SIMPLE HIGH RESOLUTION VIDEO MONITORS

INTRODUCTION

These chassis are able to drive high resolution monochromatic picture tubes for computer data dispalys (80 characters per line).
The market demands require simple, cheap solutions together with very high quality and reliability. To fulfil these requirements, SGS devices already produced in large sclae for the TV consumer market have been used. SGS wide range of devices for TV allows a very good compromise between price, performance, quality and reliability. The 20 MHz video bandwidth, the dynamic focus and the good deflection linearity (± 3%) together with the high resolution picture tube make this circuits suitable for a large range of applications. A special one was designed for direct TTL input.

CIRCUIT DESCRIPTION (Fig. 1)

1. COMPOSITE VIDEO SIGNAL

The negative composite video signal coming from the computer (1 Vpp) drives the base of transistor T6 and the video preamplifier.
The video preamplifier consist of an amplifier (T1) and an inverter (T3) giving at the output the same phase as the input signal; the preamplifier signal drives the video output stage (T4–T5 in common base configuration) to reach the largest possible bandwidth.
The video signal, coming from the computer, is modulated by pulses in order to operate the video output stage in "C" class..
Over black voltage is always provided so that no vertical balnking is needed, but if required, it can be added very easily because the blanking pulse is available from the vertical deflection I.C. Horizontal blanking on the other hand is used in order to avoid shadow effects on the edges of the screen caused by phase and duration differences between video signal and flyback pulse.
The brightness regulation acts on grid 1 of the picture tube in order to cover the whole range of cut off characteristics. Potentiometer P1 controls the contrast and P2 the brightness.
A simple dynamic focus circuit is used in order to reach the best compromise between focus adjustments at edges and center of the screen; a parabolic waveform, shaped by C50, L5 and C52, is added to the DC. focus bias voltage which can range from -350V to +600V.

2. TTL INPUT SIGNALS (Fig. 3)

The TTL video signal coming from the computer goes directly to the video output stage (T4).
The vertical pulse is present at pin 11 of the vertical stage; C15, D9 and R10 operate as a differential group so that only the first front of the pulse is used.
The horizontal pulse goes into the monostable multivibrator, HCF 4098BE, which provides the pulse at its output pin only when the sync pulse is present.
The horizontal deflection is always off when the computer is not connected to the display chassis. The wide range of phase regulation (P2) allows the monitor to accept every writing position simply through phase adjustment.
All the circuits are assembled on a single board layout, only the video output stage and main transformer are outside the PCB.
The video output stage is located on the picture tube socket in order to minimize stray capacitance between output transistor collector and ground; this position is when we have to handle large bandwidth. The main transformer is mounted on the chassis in order to obtain the position which gives the best compromise between stray fields and mechanical design of the cabinet.
It is very important to design the PCB layout so that interference between video signal and sync. separator is reduced to a minimum.
The reduced dimensions of the PCB enable it to be housed in most video display cabinets.
The control potentiometers are mounted on the PCB because they are normally used only for setting up purposes but, if necessary, they can be placed on the front or rear panel of the cabinet for external control (brightness and contrast mainly).
The amplifier T6 gives a 3 Vpp composite video signal to drive the TDA 1180P sync. separator; this device also integrates horizontal phase comparator, noise gate, vertical sync. generator and it drives directly, from pin 2, the SGS-BU806 deflection darlington.
The TTL horizontal sync. drive the monostable HCF 4098BE. The pulse now present on pin 10 is inverted and amplified by T3 and T6 to give right drive phase to the horizontal output darlington BU806.
The TDA 1770, whose performance is superior to that of the well known TDA 1170S, is also used for vertical deflection. The TDA 1770 is a 20 pin plastic package device with thermal shut down protection, flyback generator, precision blanking generator, precision oscillator and ramp generator able to eliminate frequency regulation as well as the normal functions of the TDA 1170S. The blanking pulse from pin 1 is 1.4 ms. The pulse from pin 8 has the same lenght as the deflection flyback.
Linearity and stability are very good. The supply voltage is provided by the main transformer TR1, the rectifier diodes D3 and the stabilizer integrated circuit L200. When the stabilizer supply voltage is provided by the computer the main transformer, the rectifier diode and the stabilizer are no longer necessary.
The horizontal deflection supply is provided by boostering the +11V DC to +25V DC for the 11" and the +24V to +32V DC for the 15" one because those DC supply are the best compromise between

collector peak current and flyback peak voltage on the BU806 deflection darlington. This solution makes it possible to supply the monitor from battery or from computer voltage.
Separate coils are used for regulation of horizontal amplitude and linearity in order to achieve the best performance (L3-L4). The 12"/90° picture tube uses the 110° deflection yokes because they give allow better focus at the edges of the picture tube.

MAIN PERFORMANCE OF MONOCHROMATIC MONITORS

Parameter	12"/90°	15"/110°
Supply voltage	+ 11V	+ 22V
Supply current	1,1A	1.3A
Boosterred voltage	+ 25V	+ 32V
Ripple on + 11	50 mVpp	30 mVpp
Ripple on + 25 (Boostered)	2 Vpp	2 Vpp
Video out supply voltage	+ 80V	+ 86V
High voltage (I beam = 0)	12,8 KV	17,8 KV
Horizontal deflection current	5,2 App	8 App
Vertical deflection current	1 App	0,85 App
Horizontal linearity distortion	3%	3%
Vertical linearity distortion	3%	3%
Collector voltage horiz. out. transistor	280 Vpp	350 Vpo
Horizontal flyback time	8 µsec	8 µsec
Vertical flyback time	0,48 msec	0,75 msec
Center screen picture tube resolution (FIVRE M31-190T)	850 Lines (1)	850 Lines
Video amplifier bandwidth (-3 db)	20 MHz	20 MHz
Horizontal frequency	15.625 Hz	15.625 Hz
Vertical frequency	50 Hz	50 Hz
Input impedance	75 Ω	75 Ω
Video composite input	1 Vpp	1 Vpp
TTL input		

(1) Referring to MIL STD mil norm N° E - 1E; procedure N° 5226 "line width test". The beam current is 100 µA with white raster.

ALIGNMENT PROCEDURE

- Adjust P6 for +11V DC supply voltage.
- Put on the input a complete character video signal (1 Vpp)
- Adjust brightness (P7) and contrast controls to see the characters on the screen (even if they are not locked)
- Adjust vertical hold (P9) to stop vertical.
- Connect P8 of TDA1180P to ground.
- Adjust horizontal hold to see the picture running slowly on the screen (2) take out the short circuit on pin 8.
- Adjust L4 for good horizontal amplitude.
- Adjust L3 for good horizontal linearity.
- Readjust L4 for right horizontal amplitude (when necessary).
- Adjust P2 for right horizontal phase.
- Adjust P4 for right vertical amplitude.
- Adjust P5 for right vertical linearity.
- Adjust P8 for the best focus on the center of the screen.
- Adjust L5 for the best focus on the edges of the screen.

(2) For TTL chassis this operation is cancelled.

Fig. 1 - Data display chassis M003 - 12 " 90°

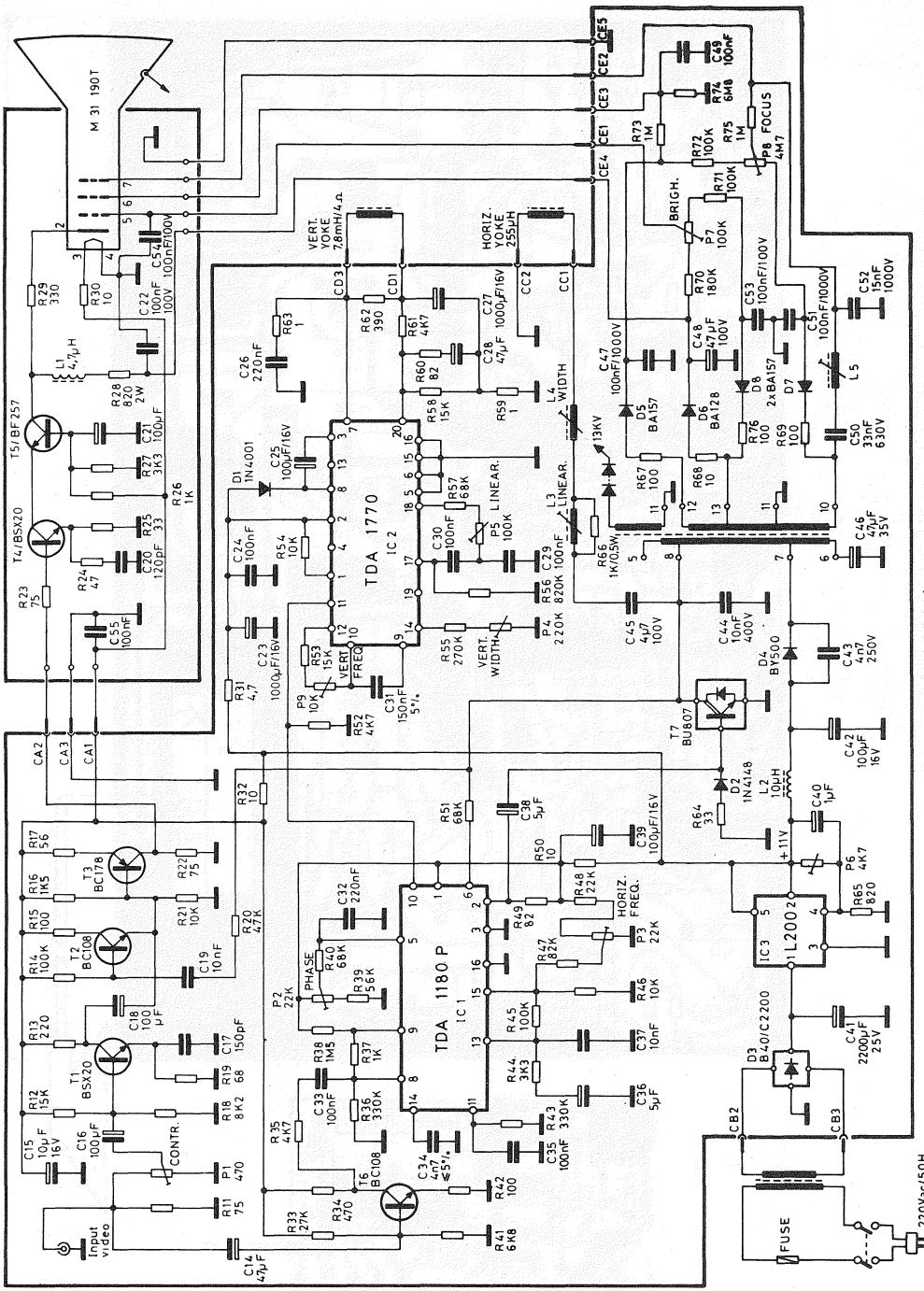

Fig. 2 - P.C. board and components layout of the circuit of Fig. 1

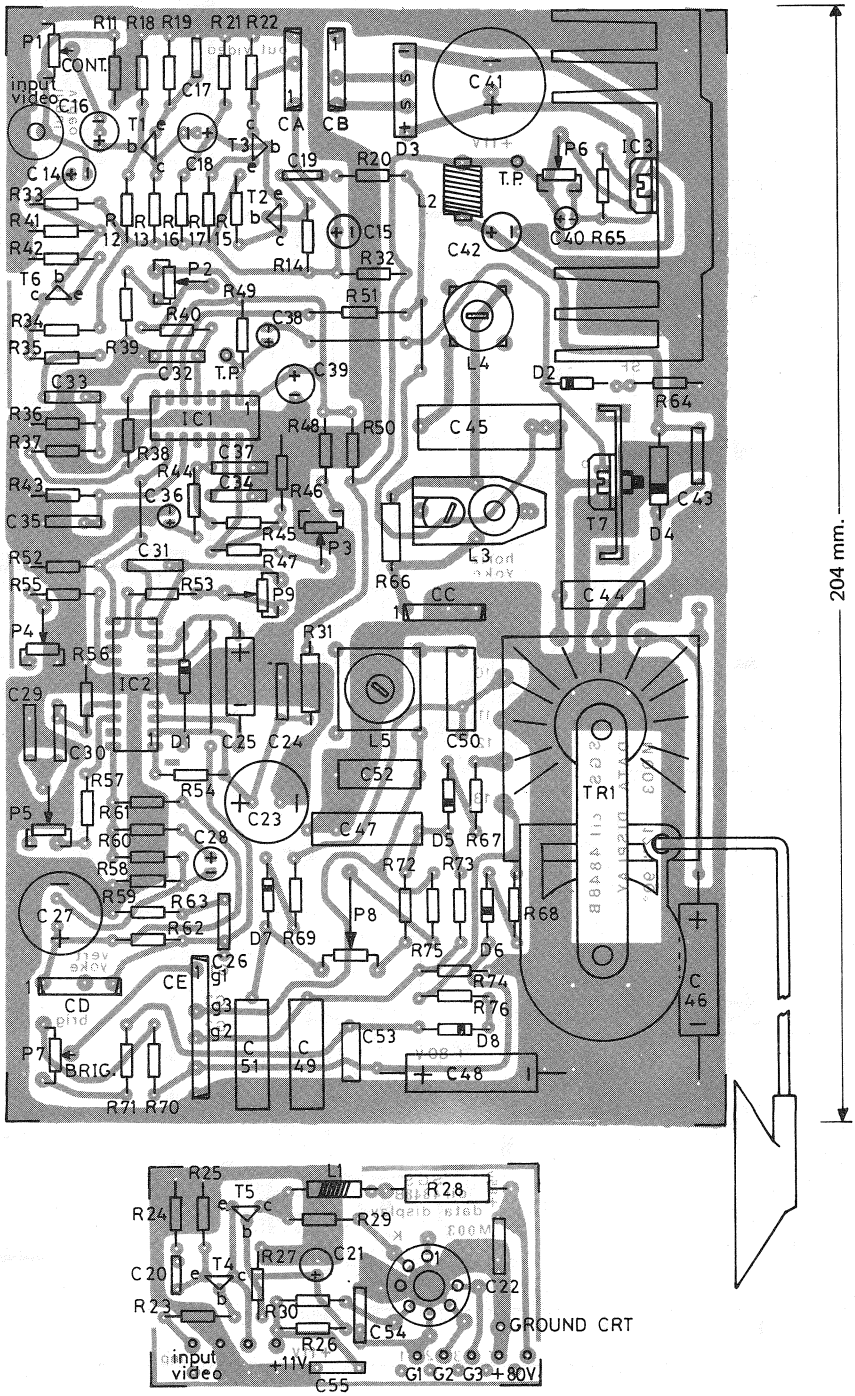

Fig. 3 - Data display chassis M003/TTL - 12" 90°

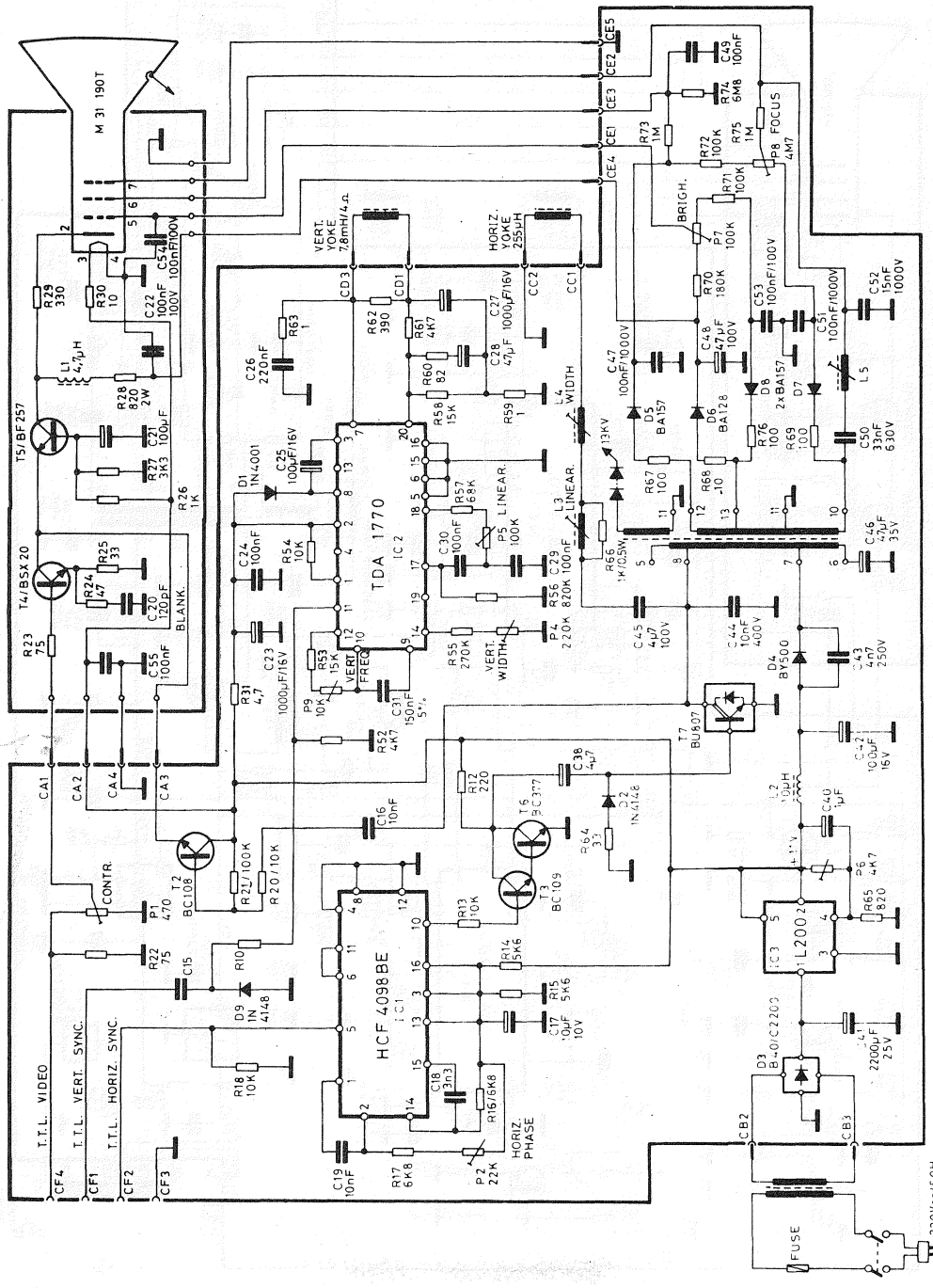

Fig. 4 - Data display chassis M004 - 15" 110°