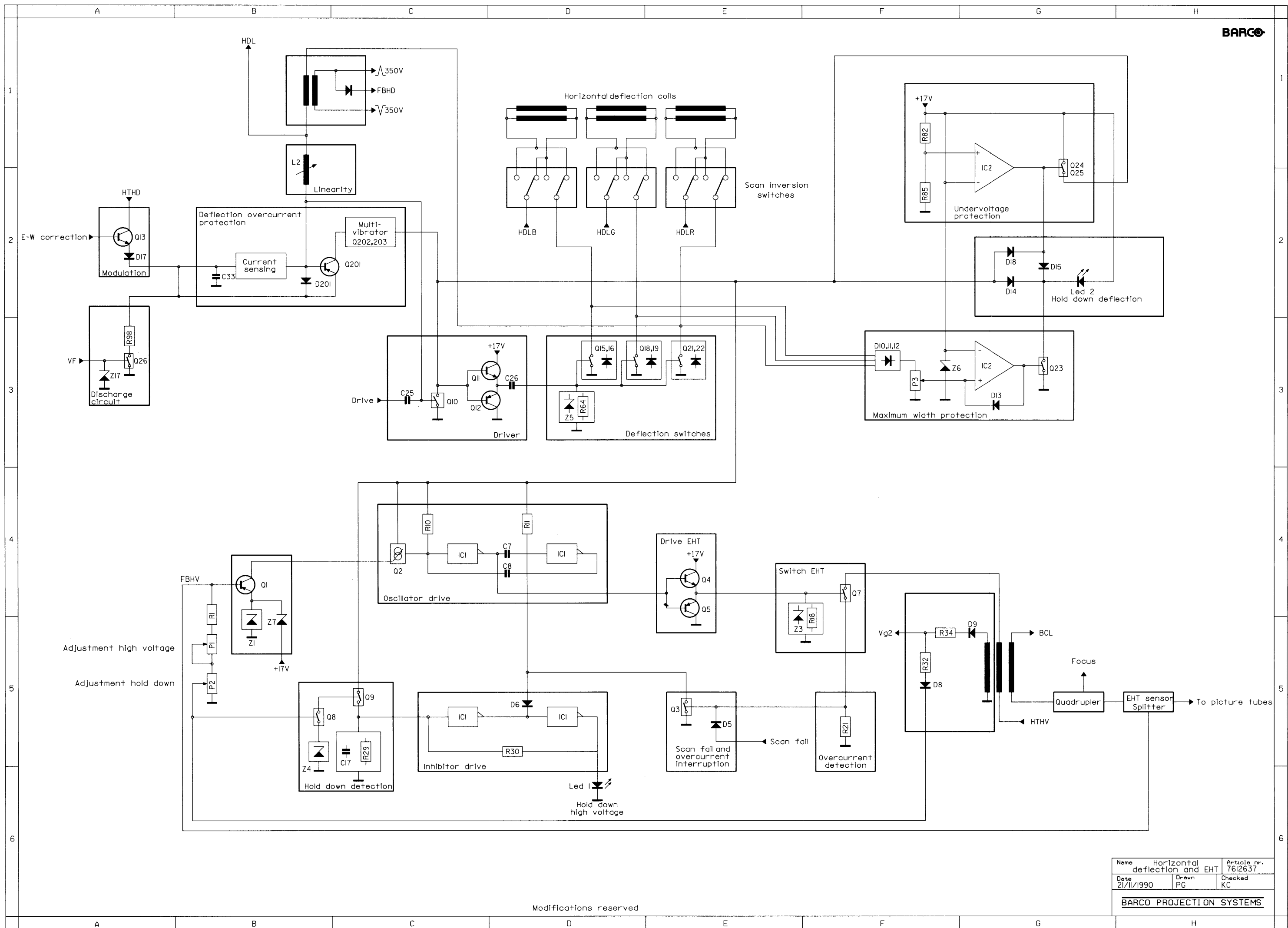
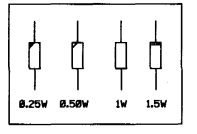
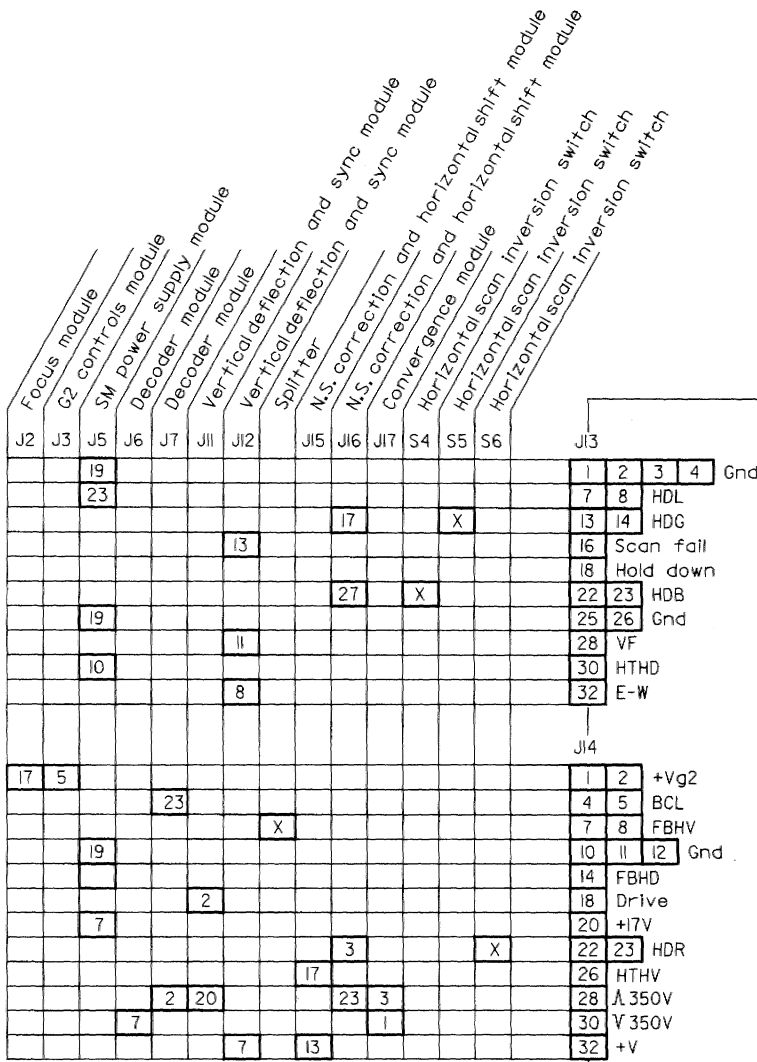


To QUADRUPLER

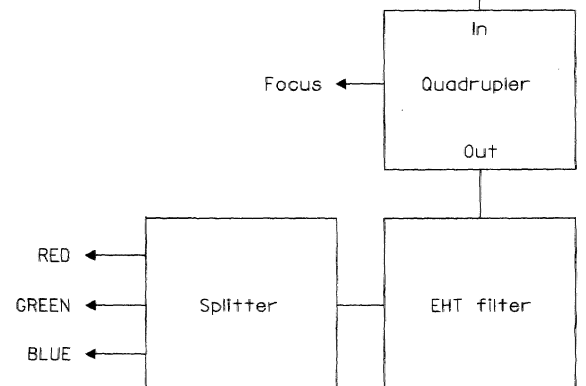




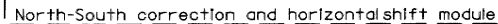
BARCO PROJECTION SYSTEMS



Horizontal deflection and EHT module



Name Interconnection		Article nr. 7612637	
Date 03/12/1990	Drawn PG	Checked KC	
BARCO PROJECTION SYSTEMS			



Horizontal deflection and EHT module

Modifications reserved

Important

The potentiometers P1 (Adjustment High Voltage), P2 (Hold Down adjustment), P3 (Picture Width limitation) and P1 on splitter unit are adjusted and sealed at the factory.

For the adjustment of one of the above potentiometers, the following procedure has to be followed strictly.

Adjustment procedure

a. Potentiometers P1 "Adj. HV" and P2 "Hold Down"

Important: These adjustments can be applied if the splitter unit in the projector is the original one.

Procedure

- Switch OFF the projector.

- **Before connecting the EHT probe, Read carefully the user's instructions of the EHT probe.**

Connect the calibrated EHT probe of the voltmeter to one output of the EHT splitter (pull out one of EHT output cables on the splitter unit).

- Turn P2 "Hold Down" fully clockwise.

- Switch ON the projector.

- Adjust P1 "Adj. HV" first for +36.4kV.

- Adjust further P2 "Hold Down" until the projector switches OFF = Hold Down mode.

- Decrease the High Voltage by turning the potentiometer P1 a little backwards (EHT < 36.5kV)

- Switch ON the projector again by pushing the power switch OFF/ON.

- Adjust the High Voltage potentiometer P1 for an EHT of 34.7kV.

b. Potentiometer P1 on splitter unit.

Important: This adjustment can be applied if the Hor. Defl.+EHT module in the projector is the original one.

Procedure

- Switch OFF the projector.

- **Before connecting the EHT probe, Read carefully the user's instructions of the EHT probe.**

Connect the calibrated EHT probe of the voltmeter to one output of the EHT splitter (pull out one of EHT cables on the splitter unit).

- Switch ON the projector.

- Adjust P1 "Adj. HV" for +34.7kV.

c. Potentiometer P3 "Picture Width limitation"

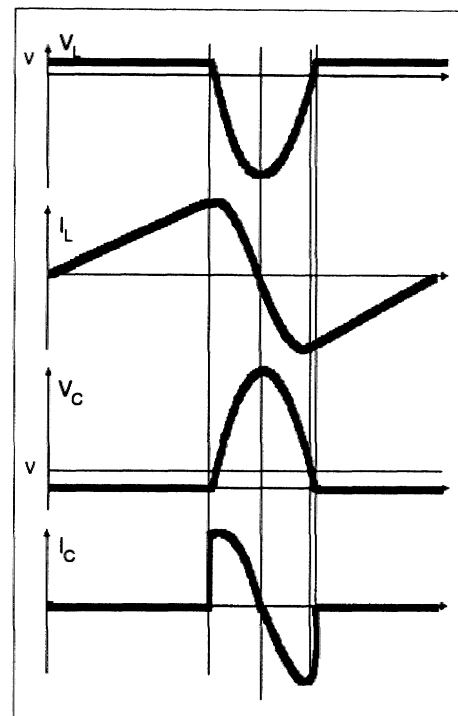
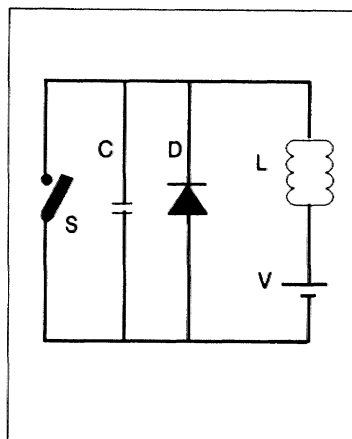
- Projector in normal video 4/3 operation.
- Turn P3 "Picture width lim." fully clockwise.
- Connect a voltmeter on the junction of the resistors SR65 and R66.
- Adjust P2 "Hor. Ampl." on the SM Power Supply for +925V (DC) on mentioned measure point.
- Adjust P3 "Picture width lim." until the projector switches OFF = Hold Down mode.
- Decrease a little the +925V by turning P2 backwards.
- Switch ON the projector again by pushing the power switch OFF/ON.
- Adjust the horizontal amplitude with P2 on the SM Power Supply for a picture aspect ratio of 4 by 3.

d. Coil L2" Horizontal linearity"

- Select the 32kHz internal crosshatch pattern.
- Adjust the horizontal linearity coil for horizontal equal size of the crosshatch squares of the projected picture.

- The Horizontal Deflection + EHT module has two main functions:
- The generation of the horizontal deflection currents used in the deflection yokes of the CRT's.
 - The generation and regulation of the Extremely High Tension used at the anodes of the CRT's.

1. Simplified horizontal deflection circuit



The circuit and corresponding timings diagram shown below are representative of the basic horizontal deflection circuit. When the switch S is closed, the capacitor and the diode are short circuited and the supply voltage V is dropped across the coil L. The coil will inherently resist the change in current flow now imposed on it by allowing it to increase in linear fashion. When the switch S is opened, the coil will discharge into the capacitor. The presence of the parallel diode keeps the oscillation from continuing.

The Horizontal Deflection Circuit

The horizontal deflection section is primarily composed of power mosfets Q15 - Q22, capacitors C27 - C29, and capacitor C33. The mosfets correspond to the switch S, and C33 to the voltage source V. The deflection coils are represented by the inductor L of the simplified circuit and the damping action of the diode D is provided by diodes internal to the six power mosfets.

During the horizontal scan period the mosfets are conducting, allowing the deflection coils of the CRT yokes to charge. At the end of the scan, the mosfets close and allow the charge on the deflection coils to collapse. The value of capacitors C27, C28 and C29 determine the horizontal retrace time.

The horizontal drive pulses enter the deflection circuit at the base of Q10 after being decoded by the Vertical deflection and Sync module. The push-pull amplifier formed by transistors Q11 and Q12 passes the drive pulses to the gates of the six power mosfets. Zener diode Z5 insures that the incoming pulses will not damage the mosfets by becoming too high in amplitude. The six mosfets are divided into three pairs, each of which switch current through the deflection yokes of the CRT's.

HTHD, the high tension horizontal deflection voltage is both generated and regulated on the SMPS. It enters the module at the collector of Q13 and is modulated by the east-west correction signal found at the base of Q13. Capacitor C33 delivers the horizontal deflection current HDL to the deflection coils via the horizontal linearity coil L2, the scan inversion switches on the motherboard and the width coil on the North South module.

Transformer T2 samples the blue deflection signal. The secondary windings of T2 provide flyback pulses to be used on other modules in the projector and also FBHD, the horizontal deflection voltage feedback signal used by the SMPS. As the horizontal scan frequency of the deflection circuit increases, the impedance of the deflection coils increases. Therefore, HTHD must increase to provide a constant deflection current. As mentioned before, the regulation of HTHD is performed on the SMPS.

Mosfet Protection Circuitry

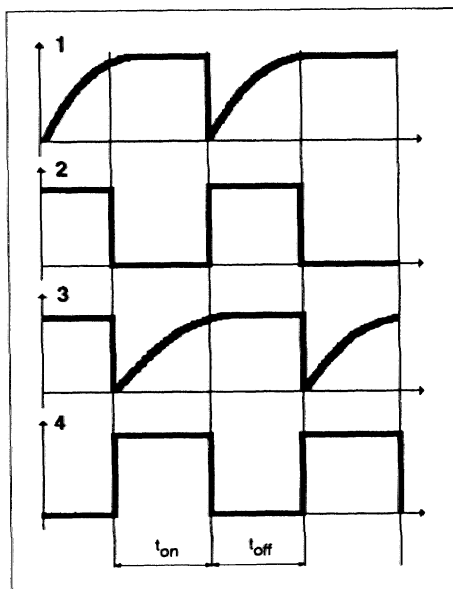
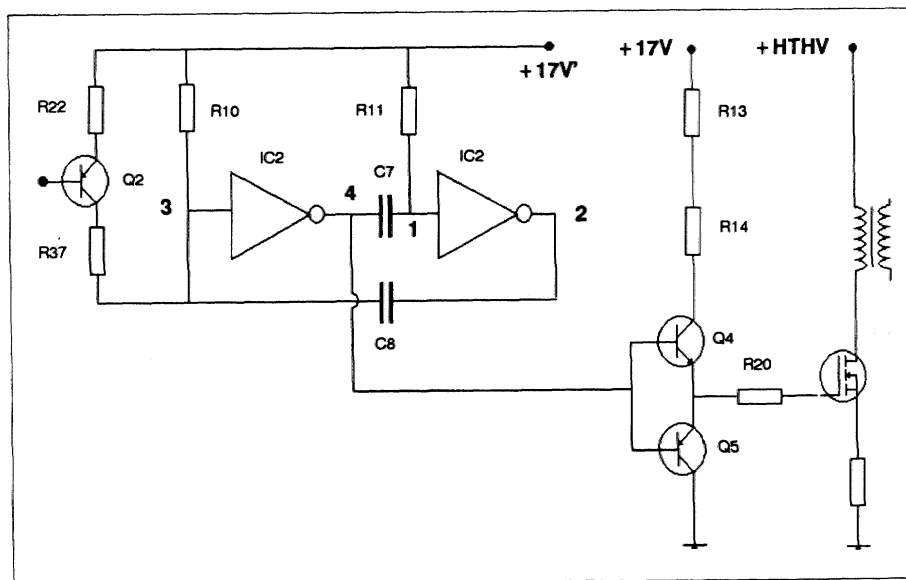
The six power mosfets used for switching the deflection current require protection against excessive drain to source current and voltages. Should the deflection current become excessive, a small voltage will appear across the wire bridge between C33 and L2. As this voltage approaches 0.7V, transistor Q201 will begin to conduct, thus applying a positive current to the base of Q202. The drive pulses found at the bases of Q11 and Q12 will pass through D202 and Q202 to ground rather than to the gates of the switching mosfets. Capacitor C201 will discharge through Q202 and send Q203 into cutoff thereby applying the +17V supply to the base of Q202. After the RC time constant formed by C201 and R204, C201 will charge and send Q203 into saturation, thus removing the 17V from the base of Q202. If the deflection current has returned to normal, the horizontal drive pulses will be redirected to the gates of the switching mosfets.

The power mosfets are protected by excessive drain to source voltage by the comparator IC1 and its ancillary circuitry. The highest Vds of the three mosfets pairs will pass through D10, D11 or D12. The voltage is divided by the horizontal picture width limiter potentiometer P3 before being compared with the reference voltage at IC1. Should Vds of one of the mosfets exceed the limit set by P3, the output of the comparator will be set. Notice that diode D13 forms a feedback loop which will hold the high output of the comparator until power to the circuit is removed by switching off the projector. Transistor Q23 will saturate and detour the horizontal switching pulses through D14 and away from the gates of the switching mosfets. LED 2, the Deflection Hold Down indicator will illuminate and the base of Q24 will be pulled low through D15. As Q24 cuts off, Q25 will also cut off and interrupt the voltage supply to the collector of Q10, the input stage of the horizontal drive pulses.

It is imperative that the switching mosfets have as small a resistance as possible during the conductive part of the deflection cycle. If the 17V supply to the collector of Q10 should decrease, the pulse amplitude at the gates of the mosfets would not be high enough to allow minimum drain to source resistance. As a result, the power dissipation limitations of the mosfets could be exceeded, causing a failure. The second comparator in IC1 is used to detect a drop in the 17V supply with respect to the voltage across Z6. Should a drop in the 17V supply occur, the output of the comparator will clear and allow the drive pulses to drop across D18, Q24 and Q25 will also cut off and interrupt the 17V supply to Q10, thus disabling the horizontal deflection circuit. Note that in this case, LED 2 will not be illuminated.

The Extremely High Voltage Generation Circuit

The module is also responsible for generating the EHT (extremely high tension) necessary at the anodes of the CRT's. The EHT is both generated and regulated by a switching power supply formed around a pair of



Schmidt Trigger NAND gates configured as inverters. As shown in the schematic and corresponding timing diagrams below, the off time of the oscillator is set by the RC time constant of R11 and C7 and the on time by R10 and C8. The duty cycle of the oscillator is controlled by varying the current to the base of Q2, which in turn varies the resistance between C8 and the 17V supply. The on time of the oscillator is thus adjustable, allowing a means of control.

The output of the two inverter oscillator is passed to the gate of Q7 via the push-pull combination of Q4 and Q5. Z3 protects Q7 against pulses of excessive amplitude. Q7 switches HTHV, the high tension high voltage supply, through the primary coils of transformer T1. The secondary winding between pins 4 and 24 develops the 9 kV EHT while the secondary winding between pins 9 and 22 supply the G2 voltage for the CRT's.

The feedback voltage for the oscillator is tapped at the EHT splitter and returned to the module where it is fed to the base of Q1 which in turn, controls Q2 of the oscillator. Q2 controls the duty cycle of the oscillator and therefore, the output of the EHT transformer

In the event that the 17V supply to the circuit should drop, the pulses that drive Q7 would not be sufficient to minimize the on time resistance of the mosfet, which could cause the mosfet to fail. This is avoided by feeding pin 6 of the second inverter of the oscillator with the 17V dropped across R96. When the comparator in IC1 cuts off Q24 and Q25, pin 6 is pulled to ground through R96 and the oscillator is halted. Should the comparator in IC1 fail to detect the drop in the 17V supply, the oscillator will still be halted as C9 discharges across D4.

The switching mosfet Q7 is protected from excessive drain to source current by 21. As the voltage across R21 approaches 0.7V, transistor Q3 will conduct and halt the oscillator.

Should HTHV become too high and pose a threat to the mosfet, the increase will be detected at the secondary windings between pins 9 and 22 by Q8 which will saturate. This in turn will cause Q9 to conduct and as a result, halt the oscillator. The collector of Q9 is tied to a self holding circuit formed by two inverters which, when fed 17V by the saturation of Q9, will halt the oscillator until the power to the projector is switched off. The self holding circuit will also illuminate LED 1, the high voltage hold down indicator.

HOR + EHT MODULE

76 12637

ITEM NO.	SIT.	DESCRIPTION	ITEM NO.	SIT.	DESCRIPTION
11 4106	C...	CAP POMEFF 1M K 100	77 4153	L..2	COIL LIN PJ 45 HOR DATA HR45
11 37121	C..1	CAP POME 10K K5 100	10 6834	P..1	R T CEMV 200K K 0W50
11 3732	C..2	CAP POME 470K K5 63	10 6833	P..2	R T CEMV 100K K 0W50
11 2747	C..3	CAP CE MI 4K7 K5 63	10 6736	P..3	R T CEMH 500K K 0W50
11 1488	C..4	CAP ELPR 220M Z5 40	71 6298	PC..	PC PJ 45 HOR EHT HR DATA761263
11 3724	C..6	CAP POME 100K K5 63	13 2590	Q..1	TSTR BC560B P 45 / 0A1
11 2387	C..7	CAP N152MI 470P J5 63	13 14182	Q..2	TSTR BC559C,BC309C P 30 / 0A1
11 2368	C..8	CAP N750MI 330P J5 63	13 14295	Q..3	TSTR BC549B N 30 / 0A1
11 1531	C..9	CAP ELPRMI 10M M5 35	13 1424	Q..4	TSTR BC338 N 25 / 0A8
11 1476	C.10	CAP ELPR 47M Z5 25	13 14311	Q..5	TSTR BC327 P 45 / 0A5
11 41031	C.11	CAP POMEFF 270K K 100	13 2918	Q..7	TSTR IXTH12N100FET 1000 / 12A
11 1714	C.12	CAP PPMEPO 8K2 J 1500	13 2952	Q..7	TSTR IXTH1349 FET 1050 / 12A
11 37141	C.13	CAP POME 15K K5 100	13 1411	Q..8	TSTR BC549C,BC239C N 30 / 0A1
11 1476	C.14	CAP ELPR 47M Z5 25	13 14182	Q..9	TSTR BC559C,BC309C P 30 / 0A1
11 2739	C.15	CAP CE MI 1K K5 63	13 1411	Q.10	TSTR BC549C,BC239C N 30 / 0A1
11 2763	C.16	CAP CE MI 10K U5 63	13 1424	Q.11	TSTR BC338 N 25 / 0A8
11 2763	C.17	CAP CE MI 10K U5 63	13 14311	Q.12	TSTR BC327 P 45 / 0A5
11 4636	C.18	CAP HV AX 50K M 1600	13 25131	Q.13	TSTR BDV65 DAR N 60 / 12A
11 1639	C.19	CAP ELRA 47M T 250	13 2945	Q.13	TSTR BDV65C DAR N 120 / 20A
11 4100	C.20	CAP POMEFF 100K K 100	13 2901	Q.15	TSTR BUZ357(-6)FET 800 / 5A
11 59201	C.25	CAP PP RA 1K5 J5 100	13 2901	Q.16	TSTR BUZ357(-6)FET 800 / 5A
11 4104	C.26	CAP POMEFF 470K K 100	13 2901	Q.18	TSTR BUZ357(-6)FET 800 / 5A
11 1775	C.27	CAP PPMEPO 5K6 J 1500	13 2901	Q.19	TSTR BUZ357(-6)FET 800 / 5A
11 1775	C.28	CAP PPMEPO 5K6 J 1500	13 2901	Q.21	TSTR BUZ357(-6)FET 800 / 5A
11 1775	C.29	CAP PPMEPO 5K6 J 1500	13 2901	Q.22	TSTR BUZ357(-6)FET 800 / 5A
11 4603	C.30	CAP POHVPO 100K M 1000	13 1411	Q.23	TSTR BC549C,BC239C N 30 / 0A1
11 2242	C.31	CAP NPO MI 100P J5 63	13 14295	Q.24	TSTR BC549B N 30 / 0A1
11 1569	C.32	CAP ELPRMI 10M M5 250	13 14311	Q.25	TSTR BC327 P 45 / 0A5
11 4799	C.33	CAP PAMERA 30M K AC300	13 2593	Q.26	TSTR BUZ74A FET N 500 / 2A
11 4160	C.34	CAP POMEFF 68K K 400	13 1411	Q.27	TSTR BC549C,BC239C N 30 / 0A1
11 3732	C.35	CAP POME 470K K5 63	13 2552	Q201	TSTR BF423 P 250 / 50
11 2739	C.36	CAP CE MI 1K K5 63	13 14295	Q202	TSTR BC549B N 30 / 0A1
11 2762	C.37	CAP CE MI 4K7 U5 63	13 14295	Q203	TSTR BC549B N 30 / 0A1
11 1500	C.39	CAP ELPRMI 47M M5 10	13 30291		TSTR MICA INSULAT TO-220
11 59161	C201	CAP PP RA 1K J5 100	13 30292		TSTR BUSH INSULAT TO-220
11 59141		CAP PP RA 820P J5 100			
13 1621	D..1	DIODE 1N4148 SWITCH	10 1160	R..1	R CF 100K J 0W25
13 1621	D..2	DIODE 1N4148 SWITCH	10 1152	R..2	R CF 22K J 0W25
13 1621	D..3	DIODE 1N4148 SWITCH	10 1156	R..3	R CF 47K J 0W25
13 1621	D..4	DIODE 1N4148 SWITCH	10 1152	R..4	R CF 22K J 0W25
13 1621	D..5	DIODE 1N4148 SWITCH	10 1112	R..5	R CF 10E J 0W25
13 1621	D..6	DIODE 1N4148 SWITCH	10 1132	R..6	R CF 470E J 0W25
13 1913	D..7	DIODE BY229-1000 1000V/7A FSR	10 3252	R..7	R MO 22K J 1W50
13 1621	D..8	DIODE 1N4148 SWITCH	10 1156	R..8	R CF 47K J 0W25
13 1907	D..9	DIODE BY584(184) 1500V/85MA R	10 11209	R..9	R CFF UL 47E J 0W25
13 1906	D.10	DIODE BYV96E	10 1162	R.10	R CF 150K J 0W25
13 1906	D.11	DIODE BYV96E	10 25561	R.11	R MF 43K G 0W25
13 1906	D.12	DIODE BYV96E	10 1148	R.12	R CF 10K J 0W25
13 1621	D.13	DIODE 1N4148 SWITCH	10 11129	R.13	R CFF UL 10E J 0W25
13 1636	D.14	DIODE BAT43,(85) SCHOTTKY	10 1120	R.14	R CF 47E J 0W25
13 1636	D.15	DIODE BAT43,(85) SCHOTTKY	10 1142	R.15	R CF 3K3 J 0W25
13 1637	D.16	DIODE BA158 SWITCH	10 1148	R.16	R CF 10K J 0W25
13 1952	D.17	DIODE BYW96E 1000V/3A FSR	10 1141	R.17	R CF 2K7 J 0W25
13 1621	D.18	DIODE 1N4148 SWITCH	10 1136	R.18	R CF 1K J 0W25
13 1621	D.20	DIODE 1N4148 SWITCH	10 1116	R.20	R CF 22E J 0W25
13 1621	D.21	DIODE 1N4148 SWITCH	10 3606	R.21	R WW H 0E33 K 4W
13 1636	D201	DIODE BAT43,(85) SCHOTTKY	10 1146	R.22	R CF 6K8 J 0W25
13 1621	D202	DIODE 1N4148 SWITCH	10 1104	R.23	R CF 2E2 J 0W25
13 1621	D203	DIODE 1N4148 SWITCH	10 1164	R.25	R CF 220K J 0W25
13 1662	DLED	DIODE CQY54-A3 LED D3 RED	10 1152	R.26	R CF 22K J 0W25
13 4114	I..1	IC 393 DUAL VOLT COMP	10 1148	R.27	R CF 10K J 0W25
13 73945	I..2	IC 4093B QUAD 2I NAND S TRIG	10 1152	R.28	R CF 22K J 0W25
77 4154	L..1	COIL CHOKE HOR DATA HR45	10 1160	R.29	R CF 100K J 0W25
			10 1156	R.30	R CF 47K J 0W25

HOR + EHT MODULE

76 12637

ITEM NO.	SIT.	DESCRIPTION	ITEM NO.	SIT.	DESCRIPTION
10 1144	R.31	R CF 4K7 J 0W25	10 1150	R207	R CF 15K J 0W25
10 4674	R.32	R HV 6M8 J 0W50	10 1154	R208	R CF 33K J 0W25
10 1152	R.33	R CF 22K J 0W25	77 4128	T..1	TRANSF PJ 45 EHT DATA HR
10 11575	R.34	R MF 51E F 0W25	77 4129	T..2	TRANSF PJ 45 HOR DEFL DATA HR
10 1129	R.35	R CF 270E J 0W25	13 2102	Z..1	IC 33B ZTK 33V STABILIZER
10 1124	R.36	R CF 100E J 0W25	13 1745	Z..2	DIODE ZENER 18V 1W1 C
10 1139	R.37	R CF 1K8 J 0W25	13 1730	Z..3	DIODE ZENER 20V 0W5 C
10 1130	R.50	R CF 330E J 0W25	13 1734	Z..4	DIODE ZENER 5V6 0W5 B
10 1166	R.51	R CF 330K J 0W25	13 1730	Z..5	DIODE ZENER 20V 0W5 C
10 1168	R.52	R CF 470K J 0W25	13 1791	Z..6	DIODE ZENER 6V2 0W5 B
10 1139	R.53	R CF 1K8 J 0W25	13 1730	Z..7	DIODE ZENER 20V 0W5 C
10 1118	R.54	R CF 33E J 0W25	13 1790	Z.16	DIODE ZENER 33V 1W C
10 1116	R.56	R CF 22E J 0W25	13 1730	Z.17	DIODE ZENER 20V 0W5 C
10 1116	R.57	R CF 22E J 0W25	31 53151		CONN RIVET MBT D 2,3 L13
10 1116	R.59	R CF 22E J 0W25	36 7413		RIVET EYE D3,2 L7,2
10 1116	R.60	R CF 22E J 0W25	31 3525	001.	CONN EURO MBS P64
10 1116	R.62	R CF 22E J 0W25	31 3531	0010	CONN EURO MBS P64 KEY
10 1116	R.63	R CF 22E J 0W25	36 7699	0011	RIVET CHOBERT D2,38 L6,35
10 1136	R.64	R CF 1K J 0W25	80 1297Y	002.	HEATSINK PJ 45 HOR EHT BUZ310
10 11008	R.65	R CFF 1E J 0W25	80 0256	0021	SPACER ISO L10 D9,75D6,5PTFE
10 4690	R.66	R HV 33M J 0W50	13 3064	0022	TSTR MICA INSULAT SOT-93
10 1148	R.70	R CF 10K J 0W25	80 1397	0023	ISOL PJ 45 HOR FIX HEATSINK 00
10 3158	R.71	R MO 68K J 0W70	36 20256	0024	SCREW DIN84 M 3 X16 MP-
10 3636	R.72	R WW H 100E J 4W	80 1360X	0025	NUT SC + WASHER M3 FIX TSTR
10 11209	R.74	R CFF UL 47E J 0W25	36 20276	0026	SCREW DIN84 M 3 X20 MP-
10 1152	R.80	R CF 22K J 0W25	36 20256	0027	SCREW DIN84 M 3 X16 MP-
10 1136	R.81	R CF 1K J 0W25	80 1324	003.	HEATSINK PJ 45 HOR HR FIX
10 1147	R.82	R CF 8K2 J 0W25	36 20226	0031	SCREW DIN84 M 3 X8 MP-
10 1143	R.83	R CF 3K9 J 0W25	36 7502	0032	WASHER DIN6798 A 3,2
10 1160	R.84	R CF 100K J 0W25	80 1341	004.	HEATSINK PJ 45 HOR EHT BDX65
10 1147	R.85	R CF 8K2 J 0W25	80 1282	0041	SPACER ISO L 5 D9,75D6,9PTFE
10 1152	R.86	R CF 22K J 0W25	80 1282	0042	SPACER ISO L 5 D9,75D6,9PTFE
10 1142	R.87	R CF 3K3 J 0W25	13 3008	0043	TSTR MICA INSULAT TO-3
10 1144	R.88	R CF 4K7 J 0W25	13 3064	0043	TSTR MICA INSULAT SOT-93
10 1156	R.89	R CF 47K J 0W25	36 20246	0044	SCREW DIN84 M 3 X12 MP-
10 1156	R.90	R CF 47K J 0W25	80 0354X	0045	WASHER DIA 3,25X 7,5 T, MS
10 1144	R.91	R CF 4K7 J 0W25	31 5331	0046	SOLDERLUG SCREW 1TAG D3.2 L12
10 1152	R.92	R CF 22K J 0W25	36 7502	0047	WASHER DIN6798 A 3,2
10 1148	R.93	R CF 10K J 0W25	36 61026	0048	NUT DIN934 M 3 HEXAGON
10 1148	R.94	R CF 10K J 0W25	36 7502	0049	WASHER DIN6798 A 3,2
10 1144	R.95	R CF 4K7 J 0W25	80 0354X	0050	WASHER DIA 3,25X 7,5 T, MS
10 1235	R.96	R CF 820E J 0W50	72 1850	006.	CLIPS PROTECTION TRIMPOT CEMH
10 1152	R.97	R CF 22K J 0W25	31 3220	007.	RES WW V HOLDER H10
10 4430	R.98	R WW V 270E K 11W	80 12922	008.	HEATSINK SC TO220 AL
10 1116	R.99	R CF 22E J 0W25	36 20226	0081	SCREW DIN84 M 3 X8 MP-
10 11369	R100	R CFF UL 1K J 0W25	36 7502	0082	WASHER DIN6798 A 3,2
10 1148	R101	R CF 10K J 0W25	36 61026	0083	NUT DIN934 M 3 HEXAGON
10 1151	R102	R CF 18K J 0W25	13 3029	0084	TSTR SET INSULAT TO-220
10 1136	R201	R CF 1K J 0W25	13 3039	009.	SPACER L8 D4 D1,2 CER
10 1156	R202	R CF 47K J 0W25	59 0223	0109	LABEL PJ EHT ARROW 9KV
10 1143	R203	R CF 3K9 J 0W25			
10 1148	R204	R CF 10K J 0W25			
10 1143	R205	R CF 3K9 J 0W25			
10 1140	R206	R CF 2K2 J 0W25			

HOR + EHT MODULE

76 12637

ART NO.	DESCRIPTION	QUANTITY	ART NO.	DESCRIPTION	QUANTITY
10 11008	R CFF 1E J 0W25	1	13 2901	TSTR BUZ357(-6)FET 800 / 5A	6
10 11129	R CFF UL 10E J 0W25	1	13 2918	TSTR IXTH12N100FET 1000 /12A	1
10 11209	R CFF UL 47E J 0W25	2	13 2945	TSTR BDV65C DAR N 120 /20A	1
10 11369	R CFF UL 1K J 0W25	1	13 2952	TSTR IXTH1349 FET 1050 /12A	1
10 3158	R MO 68K J 0W70	1	13 3008	TSTR MICA INSULAT TO-3	1
10 3252	R MO 22K J 1W50	1	13 3029	TSTR SET INSULAT TO-220	1
10 3606	R WW H 0E33 K 4W	1	13 30291	TSTR MICA INSULAT TO-220	1
10 3636	R WW H 100E J 4W	2	13 30292	TSTR BUSH INSULAT TO-220	1
10 4430	R WW V 270E K 11W	1	13 3039	SPACER L 8 D 4 D1,2 CER	6
10 4674	R HV 6M8 J 0W50	1	13 3064	TSTR MICA INSULAT SOT-93	8
10 4690	R HV 33M J 0W50	1	13 4114	IC 393 DUAL VOLT COMP	1
10 6736	RT CEMH 500K K 0W50	1	13 73945	IC 4093B QUAD 2I NAND S TRIG	1
10 6833	RT CEMV 100K K 0W50	1			
10 6834	RT CEMV 200K K 0W50	1	31 3220	RES WW V HOLDER H10	1
			31 3525	CONN EURO MBS P64	1
11 1569	CAP ELPRMI 10M M5 250	1	31 3531	CONN EURO MBS P64 KEY	1
11 1639	CAP ELRA 47M T 250	1	31 53151	CONN RIVET MBT D 2,3 L13	4
11 1714	CAP PPMEPO 8K2 J 1500	1	31 5331	SOLDERLUG SCREW 1TAG D3.2 L12	1
11 1775	CAP PPMEPO 5K6 J 1500	3			
11 4160	CAP POMEFF 68K K 400	1	36 20226	SCREW DIN84 M 3 X 8 MP-	6
11 4603	CAP POHVPO 100K M 1000	1	36 20246	SCREW DIN84 M 3 X12 MP-	2
11 4636	CAP HV AX 50K M 1600	1	36 20256	SCREW DIN84 M 3 X16 MP-	6
11 4799	CAP PAMERA 30M K AC300	1	36 20276	SCREW DIN84 M 3 X20 MP-	1
			36 61026	NUT DIN934 M 3 HEXAGON	3
13 1411	TSTR BC549C,BC239C N 30 / 0A1	4	36 7413	RIVET EYE D3,2 L7,2	1
13 14182	TSTR BC559C,BC309C P 30 / 0A1	2	36 7502	WASHER DIN6798 A 3,2	7
13 1424	TSTR BC338 N 25 / 0A8	2	36 7699	RIVET CHOBERT D2,38 L6,35	4
13 14295	TSTR BC549B N 30 / 0A1	4			
13 14311	TSTR BC327 P 45 / 0A5	3	59 0223	LABEL PJ EHT ARROW 9KV	1
13 1621	DIODE 1N4148 SWITCH	14			
13 1636	DIODE BAT43,(85) SCHOTTKY	3	72 1850	CLIPS PROTECTION TRIMPOT CEMH	2
13 1637	DIODE BA158 SWITCH	1			
13 1662	DIODE CQY54-A3 LED D3 RED	2	77 4128	TRANSF PJ 45 EHT DATA HR	1
13 1730	DIODE ZENER 20V 0W5 C	4	77 4129	TRANSF PJ 45 HOR DEFL DATA HR	1
13 1734	DIODE ZENER 5V6 0W5 B	1	77 4153	COIL LIN PJ 45 HOR DATA HR45	1
13 1745	DIODE ZENER 18V 1W1 C	1	77 4154	COIL CHOKE HOR DATA HR45	1
13 1790	DIODE ZENER 33V 1W C	1			
13 1791	DIODE ZENER 6V2 0W5 B	1	80 0256	SPACER ISO L10 D9,75D6,5PTFE	7
13 1906	DIODE BYV96E	3	80 0354X	WASHER DIA 3,25X 7,5 T, MS	9
13 1907	DIODE BY584(184) 1500V/85MA R	1	80 1282	SPACER ISO L 5 D9,75D6,9PTFE	2
13 1913	DIODE BY229-1000 1000V/7A FSR	1	80 12922	HEATSINK SC TO220 AL	1
13 1952	DIODE BYW96E 1000V/3A FSR	1	80 1297Y	HEATSINK PJ 45 HOR EHT BUZ310	1
13 2102	IC 33B ZTK 33V STABILIZER	1	80 1324	HEATSINK PJ 45 HOR HR FIX	1
13 25131	TSTR BDX65 DAR N 60 /12A	1	80 1341	HEATSINK PJ 45 HOR EHT BDX65	1
13 2552	TSTR BF423 P 250 / 50	1	80 1360X	NUT SC + WASHER M3 FIX TSTR	7
13 2590	TSTR BC560B P 45 / 0A1	1	80 1397	ISOL PJ 45 HOR FIX HEATSINK 00	1
13 2593	TSTR BUZ74A FET N 500 / 2A	1			

