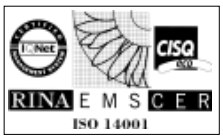
AUTV/3500LD

LDMOS - UHF TV Solid State Amplifier

User's manual

Registration number: ***IT-17686***



Registration number: ***IT-24436***

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WARNING

The apparatus described in this manual has been designed and manufactured with devices to safeguard the users. In any case it is recommended that during any operation of installation, maintenance, miscellaneous interventions and calibrations requiring the apparatus to be switched on,

THE USER TAKES ALL THE PRECAUTIONS AGAINST INCIDENTS

It is required to use the proper clothes and protection gloves in order to prevent damages from incidental contacts with high-voltage parts.
The manufacturer declines every responsibility in case the recommendations above are not followed.

IMPORTANT

The component lists attached to the relevant electrical diagrams indicate for each item the reference, the description and the type normally used.
The ***Elettronika S.r.l.*** though reserves the right to use or supply as spare parts components with equivalent characteristics but of a different type, assuring anyway the optimal work of the apparatus in accordance with the specifications.

The enclosed monographs are solely owned by ***Elettronika S.r.l.***
The use of anything enclosed in this technical manual without explicit authorization given by ***Elettronika S.r.l.*** will be prosecuted by the law.

The data and technical characteristics of the apparatus described in this manual are not compelling for the manufacturer.
The ***Elettronika S.r.l.*** reserves the right to make, without previous notice, modifications or updates in order to improve the quality of the product.

The general conditions of supply and sale are described in the contracts.

The delivery time are in accordance with the products and quantities ordered.

Summary of warranty

We, ELETTRONIKA S.r.l., SS096 Km 113 Z.I. PALO DEL COLLE (BA) ITALY, warrant to the ORIGINAL PURCHASER of a NEW product, for a period of one (1) year from the date of purchase by the original purchaser (the "warranty period") that the new ELETTRONIKA product is free of defects in materials and workmanship and will meet or exceed all advertised specifications for such a product. This warranty does not extend to any subsequent purchaser or user, and automatically terminates upon sale or other disposition of our product.

Items excluded from this ELETTRONIKA warranty

We are not responsible for product failure caused by misuse, accident, or neglect. This warranty does not extend to any product on which the serial number has been defaced, altered, or removed. It does not cover damage to loads or any other products or accessories resulting from ELETTRONIKA product failure. It does not cover defects or damage caused by use of unauthorized modificstions, accessories, parts, or service.

What we will do

We will remedy any defect, in material or workmanship (except as excluded), in our sole discretion, by repair, replacement, or refund. If a refund is elected, then you must make the defective or malfunctioning component available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers or at our factory. Expenses in remedying the defect will be borne by ELETTRONIKA, including one-way surface freight shipping costs within the United States. (Purchaser must bear the expense of shipping the product between any foreign country and the port of entry in the United States and all taxes, duties, and other custom's fee(s) for such foreign shipments).

How to obtain warranty service

You must notify us of your need for warranty service not later than ninety (90) days after the expiration of the warranty period. We will give you an authorization to return the product for service. All components must be shipped in a factory pack or equivalent which, if needed, may

Desclaimer of consequential and incidental damages

You are not entitled to recover from us any consequential or incidental damages resulting from any defect in our product. This includes any damage to another product or products resulting from such a defect.

Warranty alterations

No person has the authority to enlarge, or modify this warranty. The warranty is not extended by the lenght of time for which you are deprived of the use of the product. Repairs and replacement parts are provided under the terms of this warranty shall carry only the unexpired portion of this warranty.

Design changes

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

Legal remedies of purchaser

There is no warranty which extends beyond the terms hereof. This written warranty is given in lieu of any oral or implied warranties not contained herein. We disclaim all implied warranties, including without limitation any warranties of merchantability or fitness for a particular purpose. No action to enforce this warranty shall be commenced later than ninety (90) days after expiration of the warranty period.

Warranty for electronic tubes

The warranty applied for electronic tubes is the one given by the manufacturer of the tube. In the event that the product shows anomalies within the deadline of the validity of the warranty given by the manufacturer of the product itself, the buyer will have to return it to the seller with the needed documents and the written description of the defect. The seller will ship the broken tube to the manufacturer in order to effect the necessary technical tests to find out the cause of the anomaly. Meanwhile the buyer of the tube who needs to use, and as such to replace immediately the product, will have to buy a new one and provide to the relevant payment, further to the issuing by the seller of a regular commercial invoice. After the adequate tests made by the manufacturer, should the result be positive, that is confirm the defect in manufacturing, the seller will issue a regular credit note in the name of the buyer and return the amount paid. Should the result be negative, that is detect a negligence in the installation or use by the buyer, he will have no right against the seller.

INTRODUCTION

The apparatus described in this manual is the latest of this series, offering high performances, remarkable reliability and a wide range of characteristics, it all at a low cost.
Its is easy to install and use. It only takes to follow the installation procedure as shown in this manual: after having removed all from the package, you only have to follow step by step the description in the various sections.
Before starting to use the apparatus, remember to:

- ❑ read carefully the general safety information contained in this section;
- ❑ follow the instructions for the installation and set up of the apparatus;
- ❑ read all the remaining sections of this manual in order to know well the apparatus and learn how to obtain the best of its characteristics.

CONTENTS OF THE MANUAL

The chapter composing this manual contain all the information concerning the use of the apparatus. For more information refer to ELETTRONIKA S.r.l.
This manual is made up of different chapters, each made up of various sections. Each individual chapter represents a single apparatus composing the whole station.

WARNING!

The currents and voltages in this equipment are dangerous!
Personnel must at all times observe safety regulation!

This manual is intended as a general guide for trained and qualified personnel who are aware of the dangers inherent in handling potentially hazaedous electrical and electronic circuits.
It is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this or other electronic equipment.

The installation, operation, maintenance and service of this equipment involves risks both to personnel and equipment, and must be performed only by qualified personnel exercising due care.
Elettronika S.r.l. shall not be responsible for injury or damage resulting from improper procedures or from the use of improperly trained or inexperienced personnel performing such tasks.

During installation and operation of this equipment, local building codes and fire protection standards must be observed.

WARNING!

Always disconnect power before opening covers,
doors, enclosures, gates, panels or shields.
Always use grounding nsticks and short out high
voltage points before servicing. Never make
internal adjustments, perform maintenance or
service when alone or when fatigued.

Do not remove, short-circuit or tamper with interlock switches on access covers, doors, enclosures, gates, panels or shields.
Keep away from live circuits, know your equipment and don't take chances.

WARNING!

In case of emergency ensure that power has been disconnected.

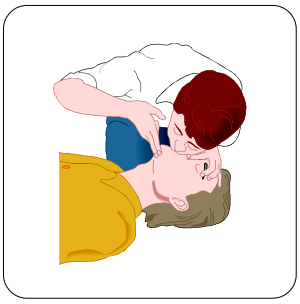
1) If victim is not responsive follow the A, B, C's of basic life support.

PLACE VICTIM FLAT ON HIS BACK ON A HARD SURFACE

A - AIRWAY

If unconscious, open airway lift up neck, push forehead back, clear out mouth if necessary, observe for breathing.

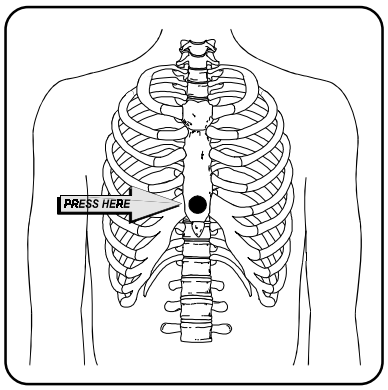
B - BREATHING



If not breathing, begin artificial breathing. Tilt head, pinch nostrils, make airttght seal, 4 quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible.

C - CIRCULATION

Check carotid pulse. If pulse absent, begin artificial circulation.



Approx. 80sec.: 1 rescuer, 15 compressions, 2 quick breaths.
Approx. 60sec.: 2 rescuers, 5 compressions, 1 breath.
NOTE: DO NOT INTERRUPT RHYTHM OF COMPRESSIONS WHEN SECOND PERSON IS GIVING BREATH.

Call for medical assistance as soon as possible.

2) If victim is responsive:

- keep them warm;
- keep them as quiet as possible;
- loosen their clothing (a reclining position is recommended).

FIRST-AID

Personnel engaged in the installation, operation, maintenance or servicing of this equipment are urged to become familiar with first-aid theory and practices. The following information is not intended to be a complete first-aid procedure, it is brief and is only to be used as a reference. It is the duty of all personnel using the equipment to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.

TREATMENT OF ELECTRICAL BURNS

1) Extensive burned and broken skin.

- Cover area with clean sheet or cloth (cleansed available cloth article);
- do not break blisters, remove tissure, remove adhered particles of clothing, or apply any salve or ointment;
- treat victim for shock as required;
- arrange transportation to a hospital as quickly as possible;
- if arms or legs are effected keep them elevated.

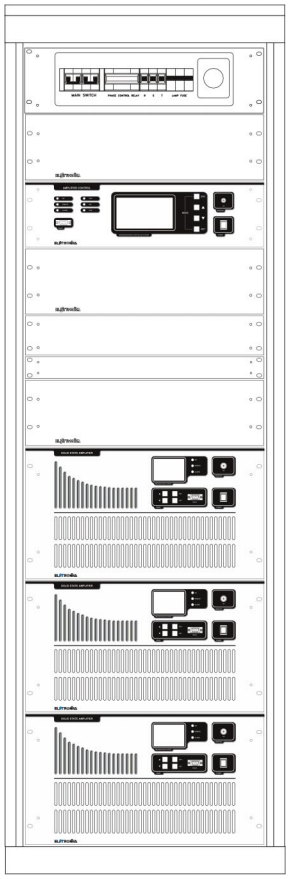
NOTE

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold).
Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes.
Discontinue fluid if vomiting occurs (do not give alcohol).

2) Less severe burns - (1st & 2nd degree).

- Apply cool (not ice cold) compresses using the cleansed available cloth article;
- do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment;
- apply clean dry dressing if necessary;
- treat victim for shock as required;
- arrange transportation to a hospital as qickly as possible;
- if arms or legs are affected keep them elevated.

LDMOS - UHF TV AMPLIFIER



AUTV/3500LD

User's manual

AUTV/3500LD
LDMOS - UHF TV SOLID STATE AMPLIFIER

INTRODUCTION

The AUTV/3500LD belongs to the High Power UHF products family of Television Transmitters fully in solid state technology.
The AUTV/3500LD series represents the 3,5kW TV Transmitters operating in the IV/V Band for Common amplification process (separate amplification available) of the Vision and Sound carriers. This Transmitters family has been designed to offer to the customer high performances, high reliability and greater simplicity in their operation and maintenance procedures.
The Vision and Sound signal processing is provided for all TV Standards and all types of Audio applications (Mono & Dual sound - NICAM) together with colour systems such as PAL - NTSC - SECAM. Thanks to the amplitude and phase pre-correction circuit, it is possible to cancel the distortions in the output stage, thus cutting down the operating costs. The RF transposition in the driver is carried out by a synthesizer with various possibilities of accuracy and stability as well as precision offset locked by internal or external frequency reference.
The RF amplifier is made up by three RF modules installed in a power rack, the modules are dedicated for the Vision and Sound carriers common amplification. The amplifiers employ solid state LDMOS technology in order to obtain wide band, reliability, and high efficiency. Each RF module has a built-in switching-mode power supply unit, self-protected against overcurrents and overvoltages, as well as overtemperature and VSWR for RF parameters. The cooling system is fully contained into the transmitter. The control unit provides full management of the transmitter without the presence of the operator, the system includes a central controller and several peripheral units installed in each RF module and rack. The control device includes a fault finding system to detect equipment malfunctions and locate the faulty subassembly which needs to be replaced. The interlock circuit is independent on the software and remains always operational whether computer control is present or not. The operator interface is made by a high resolution LCD graphic display and a simple keyboard, the menu is very friendly and easy to use.
The Control Unit can be fully controlled in REMOTE mode via link or via modem in RS232 or other interface.
The equipment design allows the soft degradation (RF power loss) for several transistors faults.

TECHNICAL CHARACTERISTICS

RF SECTION

Frequency range	470 - 860MHz
Output power	3,5kW PEP
Vision / Sound power ratio	10/1 single sound - 20/1/0.2 dual sound
Out stage technology	Solid State LDMOS
Vision / Sound amplification	Common
Standards	G, K, I, M
Sound transmission	FM single sound - Dual sound coding IRT - NICAM 728
Harmonics and spurious emission	In compliance with CCIR rec.
Intermodulation products from vision and sound	<= 56dB
Frequency stability	2,5ppm (option 0,05ppm)

VISION SECTION

Video input	BNC 75Ω connector
Nominal input level	1Vpp ± 6dB
Return loss	>= 30dB
DC Restoration	Clamped to the blanking level without affecting the burst
White limiter	At 90% picture signal without affecting the chrominance

Transmission characteristics

Sideband spectrum response	According to the standard
Amplitude frequency response	According to the standard
Group delay variation without receiver pre-correction and TV demodulator in flat	<= ± 35ns
Non linearity distortion (10 to 75% mod.)	<= 5%
Differential gain (10 to 75% mod.)	<= 5%
Differential phase (10 to 75% mod.)	<= 5°
Signal to random noise ratio (weighted 0.2 to 5MHz)	>= 60dB
Blanking level variation	<= 2%
2T k factor	<= 2%

SOUND SECTION

Nominal input level (± 50kHz dev.)	-10 to +8dBm
Input impedance	600Ω balanced
Pre-emphasis	50ms

Transmission characteristics

Amplitude-frequency response	40 to 15000Hz ± 0.5dB
Total harmonic distortion	<= 0.5%
FM Signal to noise ratIO (referred to ± 50kHz dev. f = 400Hz)	>= 60dB (weighted)

AM Signal to noise ratio	>= 50dB (referred to 100%)
AM Synchronous modulation	<= 40dB (referred to 100%)

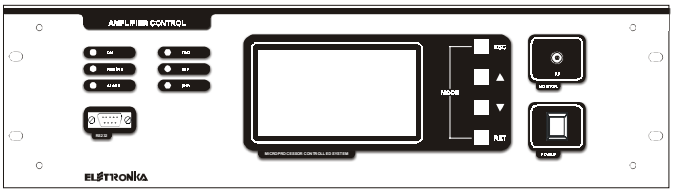
REMOTE CONTROL

Parallel interface	On/Off, Alarms, Interlock
Serial interface	RS232 (Full monitoring and management)

GENERAL

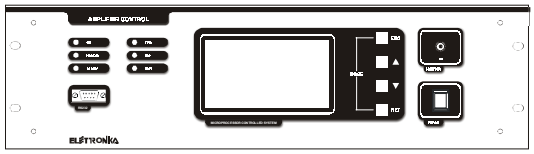
Power supply voltage	3x380VAC, ±10% (other on request)
Frequency	50-60Hz, ± 5%
Temperature operating range	0 to 45°C
Altitude	Up to 2.500 meters (>= 2.500m with additional cooling system)
Power consumption (cooling system included)	<= 10,2kVA (black level)
Power factor	>= 0.9
Cooling	Forced air
Dimensions	Rack 19”-36U

AMPLIFIER CONTROL



ELETTRONIKA	**CODE:** APG012C	**TITLE:** AMPLIFIER CONTROL	**REV:** 1	**DATE:** 10/02/04

AMPLIFIER CONTROL



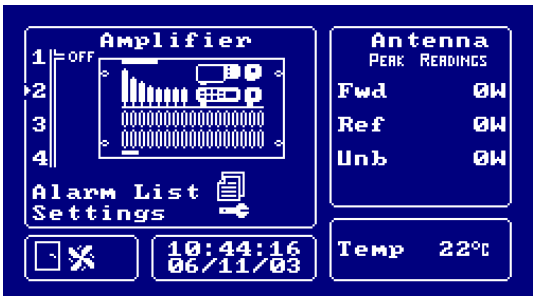
1.1 CONTROL SYSTEM OVERVIEW

The control system is made up by some *"Slave"* boards, which check locally the amplifier modules, and a *"Master"* board to monitor the status of the *Slave* boards in each module and show on a graphic display all the checked parameters.
The number of the *Slaves* changes depending on the output power of the amplifier. The communication between Master and Slaves is made via RS485 standard. The *Master* board reads the overall parameters of the equipment (Forward and Reflected power and Unbalancing), *polls* (interrogaes in sequence) the local boards, shows on the display the values requested by the user, indicates alarm conditions, if any, and allows to change some of the operating parameters of the apparatus. Besides it realizes a serial data interface to an external system able to analyse the working parameters of the equipment, using the RS232 and RS485 communication protocols.

1.2 FUNCTIONS

At start-up, the display of Amplifier Control module shows an informational message concerning the equipment and its firmware version.

- Main menu
The main menu has: a list of the amplifier modules, the measure of some parameters of the power in antenna, a window with icons to show the alarm status (Alarm Status Window) and some general information, that is date, time, temperature inside the module and, for FM equipment, transmission frequency.
The following picture is an exact representation of the main menu screen.



In the Amplifier List, next to each module, the following symbols can be found:

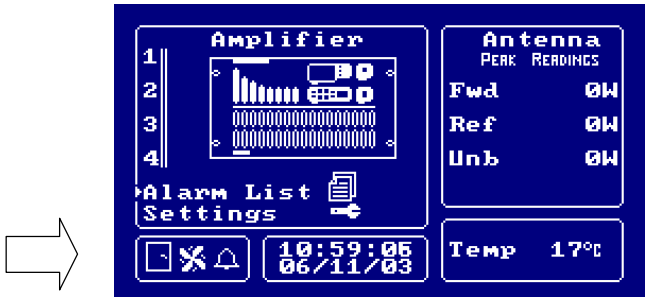
if the communication with the slave is correct and then

ON if the amplifier module is ON

OFF if the amplifier module is OFF

if the communication with the slave is interrupted

The *UP* and *DOWN* arrow keys allow to select one of the slave, the alarm list, or a menu allowing to change some settings of the control module and the apparatus; the *RET* key is used to confirm the selection.
In the main and slave menu the Alarm Status Window (which position is indicated by an arrow in the picture below) is shown: the gate symbol displays the status of the INTERLOCK, in case of alarm this icon blinks and the buzzer ringgs.
The INTERLOCK signal is a control available to the user to manage an ON/OFF sensor.
When the relevant PIN is grounded, the Master board does not signal any alarm, as soon as the PIN is left floating, an alarm is detected; the rotating screw symbol shows that the FANS work normally; in case of alarm this icon blinks and the buzzer rings; the bell symbol appears in case of alarm detected by the control module or the amplifier. It blinks if the alarm condition is terminated and the alarm itself can be displayed in the Alarm List.

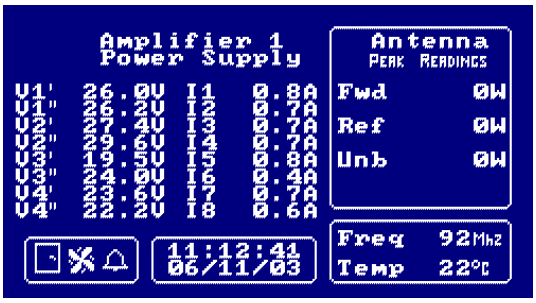


If one of the parameters of a *Slave* or any of the ones directly checked by the *Master* is alarmed, the general

alarm LED and the alarm icon blink until the Alarm List is checked to see the type of alarm occurred.
Besides, if an alarm for any of the powers of the signals in antenna occurs, the relevant measure in the *Antenna* window of the display and the relevant LED on the front panel of the Master module blink until the measure decreases below the threshold level, determined by the nominal power of the amplifier.
If the slave modules are working and an INTERLOCK or FANS alarm occurs, aside from the indication explained above, the amplifiers are switched off. This happens immediately after an INTERLOCK alarm, or about 7 seconds after a FANS alarm is detected.
In case the amplifiers are communicating but switched off, or they are not communicating and the INTERLOCK alarm contact is open, a WARNING condition occurs: buzzer on and blinking ALARM LED on the front panel; while if it is the FANS alarm contact to be open, the icon of the alarm appears in the box.
Further to any of these two alarms it is possible to choose whether to turn off the amplifiers or not. In fact, there is a submenu of the Settings menu which allows to choose whether to turn off the amplifiers connected to the control module as a consequence of an INTERLOCK and FAN alarm.

- Slave menu

By selecting one of the slaves, it is possible to see all the parameters of that amplifier module in two pages. The first one shows voltages and currents Power Supply, the second one shows RF Powers: forward and reflected power, temperature and, for some amplifiers, unbalancing and input power. The UP and DOWN keys allow to scroll the local measures of all the slaves, page by page. The ESC key is used to go back to the main menu. The following pictures show the menu screen of one amplifier.

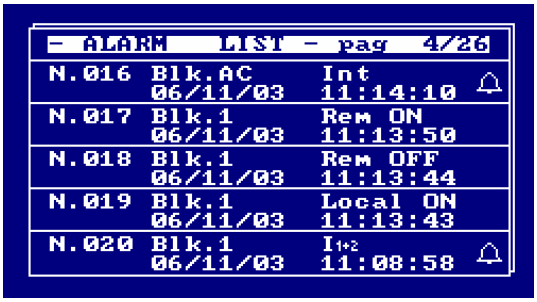


Note that no numerical value is shown for amplifiers which are not communicating with the control module.

- Alarm List

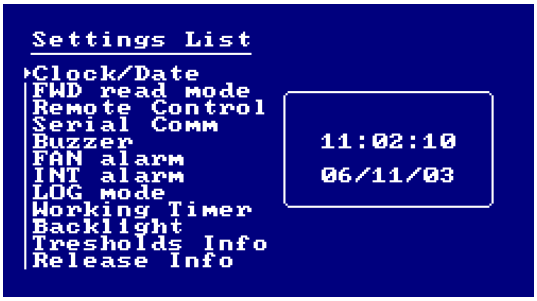
By selecting the Alarm List, 26 pages listing the latest 130 alarms saved are shown. Each page shows 5 alarms, each contained in a box providing the following information: progressive number of the alarm, starting with the most recent; number of the module in which the alarm occurred, following the "Blk." Message (the indication "AC" means that the alarm occurred in the Amplifier Control module); parameter in alarm, date and time of the alarm. Next to the parameter showing the alarm type there may be a bell symbol. In case it is not here, the alarm event has been communicated by an amplifier connected to the control module. These events are different and on option of the Settings menu allows to choose whether they are displayed or not in the alarm list.

The saved alarm can be deleted by keeping simultaneously pressed the *UP* and *DOWN* keys. The *ESC* key is used to go back to the main menu. The picture shows a page of the list, containing both alarms and general events.



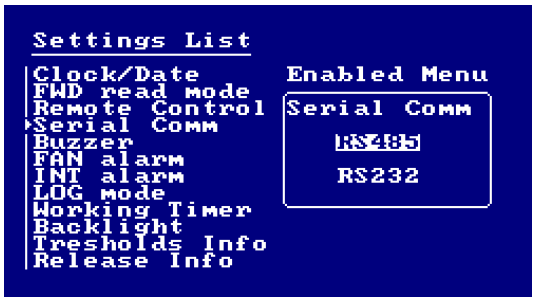
1.3 PROGRAMMING MODE

The Settings menu gives access to programming mode. As shown below, the menu offers a list of settings next to a window showing the default parameter set, or the one selected previously, when the pointer is moved on the relevant options.



The menu under the cursor is accessed by pressing the RET key. This is shown by the "Enabled Menu". Once

the menu is accessed, it is possible to change the value of the displayed fields or select a function by means of the arrow keys. The RET key is used to confirm the selection (an acoustic signal should be heard). The ESC key (or no key pressed for more than 7 seconds) sends back to the setting list. Pressing it again (or pressing no key for more than 10 seconds) brings back to the main menu.
Every selection made in the Settings menu is stored into the EEPROM until it is changed again, this allows to remember the settings status after an equipment reset.



Description of the submenus included in Settings.

SUBMENU	OPERATION
Clock / Date	Update the time and date shown in the main menu box.
FWD Read Mode	Selection of the analogue voltage signal (PEAK or RMS) to convert and display the Forward power in antenna. A message in the main menu screen confirms current choice.
Remote Control	It is possible to remotely control the apparatus, thus to monitor the parameters shown on the display of Amplifier Control module and check the status of the transmitter. This is done through RS232 or RS485 standard serial communication, digital and analog inputs through the DB25 telemetering connector on the rear panel of the Amplifier Control module. If the "Local" mode is set in this menu, the control module and the apparatus can only be controlled locally, and a remote command is ignored. If "Remote" is set instead, the REMOTE LED on the front panel of the module lights up after going back to the main screen. From then on, incoming remote commands from either the serial port or the telemeasuring connector on the rear panel are handled *(Note 1)*.

Serial Comm	Selects the remote control via serial port. **RS232 MODE:** the RS232 mode allows a direct access to the equipment via PC and a remote access via modem or switched telephone line. **RS485 MODE:** the RS485 mode allows a remote access to the equipment via modem over switched telephone line or GSM network. It allows the connection to the Remote Control System, designed to monitor several apparatuses located at the same site.
Buzzer	Enables / disables the buzzer during normal operation.
FAN Alarm	Select "OFF" to have the amplifiers turned off further to a FAN alarm; if "ON" is selected, they will stay on.
INT Alarm	Select "OFF" to have the amplifiers turned off further to a INTERLOCK alarm; if "ON" is selected, they will stay on.
LOG Mode	Select "only alarms" to store in the EEPROM and display in the module LOG only detected alarms; select "all events" to store and display also any event detected by any amplifier and sent via RS485 to the control module.
Working Timer	Updates the counter of the working time of the transmitter. Once this menu has been enabled, the counter reset option appears in the window.
Backlight	If "Switch Off" is selected and no key is pressed for 8 minutes, the back light of the display is turned off; select "always ON" to have it always on.
Frequency	This menu only exists in the firmware for Amplifier Control of FM transmitters. The working frequency can be selected within a range from 88 to 108MHz, this allows to optimise the display of the Forward power sent to the antenna.
Thresholds info	Shows for some seconds the alarms thresholds of the powers sent to the antenna.
Release info	Shows for some seconds information concerning the transmitter and the firmware version.

Note 1: to control the apparatus from remote, consider that pins n. 1 and n. 14 of the telemetering connector on the rear panel of Amplifier Control module are used to receive the ON (pin n. 1) and OFF (pin n. 14) commands, both impulsive and stationary. The digital level on these contacts is usually high, becoming low when the remote control is active. When a remote command to turn off the amplifiers is received while the transmitters is ON, the LED ON of the frontal panel blinks.

1.3 POWER CALIBRATION

- FWD Power calibration

Disconnect the antenna and connect a wattmeter to the antenna connector. Give power to the amplifier until you will read on the wattmeter a value corresponding to the equipment nominal power. Then turn the trimmer A (see mounting plan BOTTOM - PN1071AR2, it is a variable resistor used to adjust the A analog input measure) until you read approximately the same FWD power value on the display.

- REF Power calibration

Disconnect the antenna and connect a wattmeter to the antenna connector. Connect the Forward power monitoring cable to the Reflected power input connector. Give power to the amplifier until you will read on the wattmeter a value corresponding to 10% of the equipment nominal power. Then turn the trimmer B (see mounting plan BOTTOM - PN1071AR2, it is a variable resistor used to adjust the B analog input measure) until you read approximately the same REF power value on the display.

- UNB Calibration

Connect a wattmeter before the dummy load. Give power to the amplifier then turn off one slave module: you will read an amount of unbalancing power on the wattmeter. Turn the trimmer C (see mounting plan BOTTOM - PN1071AR2, it is a variable resistor used to adjust the C analog input measure) until you read approximately the same UNB power value on the display.

1.4 RS232 AND RS485 PIN TABLES

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	-	-	-
2	Digital	Output	TX232
3	Digital	Input	RX232
4	-	-	-
5	GND	-	-
6	VDC +5V	-	-
7	-	-	-
8	-	-	-
9	-	-	-

RS232 - DB9 Connector (Front panel)

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	-	-	-
2	Digital	Input	RX2_485B-
3	Digital	Input	RX2_485A+
4	-	-	-
5	GND	-	-
6	-	-	-
7	Digital	Output	TX2_485Z-
8	Digital	Output	TX2_485Y+
9	-	-	-

RS485 - DB9 Connector (Rear panel)

1.5 TELEMEASURING PINS TABLE

PIN N°	SIGNAL TYPE	IN / OUT	FUNCTION
1	Digital	-	REMOTE ON/OFF TTL: GND = REMOTE ON +5V = REMOTE OFF
2	Digital	Output	-
3	Digital	Output	-
4	Digital	Output	-
5	Digital	Output	-
6	Digital	Output	-
7	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
8	Digital	Output	-
9	GND	-	-
10	Analog	Output	-
11	Analog	Output	-
12	Analog	Output	-
13	Analog	Output	-
14	Digital	Input	REMOTE AMPLIFIER ON/OFF TTL: if REMOTE ON then GND = AMPLIFIER OFF +5V = AMPLIFIER ON
15	Digital	Output	-
16	Digital	Output	-
17	Digital	Output	-
18	Digital	Output	-
19	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
20	GND	-	-
21	+5V	-	-
22	Analog	Output	FWD Power [0,+ 5V]
23	Analog	Output	REF Power [0,+ 5V]
24	Analog	Output	UNB Power [0,+ 5V]
25	Analog	Output	-

1.6 OTHER TABLES

	SYGNAL TYPE	IN/OUT	FUNCTION
A	Analog	Input	FWD Power monitoring
B	Analog	Input	REF Power monitoring
C	Analog	Input	UNB Power monitoring
D	-	-	-
E	-	-	-
F	-	-	-
G	-	-	-

BNC Connectors

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	GND	-	-
2	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
3	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	Analog	Output	FWD Power (range 0 - +5V)
9	Analog	Output	FWD Power (range 0 - +5V)

AGC Connector

BNC	SYGNAL TYPE	IN/OUT	FUNCTION
Contact	Digital	Input	FANS control Switch or TTL: closed/GND = no FANS alarm open/+5V = FANS alarm
Body	GND	-	-

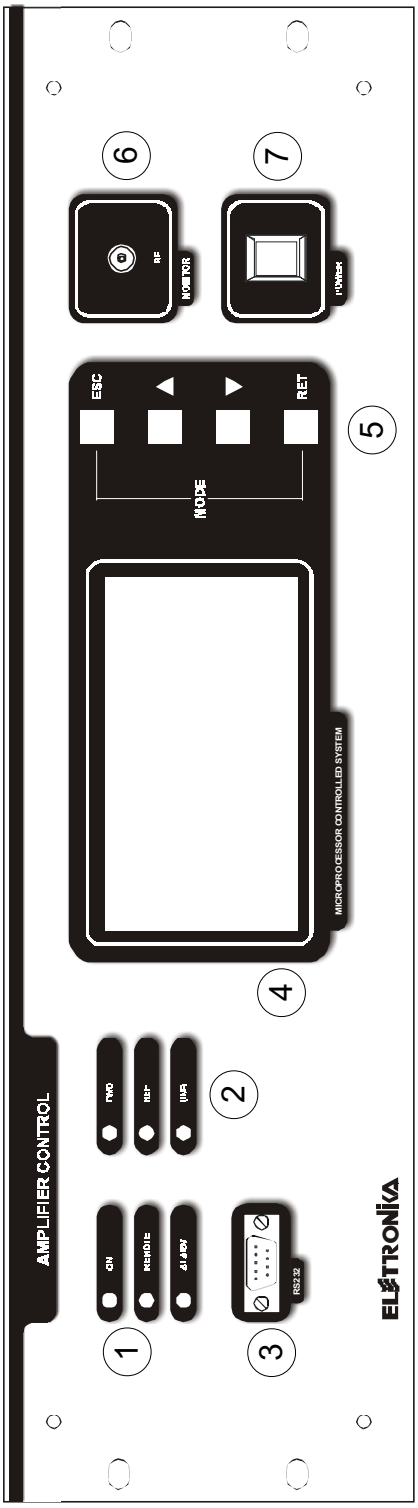
FANS CONTROL Connector

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	-	-	-
2	Digital	Output	TX1_485Z-
3	Digital	Output	TX1_485Y-
4	-	-	-
5	GND	-	-
6	-	-	-
7	Digital	Input	RX1_485B-
8	Digital	Input	RX1_485A+
9	-	-	-

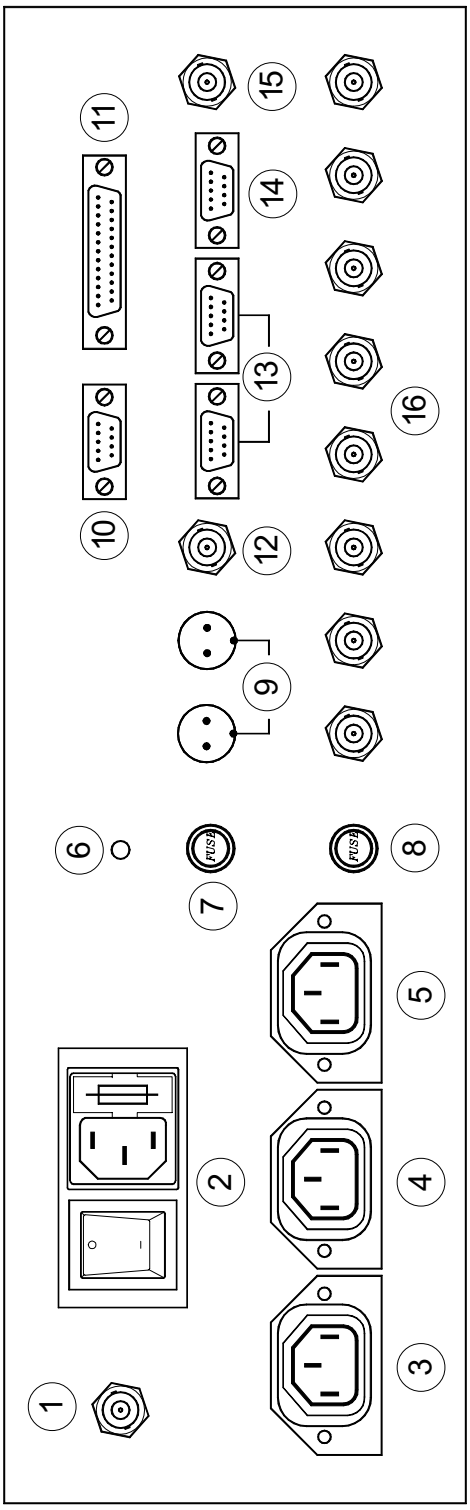
RS485 - DB9 Connector (Amplifiers communication)

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	GND	-	-
2	VDC +24V	-	-

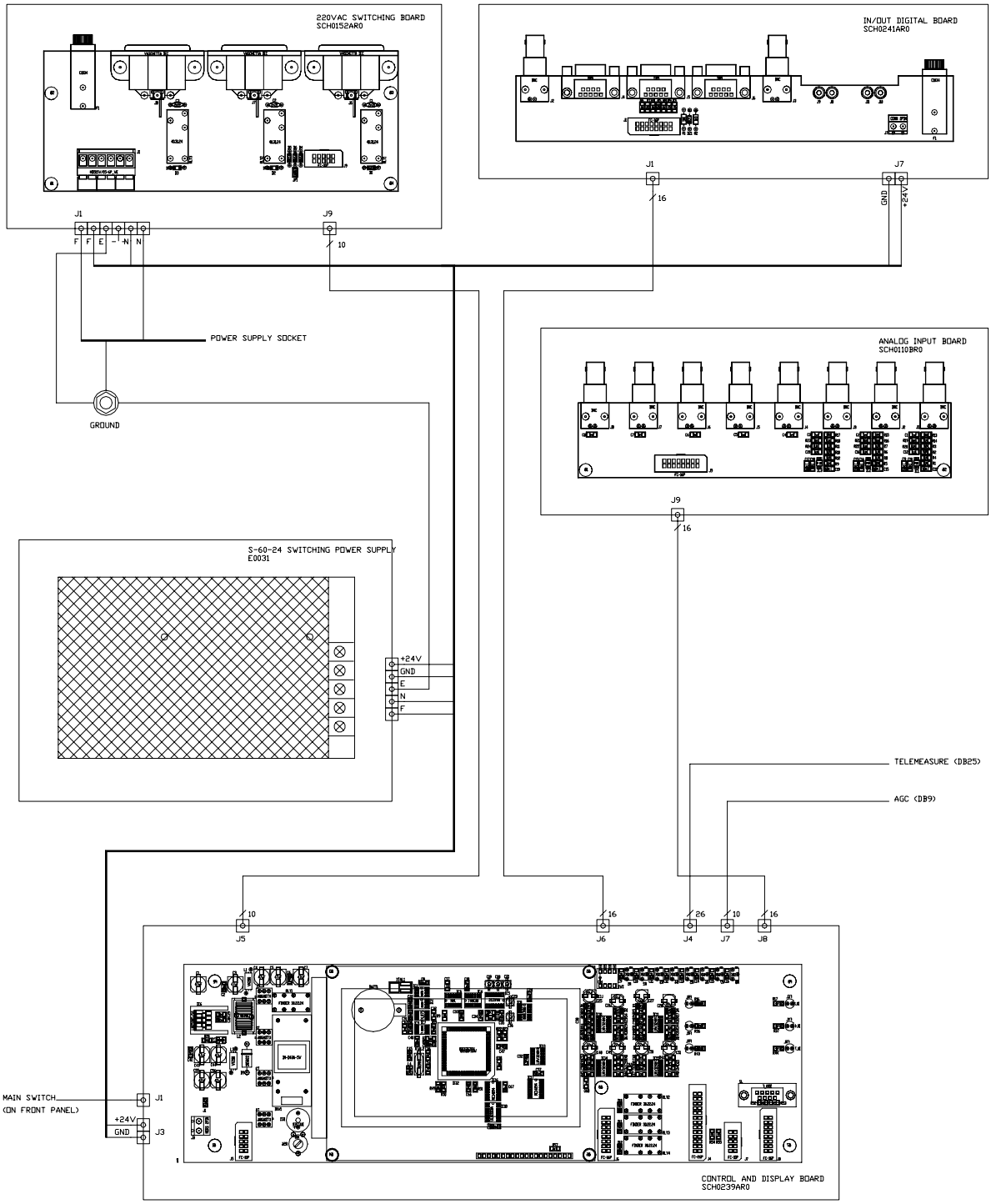
24VDC LOAD FAN Connector



DESCRIPTION	
1	Status LEDs
2	Alarm LEDs
3	RS232 Socket
4	LCD Display
5	Function keys
6	RF Monitor connector
7	ON/OFF Switch



DESCRIPTION	
1	RF Input connector
2	Main Power supply socket with Fuse-Holder by 10A
3	Driver1 Power socket
4	Driver2 Power socket
5	Fans Power socket
6	GND
7	Fuse by 1A
8	Fuse by 8A
9	24Vdc Connectors
10	AGC Socket
11	Telemeasures socket
12	Fans Control connector
13	RS485 Socket (Amplifiers Communication)
14	RS485 Socket (Remote Control)
15	Interlock connector
16	Power measurement connector



ELETTRONIKA srl	DESCRIPTION Schema di Cablaggio CASSETTO DI CONTROLLO	DESIGNER MINERVINI	Sign.	DATE 11/02/2004
		PCB DESIGNER MINERVINI	Sign.	REF
CODE APG012C	TITLE AMPLIFIER CONTROL Cable Diagram	QUALITY CONTROL RUSSO	Sign.	SHEET 1/1

Part Name Code	Description	Qty
CON0145	CON0145R0 POST. CASS. CONTROLLO APG012B	1
05504	CON0134R0 PIANO PROF. 260 ARE. p. 02047 ZN	1
05525	LAT. 3U PROF. 260 TAV. 424/A p. 2033 ZN	2
PAN0066	PAN0066R0 PANNELLO CONTR. APG012B 3U	1
CON0153	CON0153AR0 BASE CASS. CONTR. x APG012 ZN	1
0552B	KIT MANIGLIE 3-4U cod. 235.012	2
02880	SPINA V.DE 10A + INT. + FUS. DA PANN. BZ15011	1
SCH0239AR0	SCHEDA DI CONTROLLO CON DISPLAY	1
SCH0110BR0	SCHEDA 3 IN. ANALOGICI MASTER APG012B	1
SCH0152AR0	SCHEDA COMMUTAZIONE 220VAC x APG012B	1
SCH0241AR0	SCHEDA IN/OUT DIGITAL SIGNAL FOR APG012C	1
E0031	ALIM. SWITCHING S-60-24	1
07926	PROTEZIONE IN GOMMA PVC PG 087	1
02843	SPINA SCHERM. 2 POLI cod. 525.2552	1
02695	CONNETTORE DB9F x CAVO IU008059	1
02856	CONNETTORE DB25F x CAVO 525-2812	1
07925	PROTEZIONE IN GOMMA PVC PG075	1
07524A	INTERR. NERI I3910	1
02018	GE 35145D/22 BN(UG909/cxRG174)	1
02035	PRESA BNC/F x RG316 cod. 60140	1
08500	CAVO RG174 50Ω	0,30
02700	CONNETTORE cod. 534-2303 FEM. 16 VIE	1
02790	CONNETTORE DB25M x CAVO SALDATO 525-2602	1
02871A	CALOTTE PER DB25 cod. 525-2622	1
C0814	NASTRO CONDUT. IN RAME DA 25mm 264/9275	0,50
V0761	TAPPI NERI O 12.7 PLASTICA DP-500	5

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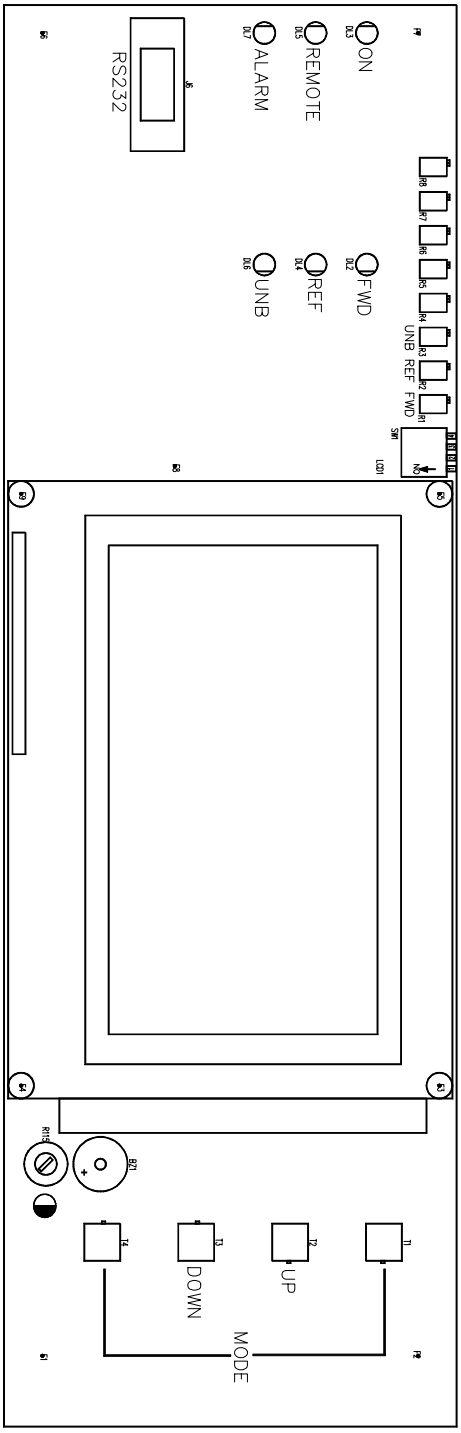
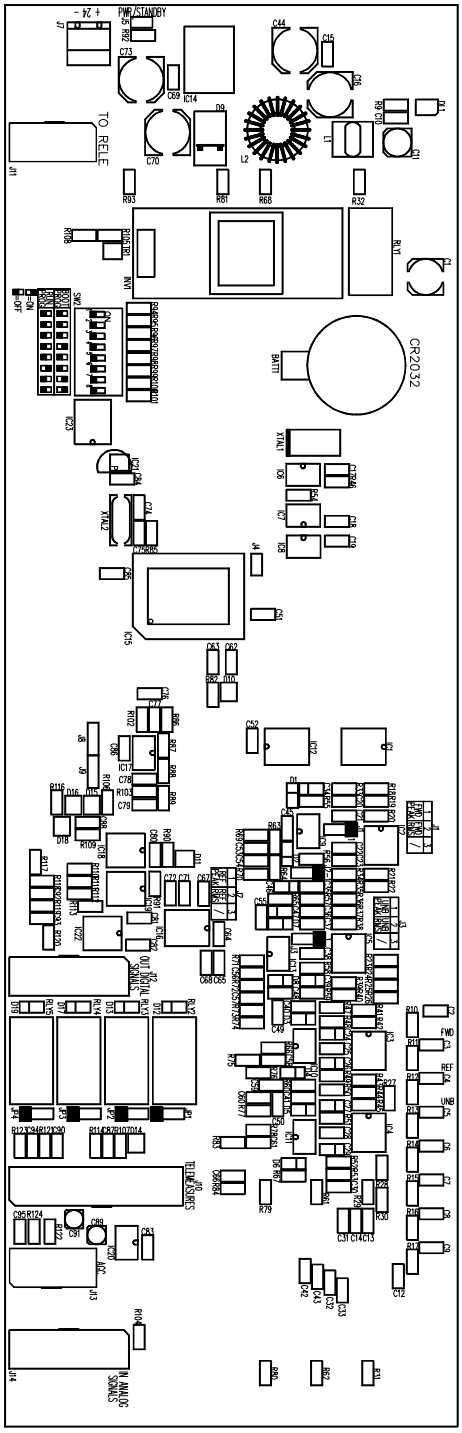
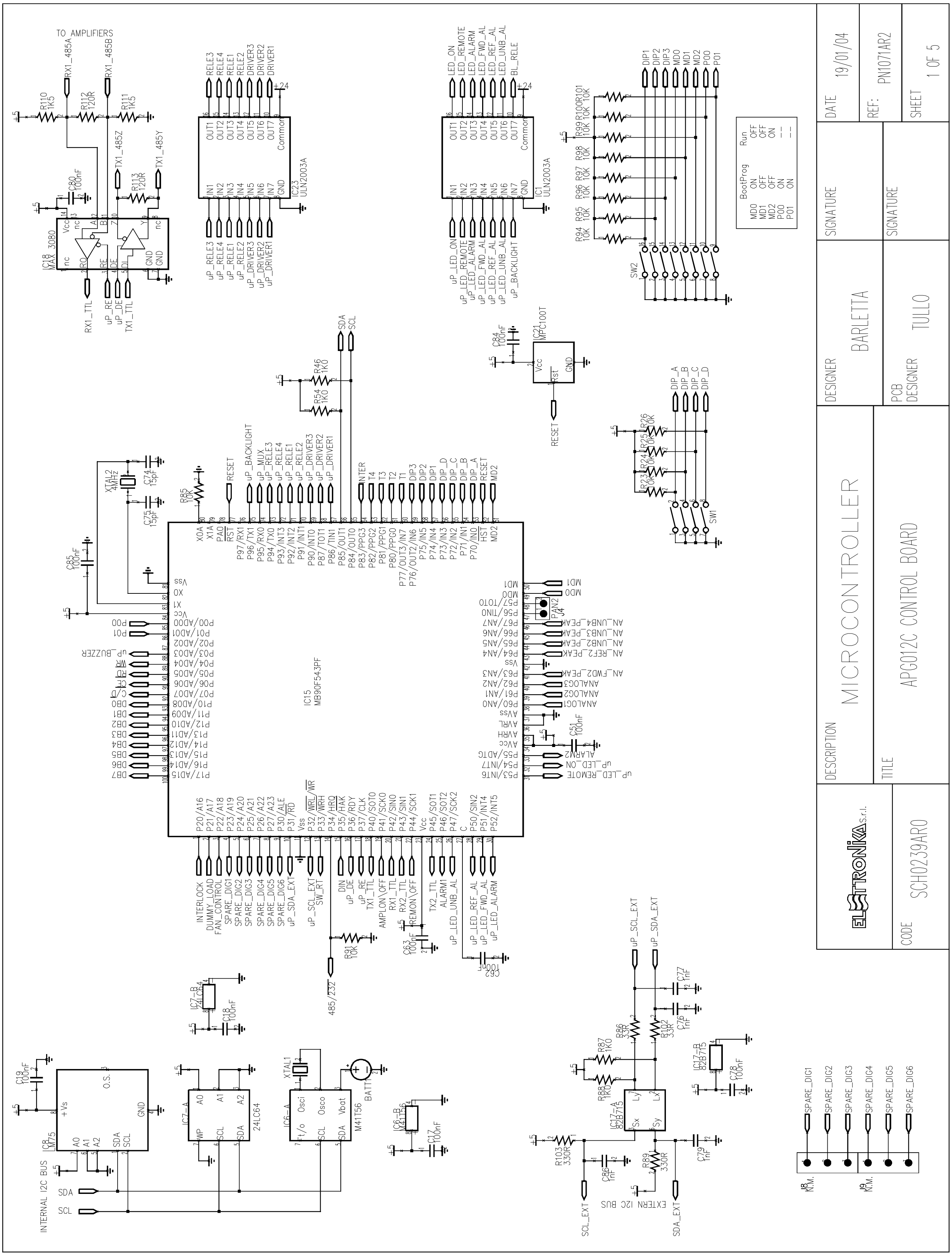
Component layout SCH0239AR0 (Bottom and Top layer)



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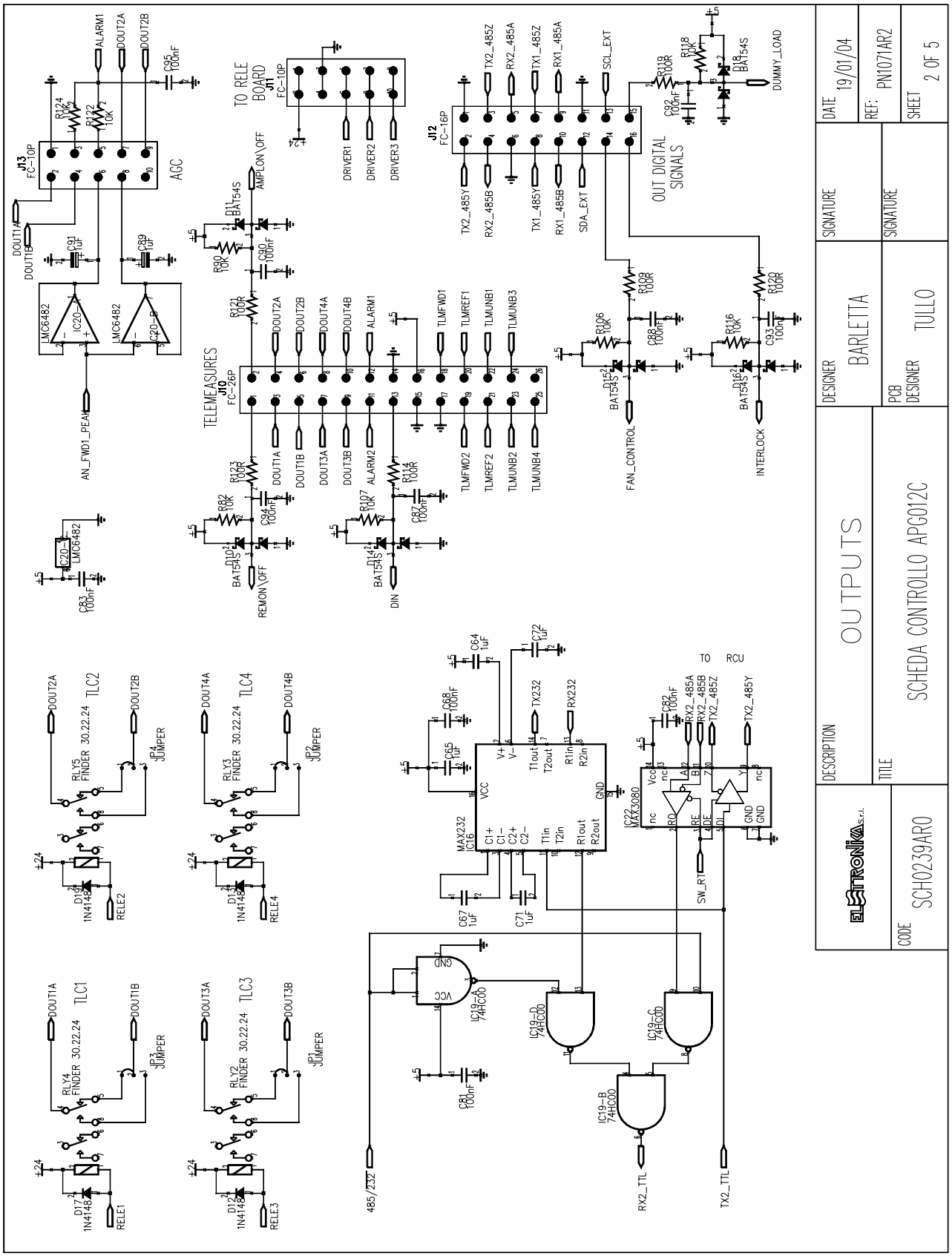
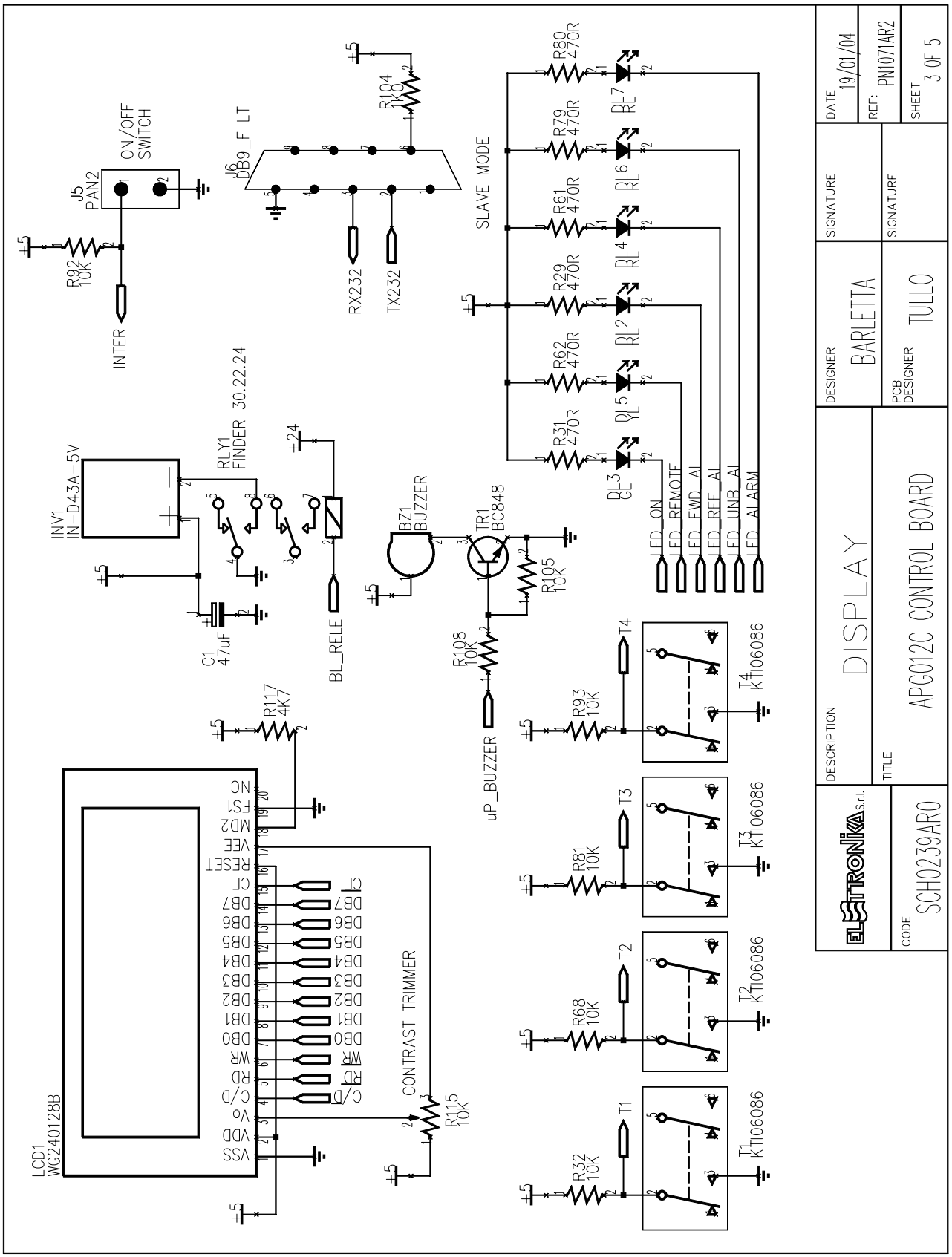
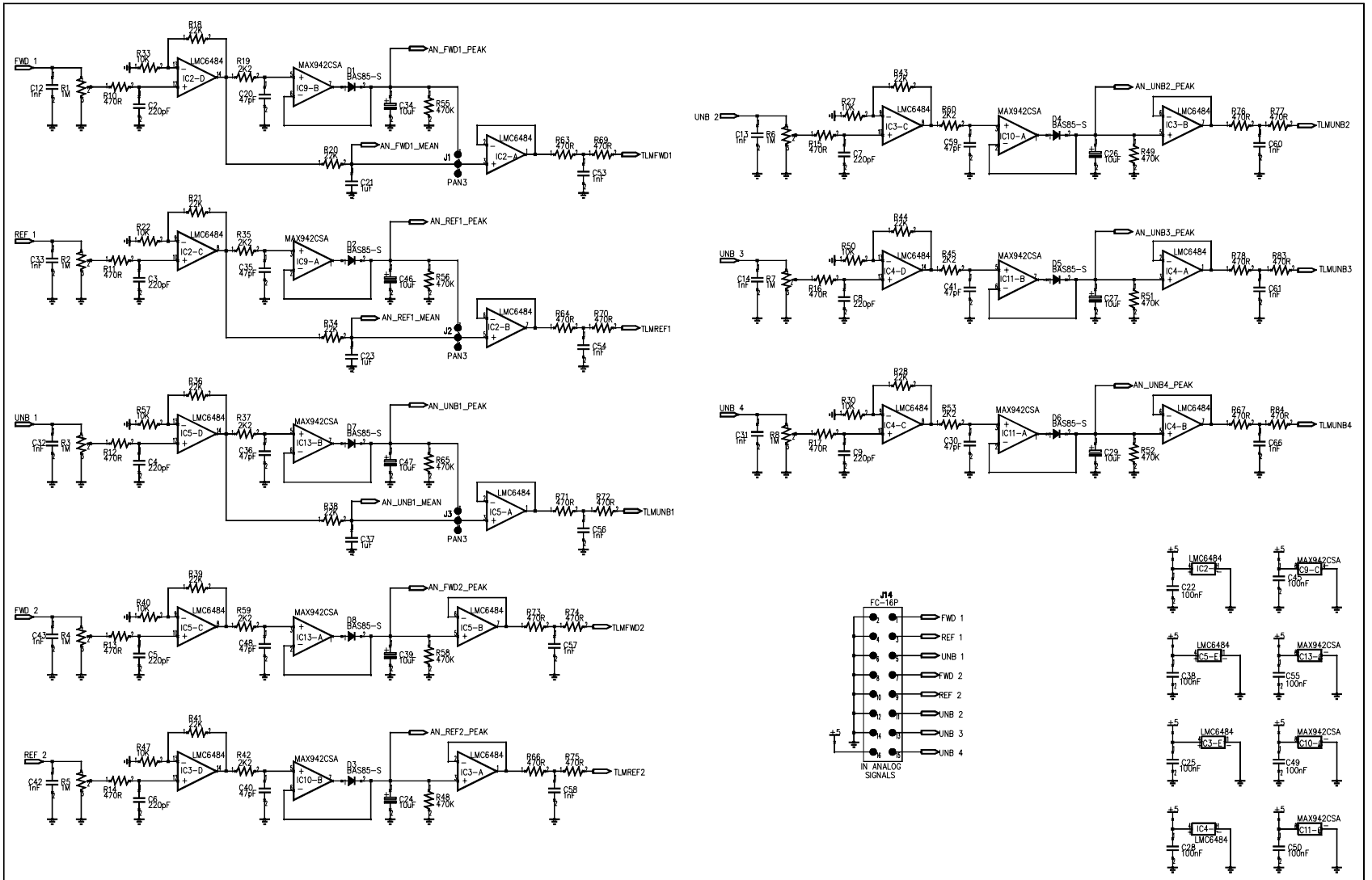
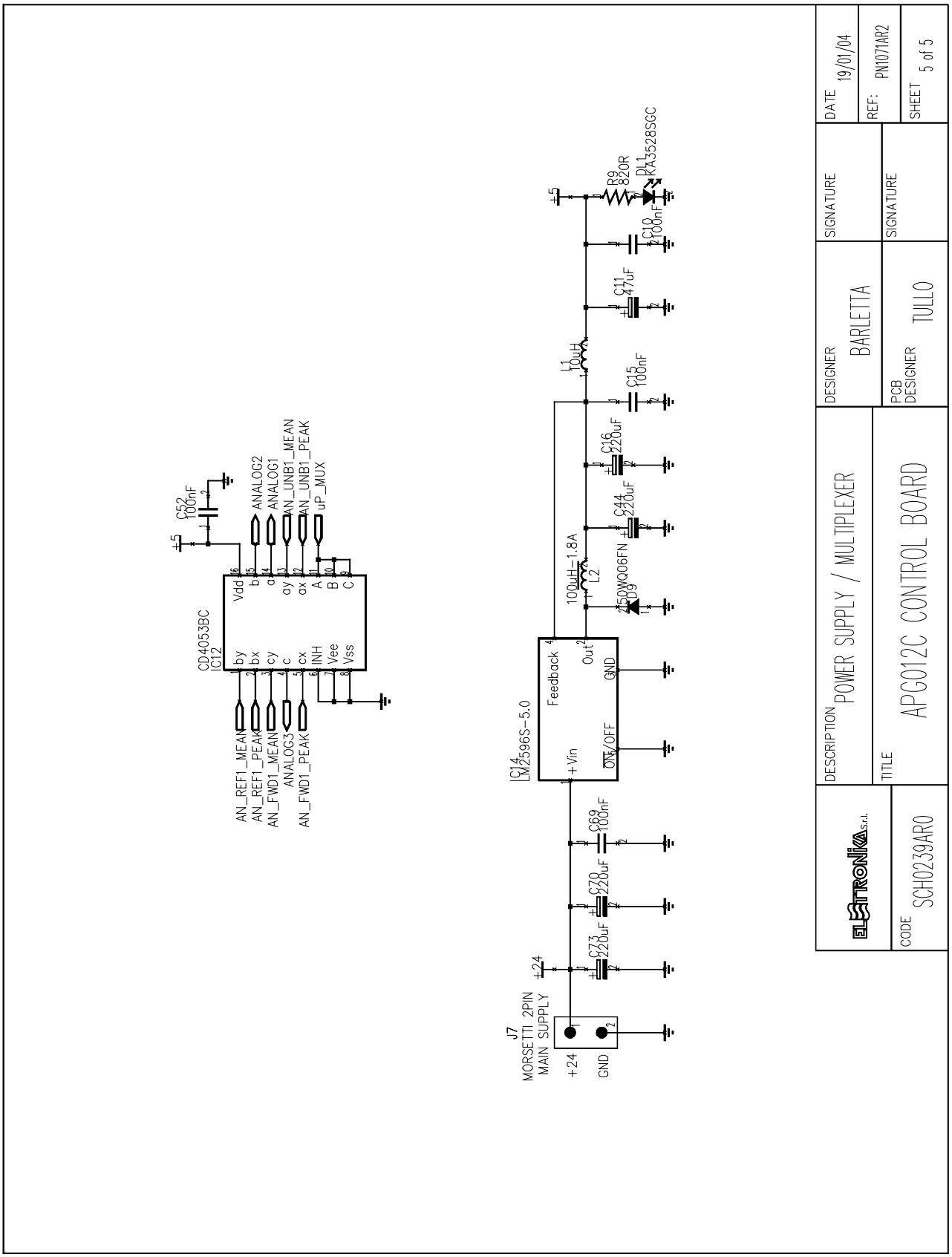
MICROCONTROLLER
TITLE
APG012C CONTROL BOARD
CODE
SCH0239AR0
DESIGNER
BARLETTA
PCB DESIGNER
TULLO
SIGNATURE
DATE
19/01/04
REF:
PN1071AR2
SHEET
1 OF 5


OUTPUTS
SCHEDA CONTROLLO APG012C
SCH0239ARO
ELETTRONICA s.r.l.
DESCRIPTION
TITLE
CODE
DESIGNER
BARLETTA
PCB DESIGNER
TULLO
SIGNATURE
SIGNATURE
DATE 19/01/04
REF: PN1071AR2
SHEET 2 OF 5
AGC
TO RELE BOARD
TELEMEASURES
OUT DIGITAL SIGNALS
TO RCU
TLC1
TLC2
TLC3
TLC4
RELE1
RELE2
RELE3
RELE4
REMON\OFF
DIN
AMPLON\OFF
DRIVER1
DRIVER2
DRIVER3
AN_FWD1_PEAK
FAN_CONTROL
INTERLOCK
DUMMY_LOAD
SCL_EXT
SDA_EXT
485/232
RX2_TTL
TX2_TTL
SW_RT
MAX232
MAX3080
LMC6482
74HC00


ON/OFF SWITCH
J5 PAN2
R92 10K
INTER
DB9_F LT
J6
R104 10K
RX232
TX232
SLAVE MODE
R80 470R
R79 470R
R61 470R
R29 470R
R62 470R
R31 470R
RL7
RL6
RL4
RL2
RL5
RL3
LED_ON
LED_REMOTE
LED_FWD_AL
LED_REF_AL
LED_UNB_AL
LED_ALARM
INV1 IN-D43A-5V
RLY1 FINDER 30.22.24
+24
C1 47uF
BL_RELE
BZ1 BUZZER
TR1 BC848
R105 10K
R108 10K
uP_BUZZER
R117 4K7
LCD1 WG240128B
CONTRAST TRIMMER
R115 10k
R32 10K
R68 10K
R81 10K
R93 10K
T1
T2
T3
T4
KT106086
DESCRIPTION
DISPLAY
TITLE
APG012C CONTROL BOARD
DESIGNER
BARLETTA
PCB DESIGNER
TULLO
SIGNATURE
SIGNATURE
DATE
19/01/04
REF:
PN1071AR2
SHEET
3 OF 5
CODE
SCH0239ARO



ELETTRONIKA S.r.l.	DESCRIPTION: INPUT SIGNALS	DESIGNER: BARLETTA	SIGNATURE	DATE: 19/01/04
CODE: SCH0239AR0	TITLE: APG012C CONTROL BOARD	PCB DESIGNER: TULLO	SIGNATURE	REF: PN1071AR2
				SHEET: 4 OF 5

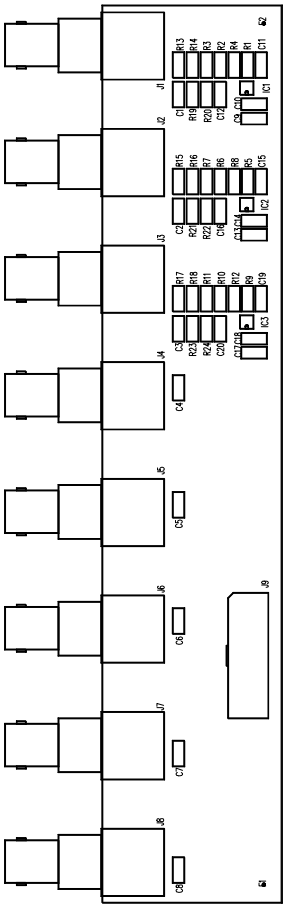

+5
C52
100nF
ANALOG2
ANALOG1
AN_UNB1_MEAN
AN_UNB1_PEAK
uP_MUX
CD4053BC
IC12
Vdd
by
bx
cy
c
cx
INH
Vee
Vss
ay
ax
A
B
C
AN_REF1_MEAN
AN_REF1_PEAK
AN_FWD1_MEAN
ANALOG3
AN_FWD1_PEAK
+5
R9
820R
PA1
KA3528SGC
C18
100nF
C11
47uF
L1
10uH
C15
100nF
C16
220uF
C44
220uF
100uH-1.8A
L2
150WQ06FN
D9
IC14
LM2596S-5.0
Feedback
+Vin
ON/OFF
Out
GND
C69
100nF
C70
220uF
C73
220uF
+24
J7
MORSETTI 2PIN
MAIN SUPPLY
+24
GND
DESCRIPTION
POWER SUPPLY / MULTIPLEXER
TITLE
APG012C CONTROL BOARD
CODE
SCH0239ARO
DESIGNER
BARLETTA
SIGNATURE
PCB
DESIGNER
TULLO
SIGNATURE
DATE
19/01/04
REF:
PN1071AR2
SHEET
5 of 5

COMPONENT LIST *SCH0239AR0*

Part Name/Number	Description	Qty.	Comps.	Page 1/2
BATT BH001RB 3093_90	03093 03090 BATTERY HOLDER	1	BATT1	
BZ AI-155 03705	03705 5VDC BUZZER	1	BZ1	
CC 100nF-S 01065C	01065C Y5V 1206 COND	33	C10, C15, C17-19, C22, C25, C28, C38, C45, C49-52, C55, C62-63, C68-69, C78, C80-85, C87-88, C90, C92-95	
CC 15pF-S 01088	01088 SMD 1206 COND	2	C74-75	
CC 1nF-S 01096	01096 SMD 1206 COND	20	C12-14, C31-33, C42-43, C53-54, C56-58, C60-61, C66, C76-77, C79, C86	
CC 1uF100V-S 01760A	01760A Y5V 1206 COND <<50 V>>	8	C21, C23, C37, C64-65, C67, C71-72	
CC 220pF-S 01093	01093 SMD 1206 COND	8	C2-9	
CC 47pF-S 01100	01100 SMD 1206 COND	8	C20, C30, C35-36, C40-41, C48, C59	
CE 10uF16V-S	01626B TANT. ELETTR SMD CO	8	C24, C26-27, C29, C34, C39, C46-47	
CE 1uF50V-S 01763A	01763A ELETTR SMD COND	2	C89, C91	
CE 220uF50V LOW ESR	1799A ELETTR SMD COND LOW ESR	4	C16, C44, C70, C73	
CE 47uF35V-S 01790A	01790A ELETTR SMD COND	1	C11	
CE 47uF50V-S 01791C	01791C ELETTR SMD COND	1	C1	
D 1N4148-S 03002	03002 SMD DIODE	4	D12-13, D17, D19	
D 50WQ06FN	03019A SMD DIODE SCHOTTKY 5,5A	1	D9	
D BAS85-S	03024 SMD DIODE SCHOTTKY	8	D1-8	
D BAT54S	03199 SMD SCHOTTKY DIODE A-K T	6	D10-11, D14-16, D18	
DIS WG240128B	03083 240/128 DOT MATRIX LCD	1	LCD1	
DL KA-3528SGC 03057	03057 GREEN SMD LED DIODE	1	DL1	
DL LEDG3 03053	03053 GREEN LED DIODE 3mm	1	DL3	
DL LEDR3 03058	03058 RED LED DIODE 3mm	4	DL2, DL4, DL6-7	
DL LEDY3 03051	03051 YELLOW LED DIODE 3mm	1	DL5	
IC 24LC64 04815	04815 SMD INTEG CIRCUIT	1	IC7	
IC 74HC00-S 4762A	4762A SMD INTEG CIRCUIT	1	IC19	
IC 82B715-S 04734A	04734A SMD INTEG CIRCUIT	1	IC17	
IC CD4053BC-S 04710A	04710A SMD INTEG CIRCUIT	1	IC12	
IC LM2596S-5.0	04580 SMD INTEG CIRCUIT	1	IC14	
IC LM75-S 00668	00668 SMD INTEG CIRCUIT	1	IC8	
IC LMC6482-S	04632 SMD INTEG CIRCUIT	1	IC20	
IC LMC6484-S	04634 SMD INTEG CIRCUIT	4	IC2-5	
IC M41T56 04611	04611 SMD INTEG CIRCUIT	1	IC6	
IC MAX232-S 04804B	04804B SMD INTEG CIRCUIT	1	IC16	
IC MAX3080-S 04770	04770 SMD INTEG CIRCUIT	1	IC22	
IC MAX3080-S N.M.	NOT MOUTED SMD INTEG CIRCUIT	1	IC18	
IC MAX942CSA-S	04572 SMD INTEG CIRCUIT	4	IC9-11, IC13	
IC MB90F543PF	04596 SMD INTEG CIRCUIT	1	IC15	
IC MPC100T-450I-TT	04577 SMD INTEG CIRCUIT	1	IC21	
IC ULN2003A 4870	04870 SMD INTEG CIRCUIT	2	IC1, IC23	
IND MS85 10uH-S	04948 INDUCTOR 2,7A	1	L1	
IND T100uH-1.8A 4958	04958 TOROIDAL-STORAGE CHOKES	1	L2	

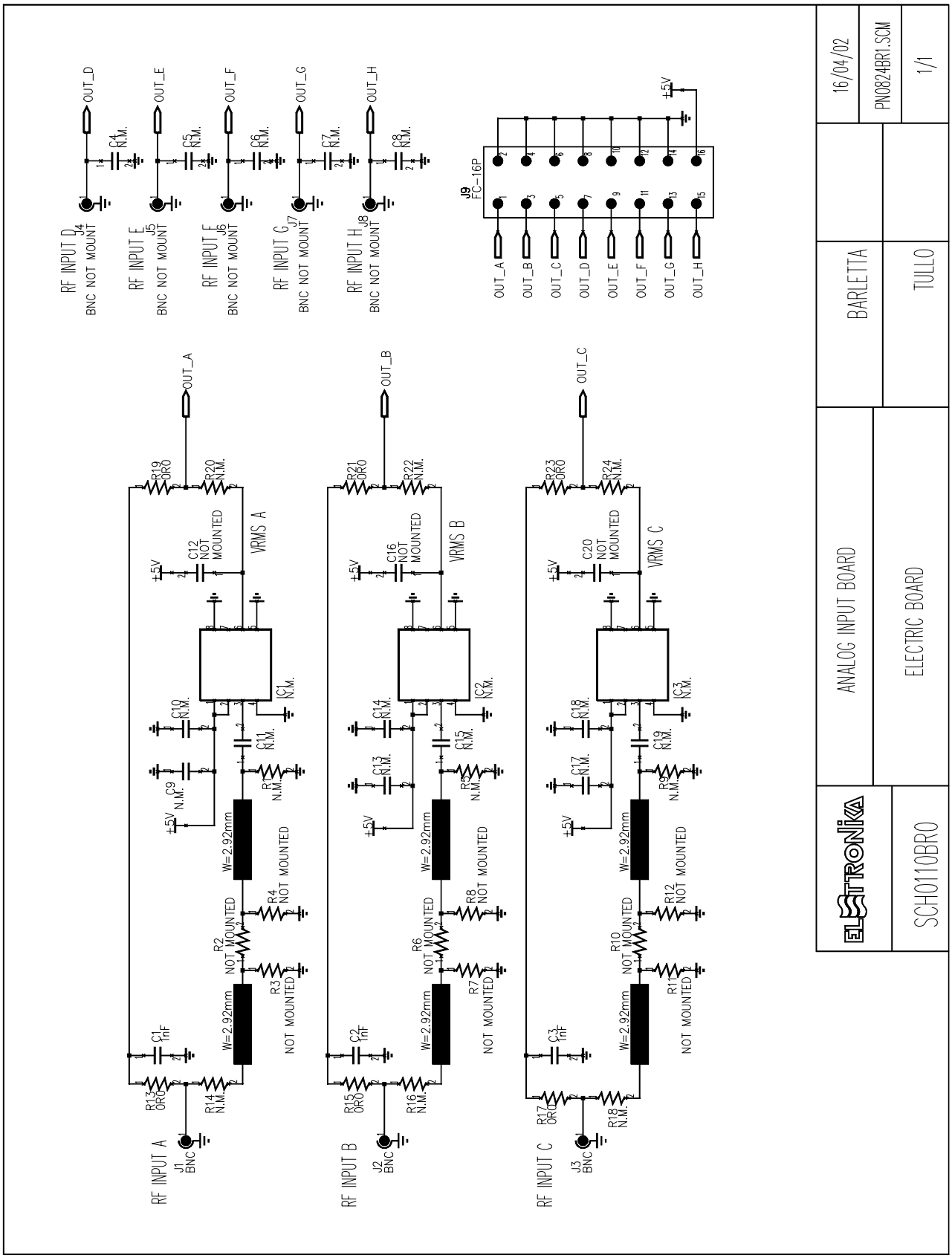
Part Name/Number	Description	Qty.	Comps.	Page 2/2
INV IN-D43A-5V	03085 DC/AC MODULE	1	INV1	
J DB9_F-0° LT	02794 PCB CONNECTOR DB9 LONG T	1	J6	
J FC-10P 02697-02699	02697+02699 PCB CONNECTOR POL	2	J11, J13	
J FC-16P 02701-02700	02701+02700 PCB CONNECTOR POL	2	J12, J14	
J FC-26P 02855-02854	02855+02854 PCB CONNECTOR POL	1	J10	
J PAN2 02739	02739 PCB CONNECTOR	1	J4	
J PAN2 02739-40-41	02739+02740+02741 PCB CONNECTO	1	J5	
J PAN3 02707	02707 PCB CONNECTOR	3	J1-3	
J PAN3 NOT MOUNTED	NOT MOUNTED PCB CONNECTOR	2	J8-9	
J SCREWCONN2 02853	02853 PCB SCREW CONNECTOR	1	J7	
JU JUMP3 02707-02742	02707+02742 MASCHIO PAN3	4	JP1-4	
R 100R-S 00029A	00029A RES 1/4W 5% SMD 1206	6	R109, R114, R119-121, R123	
R 10K-S 00053A	00053A RES 1/4W 5% SMD 1206	37	R22-27, R30, R32-33, R40, R47, R50, R57, R68, R81-82, R85, R90-101, R105-108, R116, R118, R122, R124	
R 120R-S 00030A	00030A RES 1/4W 5% SMD 1206	2	R112-113	
R 1K0-S 00041A	00041A RES 1/4W 5% SMD 1206	5	R46, R54, R87-88, R104	
R 1K5-S 00043A	00043A RES 1/4W 5% SMD 1206	2	R110-111	
R 22K-S 00057A	00057A RES 1/4W 5% SMD 1206	11	R18, R20-21, R28, R34, R36, R38-39, R41, R43-44	
R 2K2-S 00045A	00045A RES 1/4W 5% SMD 1206	8	R19, R35, R37, R42, R45, R53, R59-60	
R 330R-S 00035B	00035B RES 1/4W 5% SMD 1206	2	R89, R103	
R 33R-S 00023A	00023A RES 1/4W 5% SMD 1206	2	R86, R102	
R 470K-S 00073A	00073A RES 1/4W 5% SMD 1206	8	R48-49, R51-52, R55-56, R58, R65	
R 470R-S 00037A	00037A RES 1/4W 5% SMD 1206	30	R10-17, R29, R31, R61-64, R66-67, R69-80, R83-84	
R 4K7-S 00049A	00049A RES 1/4W 5% SMD 1206	1	R117	
R 820R-S 00040A	00040A RES 1/4W 5% SMD 1206	1	R9	
RL 30.22.24 07569	07569 RELE	5	RLY1-5	
RV 10K-S-H 00715	00715 VARIABLE RESISTOR	1	R115	
RV 1M-3266X	00815 VARIABLE RESISTOR	8	R1-8	
SW SWITCH-4DIP 90°	07531A PCB DIP SWITCH 90°	1	SW1	
SW SWITCH-8DIP	07530A PCB DIP SWITCH SMD	1	SW2	
T 06086 N 7630 7632	7630 7632 KTI06086 PULSANTE 2	4	T1-4	
TR BC848 03457	03457 NPN SMD TRANSISTOR	1	TR1	
XTAL 32.768k-S 05146	05146 QUARTZ	1	XTAL1	
XTAL 4MHz-S 05101A	05101A QUARTZ	1	XTAL2	

Component layout SCH0110BR0

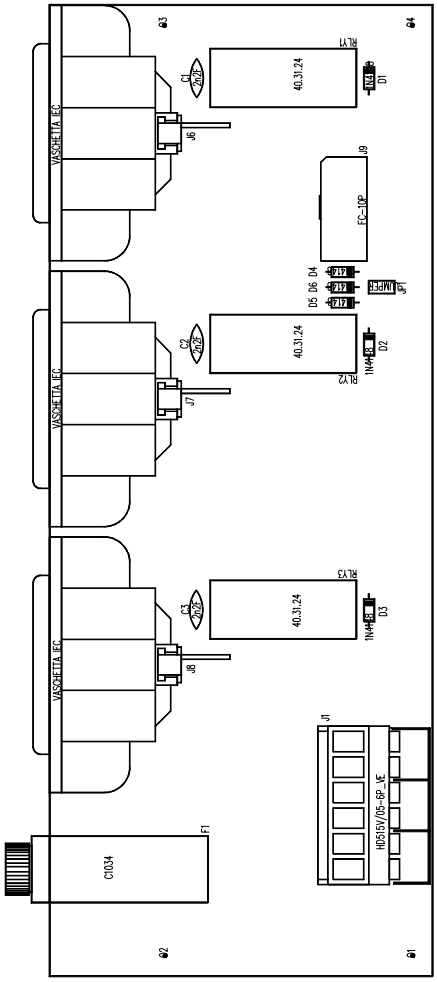


COMPONENT LIST *SCH0110BR0*

Part Name/Number	Description	Qty.	Comps.
CC 1206 N.M.	N.M. SMD 1206 COND	17	C4-20
CC 1nF-S 01096	01096 SMD 1206 COND	3	C1-3
J BNC-90G-PCB 2034	02034 PCB CONNECTOR	3	J1-3
J BNC-90G-PCB 2034	N.M. BNC-90G	5	J4-8
J FC-16P 02701-02700	02701+02700 PCB CONNECTOR POL	1	J9
R 0R0-S 00001	00001 RES 1/4W 5% SMD 1206	6	R13, R15, R17, R19, R21, R23
R 1206 N.M.	N.M. RES 1/4W 5% SMD 1206	18	R1-12, R14, R16, R18, R20, R22 R24
Z MICRO SOIC 8P N.M.	SMD INTEG CIRCUIT NOT MOUNTED	3	IC1-3

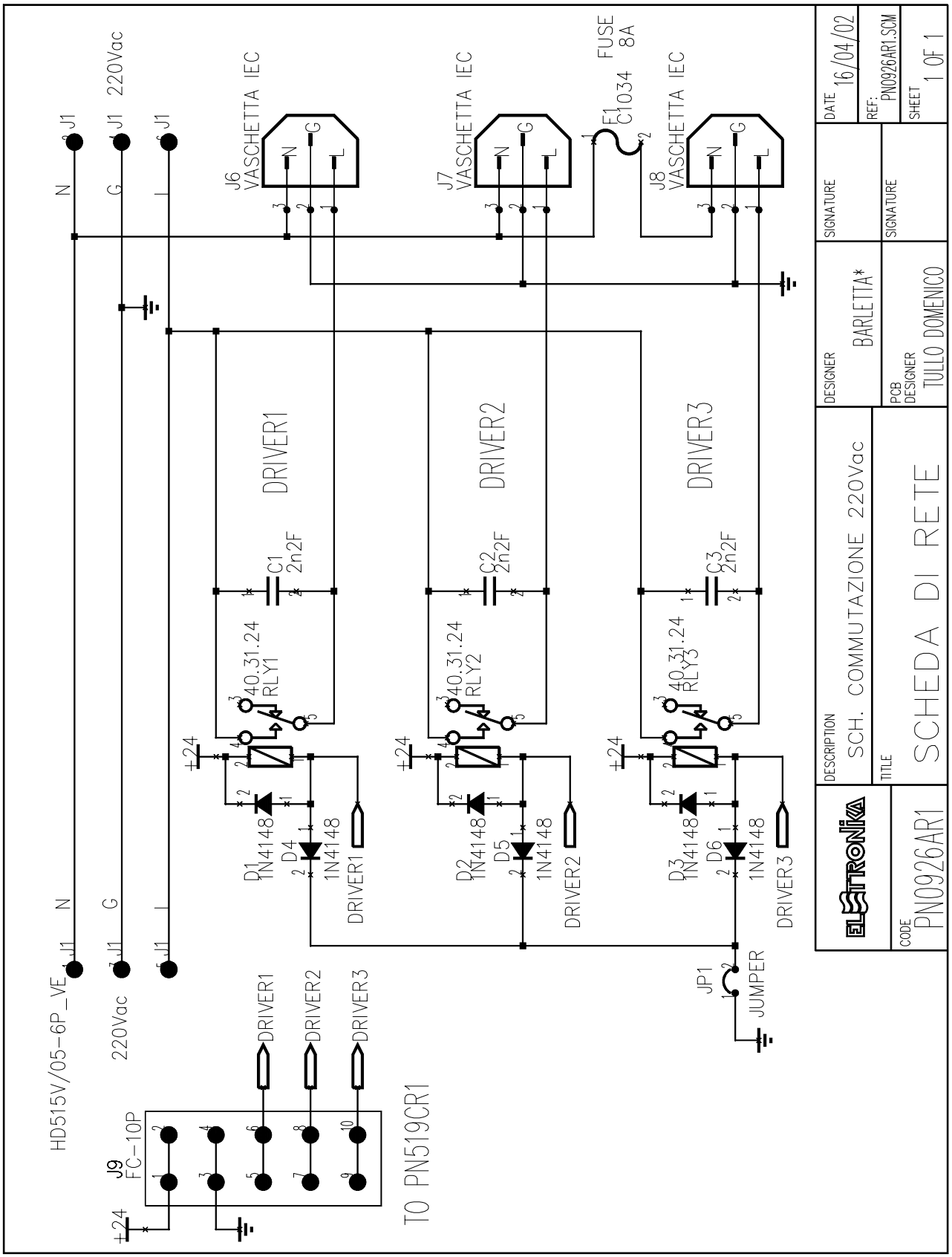

RF INPUT A
RF INPUT B
RF INPUT C
RF INPUT D
RF INPUT E
RF INPUT F
RF INPUT G
RF INPUT H
BNC NOT MOUNT
OUT_A
OUT_B
OUT_C
OUT_D
OUT_E
OUT_F
OUT_G
OUT_H
VRMS A
VRMS B
VRMS C
NOT MOUNTED
W=2.92mm
FC-16P
+5V
ELETTRONIKA
ANALOG INPUT BOARD
ELECTRIC BOARD
BARLETTA
TULLO
16/04/02
PN0824BR1.SCM
1/1
SCH0110BRO

Component layout SCH0152AR0

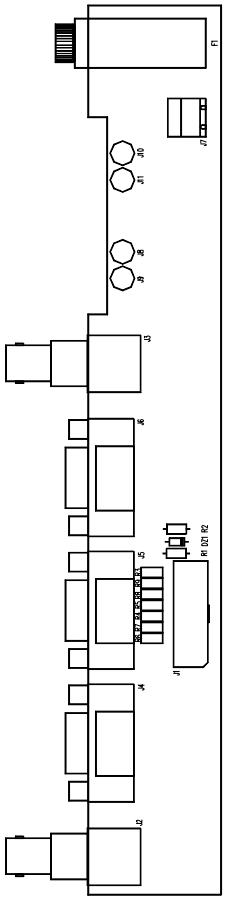


COMPONENT LIST *SCH0152AR0*

Part Name/Number	Description	Qty.	Comps.
CC 2nF2 2kV 01045A	01045A CERAMIC COND	3	C1-3
D 1N4148 03001	03001 DIODE	6	D1-6
FUSE OMEGA C1034	FUS00008 PORTA FUSIBILE 5x20 D	1	F1
J CON HD515V/05-6PVE	02883 + 02884 PANDUIT PCB CONN	1	J1
J FC-10P 02697-02699	02697+02699 PCB CONNECTOR POL	1	J9
J VASCHETTA IEC	02879 VASCHETTA FEMALE PCB	3	J6-8
JU JUMP2 02739-02742	02739+02742 MASCHIO PAN2	1	JP1
RL 40.31.24	7567C RELE	3	RLY1-3

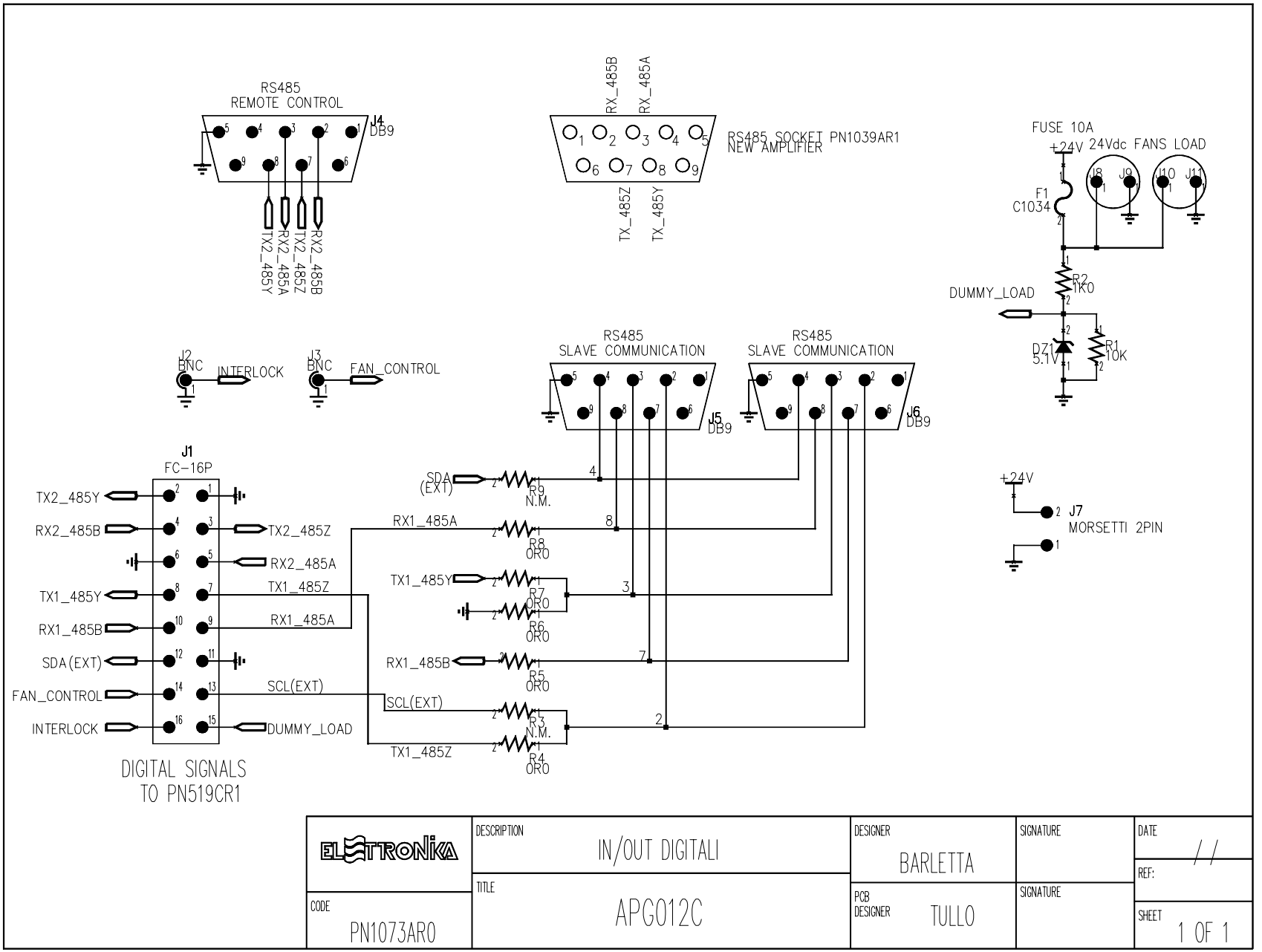

HD515V/05-6P_VE
J1
N
G
L
220Vac
J6
VASCHETTA IEC
J7
VASCHETTA IEC
J8
VASCHETTA IEC
F1
FUSE
C1034
8A
DRIVER1
DRIVER2
DRIVER3
C1
2n2F
C2
2n2F
C3
2n2F
40.31.24
RLY1
RLY2
RLY3
±24
R1
1N4148
R2
1N4148
R3
1N4148
D4
1N4148
D5
1N4148
D6
1N4148
DRIVER1
DRIVER2
DRIVER3
JP1
JUMPER
J9
FC-10P
TO PN519CR1
DESCRIPTION
SCH. COMMUTAZIONE 220Vac
TITLE
SCHEDA DI RETE
CODE
PN0926AR1
ELETTRONIKA
DESIGNER
BARLETTA*
PCB DESIGNER
TULLO DOMENICO
SIGNATURE
SIGNATURE
DATE
16/04/02
REF:
PN0926AR1.SCM
SHEET
1 OF 1

Component layout SCH0241AR0



COMPONENT LIST *SCH0241AR0*

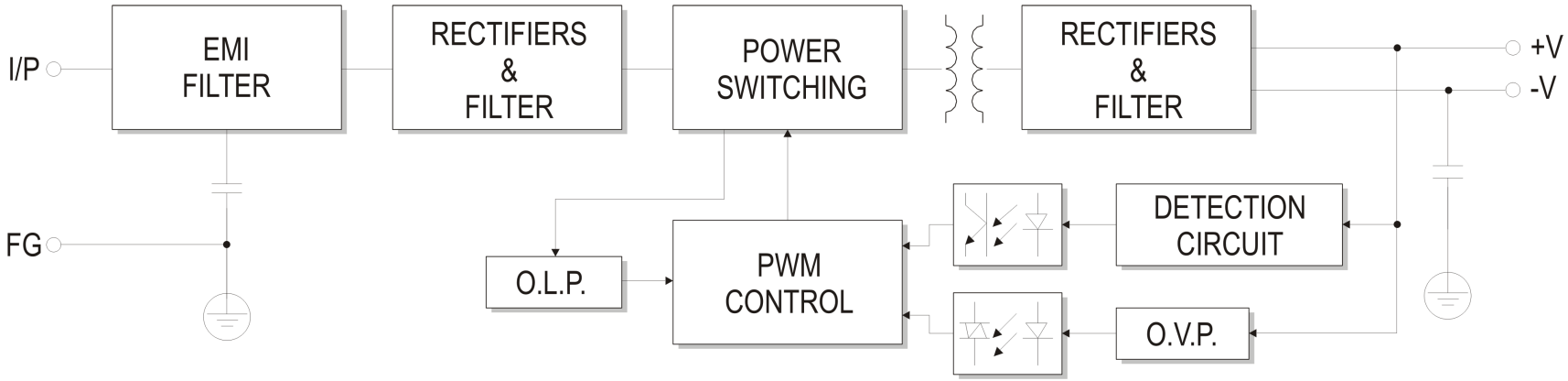
Part Name/Number	Description	Qty.	Comps.
DZ 5V1 03109	03109 ZENER DIODE	1	DZ1
FUSE OMEGA C1034	FUS00008 PORTA FUSIBILE 5x20 D	1	F1
J BNC-90G-PCB 2034	02034 PCB CONNECTOR	2	J2-3
J DB9-90G 02797	02797 PCB CONNECTOR	3	J4-6
J FC-16P 02701-02700	02701+02700 PCB CONNECTOR POL	1	J1
J SCREWCONN2 02853	02853 PCB SCREW CONNECTOR	1	J7
J TESTP2.5mm 07912	07912 TEST POINT	4	J8-11
R 0R0-S 00001	00001 RES 1/4W 5% SMD 1206	7	R3-9
R 10K 0053	0053 RES 1/4W 5%	1	R1
R 1K0 0041	0041 RES 1/4W 5%	1	R2


RS485
REMOTE CONTROL
J4
DB9
TX2_485Y
RX2_485A
TX2_485Z
RX2_485B
RX_485B
RX_485A
RS485 SOCKET PN1039AR1
NEW AMPLIFIER
TX_485Z
TX_485Y
FUSE 10A
+24V
24Vdc FANS LOAD
J8
J9
J10
J11
F1
C1034
R2
1K0
DUMMY_LOAD
DZ1
5.1V
R1
10K
J2
BNC
INTERLOCK
J3
BNC
FAN_CONTROL
RS485
SLAVE COMMUNICATION
RS485
SLAVE COMMUNICATION
J5
DB9
J6
DB9
J1
FC-16P
TX2_485Y
RX2_485B
TX2_485Z
RX2_485A
TX1_485Y
TX1_485Z
RX1_485B
RX1_485A
SDA(EXT)
FAN_CONTROL
SCL(EXT)
INTERLOCK
DUMMY_LOAD
SDA
(EXT)
R9
N.M.
RX1_485A
R8
0R0
TX1_485Y
R7
0R0
R6
0R0
RX1_485B
R5
0R0
SCL(EXT)
R3
N.M.
TX1_485Z
R4
0R0
+24V
J7
MORSETTI 2PIN
DIGITAL SIGNALS
TO PN519CR1
ELETTRONIKA
DESCRIPTION
IN/OUT DIGITALI
DESIGNER
BARLETTA
SIGNATURE
DATE
/ /
TITLE
APG012C
PCB
DESIGNER
TULLO
SIGNATURE
REF:
CODE
PN1073AR0
SHEET
1 OF 1

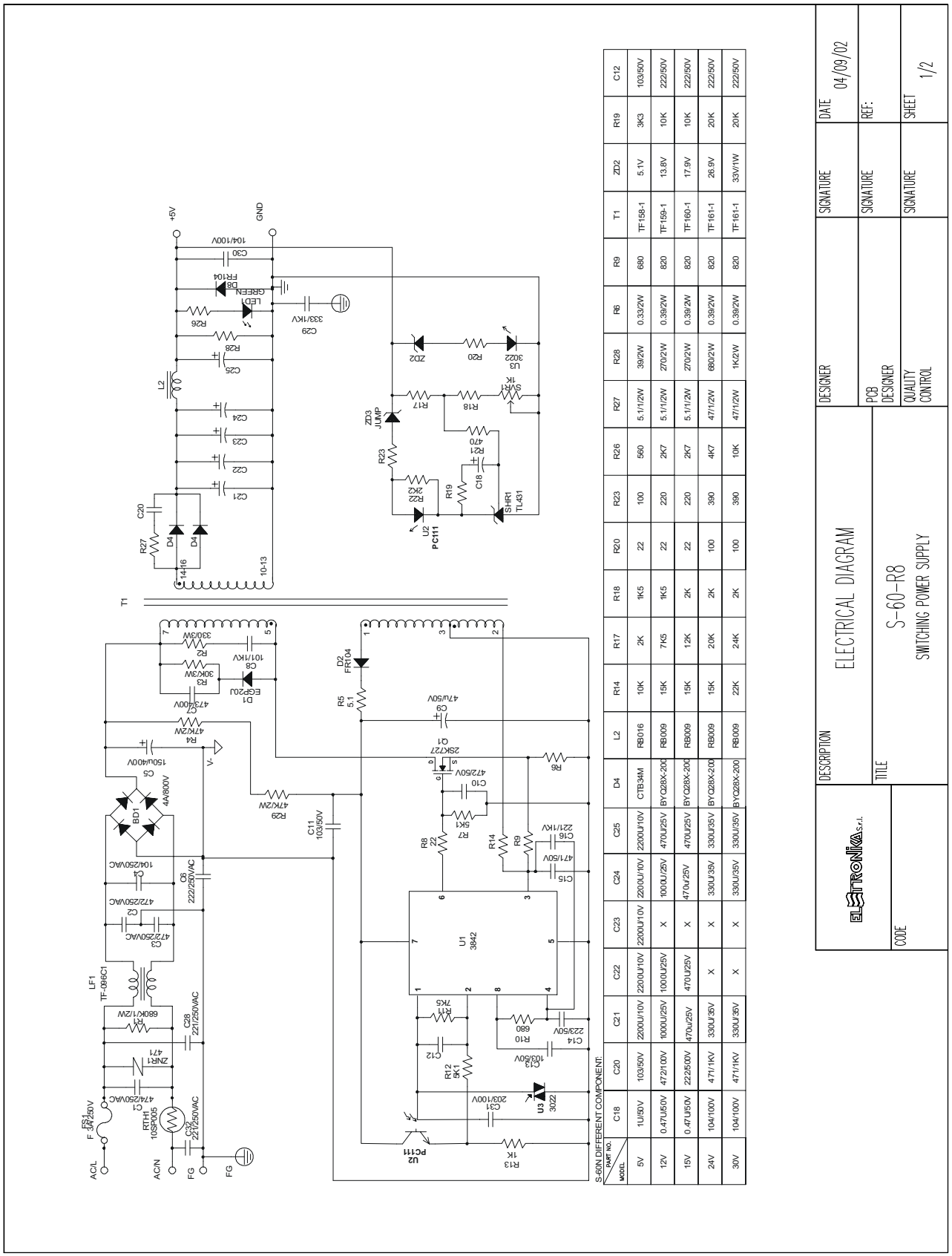
SPECIFICATION

MODEL	**S-60-24**
Input voltage	85 ~ 264VAC; 120 ~ 370VAC
Input frequency	47-63Hz
Inrush current	Cold start, 30A/115V, 60A/230V
Output voltage	Refer to below table (±10% ADJ.)
Overload protection	105% ~ 150% output pulsing code
Over voltage protection	115% ~ 135% of output voltage
Setup, rise, hold up time	800ms, 50ms, 10ms/115VAC 300ms, 50ms, 80ms/230VAC
Withstand voltage	I/P-O/P:3kV, I/P-FG:1.5KV, 1min.
Working temp	0-50°C@100%, -10°C@80%, 60°C@60%
Safety standards	UL 1012, UL 1950, TUV EN60950
EMC Standards	EN55022 class B, EN61000-4-2,3,4,5, EN60555-2,3
Connection	5P/9.5mm pitch terminal block
Weight/Packing	0.55kgs/pcs; 30pcs/ 17kgs/ 1CUFT

Type No	Output	Tol.	R&N	Effi.	P.P.
S-60-5	5V, 12A	± 2%	120mV	73%	58
S-60-12	12V, 5A	± 1%	120mV	76%	58
S-60-15	15V, 4A	± 1%	150mV	77%	58
S-60-24	24V, 2.5A	± 1%	150mV	79%	58



ELETTRONIKA S.r.l.	DESCRIPTION: Schema a Blocchi ALIMENTATORE SWITCHING S-60-24	DESIGNER: –	SIGNATURE:	DATE: 04/09/02
	TITLE: S-60-24 SWITCHING POWER SUPPLY Block Diagram	PCB DESIGNER: –	SIGNATURE:	REF: E0031_S-60-24_Block Diagram
CODE: E0031		QUALITY CONTROL: –	SIGNATURE:	SHEET: 1/1



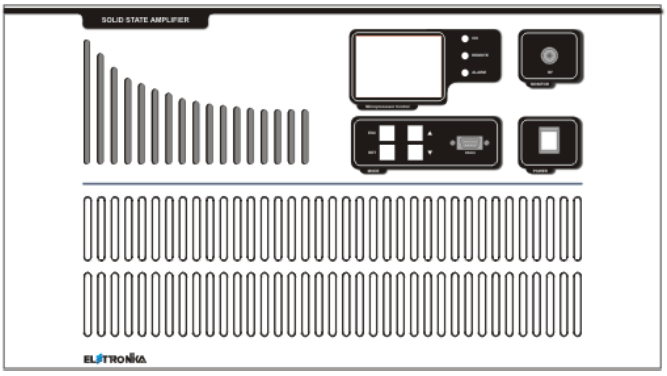
MODEL / PART NO.	C18	C20	C21	C22	C23	C24	C25	D4	L2	R14	R17	R18	R20	R23	R26	R27	R28	R6	R9	T1	ZD2	R19	C12
5V	1U/50V	103/50V	2200U/10V	2200U/10V	2200U/10V	2200U/10V	2200U/10V	CTB34M	RB016	10K	2K	1K5	22	100	560	5.1/1/2W	39/2W	0.33/2W	680	TF158-1	5.1V	3K3	103/50V
12V	0.47U/50V	472/100V	1000U/25V	1000U/25V	X	100U/25V	470U/25V	BYQ28X-200	RB009	15K	7K5	1K5	22	220	2K7	5.1/1/2W	270/2W	0.39/2W	820	TF159-1	13.8V	10K	222/50V
15V	0.47U/50V	222/500V	470u/25V	470U/25V	X	470u/25V	470U/25V	BYQ28X-200	RB009	15K	12K	2K	22	220	2K7	5.1/1/2W	270/2W	0.39/2W	820	TF160-1	17.9V	10K	222/50V
24V	104/100V	471/1KV	330U/35V	X	X	330U/35V	330U/35V	BYQ28X-200	RB009	15K	20K	2K	100	390	4K7	47/1/2W	680/2W	0.39/2W	820	TF161-1	26.9V	20K	222/50V
30V	104/100V	471/1KV	330U/35V	X	X	330U/35V	330U/35V	BYQ28X-200	RB009	22K	24K	2K	100	390	10K	47/1/2W	1K/2W	0.39/2W	820	TF161-1	33V/1W	20K	222/50V

COMPONENT LIST *S-60-24*

SPECIFICATIONS	QUANTITY	POSITION
BOM FOR S-60-24 ON CASE	1	
CASE 901-D-R1 M	1	
CASE 901-T-R2 M	1	
HS YS004W-055-R4 71268W-055	1	HS3
MHS002-R1 25mm	1	HS3
MYLAR FILM 901-R2	1	
PR-7.5	1	
BOX 901 168x105x45mm	1	1
SCREW F 3x6 ISO NI	2	HS3, HS3
SCREW F 3x18 ISO NI	1	HS3
SCREW T 3x6 ISO NI	2	HS1
SCREW P 3x6 ISO NI	1	CASE
LABEL UL S-60N-24-R2	1	
LABEL IN/OUT UL BO17-R1 S-60N	1	
CARTON 901 0.97CUFT	1	30
BOM FOR S-60-24 ON PCB	1	
R/C 1/4W 5.1Ω 5% HP=10 T-52mm	1	R5
R/C 1/4W 22Ω 5% HP=10 T-52mm	1	R8
R/C 1/4W 100Ω 5% HP=10 T-52mm	1	R20
R/C 1/4W 390Ω 5% HP=10 T-52mm	1	R23
R/C 1/4W 470Ω 5% HP=10 T-52mm	1	R21
R/C 1/4W 680Ω 5% HP=10 T-52mm	1	R10
R/C 1/4W 820Ω 5% HP=10 T-52mm	1	R9
R/C 1/4W 1kΩ 5% HP=10 T-52mm	1	R13
R/C 1/4W 2kΩ 5% HP=10 T-52mm	1	R18
R/C 1/4W 2.2kΩ 5% HP=10 T-52mm	1	R22
R/C 1/4W 4.7kΩ 5% HP=10 T-52mm	1	R26
R/C 1/4W 5.1kΩ 5% HP=10 T-52mm	2	R12, R7
R/C 1/4W 7.5kΩ 5% HP=10 T-52mm	1	R11
R/C 1/4W 15kΩ 5% HP=10 T-52mm	1	R14
R/C 1/4W 20kΩ 5% HP=10 T-52mm	2	R17, R19
R/C 1/2W 47Ω 5% T-52mm	1	R27
R/C 1/2W 680kΩ 5% T-52mm	1	R1
R/MO 2W 680Ω 5% KINK	1	R28
R/MO 2W 47kΩ 5%	2	R29, R4
R/MO 3W 330Ω 5% MINI	1	R2
R/MO 3W 30kΩ 5% MINI	1	R3
R/NW 2W 0.39Ω 5%	1	R6
MVR 0.3W 1kΩ 10% HP=5x5	1	SCR1
NTC 4A 5Ω SCK054 KINK	1	RTH1
MOV 0.6W 470V TNR15G471K	1	ZNR1
JUMP 0.6 P=10	5	J1, J2, J3, J4, ZD3
JUMP 0.6 P=15	1	J5

SPECIFICATIONS	QUANTITY	POSITION
C/Y2 221/250VAC 20% P=7.5 AC	2	C28, C32
C/Y2 222/250VAC 20% P=7.5 AC	1	C6
C7Y2 472/250VAC 20% P=7.5 AC	2	C2, C3
C/X2 104/250VAC 20% P=15 KNB153X	1	C4
C/X2 474/250VAC 20% P=22 KNB153X	1	C1
C/M 473/400V 10% P=10	1	C7
C/M 104/63V 10% P=5	2	C18, C30
C/C 101/1KV 10% P=5 Y5P	1	C8
C/C 221/1KV 10% P=5 Y5P	1	C16
C/C 471/100V 10% P=5 Y5P	1	C15
C/C 471/1KV 10% P=5 Y5P	1	C20
C/ML 222/100V 5% P=3	1	C12
C/ML 472/100V 5% P=3	1	C10
C/ML 103/100V 5% P=3	2	C11, C13
C/ML 203/100V 5% P=5	1	C31
C/ML 223/100V 5% P=4.5	1	C14
C/C 333/1KV EPOXY 20% P=10 Z5V	1	C29
C/E 150u/400V 85°C 30x25 HP3	1	C5
C/E 47u/50V 105°C 6.3x11 KM	1	C9
C/E 330u/35V LL3K 10x16 YXG	3	C21, C24, C25
BD 4A/600V GLASS D3SB60	1	BD1
FRD 1A/400V FR104 T-52mm	2	D2, D8
SFRD BYQ28X-200 10A/200V TO220F	1	D4
SFRD EGP20J 2A/600V T-52mm	1	D1
ZD 1/2W 26.9V 2% 27-2 T-52mm	1	ZD2
LED GREEN 204GD-A	1	LED1
FET 2SK2652 6A/900V TO3P	1	Q1
SHR 431 2.5V 2% MM1431AT	1	SHR1
PHOTO CNX82A PC111	1	U2
PHOTO-TRIAC MOC3022	1	U3
PWM TL3842P TI	1	U1
RB-COIL RB009A 6x25 10. 1.5uH	1	L2
LF TF096C1 EE-25 0.5 23mH	1	LF1
MT TF161-1-R3 EER-35	1	T1
FUSE F3 L 250 5x20 G- U GFE/GMA	1	FS1
FUSE CLIP 5x20	2	FS1
TB HB 951-05P/DT49-B01W-05P	1	TB1
WIRE 07#18 100mm 05x05	1	F-F
HS HS001-R2	1	HS1
MHS002-R1 25mm	1	HS1
PCB S-60N-R5 CEM-1 20Z SS M1	1	PCB
SCREW F 3x12 ISO NI	1	Q1
SCREW P 3x6 ISO ZN	2	HS1

LDMOS - UHF TV AMPLIFIER



AUTV/1500LD

User's manual

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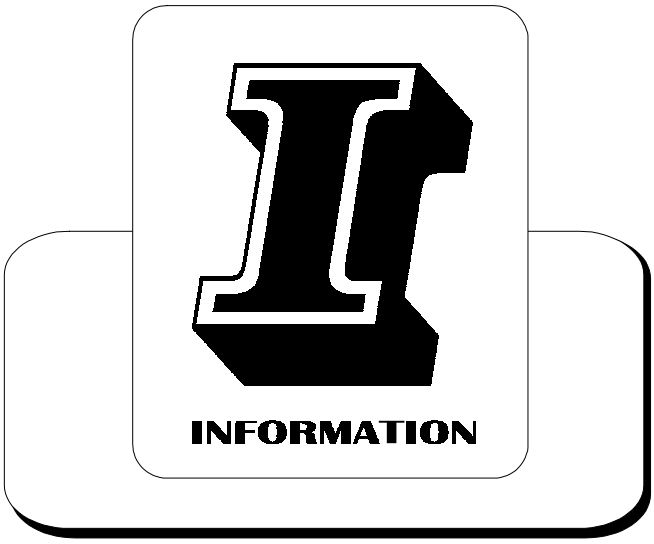
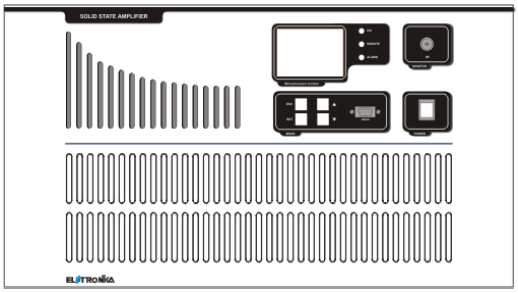


Section 1 - Information

Contents:

AUTV/1500LD
LDMOS - UHF TV AMPLIFIER



1.1 DESCRIPTION

The AUTV/1500LD is an amplifier operating into Band IV-V for common amplification process of the Vision and Sound carriers.
The amplifier has been designed to offer to the customer high performances, high reliability and greater simplicity in his operation and maintenance procedures.
The amplifiers modules employ all solid state LDMOS technology in order to obtain high gain, wide-band performances, very good linearity, reliability and high efficiency.
The equipment design allows the soft degradation (RF power loss) for several transistor faulty: in fact the output combiner uses RF power resistors for unbalancing power dissipation. The unit is enclosed in a cabinet for 19”- 6U rackmounting.

1.2 TECHNICAL CHARACTERISTICS

RF

Frequency range	470 - 860MHz
Output power	1300W PEP
Video/Sound power ratio	10/1
Out stage technology	Solid State LDMOS
Vision-Sound amplification	Common
I.M.D. (-8, -10, -16dB)	Better than -54dB
Standards	G, K, N
Spurious and harmonics level	In compliance with CCIR rec.
RF Output impedance	50Ω
RF Output connector	7/16”

GENERAL

Power supply	230Vac, ±10%, 50/60Hz 400Vac 3P+N (on request)
Power consumption	3400VA at black level
RS232 Socket	DB9 Connector (on front panel)
RS485 Socket	DB9 Connector (on rear panel)
Telemeasuring socket	DB9 Connector (on rear panel)
AGC Socket	DB9 Connector (on rear panel)
Power factor	>= 0.9
Ambient temperature	-5° to +45°C
Relative humidity	20% - 90%
Altitude	Up to 2.500 meters
Cooling	Forced air
Cabinet	Rack 19”-6U
Weight	70kg

PROTECTION THR.

FWD Power	1500W
REF Power	150W
Unbalacing	300W
Temperature	75ºC
I_{DC}	18A
V_{DC}	Min 10V - Max 33,5V

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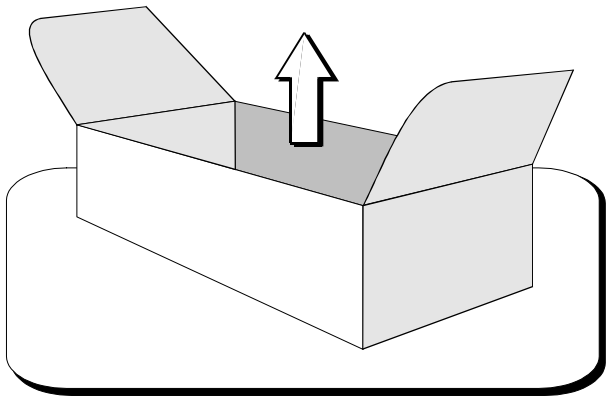
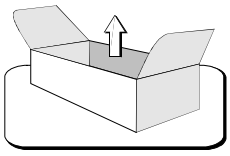


Section 2 - Installation

Contents:



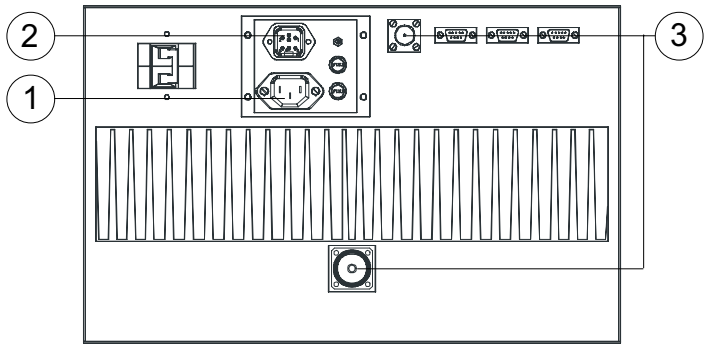
2.1 OPERATING ENVIRONMENT

You can install the apparatus in a standard component rack or on a suitable surface such as a bench or desk. In any case, the area should be as clean and well-ventilated as possible. Always allow for at least 2 cm of clearance under the unit for ventilation. If you set the apparatus on a flat surface, install spacers on the bottom cover plate. If you install the apparatus in a rack, provide adequate clearance above and below. Do not locate the apparatus directly above a hot piece of equipment.

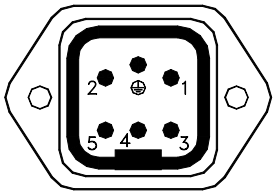
2.2 PRELIMINARY OPERATIONS

Correct installation of the equipment is important for maximum performance and reliability. Antenna and earth connections must be installed with the greatest care. The equipment adjustment isn't need, because the unit is completely adjusted by our technical staff. This is the installation procedure:

1. connect the power supply cable of the exciter to the auxiliary socket on the rear panel of the amplifier;
2. connect the power supply cable of the amplifier to the electric network (230VAC). If there is the Isolator Transformer, the amplifier is provided with cable and plug;
3. connect the exciter / antenna cables respectively to the RF IN and RF OUT on the rear panel of the amplifier.

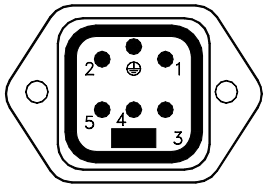


Monophase cabling



1 = NC
2 = N
3 = N
4 = L
5 = L

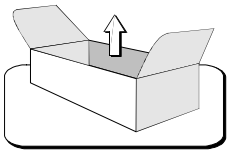
Three-Phase cabling



1 = NC
2 = N
3 = R
4 = S
5 = T

WARNING!!!

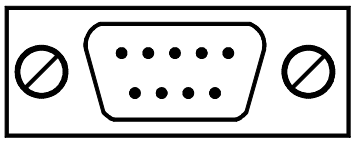
FOR ELECTRICAL SAFETY REASONS AND IN ORDER TO KEEP THE APPARATUS SAFE, THE GROUND TERMINAL OF THE APPARATUS MUST BE CONNECTED TO THE EXISTING GROUNDING SYSTEM AND NOT BY USING THE SHIELD OF THE OUTPUT COAXIAL CABLE.



When the apparatus is put within a combined system it is directly connected to the input splitting and output combining systems.

Before fully powering the apparatus, check that the output connections of the coaxial cable to the antenna system are working.
In order to this it is possible to check the indication of the reflected power at low power levels. Only if the SWR indication on the display is 0, the output power can be slowly increased. At maximum output power, some watts might be shown as reflected power.

2.3 TELEMEASURING SOCKET CONNECTIONS



DB9 Socket

PIN N°	SIGNAL TYPE	IN / OUT	FUNCTION
1	Analog	Output	FWD Power
2	Analog	Output	REF Power
3	Digital	Output	Temperature
4	Digital	Input	Interlock
5	GND	-	-
6 - 7	Digital	Output	Free contact (closed when alarm)
8	Digital	Input	0V = ON 5V = Normal
9	Digital	Input	0V = OFF 5V = Normal

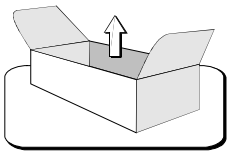
2.4 RS232, RS485 AND AGC SOCKET CONNECTIONS

PIN	1	2	3	4	5	6	7	8	9
FUNCTIONS	-	TxD	RxD	-	GND	-	-	-	-

RS232 - DB9 Socket

PIN	1	2	3	4	5	6	7	8	9
FUNCTIONS	-	Rx-	Rx+	5V	GND	-	Tx-	Tx+	-

RS485 - DB9 Socket

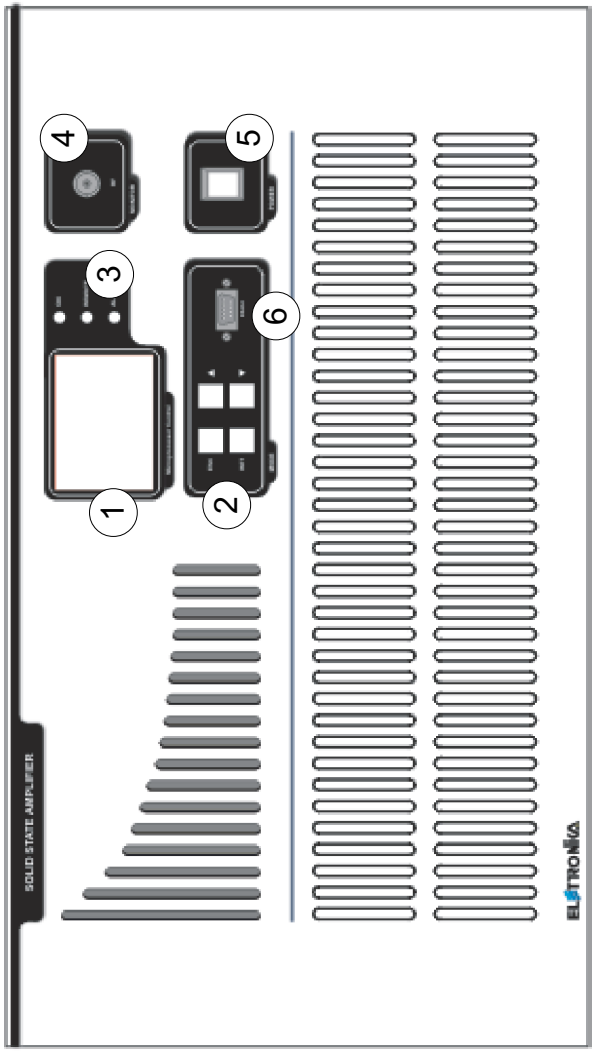


PIN N°	SIGNAL TYPE	IN / OUT	FUNCTION
1	GND	-	-
2	Digital	Output	0V = Normal 5V = AGC Alarm
3	Digital	Output	0V = Normal 5V = AGC Alarm
8	Analog	Output	FWD Power
9	Analog	Output	FWD Power

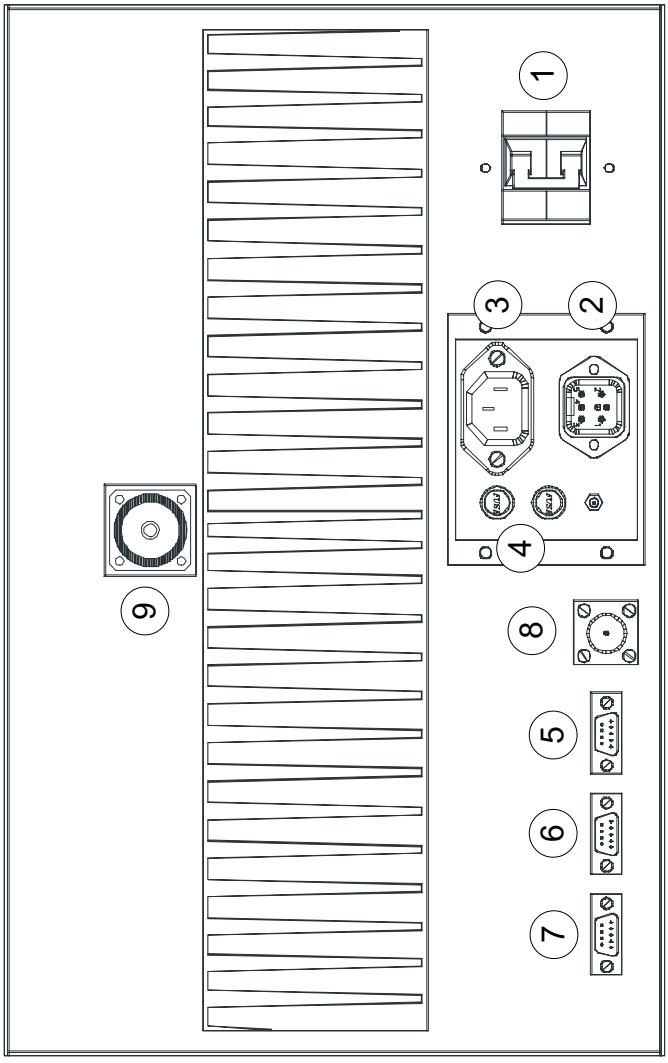
AGC - DB9 Socket

2.5 PREVENTIVE MAINTENANCE

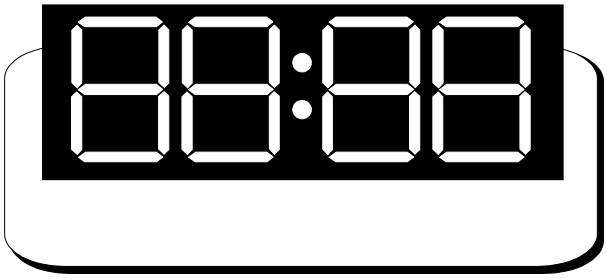
To ensure maximum performance and minimum repair trouble, we strongly recommend you to follow the below stated headlines for preventive maintenance:
1. check antenna installation and ground connection at regular intervals;
2. keep your apparatus clean and dry externally: this will ensure continuous functioning of the front panel controls;
3. if the apparatus has not been used for a long period of time combined with exposure to extreme environmental conditions, open the unit and make a visual inspection.
Remove salt, water or ice with a moist cloth before turning the apparatus on. Check that the cooling fans are running freely.
4. for general maintenance and top performance, call an authorized service technician to give the apparatus and the complete antenna/earth connection installation a general check every 12-18 months;
5. check at regular intervals that the air intake located on the front panel is free of dust. If there is visible dust, remove it by means of a soft brush.



DESCRIPTION	
1	LCD Display
2	Function keys
3	Status LEDs
4	RF Monitor connector
5	Main switch
6	RS232 Socket



DESCRIPTION	
1	Breaker
2	Power supply socket
3	Auxiliary socket
4	Fuse
5	RS485 Socket
6	AGC Socket
7	Telemeasure socket
8	RF Input connector
9	RF Output connector



Section 3 - Operation

Contents:

3.1 OPERATION

At startup, after initial image, the display shows the main screen with the RF powers as in Figure 1:

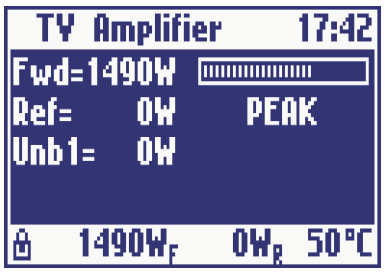


Figure 1: Main screen

The user may turn on and off the amplifier by means of the switch on the front panel. The control board turns on all the power supplies, the exciter (if any), and internal cooling fans. While the amplifier is working, the micro-controller monitors continuously the most important parameters: power supply voltages, absorbed currents, high power zone temperature, forward and reflected powers, unbalances (if any). Each measure is associated to a maximum threshold beyond which the amplifier is immediately put in protection status by turning off one or more power supply, depending on the failed block. In order to prevent a temporary problem to trigger a definitive protection status, the failed block is turned on again, after some seconds, for up to five times. If it goes beyond the protection threshold for more than five times, it is declared as FAILED and it will no longer be turned on. In this case, the amplifier will have to be turned off manually by means of the switch on the front panel, then turned on again after performing the needed maintenance.
On the front panel there are also three LEDs labelled ON, REMOTE and ALARM. Their meanings are explained in Table 1.

LED	COLOUR	MEANING	MEANING WHEN BLINKING
ON	Green	The amplifier is on	The amplifier has been turned on locally but it has been turned off by remote
REMOTE	Yellow	Remote control is enabled	It never blinks
ALARM	Red	An alarm is present	It never blinks

Table 1: Meanings of the three LEDs on the front panel

[1] Screenshots in this manual are indicative, so they can be different from those on your equipment.

3.2 DISPLAY

The control board is provided with a modern pixels graphic display with blue background. Normally it always shows a title bar (on the top line) and a status bar (on the bottom line).
The title bar, see Figure 2, shows the name of the amplifier (TV Amplifier) and the current time. If the amplifier is a single unit coupled externally with other units in a high power transmitter, the title bar shows the amplifier number (slave address) too.

Figure 2: Title bar

The status bar (Figure 3) indicates the forward and reflected powers and the temperature. It also contains two symbols for the interlock (lock) and the alarm (bell).

Figure 3: Status Bar

The bell symbol is continuously displayed in case of alarm. It blinks if there has been an alarm which has ended but has not yet been seen by the user. It stops blinking once the Log has been checked.
The interlock symbol is displayed only when this function is enabled. It may be either a close lock, as in Figure 3, when there is no alarm (interlock chain closed) or an open lock in case of alarm (interlock chain open).
Since the status bar is always showed on the display, regardless of the screen, the user may monitor at any time the most important parameters and the presence of alarms while moving between different screens.

3.3 MENUS

The user may see or modify locally some configuration parameters using the four buttons on the front panel. All screens areorganized in a hierarchical menus and the user may move between them in a simple and intuitive way.
To see the menu it's sufficient to press the ESC key (see Figure 4).

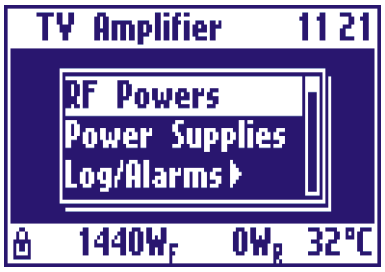


Figure 4: Main menu

The display only shows three items at a time: all the items can be scrolled by the UP and DOWN arrow keys. Any item can be chosen by selecting it and pressing the RET key. Menu entries with an arrow on the right ▶ open sub-menus when chosen. Thus there is a hierarchical structure as in Figure 5. To go back from a sub-menu to the previous menu, press the ESC key. If the ESC key is pressed in the main menu, the RF powers screen is accessed.

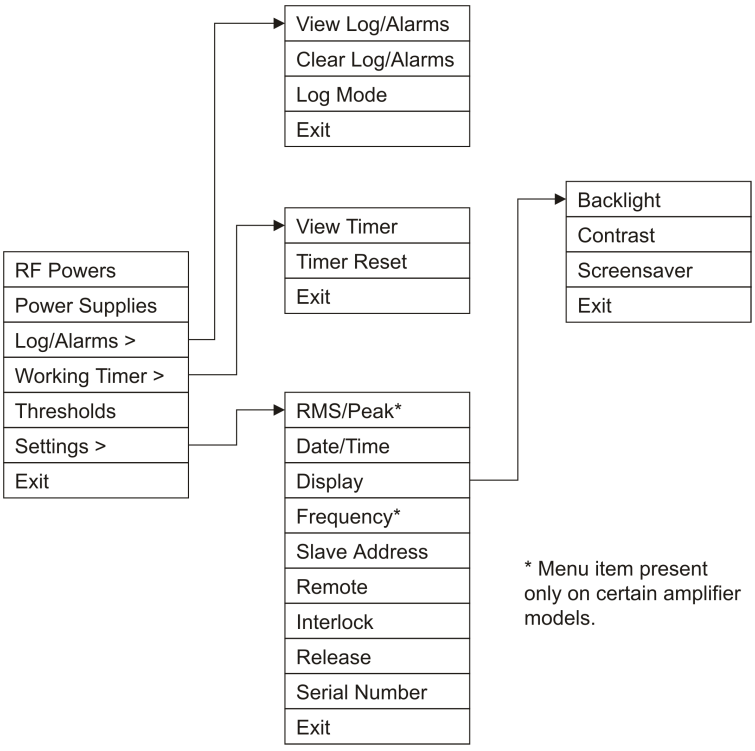


Figure 5: Hierarchical menu structure

All menu items are described in detail below.

- RF Powers

This is the main screen showing the RF powers of the amplifier: forward power, reflected power, unbalances, if any. For forward power a level bar is displayed. See an example in Figure 1.

- Power Supply

This screen shows all the signals coming from two power supply. To check the next (previous) power supply press the UP (DOWN) key. For each power supply, the voltage, the absorbed current and the status (ON or OFF) are shown.

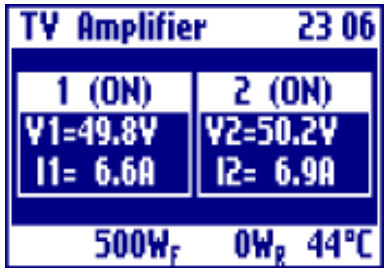


Figure 6: Power supply screen

- Log/Alarms

The control board is provided with an external EEPROM and a clock. Any alarm or switching event with the time at which it occurred is saved in the EEPROM. The Log/Alarms sub-menu allows to manage this log. It is possible to see the events stored in the log by selecting Log/Alarms ⟶View Log/Alarms. All events can be scrolled by pressing the UP and DOWN keys. For example, the event shown in Figure 7 is the turning on of the amplifier by means of the local switch. For every event/alarm a short description and the date and time at which it occurred is displayed.

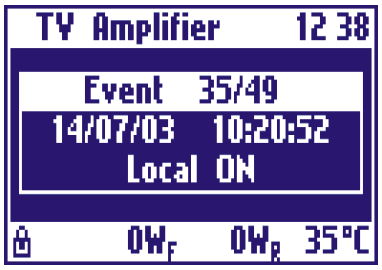


Figure 7: Event stored in the log

In case of alarm, the value of the measure which caused the alarm is saved into the log. In case of alarm still existing after five turning-on attempts, the parameter is marked as FAILED. Table 2 is the list of all the events which can be logged.

EVENT	DESCRIPTION
Local ON	Amplifier turned on by means of the local switch
Local OFF	Amplifier turned off by means of the local switch
Remote ON	Amplifier turned on remotely
Remote OFF	Amplifier turned off remotely
Interlock open	Interlock chain open
Interlock closed	Interlock chain closed
Power Supply ON	Power supply on
Fwd Pwr xxxxW	Alarm for forward power
Ref Pwr xxxxW	Alarm for reflected power
UnbY xxxxW	Unbalancing alarm
V1 xx.xV	Power supply voltage alarm
I1 xx.xA	Power supply current alarm

Table 2: Events managed and logged by the control board

The log may be completely deleted by selecting Log/Alarms ⟶ Clear Log/Alarms.
Amplifier can store in the log details about alarms and generic events. You can change this behaviour selecting Log/Alarms ⟶Log/Mode menu item.

- Working Timer

The control board has a working timer which is always enabled while the amplifier is working (i. e. there is at least one power supply working). The menu entry Working Timer ⟶View Timer allows to check the hours for which the timer has been enabled. Working Timer ⟶Timer Reset resets the timer.

- Thresholds

This is a screen showing the alarm threshold of each signals monitored by the control board. The list can be scrolled by means of the UP and DOWN keys.

- RMS/Peak

The control board can monitor both the RMS and peak powers, the first used in digital systems. The menu entry Settings ⟶ RMS/Peak allows to choose the power to be displayed and monitored. This menu is present only in certain amplifiers.

- Date/Time

This screen allows to set the current date and time. The setting is changed by pressing the arrow keys, then pressing the RET key to move to the following value and eventually save the changes. To go back to the previous menu and discard any change made, press the ESC key. Figure 8 shows an example of this screen.

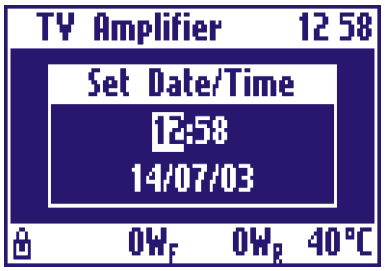


Figure 8: Date and time setting screen

- Display

The menu entry Settings ⟶ Display allows to change some settings of the display, such has back light, contrast and screensaver. The back light and the contrast are set by means of the UP and DOWN arrow keys. The changes made are saved by pressing the RET key or discarded pressing the ESC key. Figure 9 shows an example of this screen.
With Settings ⟶ Display ⟶ Screensaver you can set an interval time after which display backlight is turned off. When display backlight is off, press any key to switch it on.

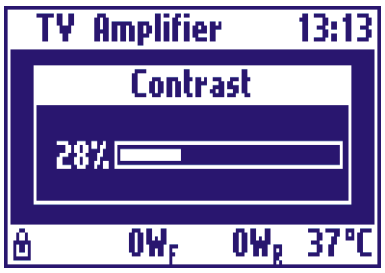


Figure 9: Display contrast setting screen

- Frequency (only for some Amplifiers)

The forward and reflected RF powers is measured by means of a directional coupler. In order to compensate for the effect due to the sampling made by the coupler, it is possible to set the frequency by menu entry Settings ⟶ Frequency. The setting can be changed by pressing the arrow keys. The changes made are saved by pressing the RET key or discarded pressing the ESC key. Set the video carrier frequency.

- Slave Address

The amplifier may be used either in stand-alone mode or as a slave of a master in a high power multiple units transmitter. In the latter case an unique address for each amplifier has to be specified, in order for all of them to communicate with the master on the same RS485 bus. The menu entry Settings ⟶ Slave Address allows to choose the stand-alone mode or set a slave address by means of the UP and DOWN arrow keys. The changes made are saved by pressing the RET key or discarded pressing the ESC key. An example of this screen is shown in Figure 10.

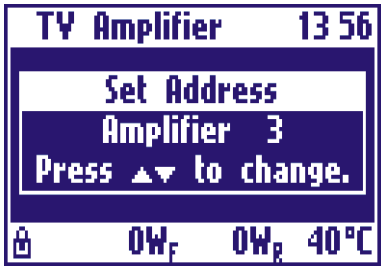


Figure 10:Slave address setting screen

- Remote

The amplifier may be controlled either locally, by means of the keys and display, or remotely. There are three possibilities for remote control:
- using a direct serial connection between amplifier RS232 connector and a PC RS232;
- using the remote control device manufactured by Elettronika S.r.l. (RCU), on the RS485;
- using a general-purpose control system connected to telemeasures.

You can enable / disable remote control choosing menu item Settings ⟶ Remote. When remote control is enabled, the yellow REMOTE LED on the front panel is lit.

- Interlock

One of the pins of the telemeasure connector, located on the rear panel, is used for the interlock alarm. It is an input line which turns off the amplifier in case of alarm. The interlock check can be enabled or disabled using

menu item Settings ⟶ Interlock. When it is enabled, the status bar shows the lock symbol (see Figure 3), which is close if the interlock chain is closed (no alarm) or open if it is open (alarm).

- Firmware Release

The menu entry Settings ⟶ Firmware Release allows to display the firmware version number and the hardware release of the amplifier.

- Serial Number

The menu entry Settings ⟶ Serial Number allows to display the serial number of the apparatus.

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