ØLTRONIX

Owners manual

Stabpac MK II

MCC

— OLTRONIX's products have those properties that decades of experience and know-how might bring —

TABLE OF CONTENTS

For detailed servicing and maintenance of this power supply, the full service manual should be available. In this matter consult your nearest OLTRONIX representative.

Please, read this page very carefully
before switching on

I n t r o d u c t i o n

This power supply has been carefully manufactured and thoroughly tested before dispatch to ensure that your instrument arrives in a perfect condition. However, the power supply should not be "switched on" before reading "Inspection", especially "Mechanical check" and "Line connection".

I n s p e c t i o n

Mechanical check

When the power supply is received, verify that the package contents are complete and as ordered.

Inspect the instrument for any physical damage; such as scratched panel surface, broken knobs or connectors etc. ocurred in shipping.

If damage is found, file a claim with the responsible carrier or insurance company and refer to the warranty - last page in this manual.

To facilitate possible reshipment, keep the original package.

Line connection

Unless otherwise specified this power supply is delivered with the primary side of the transformer connected for 220 V, 50 Hz AC.

If your line voltage is different, remove the cover (4 screws at bottomside) and make the right connections on the transformer in accordance with the label attached to it.

At the rear side of the power supply you will find the line input terminal. The rear case contact is connected to the core of the transformer and to the case contact on the front panel. For your own security: do not confuse line and case contacts.

Connect line and case without any measure on the front panel such as loading the output or disconnection of links between SENSE and output.

Output voltage

The output voltage is factory-adjusted to the lower limit of the voltage range for the different types of supplies. This voltage equals the first number in the type designation. Switch the line on and check the output voltage with a voltmeter, accurate enough for your purposes. If the value differs considerably from nominal value, adjust it at "VOLT ADJ" with a srewdriver (clock-wise for higher voltage).

In case your power supply has an overvoltage protection (OVP), check that the output voltage does not exceed the OVP-value when you turn "VOLT ADJ" fully clock-wise. It may happen that you cannot reach the OVP-limit with the "VOLT ADJ" and in such a case you can connect an external voltage (e.g. another power supply or just a chain of piles) to the output.

WARNING: When dealing with voltage output we have to warn that the "PROGR"-input on the front panel is a very sensitive point because it is directly connected to the input of the error-amplifier in the IC-regulator, which can be damaged if you short-circuit to "-" or "-SENSE".

Output current

Connect a suitable load in series with an amp-meter ot the output ("+" and "-") and check that the power supply follows the specification in the voltage-current-characteristic on page 5. Please observe that for the power supply itself it is preferably to deliver current at higher voltages. This is because less power has to dissipate inside the supply.

Further performance check - If you want to do a more detailed check on the electrical performance we refer to the Service manual whick you can order from your nearest OLTRONIX representative.

Warranty - If for any reason the power supply does not operate as specified contact your OLTRONIX representative and refer to the warranty.

Technical data

Stabpac Mk II type[1]	DC output voltage (V) nom.	DC output voltage (V) progr.	DC output current (A) max[2]	DC output current (A) S—C	Stab. 10 % Line Change	Stab. 100 % Load Change (mV)	Input (W)	Input (VA)	η (%)	Weight (kg)	Dimensions h×w×d (mm)	OVP Option Standard	OVP Threshold (V)
MCA 5-3	5—6	5—6	3	1.0	2 mV	15	36	44	46	1.2	84× 88×132	S	6.8
MCA 12-1.7	12—15	9—15	1.7	0.55	or		42	52	49			O	—
MCA 24-0.8	24—27	9—27	0.8	0.3	0.05 %		34	45	56			O	—
MCB 5-5	5—6	5—6	5	1.5	2 mV	15	56	72	49	2.0	84× 88×178	S	6.8
MCB 12-3	12—15	9—15	3	1.0	or		68	88	53			O	—
MCB 24-1.5	24—27	9—27	1.5	0.5	0.05 %		58	76	62			O	—
MCC 5-9	5—6	0—6	9	3.0	2 mV	15	88	116	56	3.6	84× 88×285	S	6.8
MCC 12-5	12—15	0—15	5	1.5	or		103	138	58			O	—
MCC 24-2.5	24—27	0—27	2.5	0.8	0.05 %		95	128	63			O	—
MCD 5-18	5—6	0—6	18	6.0	2 mV	15	177	(240)[3]	56	6.5	84×188×285	S	6.8
MCD 12-10	12—15	0—15	10	3.3	or		204	(280)[3]	59			O	—
MCD 24-5	24—27	0—27	5	1.7	0.05 %		190	(270)[3]	63			O	—

[1] The letters in the type designation stand for:
M = modular type, C = stability class, third letter = size of modul.
The figures stand for voltage and current.

[2] For an input of nominal value, full current is available at the upper limit of the voltage range. Otherwise as specified.

[3] Tentative.

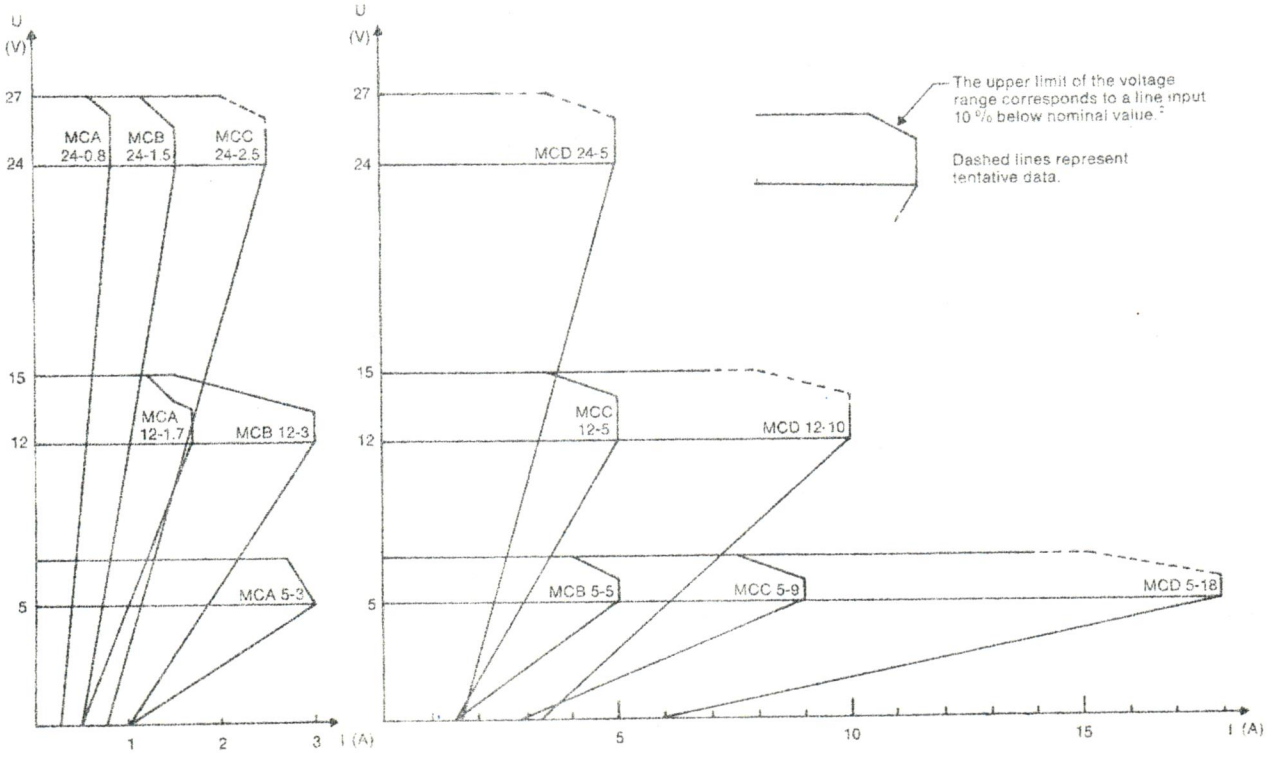
Input: AC 110, 117, 220 and 235 V ±10 %; 240 V +8 %—12 %. 45-62 Hz.
Output: DC; floating, positive or negative terminal may be grounded.
Chassis insulation: 1000 V.
Ambient temperature: Operation 0—60° C; storage —40—85° C.

Temperature coefficient: Less than 100 ppm/°C.
Ripple: Less than 1.5 mV.
Long term stability: 0.05 % per 12 hours typically.
Recovery time: Less than 50 µsec.

Remote sensing: Standard on all units.
Remote programming: Standard on all units.

Overvoltage protection OVP: Standard on all 5—6 V models.
Short-circuit protection: Standard on all units (foldback type).
Overtemperature protection OTP: Standard on all units. Disconnects mains until normal operating temperature has been restored.

Voltage-current-characteristics



Protective equipment

Overvoltage protection

All 5 V units of Stabpac MK II are equipped with a standard OVP circuit. Other models are planned for the fitting of an OVP.

The response time for the circuit is approx. 10 us and it is dimensioned for the worst case, which means a short-circuit from the transformer to the output with the exception of resistance in wires.

The standard type of OVP has a fixed overvoltage threshold which is set to approx. 6.8 V. It is possible and fairly simple to alter this OVP-circuit to be adjustable. For the details in this matter we refer to the Service manual.

For other models the OVP-circuit exists as an option. In this case the threshold is adjustable at "OVP ADJ" on the front panel.

Overtemperature protection (OTP)

All Stabpac MK II models are fitted with a temperature cut-off relay, which automatically switches the line off if the unit should exceed the high temperature limit. When the temperature has decreased to a safe value, the relay switches the line on again.

Current limit

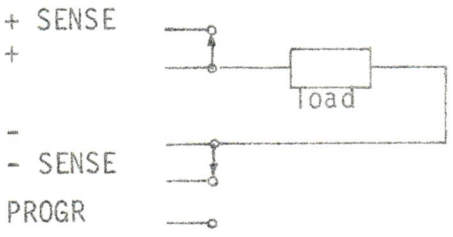
For the protection of the load and also the power supply itself all Stabpac MK II units have a current limit of semi-foldback type. The maximum current output is therefore depending on the output voltage. Below the nominal range the current is linearily decreasing and the short-circuit value is approx. 1/3 of the maximum value. See U-I-diagrams on page 5.

Optional protective equipment for OVP and OTP

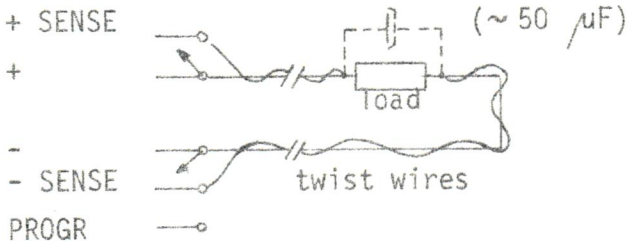
At your option we can offer a relay giving permanent disconnection after an OVP or OTP condition. We also offer an alarm relay which indicates an OTP-switch-off beeing in hand.

Normal operation

In normal operation the load is connected to "+" and "-" with short wires having negligible voltage drops. "SENSE" is connected to the output by the links on the front terminal strip. See left fig. below.



Normal connection



Remote sensing

Remote sensing

Voltage drops in the wires from the power unit to the load can be compensated for by using remote sensing. This is done by connecting the sense terminals to the load, while at the same time you disconnect the links between "SENSE" and the output terminal. See right fig. above. The sense current is of the order 1 mA and it is only to a smaller extent affected by long wires.

Due to inductance in extended wires, the response time for the regulation will be slightly longer. This is normally easy to compensate for by adding at least a 50 µF electrolytic capacitor across the load.

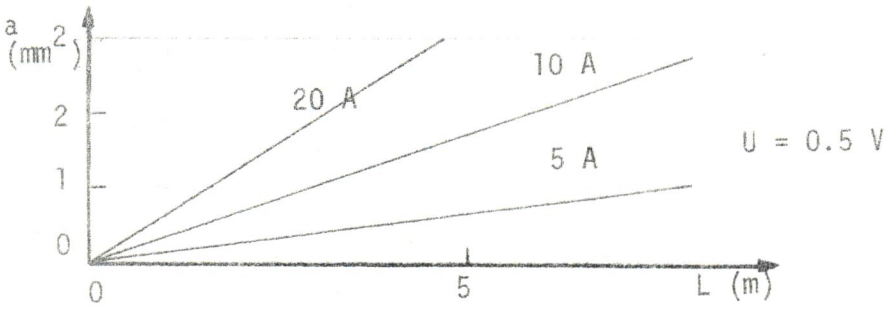
When using remote sensing the sum of the voltage drops in load and wires must not exceed the upper limit of the voltage range if the specified regulation is to be maintained.

Note: Special for MCC and MCD when using remote sense is that the voltage drop in the wire between "+" and load must not (and cannot) exceed 0.5 V.

Wires

The diagram below gives the minimum area of wires, for a max. voltage drop of 0.5 V in each wire and for different currents, as function of length of wire.

Multiply the values of area with at least the factor 4 for practical purposes.



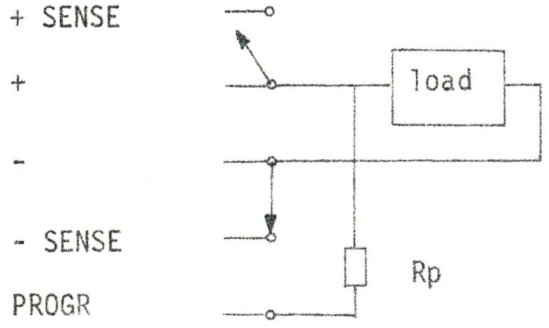
All Stabpac MK II can be programmed over the voltage range. With certain precautions it is also possible to program to values below the lower limit of the voltage range.

Ordinary voltage adjustment is done at the front panel by varying a resistor chain, which includes the "VOLT ADJ"-potentiometer. When programming, this resistor chain is substituted or paralleled by a programming resistor.

By using different programming resistors, rapid changes between pre-determined voltages can be obtained.

There are, for Stabpac MK II, two types of programming, depending on the main design of the regulating circuitry. One type (A), which is linear but having limitations on the programming range, is used for MCA and MCB units. The other type(B), which allows programming from zero to maximum voltage but non-linearly, is used for MCC and MCD.

Type A: MCA and MCB

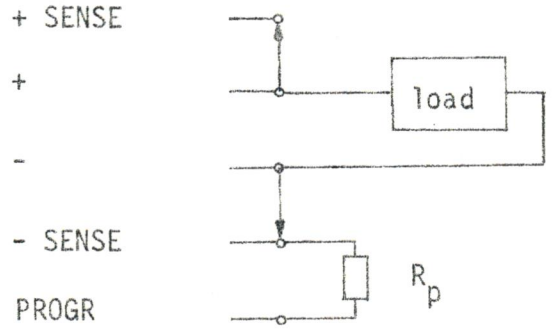


Voltage range	Programming formula, R_p in kohm
5- 6	$R_p = 3.5 + \frac{V-5}{1.01}$
12-15	$R_p = 4.6 + \frac{V-12}{1.05}$
24-27	$R_p = 16.0 + \frac{V-24}{1.05}$

Important note for type A:

Never make R_{progr} less than 1.5 kohm.

Type B: MCC and MCD



Voltage range	Programming formula, R_p in kohm
5- 6	$R_p = \frac{5.5 \cdot V}{5 - V}$
12-15	$R_p = \frac{13.1 \cdot V}{12 - V}$
24-27	$R_p = \frac{26.2 \cdot V}{24 - V}$

Constant current

Stabpac MK II power supplies can be operated with constant current by using the same regulation system that keeps the output voltage constant.

The circuit needs an external shunt resistor, which should be connected to the positive output terminal (for MCC and MCD it must be). The stability of this resistor will determine the stability of the current.

It is to prefer to use a Stabpac-unit, which is programmable to low values, if there is need for a high voltage swing in the load. On the other hand, to achieve good performance of the regulation, the voltage across the shunt resistor should not be too small.

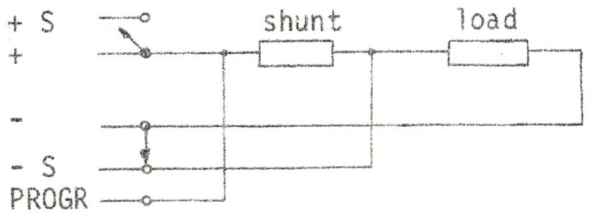


Figure: connection for constant current

If U_L max is less than the difference between the upper and lower limit of the nominal range, there is no need for programming.

When you choose voltage across the shunt resistor, check that the demands on current and voltage across the load fall within the capacity of the supply. Let the sum of the voltage drop in the shunt resistor and maximum voltage across the load be within the nominal range.

$$U_{shunt} + U_{L\ max} = \text{within nominal range}$$

Use the "PROGR"-input to set the output voltage equal to the decided value of U_{shunt} (see "programming" page 8.) Then connect the shunt and the load as shown in the figure above. The supply will keep the voltage across the shunt resistor constant and so also the current through it, but the total voltage from the supply will vary according to the load. To clarify the purpose further it should be instructive to study the figure below.

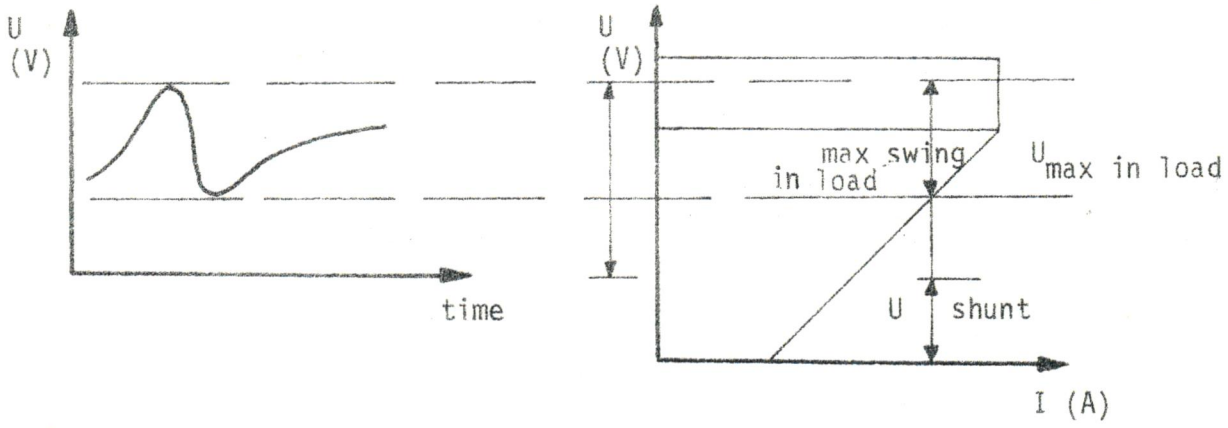


Fig. Choice of shunt resistor voltage

Series connection

To obtain higher output voltage, Stabpac MK II units may be connected in series provided that maximum voltage to ground does not exceed 1000 V.

Due to the semi-foldback current limit, however, the required voltage may not be achieved if the load is connected whilst switching the power supply on. This is because the voltage of one power supply might come up first, engaging the current limit of the other supply and give 0 voltage output.

What's necessary to avoid this is a very short time without load in order to let the power supplies reach full voltage.

If the loadline goes to the left of the point B for each supply connected as in the diagram below, there is no need to consider this limitation.

Fig 1 Series connection with remote sensing

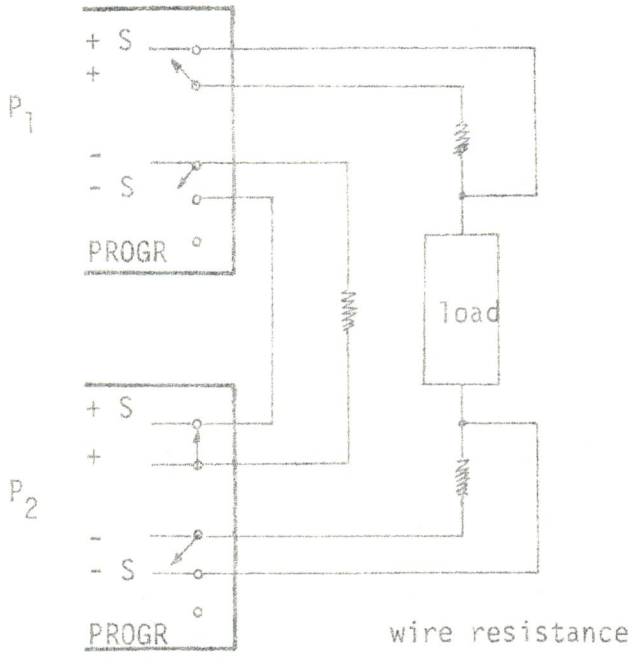
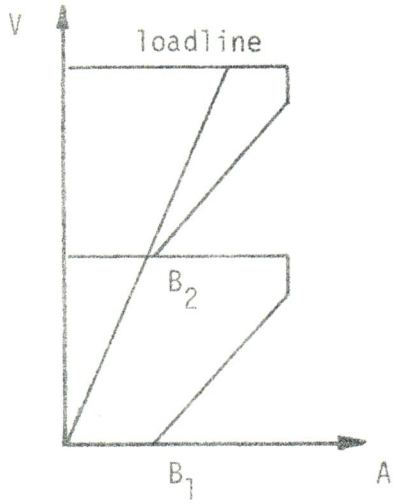


Fig 2 Loadline diagram



Parallel connection

Stabpac power supplies may be connected in parallel to give a higher output current.

Before connecting, adjust the supplies to equal output voltage. Note that there will always remain a slight incremental voltage difference between them (see fig. 2). If the load is gradually increased, the power supply with the highest voltage will deliver all the current until it reaches its current limit. Then the output voltage will drop slightly and the other power supply will begin to deliver current. Due to the excellent low internal resistance in Stabpac:s there will always remain incremental voltage steps. However, by carefully adjusting the voltages the value of the voltage step will be negligible.

If you by no means can allow voltage step, then select your current range above the limit where the second supply has started to work. This can be done with a shunt as shown in fig 1.

Fig 1 Parallel connection with remote sensing

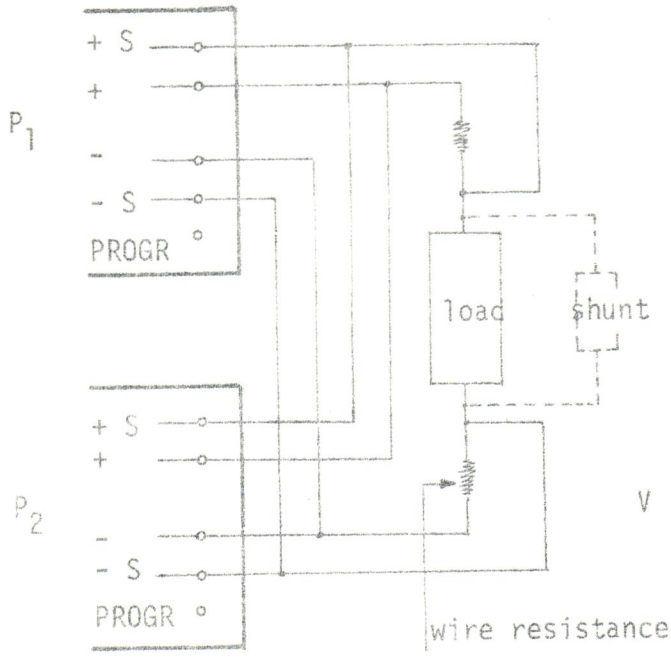
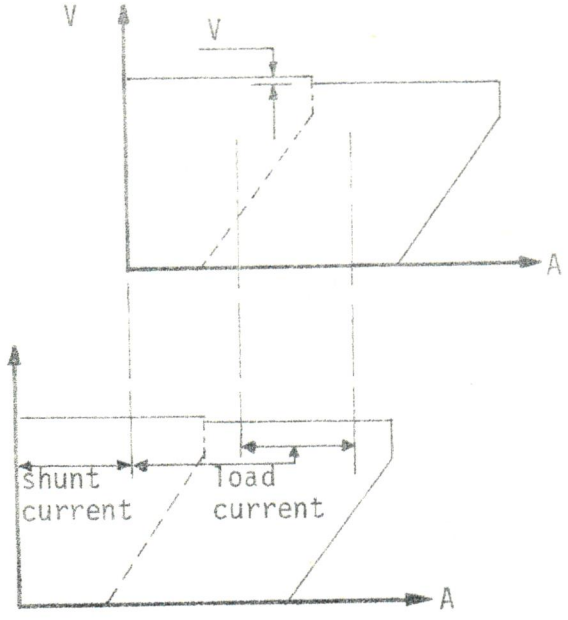
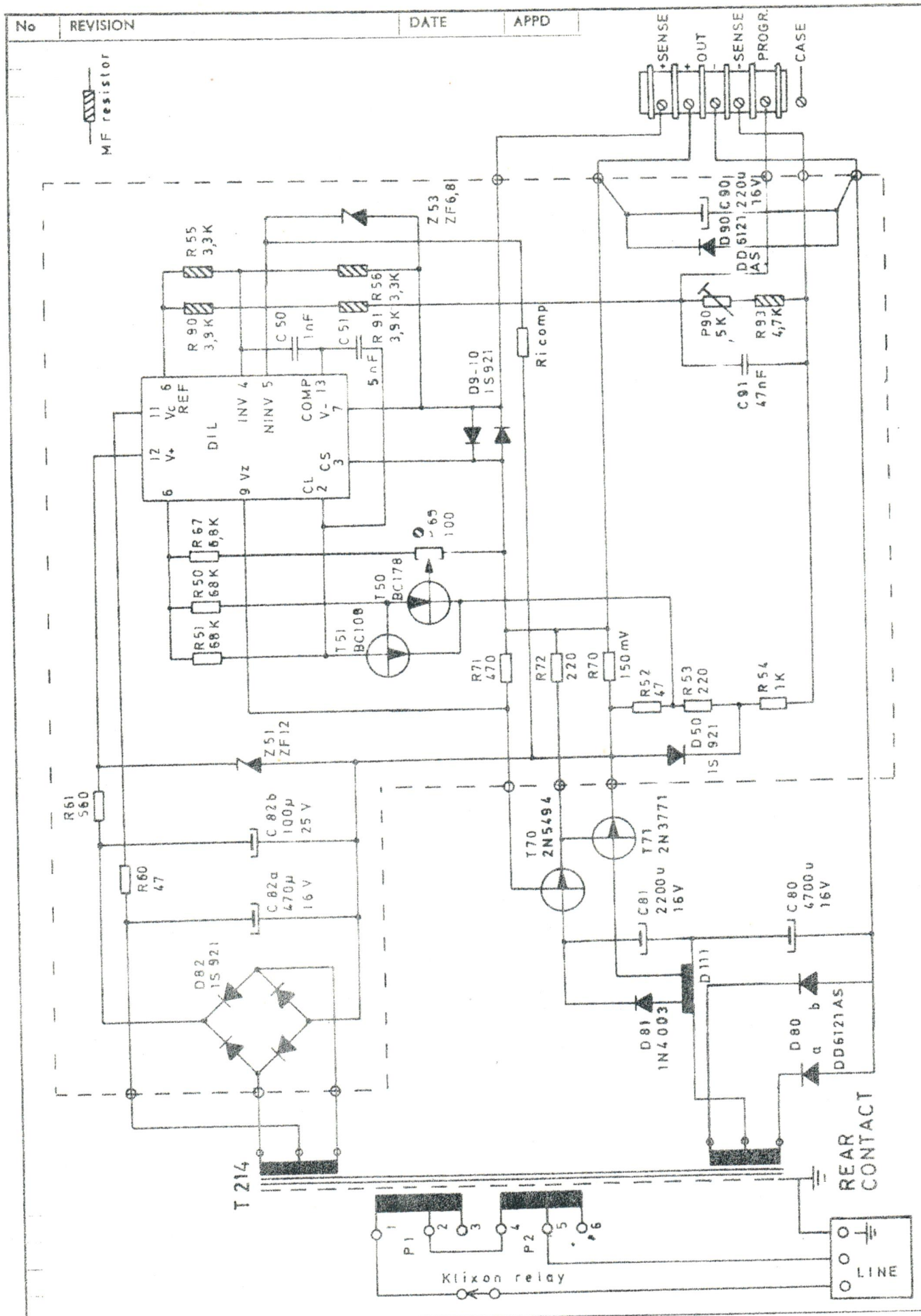


Fig 2 Selection of load current range within the range of the second supply by means of a shunt resistor

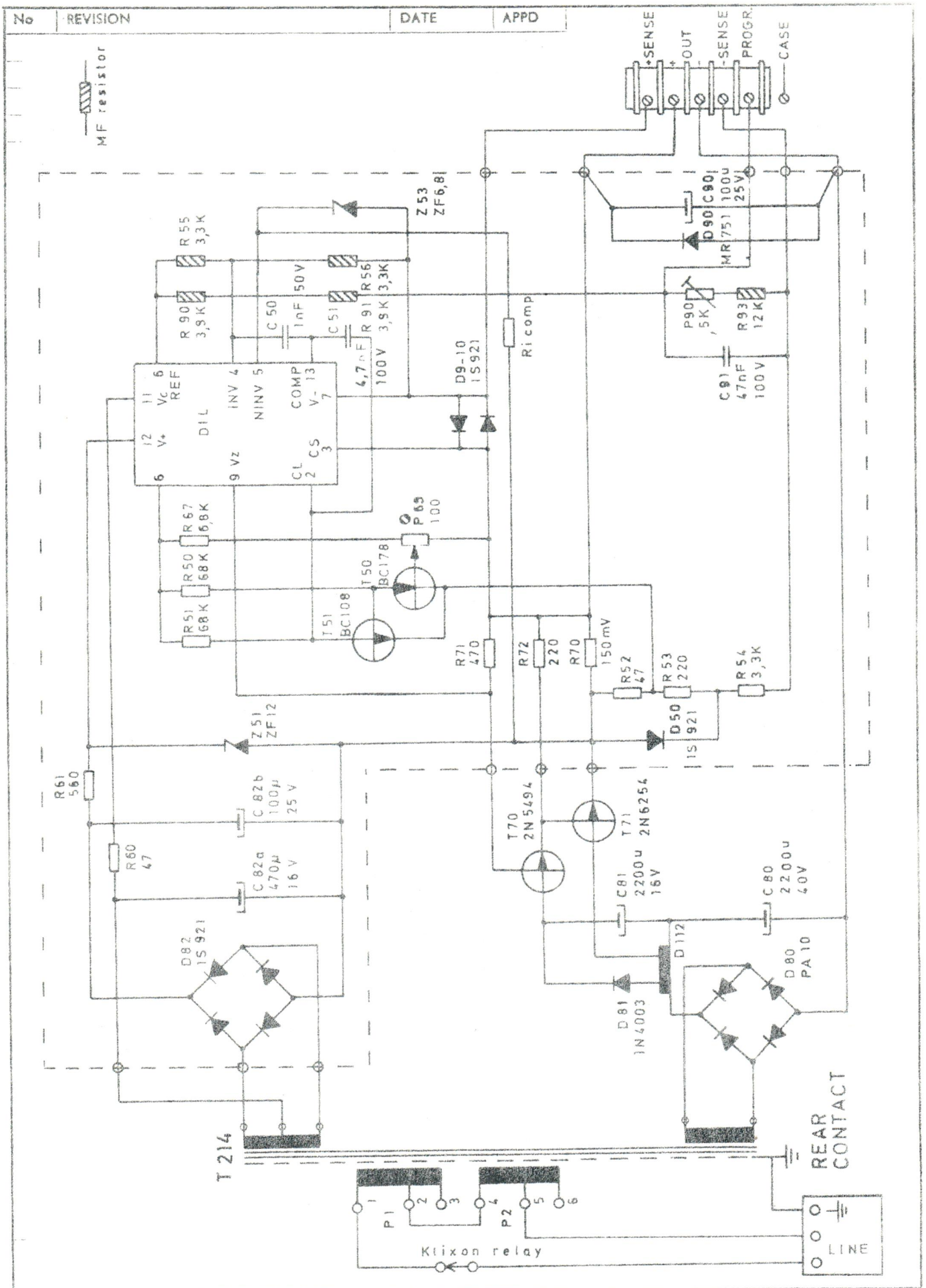


No	REVISION	DATE	APPD

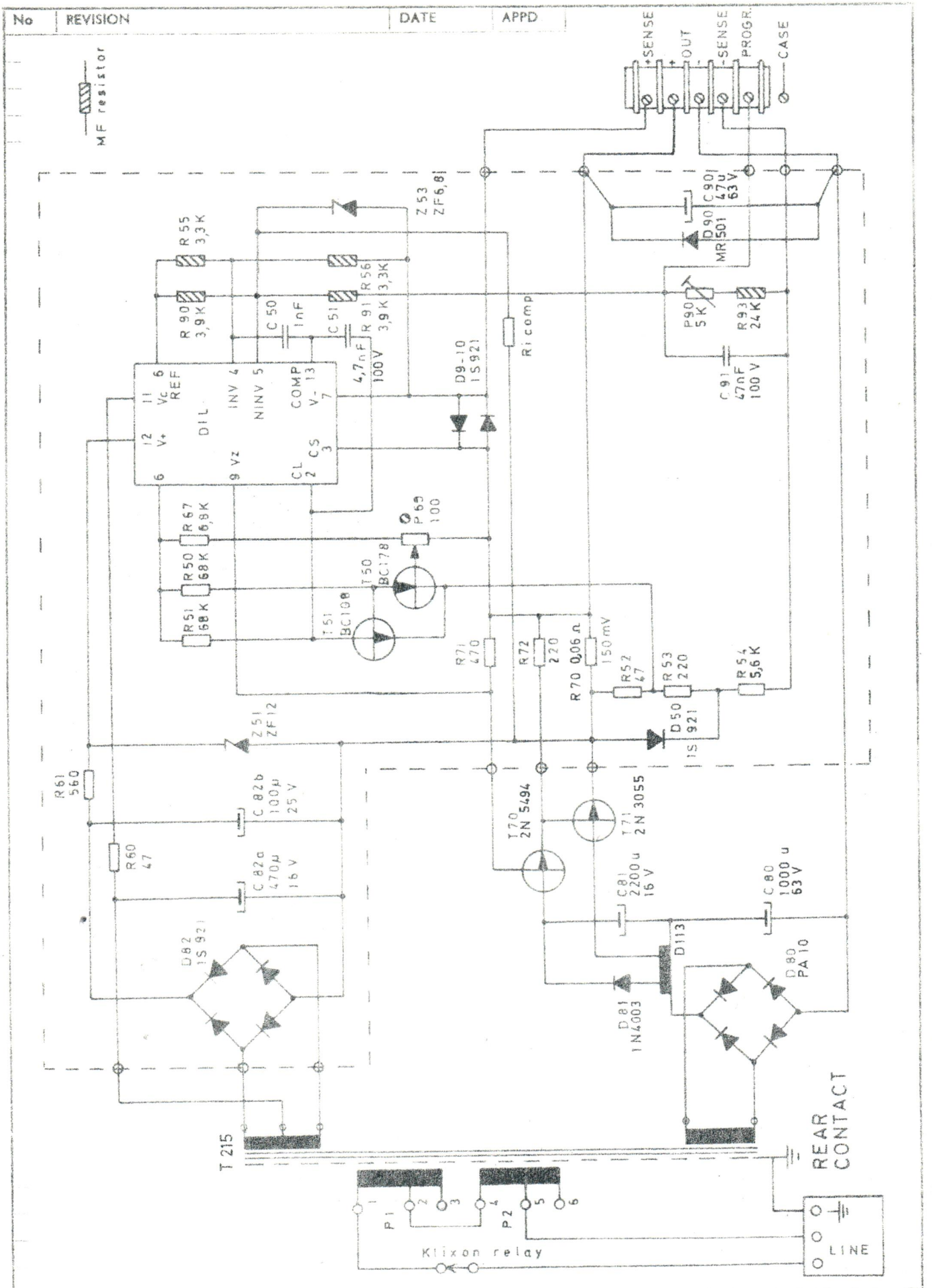


MODEL MCC 5-9	MATERIAL	FINISH
OLTRONIX	CIRCUIT DIAGRAM 5V 9A	PART NO. / SCALE
		DR 5.12.73 Sc / APPD
		233 – 74 – 1 / REV

No	REVISION	DATE	APPD



MODEL MCC 12-5	MATERIAL	FINISH	
OLTRONIX	CIRCUIT DIAGRAM 12V 5A	PART NO.	SCALE
		DR 5.12.73 Sc	APPD
		233 – 74 – 2	REV



MODEL MCC 24-2,5	MATERIAL	FINISH	
OLTRONIX	CIRCUIT DIAGRAM 24 V 2,5 A	PART NO.	SCALE
		DR 74-11-25 BF	APPD MF
		233 – 74 – 3	REV