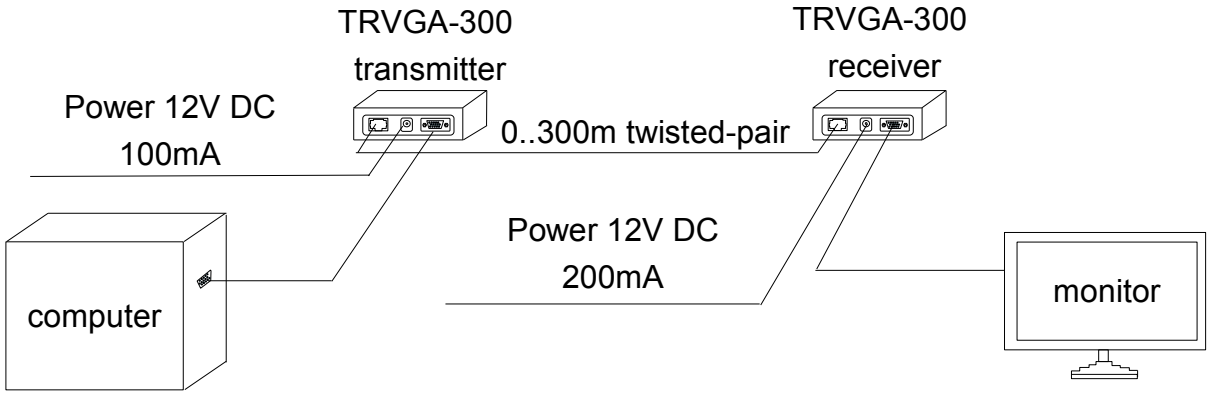
VGA TRANSFORMER – TRANSMITTER / RECEIVER TRVGA-300

The TRVGA-300 is designed for VGA signal active transmission via twisted-pair cable for the distance up to 300 meters. It has the dip-switch type switchers, which enable signal correction settings change from 0 to 300m with 50m step. For the longer distances the step is smaller. The table 1 shows all possibilities. Two devices need to be used for complete channel transmission. The transmitter converts the VGA signal, what enables its transmission via twisted-pair cable. Three pairs of wires allow to RGB signals transmission, the fourth pair - the synchronization transmission. The picture 1 shows the schematic diagram.

At the back panel of the device there are correction switchers. They allow to twisted-pair cable characteristic compensation. There are separate switchers for each RGB channel and for the sychronization (vertical and horizontal together). All switchers have to be set for the same position for chosen distance. The resolution of the transmitted image depends on the distance and vertical line frequency.

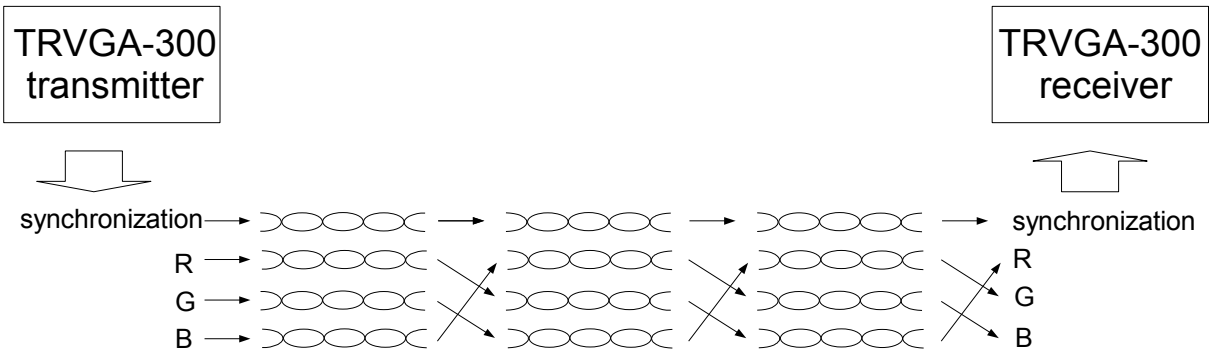
0..50m	1	1	1	1	200..230m	1	1	1	1
50..100m	2	2	2	2	230..260m	2	2	2	2
100..150m	3	3	3	3	260..280m	3	3	3	3
150..200m	4	4	4	4	280..300m	4	4	4	4

Table 1. The switchers settings for different twisted-pair cable length



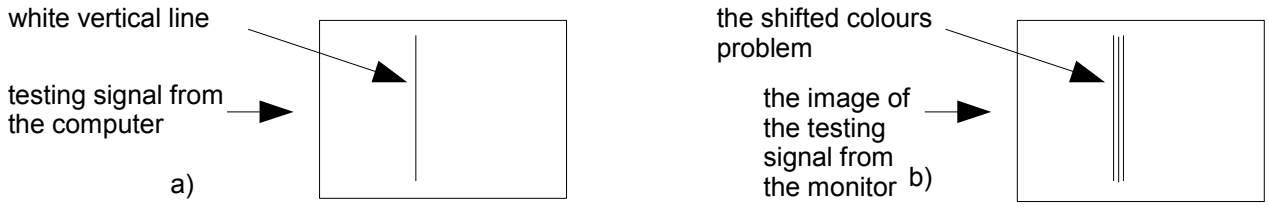
Picture 1. The TRVGA-300 transmitter and receiver schematic diagram

Each of RGB channels (each colour) is transmitted via one pair of the twisted-pair cable. The length of the particular pair of wires in twisted-pair cable can be different from others. For long distances the differences are considerable. It causes the colours shift on the image. It is visible especially for long distances. In case of 300m distance the colours shift can be equal even two pixels. The resolve of the problem is the same length of each pair of wires for each RGB channel. To do that, we have to divide the distance between the transmitter and the receiver into three equal parts. For each part, it's necessary to change the pair of wires for the particular RGB channel. It means that each RGB channel is transmitted via three different pairs for the whole distance of the cable. This idea is presented on the picture 2. This is not necessary to change the pairs for synchronization transmission.



Picture 2. Schematic diagram of the pairs length compensation idea (crossover solution).

The other way to eliminate the shifted colours problem is increase the lenght of the shorter pairs of wires. In this case is the necessary to check the lenght of the particular pairs. The simple way to do it is the white line test. We can generate the test image (for example in "Paint" application) as follows: on the monitor screen draw the vertical white line (1-pixel width) on the black background. If the shifted colours problem occurs, we will see the colours shifted lines - see the picture 3.

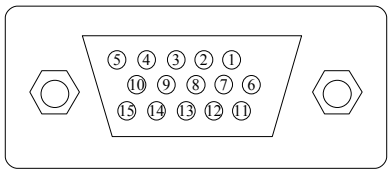


Picture 3. Test image after twisted-pair cable transmission - the shifted colours problem.

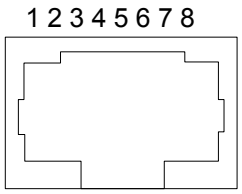
If the resolution equals 1280x1024 pixels and vertical line frequency is 60Hz, the horizontal line time is 14,6us. This is 11,4ns for the pixel (14,6us / 1280). The electrical current speed in the twisted-pair cable is about 192mlns m/s. If the shift is equal 1 pixel, the shortage of the pair length is 2,19m (192mlns m/s * 11,4ns * 1). In case of 2 pixels it equals 4,38m. The length of the pair of wire has to be increase if the proper RGB channel is shifted (on the right side of tested line). See the picture 3b. The length compensation allows to eleminate this problem. In practise the shifted colours problem doesn't exist below the distance of 50m.

The length differences of the pairs can be measured by ohmmeter, too. The shorter length means smaller resistance.

Connectors description

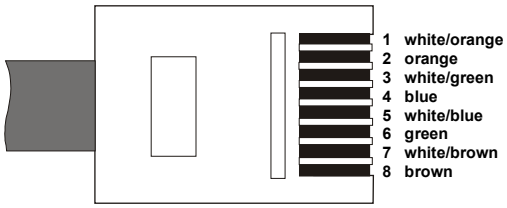


1 – RED
2 – GREEN
3 – BLUE
6 – RGND
7 – GGND
8 – BGND
13 – HSYNC
14 – VSYNC
4,5,9,10,11,12,15 – not connected



1 – R-
2 – R+
3 – G-
4 – B+
5 – B-
6 – G+
7 – SYNC-
8 – SYNC+

Wiring sequence inside the RJ-45 plug



Specification

	TRANSMITTER	RECEIVER
power voltage	12V DC	
current consumption	70mA	170mA
max. distance	max. 300m	
VGA in/out impedance	75 Ω	
twisted-pair cable in/out impedance	100 Ω	
power socket type	power DC socket 5,5/2,1mm	
weight	78g	
dimensions (W x H x L)	118 x 30 x 48mm	118 x 30 x 54mm
Max. resolution / vertical line frequency / distance	1900 x 1200 / 80Hz / 100m, 1024 x 768 / 60Hz / 300m	

Producer: P.W. DELTA, ul.Graniczna 10, 60-713 Poznań, Poland, www.delta.poznan.pl