



0÷30V 10A POWER SUPPLY

For your lab, here's a super power supply designed around the evergreen LM723, capable of delivering an output voltage of between 0 and 30 V with a maximum current of 10 Amperes. Protected against short circuits and complete with threshold regulation of the intervening current between 50 mA and 10 A. No less than 20,000 microfarads of filtering capacitors, automatic switching of the input voltage from the transformer and warning light for the presence of radio frequency on the power line!

The power supply is the first need that all those who decide to set up an electronic laboratory have, whether it is for work or simply for their hobby.

The main characteristics of a power supply must be: versatility, i.e. being able to power any circuit, whether it is a digital circuit operating at 3 or 5V, a radio, a BF amplifier or a linear RF operating at 18 ÷ 24 V, etc., without "sitting down" when the circuit under test has a strong absorption; it must be provided with effective protection to prevent power transistors from blowing in the event of accidental short circuits; The tripping threshold of the protection must be adjustable so that it can be tripped even for minimal currents.

After examining all the

With these features, we decided to create a super-powerful and super-protected power supply

to be used with absolute peace of mind in any laboratory, without any failure, or that makes you regret the money invested in its construction.

Our power supply has truly professional features: voltage regulation from 0 to 30 volts, current limiting up to a mini-



50 mA, fully protected against short circuits up to a maximum of 10 amperes, automatic voltage switching on the transformer secondary, RF presence signal.

WIRING DIAGRAM

The wiring diagram of the MK 3965 power supply is shown in figure 4, we note that the TF1 transformer is equipped with 4 completely separate secondary windings: the first represents the secondary power winding, provides a voltage of 35 V with a 20 V socket and delivers a current of 10 amperes; the second provides a voltage of 8 V 100 mA; The third

a voltage of 35 V 100 mA; the fourth a voltage of 10 V 200 mA to power the MK3980 digital ammeter voltmeter.

The voltage of the first winding is applied via the contacts of the RL1 relay to the bridge of rectifier diodes D4÷D11.

As you can see for each

Two diodes were placed in parallel to increase dissipation and switching speed. The voltage is then filtered by the C10 and C11 electrolytic capacitors for a total of 20,000 μ F; this tension is then applied to the parallel of T1÷T5 bypass transistors.

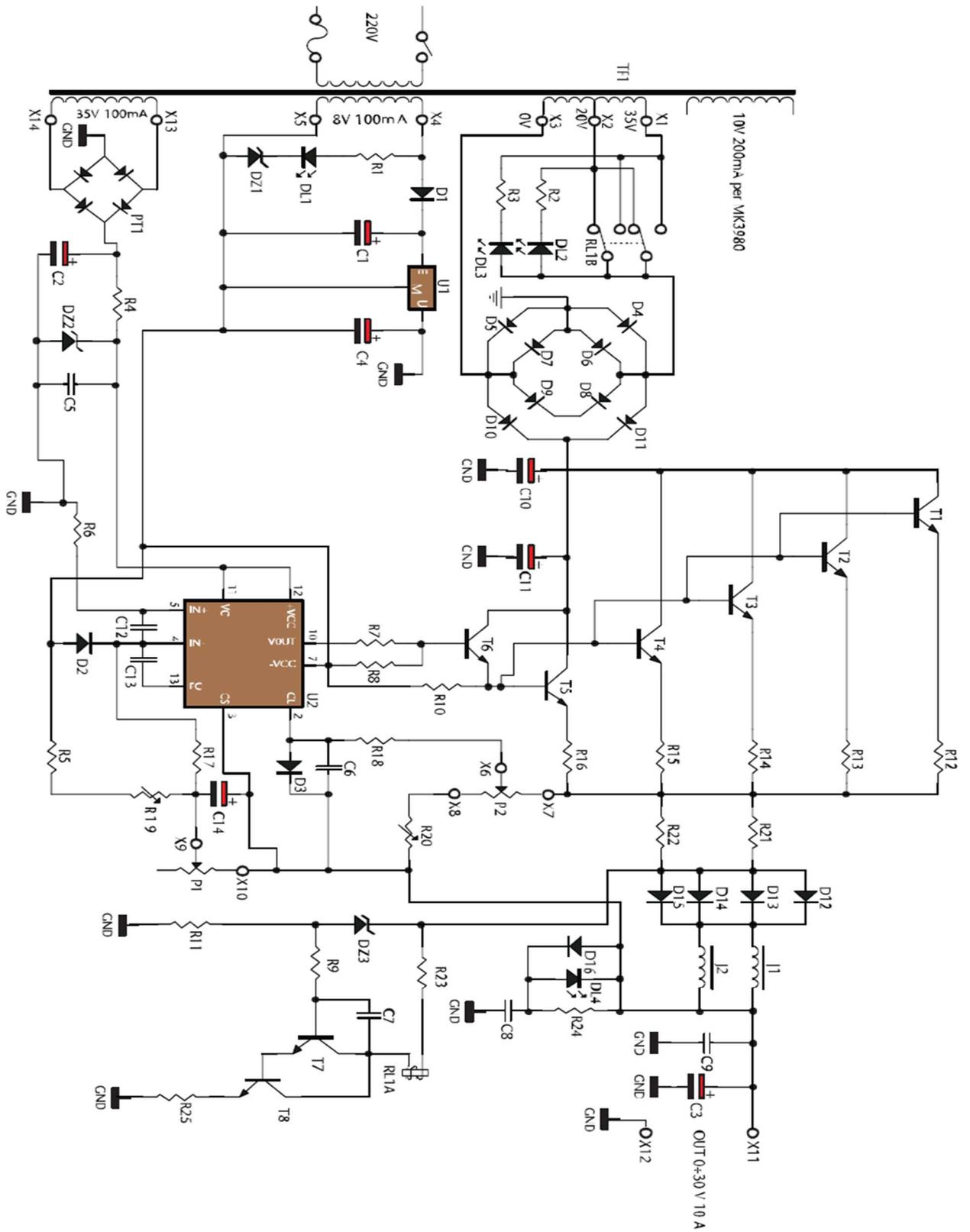


Figure 4: Power supply wiring diagram

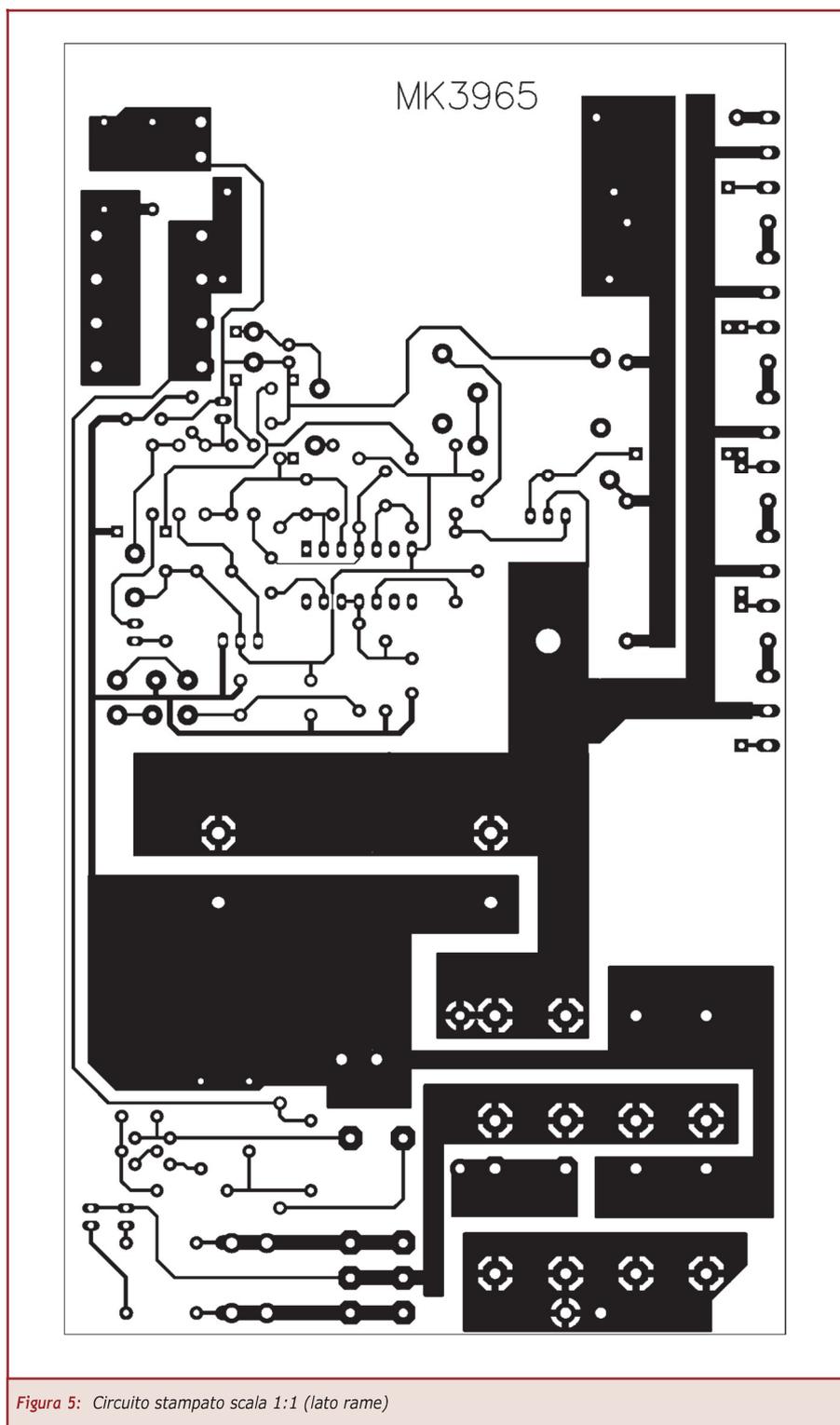


Figura 5: Circuito stampato scala 1:1 (lato rame)

The voltage of the second winding is rectified by diode D1, filtered by C1 and stabilized by the integrated circuit U1, whose output is connected to the negative of the circuit. This is in order to obtain a negative

Compared to the general ground, which applied to the U2 integrated circuit allows it to fall below the minimum voltage level (2V) obtainable by the 723. In this way, it is possible to achieve

zero volt output, so that even those circuits that require supply voltages of 1-1.2-1.5 V can be powered. The voltage of the third winding is straightened by the PT1 bridge, stabilized by the DZ2 zener diode, and then sent to the input of U2. The output voltage is regulated by means of the P1 multiturn potentiometer, the R19 trimmer, placed in series with it, determines the maximum voltage to be obtained at the output.

The current limitation (to determine the tripping level of the protection) is carried out with the P2 potentiometer, the R20 trimmer sets the maximum value of the tripping threshold.

The output of U2 (pin 10) drives the base of the T6 transistor, which in turn controls the parallel of the T1÷T5 final transistors.

Diodes D12÷D15 are used to further rectify any alternating components (ripple, noise, etc.), while impedances J1 and J2 form a necessary filter when powering radio frequency equipment.

If there is a return of the radio frequency component (on the power supply line) this is detected by the Germanium diode D16 and visualized by the lighting of the DL4 LED diode.

The T7 and T8 transistors, the DZ3 zener diode and the associated components determine the tripping threshold and the drive of the RL1 relay coil.

With the values used, the relay coil energizes when the output voltage exceeds 13-14 V, consequently switching its contacts to the high-voltage (35 V) branch of the power secondary, thus reducing the dissipation of the final transistors when supplying loads with low supply voltages. The DL2 and DL3 LED diodes indicate which of the two branches of the

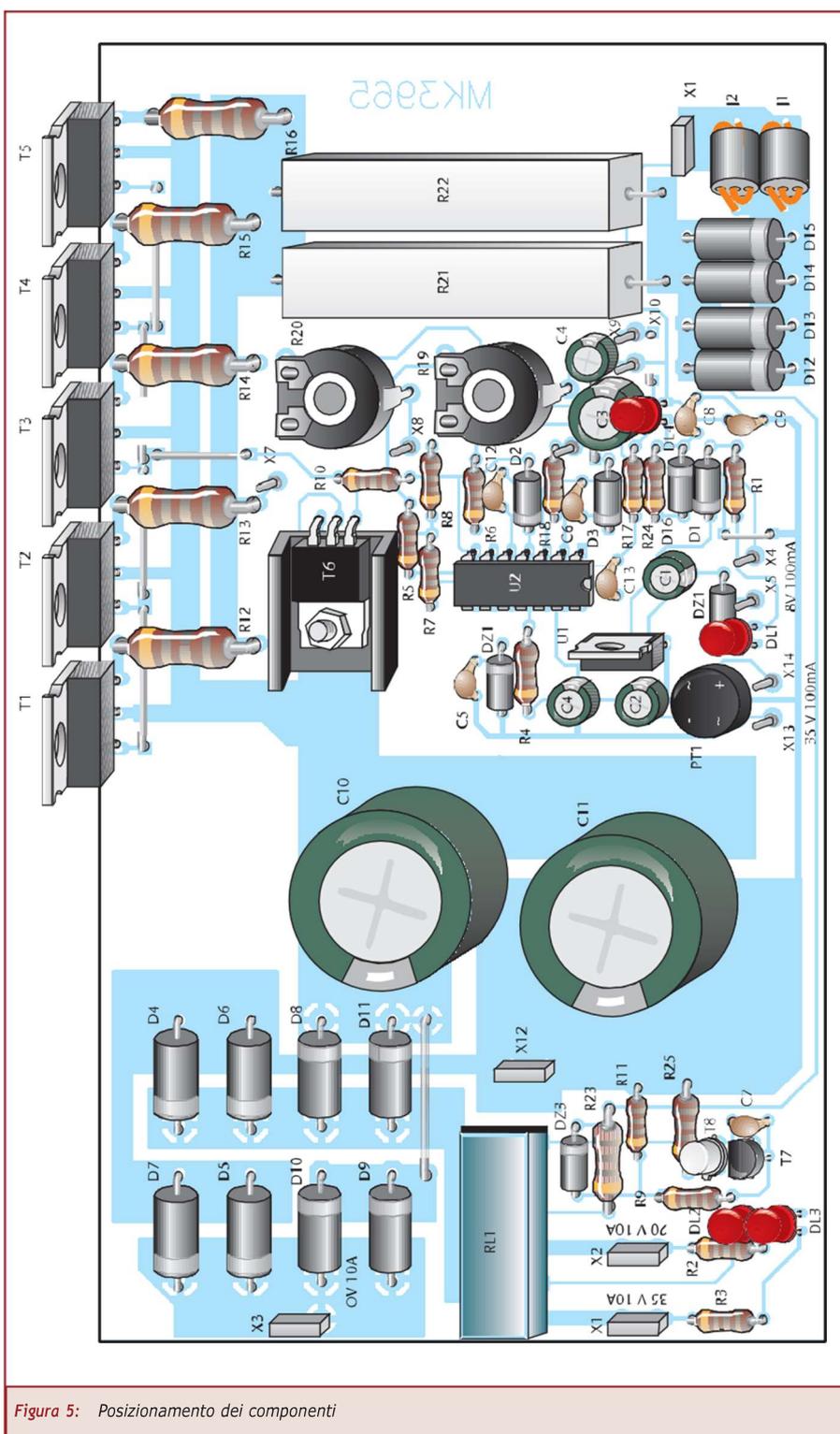


Figura 5: Posizionamento dei componenti

Secondary power is engaged.

PRACTICAL EXECUTION AND CALIBRATION

Now let's move on to the description of the assembly phases.

Very care must be taken during the entire assembly phase to avoid unpleasant surprises when supplying food. You start by assembling the lower profile components and

it follows gradually up to the larger ones, namely the RL1 relay and capacitors C10 and C11.

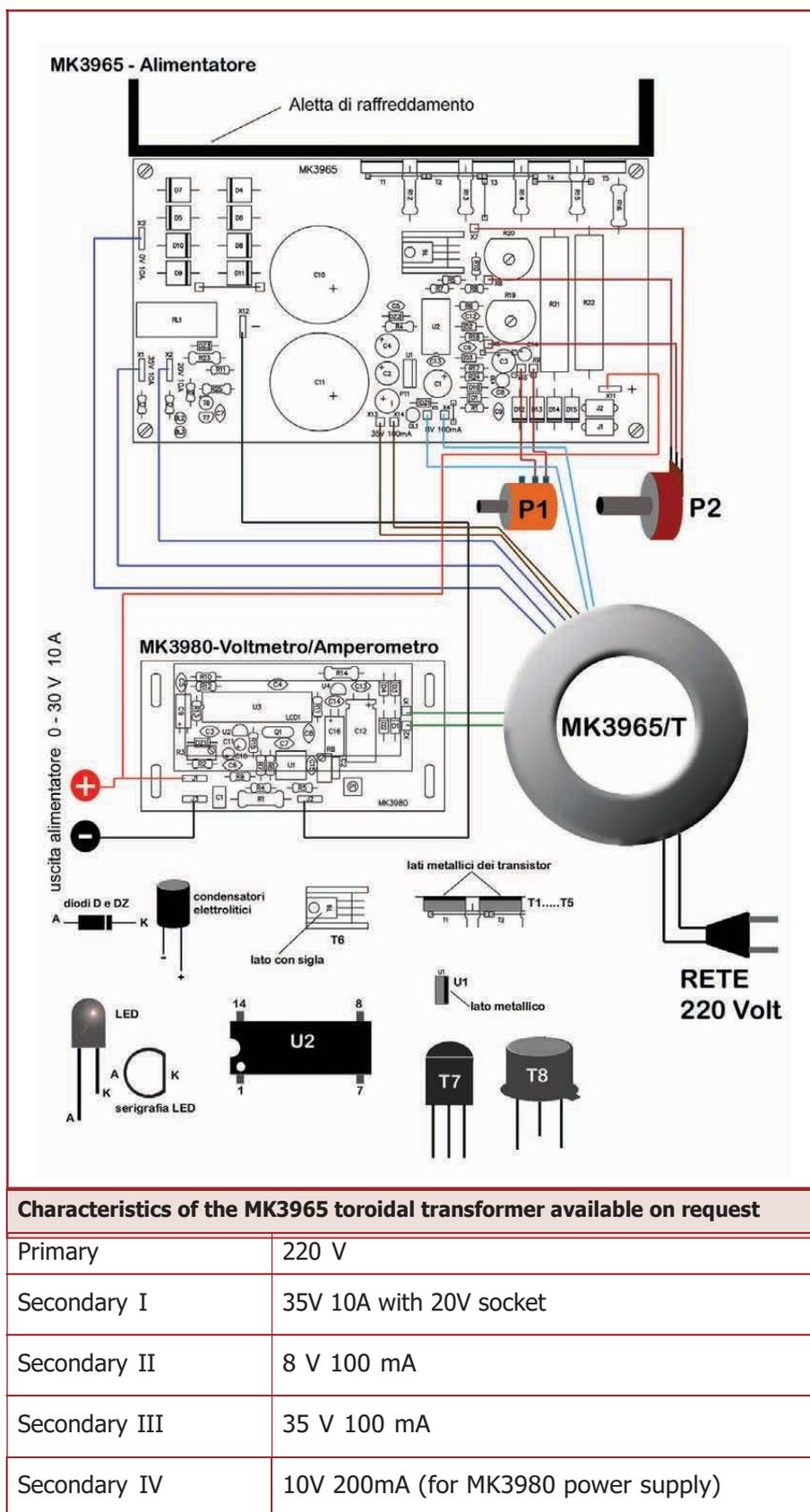
Please note that: diodes, electrolytic capacitors, zeners, LED diodes have a polarity that must be respected. The right direction of U1 and U2 integrated circuits must also be respected.

The T6 transistor must be equipped with a special fin (supplied in the kit), it must be mounted horizontally on the printed circuit board so it is necessary to fold the end of its terminals by a few millimeters then it is fixed to the printed circuit board with a special screw and only after tightening the nut must the soldering be carried out.

To mount the D4÷D15 power diodes, fold the terminals with a pair of small pliers, but do not force too hard to avoid breakage. Continue by mounting the 5 power transistors, which must be soldered keeping their body at a height of about 10 mm from the printed circuit, before performing the final welding, check that the fixing holes of the fins coincide with the threaded holes present on the heatsink of the 3965/C container, (3965/C is supplied on request). The DL4 LEDs (! RF), DL2 (Sec 1), DL3 (Sec 2) must be reported on the front panel of the container, the DL1 LED has not been designed for external mounting.

Once the assembly has been completed, we recommend that you check the exact position and polarity of the components again, as well as the welds, which must be perfect and burr-free.

At this point, all that remains is to insert everything inside the special 3965/C container, supplied already perforated with a silk-screened front panel, and is also designed to contain the Digital Ammeter Voltmeter



MK3980, which will be presented in the next issue.

For connections, we recommend using cables with the following cross-sections: 1.5–2.5 mm² for output connections 0.35mm² for all other connections.

To identify the various transformer secondaries, refer to the color chart on it, the 3 cables relating to the power secondary (0–20–35 V 10 A) must be wired with the fastons provided in the kit to make their connection to the MK3965 board more practical.

Pay attention to the connection of the potentiometers P1 and P2, they must be carried out as indicated in the wiring plan (figure 7), in order to obtain the maximum (voltage or current), with the potentiometers fully turned clockwise, and the minimum with the potentiometers turned completely counterclockwise. As spacers for the printed circuit board, two nuts are screwed on each of the four screws fixing the header, before fixing the final transistors to the dissipator, the appropriate mica and the plastic insulator for the screw must be interposed as insulation. The toroidal transformer must be fixed to the bottom of the container with the appropriate bolt, washer and rubber protection supplied in the kit.

For calibration, the R19 and R20 trimmers are turned clockwise and the potentiometers P1 and P2 are turned completely counterclockwise (i.e. for the minimum if all connections have been made correctly), a 200 Vdc multimeter is connected to the output of the MK3965 (point X11 = + ; point X12 = -) and then power is supplied, turn the multi-turn potentiometer P1 completely clockwise, then act

