

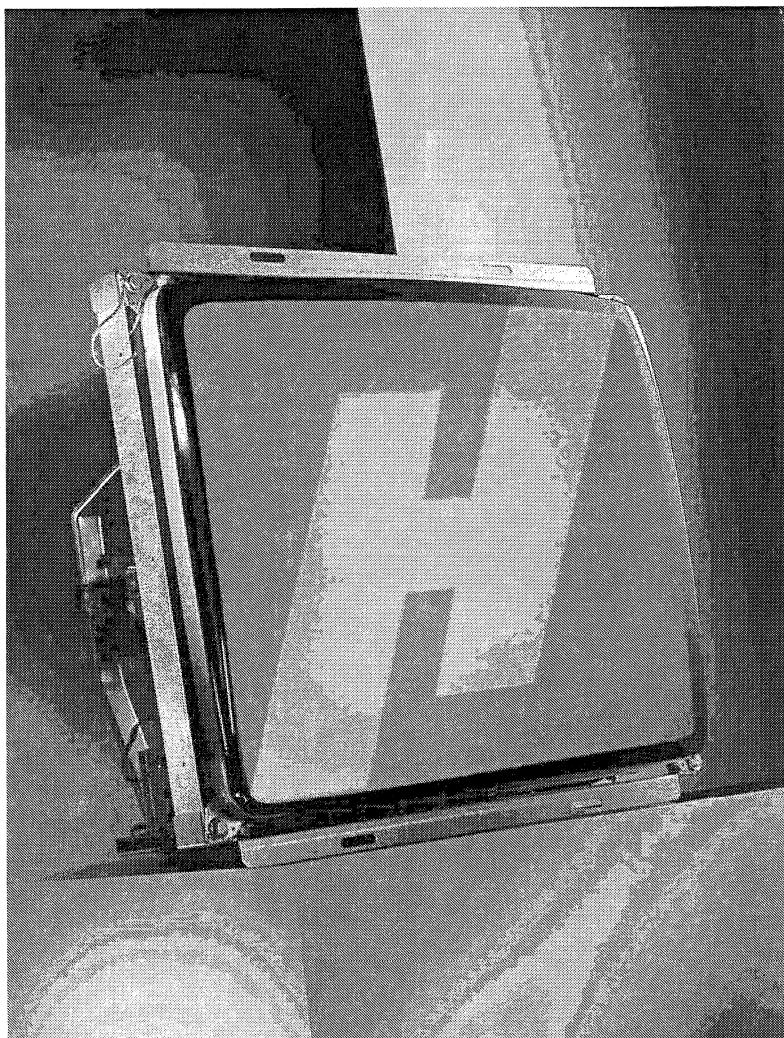
Monitors POLO

MANUALE DI SERVIZIO
SERVIZIO E MANUALE
MANUEL DE SERVICE
MANUAL DE SERVICIO
BEDIENUNGSANLEITUNG

 **HANTAREX**
ELECTRONIC SYSTEMS

manufactured and distributed by

SAMBERS
ITALIA



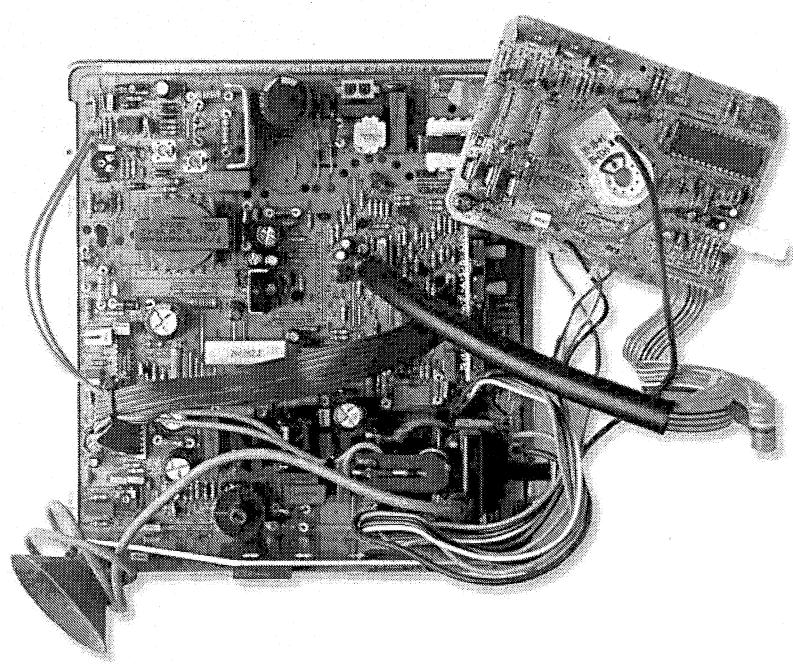
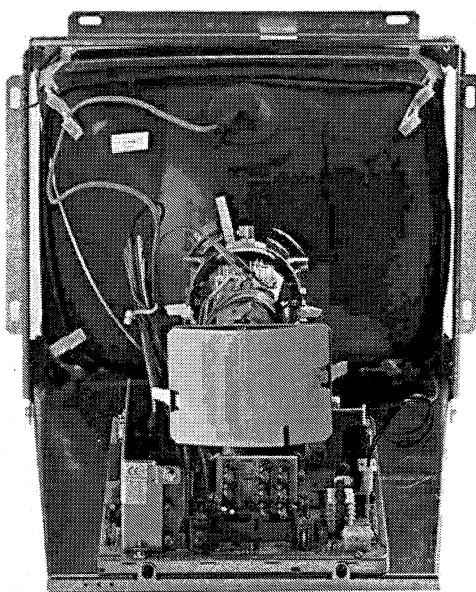
VG - POLO - 0603 - Rev.02

SAMBERS
ITALIA

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Service manual



VG - POLO - 0603 - Rev.02

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USEFUL NOTICE FOR SAFETY

● SAFETY AND NOISE SUPPRESSION

The monitors are manufactured in a professional manner, in compliance with European Directives as far as safety and noise suppression is concerned.

The relative insulation class is CLASS 1 of the European Regulation EN 60065, which foresees earth connection. Earth connection must be guaranteed through the central point of CN2 line input connector. Manufacturing criteria of monitor must not be altered during service operation, as, for example, removal of screens, change of wires with special insulations etc. Components such as fuse resistors, fire-proof resistors, safety capacitors etc. must correspond to original spare parts and must be assembled in a professional way.

● E.A.T.

The monitor has internal high voltage sources which are dangerous for the personnel safety. For any intervention, it is advisable to resort to specialized personnel.

● CRT

CRT utilized for the assembly of our monitors are manufactured and certified against implosion and are nevertheless high vacuum components, their surfaces being subject to strong external pressures. It is therefore necessary to take care not to bang them in order to avoid the possibility of an implosion projecting splinters. Above signifies that personnel in charge of installation must wear gloves and protective clothing during assembly operations and replacements.

ATTENTION

a - In order to carry out any control measure in the main input section, using either a digital voltmeter or a oscilloscope, it is necessary to separate the monitor from the network by using an INSULATION TRANSFORMER, assuring at the same time that earth wires of instruments are disconnected.

Above precaution is not necessary when control measures are carried out in the monitor section (deflection and video) and on secondary outputs of feeder.

b - The insulation transformer must have the following characteristics:
Input 230 V~; Output 230 V~ 200 W minimum

c - After every intervention in the power supply section, the metallic anti-electric shock cover must be reassembled.

DIMENSIONS AND WEIGHTS

DIMENSIONS AND WEIGHTS

MAIN DIMENSIONS AND WEIGHTS TABLE

| | | | | |
|----------------------------|-----------------|------------------|-----------------|----------------|
| 10" | WIDTH 284 mm | HEIGHT 261 mm | DEPTH 292 mm | WEIGHT 9 Kg |
| 14" | 370 mm | 312 mm | 348 mm | 12.2 Kg |
| 15" | 386 mm | 321 mm | 359.5 mm | 13 Kg |
| 17" | 431 mm | 353.5 mm | 361 mm | 15.7 Kg |
| 19" | 475.5 mm | 391 mm | 454.5 mm | 18.1 Kg |
| 20" | 508 mm | 411 mm | 464.5 mm | 19.5 Kg |
| 21" | 518 mm | 423 mm | 474 mm | 21.8 Kg |
| 25" | 593 mm | 481.5 mm | 454.5 mm | 27.6 Kg |
| 28" | 650.5 mm | 525 mm | 469 mm | 31.2 Kg |
| 29" | 668 mm | 538 mm | 420 mm | 36.9 Kg |
| 34" | 756.5 mm | 610 mm | 521 mm | 51 Kg |
| 37" | 863 mm | 688 mm | 591.5 mm | 56 Kg |
| 28" _{16/9} | 704 mm | 463 mm | 410 mm | 33.4 Kg |
| 32" | 796 mm | 515.5 mm | 465 mm | 48.5 Kg |

SPECIAL VERSIONS

MECHANICAL DATA

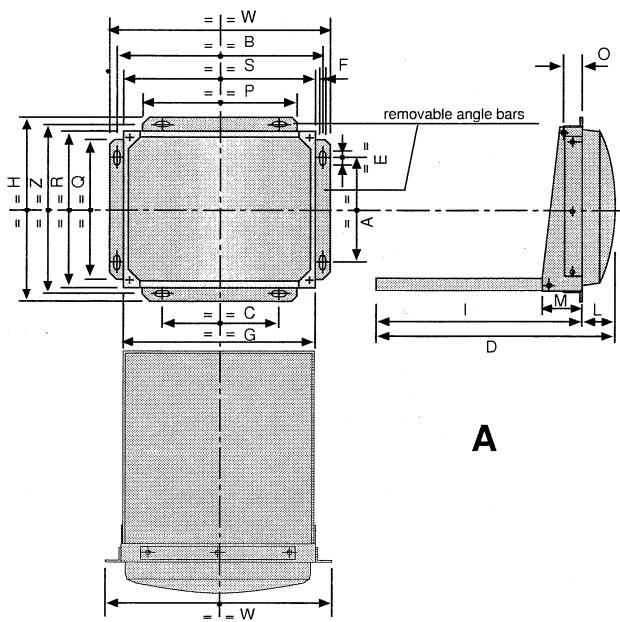
| | DIM. | W | H | D | A | B | C | N | E | F | G | I | L | M | O | P | Q | R | S | T | U | V | Z |
|----------|---------------------|------------------|------------------|------------------|-----|------------------|-----|------------------|----|---|-----|------------------|------------------|-----------------|-----|-----|-------------------|-----|-------------------|-----|------------------|-----|---|
| A | 10" | 284 | 261 | 292 | 155 | 267 | 155 | 244 | 20 | 6 | 246 | 250 | 42 | 40 | 25 | 195 | 195 | 225 | 248 | - | - | - | - |
| | 14" | 370 | 312 | 348 | 145 | 350 | 195 | 290 | 16 | 8 | 322 | 285 | 63 | - | - | - | - | - | - | - | - | - | |
| | 15" | 386 | 321 | 359 _s | 220 | 369 | 220 | 304 | 20 | 6 | 348 | 310 | 49 _s | 50 | 25 | 260 | 260 | 285 | 350 | - | - | - | - |
| | 17" | 431 | 353 _s | 361 | 200 | 413 | 280 | 333 _s | 20 | 8 | 305 | 322 | 39 | - | - | - | - | - | - | - | - | - | |
| B | 20" | 508 | 411 | 464 _s | 180 | 487 | 280 | 390 | 40 | 8 | 300 | 331 | 77 _s | 56 | 220 | 325 | 130 | 132 | 117 | 16 | - | - | - |
| | 21" | 518 | 423 | 474 | 250 | 499 | 280 | 404 | 40 | 8 | 300 | 358 | 69 _s | 46 _s | 220 | 350 | 136 _s | 134 | 120 _s | 16 | - | - | - |
| | 25" | 593 | 481 _s | 454 _s | 270 | 574 | 280 | 462 _s | 40 | 8 | 300 | 318 | 70 | 66 _s | 220 | 310 | 165 ₇₅ | 134 | 149 ₇₅ | 16 | - | - | - |
| | 28" | 650 _s | 525 | 469 | 270 | 631 _s | 280 | 506 | 40 | 8 | 300 | 338 | 71 | 60 | 220 | 330 | 187 _s | 134 | 171 _s | 15 | - | - | - |
| C | 34" | 756 _s | 610 | 521 | 390 | 740 | 530 | 593 _s | 40 | 8 | 300 | 357 | 90 | 74 | 220 | 350 | 233 | 146 | 207 | 12 | - | - | - |
| | 37" | 863 | 688 | 591 _s | 480 | 839 | 655 | 664 | 40 | 8 | 450 | 461 | 130 _s | - | - | - | - | 406 | 234 | 24 | - | - | - |
| | 28" _{16/9} | 704 | 463 | 410 | 270 | 685 | 520 | 444 | 20 | 8 | 396 | 310 _s | 77 _s | - | - | - | - | - | - | 575 | 182 | 199 | |
| | 29" | 668 | 538 | 420 | 350 | 649 | 480 | 519 | 20 | 8 | 396 | 356 _s | 435 | - | - | - | - | - | - | 550 | 188 | 201 | |
| | 32" _{16/9} | 796 | 515 _s | 465 | 330 | 777 | 610 | 496 _s | 20 | 8 | 410 | 386 _s | 454 | - | - | - | - | - | - | 607 | 240 _s | 196 | |
| | 36" _{16/9} | 893 | 566 | 470 | 395 | 873 | 400 | 546 | 25 | 8 | 410 | 369 | 109 _s | - | - | - | - | - | - | - | - | - | |

*with frontal adjustments base

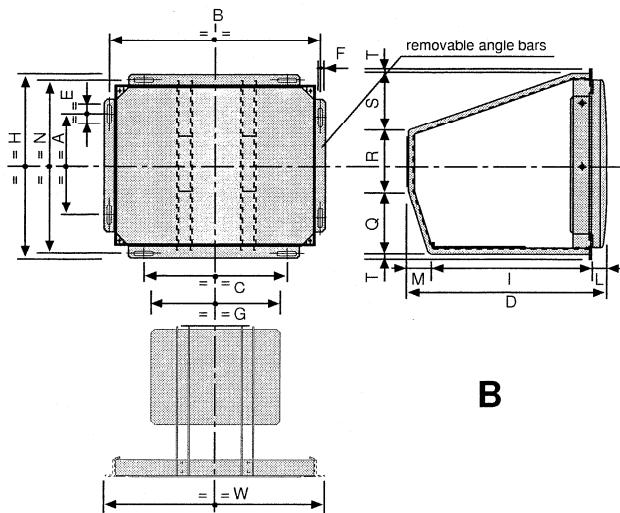
*with angle bars adjustable in two positions

DIMENSIONS AND WEIGHTS

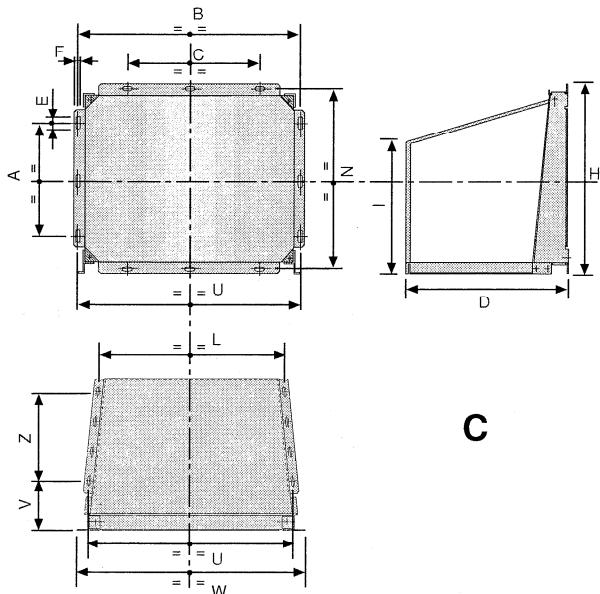
2



A



B



C

GENERAL TECHNICAL SPECIFICATIONS

MAINS INPUT 230 V 50Hz (184-264 V Europe) – optionally 115 V 60Hz (80-130 V U.S.A.)

MAINS POWER CONSUMPTION Monitor with contrast and brightness set to maximum

| | | |
|-----------------------|-----------------|-----------|
| POLO/3 15 KHz | from 14" to 21" | Max 80 W |
| POLO/2 15/25 KHz AUTO | 25" and 28" | Max 100 W |
| POLO/2 15/25 KHz AUTO | 34" and 37" | Max 130W |
| POLO/2 SVGA | from 14" to 21" | Max 100 W |
| POLO/2 SVGA | from 25" to 37" | Max 130 W |
| POLO/2 STAR | 21" | Max 80 W |
| POLO/2 STtoR | from 25" to 29" | Max 100 W |
| POLO/2 STAR | 34" | Max 130 W |
| POLO XGA | 17" | Max 80 W |

PEAK CURRENT <25A

DEGAUSSING Automatic at power-on
Automatic at power-on and from menu on 17" XGA version

VIDEO SIGNAL INPUT

| | |
|-----------------|---|
| Type | RGB positive |
| Input impedance | 1K (15KHz and 15/25KHz Auto) 75 (SVGA and Polo Star) |
| Level | from 1.5 Vpp to 4 Vpp (15KHz and 15/25KHz Auto) 0.7 Vpp (SVGA and Polo Star) |

SYNCHRONISM INPUT Separate, Horizontal and Vertical, positive or negative, TTL level input impedance 1K
Separate, Composite, negative, TTL level input impedance 1K
Automatic selection of synchronism type.

HORIZONTAL FLYBACK 15 kHz 11.5 µs
25 kHz 8 µs
SVGA/Star 5 µs

VERTICAL FLYBACK 15 kHz 1.2 ms
25 kHz 1.2 ms
SVGA/Star 0.6 ms

HORIZONTAL SCANNING FREQUENCY Frequencies Monitor
15.7 KHz ± 500 Hz 15Khz, 15/25Khz, Star
25.0 KHz ± 500 Hz 15/25Khz, Star
31.5 KHz ± 500 Hz Star, SVGA
35.5 KHz ± 500 Hz Star, SVGA
37.5 KHz ± 500 Hz SVGA
30Khz to 72Khz Auto XGA

VERTICAL SCANNING FREQUENCY Adjustable from 43Hz to 86Hz
Automatic from 47Hz to 160Hz, XGA only

VIDEO BANDWIDTH 15Khz, 15/25Khz 15 MHz-3dB
SVGA/Star 25 MHz-3dB
XGA Maximum Pixel Clock 110MHz

OPERATING TEMPERATURE 0÷50°C

MONITOR ADJUSTMENTS

| | |
|--|--|
| The control module provides the following adjustments: | |
| Horizontal frequency | RV9 H FREQ (not available on STAR version) |
| Horizontal phase | RV7 H PHASE |
| Horizontal amplitude | RV3 H AMP |
| Vertical frequency | RV10 V FREQ |
| Vertical shift | RV8 V SHIFT |
| Vertical amplitude | RV4 V AMP |
| Cushion correction | RV6 CUSHION (not available on 15KHz version from 14" to 21") |
| Trapezoid correction | RV2 KEYSTONE (not available on 15KHz version from 14" to 21") |
| Contrast | RV5 CONTRAST |
| Brightness | RV1 BRIGH |

On the SVGA versions, the East-West module provides the following additional adjustments:

| | |
|-------------------------|-----|
| 31 KHz horizontal phase | RV1 |
| 35 KHz horizontal phase | RV3 |
| 38 KHz horizontal phase | RV2 |

These three adjustments are set at the factory and do not generally have to be modified.
We therefore recommend you use the trimmer located on the control module first.

On the STAR versions, the East-West module provides the following adjustments:

| | |
|-------------------------|-----|
| 15 KHz horizontal phase | RV1 |
| 25 KHz horizontal phase | RV3 |
| 31 KHz horizontal phase | RV2 |
| 35 KHz horizontal phase | RV2 |

These three adjustments are set at the factory and do not generally have to be modified.
We therefore recommend you use the trimmer located on the control module first.

On the XGA version, all adjustments are made exclusively from the OSD menu.

The adjustment of trimmers other than those indicated above may cause faults and a deterioration in the machine's reliability.

POLO 15KHZ MONITOR

The POLO 15KHz monitors are designed to operate at a horizontal frequency of 15.7KHz.

POLO 15/25 KHZ AUTO MONITOR

The POLO 15/25KHz-Auto monitors are designed to work at a horizontal frequency of 15.7KHz or 25KHz.

The frequency is recognized automatically. The only operation that may have to be performed is to adjust the geometry of the picture using the control module.

POLO STAR MONITOR – 15/25/31/35 KHz

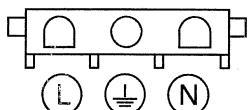
On the POLO STAR version, the frequency is recognized automatically. The only operation that may have to be performed is to adjust the geometry of the picture using the control module. With the 35KHz signal it may also be necessary to adjust the horizontal phase using the "RV2 horizontal phase" trimmer located in the E/W module.

POLO STAR supports both a high impedance input on the 6-pin connector and a low-impedance (75 Ohm) VGA input on the 15-pin connector.

To select the VGA input, the "Jumper" must be inserted in the VGA signal input module, while to select the high-impedance input on the 6-pin connector, this Jumper is to be removed.

INPUT CONNECTIONS

CN2

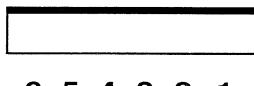


MAINS

230 V~ Europe

110 V~ U.S.A.

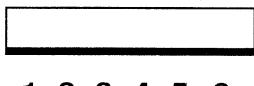
CN7



SIGNAL SYNCH.

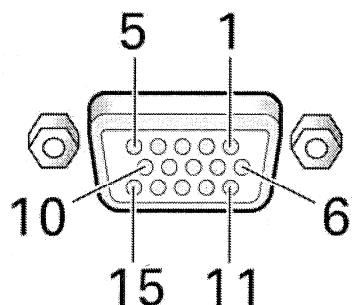
- 1 = R
- 2 = G
- 3 = B
- 4 = EARTH
- 5 = VERT. SYNC.
- 6 = HORIZ. SYNC. or COMPOSITE

**CN11
CN12**



YODE-DEFLECTION

- | | |
|-----------|---------------------------------------|
| 1 = BROWN | <input type="checkbox"/> VERT DEFL. |
| 2 = BLUE | <input type="checkbox"/> MAINS |
| 3 = BLACK | <input type="checkbox"/> HORIZ. DEFL. |
| 4 = BLACK | |
| 5 = GREEN | |
| 6 = RED | |



RGB SUB D9

- 1 = GROUND
- 2 = N.C.
- 3 = RED
- 4 = GREEN
- 5 = BLUE
- 6 = N.C.
- 7 = N.C.
- 8 = COMPOSITE SYNC. OR HORIZONTAL SYNC.
- 9 = VERTICAL SYNC.

INSTALLATION, CONTROL AND ADJUSTMENT PROCEDURES

● 1. MAINS INPUT 230 V~ (EUROPE) / (optional) 110 V~ (U.S.A.)

Insert the mains input harness into the three-position connector CN2, using a suitable cable in compliance with the EN 60065 regulation. Take care that the colours of the cables wires are inserted in the right position "Neutral-Line", following the indication and assuring that the earth wire is inserted in the central position.

● 2. VIDEO SIGNALS AND SYNC INPUT

Insert the signal input harness in the 6-position connector CN7 or the VGA connector, taking care to respect the sequence of the various inputs. If a Polo Star monitor is used, insert or remove the jumper according to the connector used.

● 3. POSITION OF YOKE HARNESS

If, after turning on, the image is found to be inverted, both horizontally and vertically, move the connector of the yoke harness from the original position and insert it in the adjacent connector, given that the crossed connections permit the image inversion in both senses. The connectors may be recognized on the PCB by the silk-screen printing indication CN11-CN12.

● 4. GEOMETRY ADJUSTMENT

Adjust the trimmer situated on the control module according to the needs of the various video signals. The trimmers of the two modules have the silk-screen indication of their functions on the PCB.

● 5. BLACK AND WHITE LEVEL ADJUSTMENTS

"POLO" monitors are calibrated at Hantarex factories with optical instrumentation for measuring chromatic coordinates of the CRT, thereby obtaining the best white possible.

Should it ever be necessary to recalibrate, follow the procedure as below:

BLACK LEVEL

- a) Turn on the monitor and wait for about ten minutes
- b) Remove the video signal. Adjust G2 of the line transformer to a minimum (by turning it anticlockwise)
- c) Set the "CUT-OFF" adjusting trimmers on the CRT socket assembly RV3 (Red) RV4(Green) RV5 (Blue) so as to obtain a voltage of 170V d.c. measured on the collector of transistors T2-T4-T6.
- d) Set Contrast and brightness to a maximum (clockwise).
- e) Adjust G2 (situated on the line transformer and called "SCREEN") until the raster becomes just visible.
- f) The RV... trimmer of the predominant colour is not to be adjusted any further. Adjust the other two trimmers (RV3/RV4 or RV5) until the best grey is obtained.
- g) This adjustment may cause an increase in brightness. We recommend you lower G2 until the raster becomes just visible again as indicated above.

WHITE LEVEL

- a) Turn on the monitor and wait approximately 10 minutes.
- b) Set the brightness and contrast situated on the control module to a medium level.
- c) Adjust brightness and contrast to maximum, situated on control module.
- d) Connect a video generator and select white page.
- e) Adjust the trimmers RV1 (red gain), RV2 (green gain) or RV6 (blue gain) on the CRT base assembly, for the best white possible.

NOTE : The 17" XGA version has no adjusting trimmer. On this version, all monitor adjustments are made using the OSD menu.

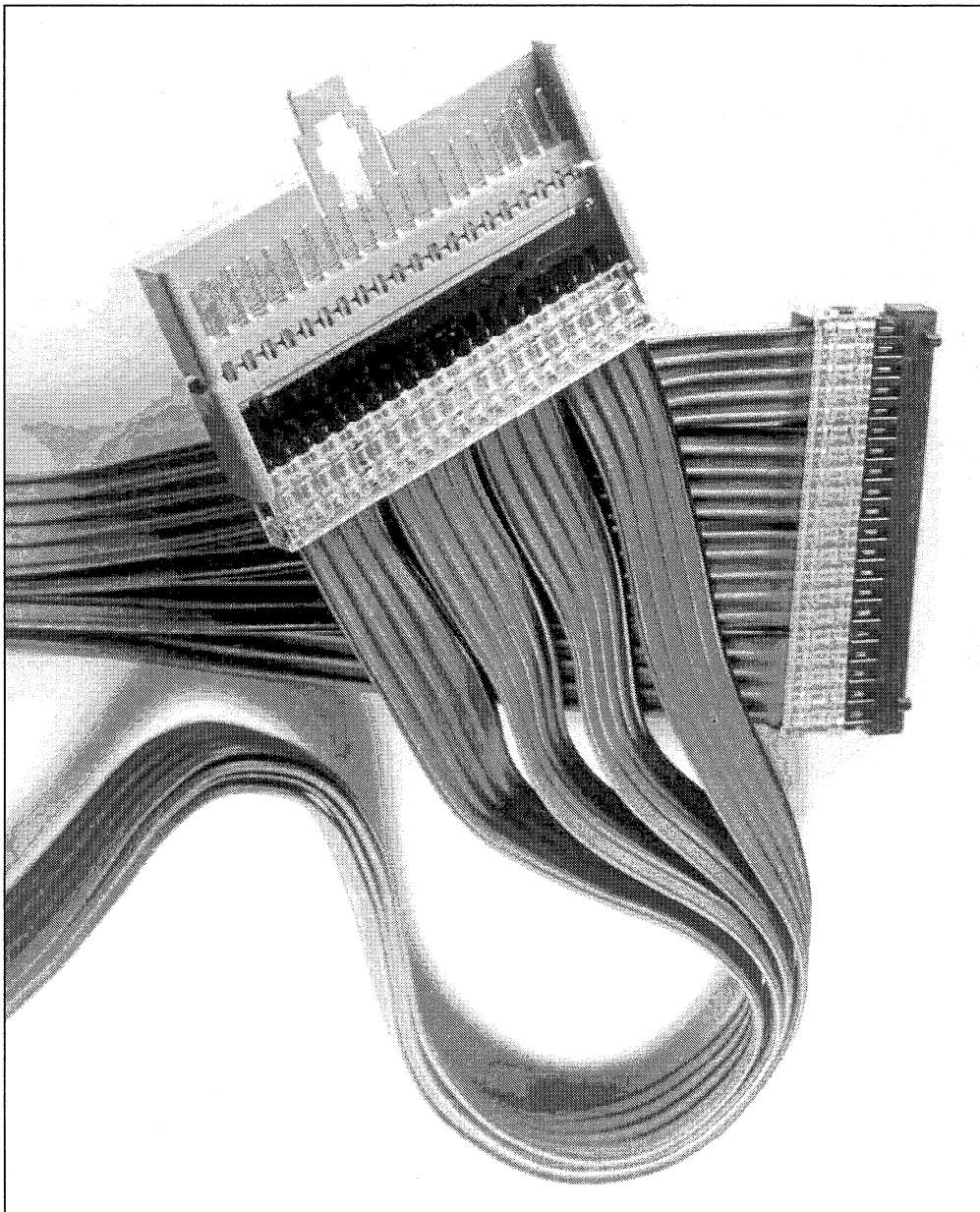
ADVICE FOR OVERALL INSTALLATION OF THE MACHINE

- 1 - The mains input plug must be easily accessible and must be calculated, together with the wire section of the main input cable, for the total power of the machine (e.g. up to a 6A absorption, with a length not exceeding 2 mt - use a cable section of 0,75 mm).
- 2 - Do not use extensions or loose mains plugs, which could create false contacts with consequent overheating and danger of fire.
- 3 - Assure that every structure where the monitor is placed is so designed that, in the eventuality of an accidental fall of liquids, they will not penetrate internally.
- 4 - Do not use the machine in environments which are too humid, thereby avoiding the possibility of electric discharges.
- 5 - The machine must be fitted with a bipolar switch, thereby permitting immediate switch-off, should it be necessary.
- 6 - The electric outlet feeding the machine, in addition to having a switch, must also be positioned within extreme vicinity of same and be easily accessible.
- 7 - Do not expose the machine to sun rays in order to avoid overheating.
- 8 - The machine must be guaranteed with earth connection.

Above suggestions are useful for a perfect function, for a machine duration and for a total security and safety of operators and users.

REMOTE CONTROLS

- The COMMAND card containing all image adjustments is connected to the base printed circuit board through a connector, this means that it may be extracted from above and, through a harness of 1,80 mt (supplied on request) the operator has the possibility of placing himself in front of the video and visibly carry out all the necessary operations. The harness and the plastic support for fixing the card must be requested as "REMOTE CONTROL ASSEMBLY" (see photo).



PARTI DI RICAMBIO

SPARE PARTS

SWITCH BOARD POLO STAR

| CODICE | DENOMINAZIONE | RIF.SCHEMA |
|----------|---------------------------------|--------------|
| 20620510 | CIRC.INT.LM 393 N | IC1 |
| 20150008 | DIODO 1N 4007 | D12 |
| 20100001 | DIODO 1N 4148/A52R NASTR.ORIZZ. | D4-6-7-9-15 |
| 20100012 | DIODO BA 159 | D1-3 |
| 20100040 | DIODO BAV 21 | D14-16 |
| 20110010 | DIODO ZENER 10V 1/2W 5% | D10 |
| 20110091 | DIODO ZENER 18V 1/2W 5% | D2-5-8-13-17 |
| 20400150 | TRANS. IRF 640 | T1 |
| 20400409 | TRANS. BC 557 B | T2-8 |
| 20420219 | TRANS.BF 422-BF 422 L/RA | T4-6-7 |
| 20432371 | TRANS.IRF 630 | |

CONTROL BOARD POLO STAR

| CODICE | DENOMINAZIONE | RIF.SCHEMA |
|----------|--|----------------------|
| 50430742 | ALBERINO REGOL. VE. TRIMMER L 10mm | RV1-3-4-5-6-7-8-9-10 |
| 34070000 | CONN.20vie BORDO SCHEDA 90g PIN SFALSATI | CN2 |
| 20400030 | TRANS.BC 327 25 NASTRATO | T1 |
| 20401069 | TRANS.BC 337 25 NASTRATO | T2 |
| 23051003 | TRIMM.CARB 10K ORIZZ 10 PERN0 | FV5-2-7-8-9 |
| 23071005 | TRIMM.CARB 1M ORIZZ 10 PERN0 | RV1 |
| 23062204 | TRIMM.CARB 220K ORIZZ 10 PERN0 | RV4 |
| 23044705 | TRIMM.CARB 4K7 ORIZZ 10 PERN0 | RV10-3-6 |

MODULO E/W POLO STAR

| CODICE | DENOMINAZIONE | RIF.SCHEMA |
|----------|--------------------------------------|------------|
| 28020640 | BOBINA CHOCKE 100uH 10% | L1 |
| 20670210 | CIRC.INT.HCF 4098 BEY | IC1 |
| 20675510 | CIRC.INT. 8146 | IC2 |
| 34070550 | CONN.14vie F.900 FILA SINGOLA p.2,54 | CN1 |
| 20100001 | DIODO 1N 4148/A52R NASTR.ORIZZ. | D1 |
| 20400429 | TRANS.BC 547 B NASTRATO | T3-6-8 |
| 20400409 | TRANS.BC 557 B NASTRATO | T5 |
| 20400409 | TRANS.BC 557 B NASTRATO | T1-2-4-7-9 |
| 23061012 | TRIMM.CARB 100K ORIZZ 10 PERN0 | RV3 |
| 23041002 | TRIMM.CARB 1K ORIZZ 10 CACCIAVITE | RV4-5 |
| 23062204 | TRIMM.CARB 220K ORIZZ 10 PERN0 | RV2 |
| 23054722 | TRIMM.CARB 47K ORIZZ 10 PERN0 | RV1 |

MAIN BOARD POLO STAR

| CODICE | DENOMINAZIONE | RIF.SCHEMA |
|----------|---------------------------------------|-----------------------------------|
| 28027760 | BOBINA 2A/RCO621 CDU1548 15uH | L13 |
| 28021290 | BOBINA CHOCKE 10uH 10% | L6 |
| 28027781 | BOBINA CHOCKE 220uH 10% | L1 |
| 28027360 | BOBINA CHOCKE 22uH 10% | L8 |
| 28020720 | BOBINA CHOCKE 47uH 10% | L3 |
| 28029460 | BOBINA LINEARITA' VGA-IDTV | L11 |
| 20829410 | BOBINA PONTE UTF 477 | L9 |
| 20821190 | CHOCKE SU FERRITE 50UH | L12 |
| 20620080 | CIRC.INT.L 7812 CV | IC2 |
| 20620510 | CIRC.INT.LM 393 N | IC4 |
| 20670950 | CIRC.INT.TDA 1675 A | IC6 |
| 20670271 | CIRC.INT.TDA 2595/V9 | IC5 |
| 20640000 | CIRC.INT.TL 072 | IC3 |
| 20672920 | CIRC.INT.UC 3842 N | IC1 |
| 34077860 | CONN.20vie M.VERT.CON RITENUTA p.2,5 | CN9 |
| 30476558 | CONN.2vie M.VERT.CON RITENUTA p.2,5 | CN14 |
| 34074640 | CONN.2vie MATE-N-LOK CIRC-STAMP.FEMM. | CN1 |
| 34074630 | CONN.3vie MATE-N-LOK CIRC-STAMP.FEMM. | CN2 |
| 34023354 | CONN.AMP MODU1 D280610/1 4VIE | CN13 |
| 34023356 | CONN.AMP MODU1 D280611/1 6VIE | CN11-12-7 |
| 34076580 | CONN.BURNDY WH8D-1 8VIE DIP-MATE | CN8 |
| 50135372 | CONNETTORE STRIP | CN10 |
| 20150008 | DIODO 1N 4007 | D9-20-11-12-39 |
| 20100001 | DIODO 1N 4148/A52R NASTR.ORIZZ. | D24-25-26-27-28-29-30-31-32-33-34 |
| 20100012 | DIODO BA 159 | D7-14-15-17-38-55-54 |
| 20100040 | DIODO BAV 21 | D51-53 |
| 20150131 | DIODO BY 255 | D1-2-3-5 |
| 20150460 | DIODO BYD 33 G/M | D40-46 |
| 20150421 | DIODO BYV 280-200 | D10-13 |
| 20150230 | DIODO BYW 95C/A52R-600 | D4-6-8-16 |
| 20100090 | DTVD32D | D52 |
| 20151280 | DIODO MUR 460 | DX1 |
| 20151280 | DIODO MUR 460 | D47 |
| 20110091 | DIODO ZENER 18V 1/2W 5% | ZD1 |
| 20110059 | DIODO ZENER 2V7 1/2W 5% | R91 |
| 20110030 | DIODO ZENER 3V6 0,5W | D49 |
| 20110043 | DIODO ZENER 47V 1/2W 5% | ZD6-7 |
| 20110021 | DIODO ZENER 6V2 1/2W | ZD3-4 |
| 28020470 | FILTO RETE 2x40 mH UTF 323 | L2 |
| 29100019 | FUSIBILE 3-15A RIT. 5x20mm | F1 |
| 21000340 | NTC 8/10R 20% | R3 |
| 21000140 | PTC 22R 5A | R1 |
| 21320001 | RES ANTIRIFI 1/2W 5% 10R | R146-135 |
| 21311003 | RES FILO VE 10W 10% 470R | R134 |
| 22354700 | RES FILO VE 10W 10% 470R | R4 |
| 22351500 | RES FILO VE 9W 5% 15K | R2 |
| 20400429 | TRANS.BC 547 B NASTRATO | I5-6-8-9-10-12-16 |
| 20400409 | TRANS.BC 557 B NASTRATO | I7-11-13-14-15-17-18 |
| 20410100 | TRANS.BDX 53 B | T19-B |
| 20420140 | TRANS.BF 419 | T21-23 |
| 20420159 | TRANS.BF 423/BF 421 | T22 |
| 20400090 | TRANS.BU 2727 AW | T21-23 |
| 20432980 | TRANS.BUZ 91 A | T1 |
| 28020540 | TRASF SWITCH POLO/2 TRIFREQ. | TH1 |
| 20820150 | TRASF.EAT x POLO VGA UTF 284 | TH3 |
| 28020100 | TRASFORMATORE DRIVER POLO 25 kHz | TH2 |
| 23061005 | TRIMM.CARB 100K ORIZZ 10 CACCIAVITE | RV4 |
| 23041002 | TRIMM.CARB 1K ORIZZ 10 CACCIAVITE | RV1 |
| 23044700 | TRIMM.CARB 4K7 OHIZZ 10 CACCIAVITE | HV2-3 |

SOCKET BOARD POLO STAR

| CODICE | DENOMINAZIONE | RIF.SCHEMA |
|----------|---------------------------------|------------|
| 20821290 | BOBINA CHOCKE 10uH 10% | L2-3-4 |
| 28020720 | BOBINA CHOCKE 47uH 10% | L1 |
| 20100001 | DIODO 1N 4148/A52R NASTR.ORIZZ. | D1-5-6-7 |
| 20130060 | DIODO BAV 20 | D2-3-4 |
| 20400429 | TRANS.BC 547 B NASTRATO | T1-3-5-7 |
| 34020640 | ZOCOLO CRT SMALL NECK | |

SWITCH BOARD POLO STAR

| CODICE | DESCRIPTION | LOCATION |
|----------|-------------------------------|--------------|
| 20620510 | IC LM 393 N | IC1 |
| 20150008 | Diode 1N 4007 | D12 |
| 20100001 | Diode 1N 4148/A52R | D4-6-7-9-15 |
| 20100012 | Diode BA 159 | D1-3 |
| 20100040 | Diode BAV 21 | D14-16 |
| 20110010 | Zener diode 10V 1/2W 5% | D10 |
| 20110091 | Zener diode 18V 1/2W 5% | D2-5-8-13-17 |
| 20400150 | Transistor IRF 640 | T1 |
| 20400409 | Transistor BC 557 B | T2-5 |
| 20420219 | Transistor BF 422-BF 422 L/RA | T2-8 |
| 20432371 | Transistor IRF 630 | T4-6-7 |

CONTROL BOARD POLO STAR

| CODICE | DESCRIPTION | LOCATION |
|----------|----------------------|----------------------|
| 50430742 | Trimmer knob | RV1-3-4-5-6-7-8-9-10 |
| 34070000 | 20 ways connector | CN2 |
| 20400030 | Transistor BC 327 25 | T1 |
| 20401069 | Transistor BC 337 25 | T2 |
| 23051003 | Trimmer 10K | FV5-2-7-8-9 |
| 23071005 | Trimmer 1M | PV1 |
| 23062204 | Trimmer 220K | RV4 |
| 23044705 | Trimmer 4K7 | RV10-3-6 |

MODULO E/W POLO STAR

| CODICE | DESCRIPTION | LOCATION |
|----------|-----------------------------|------------|
| 28020640 | Choke coil 100uH 10% UTF 30 | L1 |
| 20670210 | IC HCF 4098 BEY | IC1 |
| 20675510 | IC TDA 8146 | IC2 |
| 34070550 | 14 ways connector | CN1 |
| 20100001 | Diode 1N 4148/A52R | D1 |
| 20400429 | Transistor BC 547 B | T3-6-8 |
| 20400409 | Transistor BC 557 B | T5 |
| 23061012 | Transistor 100K | T1-2-4-7-9 |
| 23041002 | Transistor 1K | RV4-5 |
| 23062204 | Transistor 220K | RV2 |
| 23044705 | Transistor 47K | RV1 |

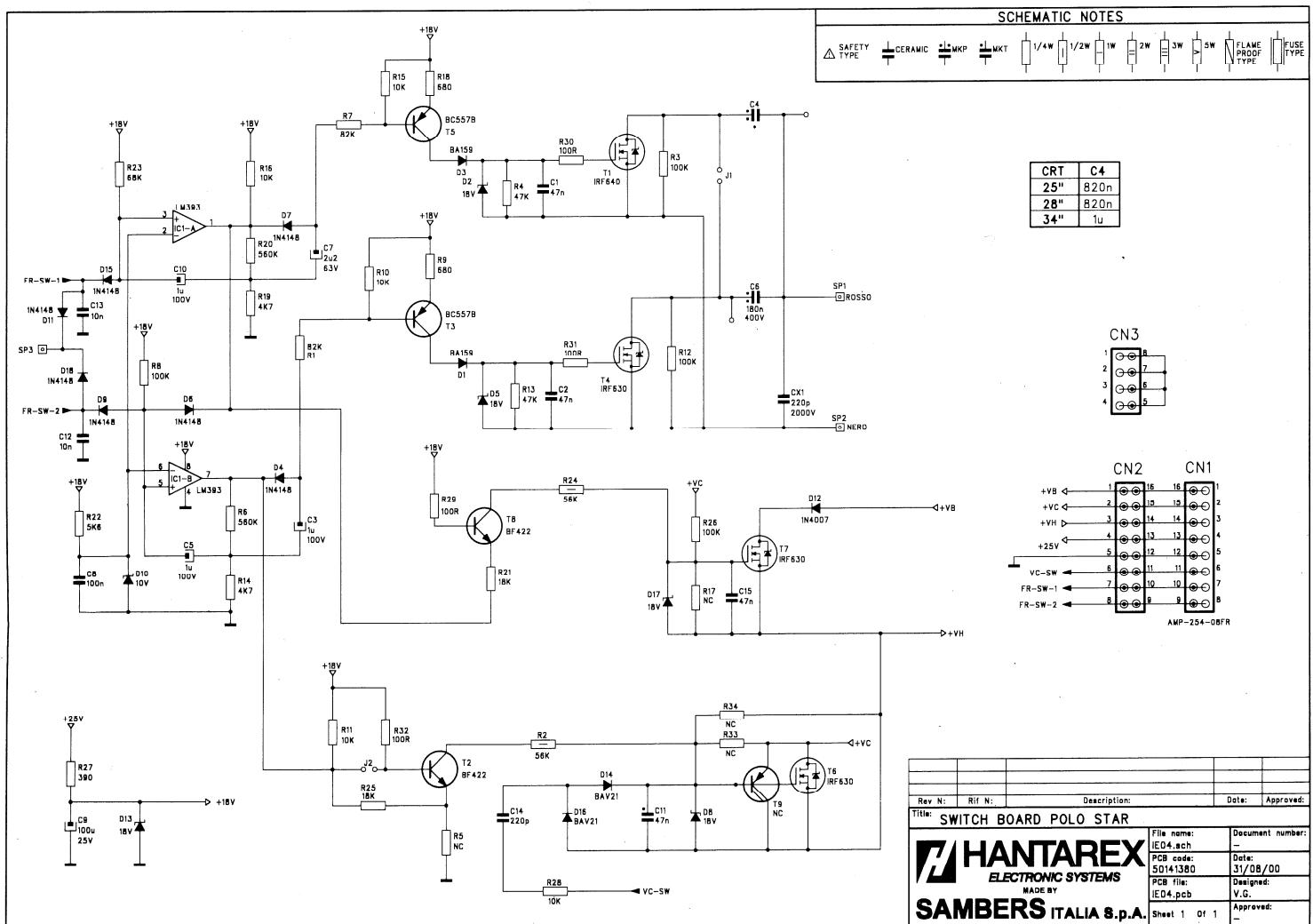
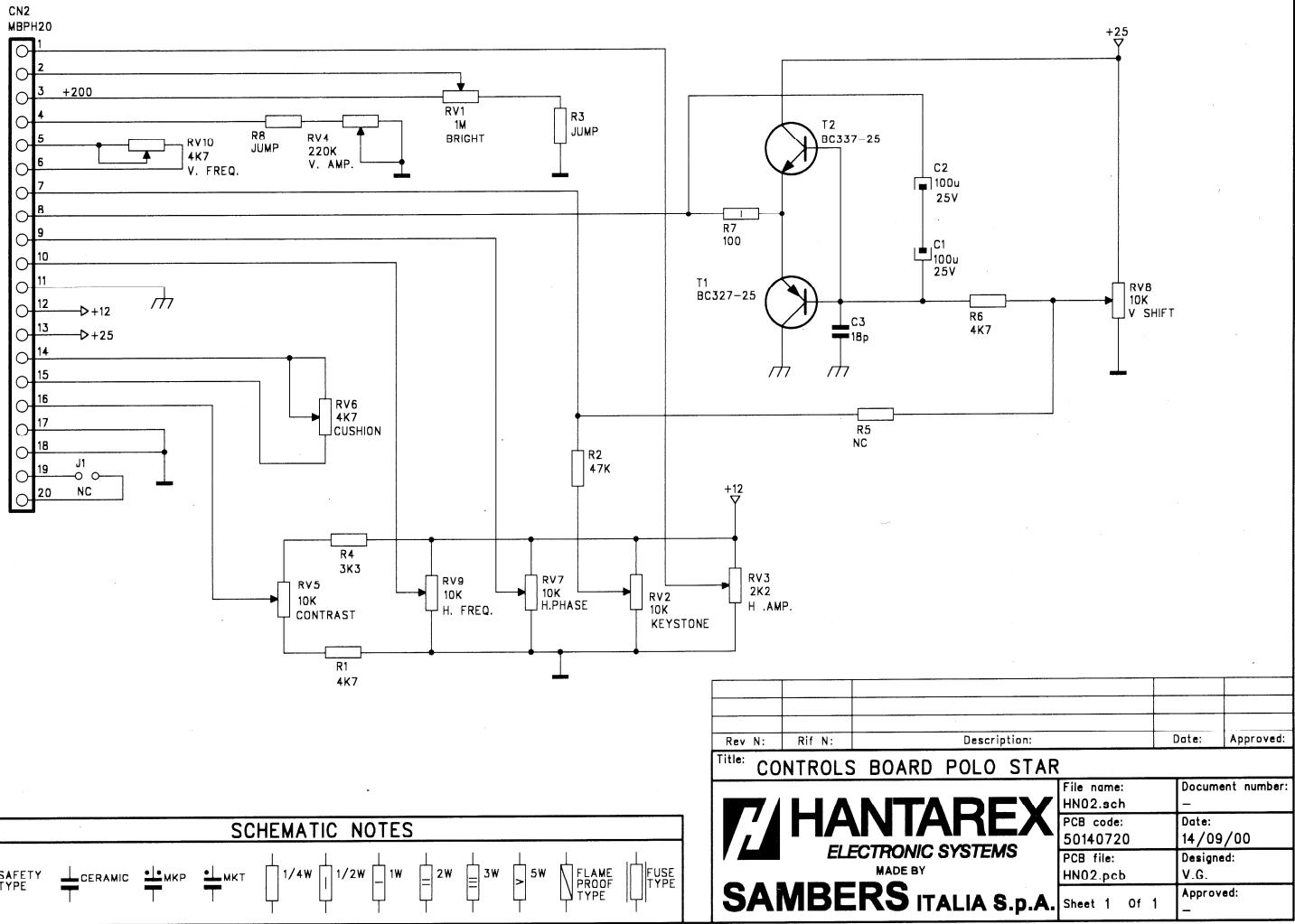
MAIN BOARD POLO STAR

| CODICE | DESCRIPTION | LOCATION |
|----------|------------------------------------|-----------------------------------|
| 28027760 | Coil 2A/RCO621 CDU1548 15uH | L13 |
| 28021290 | Choke coil 10uH 10% UTF 149 | L6 |
| 28027781 | Choke coil 220uH 10% | L4 |
| 28027360 | Choke coil 22uH 10% | L8 |
| 28020720 | Choke coil 47uH 10% | L3 |
| 28029460 | Linearity coil VGA-IDTV | L11 |
| 20829410 | Bridge coil | L9 |
| 20821190 | Choke 50UH | L12 |
| 20620080 | IC 7812 CV | IC2 |
| 20620510 | IC LM 393 N | IC4 |
| 20670950 | IC TDA 1675 A | IC6 |
| 20670271 | IC TDA 2595/V9 | IC5 |
| 20640000 | IC TDA 772 | IC3 |
| 20672920 | IC UC 3842 N | IC1 |
| 34077860 | 20 ways connector | CN9 |
| 30476558 | 2 ways connector | CN14 |
| 34074640 | 2 ways connector | CN1 |
| 34074630 | 3 ways connector | CN2 |
| 34023354 | 4 ways connector | CN13 |
| 34023356 | 6 ways connector D280611/1 | CN11-12-7 |
| 34076580 | 8 ways Burndy connector DIP-MATE | CN8 |
| 50135372 | Strip connector | CN10 |
| 20150008 | Diode 1N 4007 | D9-20-11-12-39 |
| 20100001 | Diode 1N 4148/A52R | D24-25-26-27-28-29-30-31-32-33-34 |
| 20100012 | Diode BA 159 | D7-14-15-17-38-55-54 |
| 20100040 | Diode BAV 21 | D51-53 |
| 20150131 | Diode BY 255 | D1-2-3-5 |
| 20150460 | Diode BYD 33 G/M | D40-46 |
| 20150421 | Diode BYV 280-200 | D10-13 |
| 20150230 | Diode BYW 95C/A52R-600 | D4-6-8-16 |
| 20100090 | Diode DTV32D | D52 |
| 20151280 | Diode MUR 460 | DX1 |
| 20151280 | Diode MUR 460 | D47 |
| 20110091 | Zener diode 18V 1/2W 5% | ZD1 |
| 20110590 | Zener diode 2V7 1/2W 5% | R91 |
| 20110030 | Zener diode 3V6 0,5W | D49 |
| 20110141 | Zener diode 47V 1/2W 5% | ZD6-7 |
| 20110021 | Zener diode 6V2 1/2W | ZD3-4 |
| 28020470 | Mains Filter 2x40 mH | L2 |
| 29100019 | Fuse 3,15A 5x20mm | F1 |
| 20000340 | NTC 8/10R 20% | R3 |
| 21000140 | PTC 22R 15A | R1 |
| 21321001 | Non flammable Resistor 1/2W 5% 10R | R146-135 |
| 21311003 | Non flammable Resistor 1/2W 5% 1R | R134 |
| 22534700 | Wire resistor VE 10W 10% 470R | R4 |
| 22351500 | Wire resistor VE 9W 5% 15K | R2 |
| 20400429 | Transistor BC 547 B | T15-6-8-9-10-12-16 |
| 20400409 | Transistor BC 557 B | T7-11-13-14-15-17-18 |
| 20410100 | Transistor BDX 53 B | T19-B |
| 20420140 | Transistor BF 419 | T21-23 |
| 20420159 | Transistor BF 423/BF 421 | T22 |
| 20400090 | Transistor BU 2727 AW | T22 |
| 20432980 | Transistor BUZ 91 A | T1 |
| 28020540 | Switch transformer POLO/2 STAR | TH1 |
| 20820150 | EHT transformer POLO VGA | TH3 |
| 28020100 | Driver transformer POLO 25 kHz | TH2 |
| 23061005 | 100K Trimmer | RV4 |
| 23041002 | 1K Trimmer | RV1 |
| 23044700 | 4K7 Trimmer | RV2-3 |

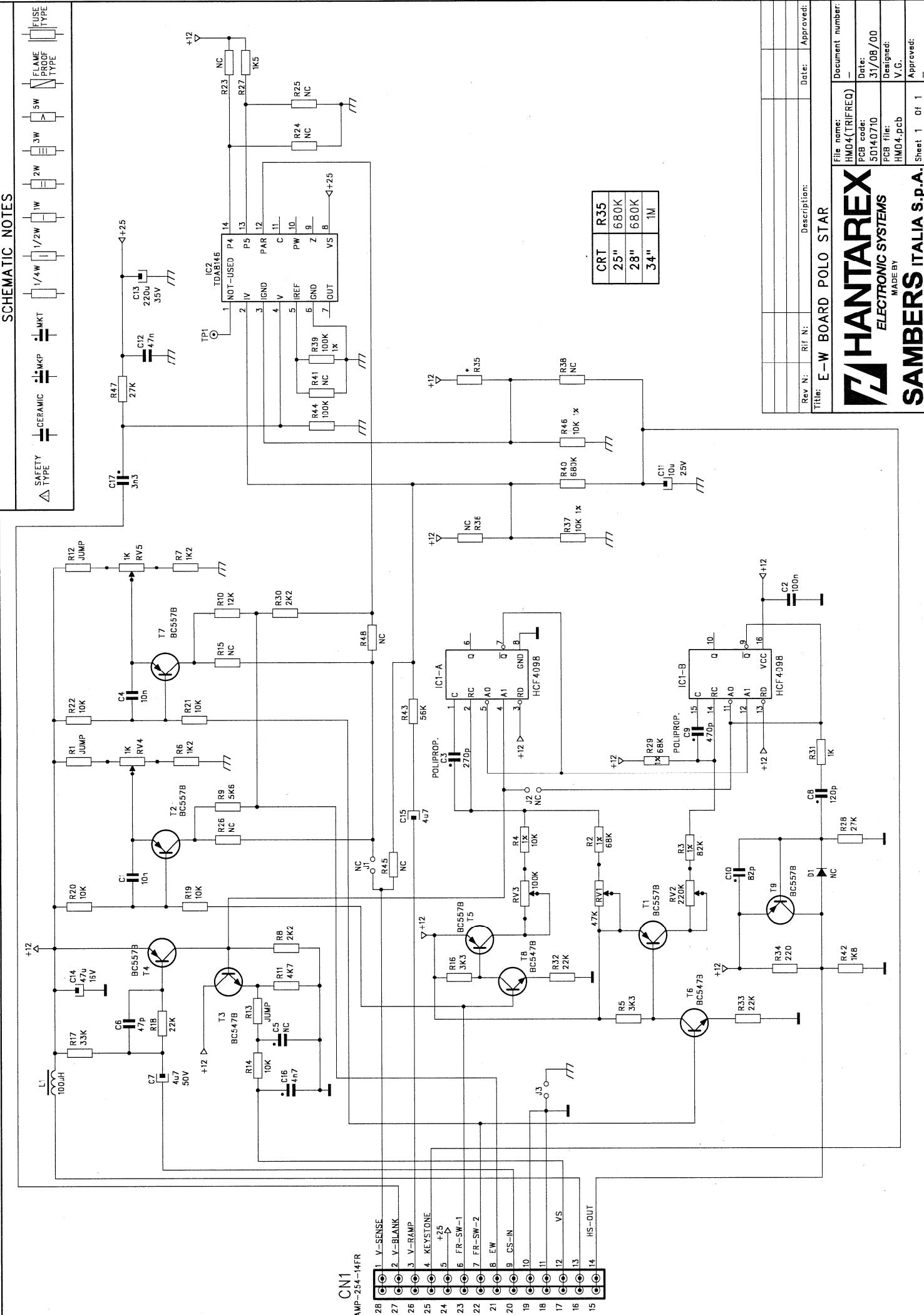
SOCKET BOARD POLO STAR

| CODICE | DESCRIPTION | LOCATION |
| --- | --- | --- |

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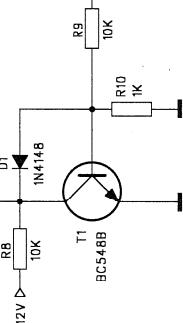
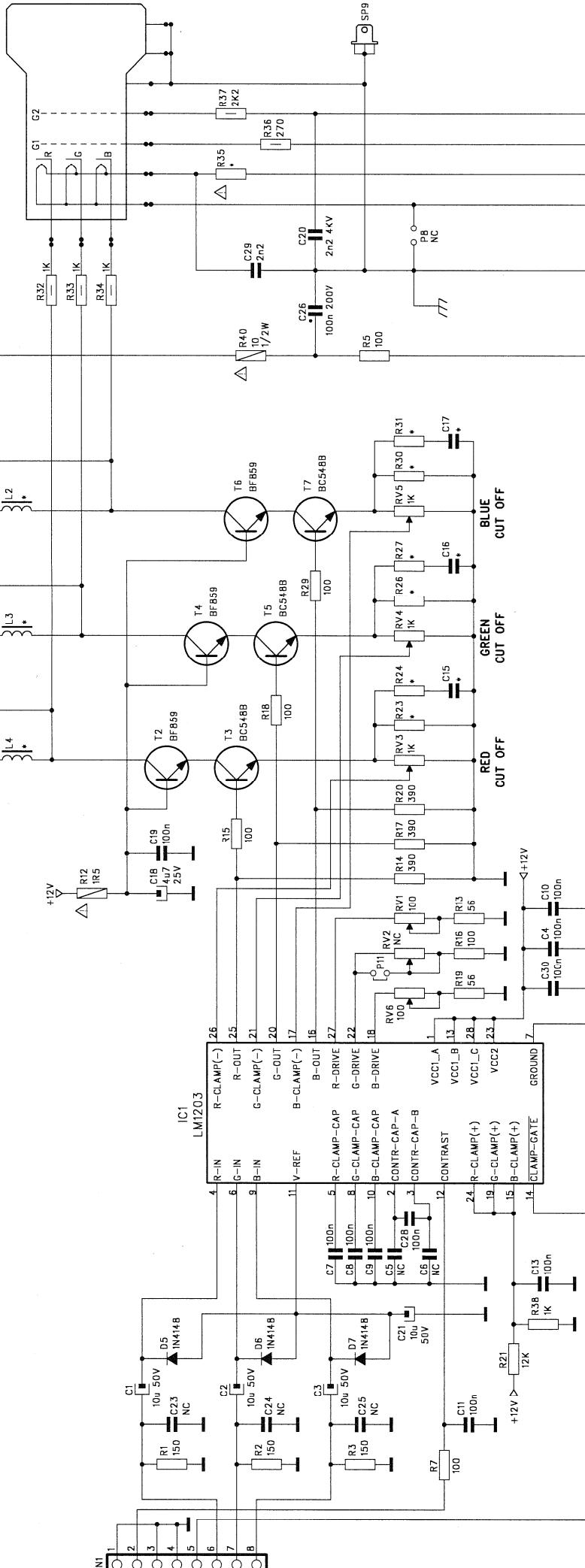


SCHEMATIC NOTES



SCHEMATIC NOTES

| | | | |
|-------------|--|------------------|--|
| SAFETY TYPE | | FUSE TYPE | |
| CERAMIC | | FLAME PROOF TYPE | |
| MKT | | 5W | |
| MKP | | 3W | |
| 1/4W | | 2W | |
| 1/2W | | 1W | |
| | | | |

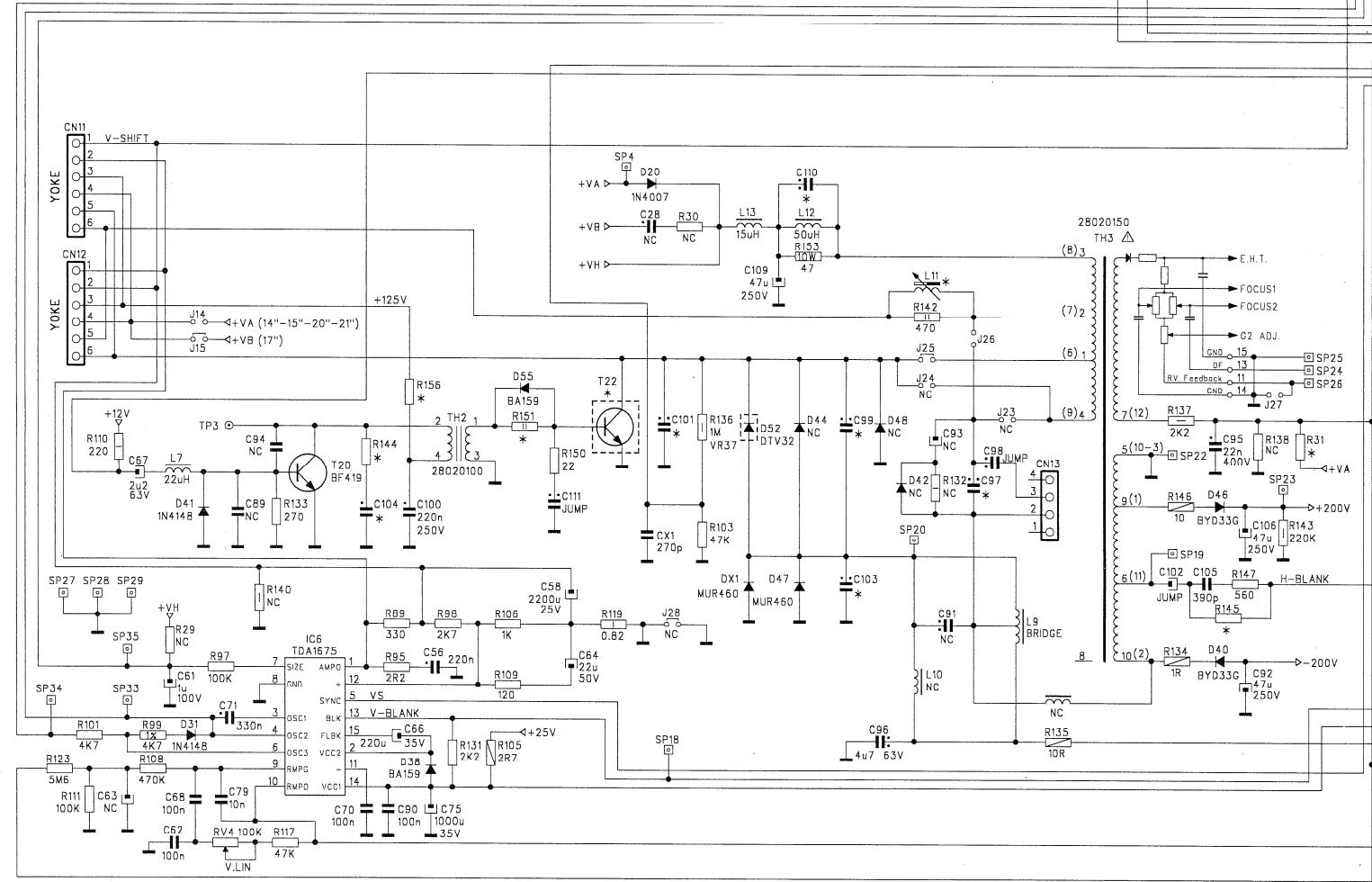
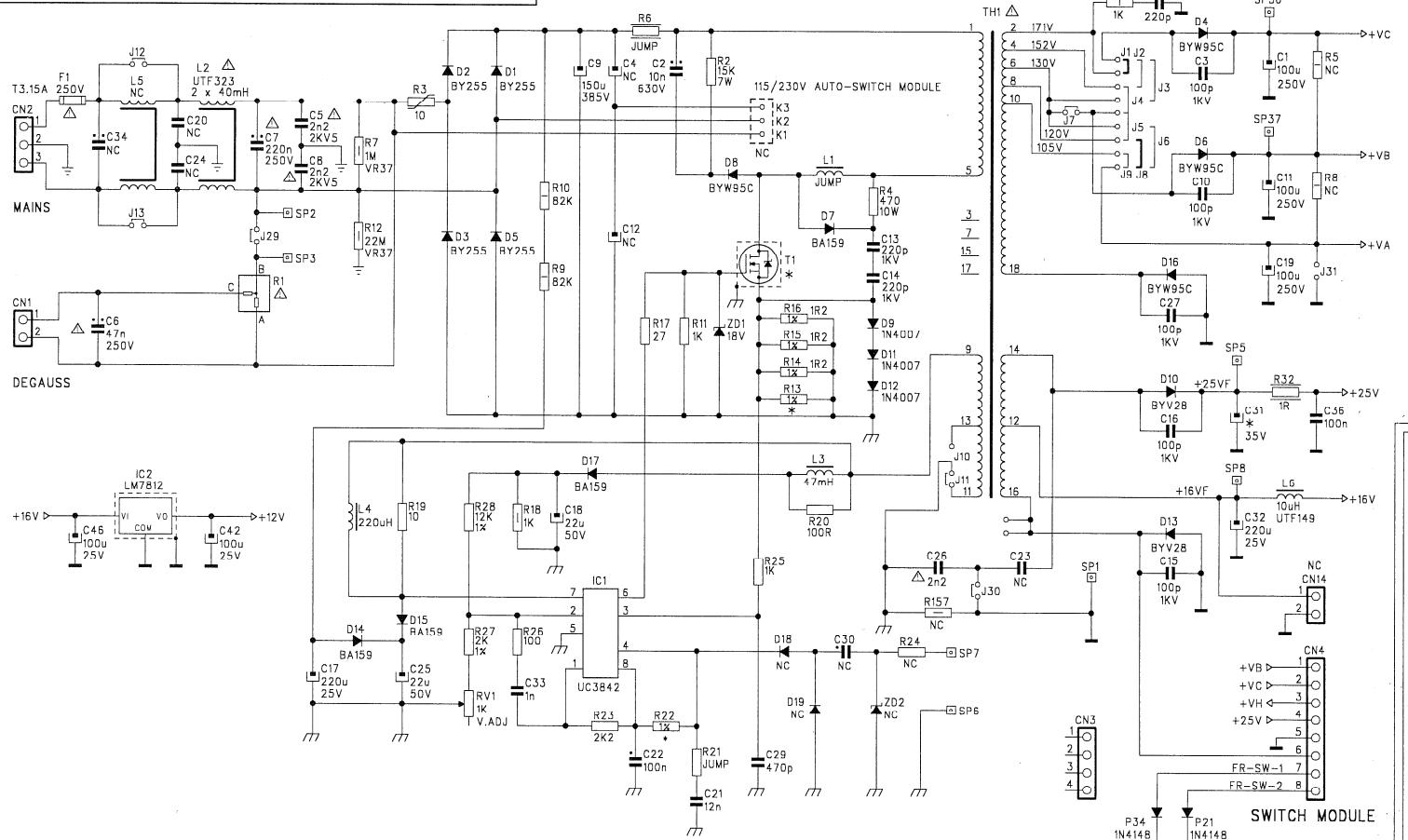


| | V/D | PH |
|-------------|------|------|
| CRT | 25" | 34" |
| R35 | 4R7 | 5R6 |
| R22,R25,R28 | 6K8 | 6K8 |
| R24,R27,R31 | 22R | 22R |
| C15,C16,C17 | 330p | 330p |
| R23,R26,R30 | 470 | 270 |

| | | | | |
|---|--------|--------------|-------|-----------|
| Rev N: | Rif N: | Description: | Date: | Approved: |
| | | | | |
| CRT SOCKET BOARD POLO STAR  HANTAREX ELECTRONIC SYSTEMS <small>MADE BY</small>  SAMBERS ITALIA S.p.A. | | | | |

SCHEMATIC NOTES

| Safety Type | Ceramic | MKP | VKT | 1/4W | 1W | 2W | 3W | 5W | Flange Probe | Fuse Type |
|----------------------------|---------|-----|-----|------|----|----|----|----|--------------|-----------|
| T3.15A 250V | | | | | | | | | | |
| CN2 | | | | | | | | | | |
| C34 | | | | | | | | | | |
| J12 | | | | | | | | | | |
| L5 NC | | | | | | | | | | |
| L2 UFT323 2 x 40mH | | | | | | | | | | |
| C20 NC | | | | | | | | | | |
| C24 NC | | | | | | | | | | |
| C5 2n2 | | | | | | | | | | |
| C7 220n | | | | | | | | | | |
| C8 2kV | | | | | | | | | | |
| R3 | | | | | | | | | | |
| D2 BY255 | | | | | | | | | | |
| D1 BY255 | | | | | | | | | | |
| R7 | | | | | | | | | | |
| 1M VR37 | | | | | | | | | | |
| R10 82K | | | | | | | | | | |
| C9 150u 385V | | | | | | | | | | |
| C4 NC 10n | | | | | | | | | | |
| R6 | | | | | | | | | | |
| JUMP | | | | | | | | | | |
| R2 7W | | | | | | | | | | |
| C2 630V | | | | | | | | | | |
| 15/230V AUTO-SWITCH MODULE | | | | | | | | | | |
| MAIN | | | | | | | | | | |
| CN1 | | | | | | | | | | |
| C6 4.7n 250V | | | | | | | | | | |
| R1 | | | | | | | | | | |
| J13 | | | | | | | | | | |
| SP2 | | | | | | | | | | |
| J29 | | | | | | | | | | |
| SP3 | | | | | | | | | | |
| C | | | | | | | | | | |
| A | | | | | | | | | | |
| DEGAUSS | | | | | | | | | | |



| CRT | C110 | C101 | C103 | C31 | C97 | C99 | C130 | R145 | R31 | R156 | R13 | R22 | R151 | C104 | T22 | T1 | R144 | R14 | |
|---------|------|------|------|------|------|-----|------|------|-----|------|-----|-----|------|------|----------|----------|--------|-----|--|
| 25"-28" | 4N7 | I5 | 15N | 100u | 470V | 7N5 | 470K | 2K2 | 56K | 1K | 1R2 | 3K9 | 1R | 2N2 | BHU1215 | BU2727AW | 2K7 2W | | |
| 34" | NC | I5 | 18N | NC | 580N | BN2 | 330K | 1K | 47K | 470 | R56 | 4K2 | 1R5 | IN | BU2727AW | BUZ91A | 1K 4W | | |

