



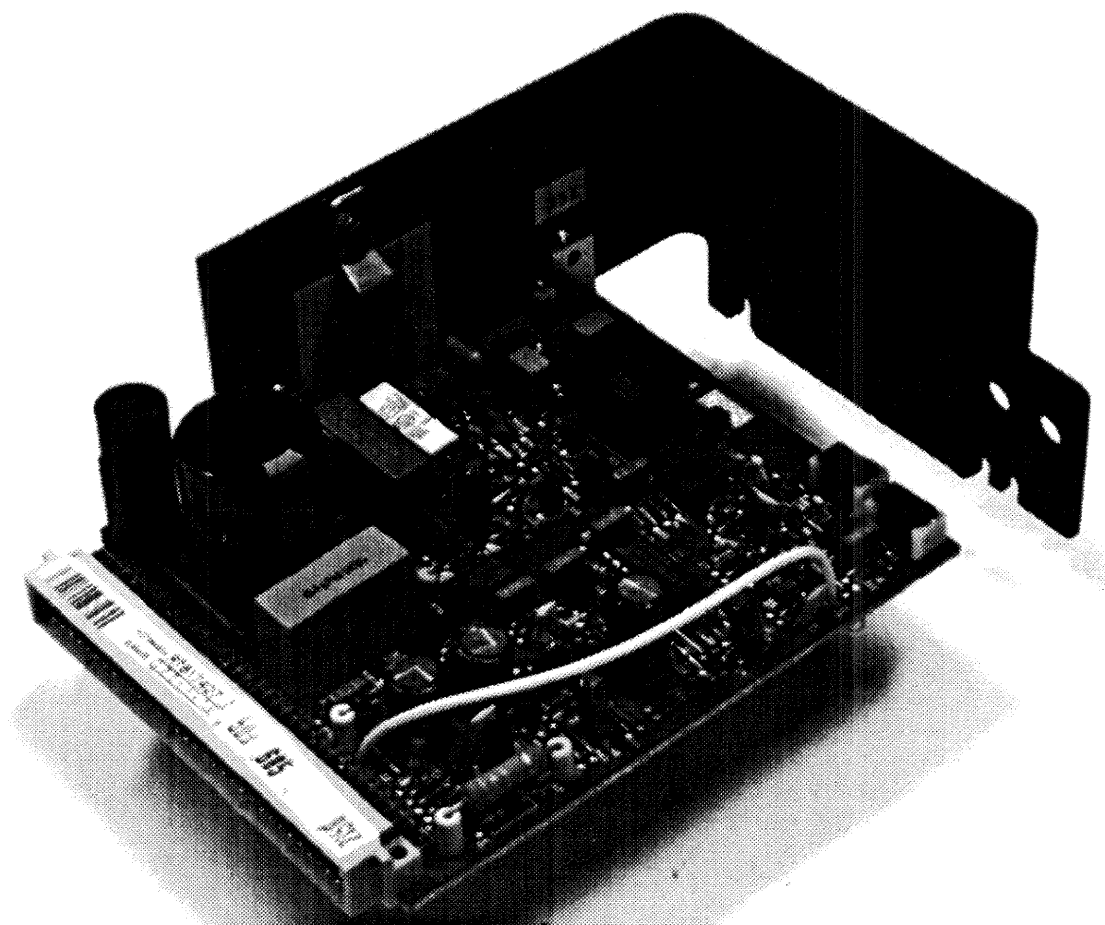
BARCO Projection Systems

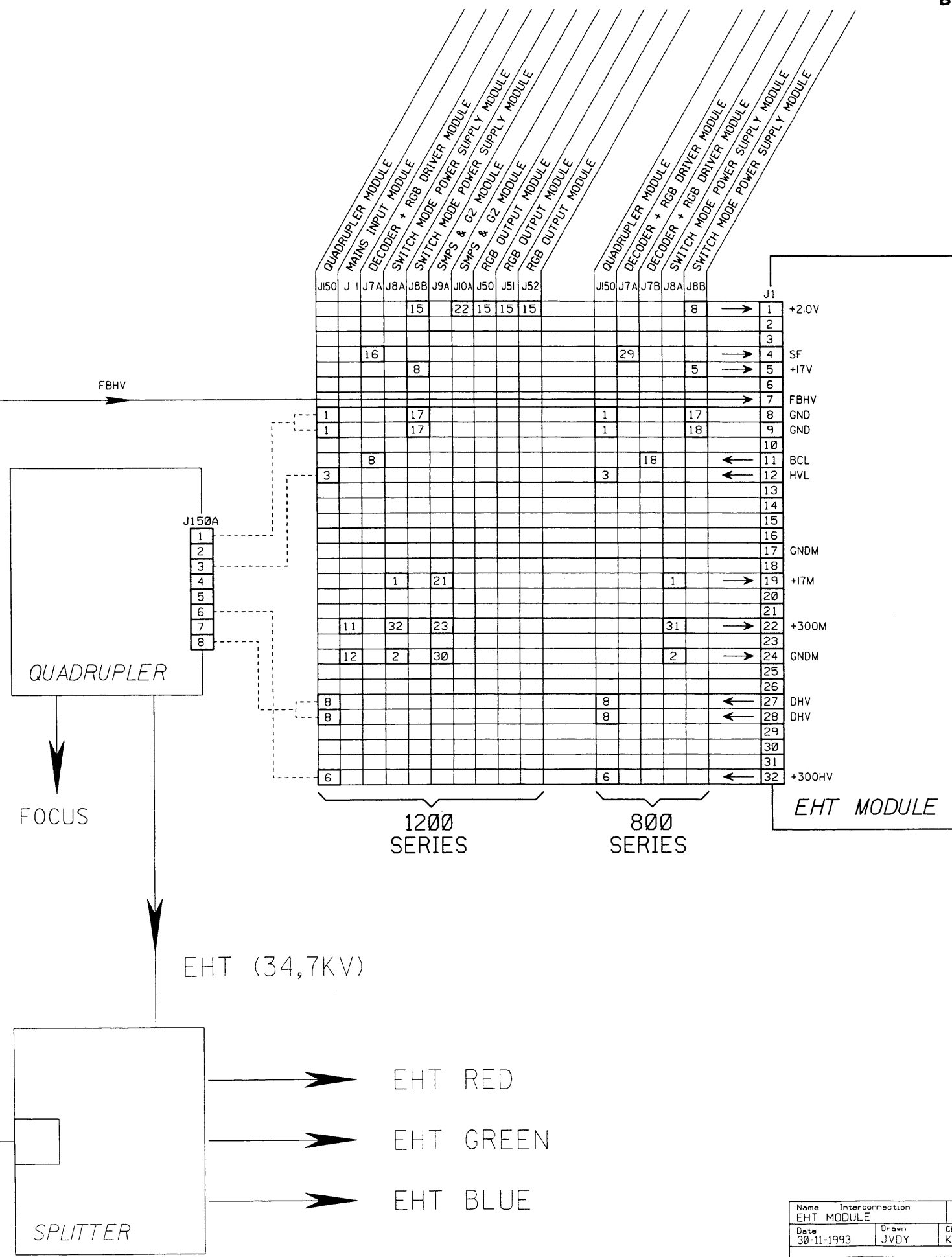
SECTION **N**

service sheet

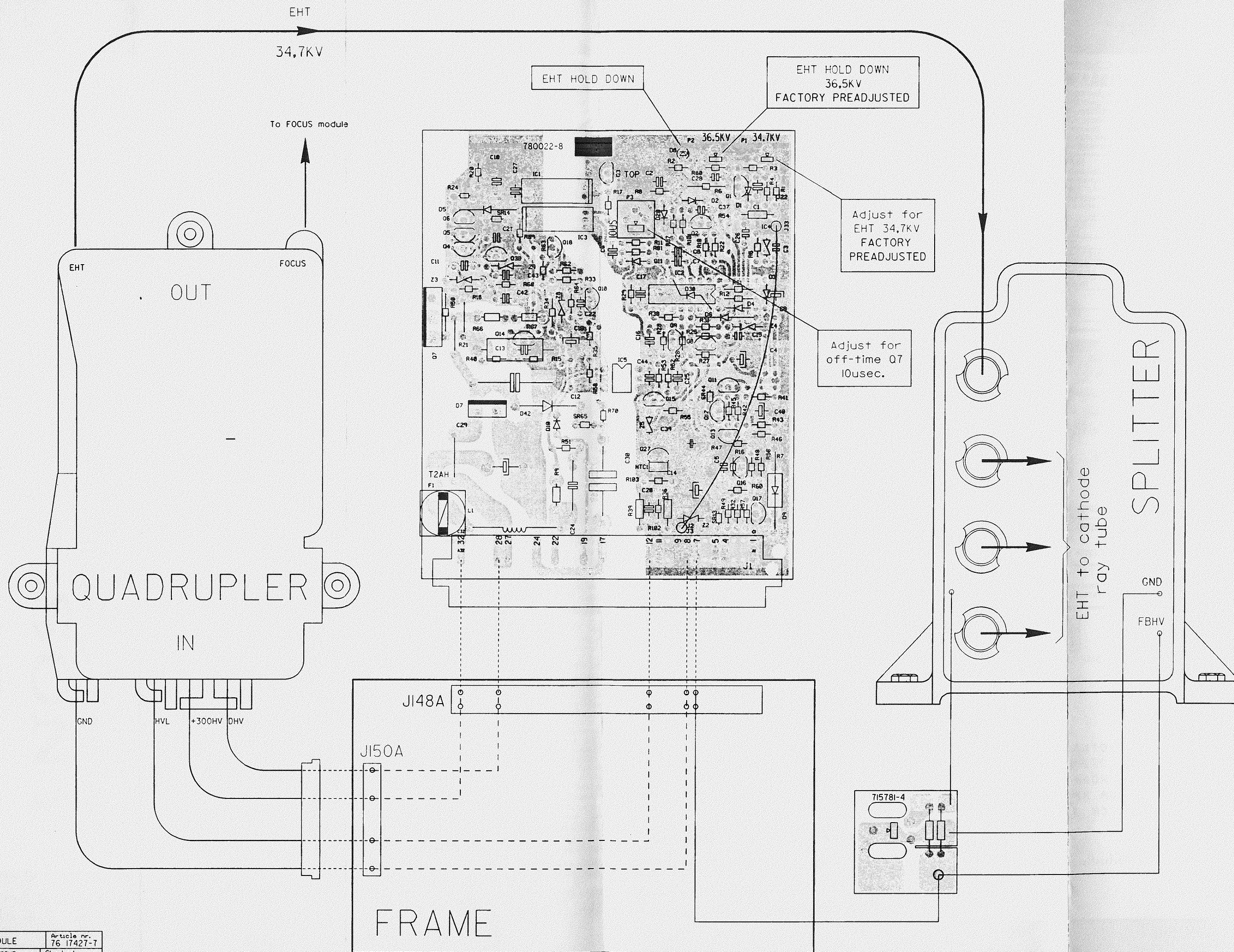
WARNING

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		76 17427
Date	Drawn	Checked
30-11-1993	JVDY	KC
BARCO PROJECTION SYSTEMS		

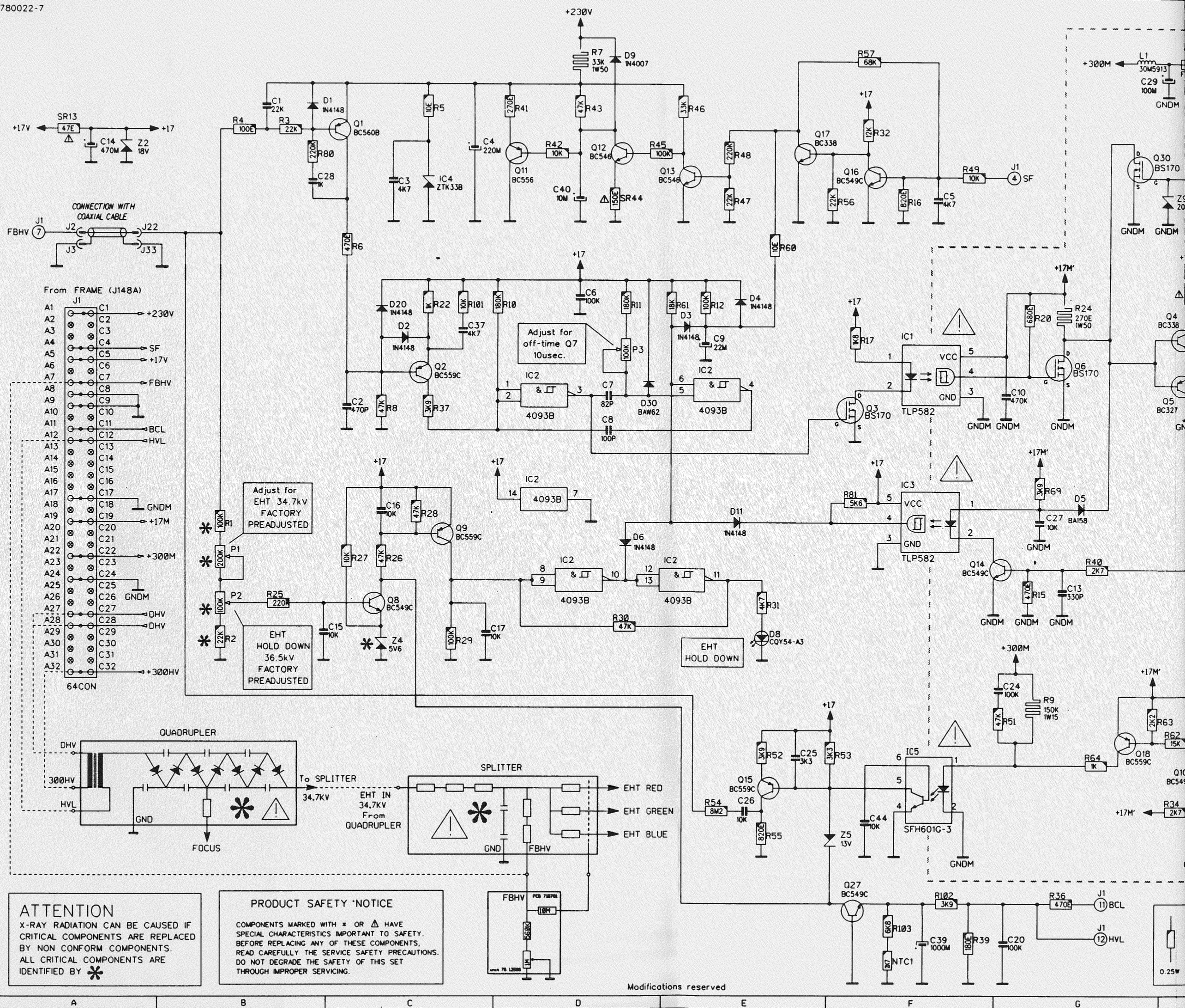


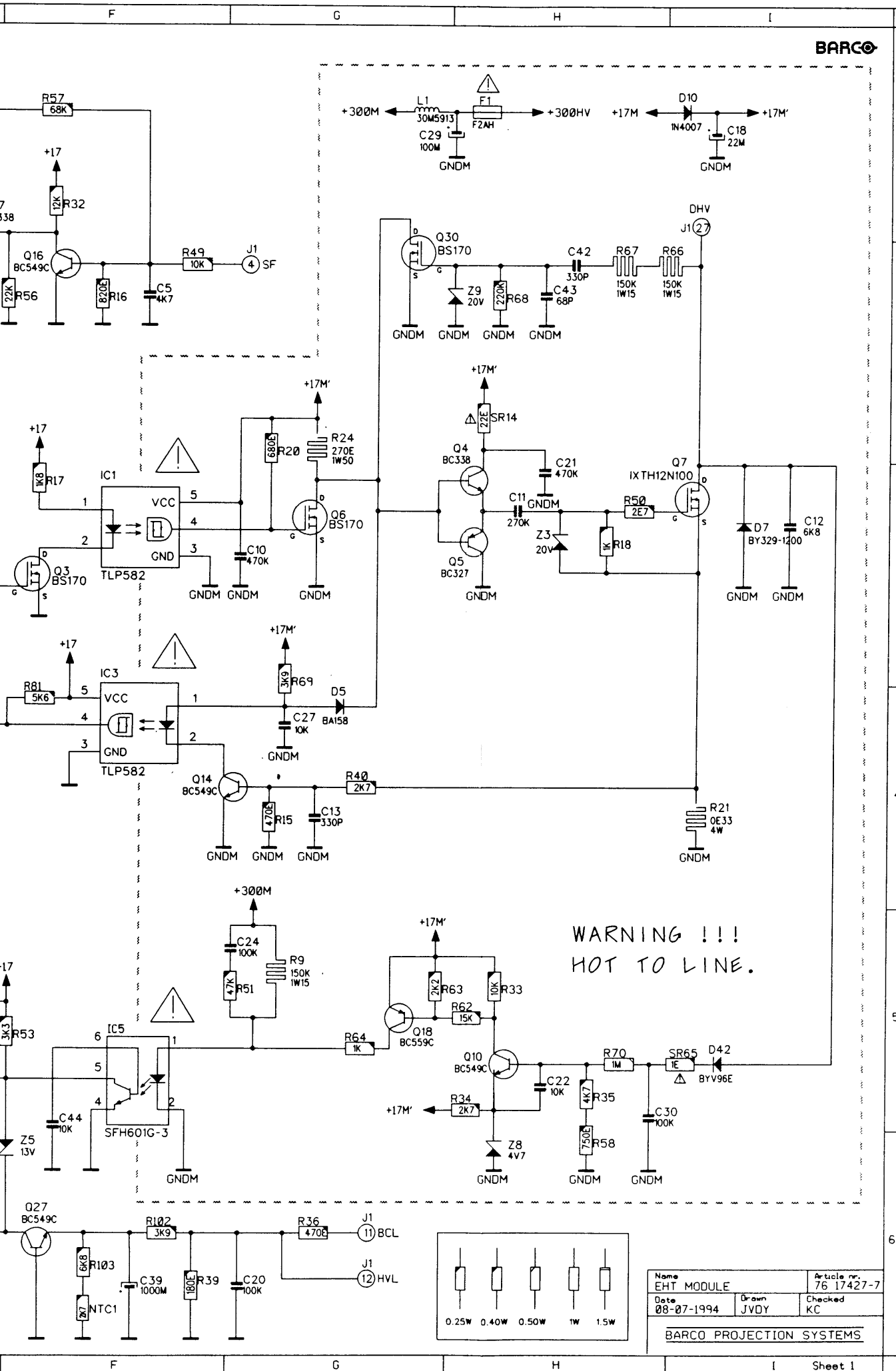
BARCO

COMP.	LOC.	COMP.	LOC.
C1	E 2	R46	E 3
C2	E 2	R47	E 3
C3	E 2	R48	E 3
C4	E 3	R49	E 4
C5	E 3	R50	D 2
C6	D 2	R51	D 3
C7	E 2	R52	E 3
C8	E 2	R53	E 3
C9	E 2	R54	E 2
C10	D 2	R55	E 3
C11	C 2	R56	E 3
C12	D 3	R57	E 4
C13	D 3	R58	D 3
C14	E 3	R59	E 3
C15	E 3	R60	E 2
C16	E 3	R61	D 2
C17	E 2	R62	D 2
C18	D 3	R63	D 2
C19	D 3	R64	D 2
C20	E 3	R65	D 3
C21	D 2	R66	D 3
C22	D 2	R67	D 2
C23	D 4	R68	D 2
C24	E 2	R69	D 2
C25	E 2	R70	D 3
C26	E 2	R71	E 2
C27	D 2	R72	E 2
C28	E 2	R73	E 2
C29	D 3	R74	E 4
C30	E 3	R75	E 3
C31	E 2	R76	E 4
C32	E 3	R77	D 2
C33	E 3	R78	E 3
C34	D 2	R79	E 3
C35	E 3	R80	D 3
C36	E 3	R81	E 4
C37	E 2	R82	E 3
C38	E 3	R83	E 3
C39	E 3	R84	E 3
C40	E 3	R85	E 3
C41	D 2	R86	E 3
C42	D 2	R87	E 3
C43	D 2	R88	E 3
C44	E 3	R89	E 3
C45	E 3	R90	E 3
C46	E 3	R91	E 3
C47	E 3	R92	E 3
C48	E 3	R93	E 3
C49	E 3	R94	E 3
C50	E 3	R95	E 3
C51	E 3	R96	E 3
C52	E 3	R97	E 3
C53	E 3	R98	E 3
C54	E 3	R99	E 3
C55	E 3	R100	E 3
C56	E 3	R101	E 3
C57	E 3	R102	E 3
C58	E 3	R103	E 3
C59	E 3	R104	E 3
C60	E 3	R105	E 3
C61	E 3	R106	E 3
C62	E 3	R107	E 3
C63	E 3	R108	E 3
C64	E 3	R109	E 3
C65	E 3	R110	E 3
C66	E 3	R111	E 3
C67	E 3	R112	E 3
C68	E 3	R113	E 3
C69	E 3	R114	E 3
C70	E 3	R115	E 3
C71	E 3	R116	E 3
C72	E 3	R117	E 3
C73	E 3	R118	E 3
C74	E 3	R119	E 3
C75	E 3	R120	E 3
C76	E 3	R121	E 3
C77	E 3	R122	E 3
C78	E 3	R123	E 3
C79	E 3	R124	E 3
C80	E 3	R125	E 3
C81	E 3	R126	E 3
C82	E 3	R127	E 3
C83	E 3	R128	E 3
C84	E 3	R129	E 3
C85	E 3	R130	E 3
C86	E 3	R131	E 3
C87	E 3	R132	E 3
C88	E 3	R133	E 3
C89	E 3	R134	E 3
C90	E 3	R135	E 3
C91	E 3	R136	E 3
C92	E 3	R137	E 3
C93	E 3	R138	E 3
C94	E 3	R139	E 3
C95	E 3	R140	E 3
C96	E 3	R141	E 3
C97	E 3	R142	E 3
C98	E 3	R143	E 3
C99	E 3	R144	E 3
C100	E 3	R145	E 3

Name	EHT MODULE	Article nr.	76 17427-7
Date	12-12-1994	Drawn	JVDY
		Checked	KC
BARCO PROJECTION SYSTEMS			

Modifications reserved



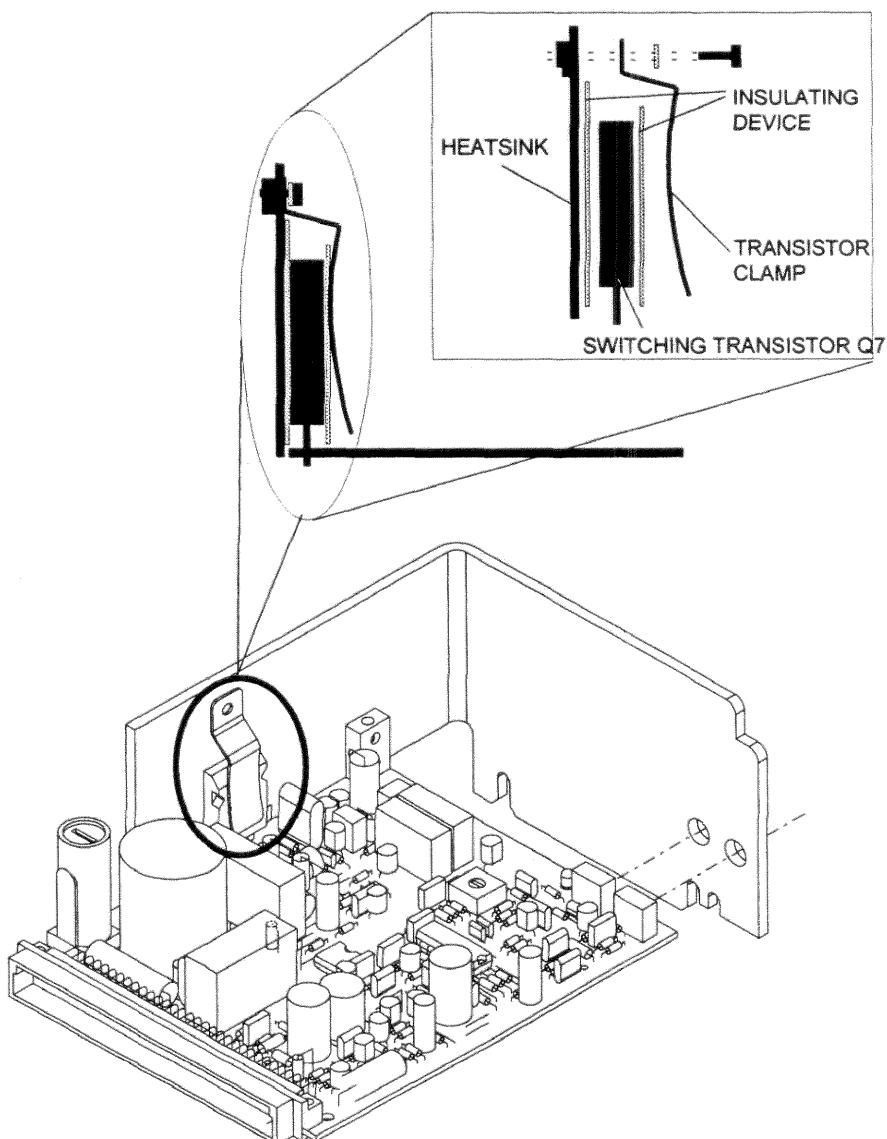


COMP.	LOC.	COMP.	LOC.
C1	B 1	R21	I 4
C2	C 3	R22	C 2
C3	C 2	R24	G 2
C4	C 1	R25	B 4
C5	F 2	R26	C 4
C6	D 2	R27	C 4
C7	D 3	R28	C 4
C8	D 3	R29	C 4
C9	E 3	R30	D 4
C10	H 3	R31	E 4
C11	H 3	R32	F 1
C12	I 3	R33	H 5
C13	G 4	R34	H 5
C14	A 1	R35	H 5
C15	C 4	R36	G 6
C16	C 4	R37	C 3
C17	C 4	R39	F 6
C18	I 1	R40	G 4
C20	G 6	R41	D 1
C21	H 2	R42	D 1
C22	H 5	R43	D 1
C24	G 5	R45	D 1
C25	E 5	R46	E 1
C26	E 5	R47	E 2
C27	G 4	R48	E 1
C28	B 2	R49	E 2
C29	G 1	R50	F 3
C30	H 5	R51	G 5
C37	C 2	R52	F 5
C39	F 6	R53	E 5
C40	D 2	R54	E 5
C42	H 2	R55	E 6
C43	H 2	R56	F 2
C44	F 5	R57	F 1
		R58	F 6
		R60	E 2
D1	B 1	R61	E 2
D2	C 2	R62	H 5
D3	E 2	R63	C 5
D4	E 2	R64	C 5
D5	G 3	R66	F 1
D6	D 4	R67	H 1
D7	I 3	R68	H 2
D8	E 4	R69	G 3
D9	D 1	R70	H 5
D10	I 1	R80	B 1
D11	E 4	R81	F 3
D20	C 2	R101	C 2
D30	D 3	R102	F 6
D42	I 5	R103	F 6
F1	H 1		
		SR13	A 1
IC1	F 3	SR14	D 2
IC2	E 3	SR44	I 5
IC2	E 4		
IC2	D 4	Z2	A 1
IC2	D 3	Z3	H 3
IC3	F 3	Z4	C 4
IC4	F 3	Z5	F 6
IC5	F 5	Z8	H 6
		Z9	H 2
J1	A 2		
J2	A 2		
J3	A 2		
J22	A 2		
J33	A 2		
L1	G 1		
NTC1	F 6		
P1	B 4		
P2	B 4		
P3	D 3		
Q1	C 1		
Q2	C 3		
Q3	F 3		
Q4	H 2		
Q5	H 3		
Q6	G 3		
Q7	I 2		
Q8	C 4		
Q9	C 4		
Q10	H 5		
Q11	D 2		
Q12	D 1		
Q13	D 2		
Q14	F 4		
Q15	E 5		
Q16	F 2		
Q17	E 1		
Q18	G 5		
Q27	F 6		
Q30	G 1		
R1	B 4		
R2	B 4		
R3	B 1		
R4	B 1		
R5	C 1		
R6	C 2		
R7	D 1		
R8	C 3		
R9	G 5		
R10	D 2		
R11	D 2		
R12	E 2		
R15	G 4		
R16	F 2		
R17	F 3		
R18	H 3		
R20	G 2		

SAFETY PRECAUTION**SWITCHING TRANSISTOR Q7 REMOVAL/REPLACEMENT**

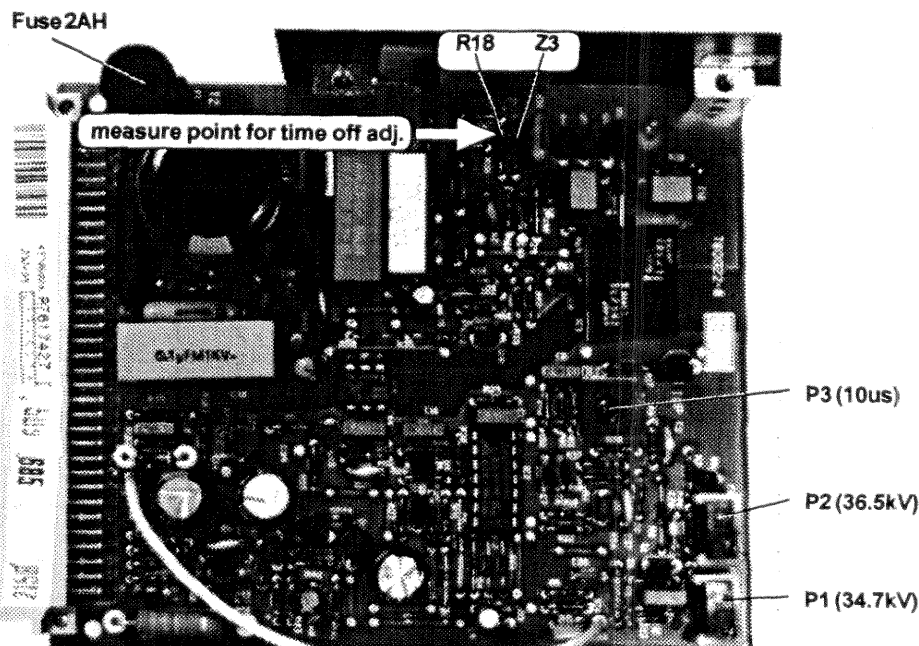
RE-INSTALL ALWAYS THE INSULATING DEVICE BETWEEN THE SWITCHING TRANSISTOR Q7 AND THE HEATSINK AND THE TRANSISTOR CLAMP.

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



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.

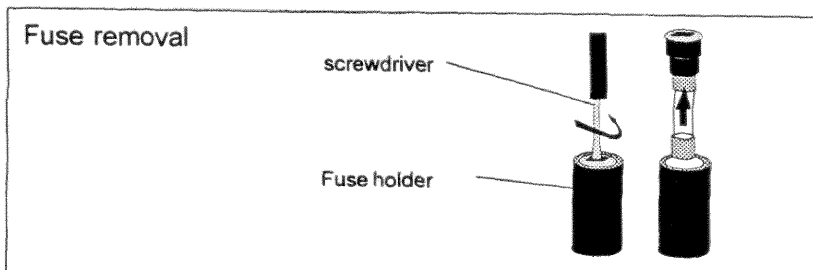
- Turn the projector off.
- Put the potentiometers P1 and P2 in their minimum position (turning clockwise!!) .
- Pull out one CRT-EHT cable of the EHT splitter.
- Insert in the free EHT connector the **precision** EHTprobe (ratio 1000/1).

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

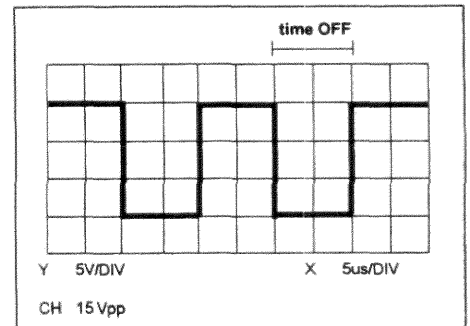
Adjustment

P3 Switching transistor time OFF

- Remove fuse "F 2A" out of fuseholder (see illustration "Fuse removal")



- Connect the oscilloscope to the resistor R18 (=gate switching transistor Q7)
- Switch on the projector.
- Adjust potentiometer P3 for a drive pulse 'time OFF' width of 10 μ s.

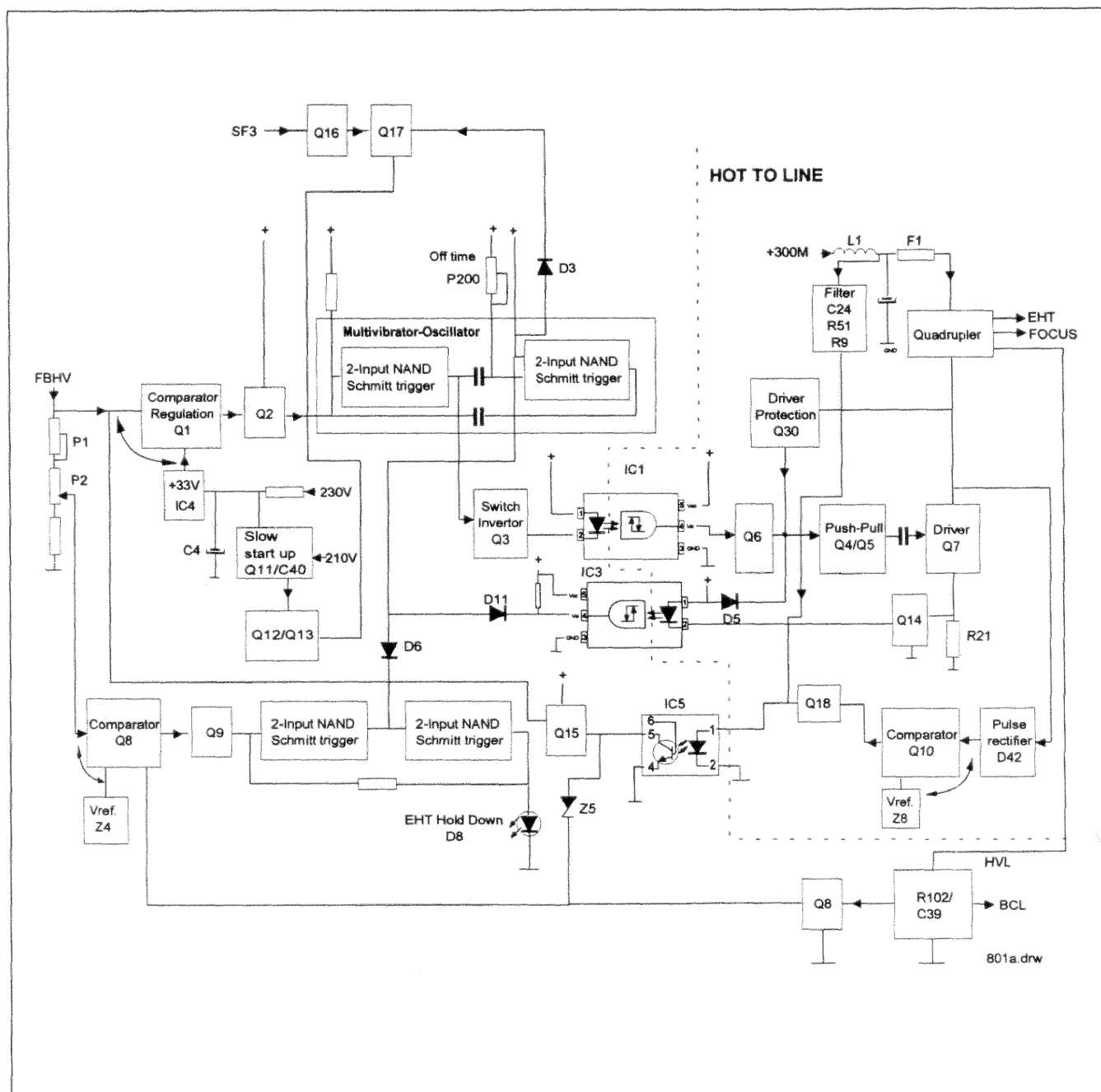


P1 High Voltage Adj. - Switch off the projector

P2 Hold Down - Put the fuse 2A on its place.

- 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 power supply are generated. The primary circuit for the EHT power supply receives its 300VDC supply from the Mains. In the event of a failure, either because the EHT is too high, too much current in the EHT circuit or a horizontal or vertical scan failure condition exists, the EHT voltage is discontinued. We will discuss the generation of the EHT pulses, the regulation of the high voltage and the different protection circuits.

DC controlled multivibrator.

The EHT multivibrator is built around two Schmitt Trigger NAND gates in IC2. Two time constants are involved in this circuit : C7 / P3 / R11 and in the feedback loop C8 / R10 + transistor Q2.

The first time constant is fixed and determines the OFF time of the power switch Q7 and is tuned with P3 to 10 μ S. The second time constant is variable and depends on the current flow through Q2. By varying the bias on transistor Q2, the time constant can be varied. Q2 is driven by the comparator Q1. This Q1 receives its base bias voltage from FBHV (feedback high voltage from the divider by 1000 circuit on the splitter. The emitter of Q1 is set at +33 volts by zener IC4. The duty cycle or the on/off time of the power switcher Q7 is regulated by the voltage difference detected by Q1, between the fixed emitter and the BFHV from the splitter.

The frequency of this oscillator is typically 80 kHz.

The squared waveform at pin 3 of the NAND gate is, via a fast switching and inverting FET Q3, sent to the opto-coupler IC1. This opto-coupler is necessary because the remainder of the circuit is supplied with the +DN (+17M) and the +300M which are not isolated from the Mains. The +17M voltage is obtained from a special winding on the SMPS and the +300M is the main bridge rectified mains voltage (**GNDM** is mains or hot ground).

Caution : Any servicing on a board that uses both a Mains Ground and a Chassis ground should involve the use of an Isolation Transformer, especially when using an oscilloscope, or other equipment connected to the main AC source. Do not connect the Main and Chassis Ground together at any time.

As this board is supplied with the +300M as soon the Mains switch is pushed, it is not recommended to remove this board even when the projector is in a standby position. This action will damage the contacts of the board.

The output drives a FET Q6 which on its turn drives the push-pull stage Q4/ Q5. The pulses are capacitively coupled with C11 to the gate of Q7. The 20 volts zener Z3 has two purposes.

The negative level of the pulses is clamped at -0.6 volt, and on the other hand the gate-source voltage is limited (protected) to 20 volt DC, in order to protect the switcher Q7.

The drain DHV of the switcher is connected with the primary winding of the EHT transformer. Transformer and quadrupler are one in the same unit. The +300M enters the board and is passing a filter L1/C19/C29 and a fuse before it supplies the Transformer / Quadrupler.

Protections.

a) EHT Hold down :

The EHT of the projector must be switched off in the event of a failure in the regulating circuit or a loss of the feedback. Moreover, when the required current of one or more tubes is excessively high, the EHT voltage is inhibited. We'll discuss these protections in more detail.

1. EHT Hold Down due to fault in the regulating circuit:

The slider voltage of P2 ("hold down adjust" potentiometer) is sent to the base of Q8 and Q8's emitter is set to a threshold of 5.6 volt by Z4. As soon as the EHT rises beyond 36.5kV, transistor Q8 starts conducting, turning on Q9. The Schmitt-trigger pins 8 and 9 of IC2 go high and its output pin 6 goes low. D6 pulls pin 6 of IC2 low in order to stop the EHT multivibrator, halting the EHT.

The output of IC2, pin 11 goes high at the same time (inverting) to forward biases LED D8 to indicate the EHT HOLD DOWN condition. The feedback resistor R30 keeps the hold down condition on (lock-down), until the projector is powered off to reset the circuit.

2. EHT Hold Down due to a feedback loop fault condition.

The EHT hold down must equally operate when there is an "open loop" situation, or no EHT feedback voltage from the splitter. If that were the condition, there would be no way for the circuit to monitor the EHT, and it could go higher than the 36.5kV. The detection for "open loop" is built around the EHT "flyback" pulses on the drain of Q7.

These pulses are rectified by D42 and the resulting pulsating DC is filtered by C30 / C12 divided down with R70/R35+R58 and sent to the base of Q10. A threshold level of 4.7 volt is set at the emitter with Z8. From 5.6 volt base voltage onwards Q10 starts conducting, turning fully on Q18. The base voltage of Q15 is set at 14 volt in normal conditions, but, is now decreased, as pin 5 is pulled to a saturating level with the photo-transistor in the opto-coupler IC5.

Via Z5 (13 volt) the collector of Q8 is dropped to approx. 13 volts, sufficient to introduce the conduction of Q9. The further actions are now similar to what is explained above.

Note that the same optocoupler and transistor Q15 are used for mains hum suppression. The +300M is via a filter C24/R51/R9 sent to pin 1 of IC5. The isolated feedback voltage is taken from the collector of Q15 and capacitively coupled to the FBHV input of the board.

3. EHT Hold Down in the event of an excessive amount of CRT beam currents.

Finally, in the vent of an excessive amount of CRT beam current, with a long duration, the duration is determined by the time constant R102/C39, the collector of Q8 is pulled low via Q27, resulting in EHT Hold Down.

The base of Q27 is connected to ground, and HVL is in the ground return of the Quadrupler, so as the emitter of Q27 goes more negative as the total beam current increases, Q27 is more forward biased and starts to conduct, pulling the collector low and activating the EHT hold down. If any one CRT begins to draw too much current i.e. shorted CRT, Q27 turns on causing HV holddown.

Note that the beam current proportional voltage is sent to the RGB-Decoder drive board to reduce the contrast and brightness from some level onwards.

In conclusion, the EHT Hold Down is active for :

- too high EHT, information coming from the feedback line FBHV
- too high EHT in "open loop" via Q10/Q18 and the opto-coupler IC5.
- too high beam current lasting for some time (short in a crt).

b) Switching off the EHT when a Horizontal or Vertical scan failure occurs.

In the event of a horizontal and vertical scan failure Q16 is blocked turning on Q17. D3 becomes forward biased and pulls pin 6 of the multivibrator at ground level, stopping the EHT.

c) Overcurrent protection of the Q7 switcher.

The drain-source current of Q7 is measured by the resistor R21 in series with the source. This voltage is applied to the base of Q14 via a divider R40/ R15.

The purpose of the circuit is to stop temporarily the drive when the beam current tends to go beyond a maximum.

The pin 4 output of the opto-coupler IC3 may only halt the EHT multivibrator when there is a drive pulse on the common bases of the push-pull stage. For that reason, the drive pulses at the bases of Q4/5 are coupled with D5 to pin 1 of the opto-coupler. When the drain of Q6 is at low level, D5 is forward biased and inhibits the supply voltage +17M' for the LED in the opto-coupler.

A stop of the multivibrator via the opto-coupler is thus only possible when a drive pulse is present at the push-pull stage.

Slow start up of the EHT.

When the projector is switched on, a slow start up of the EHT voltage is provided. This is accomplished by the circuit around Q11. The voltage for the reference zener IC4 is taken from the +230V line via R7.

When the unit is switched on, until C40 fully charges, Q11 will be forward biased and inhibits C4 from charging. This gives a slow rise to the voltage for IC4, and this is the voltage the FBHV is referenced to, so therefore the EHT will also have a slow rise.

When the unit is switched off, C40 is quickly discharged via D9, because the 230VDC line drops quickly, taking the EHT reference voltage on IC4 quickly down, and therefore the EHT itself goes down.

C40 discharging turns on Q11 because its base is pulled in a negative direction. If a scan fail condition is met, Q13 sees a low at its base and turns off. The base of Q12 then goes "high" and C40 is discharged, pulling down the reference voltage.

Delay of the power switch drive .


Fet Q30 is used to keep a drive pulse from driving Q7, until the EHT pulse on the Drain of Q7 has not fully dropped to its minimum. The EHT pulse is coupled to the gate of Q30 and the on state inhibits the push-pull stage Q4/Q5 from being driven. When the EHT pulse has dropped, turning off Q30, then the next drive pulse can pass. The gate-source of Q30 is limited by the zener D9 to 20V DC.

Parts listing EHT Module R7617427

ITEM NO.	SIT.	DESCRIPTION		ITEM NO.	SIT.	DESCRIPTION	
40	R133039	SPR L 8 D 4 D 1.2 C	4	D 20	R131621	D S 1N4148 075150 DO35	
130	R133063	Q ACC ISO MICA SOT93	1	D 30	R131628	D S BAW62 075200 DO35	1
123	R133074	Q ACC ISO SIL600 W 30	0,033	D 42	R131906	D R BYV96E 1021A5 SOD57	1
124	R133074	Q ACC ISO SIL600 W 30	0,033				
125	R133074	Q ACC ISO SIL600 W 30	0,033	F 1	R314116	F 5X20 T 2A H RU/VDE	1
	R34303616	CBLU COA RG178 BU50E 160	1	H 1	R314516	F ACC HLDR 6A 5X20 PC/HSG	1
121	R3631049	SCR D933 M 3 X 6 XIC	1	I 1	R134224	U 582 TLP 1119A1 P	1
111	R3631059	SCR D933 M 3 X 8 XIC	4	I 2	R1373945	U 4093B DIP14 P	1
110	R367600	NUT BLOC M 3	2	I 3	R134224	U 582 TLP 1119A1 P	1
10	R367699	RVT CHB D2.38L6.35 P A	2	I 4	R132102	U 33B ZTK DO35	1
				I 5	R131691	U 601G-3 SFH DIP6 P	1
10	R721850	R ACC CLIPS TCE V PROTECT	2	J 1	R313525	J EUR2C MBS P64 E1C2S 1,6	1
100	R802634	HTSNK PJ49 EHT	1	L 1	R305913	CH MNS AX 12 UH 3A	1
120	R804831	Q ACC SPG 1X 3.1 LONG	1	NTC1	R105016	R NTC 2K7 0W25	1
C 1	R1137161	C POMERA 22N K100E2 85		P 1	R106834	R TCE V200K K 0W5 S10SS	1
C 2	R112735	C CE MI 470P K100E2	1	P 2	R106833	R TCE V100K K 0W5 S10SS	1
C 3	R112747	C CE MI 4N7K100E2	1	P 3	R106733	R TCE H100K K 0W5 S10TS	1
C 4	R111488	C EL RA 220M Z 40E2 85	1	PC	R780022	PCS PJ49 800 EHT	1
C 5	R112747	C CE MI 4N7K100E2	1	Q 1	R132590	Q BC560B P SS TO92	1
C 6	R113724	C POMERA 100N K 63E2 85		Q 2	R1314182	Q BC559C P SS TO92	
C 7	R1122415	C NP0 MI 82P G100E2		Q 3	R132910	Q BS170 FN SS TO92	1
C 8	R112242	C NP0 MI 100P G100E2		Q 4	R131424	Q BC338 N SS TO92	
C 9	R111532	C EL RA 22M M 35E2 85		Q 5	R1314311	Q BC327 P SS TO92	
C 10	R113732	C POMERA 470N K 63E2 85		Q 6	R132910	Q BS170 FN SS TO92	1
C 11	R113729	C POMERA 270N K 63E2 85		Q 7	R132918	Q IXTH12N100 FN P TO247	1
C 12	R111720	C PPMERA 6N8J162E9 HV	1	Q 8	R131411	Q BC549C N SS TO92	1
C 13	R112733	C CE MI 330P K100E2	1	Q 9	R1314182	Q BC559C P SS TO92	1
C 14	R111479	C EL RA 470M Z 25E2 85	1	Q 10	R131411	Q BC549C N SS TO92	
C 15	R112763	C CE MI 10N U 63E2		Q 11	R132923	Q BC556 P SS TO92	1
C 16	R1137121	C POMERA 10N K250E2 85		Q 12	R132924	Q BC546 N SS TO92	1
C 17	R1137121	C POMERA 10N K250E2 85	1	Q 13	R132924	Q BC546 N SS TO92	1
C 18	R111532	C EL RA 22M M 35E2 85		Q 14	R131411	Q BC549C N SS TO92	
C 20	R113724	C POMERA 100N K 63E2 85		Q 15	R1314182	Q BC559C P SS TO92	
C 21	R113732	C POMERA 470N K 63E2 85		Q 16	R131411	Q BC549C N SS TO92	1
C 22	R112763	C CE MI 10N U 63E2	1	Q 17	R131424	Q BC338 N SS TO92	1
C 24	R114162	C POMERA 100N K400E6 85	1	Q 18	R1314182	Q BC559C P SS TO92	
C 25	R112760	C CE MI 3N3K100E2	1	Q 27	R131411	Q BC549C N SS TO92	
C 26	R112763	C CE MI 10N U 63E2		Q 30	R1329105	Q BS170 FN SS TO92	1
C 27	R1137121	C POMERA 10N K250E2 85		R 1	R101560	R MF H100K F 0W4 E3	
C 28	R112739	C CE MI 1N K100E2	1	R 2	R101552	R MF H 22K F 0W4 E3	
C 29	R111578	C EL RA 100M M400E4 85	1	R 3	R101552	R MF H 22K F 0W4 E3	
C 30	R114603	C POMERA 100N M102E9 HV	1	R 4	R101524	R MF H100E F 0W4 E3	
C 37	R112747	C CE MI 4N7K100E2	1	R 5	R101512	R MF H 10E F 0W4 E3	
C 39	R111453	C EL RA1000M Z 6E2 85	1	R 6	R101532	R MF H470E F 0W4 E3	
C 40	R111531	C EL RA 10M M 35E2 85		R 7	R103254	R MO H 33K J 2W	1
C 42	R112819	C CE DI 330P M400E3	1	R 8	R101556	R MF H 47K F 0W4 E3	
C 43	R112240	C NP0 MI 68P G100E2	1	R 9	R101462	R MF H150K J 2W E7	1
C 44	R1137121	C POMERA 10N K250E2 85	1	R 10	R101563	R MF H180K F 0W4 E3	
D 1	R131621	D S 1N4148 075150 DO35		R 11	R101563	R MF H180K F 0W4 E3	
D 2	R131621	D S 1N4148 075150 DO35		R 12	R101560	R MF H100K F 0W4 E3	
D 3	R131621	D S 1N4148 075150 DO35		R 15	R101532	R MF H470E F 0W4 E3	
D 4	R131621	D S 1N4148 075150 DO35		R 16	R101535	R MF H820E F 0W4 E3	
D 5	R131637	D R BA158 600400 DO7		R 17	R101539	R MF H 1K8 F 0W4 E3	
D 6	R131621	D S 1N4148 075150 DO35		R 18	R101536	R MF H 1K F 0W4 E3	
D 7	R131958	D R BY329 12208A TO220C	1	R 20	R101534	R MF H680E F 0W4 E3	
D 8	R131662	D LED D3 T RD	1				
D 9	R131646	D R 1N4007 10201A DO41					
D 10	R131646	D R 1N4007 10201A DO41	1				
D 11	R131621	D S 1N4148 075150 DO35					

ITEM NO.	SIT.	DESCRIPTION		ITEM NO.	SIT.	DESCRIPTION	
R 21	R103606	R WW H E33K 4W	1	R 61	R101551	R MF H 18K F 0W4 E3	
R 22	R101536	R MF H 1K F 0W4 E3		R 62	R101550	R MF H 15K F 0W4 E3	
R 24	R103229	R MO H270E J 2W	1	R 63	R101540	R MF H 2K2 F 0W4 E3	
R 25	R101564	R MF H220K F 0W4 E3		R 64	R101536	R MF H 1K F 0W4 E3	
R 26	R101556	R MF H 47K F 0W4 E3		R 66	R101462	R MF H150K J 2W E7	1
R 27	R101548	R MF H 10K F 0W4 E3		R 67	R101462	R MF H150K J 2W E7	1
R 28	R101556	R MF H 47K F 0W4 E3		R 68	R101564	R MF H220K F 0W4 E3	
R 29	R101560	R MF H100K F 0W4 E3		R 69	R101543	R MF H 3K9 F 0W4 E3	
R 30	R101556	R MF H 47K F 0W4 E3		R 70	R104654	R HV H 1M J 0W5 3500	1
R 31	R101544	R MF H 4K7 F 0W4 E3		R 80	R101564	R MF H220K F 0W4 E3	
R 32	R101549	R MF H 12K F 0W4 E3		R 81	R101545	R MF H 5K6 F 0W4 E3	
R 33	R101548	R MF H 10K F 0W4 E3		R101	R101548	R MF H 10K F 0W4 E3	
R 34	R101541	R MF H 2K7 F 0W4 E3		R102	R101543	R MF H 3K9 F 0W4 E3	
R 35	R101544	R MF H 4K7 F 0W4 E3		R103	R101546	R MF H 6K8 F 0W4 E3	
R 36	R1011324	R MF H475E F 0W6 E4	1	SR13	R1003209	R CFFV 47E J 0W25 E1	1
R 37	R101543	R MF H 3K9 F 0W4 E3		SR14	R1003169	R CFFV 22E J 0W25 E1	1
R 39	R1011274	R MF H182E F 0W6 E4	1	SR44	R1011269	R CFFH150E J 0W25	1
R 40	R101541	R MF H 2K7 F 0W4 E3		SR65	R1003009	R CFFV 1E J 0W25 E1	1
R 41	R101529	R MF H270E F 0W4 E3					
R 42	R101548	R MF H 10K F 0W4 E3		Z 2	R131745	D ZEN 18V 1W3 C DO41	1
R 43	R101556	R MF H 47K F 0W4 E3		Z 3	R131730	D ZEN 20V 0W5 C DO35	
R 45	R101560	R MF H100K F 0W4 E3		Z 4	R131734	D ZEN 5V6 0W5 B DO35	
R 46	R101554	R MF H 33K F 0W4 E3		Z 5	R131721	D ZEN 13V 0W5 C DO35	
R 47	R101552	R MF H 22K F 0W4 E3		Z 8	R131729	D ZEN 4V7 0W5 C DO35	
R 48	R101564	R MF H220K F 0W4 E3		Z 9	R131730	D ZEN 20V 0W5 C DO35	
R 49	R101548	R MF H 10K F 0W4 E3					
R 50	R101505	R MF H 2E7 F 0W4 E3					
R 51	R101556	R MF H 47K F 0W4 E3					
R 52	R101543	R MF H 3K9 F 0W4 E3					
R 53	R101542	R MF H 3K3 F 0W4 E3					
R 54	R101183	R CF H 8M2 J 0W25					
R 55	R101535	R MF H820E F 0W4 E3					
R 56	R101552	R MF H 22K F 0W4 E3					
R 57	R101558	R MF H 68K F 0W4 E3					
R 58	R1015351	R MF H750E F 0W4 E3	1				
R 60	R101512	R MF H 10E F 0W4 E3					

PRODUCT SAFETY NOTICE

Components identified by  have SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. Before replacing any of these components, read carefully the service safety precautions.

