



BARCO Projection Systems

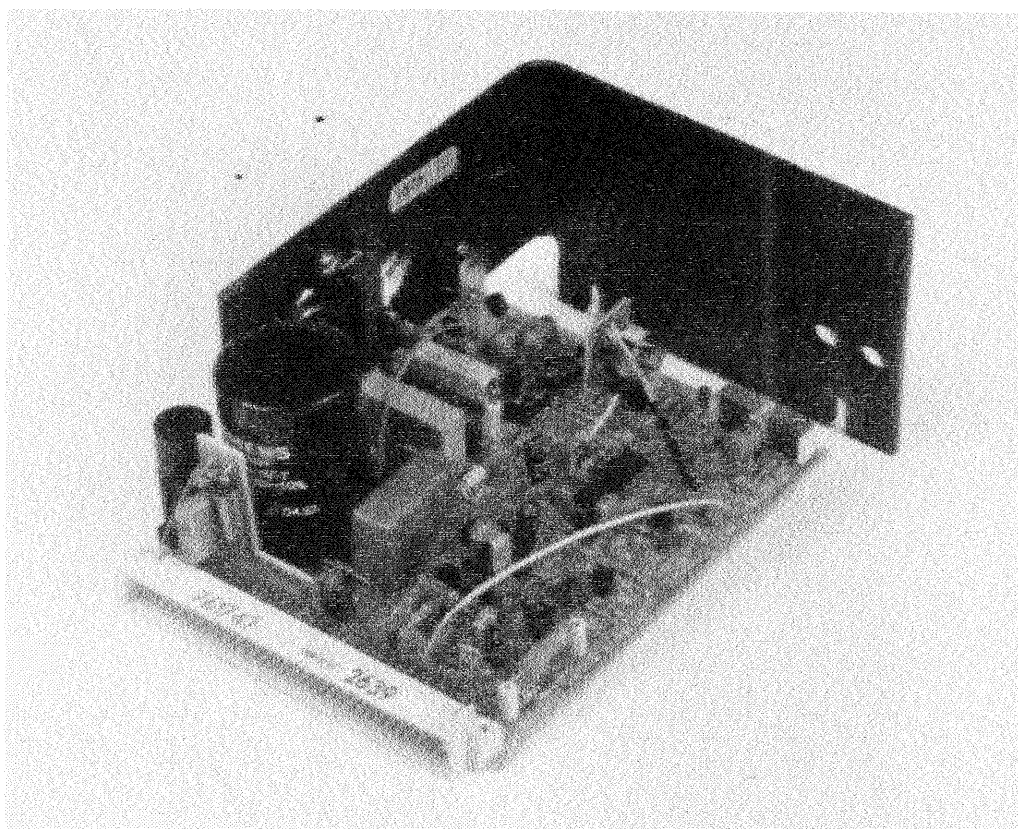
**SECTION S**

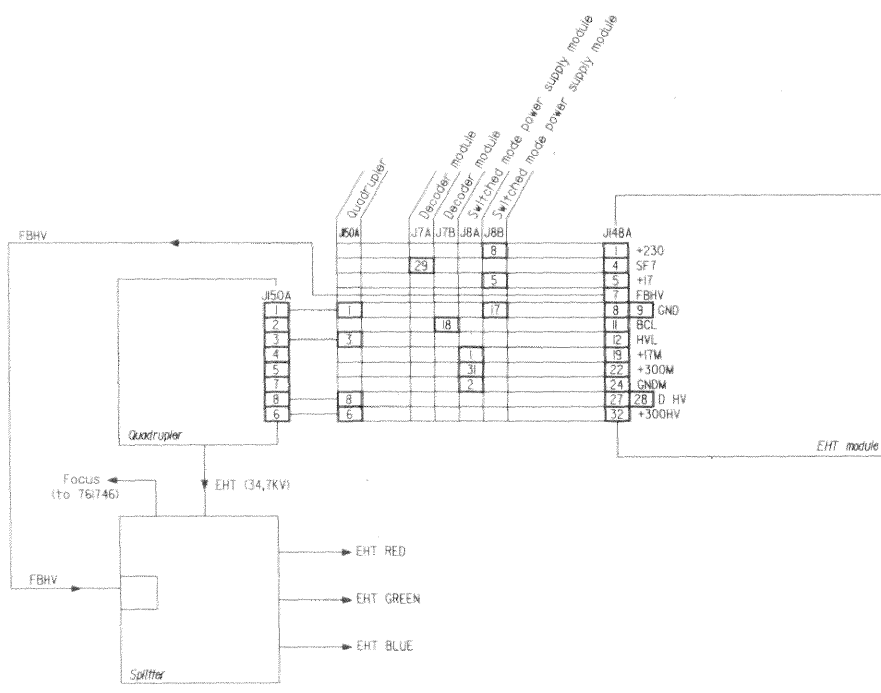
**service sheet**

**S**

### **WARNING**

**THIS CIRCUIT BOARD IS HOT TO AC. THIS POWER SUPPLY, LIKE THE HIGH VOLTAGE POWER SUPPLY, DOES NOT USE A LINE ISOLATION TRANSFORMER, MEANING A PORTION OF THE CIRCUITRY IS HOT-TO-LINE AND SHOULD BE TREATED WITH CAUTION.**

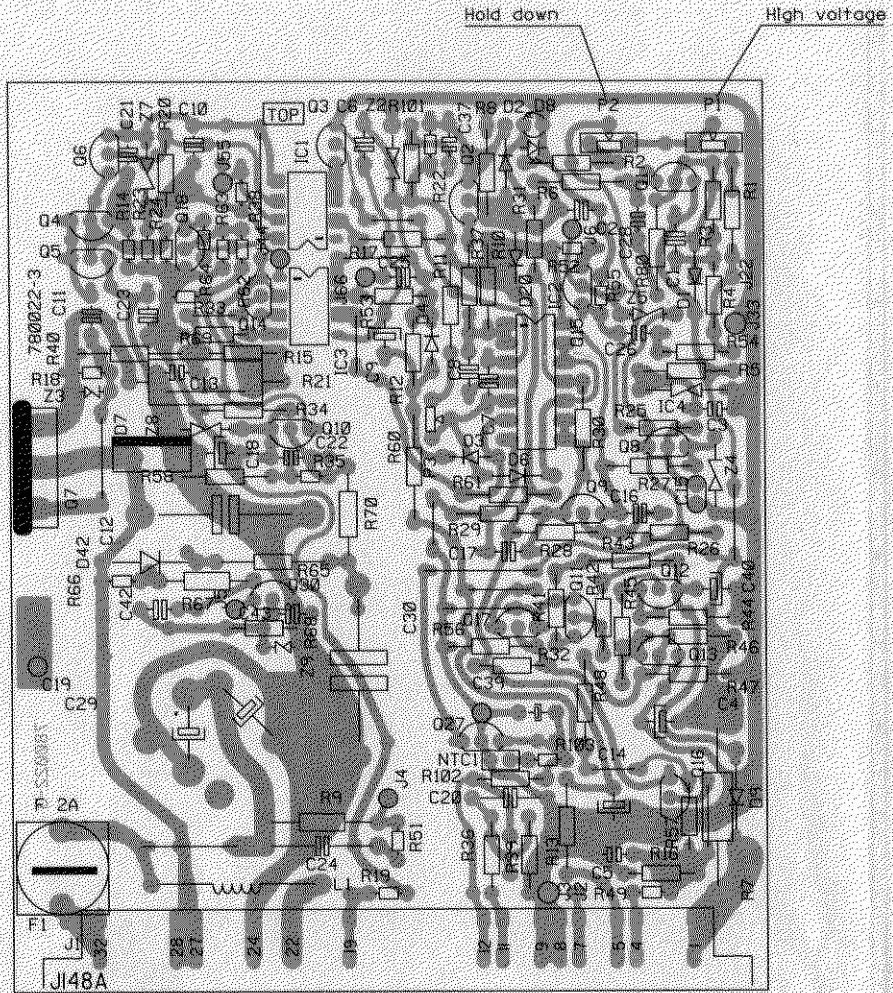




Name interconnection		Article nr.
EHT module		761742
Date	Drawn	Checked
15/09/1990	PG	KC

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Modifications reserved



COMP.	LOC.	COMP.	LOC.	COMP.	LOC.	COMP.	LOC.
C1	E 3	IC1	E 2	R1	E 4	R48	D 3
C2	E 3	IC2	E 3	R2	E 3	R49	C 3
C3	E 3	IC3	E 2	R3	E 3	R51	C 3
C4	D 3	IC4	E 3	R4	E 3	R52	E 3
C5	C 3	J	C 1	R5	E 3	R53	E 3
C6	F 2	J2	C 3	R6	E 3	R54	E 3
C7	E 3	J3	C 3	R7	C 4	R55	E 3
C8	E 3	J4	C 3	R8	F 3	R56	D 3
C9	F 2	J5	D 2	R9	D 2	R57	C 3
C10	F 2	J6	D 2	R10	E 3	R58	E 2
C11	E 1	J7	E 3	R11	E 3	R60	E 2
C12	D 2	J8	E 4	R12	E 2	R61	D 3
C13	E 2	J9	E 4	R13	C 3	R62	E 2
C14	D 3	J44	E 2	R14	E 2	R63	E 2
C15	D 3	J55	E 2	R15	E 2	R64	E 2
C16	D 3	J66	E 2	R16	C 3	R65	D 2
C17	D 3	LI	C 2	R17	E 2	R66	D 1
C18	E 2	NTC1	D 3	R18	E 1	R67	D 2
C19	D 1	P1	F 3	R19	C 3	R68	D 2
C20	D 3	P2	F 3	R20	F 2	R69	E 2
C21	F 2	P3	E 3	R21	E 2	R70	D 2
C22	E 2	Q1	E 3	R22	E 3	R80	E 3
C23	E 2	Q2	E 3	R23	E 2	R101	F 2
C24	C 2	Q3	F 2	R24	E 2	R102	D 3
C25	E 2	Q4	E 1	R25	E 3	R103	D 3
C26	E 3	Q5	E 1	R26	D 3	Z2	F 2
C28	E 3	Q6	E 2	R27	D 3	Z3	E 1
C29	D 1	Q7	D 1	R28	D 3	Z4	E 3
C30	D 2	Q8	E 3	R29	D 3	Z5	E 3
C31	F 3	Q9	E 2	R30	E 3	Z7	F 2
C39	D 3	Q10	D 3	R31	D 3	Z8	E 2
C40	D 4	Q11	D 3	R32	D 3	Z9	D 2
C42	D 2	Q12	D 3	R33	E 2		
C43	D 2	Q13	D 3	R34	E 2		
		Q14	E 2	R35	E 2		
		Q15	E 3	R36	C 3		
		Q16	D 3	R37	E 3		
		Q17	D 3	R38	E 2		
		Q18	E 2	R39	C 3		
		Q19	E 3	R40	E 1		
		Q20	D 3	R41	D 3		
		Q21	D 3	R42	D 3		
		Q22	E 2	R43	D 3		
		Q23	D 3	R44	D 4		
		Q24	D 2	R45	D 3		
		Q25	D 2	R46	D 3		
		Q26	D 2	R47	D 3		

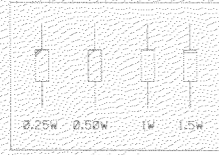
Name	EHT module	Article no.	76 1742
Date	16/07/1991	Drawn	PGOE
		Checked	KC

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Modifications reserved

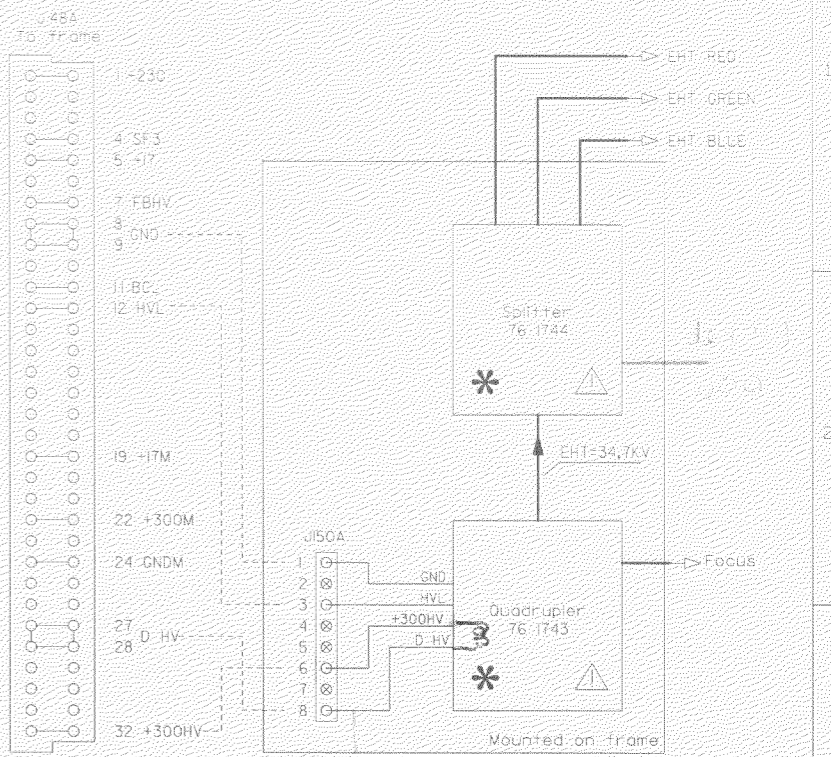
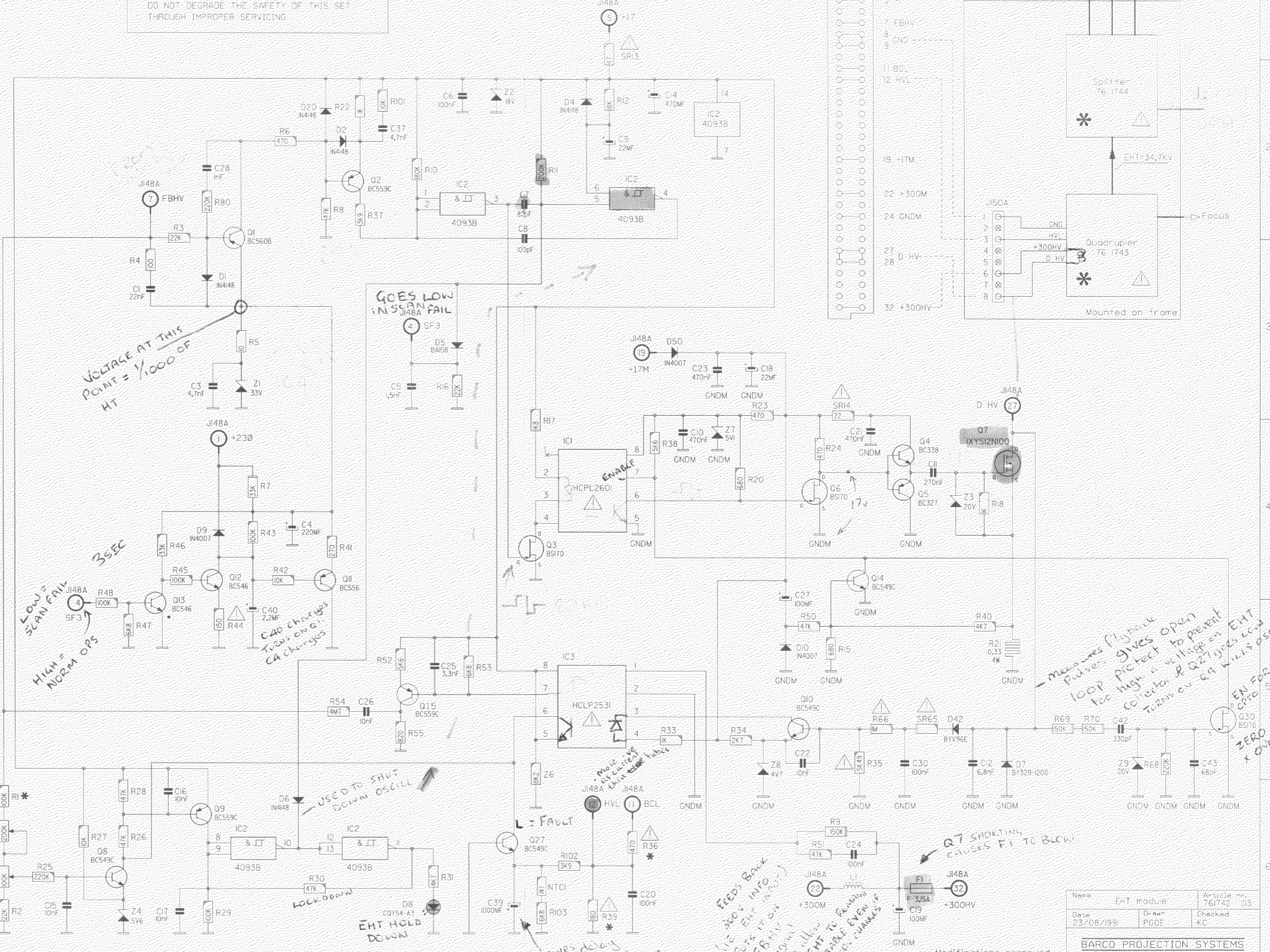


COMP. LOC.	COMP. LOC.
C1	R1
C3	R2
C4	R3
C5	R4
C6	R5
C7	R6
C8	R7
C9	R8
C10	R9
C11	R10
C12	R11
C14	R12
C15	R15
C16	R16
C17	R17
C18	R18
C19	R20
C20	R21
C22	R22
C23	R23
C24	R24
C25	R25
C26	R26
C27	R27
C28	R28
C30	R30
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C32	R33
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C36	R37
C37	R38
C38	R39
C39	R40
C40	R41
C41	R42
C42	R43
C43	R44
C44	R45
C45	R46
C46	R47
C47	R48
C48	R49
C49	R50
C50	R51
F1	S1
F2	S2
F3	S3
F4	S4
F5	S5
F6	S6
F7	S7
F8	S8
F9	S9
F10	S10
F11	S11
F12	S12
F13	S13
F14	S14
F15	S15
J150A	H 2
L1	G 6
NTC1	E 6
P1	B 6
P2	B 6
O1	C 6
O2	C 6
O3	C 6
O4	C 6
O5	C 6
O6	C 6
O7	C 6
O8	C 6
O9	C 6
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O40	C 6
O41	C 6
O42	C 6
O43	C 6
O44	C 6
O45	C 6
O46	C 6
O47	C 6
O48	C 6
O49	C 6
O50	C 6



**PRODUCT SAFETY NOTICE**

COMPONENTS MARKED WITH \* OR HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY BEFORE REPLACING ANY OF THESE COMPONENTS. READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS. DO NOT DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.



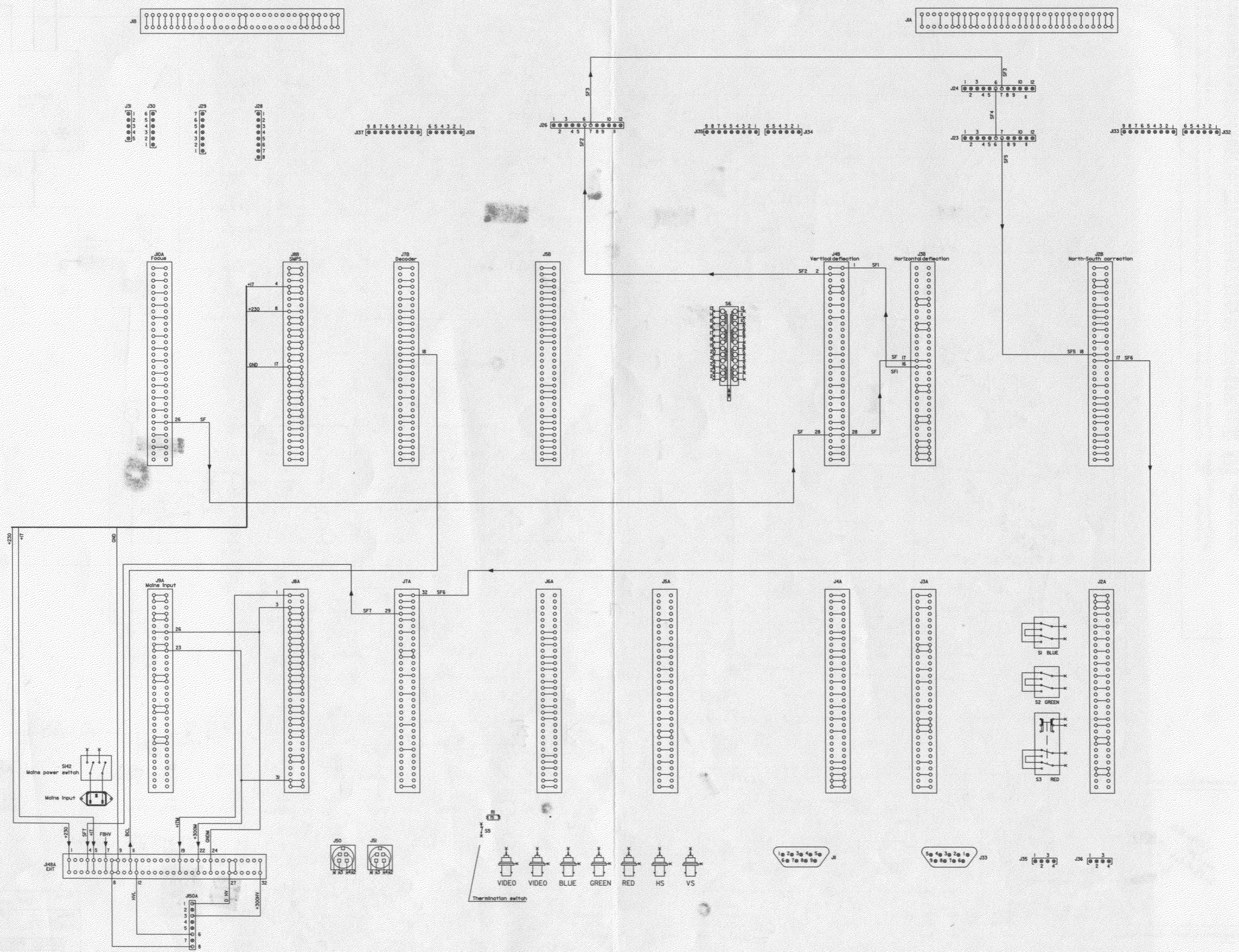
Name	EHT module	Article no.
Date	23/08/1991	761742 03
Drawn	PGOE	Checked
		KC

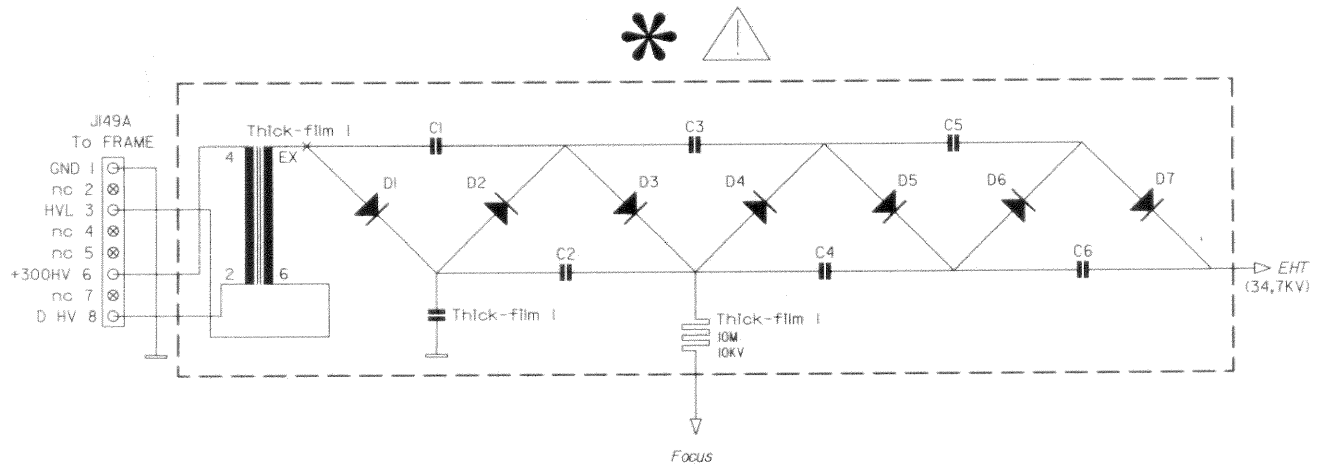
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Main frame Interconnection  
EHT module

BARCO





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DO NOT DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING

Name		Quadrupler		Article nr.	
Date		Drawn		Checked	
15/09/1990		PG		KC	

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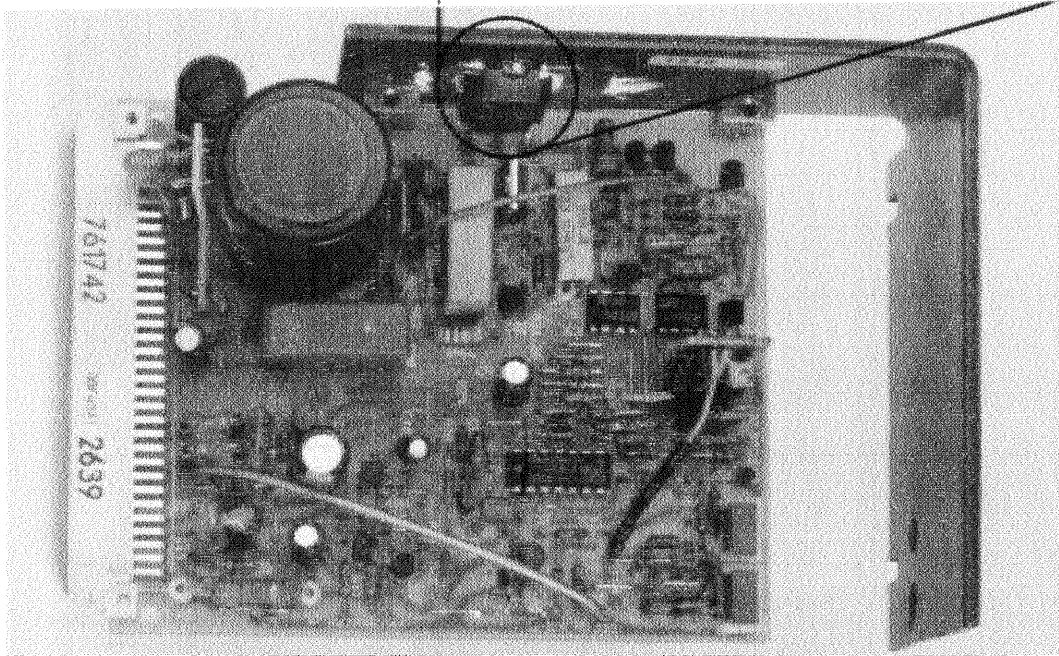
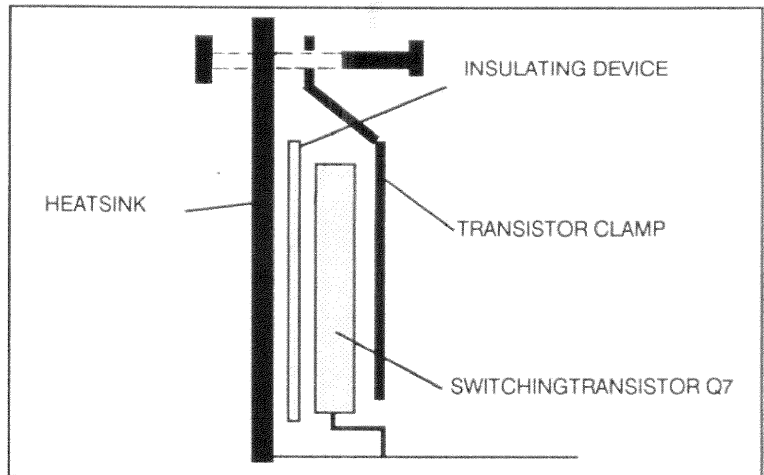


**SAFETY PRECAUTION**

**SWITCHING TRANSISTOR Q7 REMOVAL/REPLACEMENT**

**RE-INSTALL ALWAYS THE INSULATING DEVICE BETWEEN THE SWITCHING TRANSISTOR Q7 AND THE HEATSINK.**

**PROCEED TO A LEAKAGE CURRENT HOT CHECK AS DESCRIBED IN THE SAFETY NOTICES**



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**HIGH VOLTAGE WARNING**

To avoid **DANGER TO LIFE**, do not attempt to service the chassis until all precautions necessary for working on **HIGH VOLTAGE** equipment have been observed. In order to prevent damage to solid state devices, do not arc pix tube anode lead to chassis or earth ground.

**Preparation**

*Warning: The power must be OFF before removing any connector from circuit board or unit. Failure to do so may result in severe damage to the projection unit.*

- Turn the projector off.
- Put the potentiometers P1 and P2 in their minimum position (turning clockwise!!) .
- Pull out one CRT-EHT cable of the EHT splitter.
- Insert in the free EHT connector the **precision** EHTprobe (ratio 1000/1).

*Warning: read carefully all safety instructions, mentioned in the user's manual of the precision high voltage probe*

**Adjustment**

- Switch on the projector.
- Adjust potentiometer P1 "High Voltage Adj." until the EHT voltage reaches 36.5kV.
- Turn potentiometer P2 "Hold Down" until the Hold Down LED lights up. The projector switches at that moment into the Hold Down mode, picture disappears.
- Put the potentiometer P1 again in its minimum position (turning clockwise!!) .
- Turn the power switch in its OFF position (not-pressed) and switch on the projector again (press the power switch).
- Adjust the potentiometer P1 for an EHT voltage of 34.7kV.

**Important:** The EHTsplitter, on which a potentiometer is mounted , leaves the factory as a factory pre-adjusted unit. A readjustment of the mentioned potentiometer is in no case allowed.



**INTRODUCTION.**

On this board the EHT drive pulses for the EHT production are generated.

In the event of a failure, either too high EHT or a horizontal or vertical scan failure, the EHT voltage is discontinued.

We discuss hereafter the generation of the pulses, the stabilization of the EHT voltage, and the different protections.

**DC CONTROLLED MULTIVIBRATOR.**

This multivibrator is configured around two Schmidt Trigger NAND gates in IC2. Obviously two time constants are involved :  $C7/R11 + R9$  and  $C8/R10 + Q2$ .

The first time constant is invariable, whereas the second is depending on the current flow in Q2. This transistor now is driven from the comparator Q1.

The latter receives on its base the FBHV feedback voltage. This is a voltage from the EHT splitter unit and consequently proportional with the EHT voltage (approx. factor 1000).

The collector is set at 33 volts by the zener Z1.

The duty cycle or, the on/off time of the power switcher Q7, is regulated by the voltage difference detected by Q1.

The squared waveform at pin 3 of the NAND is, via a fast switching fet Q3 , feeding the optocoupler IC1. This optocoupler is necessary as the rest of the circuit that follows is supplied with a +17 and +300 volts which is not isolated from the mains.

The +17V is obtained from a special winding on the transformer of the SMPS and the +300V is the bridge rectified mains voltage (GNDM is æ mains ground/Æ).

Fet Q6 drives the push-pull stage Q4/5 and the pulses are capacitively coupled to the gate of Q7. The zenerdiode Z3 has a double meaning.

The negative level of the pulses are clamped at -0.6V and on the other hand limited at 20V in order to protect the gate of the switcher Q7.

The transformer and quadrupler are one and the same unit.

The +300V from the SMPS enters the board at contact 22 and passes here a filter L1/C19 and a fuse before it leaves to the transformer unit at contact 32.

**PROTECTIONS.**

a) *EHT hold down* :

The slider voltage of P2 is sent to the base of Q8 and its emitter is set at 5.6V by Z4.

As soon the EHT rises beyond the 36.5 kV the transistor Q8 starts conducting, turning on Q9. The Schmidt trigger input comes high and its output low. Diode D6 keeps the pin 5 of the multivibrator low and subsequently the EHT-

multivibrator is stopped.

The output pin 11 comes high and turns on the red LED D8 to show the fault to the service engineer. The feedback resistor R30 provides a stable position, in other words, the multivibrator cannot start up again as long there is no reset by switching on and off the projector.

The EHT HOLD DOWN must equally operate when there is an open loop, in other words, when there is no feedback voltage to halt the multi.

A second detection is provided by the check of the amplitude of the EHT pulses on the drain of Q7.

Indeed, these pulses are rectified by D42 and the voltage is smoothed by a pi-filter and finally reaches the base of Q10. From the 5.6V level onwards, the latter conducts and via the optocoupler the output pin 6 of the optocouplers is switched low.

As this is connected to the collector of Q8 we stop the multi as described above.

Note that Q10 is supplied by the +17VM voltage (not isolated from the mains).

Finally, in the event of a high beam current lasting for some time, this time is determined by the time constant R102/C39, the collector of Q8 gets low via Q27 resulting in an EHT HOLD DOWN.

As a conclusion, the LED D8 is 'ON' in the event of :

- too high EHT, info via the feedback FBHV voltage.
- too high EHT in open loop via Q10 and optocoupler IC3.
- too high beam current lasting for some time.

*b) Hor and vert scan failures :*

In the event of a scan failure, detected on the horizontal or vertical boards, the multivibrator is equally stopped via D5.

*c) Overcurrent protection :*

The drain-source current is measured by the resistor R21 in the source.

This voltage now is applied to Q14 transistor via a divider R40/R15. From the level 0.6 onwards, the latter conducts and pulls down the bases of the push-pull to stop the drive and prevent damage of the mosfet.

*d) Protection against incorrect drive :*

The power fet may never be driven before the drain voltage (EHT pulse) has dropped to its low level. This is achieved by clamping the bases of the push-pull at ground via Q30 with an EHT pulse.

## SLOW START UP OF THE EHT.

At switching on the projector a slow start up of the EHT is provided.

This is accomplished by the circuit around transistor Q11. The voltage for the reference zener Z1 is taken from the +230V.

At switching on, capacitor C4 charges up via R7. C40 is equally charging but via a resistor R43, but it is 10 times smaller and obviously the base-emitter voltage is the same during this start period.

At switching off, the C40 capacitor is rapidly discharged via D9, taking the EHT rapidly down as well.

In the event of a scan fail Q13 gets blocked introducing the conduction of Q12 and discharging C40. Tr Q11 starts conducting and drops the reference voltage to provide a slow start if the scan fail is removed. Note that the EHT is switched off by stopping the multi as described above.

ITEM NO.	SIT.	DESCRIPTION	ITEM NO.	SIT.	DESCRIPTION
11 37161	C..1	C POMEFF 22K K5 100	13 14182	Q..2	Q BC559C P 30 / 0A1
11 2747	C..3	C CE MI 4K7 K5 63	13 2910	Q..3	Q BS170 FN 60 / 0A5
11 1488	C..4	C ELPR 220M Z5 40	13 1424	Q..4	Q BC338 N 25 / 0A8
11 2747	C..5	C CE MI 4K7 K5 63	13 14311	Q..5	Q BC327 P 45 / 0A5
11 3724	C..6	C POMEFF 100K K5 63	13 2910	Q..6	Q BS170 FN 60 / 0A5
11 22415	C..7	C NPO MI 82P J5 63	13 2918	Q..7	Q IXTH12N100 F 1000 / 12A
11 2242	C..8	C NPO MI 100P J5 63	13 1411	Q..8	Q BC549C N 30 / 0A1
11 1532	C..9	C ELPRMI 22M M5 35	13 14182	Q..9	Q BC559C P 30 / 0A1
11 3732	C.10	C POMEFF 470K K5 63	13 1411	Q.10	Q BC549C N 30 / 0A1
11 3729	C.11	C POMEFF 270K K5 63	13 2923	Q.11	Q BC556 P 65 / 0A1
11 1720	C.12	C PPMEPO 6K8 J 1500	13 2924	Q.12	Q BC546 N 65 / 0A1
11 1479	C.14	C ELPR 470M Z5 25	13 2924	Q.13	Q BC546 N 65 / 0A1
11 27631	C.15	C CE MI 10K U2 63	13 1411	Q.14	Q BC549C N 30 / 0A1
11 37121	C.16	C POMEFF 10K K5 100	13 14182	Q.15	Q BC559C P 30 / 0A1
11 37121	C.17	C POMEFF 10K K5 100	13 1411	Q.27	Q BC549C N 30 / 0A1
11 1532	C.18	C ELPRMI 22M M5 35	13 2910	Q.30	Q BS170 FN 60 / 0A5
11 1650	C.19	C ELRA 100M T 350			
11 4100	C.20	C POMEFF 100K K 100	10 11444	R...	R MF H 4K7 F 0W25
11 3732	C.21	C POMEFF 470K K5 63	10 1160	R.1	R CF H100K J 0W25
11 2763	C.22	C CE MI 10K U5 63	10 1152	R.2	R CF H 22K J 0W25
11 3732	C.23	C POMEFF 470K K5 63	10 1152	R.3	R CF H 22K J 0W25
11 4162	C.24	C POMEFF 100K K 400	10 1112	R.5	R CF H 10E J 0W25
11 2760	C.25	C CE MI 3K3 K5 63	10 1132	R.6	R CF H470E J 0W25
11 2763	C.26	C CE MI 10K U5 63	10 3254	R.7	R MO H 33K J 1W5
11 1477	C.27	C ELPR 100M Z5 25	10 1156	R.8	R CF H 47K J 0W25
11 2739	C.28	C CE MI 1K K5 63	10 14625	R.9	R MF H150K J 1W5
11 4603	C.30	C POHVPO 100K M 1000	10 1163	R.10	R CF H180K J 0W25
11 2747	C.37	C CE MI 4K7 K5 63	10 11641	R.11	R MF H200K J 0W25
11 1453	C.39	C ELPR 1000M Z5 6	10 1151	R.12	R CF H 18K J 0W25
11 1548	C.40	C ELPRMI 2M2 M5 50	10 11209	R.13	R CFFH 47E J 0W25
11 2819	C.42	C CE DI 330P M 400	10 11169	R.14	R CFFH 22E J 0W25
11 2240	C.43	C NPO MI 68P J5 63	10 1134	R.15	R CF H680E J 0W25
			10 1152	R.16	R CF H 22K J 0W25
13 1621	D..1	D 1N4148 SWITCH	10 1139	R.17	R CF H 1K8 J 0W25
13 1621	D..2	D 1N4148 SWITCH	10 0136	R.18	R CF V 1K J 0W25 E2 R25X
13 1621	D..4	D 1N4148 SWITCH	13 1646	R.19	D 1N4007 1300V/1A
13 1637	D..5	D BA158 SWITCH	10 1134	R.20	R CF H680E J 0W25
13 1621	D..6	D 1N4148 SWITCH	10 3606	R.21	R WW H 0E33K 4W KKA4
13 1913	D..7	D BY229-1000 1000V/7A FSR	10 1136	R.22	R CF H 1K J 0W25
13 1662	D..8	D LED D3 RED	10 1232	R.23	R CF H470E J 0W5
13 1646	D..9	D 1N4007 1300V/1A	10 1232	R.24	R CF H470E J 0W5
13 1646	D.10	D 1N4007 1300V/1A	10 1164	R.25	R CF H220K J 0W25
13 1621	D.20	D 1N4148 SWITCH	10 1156	R.26	R CF H 47K J 0W25
13 1906	D.42	D BYV96E	10 1148	R.27	R CF H 10K J 0W25
			10 1156	R.28	R CF H 47K J 0W25
31 4143	F..1	FUSE 2A 5X20 FAST	10 1160	R.29	R CF H100K J 0W25
			10 1156	R.30	R CF H 47K J 0W25
31 4516	H..1	FUSE HOLDER 5X20 V FASTENER	10 1144	R.31	R CF H 4K7 J 0W25
31 45161	H.10	FUSE HOLDER 5X20 V CARRIER	10 1136	R.33	R CF H 1K J 0W25
			10 1141	R.34	R CF H 2K7 J 0W25
13 1683	I..1	U 2601 HCPL OPTOCOUP	10 24717	R.35	R MF H 5K49F 0W25
13 73945	I..2	U 4093B 4X2I NAND STRIG	10 11324	R.36	R MF H470E F 0W25
13 1682	I..3	U 2531 HCPL OPTOCOUP	10 1143	R.37	R CF H 3K9 J 0W25
13 2102	I..4	U 33B ZTK 33V STAB	10 0145	R.38	R CF V 5K6 J 0W25 E2
			10 11274	R.39	R MF H180E F 0W25 156
31 3525	J..1	J EURO MBS P64	10 1144	R.40	R CF H 4K7 J 0W25
			10 1129	R.41	R CF H270E J 0W25
77 4154	L..1	COIL CHOKE HOR DATA HR45	10 1148	R.42	R CF H 10K J 0W25
			10 1160	R.43	R CF H100K J 0W25
10 5016	NTC1	R NTC 2K7 0W25 640	10 11269	R.44	R CFFH150E J 0W25
			10 1160	R.45	R CF H100K J 0W25
10 6834	P..1	R TCE V200K K 0W5 S10SS3386H	10 1154	R.46	R CF H 33K J 0W25
10 6833	P..2	R TCE V100K K 0W5 S10SS3386H	10 1146	R.47	R CF H 6K8 J 0W25
			10 1160	R.48	R CF H100K J 0W25
78 0022	PC..	PCB PJ 49 EHT *800 761742	10 0136	R.49	R CF V 1K J 0W25 E2 R25X
			10 1156	R.50	R CF H 47K J 0W25
13 2590	Q..1	Q BC560B P 45 / 0A1	10 1156	R.51	R CF H 47K J 0W25

ITEM NO.	SIT.	DESCRIPTION	ITEM NO.	SIT.	DESCRIPTION
10 0145	R.52	R CF V 5K6 J 0W25 E2	10 1148	R101	R CF H 10K J 0W25
10 1146	R.53	R CF H 6K8 J 0W25	10 1143	R102	R CF H 3K9 J 0W25
10 1180	R.54	R CF H 4M7 J 0W25	10 1146	R103	R CF H 6K8 J 0W25
10 1135	R.55	R CF H820E J 0W25			
10 11008	R.65	R CFFH 1E J 0W25 0207	13 1745	Z.2	D ZENER 18V 1W1 C
10 14625	R.66	R MF H150K J 1W5	13 1730	Z.3	D ZENER 20V 0W5 C
10 14625	R.67	R MF H150K J 1W5	13 1734	Z.4	D ZENER 5V6 0W5 B
10 1164	R.68	R CF H220K J 0W25	10 1147	Z.6	R CF H 8K2 J 0W25
10 4654	R.70	R HV H 1M J 0W5 3500 242	13 1716	Z.7	D ZENER 5V1 0W5 C
10 1164	R.80	R CF H220K J 0W25	13 1865	Z.8	D ZENER 4V7 0W4 B
10 1124	R.C1	R CF H100E J 0W25	13 1730	Z.9	D ZENER 20V 0W5 C



# EHT MODULE

76 1742

ART NO.	DESCRIPTION	QUANTITY	ART NO.	DESCRIPTION	QUANTITY
10 11008	R CFFH 1E J 0W25 0207	1	13 1865	D ZENER 4V7 0W4 B	1
10 11169	R CFFH 22E J 0W25	1	13 1906	D BYV96E	*1
10 11209	R CFFH 47E J 0W25	1	13 1913	D BY229-1000 1000V/7A FSR	1
10 11269	R CFFH150E J 0W25	1	13 2102	U 33B ZTK 33V STA	1
10 1180	R CF H 4M7 J 0W25	1	13 2590	Q BC560B P 45 / 0A1	1
10 14625	R MF H150K J 1W5	3	13 2910	Q BS170 FN 60 / 0A5	3
10 3254	R MO H 33K J 1W5	1	13 2918	Q IXTH12N100 F 1000 /12A	1
10 3606	R WW H 0E33K 4W KKA4	*1	13 2923	Q BC556 P 65 / 0A1	1
10 4654	R HV H 1M J 0W5 3500 242	1	13 2924	Q BC546 N 65 / 0A1	2
10 5016	R NTC 2K7 0W25 640	1	13 3039	SPACER L 8 D 4 D1,2 CE	*8
10 6833	R TCE V100K K 0W5 S10SS3386	*1	13 73945	U 4093B 4X2I NAND STRI	1
10 6834	R TCE V200K K 0W5 S10SS3386	*1	31 3525	J EURO MBS P64	*1
11 1650	C ELRA 100M T 350	*1	31 4143	FUSE 2A 5X20 FAST	*1
11 1720	C PPMEPO 6K8 J 1500	1	31 4516	FUSE HOLDER 5X20 V FASTENER	1
11 2819	C CE DI 330P M 400	1	31 45161	FUSE HOLDER 5X20 V CARRIER	1
11 4162	C POMEFF 100K K 400	1	36 20216	SCREW DIN84 M 3 X 6 MP-	*4
11 4603	C POHVPO 100K M 1000	1	36 20226	SCREW DIN84 M 3 X 8 MP-	1
13 1411	Q BC549C N 30 / 0A1	4	36 7502	WASHER DIN6798 A 3,2	5
13 14182	Q BC559C P 30 / 0A1	3	36 7600	FIXING BLOC UNIVERSEL M3	*2
13 1424	Q BC338 N 25 / 0A8	1	36 7699	RIVET CHOBERT D2,38 L6,35	*1
13 14311	Q BC327 P 45 / 0A5	1	72 1850	CLIPS PROTECTION TRIMPOT CEMH	*2
13 1621	D 1N4148 SWITCH	5	76 1742A	UN EHT PJ 49 GR800	1
13 1637	D BA158 SWITCH	1	76 1742D	UN EHT PJ 49 GR800	1
13 1646	D 1N4007 1300V/1A	3	77 4154	COIL CHOKE HOR DATA HR4	1
13 1662	D LED D3 RED	*1	80 2628	FIX PJ 49 TSTR SPRING 1X HOR	*1
13 1682	U 2531 HCPL OPTOCOUP	*1	80 2634	HEATSINK PJ 49 EHT 0	*1
13 1683	U 2601 HCPL OPTOCOUP	*1	80 2780	Q INSULAT SHEET 33X33	3
13 1716	D ZENER 5V1 0W5 C	1			
13 1730	D ZENER 20V 0W5 C	2			
13 1734	D ZENER 5V6 0W5 B	1			
13 1745	D ZENER 18V 1W1 C	1			

\*NUMBERS REFERRING TO PICTURE

