



BARCO Projection Systems

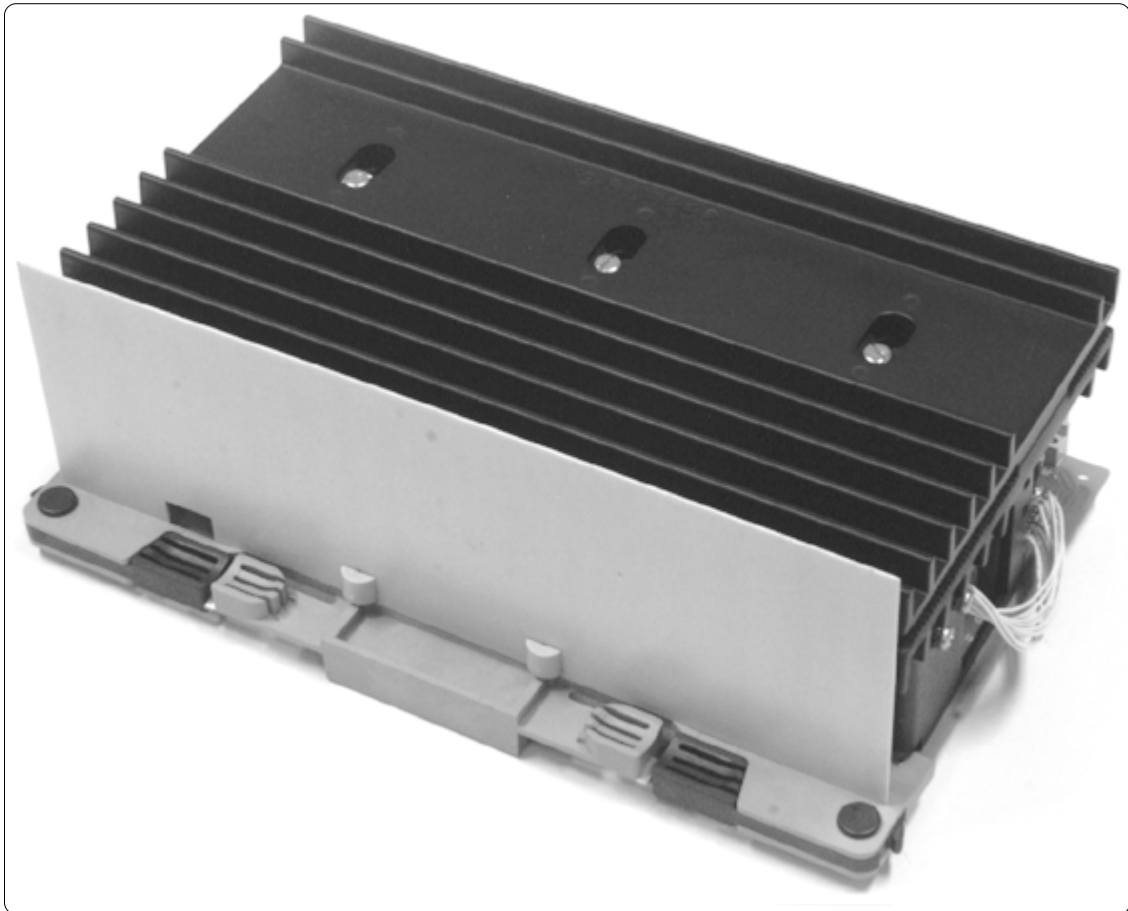
SECTION **E**

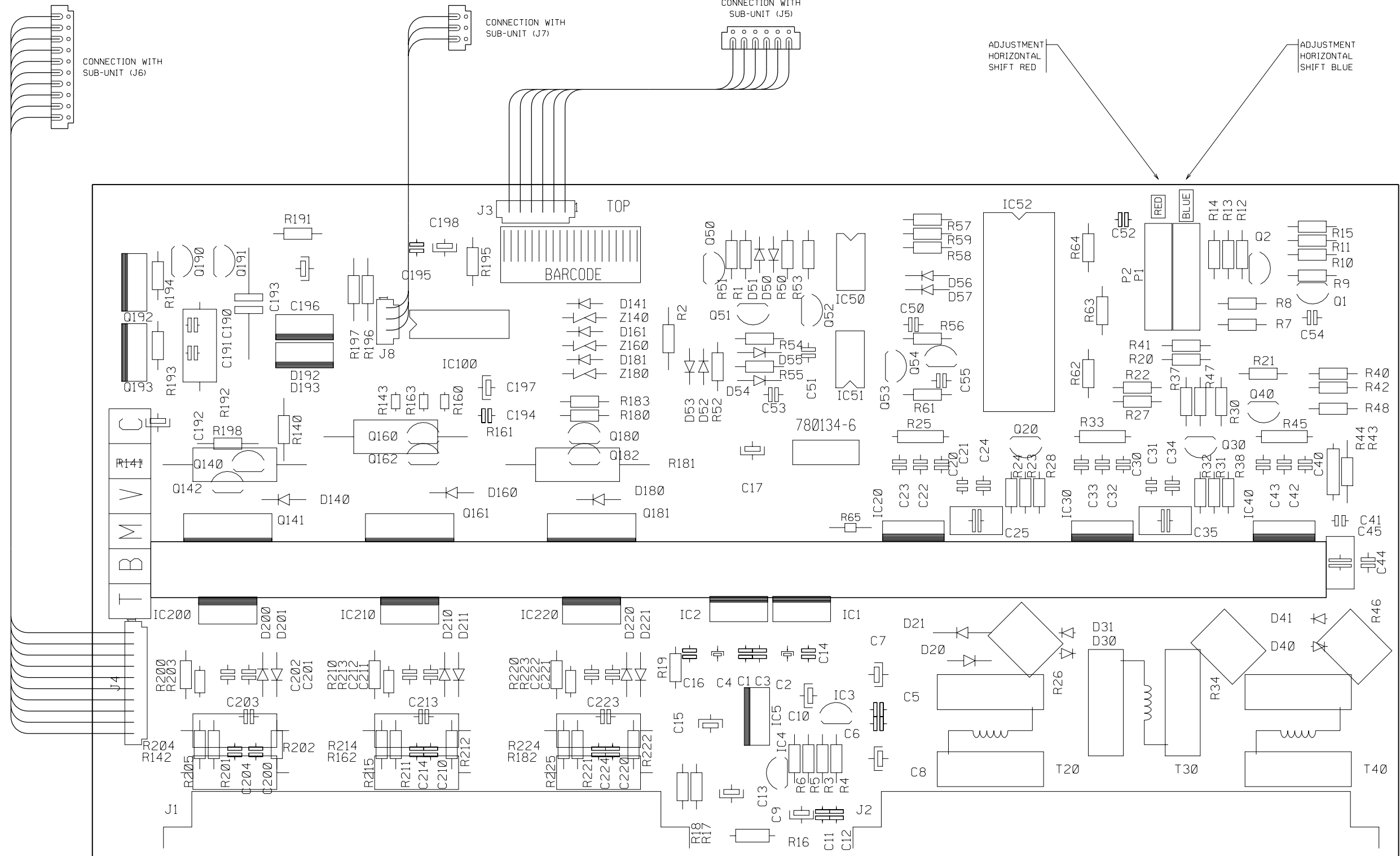
service sheet

Electromagnetic Focus+Hor Shift

Sub module

R762271
R762271S

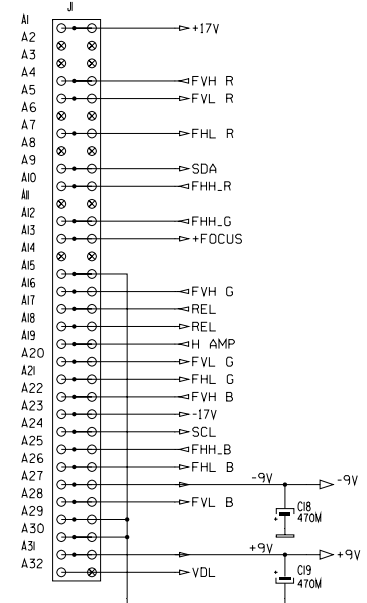




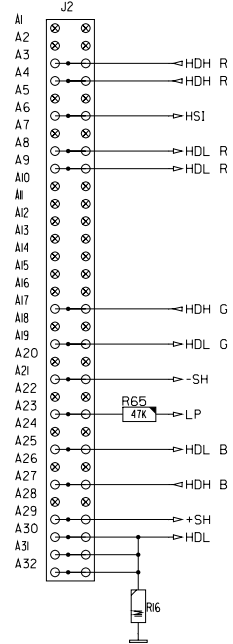
Modifications reserved

Name MAG. FOCUS + HOR. SHIFT			Sheet 1 / 1	
Module No R762271		Index 3	PCB No R780134	Rev 6
Date 04-03-1998		Drawn JVDY	Checked WBU	
BARCO PROJECTION SYSTEMS				

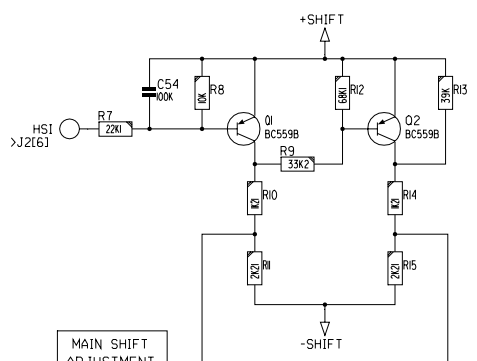
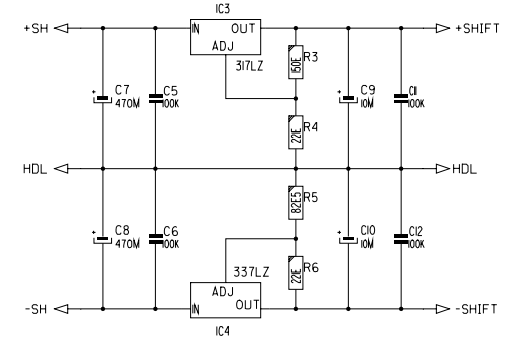
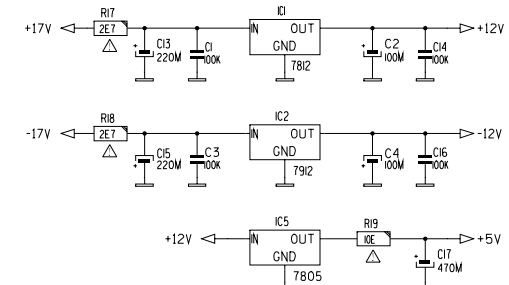
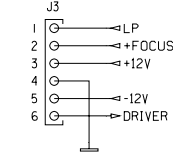
TO FRAME (J2B)



TO FRAME (J2A)

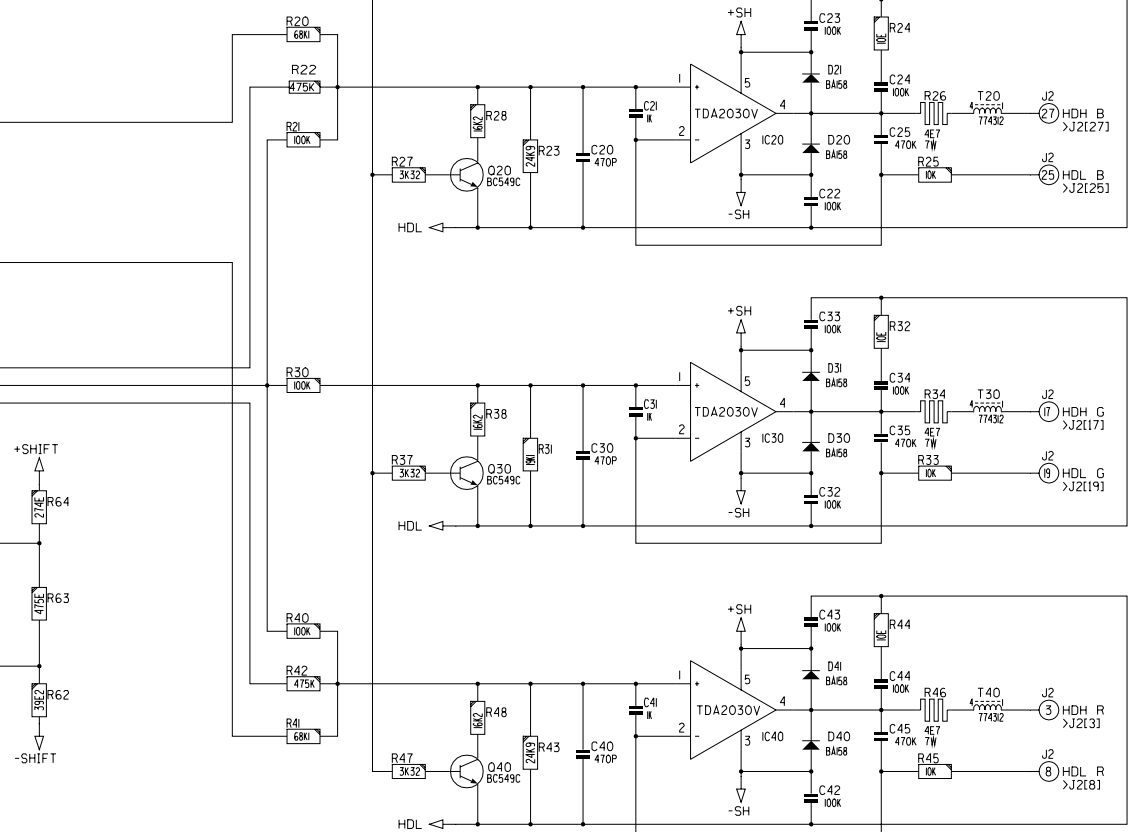
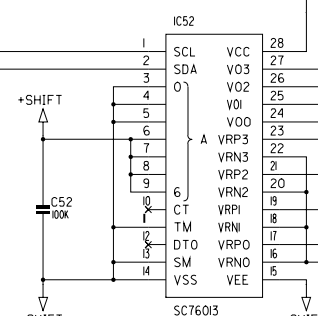


TO SUB-UNIT (J5)



MAIN SHIFT ADJUSTMENT BLUE

MAIN SHIFT ADJUSTMENT RED

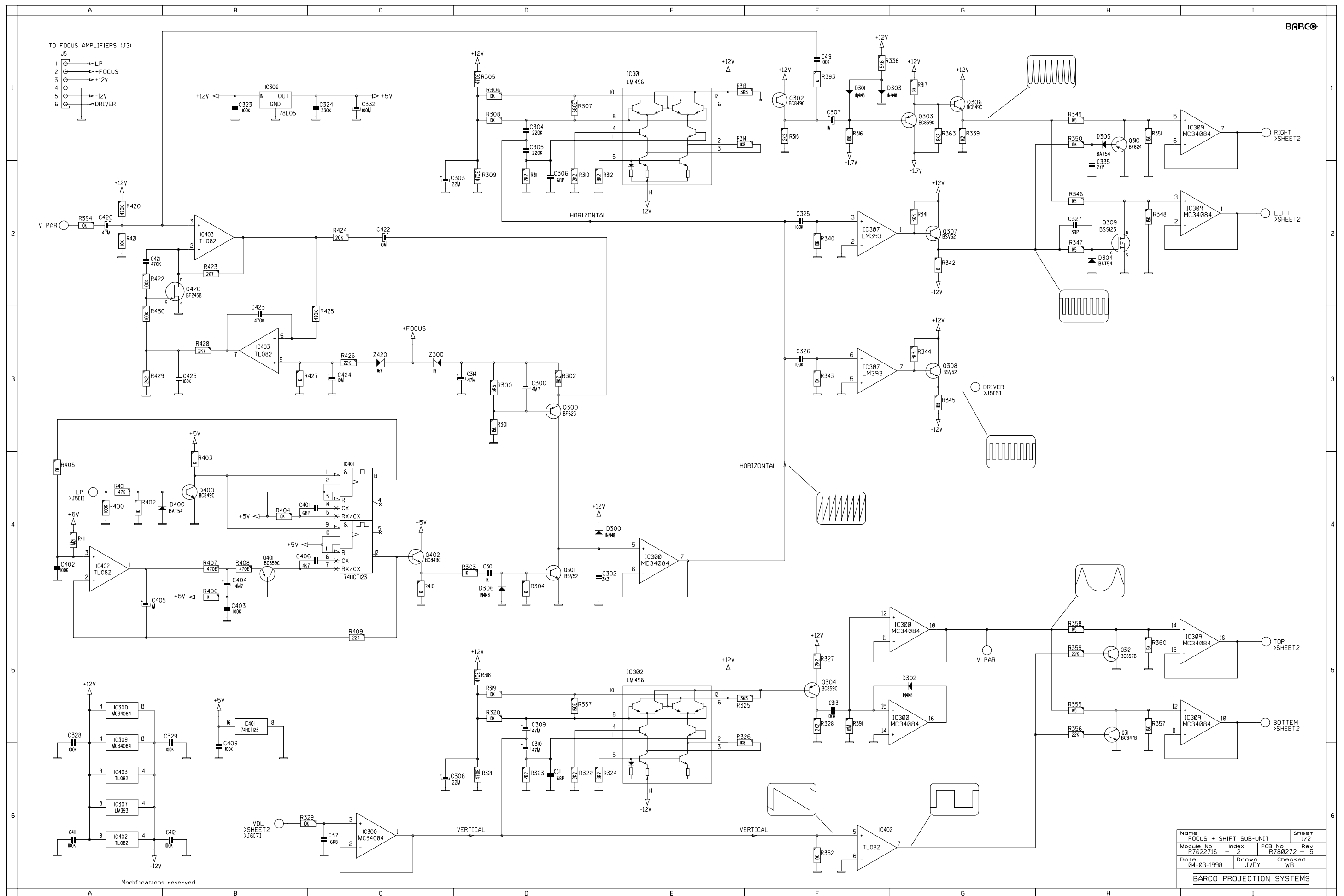


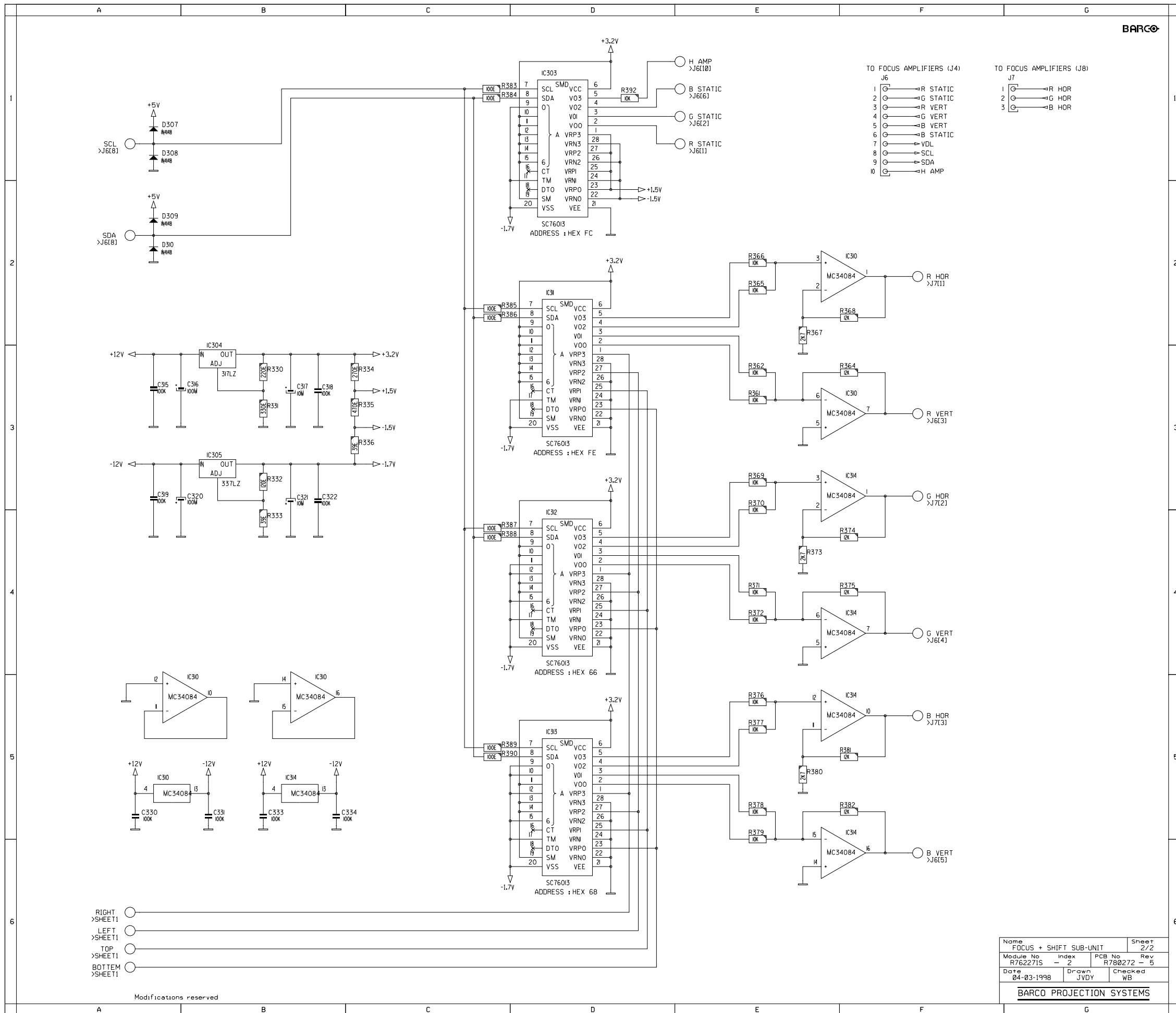
PRODUCT SAFETY NOTICE
COMPONENTS MARKED WITH * OR Δ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS. DO NOT DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

Name	FOCUS + SHIFT	Sheet	1/2
Module No	R762271	Index	3
PCB No	R780134	Rev	6
Date	27-10-1997	Drawn	JVDY
Checked	WB		

BARCO PROJECTION SYSTEMS

Modifications reserved





COMP.	LOC.	SHT.	COMP.	LOC.	SHT.
C300	D 3	1	R313	E 1	1
C301	D 4	1	R314	E 1	1
C302	E 4	1	R315	F 1	1
C303	C 2	1	R316	F 1	1
C304	D 1	1	R317	G 1	1
C305	D 1	1	R318	D 5	1
C306	D 2	1	R319	D 5	1
C307	F 1	1	R320	D 5	1
C308	C 6	1	R321	D 6	1
C309	D 5	1	R322	D 6	1
C310	D 5	1	R323	D 6	1
C311	D 6	1	R324	D 6	1
C312	D 6	1	R325	D 6	1
C313	F 5	1	R326	E 5	1
C314	D 3	1	R327	F 5	1
C315	A 3	1	R328	F 5	1
C316	B 3	1	R329	B 3	1
C317	B 3	1	R330	B 3	1
C318	B 3	1	R331	B 3	1
C319	A 3	1	R332	B 3	1
C320	B 3	1	R333	B 3	1
C321	B 3	1	R334	B 3	1
C322	B 3	1	R335	C 3	1
C323	B 1	1	R336	C 3	1
C324	C 1	1	R337	D 5	1
C325	C 2	1	R338	D 5	1
C326	F 3	1	R339	G 1	1
C327	H 2	1	R340	H 2	1
C328	A 5	1	R341	A 5	1
C329	B 5	1	R342	C 2	1
C330	A 5	1	R343	F 3	1
C331	B 5	1	R344	G 3	1
C332	C 1	1	R345	C 3	1
C333	B 5	1	R346	H 2	1
C334	B 5	1	R347	H 2	1
C335	H 1	1	R348	H 2	1
C401	B 4	1	R349	H 1	1
C402	A 4	1	R350	H 1	1
C403	B 5	1	R351	H 1	1
C404	B 4	1	R352	F 6	1
C405	A 5	1	R353	D 3	1
C406	B 4	1	R354	D 3	1
C409	B 5	1	R355	H 1	1
C411	A 5	1	R356	H 1	1
C412	B 6	1	R357	H 5	1
C419	F 1	1	R358	H 5	1
C420	A 2	1	R359	H 5	1
C421	A 2	1	R360	H 5	1
C422	C 2	1	R361	E 3	1
C423	B 2	1	R362	E 3	1
C424	C 3	1	R363	C 1	1
C425	B 3	1	R364	B 3	1
D300	E 4	1	R365	B 3	1
D301	F 1	1	R366	E 5	1
D302	G 5	1	R367	E 5	1
D303	F 1	1	R368	E 5	1
D304	H 2	1	R369	E 5	1
D305	H 1	1	R370	E 5	1
D306	D 4	1	R371	E 4	1
D307	A 1	1	R372	E 4	1
D308	A 1	1	R373	E 4	1
D309	A 2	1	R374	F 4	1
D310	A 2	1	R375	F 4	1
D400	B 4	1	R376	E 5	1
IC300	E 4	1	R377	E 5	1
IC301	G 5	1	R378	E 5	1
IC302	G 5	1	R379	E 5	1
IC303	C 6	1	R380	E 5	1
IC304	C 6	1	R381	E 5	1
IC305	E 5	1	R382	C 1	1
IC306	E 5	1	R383	C 1	1
IC307	D 1	1	R384	C 1	1
IC308	D 1	1	R385	C 2	1
IC309	B 3	1	R386	C 2	1
IC310	B 3	1	R387	C 2	1
IC311	B 3	1	R388	C 2	1
IC312	B 3	1	R389	C 2	1
IC313	B 3	1	R390	C 2	1
IC314	B 3	1	R391	C 2	1
IC315	B 3	1	R392	D 1	1
IC316	B 3	1	R393	F 1	1
IC317	B 3	1	R394	A 2	1
IC318	B 3	1	R400	A 4	1
IC319	B 3	1	R401	A 4	1
IC320	B 3	1	R402	A 4	1
IC321	B 3	1	R403	B 4	1
IC322	B 3	1	R404	B 4	1
IC323	B 3	1	R405	B 4	1
IC324	B 3	1	R406	B 4	1
IC325	B 3	1	R407	B 4	1
IC326	B 3	1	R408	B 4	1
IC327	B 3	1	R409	C 4	1
IC328	B 3	1	R410	C 4	1
IC329	B 3	1	R411	A 4	1
IC330	B 3	1	R420	A 2	1
IC331	B 3	1	R421	A 2	1
IC332	B 3	1	R422	A 2	1
IC333	B 3	1	R423	B 2	1
IC334	B 3	1	R424	B 2	1
IC335	B 3	1	R425	C 3	1
IC336	B 3	1	R426	C 3	1
IC337	B 3	1	R427	B 3	1
IC338	B 3	1	R428	B 3	1
IC339	B 3	1	R429	A 3	1
IC340	B 3	1	R430	A 3	1
IC341	B 3	1	Z300	C 3	1
IC342	B 3	1	Z420	C 3	1
J5	A 1	1			
J6	F 1	2			
J7	G 1	2			
O300	D 3	1			
O301	D 4	1			
O302	F 1	1			
O303	G 1	1			
O304	F 5	1			
O305	G 1	1			
O306	G 2	1			
O307	G 2	1			
O308	G 3	1			
O309	H 2	1			
O310	H 1	1			
O311	H 5	1			
O312	H 5	1			
O400	B 4	1			
O401	B 4	1			
O402	C 4	1			
O420	B 2	1			
R300	D 3	1			
R301	D 3	1			
R302	D 3	1			
R303	D 4	1			
R304	D 4	1			
R305	D 1	1			
R306	D 1	1			
R307	D 1	1			
R308	D 1	1			
R309	D 1	1			
R310	D 2	1			
R311	D 2	1			
R312	E 2	1			

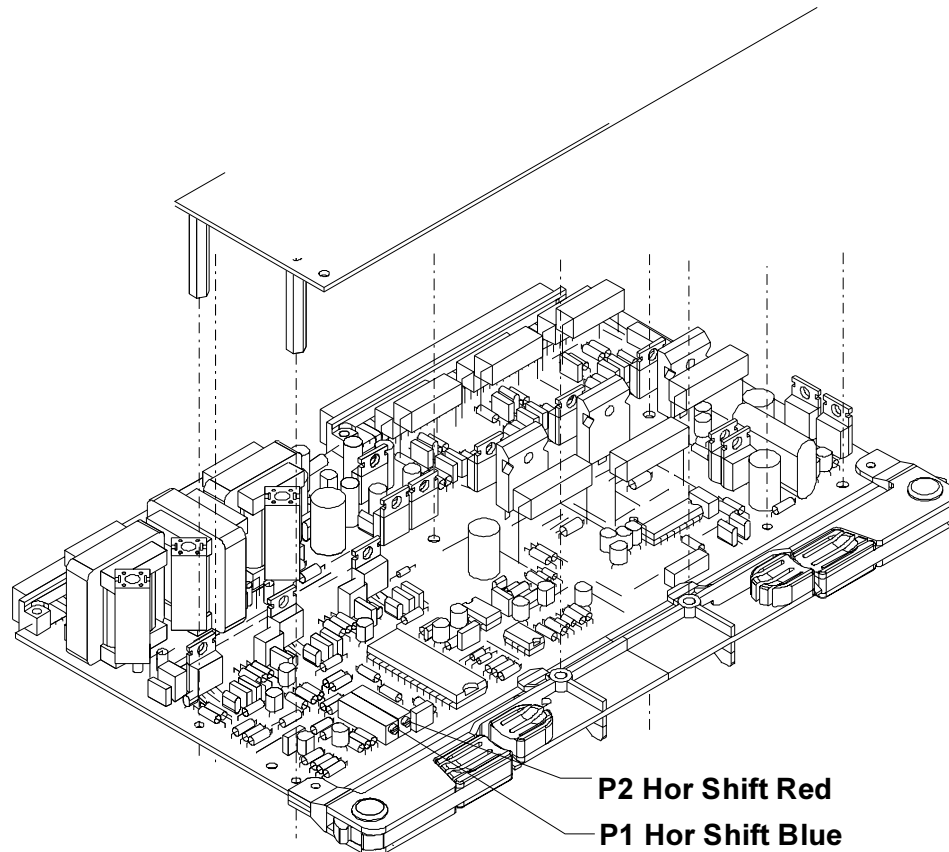
Name FOCUS + SHIFT SUB-UNIT		Sheet 2/2	
Module No. R7622715	Index - 2	PCB No. R780272	Rev - 5
Date 04-03-1998	Drawn JVDY	Checked WB	
BARCO PROJECTION SYSTEMS			

Adjustment procedure "MAGNETICAL FOCUS+SHIFT"

Introduction

The following adjustments are provided on the **main module**:

Horizontal SHIFT adjustment for RED - P2 and BLUE - P1 image



Adjustments

Horizontal SHIFT adjustment for RED and BLUE image

Note: the mentioned adjustments are Horizontal shift 'course' adjustments for the Red and Blue picture tube.

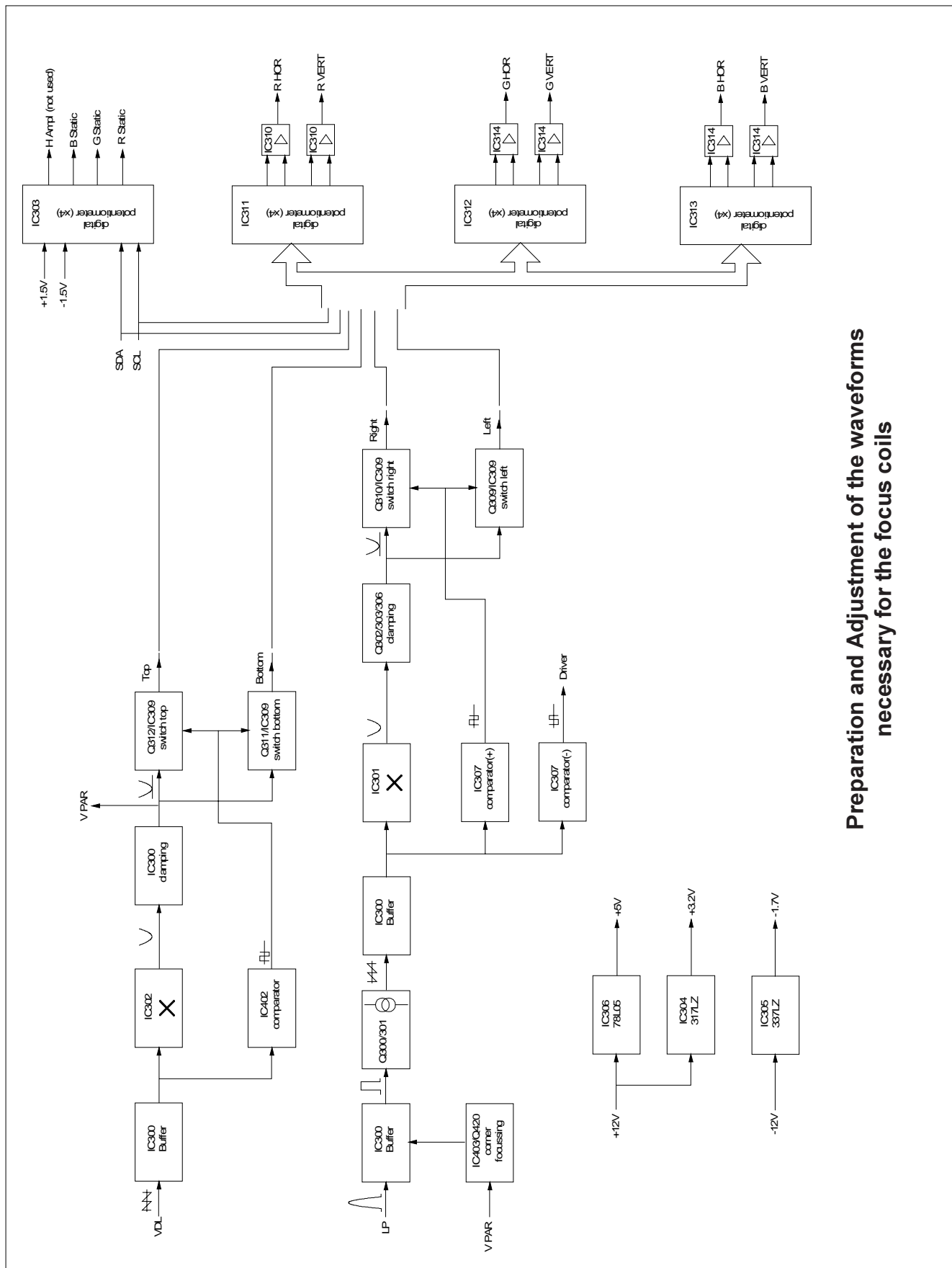
Preparation

Adjust the Horizontal raster centering controls for Red and Blue in their mid position by means of the Remote Control Unit. The numeric indicator under the respective bar scale indicates 50.

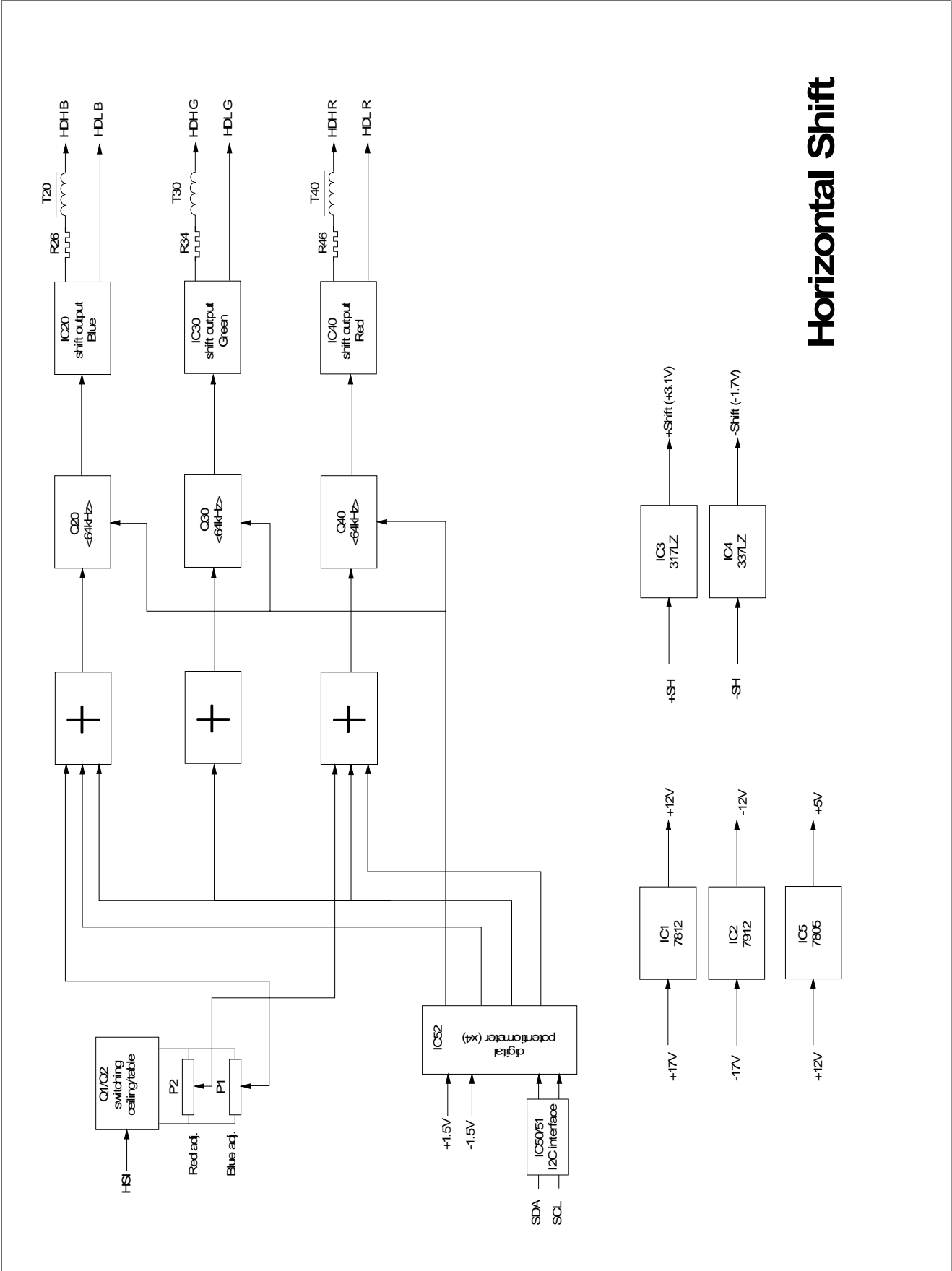
(Refer to the Owner's manual of the projector - Guided or Random adjustment mode).

Alignment

Use the Horizontal shift controls P2 for RED and P1 for BLUE to shift horizontally the Red and Blue image until the center coincides with the center of the Green image.

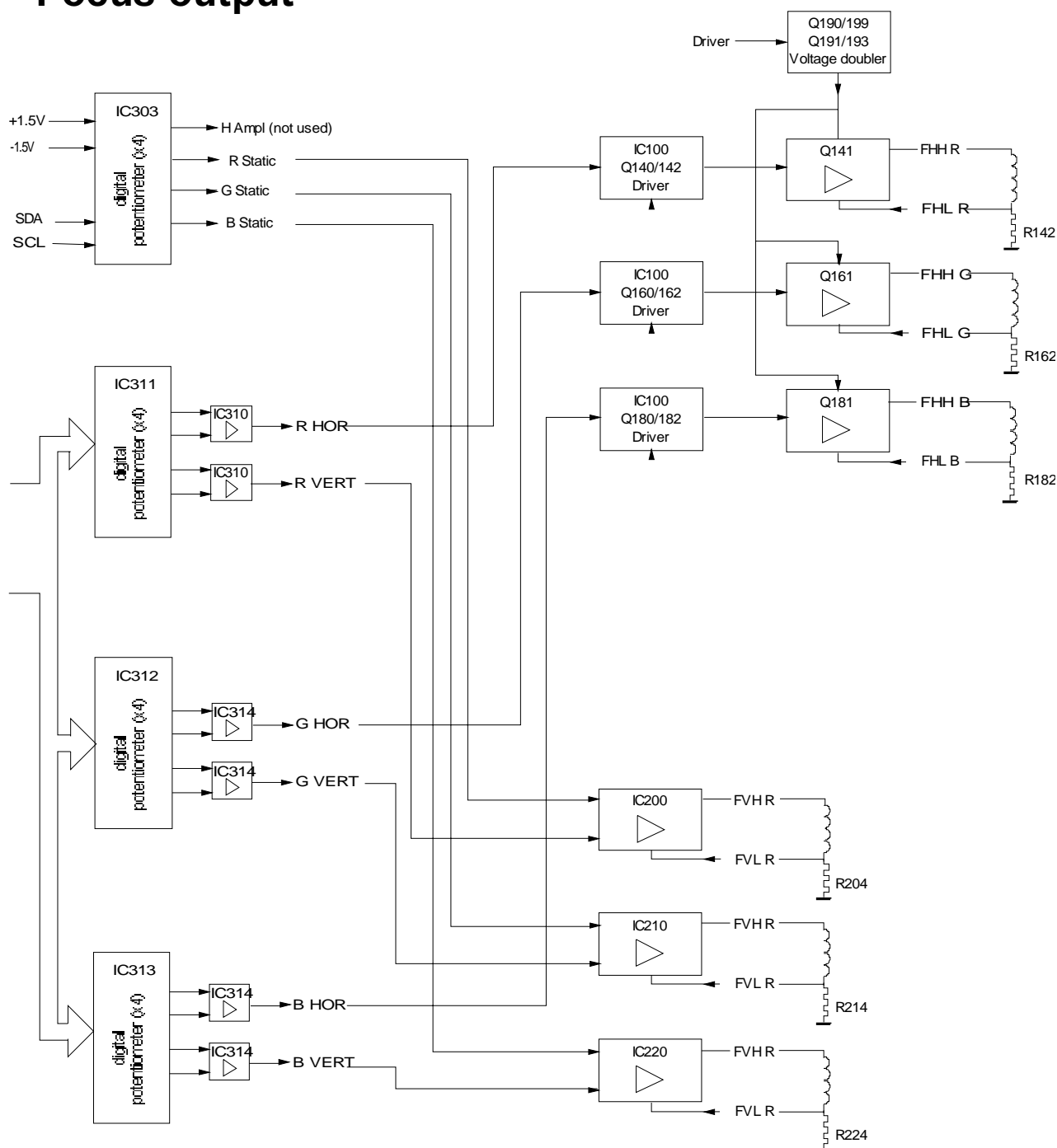


Preparation and Adjustment of the waveforms
necessary for the focus coils



Horizontal Shift

Focus output



TECHNICAL DESCRIPTION “FOCUS - SHIFT”

Introduction.

Two completely independent functions are performed on this board and its subunit, the electromagnetic focus and the horizontal shift.

On the main board we find the Horizontal shift circuits and the power stages to drive the focus coils.

The preparation and adjustment of the waveforms necessary for the focus coils are accomplished on the sub-unit.

To obtain an independent left/right and top/bottom adjustment of the electromagnetic focus, the waveforms are clamped during one half of a scan period.

A. Electromagnetic Focus principle.

In this form of focusing, a strong magnetic field produced by an electromagnet or a permanent magnet mounted behind the yoke on the neck of the CRT forces divergent electrons to take a helical (coil-like) path to reach the CRT faceplate. The helical path is usually only one turn long. With the proper magnetic field strength oppositely divergent electrons will move forward along coil-like paths that rotate in opposite directions and meet at the phosphor screen, thereby bringing the electrons together again to form a small spot.

a) At line frequency :

A sawtooth generator is built around Q300 / 301. C302 charges up via the variable (line tracked) current generator Q300, and discharges via Q301 when a horizontal pulse is sent to its base. This pulse starts slightly before the end of the horizontal scan in order to obtain sufficient energy at the start of the horizontal scanning. The trigger pulse is generated in two steps by the two monoflops of IC401. By an integration (= averaging) of the pulse train at the output pin 13, an automatic tracking of the trigger moment with the line frequency is got.

C302 then charges, and its rate of charge is determined by the condition of the current generator Q300. Q300 is supplied with the **+ FOCUS** voltage from the SMPS, which is in some way proportional to the line frequency. A vertical parabola is added to this charging current via C422.

Because of this, a tracking of the amplitude sawtooth signal with the line and vertical frequencies is developed.

The sawtooth signal is now applied to :

- a multiplier IC301 in order to generate a symmetrical parabolic waveform, regardless of the line frequency.
- a level detector in IC307 pins 3, 2 and 1 to produce a left-right squarewave which is buffered by Q307 and feeds the switchers-clampers Q309 and Q310 with a correct DC level (note that Q307 is supplied with + / - 12 volts).
- the inverting input of another level detector of IC307, pin 6, to produce a left-right squarewave (DRIVER) opposite in phase to the one on pin 1 of IC307. This squarewave is used on the main board to boost up the supply voltage of the line power amplifiers during the second half of the horizontal scan (see further).

The parabolic signal from the multiplier, IC301 is buffered with Q302, clamped and buffered. The signal then goes to the non-inverting inputs of two voltage-followers in IC309 (MC34084).

Obviously, the clamper Q310 shorts to ground the parabolic waveform, during the first half of the horizontal scan, and Q309 shorts the signal during the second half of scan.

The buffered signals are now adjusted in amplitude with IC311, IC312 and IC313 for the three colours. The outputs are summed and sent to the power amplifiers on a suitable level.

b) At vertical frequency :

The vertical sawtooth "VDL" is DC coupled to a buffer IC308 pin 3 and then applied to :

- the multiplier IC302 to generate a vertical parabola.
The parabola is inverted with Q304, clamped, buffered, and feeds two buffers in IC309.
- a level detector IC308 input, pin 5, to produce a top-bottom squarewave. The output is buffered and feeds the clammers Q311 / Q312 with a correct DC level for grounding the input at either the top or bottom half of the raster.

The two remaining potentiometers of IC311, IC312, IC313 are used to adjust the top / bottom waveforms which are again summed and leave the subunit to be amplified by the power amplifiers on the main board.

c) Static or average focus (centre focus).

Three voltages **R STATIC** , **G STATIC** and **B STATIC**, adjustable between + / - 1.5 volts with potentiometers in IC303 are added to the feedback of the vertical focus power amplifiers.

d) Power amplifiers :

1. CORNER - H.

The left / right adjusted waveforms, summed on the subunit IC309 output, are now amplified to generate the required magnetic field for focusing of the beam during the horizontal scan. Because of the high scanning range, a good slew rate of these amplifiers is necessary. This is especially critical during the second part of the horizontal scan. This can be realised by boosting up the supply voltage during this time.

This boosting up of the +FOC voltage is got with the circuit around Q190 - 193. The squarewave drives the push-pull stage Q190 / Q191, which on its turn drives the MOSFETs Q192 - Q193. The +FOC voltage is boosted up during the second part of the horizontal scan and is now referred to as **+V[DYN]**.

Three identical amplifier stages with feedback to the inverting input of the OPAMPs in IC100, deliver the required current to the horizontal focus coils.

2. CORNER - V / STATIC.

Since the vertical scanning frequencies are much lower than the horizontal frequencies, a TDA2030 may be used. For stability reasons, a similar feedback voltage is applied on the inverting input, together with a DC-voltage (=static, for the centre).

B. Horizontal SHIFT

The +/- SHIFT voltages are not returned to chassis ground, but to the HDL (Horizontal Deflection Low, which is basically HTHD). Therefore, the adjusted shift voltages may not be referenced to chassis ground, but to the same HDL.

The digital potentiometer IC (IC52) has to be supplied with the +/- SHIFT voltages from the SMPS.

The I2C-bus lines SDA and SCL must drive the above-mentioned chip via an isolation circuit, using an opto-coupler.

The opto-coupler IC50 is used to isolate the SDA and SCL lines, referenced to a cold (chassis) ground, from the shift circuits in IC52.

The SCL pulses are sent to pin 1 of IC52 via an opto-coupler in IC50, whereas the SDA data line is connected with pin 2 through the other opto-coupler in IC50.

At the moment an "Acknowledgment" bit is returned to the Controller, another opto-coupler IC51 takes over. To avoid a return to IC52 via the first opto-coupler, MOSFETs are automatically switched on and off.

The HSI (Horizontal Scan Identification) information from one of the horizontal scan switches on the "Scan Switching" module, allows an inversion of the supply voltages for the multiturn potentiometers P1 and P2. These potentiometers are the factory set *coarse alignments* of the shift, to be adjusted prior to the digital control.

The SHIFT voltages control an average DC current through the horizontal yoke windings in order to horizontally shift the rasters.

Electromagnetic Focus+Hor Shift

Sub module

R762271
R762271S

Parts listing 76 2271 CPL

SIT.	ITEM NO.	DESCRIPTION	QUANTITY	SIT.	ITEM NO.	DESCRIPTION	QUANTITY
	R762271S	UN M_F+SH PJ51 G1200 VH/P	1	C 34	R113724	C POMERA 100N K 63E2	
130	R133039	SPR L 8 D 4 D 1.2 C	28	C 35	R113732	C POMERA 470N K 63E2	
10	R133063	Q ACC ISO MICA SOT93	14	C 40	R112735	C CE MI 470P K100E2	
310	R3153151	J RVT MBT D 2.3L13	6	C 41	R112739	C CE MI 1N K100E2	
	R348320	CDSLDRLUG D3,240	1	C 42	R113724	C POMERA 100N K 63E2	
	R34840313	CD CT FTMT P 3 90	1	C 43	R113724	C POMERA 100N K 63E2	
	R34840612	CD CT FTMT P 6 80	1	C 44	R113724	C POMERA 100N K 63E2	
	R3484100	CD CT FTMT P10 110	1	C 45	R113732	C POMERA 470N K 63E2	
60	R3620127	SCR D84 M 2.5X 6 SI	6	C 50	R113724	C POMERA 100N K 63E2	
70	R3626726	SCR D921 M 3 X 16 SI	3	C 51	R113724	C POMERA 100N K 63E2	
50	R3631049	SCR D933 M 3 X 6 XIC	1	C 52	R112774	C CE MI 100N S 63E2	
80	R3631059	SCR D933 M 3 X 8 XIC	4	C 53	R1122415	C NPO MI 82P J 63E2	
40	R3631089	SCR D933 M 3 X 16 XIC	9	C 54	R113724	C POMERA 100N K 63E2	
45	R3631099	SCR D933 M 3 X 20 XIC	3	C 55	R112364	C N750MI 150P J 63E2	
160	R366988	NUT I SOUTH M 3 X0.5	3	C190	R113730	C POMERA 330N K 63E2	
100	R367528	WSHR D6798 A 2.7 S Z	6	C191	R113730	C POMERA 330N K 63E2	
150	R367699	RVT CHB D2.38L6.35 P A	6	C192	R1113889	C EL RA 47M M100E2 85	1
210	R721620	SPR L 5 D 8 D 3 P	2	C193	R114144	C POMERA 1M K250E9	1
140	R722276	LOCKPJ49PCBUNCPL	1	C194	R112774	C CE MI 100N S 63E2	
300	R780298	PCDPJ51 G1200M_FOC PROT	1	C195	R112774	C CE MI 100N S 63E2	
120	R801277	SPR L22 D 5 M 2.5 B	3	C196	R1113889	C EL RA 47M M100E2 85	1
25	R804674	Q ACC SPG 1XM3 SHORT	2	C197	R111531	C EL RA 10M M 35E2 85	
30	R804831	Q ACC SPG 1X 3.1 LONG	3	C198	R111531	C EL RA 10M M 35E2 85	
20	R804832	Q ACC SPG 1XM3 LONG	8	C200	R112743	C CE MI 2N2K100E2	
170	R804998	FRMPJ51 G12FOC SCR N	1	C201	R113724	C POMERA 100N K 63E2	
200	R805835	FRMPJ56 G808 FOC HTSNK 1	1	C202	R113724	C POMERA 100N K 63E2	
190	R805836	FRMPJ56 G808 FOC HTSNK 2	2	C203	R113724	C POMERA 100N K 63E2	
180	R805839	FRMPJ56 G808 E FOC BRKT	1	C204	R112743	C CE MI 2N2K100E2	
C 1	R112774	C CE MI 100N S 63E2		C210	R112743	C CE MI 2N2K100E2	
C 2	R111477	C EL RA 100M Z 25E2 85		C211	R113724	C POMERA 100N K 63E2	
C 3	R112774	C CE MI 100N S 63E2		C212	R113724	C POMERA 100N K 63E2	
C 4	R111477	C EL RA 100M Z 25E2 85		C213	R113724	C POMERA 100N K 63E2	
C 5	R112774	C CE MI 100N S 63E2		C214	R112743	C CE MI 2N2K100E2	
C 6	R112774	C CE MI 100N S 63E2		C220	R112743	C CE MI 2N2K100E2	
C 7	R111479	C EL RA 470M Z 25E2 85	1	C221	R113724	C POMERA 100N K 63E2	
C 8	R111479	C EL RA 470M Z 25E2 85	1	C222	R113724	C POMERA 100N K 63E2	
C 9	R111531	C EL RA 10M M 35E2 85		C223	R113724	C POMERA 100N K 63E2	
C 10	R111531	C EL RA 10M M 35E2 85		C224	R112743	C CE MI 2N2K100E2	
C 11	R112774	C CE MI 100N S 63E2		D 20	R131637	D R BA158 600400 DO7	1
C 12	R112774	C CE MI 100N S 63E2		D 21	R131637	D R BA158 600400 DO7	
C 13	R111478	C EL RA 220M M 25E2 85	1	D 30	R131637	D R BA158 600400 DO7	1
C 14	R112774	C CE MI 100N S 63E2		D 31	R131637	D R BA158 600400 DO7	1
C 15	R111478	C EL RA 220M M 25E2 85	1	D 40	R131637	D R BA158 600400 DO7	1
C 16	R112774	C CE MI 100N S 63E2		D 41	R131637	D R BA158 600400 DO7	1
C 17	R111458	C EL RA 470M Z 10E2 85	1	D 50	R131621	D S 1N4148 075150 DO35	
C 18	R111468	C EL RA 470M Z 16E2 85	1	D 51	R131621	D S 1N4148 075150 DO35	
C 19	R111468	C EL RA 470M Z 16E2 85	1	D 52	R131621	D S 1N4148 075150 DO35	
C 20	R112735	C CE MI 470P K100E2		D 53	R131621	D S 1N4148 075150 DO35	
C 21	R112739	C CE MI 1N K100E2		D 54	R1316361	D Y BAT85 030200 DO35	1
C 22	R113724	C POMERA 100N K 63E2		D 55	R1316361	D Y BAT85 030200 DO35	1
C 23	R113724	C POMERA 100N K 63E2		D 56	R1316361	D Y BAT85 030200 DO35	1
C 24	R113724	C POMERA 100N K 63E2		D 57	R1316361	D Y BAT85 030200 DO35	1
C 25	R113732	C POMERA 470N K 63E2		D140	R131637	D R BA158 600400 DO7	1
C 30	R112735	C CE MI 470P K100E2		D141	R131621	D S 1N4148 075150 DO35	
C 31	R112739	C CE MI 1N K100E2		D160	R131637	D R BA158 600400 DO7	1
C 32	R113724	C POMERA 100N K 63E2		D161	R131621	D S 1N4148 075150 DO35	
C 33	R113724	C POMERA 100N K 63E2		D180	R131637	D R BA158 600400 DO7	1
				D181	R131621	D S 1N4148 075150 DO35	
				D192	R131954	D R BYW29 20008A TO220	1
				D193	R131954	D R BYW29 20008A TO220	1
				D200	R131637	D R BA158 600400 DO7	1
				D201	R131637	D R BA158 600400 DO7	1
				D210	R131637	D R BA158 600400 DO7	1
				D211	R131637	D R BA158 600400 DO7	1

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D220	R131637	D R BA158 600400 DO7	1	R 18	R1011059	R CFFH 2E7 J 0W25	1
D221	R131637	D R BA158 600400 DO7	1	R 19	R1011129	R CFFH 10E J 0W25	
I 1	R134002	U 7812 TO220 P	1	R 20	R101158	R CF H 68K J 0W25	
I 2	R134016	U 7912 TO220 P	1	R 21	R101160	R CF H100K J 0W25	
I 3	R134028	U 317LZ LM TO92 P	1	R 22	R101168	R CF H470K J 0W25	
I 4	R134029	U 337LZ TO92 P	1	R 23	R101156	R CF H 47K J 0W25	
I 5	R134001	U 7805 TO220 P	1	R 24	R101112	R CF H 10E J 0W25	
I20	R132751	U 2030V TDA TO220T P	1	R 25	R101148	R CF H 10K J 0W25	
I30	R132751	U 2030V TDA TO220T P	1	R 26	R104212	R WW V 4E7 K 7W	1
I40	R132751	U 2030V TDA TO220T P	1	R 27	R101142	R CF H 3K3 J 0W25	
I50	R131684	U 2630 HCPL DIP8 P	1	R 28	R101153	R CF H 27K J 0W25	
I51	R131683	U 2601 HCPL DIP8 P	1	R 30	R101160	R CF H100K J 0W25	
I52	R132833	U 76013 SC DIP28 P	1	R 31	R101156	R CF H 47K J 0W25	
I100	R134125	U 34084 DIP14 P	1	R 32	R101112	R CF H 10E J 0W25	
I200	R132751	U 2030V TDA TO220T P	1	R 33	R101148	R CF H 10K J 0W25	
I210	R132751	U 2030V TDA TO220T P	1	R 34	R104212	R WW V 4E7 K 7W	1
I220	R132751	U 2030V TDA TO220T P	1	R 37	R101142	R CF H 3K3 J 0W25	
J 1	R313525	JEUR2CMBS P64 E1C2S 1,6	1	R 38	R101153	R CF H 27K J 0W25	
J 2	R313525	JEUR2CMBS P64 E1C2S 1,6	1	R 40	R101160	R CF H100K J 0W25	
P 1	R107534	R MCE H100K K 0W75 M20SS	1	R 41	R101158	R CF H 68K J 0W25	
P 2	R107534	R MCE H100K K 0W75 M20SS	1	R 42	R101168	R CF H470K J 0W25	
PC	R780134	PCSPJ51G1200M_FOC+SHF	1	R 43	R101156	R CF H 47K J 0W25	
Q 1	R1314181	Q BC559B P SS TO92		R 44	R101112	R CF H 10E J 0W25	
Q 2	R1314181	Q BC559B P SS TO92		R 45	R101148	R CF H 10K J 0W25	
Q 20	R131411	Q BC549C N SS TO92		R 46	R104212	R WW V 4E7 K 7W	1
Q 30	R131411	Q BC549C N SS TO92		R 47	R101142	R CF H 3K3 J 0W25	
Q 40	R131411	Q BC549C N SS TO92		R 48	R101153	R CF H 27K J 0W25	
Q 50	R132916	Q BS250 FN SS TO92	1	R 50	R101144	R CF H 4K7 J 0W25	
Q 51	R132916	Q BS250 FN SS TO92	1	R 51	R101130	R CF H330E J 0W25	
Q 52	R1329105	Q BS170 FN SS TO92	1	R 52	R101144	R CF H 4K7 J 0W25	
Q 53	R132916	Q BS250 FN SS TO92	1	R 53	R101130	R CF H330E J 0W25	
Q 54	R1329105	Q BS170 FN SS TO92	1	R 54	R101152	R CF H 22K J 0W25	
Q140	R131411	Q BC549C N SS TO92		R 55	R101132	R CF H470E J 0W25	
Q141	R132900	Q BUZ310 FN P TO218	1	R 56	R101130	R CF H330E J 0W25	
Q142	R1314182	Q BC559C P SS TO92		R 57	R101132	R CF H470E J 0W25	
Q160	R131411	Q BC549C N SS TO92		R 58	R101144	R CF H 4K7 J 0W25	
Q161	R132900	Q BUZ310 FN P TO218	1	R 59	R101132	R CF H470E J 0W25	
Q162	R1314182	Q BC559C P SS TO92		R 61	R101152	R CF H 22K J 0W25	
Q180	R131411	Q BC549C N SS TO92		R 62	R101119	R CF H 39E J 0W25	
Q181	R132900	Q BUZ310 FN P TO218	1	R 63	R101132	R CF H470E J 0W25	
Q182	R1314182	Q BC559C P SS TO92		R 64	R101129	R CF H270E J 0W25	
Q190	R131411	Q BC549C N SS TO92	1	R 65	R101556	R MF H 47K F 0W4 E3	
Q191	R1314182	Q BC559C P SS TO92		R140	R101136	R CF H 1K J 0W25	
Q192	R132942	Q IRF9630 FPP TO220	1	R141	R103742	R WW H 1K5 K 5W	1
Q193	R132941	Q IRF632 FN P TO220	1	R142	R103620	R WW H 4E7 K 4W	1
R 1	R101124	R CF H100E J 0W25		R143	R100124	R CF V100E J 0W25 E2	
R 2	R101124	R CF H100E J 0W25		R160	R100136	R CF V 1K J 0W25 E2	
R 3	R101126	R CF H150E J 0W25		R161	R103742	R WW H 1K5 K 5W	1
R 4	R101128	R CF H220E J 0W25		R162	R103620	R WW H 4E7 K 4W	1
R 5	R101123	R CF H 82E J 0W25		R163	R100124	R CF V100E J 0W25 E2	
R 6	R101128	R CF H220E J 0W25		R180	R101136	R CF H 1K J 0W25	
R 7	R101152	R CF H 22K J 0W25		R181	R103742	R WW H 1K5 K 5W	1
R 8	R101148	R CF H 10K J 0W25		R182	R103620	R WW H 4E7 K 4W	1
R 9	R101154	R CF H 33K J 0W25		R183	R101124	R CF H100E J 0W25	
R 10	R101137	R CF H 1K2 J 0W25		R191	R101144	R CF H 4K7 J 0W25	
R 11	R101140	R CF H 2K2 J 0W25	1	R192	R103612	R WW H 1E K 4W	1
R 12	R101158	R CF H 68K J 0W25		R193	R101144	R CF H 4K7 J 0W25	1
R 13	R101155	R CF H 39K J 0W25		R194	R101144	R CF H 4K7 J 0W25	
R 14	R101137	R CF H 1K2 J 0W25		R195	R101148	R CF H 10K J 0W25	
R 15	R101140	R CF H 2K2 J 0W25	1	R196	R101148	R CF H 10K J 0W25	
R 16	R104654	R HV H 1M J 0W5 3500	1	R197	R101148	R CF H 10K J 0W25	
R 17	R1011059	R CFFH 2E7 J 0W25	1	R198	R1011917	R CFFH E22K 0W4	1
				R200	R101141	R CF H 2K7 J 0W25	
				R201	R101145	R CF H 5K6 J 0W25	
				R202	R101112	R CF H 10E J 0W25	
				R204	R103620	R WW H 4E7 K 4W	1
				R205	R101148	R CF H 10K J 0W25	
				R210	R101141	R CF H 2K7 J 0W25	

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R211	R101145	R CF H 5K6 J 0W25		R224	R103620	R WW H 4E7 K 4W	1
R212	R101112	R CF H 10E J 0W25		R225	R101148	R CF H 10K J 0W25	
R214	R103620	R WW H 4E7 K 4W	1				
R215	R101148	R CF H 10K J 0W25		T 20	R774312	COIL SHF PJ49 G800	1
R220	R101141	R CF H 2K7 J 0W25		T 30	R774312	COIL SHF PJ49 G800	1
R221	R101145	R CF H 5K6 J 0W25		T 40	R774312	COIL SHF PJ49 G800	1
R222	R101112	R CF H 10E J 0W25					

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SIT.	ITEM NO.	DESCRIPTION	QUANTITY	SIT.	ITEM NO.	DESCRIPTION	QUANTITY
C301	P210013	C# COG MU 1N J 50 1206	1	D304	P234055	D#BAT54 SCH SOT23	1
C302	R115928	C PP RA 3N3J 63E2	1	D305	P234055	D#BAT54 SCH SOT23	1
C303	P212031	C# TA 22M M 16 7343	1	D306	P234099	D#4148 R DMMELF	1
C304	P210049	C# X7R MU 220N K 50 1808	1	D307	P234099	D#4148 R DMMELF	1
C305	P210049	C# X7R MU 220N K 50 1808	1	D308	P234099	D#4148 R DMMELF	1
C306	P210010	C# COG MU 68P J 50 1206	1	D309	P234099	D#4148 R DMMELF	1
C307	R111546	C EL RA 1M M 50E2 85	1	D310	P234099	D#4148 R DMMELF	1
C308	P212031	C# TA 22M M 16 7343	1	D400	P234055	D#BAT54 SCH SOT23	1
C309	R111476	C EL RA 47M M 25E2 85	1				
C310	R111476	C EL RA 47M M 25E2 85	1	I300	P230705	U#34084 MC SOL16 P	1
C311	P210010	C# COG MU 68P J 50 1206	1	I301	R1327655	U 1496 MC DIP14 P	1
C312	R114685	C PO RA 6N8K100E2 KT	1	I302	R1327655	U 1496 MC DIP14 P	1
C313	P210122	C# X7R MU 100N K 50 1206	1	I303	P230653	U#76013 SC SOL28 P	1
C314	R1113889	C EL RA 47M M100E2 85	1	I304	R134028	U 317LZ LM TO92 P	1
C315	P210122	C# X7R MU 100N K 50 1206	1	I305	R134029	U 337LZ TO92 P	1
C316	R111466	C EL RA 100M Z 16E2 85	1	I306	R134032	U 78L05 TO92 P	1
C317	P212024	C# TA 10M M 35 7343	1	I307	P230028	U#393 LM SO8 P	1
C318	P210122	C# X7R MU 100N K 50 1206	1	I308	P230028	U#393 LM SO8 P	1
C319	P210122	C# X7R MU 100N K 50 1206	1	I309	P230705	U#34084 MC SOL16 P	1
C320	R111466	C EL RA 100M Z 16E2 85	1	I310	P230705	U#34084 MC SOL16 P	1
C321	P212024	C# TA 10M M 35 7343	1	I311	P230653	U#76013 SC SOL28 P	1
C322	P210122	C# X7R MU 100N K 50 1206	1	I312	P230653	U#76013 SC SOL28 P	1
C323	P210122	C# X7R MU 100N K 50 1206	1	I313	P230653	U#76013 SC SOL28 P	1
C324	P210095	C# X7R MU 330N M 50 1812	1	I314	P230705	U#34084 MC SOL16 P	1
C325	P210122	C# X7R MU 100N K 50 1206	1	I401	P230073	U#74HCT123 SO16 I	1
C326	P210122	C# X7R MU 100N K 50 1206	1	I402	P230293	U#082 TL SO8 P	1
C327	R112237	C NPO MI 39P G 63E2	1	I403	P230293	U#082 TL SO8 P	1
C328	P210122	C# X7R MU 100N K 50 1206	1				
C329	P210122	C# X7R MU 100N K 50 1206	1	J 5	R313946	JCT H MBS P 6 M2SN	1
C330	P210122	C# X7R MU 100N K 50 1206	1	J 6	R313950	JCT H MBS P 10 M2SN	1
C331	P210122	C# X7R MU 100N K 50 1206	1	J 7	R313943	JCT H MBS P 3 M2SN	1
C332	R111466	C EL RA 100M Z 16E2 85	1				
C333	P210122	C# X7R MU 100N K 50 1206	1	PC	R780272	PCD#PJ51 G1200M_FOC+SHF	1
C334	P210122	C# X7R MU 100N K 50 1206	1				
C335	P210141	C# COG MU 27P J 50 1206	1	Q300	P232092	Q#BF623 P SS SOT89	1
C401	P210010	C# COG MU 68P J 50 1206	1	Q301	P232033	Q#BSV52 N SS SOT23	1
C402	P210122	C# X7R MU 100N K 50 1206	1	Q302	P232004	Q#BC849C N SS SOT23	1
C403	P210122	C# X7R MU 100N K 50 1206	1	Q303	P232101	Q#BC859C P SS SOT23	1
C404	R1115915	C EL5 RA 4M7M 35E2 85	1	Q304	P232101	Q#BC859C P SS SOT23	1
C405	R111546	C EL RA 1M M 50E2 85	1	Q306	P232004	Q#BC849C N SS SOT23	1
C406	R115932	C PP RA 4N7J 63E2	1	Q307	P232033	Q#BSV52 N SS SOT23	1
C409	P210122	C# X7R MU 100N K 50 1206	1	Q308	P232033	Q#BSV52 N SS SOT23	1
C411	P210122	C# X7R MU 100N K 50 1206	1	Q309	P232118	Q#BSS87 F SS SOT89	1
C412	P210122	C# X7R MU 100N K 50 1206	1	Q310	P232158	Q#BF824 P SS SOT23	1
C420	R111476	C EL RA 47M M 25E2 85	1	Q311	P232051	Q#BC847B N SS SOT23	1
C421	P210148	C# Y5V MU 470N Z 50 1206	1	Q312	P232050	Q#BC857B P SS SOT23	1
C422	P212024	C# TA 10M M 35 7343	1	Q400	P232004	Q#BC849C N SS SOT23	1
C423	P210148	C# Y5V MU 470N Z 50 1206	1	Q401	P232101	Q#BC859C P SS SOT23	1
C424	P212024	C# TA 10M M 35 7343	1	Q402	P232004	Q#BC849C N SS SOT23	1
C425	P210122	C# X7R MU 100N K 50 1206	1	Q420	R1314651	Q BF245B FN SS TO92	1
D300	P234099	D#4148 R DMMELF	1	R300	P200091	R# CE H 5K6 J 0W12 1206	1
D301	P234099	D#4148 R DMMELF	1	R301	P200101	R# CE H 15K J 0W12 1206	1
D302	P234099	D#4148 R DMMELF	1	R302	P200095	R# CE H 8K2 J 0W12 1206	1
D303	P234099	D#4148 R DMMELF	1	R303	P200073	R# CE H 1K J 0W12 1206	1

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R304	P200073	R# CE H 1K J 0W12 1206	1	R374	P200099	R# CE H 12K J 0W12 1206	1
R305	P200065	R# CE H470E J 0W12 1206	1	R375	P200099	R# CE H 12K J 0W12 1206	1
R306	P200097	R# CE H 10K J 0W12 1206	1	R376	P200097	R# CE H 10K J 0W12 1206	1
R307	P200067	R# CE H560E J 0W12 1206	1	R377	P200097	R# CE H 10K J 0W12 1206	1
R308	P200097	R# CE H 10K J 0W12 1206	1	R378	P200097	R# CE H 10K J 0W12 1206	1
R309	P200065	R# CE H470E J 0W12 1206	1	R379	P200097	R# CE H 10K J 0W12 1206	1
R310	P200081	R# CE H 2K2 J 0W12 1206	1	R380	P200083	R# CE H 2K7 J 0W12 1206	1
R311	P200081	R# CE H 2K2 J 0W12 1206	1	R381	P200099	R# CE H 12K J 0W12 1206	1
R312	P200095	R# CE H 8K2 J 0W12 1206	1	R382	P200099	R# CE H 12K J 0W12 1206	1
R313	P200085	R# CE H 3K3 J 0W12 1206	1	R383	P200049	R# CE H100E J 0W12 1206	1
R314	P200079	R# CE H 1K8 J 0W12 1206	1	R384	P200049	R# CE H100E J 0W12 1206	1
R315	P200081	R# CE H 2K2 J 0W12 1206	1	R385	P200049	R# CE H100E J 0W12 1206	1
R316	P200097	R# CE H 10K J 0W12 1206	1	R386	P200049	R# CE H100E J 0W12 1206	1
R317	P200099	R# CE H 12K J 0W12 1206	1	R387	P200049	R# CE H100E J 0W12 1206	1
R318	P200065	R# CE H470E J 0W12 1206	1	R388	P200049	R# CE H100E J 0W12 1206	1
R319	P200097	R# CE H 10K J 0W12 1206	1	R389	P200049	R# CE H100E J 0W12 1206	1
R320	P200097	R# CE H 10K J 0W12 1206	1	R390	P200049	R# CE H100E J 0W12 1206	1
R321	P200065	R# CE H470E J 0W12 1206	1	R391	P200169	R# CE H 10M J 0W12 1206	1
R322	P200081	R# CE H 2K2 J 0W12 1206	1	R392	R101548	R MF H 10K F 0W4 E3	1
R323	P200081	R# CE H 2K2 J 0W12 1206	1	R400	P200121	R# CE H100K J 0W12 1206	1
R324	P200095	R# CE H 8K2 J 0W12 1206	1	R401	P200113	R# CE H 47K J 0W12 1206	1
R325	P200085	R# CE H 3K3 J 0W12 1206	1	R402	P200073	R# CE H 1K J 0W12 1206	1
R326	P200079	R# CE H 1K8 J 0W12 1206	1	R403	P200073	R# CE H 1K J 0W12 1206	1
R327	P200081	R# CE H 2K2 J 0W12 1206	1	R404	P200097	R# CE H 10K J 0W12 1206	1
R328	P200081	R# CE H 2K2 J 0W12 1206	1	R405	P200097	R# CE H 10K J 0W12 1206	1
R329	P200097	R# CE H 10K J 0W12 1206	1	R406	P200073	R# CE H 1K J 0W12 1206	1
R330	P200057	R# CE H220E J 0W12 1206	1	R407	P200065	R# CE H470E J 0W12 1206	1
R331	P200061	R# CE H330E J 0W12 1206	1	R408	P200065	R# CE H470E J 0W12 1206	1
R332	P200051	R# CE H120E J 0W12 1206	1	R409	P200105	R# CE H 22K J 0W12 1206	1
R333	P200039	R# CE H 39E J 0W12 1206	1	R410	P200073	R# CE H 1K J 0W12 1206	1
R334	P200059	R# CE H270E J 0W12 1206	1	R420	P200137	R# CE H470K J 0W12 1206	1
R335	P200065	R# CE H470E J 0W12 1206	1	R421	P200097	R# CE H 10K J 0W12 1206	1
R336	P200039	R# CE H 39E J 0W12 1206	1	R422	P200121	R# CE H100K J 0W12 1206	1
R337	P200053	R# CE H150E J 0W12 1206	1	R423	P200083	R# CE H 2K7 J 0W12 1206	1
R338	P200085	R# CE H 3K3 J 0W12 1206	1	R424	P200123	R# CE H120K J 0W12 1206	1
R339	P200075	R# CE H 1K2 J 0W12 1206	1	R425	P200137	R# CE H470K J 0W12 1206	1
R340	P200097	R# CE H 10K J 0W12 1206	1	R426	P200105	R# CE H 22K J 0W12 1206	1
R341	P200085	R# CE H 3K3 J 0W12 1206	1	R427	P200073	R# CE H 1K J 0W12 1206	1
R342	P200073	R# CE H 1K J 0W12 1206	1	R428	P200083	R# CE H 2K7 J 0W12 1206	1
R343	P200097	R# CE H 10K J 0W12 1206	1	R429	P200081	R# CE H 2K2 J 0W12 1206	1
R344	P200085	R# CE H 3K3 J 0W12 1206	1	R430	P200121	R# CE H100K J 0W12 1206	1
R345	P200079	R# CE H 1K8 J 0W12 1206	1				
R346	P200077	R# CE H 1K5 J 0W12 1206	1	Z300	P234145	D#ZEN 9V1 0W3 C SOT23	1
R347	P200097	R# CE H 10K J 0W12 1206	1	Z420	P234124	D#ZEN 16V 0W3 C SOT23	1
R348	P200101	R# CE H 15K J 0W12 1206	1				
R349	P200077	R# CE H 1K5 J 0W12 1206	1				
R350	P200097	R# CE H 10K J 0W12 1206	1				
R351	P200101	R# CE H 15K J 0W12 1206	1				
R352	P200097	R# CE H 10K J 0W12 1206	1				
R355	P200077	R# CE H 1K5 J 0W12 1206	1				
R356	P200105	R# CE H 22K J 0W12 1206	1				
R357	P200101	R# CE H 15K J 0W12 1206	1				
R358	P200077	R# CE H 1K5 J 0W12 1206	1				
R359	P200105	R# CE H 22K J 0W12 1206	1				
R360	P200101	R# CE H 15K J 0W12 1206	1				
R361	P200097	R# CE H 10K J 0W12 1206	1				
R362	P200097	R# CE H 10K J 0W12 1206	1				
R363	P200091	R# CE H 5K6 J 0W12 1206	1				
R364	P200099	R# CE H 12K J 0W12 1206	1				
R365	P200097	R# CE H 10K J 0W12 1206	1				
R366	P200097	R# CE H 10K J 0W12 1206	1				
R367	P200083	R# CE H 2K7 J 0W12 1206	1				
R368	P200099	R# CE H 12K J 0W12 1206	1				
R369	P200097	R# CE H 10K J 0W12 1206	1				
R370	P200097	R# CE H 10K J 0W12 1206	1				
R371	P200097	R# CE H 10K J 0W12 1206	1				
R372	P200097	R# CE H 10K J 0W12 1206	1				
R373	P200083	R# CE H 2K7 J 0W12 1206	1				

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