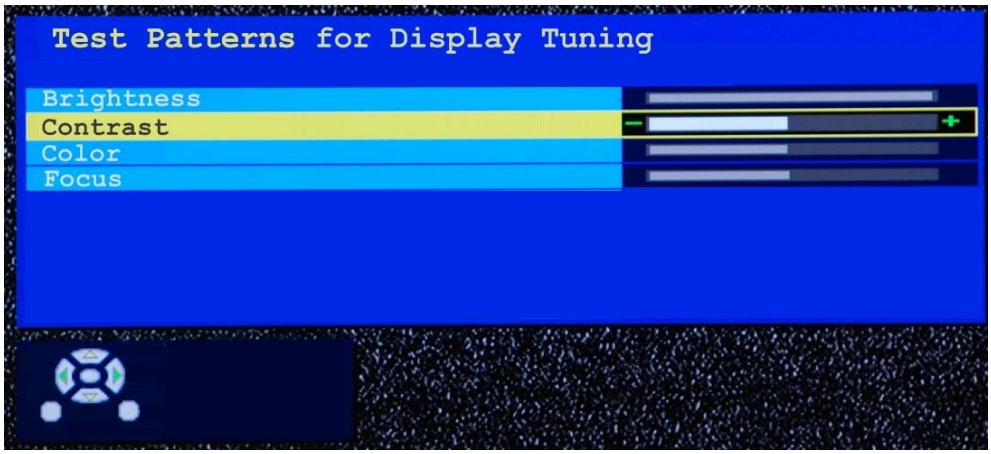
This test pattern shows two gray bars – one with 15 steps at the bottom and one with 8 steps on the right side – on a 100% white background. Further there is a real image showing two women with different skin types. The left woman is light-skinned; the right woman is dark-skinned. This portrait of the two women is for check-up of the naturalness of skins.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.2.1 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.



You can evaluate and calibrate the quality of contrast by the help of the vertical and horizontal gray bars (red arrows).

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.2.2 Optimal Display

Please keep the gray bars marked with red arrows in mind which help you calibrating the brightness.

- Background 100% white
- Two women with different skin types in the middle
- On the right: Vertical 8-stepped gray bars from 100% white (on top) to 0% white (maximum black) at the bottom
- At the bottom: Horizontal 15-stepped gray bars from middle gray (RGB 116) on the left to maximum white (100%) on the right.
- All nuances are homogeneous and don't show any color faults

You find the correct adjustment by following this procedure:

1. Please set the contrast control far down
2. Set the color control in center position and factory setting respectively
3. Now you can adjust the contrast control of your display slowly up and pay attention to the neutral 100% white background and the horizontal gray bars at the bottom. You have to be able to see as many gray bars you can at a 100% white background.

At least you have to see all horizontal and vertical gray steps clearly on a neutral 100% white background. Please also pay attention to the naturalness of the two women. Especially the bright parts like the skin and shoulder area of the left woman have to show natural nuances and differences respectively. In case of need rather resign having a 100% white background than color faults in the bright gray steps.

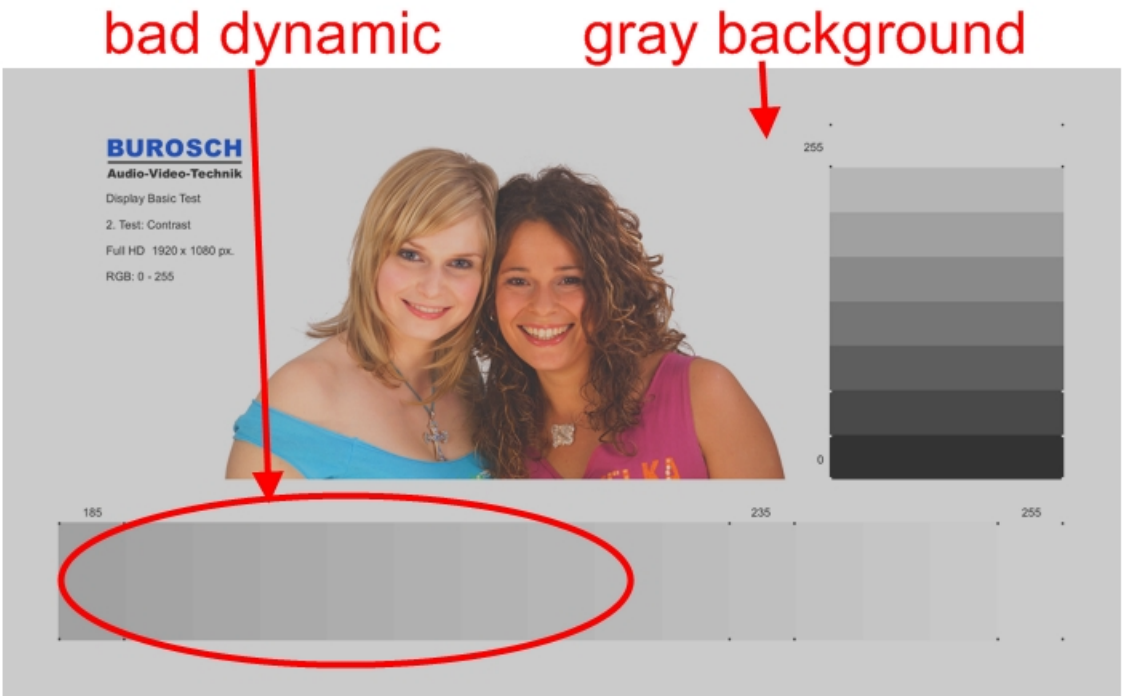
IMPORTANT: The gray bars mustn't show any color faults! In the case of doubt please compare the 100% white bar with a piece of a normal matt white paper which confirms the neutrality of white this way.

5 Descriptions of Basic Tuning Test Patterns

5.2.3 Typical Faults

- The background is grayish and the nuances in the bottom gray bars show a poor dynamic (red marked) which means nearly all steps aren't clearly separated in the gray shadings from each other. Further the two women become an unnaturally skin colors – Please try to set the contrast control slowly higher to see what will happen. Normally the white value increase by doing this. But pay attention to the gray bars at the bottom! They must show clearly nuances in the brighter areas at a 100% white background.

The following image shows the effect of a too low adjusted contrast control.



The quality of this image is "bad" ★

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

- The background is still 100% white but fine nuances of the bright and dark areas like the face area of the left light-skinned woman and the hair nuances of the right woman aren't visible (red marked). You see the unnatural skin color especially on the left light-skinned woman. Nuances in the face area of this woman don't show any differences which makes the real image very unnatural – The reason for this problem is a too high adjusted contrast. Too high adjusted contrast causes no visible nuances in bright and in dark areas too. Please set the contrast control gradually lower until you see clearly differences in the bright and dark nuances.

The following image shows the effect of a too high adjusted contrast control.

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.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.3 Test Pattern No.3: Color

The third test pattern is for color adjustment which defines the value of colors the image gets. This adjustment assigns the quantity of color and saturation respectively.
A problem of color adjustment is that the most displays have set a too high color temperature from the factory. This colors the image blue. If you can adjust the color temperature please set “6,500K” and “D65”, “Neutral” or “Warm” respectively.

The object of this test pattern is to ensure a natural reproduction of colors.

The following image shows the test pattern for color in optimal display.

Third test pattern: Color

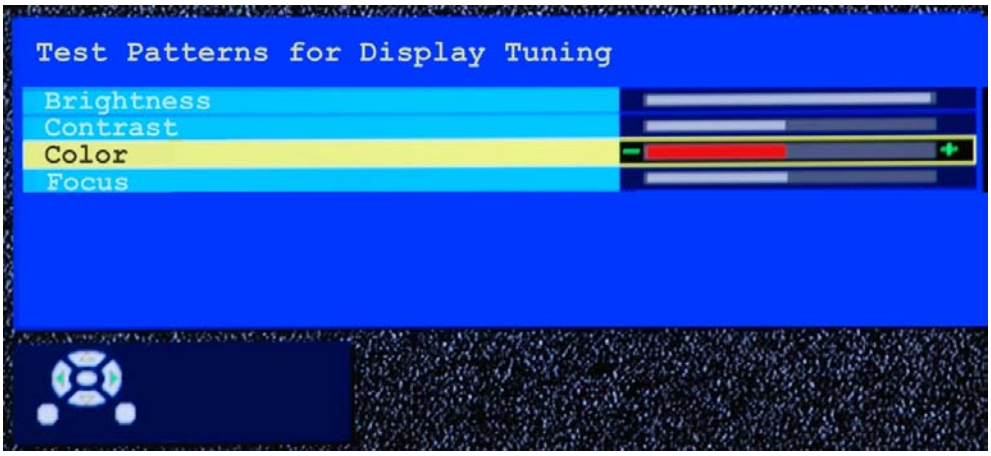
This test pattern shows three color steps (Red, Green, and Blue) and one gray bar – all with the same numbers of steps at the bottom and typically 8-stepped color bars on the right side. The background of this test pattern is 100% white (D65). Further there is a real image showing two women with different skin types. The left woman is light-skinned; the right woman is dark-skinned. This portrait of the two women is for check-up of the naturalness of skins.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.3.1 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.



You can evaluate and calibrate the quality of color by the help of the horizontal color steps and gray bars and the 8-stepped color bars on the right (red arrows).

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.3.2 Optimal Display

Please keep the color steps and color bars in mind (red arrows) which helps you calibrating the colors and so the naturalness of skins.

- Background 100% white
- Two women with different skin types in the middle
- On the right: Vertical 8-stepped color bars with all primary and secondary colors in full saturation. From top: White, yellow, cyan, green, magenta, red, blue, black
- At the bottom: 3 horizontal RGB-steps from bright at left over full saturation in the middle until complete black on the right. Further there are gray bars from complete black (left) to 100% white (right) on the bottom.
- All nuances of the RGB-steps and the gray bars are homogeneous and don't show any color faults

You find the correct adjustment by following this procedure:

- Please set the color control in center position and factory setting respectively
- Now you can adjust the color control of your display slowly up or down until the maximum saturation of the color bars and the middle RGB-steps is reached and pay attention to the nuances and the naturalness of the real image simultaneously. In case of need don't hesitate to hold your own hand beside the real image to check the naturalness of colors on this way.

The object of your adjustment should always be the natural image impression. Ideally all 24 steps of the color and gray bars should be clearly distinguishable.

IMPORTANT: The gray bars at the bottom mustn't show any color faults! In the case of doubt please compare the 100% white bar with a piece of a normal matt white paper which confirms the neutrality of white this way.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.3.3 Typical Faults

- The RGB-steps still show nuances and are distinguishable but all colors are shown not in full (100%) saturation (red marked). Naturalness of the skin types of the women are disappearing. But the image is still not so bad – Color control adjusted a bit too low. Please set the control slowly higher so that you see all colors of the 8-stepped color bars and the middle field of the RGB-steps in full saturation.

The following image shows the effect of a too low adjusted color control.

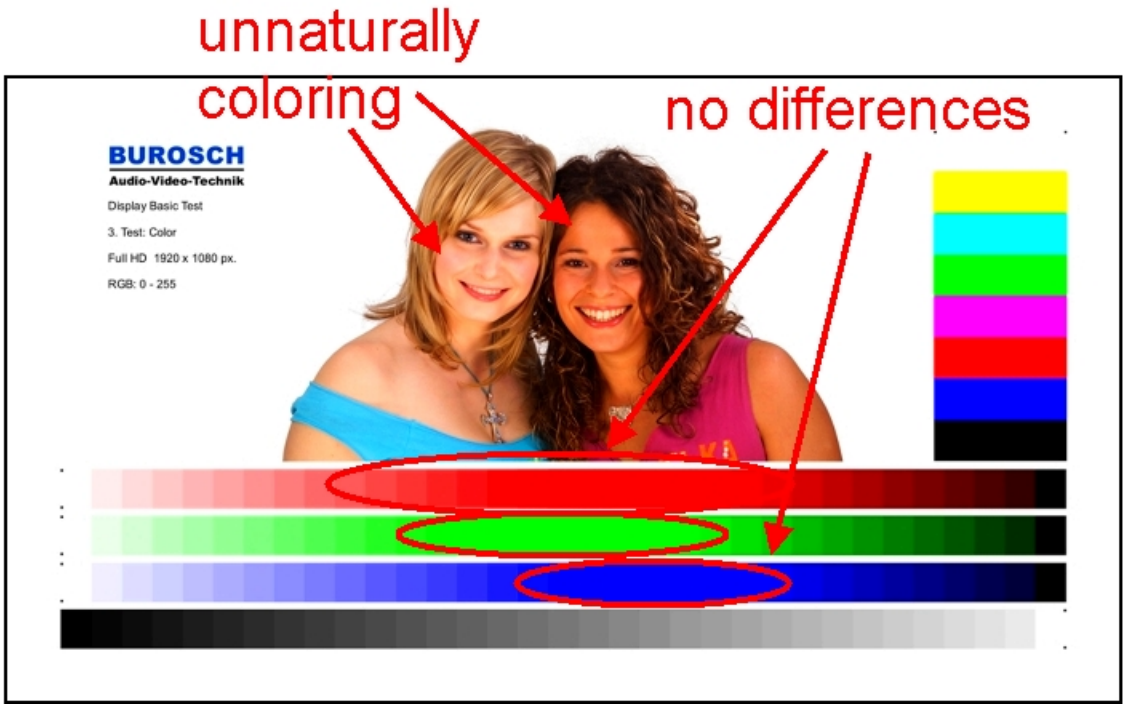
The quality of this image is “fair” ★★★

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

- The skins of the two women are colored very unnaturally (red marked). The color bars on the right are still in 100% saturation but become artifacts like blurring. The middle fields of the RGB-steps don't show any differences (red marked) – Color control set too high. Please adjust the color control carefully lower until you can clearly see the middle RGB-steps. The number of the undistinguishable RGB-steps of any color depends on the color temperature of the display. If the color temperature is set too low like in this example the number of the undistinguishable middle red fields are higher than green or blue. You see these artifacts very clearly in the following real image. It is very awkward to watch a film with such color settings.

The following image shows the effect of a too high adjusted color control.



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.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.4 Test Pattern No.4: Focus

The last adjustment is the focus control. By the help of the “Focus” test pattern you are able to detect scaling (blur) and artificial over-focusing. The sharpest image result you get if the image isn’t recalculated and displayed with maximum contour sharpness without over-focusing. In this case the pixels from the image source compares exactly with the pixels of your display.

The following image shows the test pattern for focus in optimal display.

Fourth test pattern: Focus

This test pattern is made up of 3 vertical Multiburst stripe patterns on the right side and 3 stripe patterns on bottom. The Multiburst stripes are made up of hard differentiated black and white stripes in change with different gaps at each stripe pattern. Again there is an image of two women for evaluating the naturalness. The background is 50% white (middle gray) with black grid lines on it which show exact squares. Further there are white cross hairs around the image and red, green, and blue cross hairs beside the two women.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.4.1 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.

You can evaluate and calibrate the quality of focus by the help of the Multiburst stripe patterns on the right and the bottom. Further there are white, red, green and blue cross hairs all over the test pattern for detection of blurring or over-focusing (red arrows and circles).

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.4.2 Optimal Display

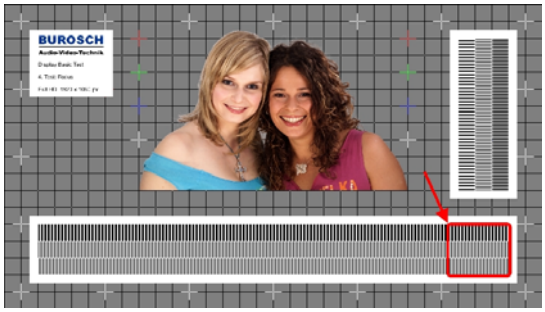
Please keep the red marked areas in mind which help you calibrating the focus. Important here is the sharp display of the gridlines over the whole image surface.

- 50% neutral gray background with black grid lines which show exact squares
- All cross hairs perfect visible without blurring or over-focusing
- There haven't to be visible any over-focusing artifacts like double contours parallel beside the black grid lines.
- The hairs of the two women are perfect differentiated and natural
- On the right: Multiburst stripe patterns (black-white-changing) with 1 pixel gap in the left pattern, 2 pixels in middle pattern and 3 pixels gap in the right pattern
- On the bottom: Multiburst stripe patterns (black-white-changing) with 1 pixel gap in the upper pattern, 2 pixels in middle pattern and 3 pixels gap in the lower pattern
- At least the hard contours of the two lowest Multiburst stripe patterns at the bottom and the two right Multibursts on the right side with 3 pixels and 2 pixels gap have to be clearly visible over the whole surface (see following two pictures on the next page which shows a general view and a detail view of the red marked area).

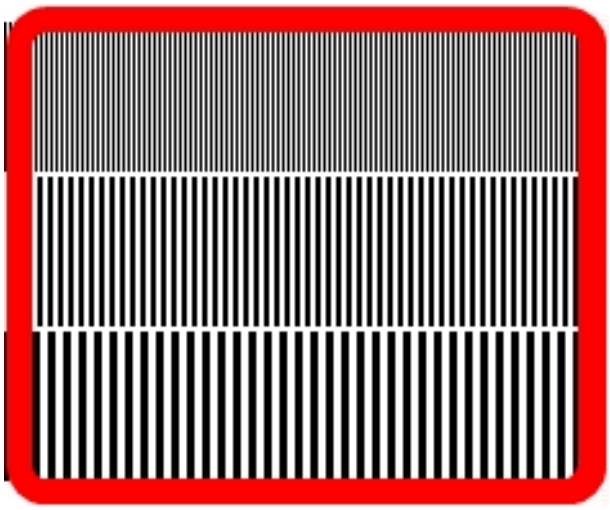
Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

General View



Detail View



Note: Of course it depends on your printer quality and printer settings respectively how the finest stripe patterns are reproduced. Ideally there have to be visible clearly changes from black to white with sharp contours with increasing gaps from top to bottom. So because of scaling of your printer it could be that the fine stripe patterns become blurred to a complete gray surface. Don't worry about this. That's quite normal.

You find the correct adjustment by following this procedure:

1. Please set the focus or sharpness control so far down until the grid lines are displayed without shadows, double-contours or other changeovers on the neutral gray background, but high enough so that they are displayed maximum sharp. Don't wonder: In most cases the perfect adjustment is far down in the scale.
2. On the hairs and faces of the two women and by the help of the Multiburst stripe patterns you can easily detect over-focusing or blurring. Only if there is no scaling you see all horizontal and vertical stripe patterns clearly.

At least you have to see the two last Multiburst stripe patterns on the right and at the bottom. Please also pay attention to the naturalness of the two women. Especially the hairs and the face and shoulder areas of the two women have to show fine nuances and natural differences respectively.

IMPORTANT: Especially in this test pattern you are able to detect false configurations in the signal source (e.g. DVD-Player …). Only if the configurations of the signal source correspond with the display configurations an optimal reproduction is possible.

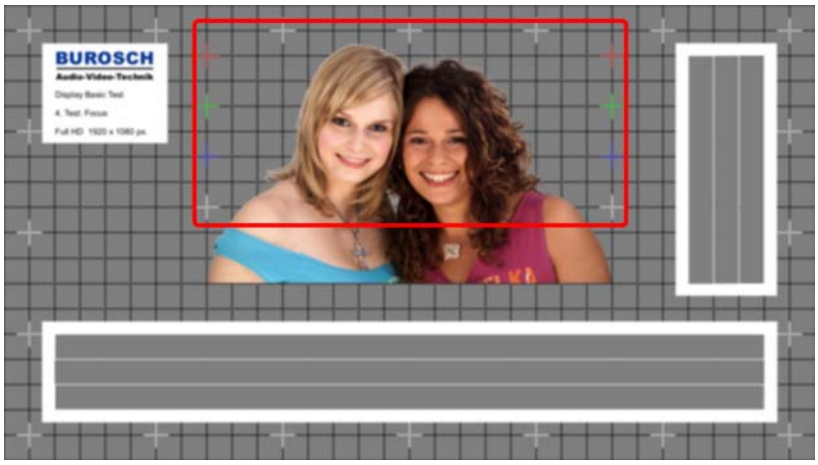
Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.4.3 Typical Faults

- The grid lines and cross hairs show soft contours. The face and hairs of the two women don't show any nuances – Maybe the focus control is adjusted too low or there is an over scan of the image which enlarges the image a little bit. Try to set the focus control a bit higher. If the image isn't better after setting the focus control higher there is probably a scaling.

The following images show the effect of a too low adjusted focus control. You see the red marked area in the second detail view which clarifies the effect.



The quality of this image is poor" ★★

Detail View:

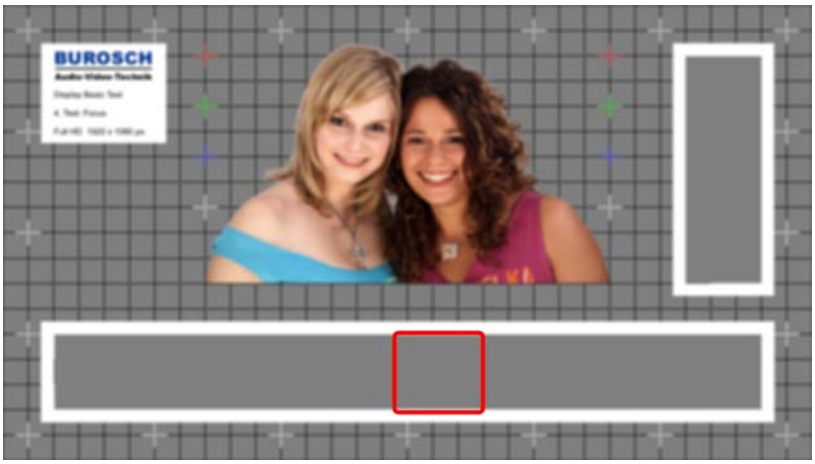
Detail View of a blurring

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

- The Multiburst stripe patterns are shown as complete gray surfaces – There is a scaling which means that the parameters in the signal source aren't equal with the parameters of the display device. Please check especially the image format (16:9 , 4:3) of your signal source and your display.

The following images show the effect of a scaling. You see the red marked area in the second detail view which clarifies the effect.



The quality of this image is poor" ★★

Detail View:

Detail View of a scaling

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

Display Basic Tuning Workshop

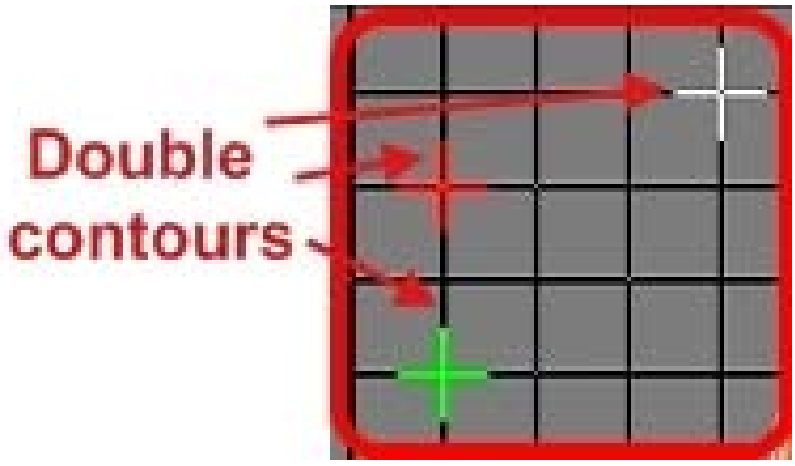
5 Descriptions of Basic Tuning Test Patterns

- The cross hairs show artificial double contours with complementary “shadows”; the nuances of the women are displayed very over focused (red marked) – Maybe the image is over focused in this example. Please set the focus control far down until you don’t see any double contours. Further the grid lines and cross hairs have to be clearly and sharply visible.

The following image show the effect of an over focusing. The afterimage shows a detail view of the red marked area which clarifies the effect.

The quality of this image is poor” ★★

Detail View:



Detail view of a too high adjusted focus control

The detail view shows a flat reproduction of the black grid lines on the neutral gray background.

Display Basic Tuning Workshop

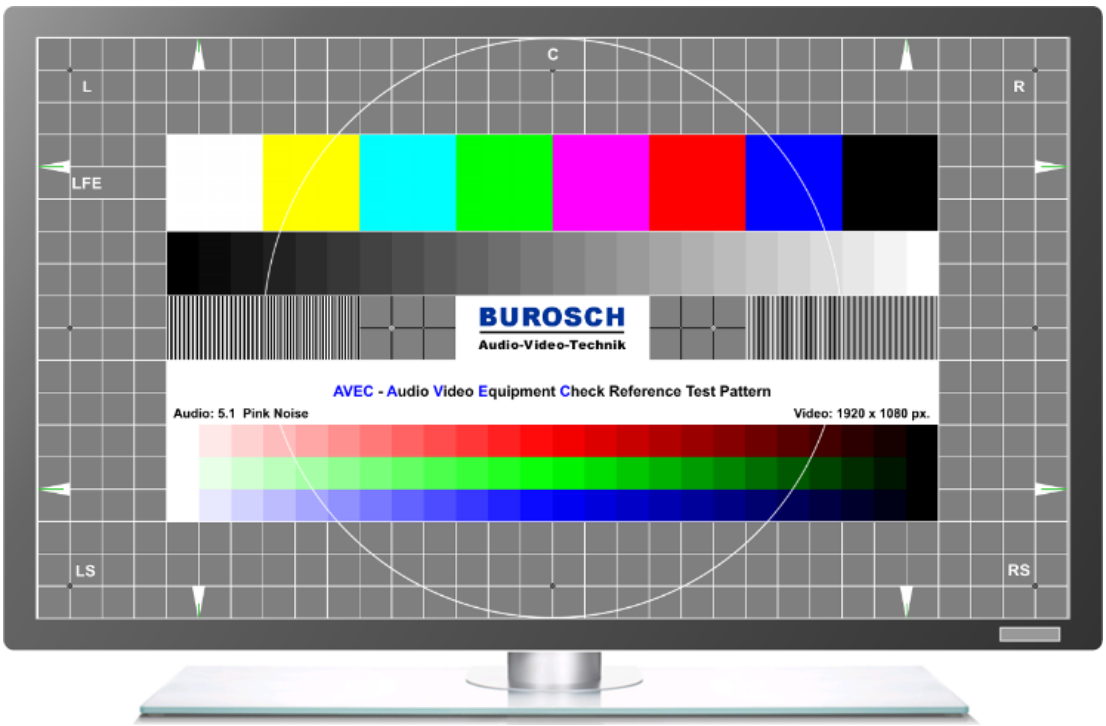
5 Descriptions of Basic Tuning Test Patterns

5.5 Test Pattern No.5: AVEC Reference Test Pattern

The last test pattern is called AVEC (Audio Video Equipment Check) which gives you the option for a final check of all parameters. With the reference test pattern AVEC you can evaluate and if needed to calibrate the following aspects of image reproduction once more:

- Focus
- Brightness
- Contrast
- Color balance (color temperature)
- Gamma
- Scaling
- Geometry (deformations)
- Over Scan
- Speakers (audio)

The following image shows the AVEC test pattern in optimal display



Reference Test Pattern AVEC in optimal Display

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

This universal 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.

For more detailed information please read the AVEC manuscript!

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.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

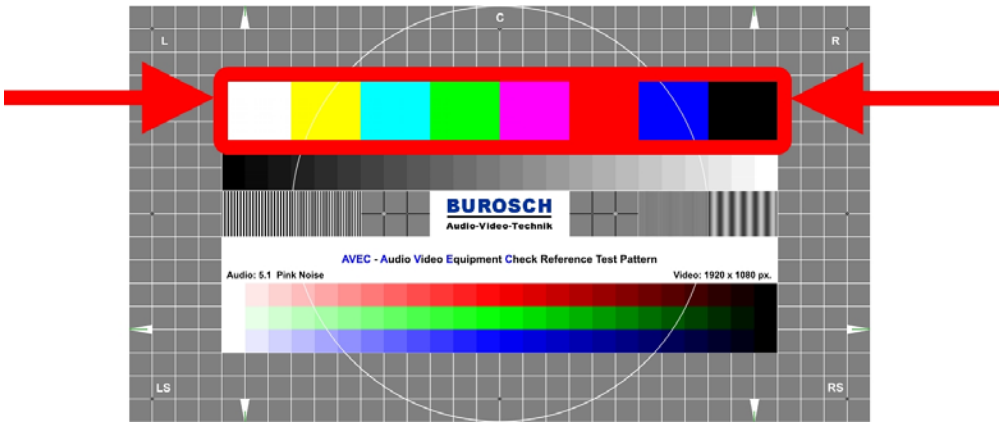
5.5.1 Overview and Function of the AVEC reference test pattern

In this chapter you find short descriptions about the functions of the individual test zones. It's important to say that this reference test pattern is a general test which you should do best after using the four main Basic Tuning test patterns for brightness, contrast, color and focus.

AVEC gives you the option to run a final check of your display!

5.5.1.1 Test Zone 1: Color Bars

The following image shows the test zone (red arrows).



Test Zone 1: Color Bars

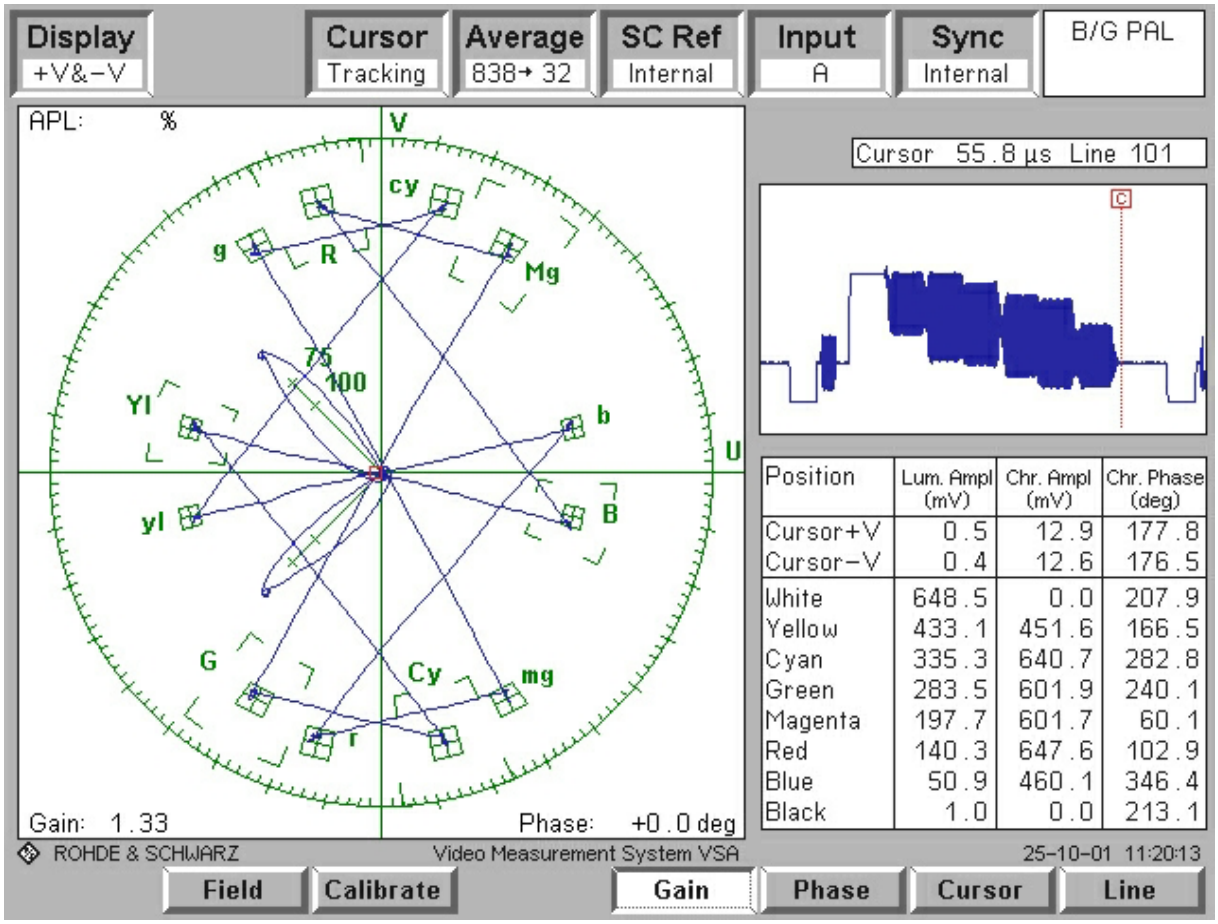
This test zone allows a final check of the color intensity. The colors shown in this test zone are all primary and secondary colors from white to black. All colors have to be in 100% saturation and pay special attention to the changeover green-magenta. If this changeover doesn't show blurring this is a sign that the color processing of your display works very well.

On the following page you see an image of a vector scope from Rohde & Schwarz which shows 75% saturated color bars (100/0/75/0).

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

The following image shows a vector scope of 75% saturated color bars.



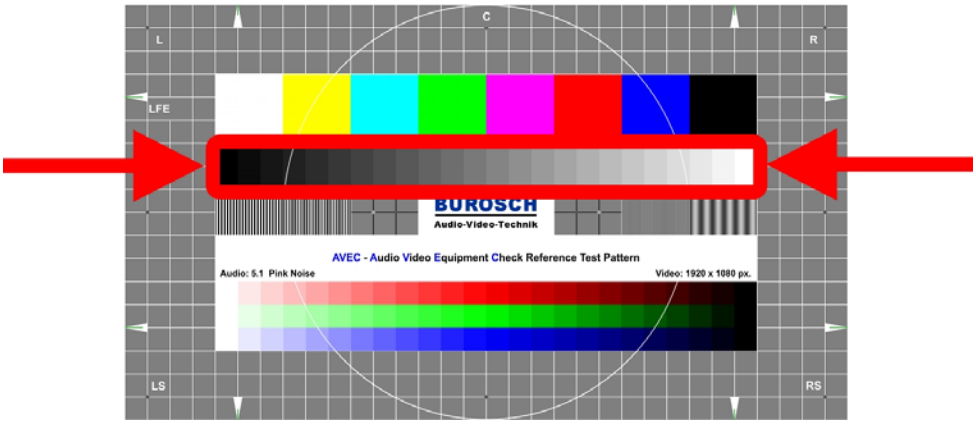
Vector scope of 75% saturated color bars (100/0/75/0)

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.5.1.2 Test Zone 2: 24-stepped Gray Bars

The following image shows the test zone (red arrows).



Test Zone 2: 24-stepped Gray Bars

This second test zone is very important to detect faults in the following parameters of image reproduction:

- Brightness
- Contrast
- Gamma
- Color Processing (Color Drifts)

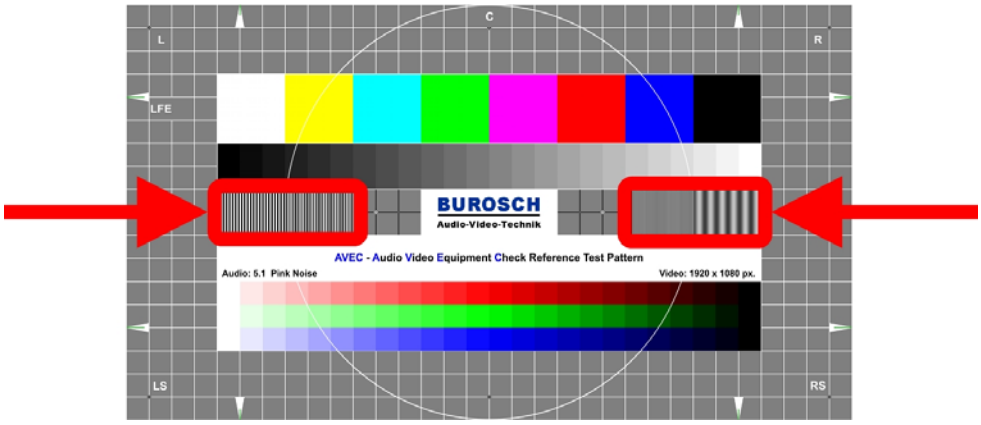
If you see all nuances of the gray bars especially the darkest and brightest three steps very clearly and without color faults or color drifts the display is adjusted correctly.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.5.1.3 Test Zone 3: Multiburst

The following image shows the test zone (red arrows).



Test Zone 3: Multiburst stripe pattern

The third test zone is the Multiburst stripe patterns, which show hard contoured black-white changeovers for the relative image evaluation of the displayable fine-resolution or scaling artifacts of the TV-display.

The gap between the changeovers decreases from left to right linearly. On the left side you see changeovers every 4 and 3 pixels respectively; on the right side you see fine gaps of 2 and 1 pixels.

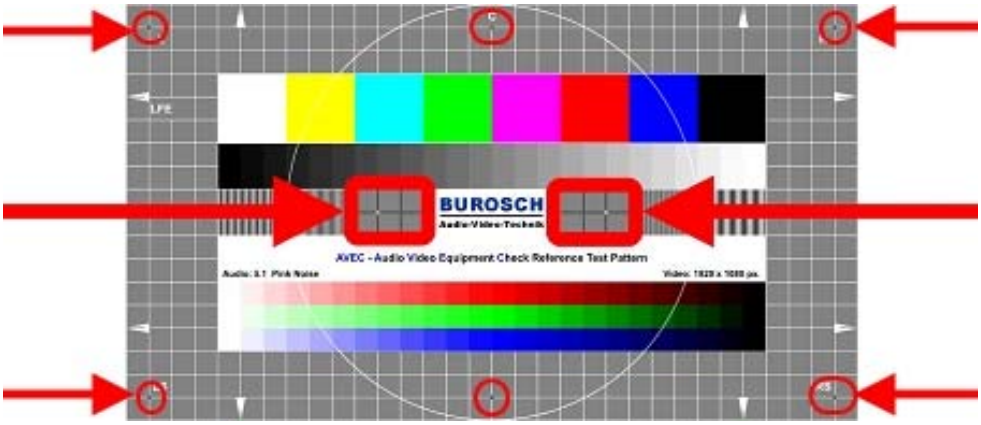
At least you have to see the two stripe patterns on the left very clearly with hard contours. But ideally you see clearly separated stripe patterns even on the right side.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.5.1.4 Test Zone 4: Focus

The following image shows the test zone (red arrows).



Test Zone 4: Focus test fields

By the help of the focus test fields you are able to see how good the focus control is adjusted. 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.

Ideally you see clearly black cross hairs on a neutral gray background. The background mustn't show any color faults. If you see the cross hairs sharp enough without soft contours the focus control of the display is adjusted correctly.

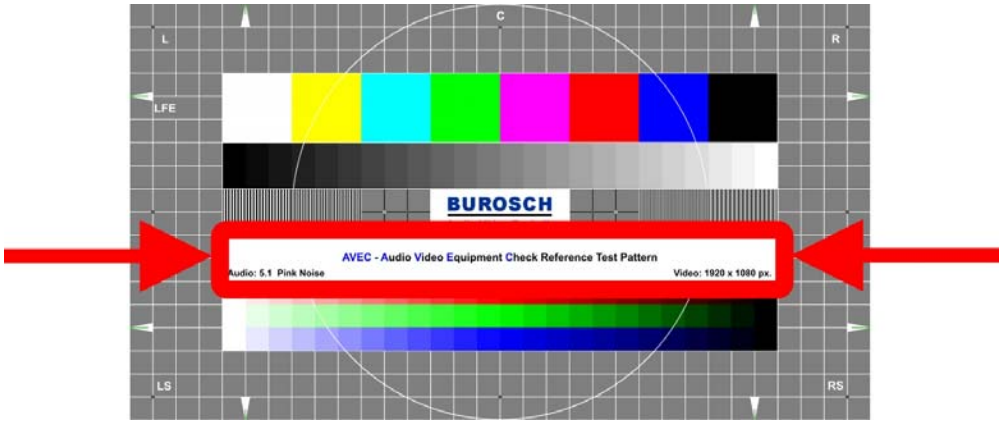
IMPORTANT: Please also pay attention to the small black marginal cross hairs. These have to be reproduced very sharp over the whole image surface! The optimal sharpness shouldn't be displayed only at the margin but also everywhere in the image. On this account all cross hairs are displayed identical.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.5.1.5 Test Zone 5: White Balance

The following image shows the test zone (red arrows).



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.

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.

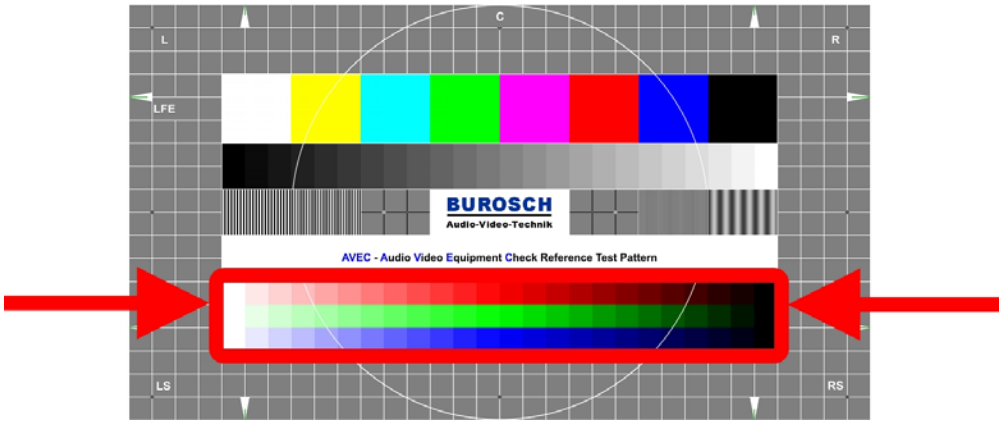
Tip: To work against illusions of the human eye, which adapt to minimal color differences very quick, we suggest the application of a white paper which you can easily hold beside the test zone to check the neutrality of white by comparing paper with display. That way you can best check the quality and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

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.5.1.6 Test Zone 6: RGB Steps

The following image shows the test zone (red arrows).



Test Zone 6: RGB Steps

This test zone gives you the last option to check the color intensity, color temperature and saturation respectively. With this test zone you are able to evaluate the color processing of your display especially the gamma of each primary color.

Ideally you see constant 24-stepped changeovers from 100% white on the left over 100% color saturation in the middle until 0% white (maximum black) on the right side of each primary color (red, green and blue).

If you see drifts of one or more colors horizontally it's an unmistakable sign that the color processing works bad.

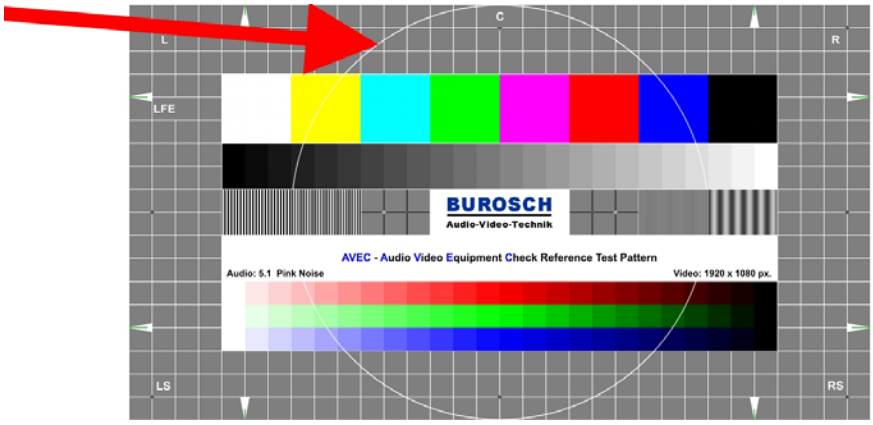
The object of this test zone is to allow a preferably lifelike reproduction of skin tones in the later film.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.5.1.7 Test Zone 7: Geometry

The following image shows the test zone (red arrow).



Test Zone 7: Geometry

This test zone is adapted for checking the image geometry of the display especially deformations in vertical and horizontal direction. The real test zone is the background where you see white grid lines showing perfect squares and a circle which implicitly has to be perfect round.

Ideally you see over the whole background surface perfect sharp squares with same length of each side and a perfect round circle which cuts the upper and lower borders of the display screen.

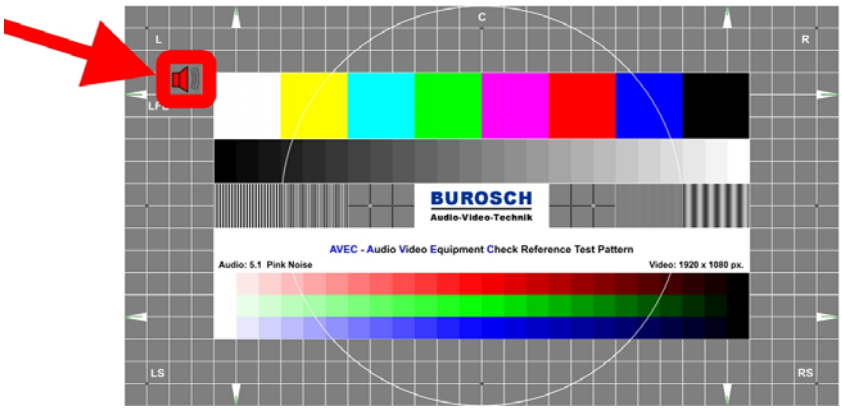
Tip: To work against illusions of the human eye, which adapt to minimal color or geometry differences very quick, we suggest the application of a simply ruler which you can easily hold on the display to check the uniformity of the squares and the horizontal / vertical diameter of the circle respectively.

Display Basic Tuning Workshop

5 Descriptions of Basic Tuning Test Patterns

5.5.1.8 Test Zone 8: Audio Test

The following image shows the speaker icon which helps you calibrate your speakers (red arrow).



Test Zone 8: 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.

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.

Note: If your TV-device only has stereo speakers it could be that you hear the noise only from them.

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

Display Basic Tuning Workshop

7 Visual Test

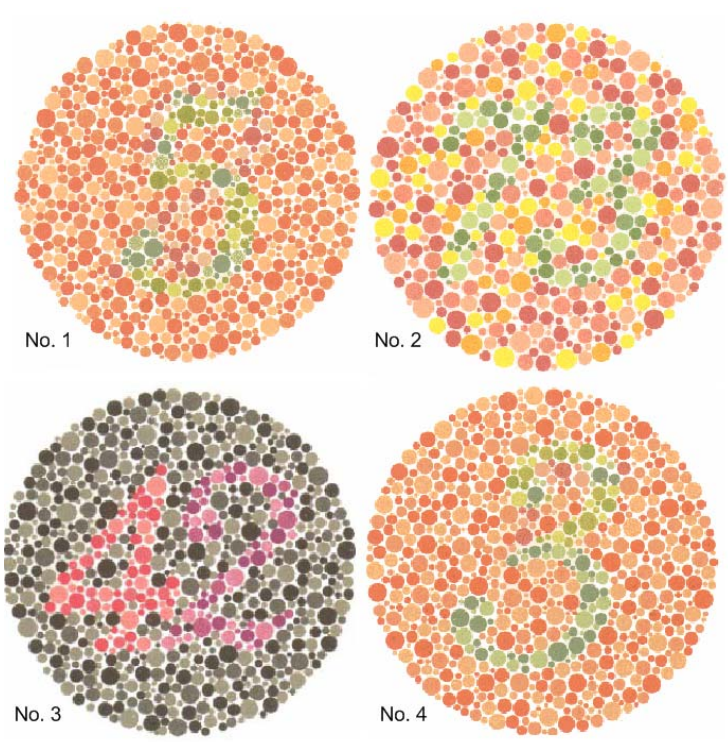
7 Visual Test

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!

Display Basic Tuning Workshop

7 Visual Test

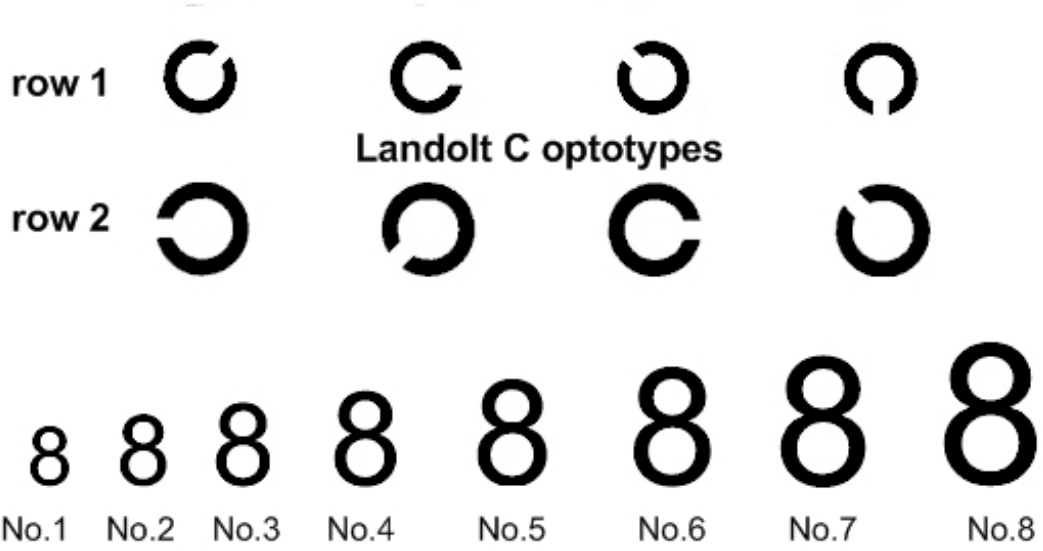
7.2 Visual Acuity

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.

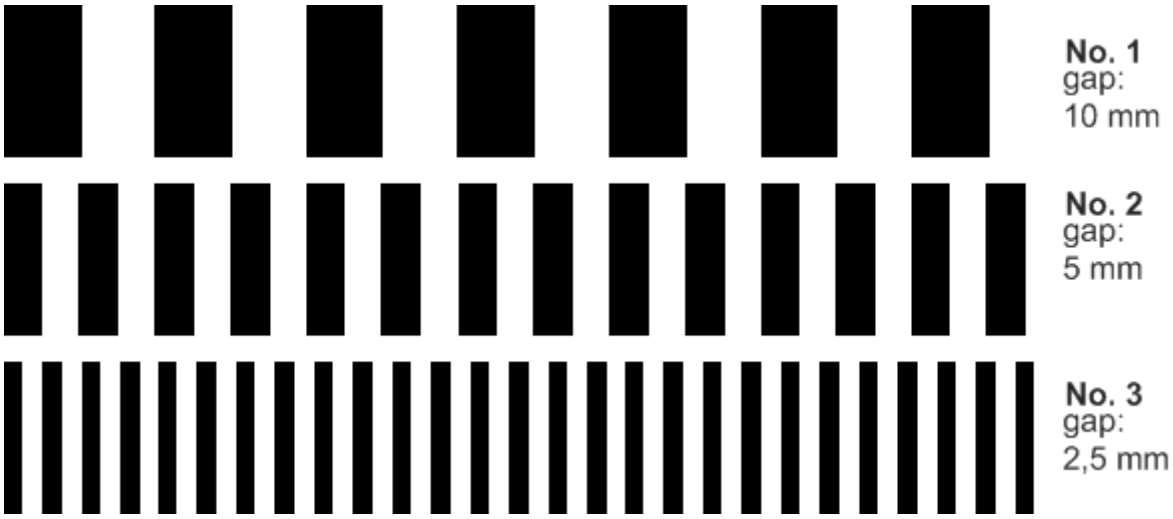
Display Basic Tuning Workshop

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 these reference test patterns:

BUROSCH Audio-Video-Technik
Owner: Klaus Burosch, Steffen Burosch, Andreas Burosch
Technicians: Paul Gaukler, Eberhard Graf, Philipp Smoldas, Raphael Vogt
Sigmaringer Straße 20
70567 Stuttgart / Germany
Telefon: +49 (0)711 161 89 80
Telefax: +49 (0)711 161 89 81

eMail: info@burosch.de
Web: www.burosch.de

VAT Nr.: DE147421720
Registriergericht: Stuttgart – Germany
Handelsregister Nr.: HRA 6322

8 Credits

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