

THE H.V. SUPPLIES, INTERLOCKS AND CONTROLS

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1. INTRODUCTION

The following description is a survey of the requirements for the construction of the Interlocks and Controls (I+C) of the H.V. power supplies and its related philosophy, so that it will form a coherent part of the ejection system. The I+C system must be located in the same rack where the SCR switching circuit is installed. Local control must be possible, independent of remote controls. Signalization of every individual fault is foreseen only locally.

2. FUNCTIONING

When the H.V. supply is powered from the mains distribution panel with the 380 V~, the 3 lamps R, S, T and the 24 V D.C. are illuminated, while the controls are automatically directed to the Control Room (C.R.)

a) Local + Remote control

Two modes of operation are possible, local (E.Q.R.) and from the Control Room (C.R.) respectively. Selection of either one can only be done, if the supply is "OFF" and if the ejection is "OFF".

b) Switching "ON"

Normally the switch "ON" is under control of the Control Room (C.R.). If control near the equipment is desired, the "E.Q.R." button must be pushed first, which eliminates any further remote "ON" action. Switching "ON" results in:

1. "ON" lamp starts flashing
2. I+C power on
3. All interlock lamps are flashing

If switched "ON" in the C.R. the central reset button starts flashing (in addition possibly an audible warning).

If switched "ON" locally, the local "Reset" starts flashing. Switching "ON" is not possible if the ejection is "ON".

c) Reset: has been included to make the I+C in such a way that any occurring fault stays memorized. Reset results in continuous illumination of all interlock lamps, if the interlocks are in the O.K. state, which in

turns stops flashing the "RESET" button. (Each interlock has a repeater relay, which receives on one side the +24 V through its own sensor, while the other side is connected by means of a diode and the reset button to 0. Reset is done on the 0 side of the relay, to protect the whole interlock system from short-circuiting, if one of the diodes would break down).

d) After resetting the I+C, the "ON" button must be pushed again, which switches the system completely on. The "OFF" lamp is deenergized, and the "ON" lamp gets power.

Note: The general applied flashing or continuous illumination of the lamps eliminates any lamp-test circuit.

e) Switching "OFF" (must be possible everywhere at any time).

For this purpose relay R 26 must be deenergized, which can be done by the local "OFF" button or remotely by energizing R 6, which is a repeater relay, put in to have the possibility to install any number of "OFF" buttons, without the obligation of putting all buttons in series. (This can be very annoying for example in case of the kicker magnet supplies, which can be preselected on 4 different "Kick and Bunch" selectors. Putting the "OFF" buttons in series would mean limited flexibility in taking out one of the 4 selectors).

The "OFF" lamp is powered from R 8.

f) Ampere and Voltmeters in primary side of supply

The measuring instruments on the primary side should be selectable by a push-button selector, which can be assembled with the standard components in so-called Bailing circuit (see drawing fig. 1).

g) Charging Current Control

The adjustment of the charging current (by phase cut) is obtained by turning of a potentiometer. The current setting is indicated on a small meter, calibrated in % of the charge current.

h) Pulse Totalizer

A pulse totalizer, indicating the number of charging cycles should be foreseen. The drive voltage can be obtained by putting a small heater transformer 220 V; 6,3 V on the secondary of one of the current transformers (see drawing fig. 3).

Construction details

The mechanical construction of the I+C system should be suitable for 19" standard rack mounting. The layout of the front panel should give a synoptic representation of the main circuit elements. The potentiometer for charging current control should either have a positive lock or be mounted behind a transparent window. The I+C system should operate from a 24 V D.C. power supply, stabilized to better than 5 %.

The relays to be used should be of the so-called "Universal" type with 3 change-over contacts. Extra contacts can be obtained by connecting relays in parallel. The "Universal" relay is a plug-in relay, suitable for use with 11 pole sockets, available in screw and soldering executions. The coil resistance of the relay must be higher than 300Ω, while the contact capability must be for at least 250 V, 6 A (A.C.) A.C. relays must be of the same type with a coil resistance of at least 10000Ω.

These relays are manufactured by:

H. Kuhnke, 2427 Malente/Holstein	}	Deutschland
Schrak		
Elesta AG, 7310 Bad Ragaz	}	Schweiz
Erni u. Co., 8306 Brüttisellen		

All D.C. relays should have a diode in parallel, type 10 D 10, made by International Rectifier or equivalent. All push-buttons must be of the type 0.1-series 120 and all signal-lamps must be type 0.1-series 040, manufactured by E.A.O., Olten, CH.

Colour code to be used

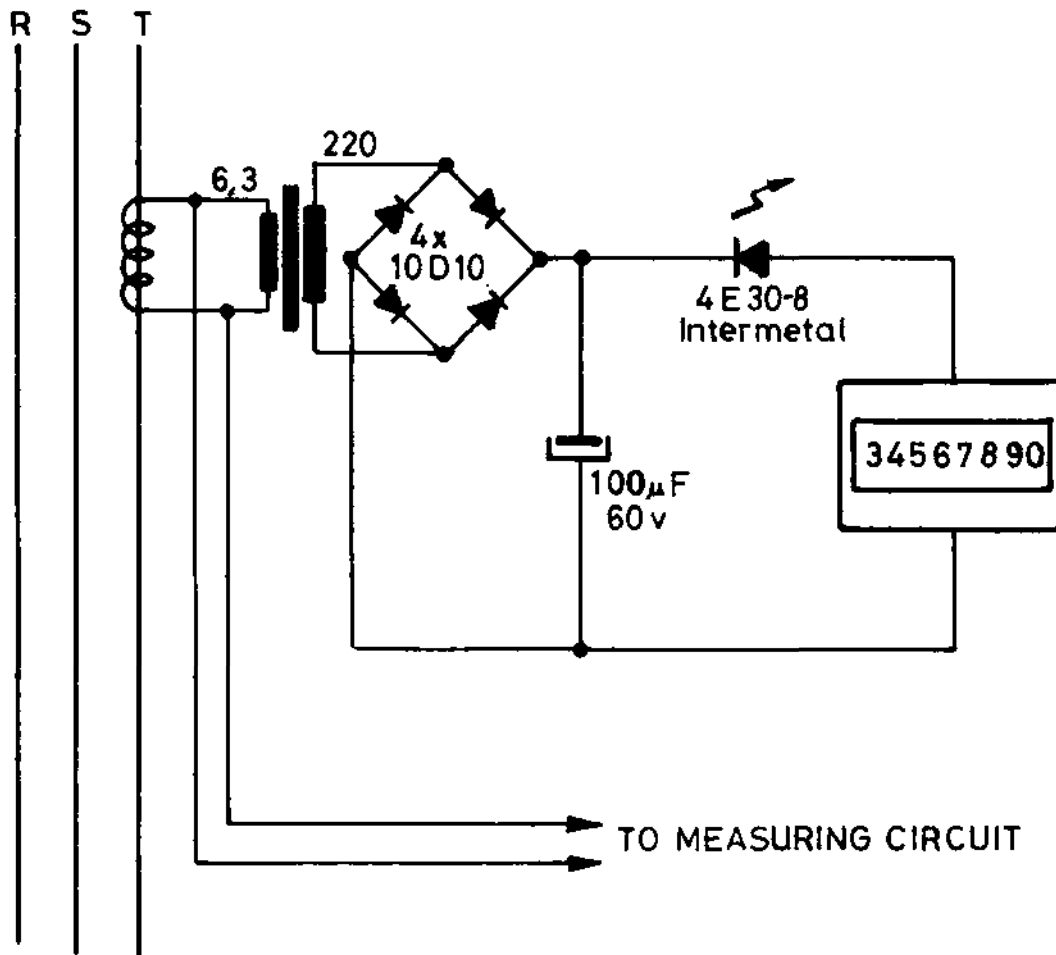
red	= on, equipment powered
green	= interlocks and "OFF" for push-buttons
yellow	= warning
white	= general information
transparent	= A.C. 220 V
amber	= Reset

All plugs should be of the type U.T.O., manufactured by Burndy. The pins are intended for crimping, but soldering is quite well possible.

P1	= 8 pole, Male
P2	= 28 pole, Male
P3	= 8 pole, Female (possible load 2 A)
P4	= 8 pole, Female (possible load 0,1 A)
P5	= 8 pole, Female (possible load 1 A)

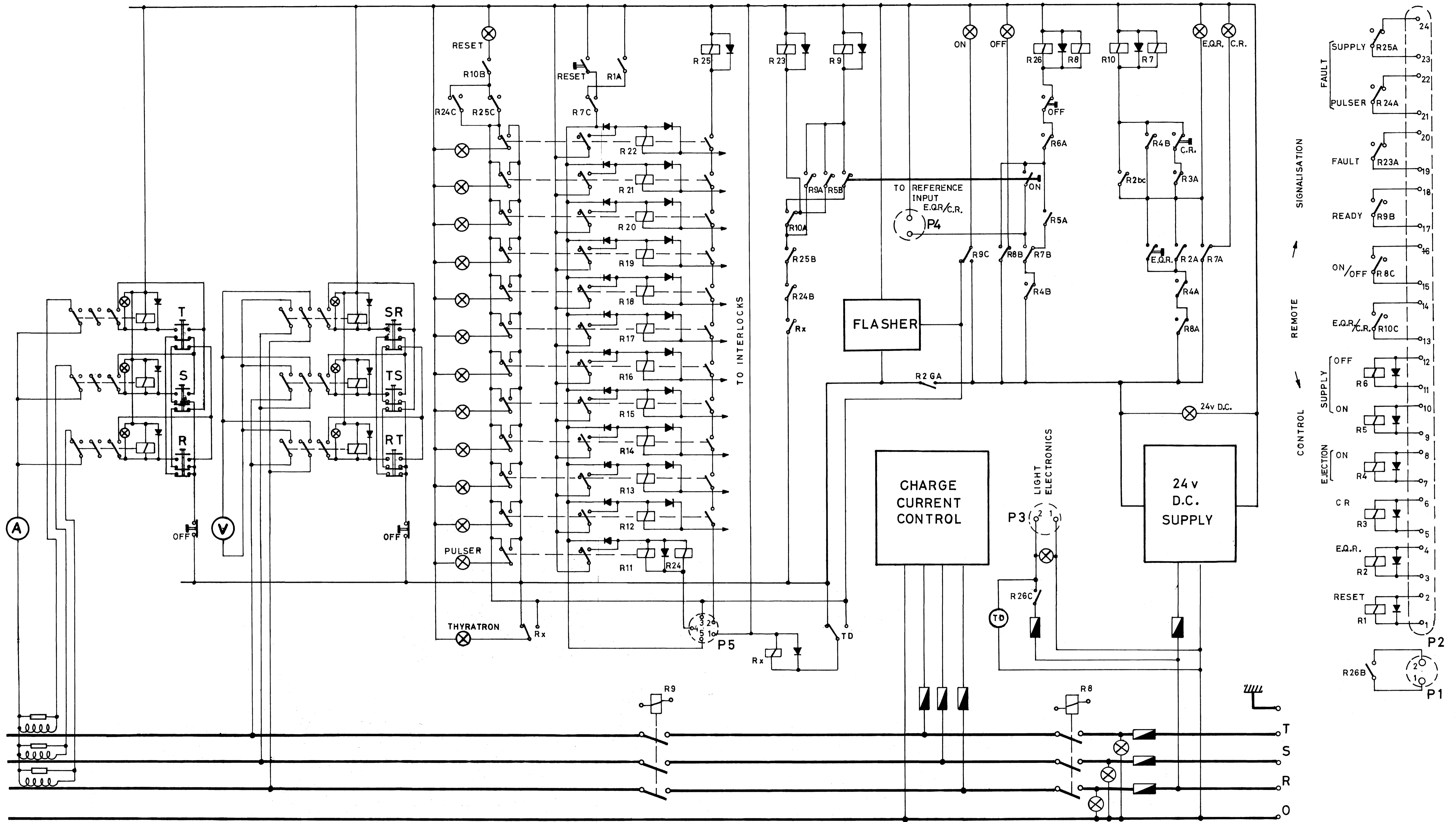
CERN will supply the solid state flasher, which is capable to deliver 2 A maximum. It will be a printed circuit execution (see drawing fig. 4). The counter used in the pulse totalizer circuit should be type R.G. - 082 A, 24 V, coil resistance  $186\Omega$ , manufactured by Sodeco, Geneve, CH, which can be ordered from

Landis und Gyr, AG  
Frankfurt am Main (Deutschland)



Nombre de pièces			Désignation	Pos.	Matière	Observations
III	II	I	Mod.	Date	Nom	Tolérances générales
			A			de à ±
			B			de à ±
			C			de à ±
			Ensemble			S. Ensemble
fig 2					Echelle	Contrôlé
PULSE TOTALIZER CIRCUIT						Vu
						Remplace
ORGANISATION EUROPÉENNE POUR LA RECHERCHÉ NUCLÉAIRE <b>CERN</b> EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH <b>FES</b> 1211 GENÈVE 23					Remplacé par	
					313-106-4	
Dossier N°	Dossier N°	Dossier N°				





Nombre de pièces		Désignation	Pos.	Matière	Observations
III	II	I	Mod.	Date	Nom
			A		
			B		
			C		
Ensemble		S. Ensemble		Dessiné 27 1 70 Brochet	
fig 1		Echelle		Contrôle Vu	
I+C system for H.V. power supplies		Remplace		Remplacé par	
ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE		FES		367-101-1	
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH		1211 GENEVE 23			