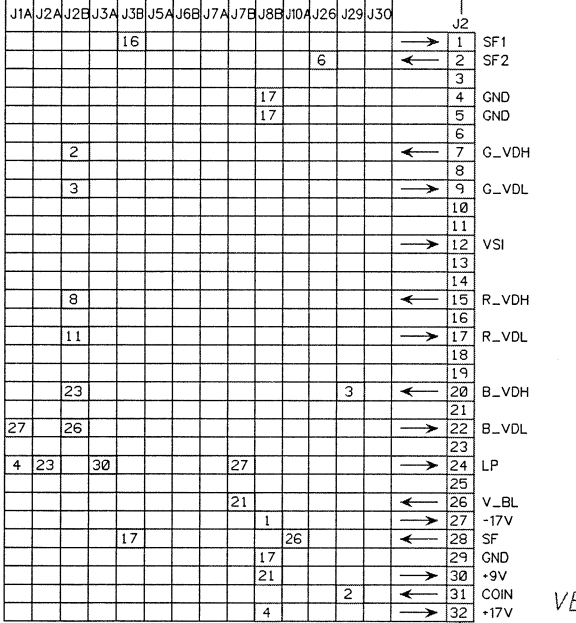
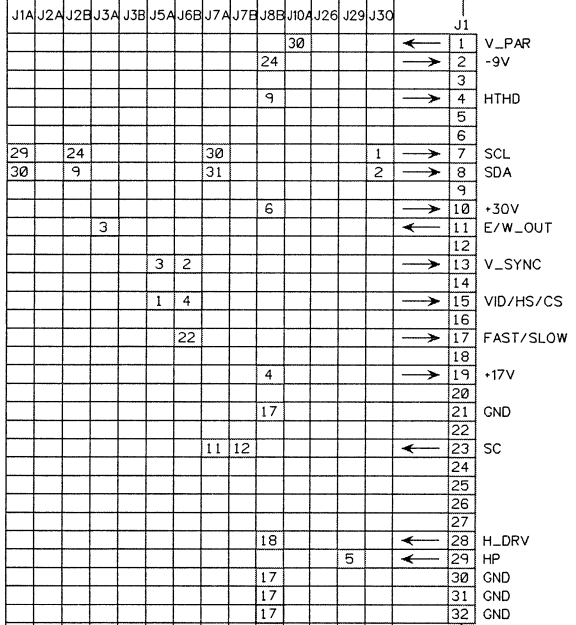
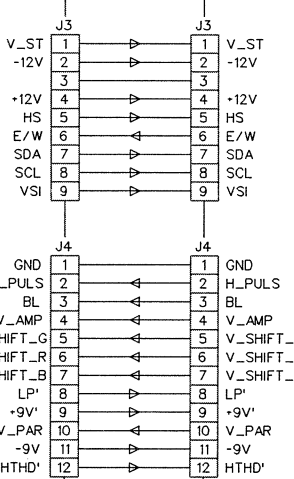


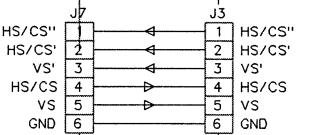
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HORIZONTAL SHIFT MODULE  
HORIZONTAL DEFLECTION MODULE  
SECOND RGB ANALOG INPUT MODULE  
RGB ANALOG INPUT MODULE  
DECODER + RGB DRIVER MODULE  
DECODER + RGB DRIVER MODULE  
SWITCH MODE DRIVER MODULE  
ELECTRICAL FOCUS + C3 + DIAGNOSTIC MODULE  
DEFLECTION & CONVERGENCE COILS BLUE  
CONTROLLER MODULE



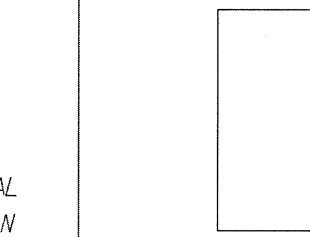
VERTICAL  
DEFLECTION



SUB-UNIT  
VERTICAL  
DEFLECTION



HDTV  
3 LEVEL  
SYNC



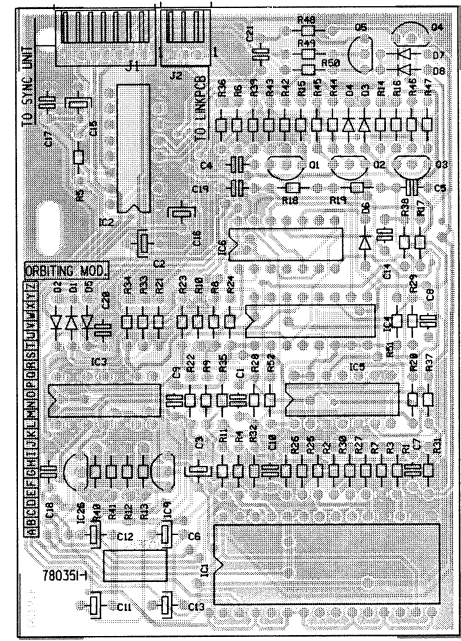
ORBITING  
MODULE

To PORT 3

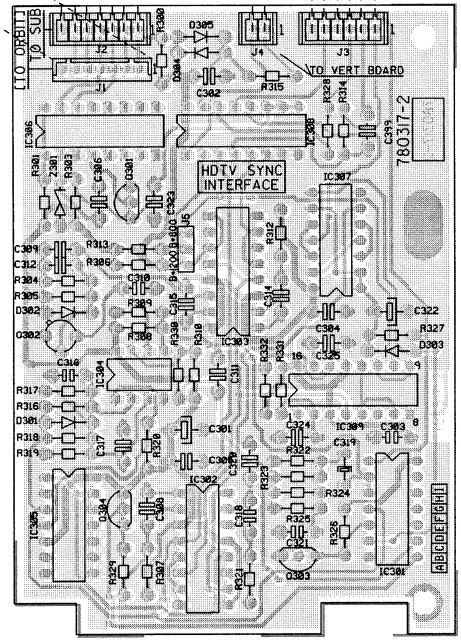
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VERTICAL DEFLECTION		76 22695
Date	Drawn	Checked
12-01-1995	JVDY	CHT

BARCO PROJECTION SYSTEMS

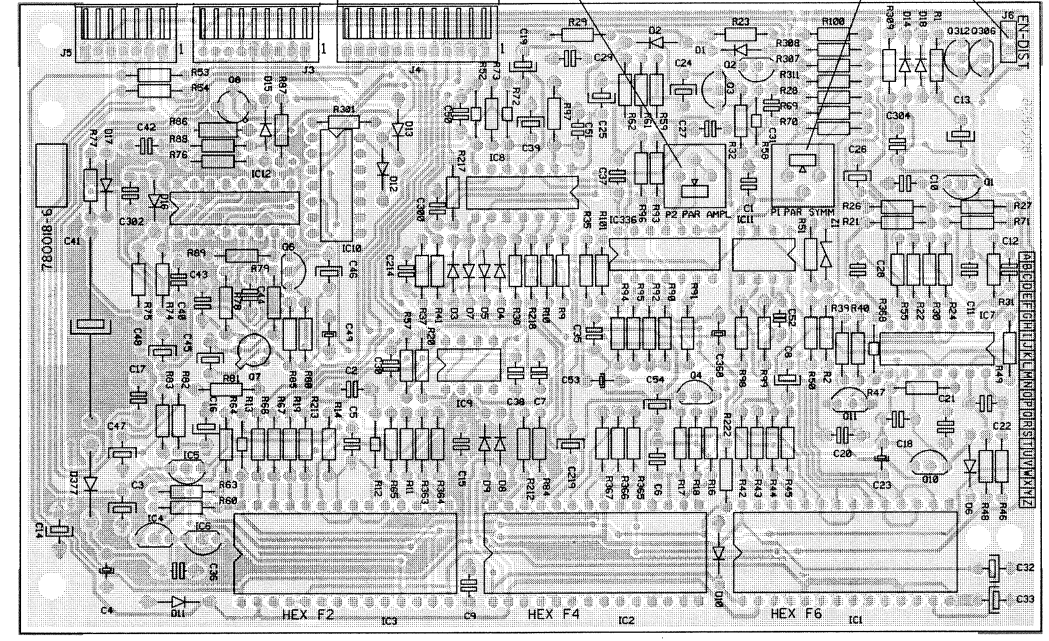
To PORT 3  
(via FRAME)



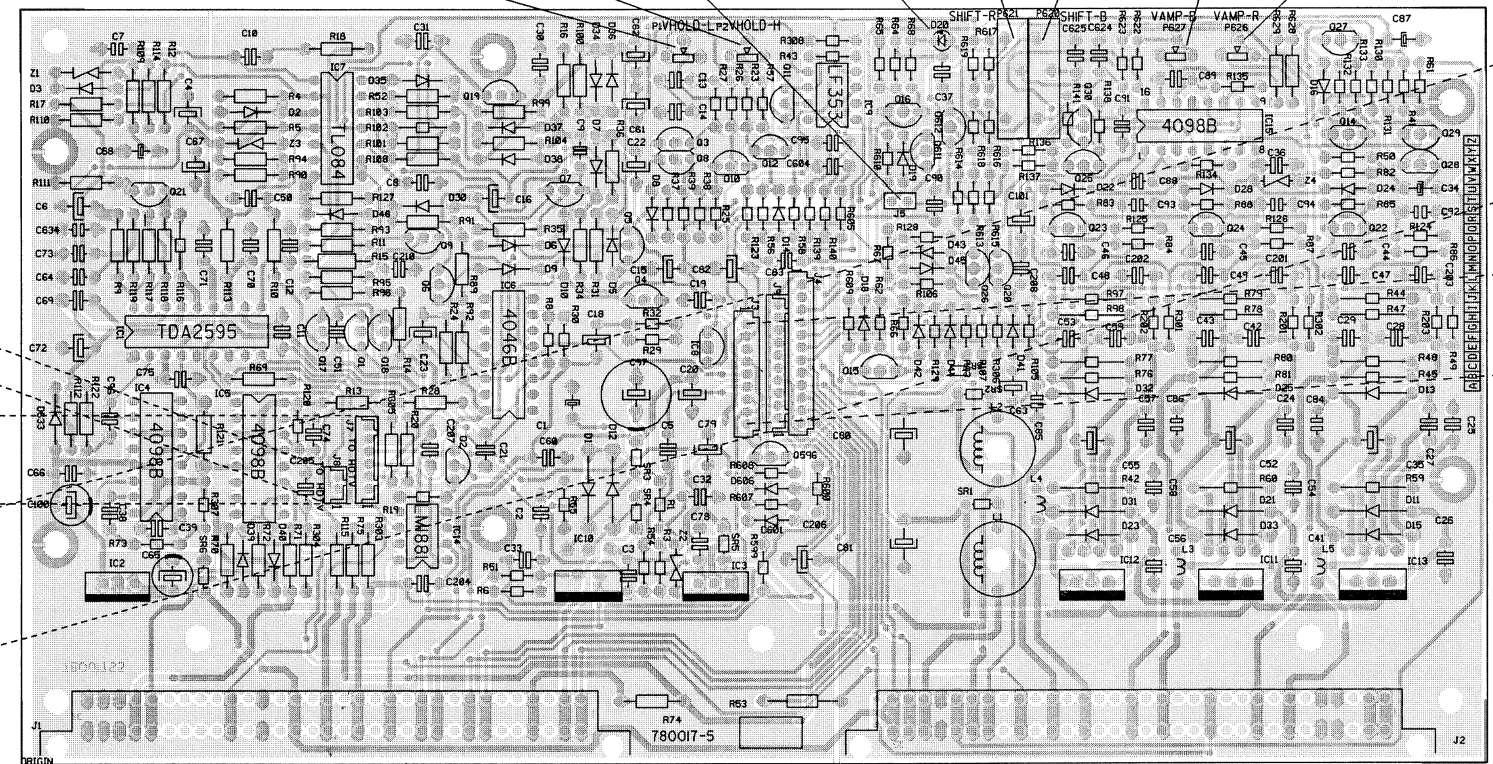
ORBITING MODULE



HDTV MODULE



SUB-UNIT VERTICAL DEFLECTION



VERTICAL DEFLECTION

- ADJUSTMENT VERTICAL LOWEST OSCILLATOR FREQUENCY V HOLD-L
- ADJUSTMENT VERTICAL HIGHEST OSCILLATOR FREQUENCY V HOLD-H
- OPEN CIRCUIT DISABLE BLANKING WHILE THERE IS NO COINCIDENCE
- LED ON : NO COINCIDENCE
- VERTICAL SHIFT ADJUSTMENT RED
- VERTICAL SHIFT ADJUSTMENT BLUE
- VERTICAL AMPLITUDE ADJUSTMENT BLUE
- VERTICAL AMPLITUDE ADJUSTMENT RED

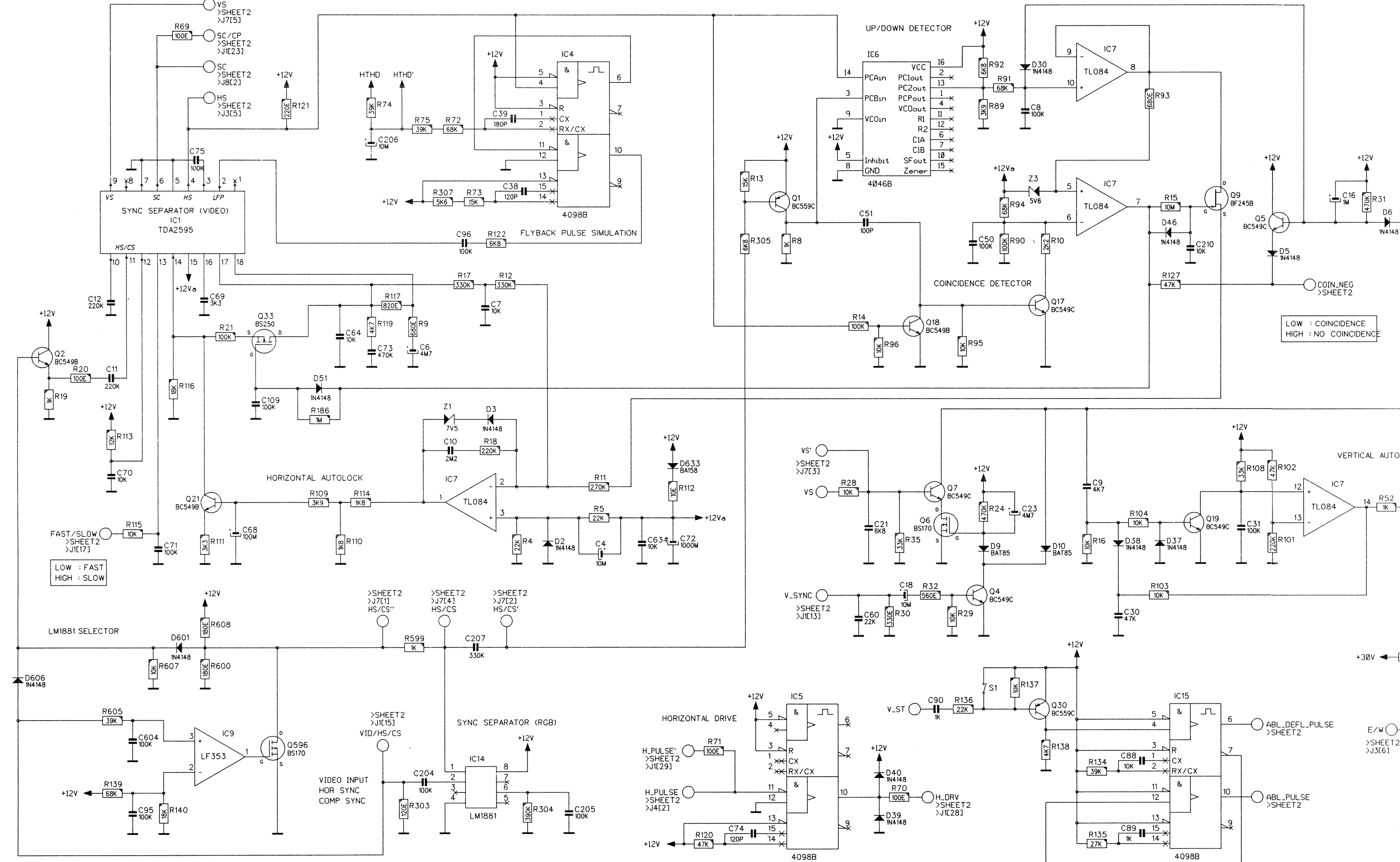
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Date	21-02-1995	Drawn	JVDY
		Checked	CHT
BARCO PROJECTION SYSTEMS			

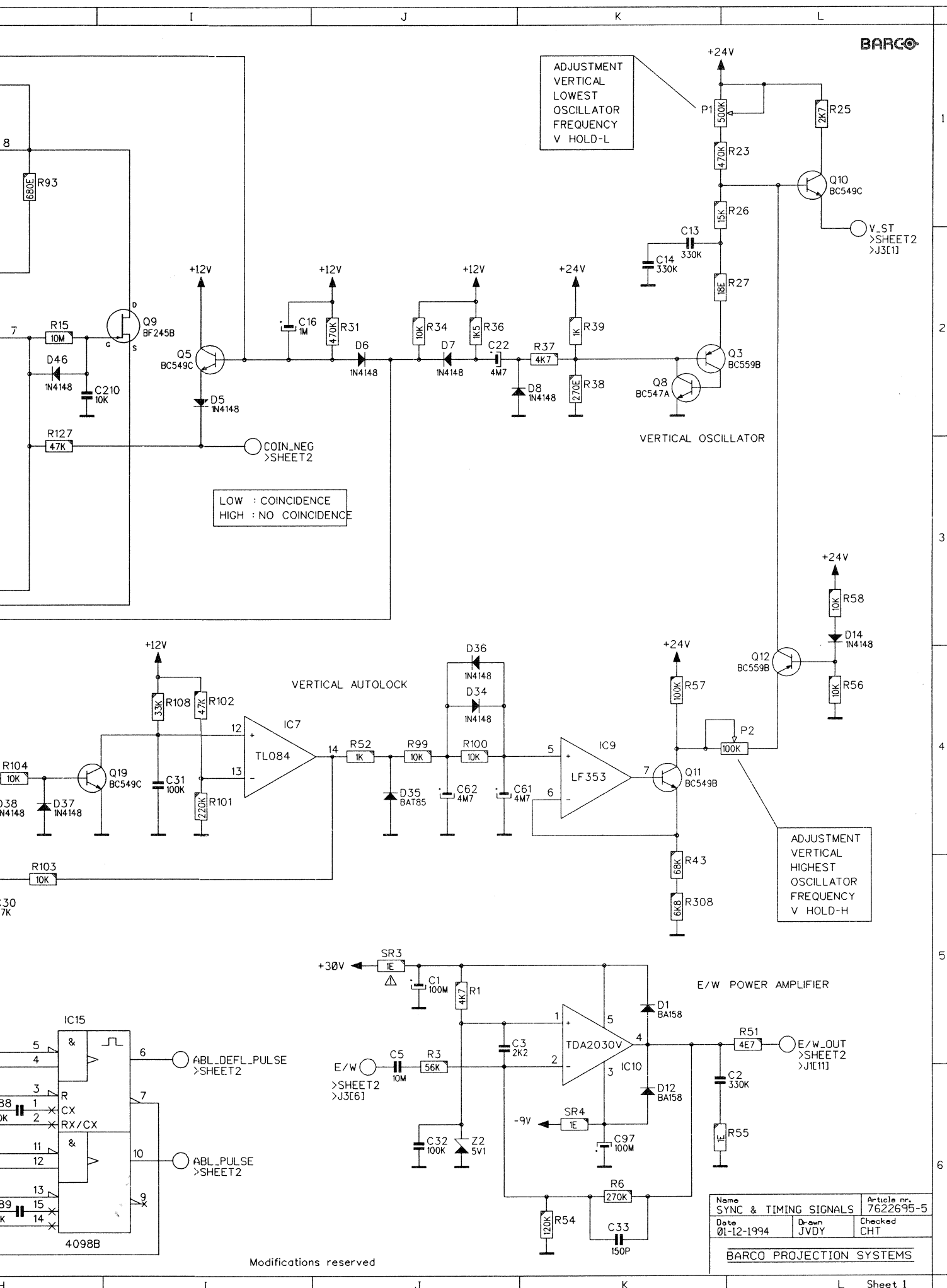
Modifications reserved

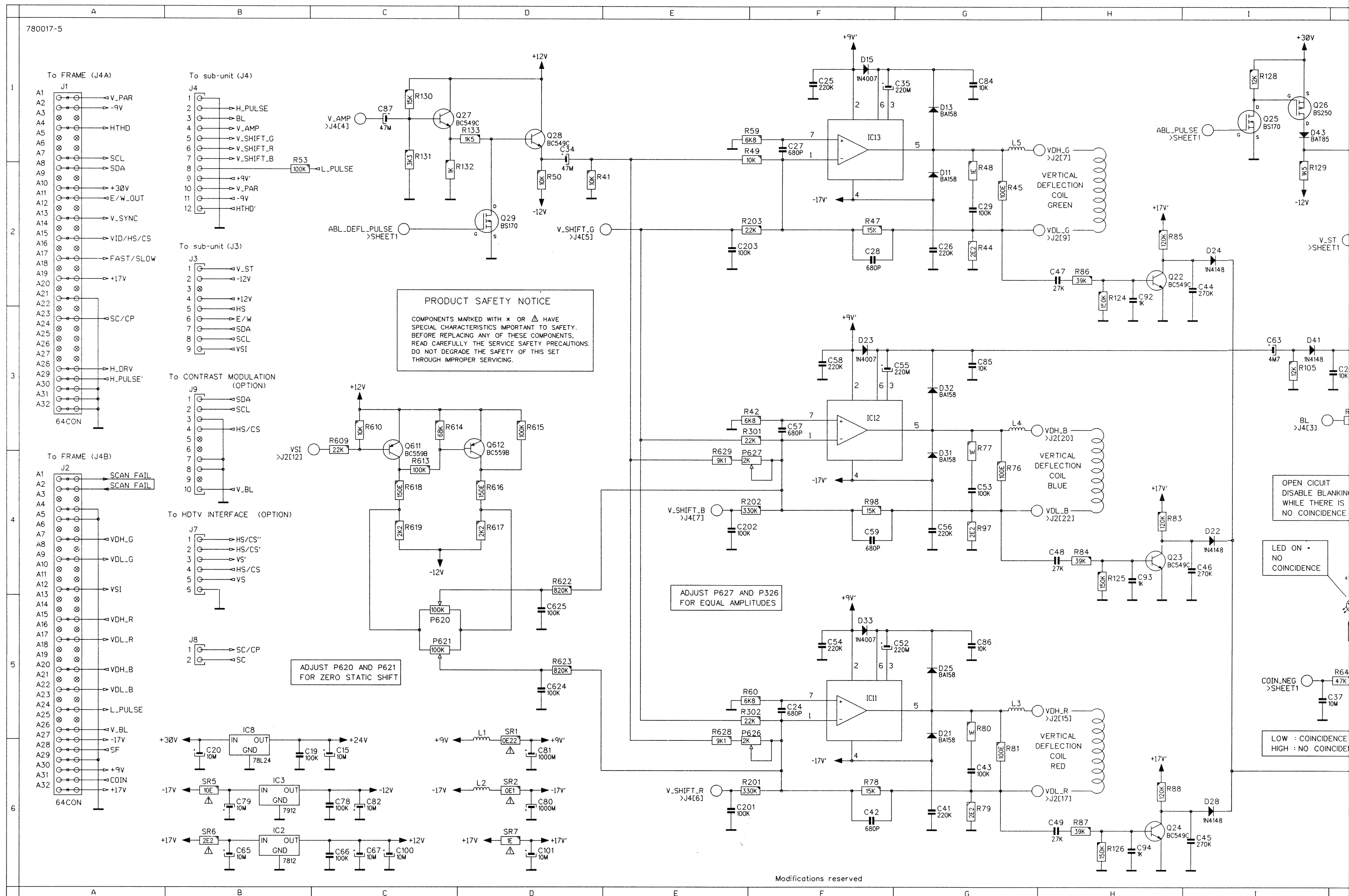
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C1	E 5	C34	G 5	IC26	A 3	R25	A 3	R96	G 2
C2	A 2	C35	F 4	IC301	C 3	R25	F 5	R96	E 5
C2	F 2	C36	D 5	IC302	C 3	R26	A 3	R97	G 2
C2	E 5	C37	D 5	IC303	C 2	R26	G 2	R97	G 5
C3	A 3	C38	D 5	IC304	B 3	R26	F 4	R98	G 2
C3	E 3	C39	G 5	IC305	B 3	R27	B 3	R98	G 5
C3	E 6	C201	G 5	IC306	B 2	R27	H 2	R99	G 2
C4	A 2	C202	G 5	IC307	C 2	R27	F 4	R99	E 4
C4	E 3	C203	F 5	IC308	C 2	R28	A 2	R100	G 1
C4	D 4	C204	E 6	IC309	C 3	R28	G 2	R100	E 4
C5	B 2	C205	D 5	IC336	G 2	R28	E 5	R101	G 2
C5	F 3	C206	F 6			R29	B 2	R101	E 4
C5	F 5	C207	E 5	J	B 2	R29	G 1	R102	E 4
C6	A 3	C208	G 5	J	A 2	R29	E 5	R103	E 4
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C7	B 3	C219	G 3	J2	A 2	R30	E 5	R106	F 5
C7	F 3	C300	F 2	J2	H 6	R31	B 3	R107	F 5
C7	D 4	C301	C 3	J3	C 2	R31	H 2	R108	E 4
C8	B 2	C302	C 2	J3	F 2	R31	E 5	R109	D 4
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C9	A 2	C304	F 2	J4	F 2	R32	E 5	R12	D 5
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C10	A 3	C306	B 2	J5	E 2	R34	E 5	R15	E 6
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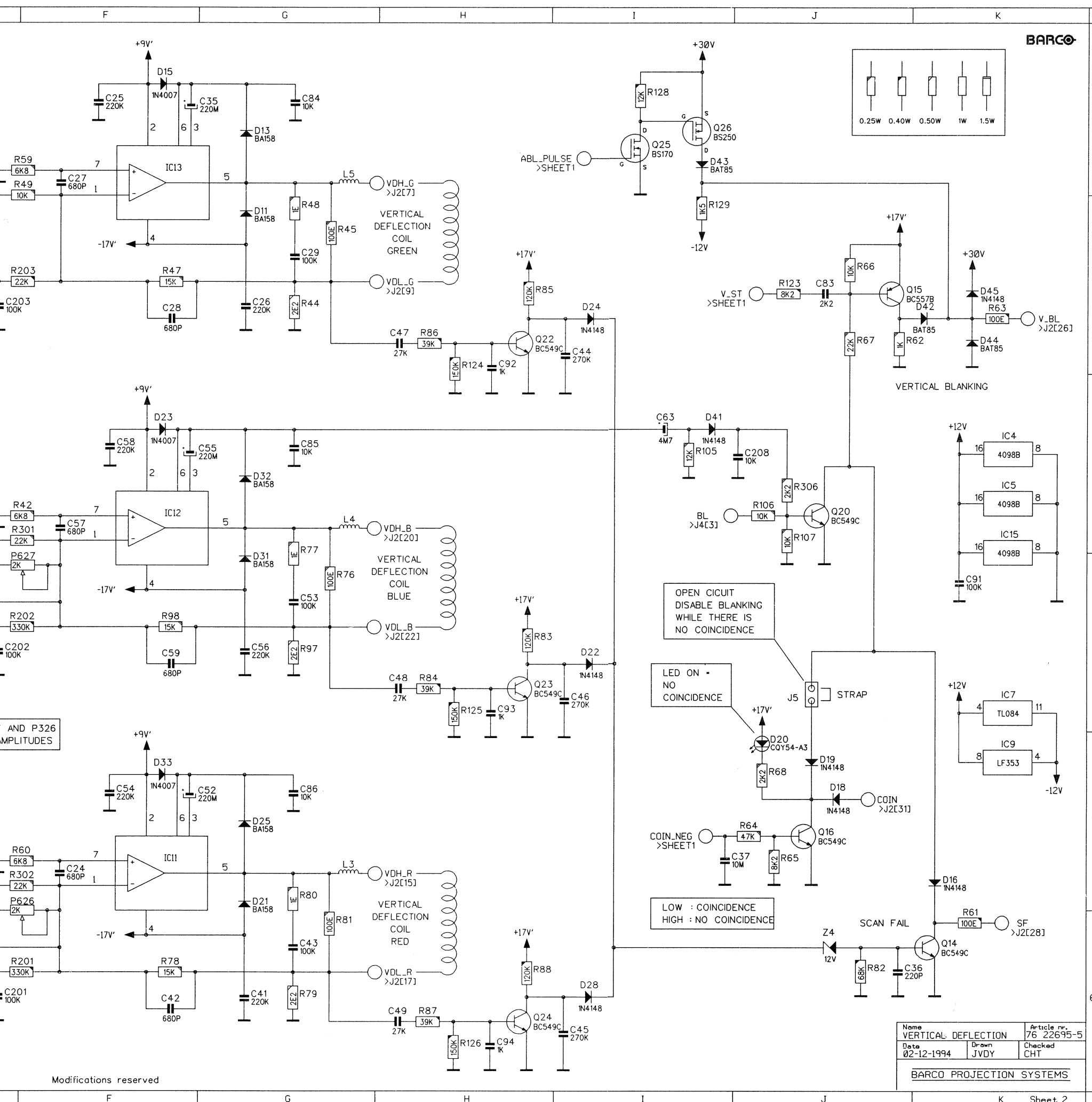


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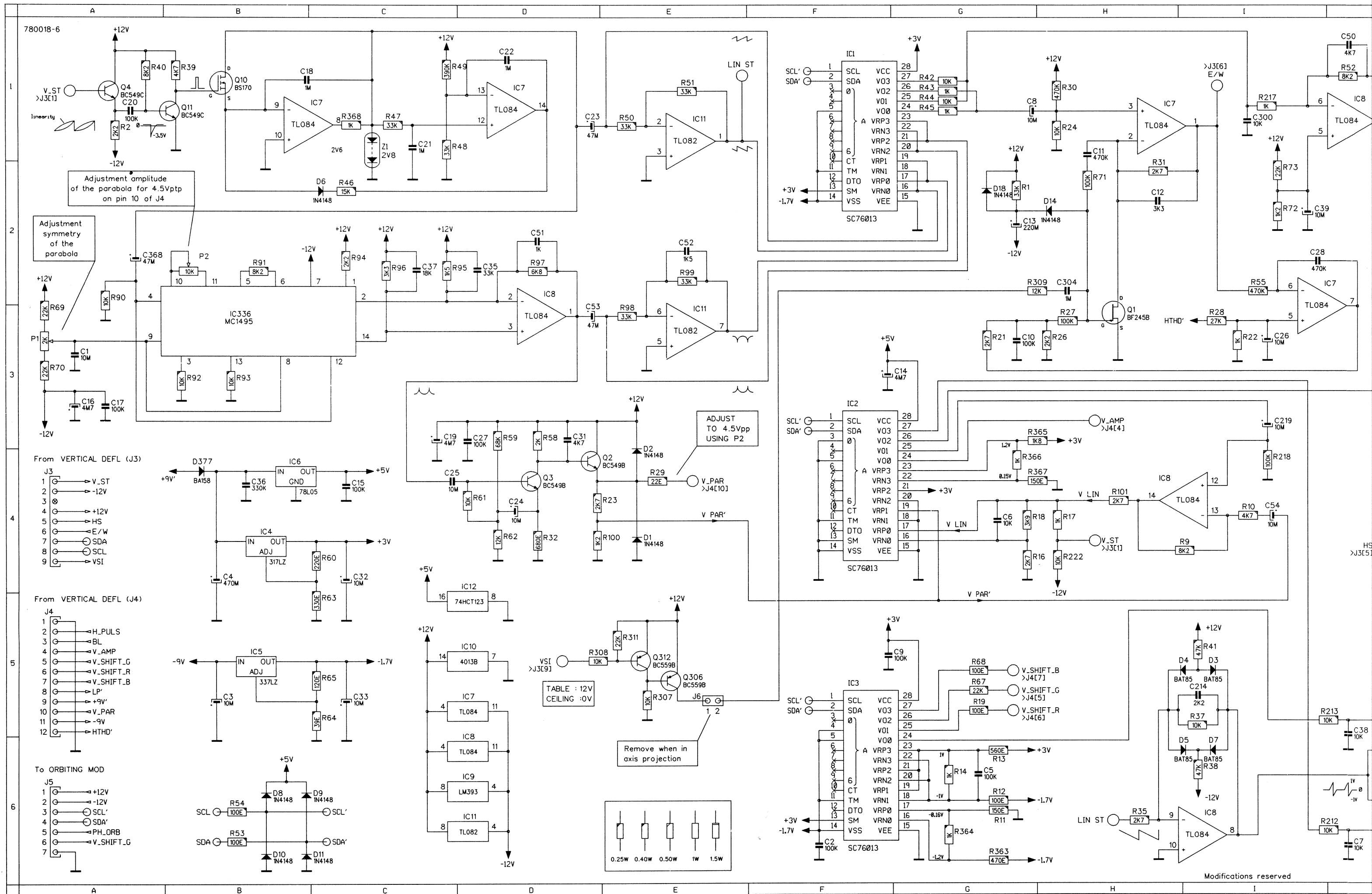


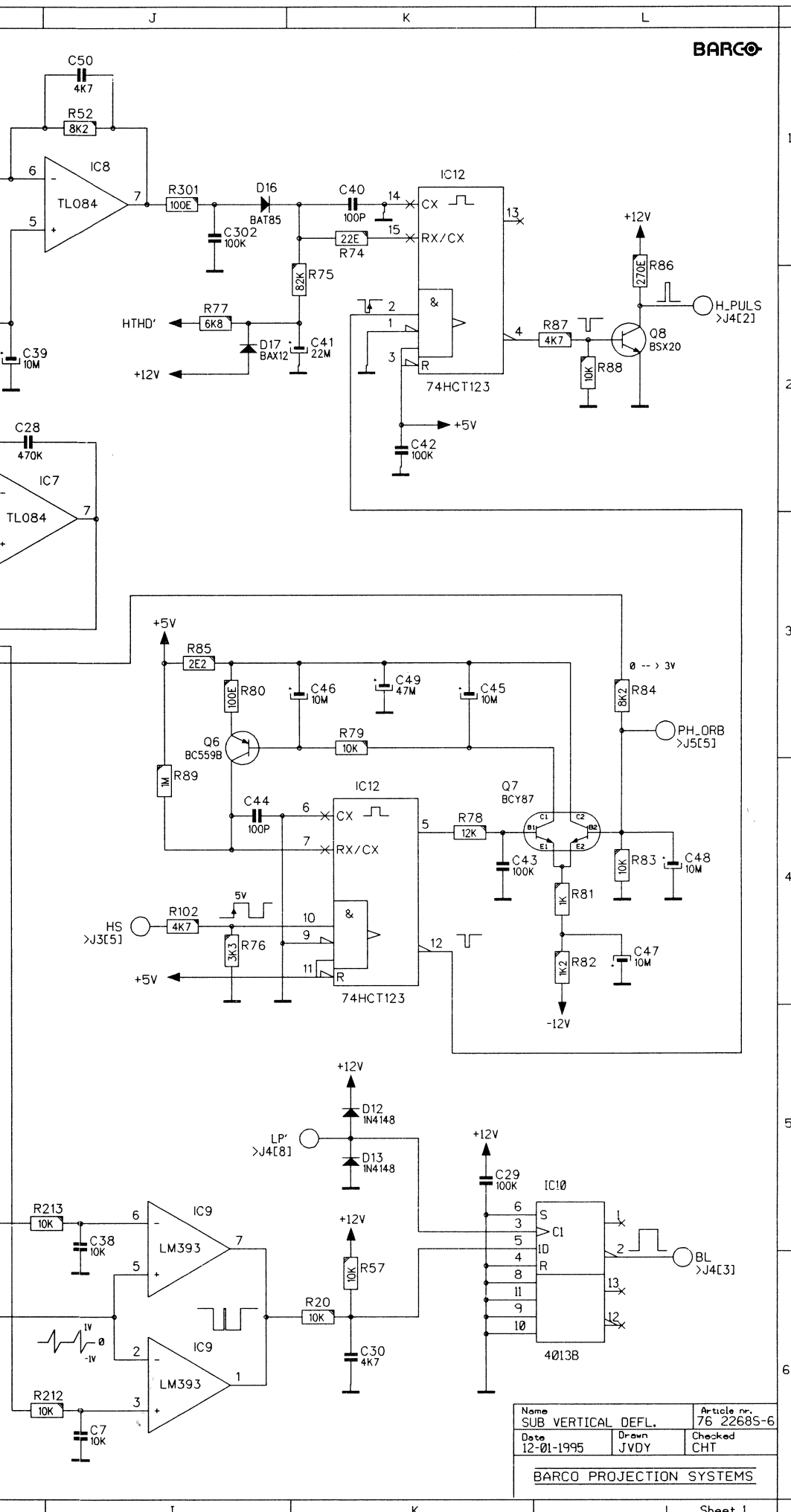




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C3	J 5	sheet 1	D8	K 2	sheet 1	Q29	D 2	sheet 2	R114	A 4	sheet 1
C4	D 4	sheet 1	D9	H 4	sheet 1	Q30	H 5	sheet 1	R115	A 4	sheet 1
C5	J 5	sheet 1	D10	H 4	sheet 1	Q33	B 3	sheet 1	R116	B 3	sheet 1
C6	C 3	sheet 1	D11	G 2	sheet 2	Q596	B 6	sheet 1	R117	C 3	sheet 1
C7	D 3	sheet 1	D12	K 6	sheet 1	Q611	C 3	sheet 2	R119	C 3	sheet 1
C8	G 1	sheet 1	D13	G 1	sheet 2	Q612	D 3	sheet 2	R120	E 6	sheet 1
C9	H 4	sheet 1	D14	L 3	sheet 1				R121	B 1	sheet 1
C10	C 4	sheet 1	D15	F 1	sheet 2	R1	J 5	sheet 1	R122	D 2	sheet 1
C11	A 3	sheet 1	D16	K 5	sheet 2	R3	J 5	sheet 1	R123	J 2	sheet 2
C12	A 3	sheet 1	D18	J 5	sheet 2	R4	D 4	sheet 1	R124	H 2	sheet 2
C13	K 1	sheet 1	D19	J 5	sheet 2	R5	D 4	sheet 1	R125	H 4	sheet 2
C14	K 2	sheet 1	D20	J 5	sheet 2	R6	K 6	sheet 1	R126	H 6	sheet 2
C15	C 6	sheet 2	D21	G 5	sheet 2	R8	F 2	sheet 1	R127	H 2	sheet 1
C16	I 2	sheet 1	D22	I 4	sheet 2	R9	C 3	sheet 1	R128	I 1	sheet 2
C18	G 5	sheet 1	D23	F 3	sheet 2	R10	H 2	sheet 1	R129	I 2	sheet 2
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C41	G 6	sheet 2	D601	B 5	sheet 1	R34	J 2	sheet 1	R307	C 2	sheet 1
C42	F 6	sheet 2	D606	A 5	sheet 1	R35	G 4	sheet 1	R308	K 5	sheet 1
C43	G 6	sheet 2	D633	E 4	sheet 1	R36	J 2	sheet 1	R599	C 5	sheet 1
C44	I 2	sheet 2				R37	K 2	sheet 1	R600	B 5	sheet 1
C45	I 6	sheet 2	IC1	B 2	sheet 1	R38	K 2	sheet 1	R605	A 5	sheet 1
C46	I 4	sheet 2	IC2	B 6	sheet 2	R39	K 2	sheet 1	R607	B 5	sheet 1
C47	H 2	sheet 2	IC3	B 6	sheet 2	R41	D 2	sheet 2	R608	B 5	sheet 1
C48	H 4	sheet 2	IC4	D 1	sheet 1	R42	E 3	sheet 2	R609	C 3	sheet 2
C49	H 6	sheet 2	IC4	K 3	sheet 1	R43	K 4	sheet 1	R610	C 3	sheet 2
C50	F 2	sheet 1	IC5	F 5	sheet 1	R44	G 2	sheet 2	R613	C 4	sheet 2
C51	F 2	sheet 1	IC5	K 3	sheet 2	R45	G 2	sheet 2	R614	C 3	sheet 2
C52	G 5	sheet 2	IC6	F 1	sheet 1	R47	G 2	sheet 2	R615	D 3	sheet 2
C53	G 4	sheet 2	IC7	H 2	sheet 1	R48	G 2	sheet 2	R616	D 4	sheet 2
C54	F 5	sheet 2	IC7	C 4	sheet 1	R49	E 2	sheet 2	R617	D 4	sheet 2
C55	G 3	sheet 2	IC7	I 4	sheet 1	R50	D 2	sheet 2	R618	D 4	sheet 2
C56	G 4	sheet 2	IC7	H 1	sheet 1	R51	L 5	sheet 1	R619	C 4	sheet 2
C57	F 3	sheet 2	IC7	K 4	sheet 2	R52	J 4	sheet 1	R622	D 4	sheet 2
C58	F 3	sheet 2	IC8	B 5	sheet 2	R53	B 1	sheet 2	R623	D 5	sheet 2
C59	F 4	sheet 2	IC9	B 6	sheet 1	R54	K 6	sheet 1	R628	F 5	sheet 2
C60	F 5	sheet 1	IC9	K 5	sheet 1	R55	L 6	sheet 1	R629	F 5	sheet 2
C61	J 4	sheet 1	IC9	K 5	sheet 2	R56	L 4	sheet 1			
C62	J 4	sheet 1	IC10	K 5	sheet 1	R57	K 4	sheet 1	S1	G 5	sheet 1
C63	I 3	sheet 2	IC11	F 5	sheet 2	R58	L 3	sheet 1			
C64	C 3	sheet 1	IC12	F 3	sheet 2	R59	E 1	sheet 2	SR1	D 5	sheet 2
C65	B 6	sheet 2	IC13	F 1	sheet 2	R60	E 5	sheet 2	SR2	D 6	sheet 2
C66	C 6	sheet 2	IC14	D 6	sheet 1	R61	K 5	sheet 2	SR3	J 5	sheet 1
C67	C 6	sheet 2	IC15	H 5	sheet 1	R62	J 2	sheet 2	SR4	K 6	sheet 1
C68	B 4	sheet 1	IC15	K 3	sheet 2	R63	K 2	sheet 2	SR5	B 6	sheet 2
C69	B 3	sheet 1				R64	J 5	sheet 2	SR6	B 6	sheet 2
C70	A 4	sheet 1	J1	A 1	sheet 2	R65	J 5	sheet 2	SR7	D 6	sheet 2
C71	B 4	sheet 1	J2	A 4	sheet 2	R66	J 2	sheet 2			
C72	E 4	sheet 1	J3	B 2	sheet 2	R67	J 2	sheet 2	Z1	C 3	sheet 1
C73	C 3	sheet 1	J4	B 1	sheet 2	R68	J 5	sheet 2	Z2	J 6	sheet 1
C74	E 6	sheet 1	J5	J 4	sheet 2	R69	B 1	sheet 1	Z3	G 2	sheet 1
C75	B 2	sheet 1	J7	B 4	sheet 2	R70	F 6	sheet 1	Z4	J 6	sheet 2
C76	C 6	sheet 2	J8	B 5	sheet 2	R71	E 6	sheet 1			
C77	B 6	sheet 2	J9	B 3	sheet 2	R72	C 1	sheet 1			
C78	C 6	sheet 2				R73	D 2	sheet 1			
C79	B 6	sheet 2	L1	D 5	sheet 2	R74	C 1	sheet 1			
C80	D 6	sheet 2	L2	D 6	sheet 2	R75	C 1	sheet 1			
C81	D 6	sheet 2	L3	G 5	sheet 2	R76	G 4	sheet 2			
C82	C 6	sheet 2	L4	G 3	sheet 2	R77	G 3	sheet 2			
C83	J 2	sheet 2	L5	G 1	sheet 2	R78	F 6	sheet 2			
C84	G 1	sheet 2				R79	G 6	sheet 2			
C85	G 3	sheet 2	P1	K 1	sheet 1	R80	G 5	sheet 2			
C86	G 5	sheet 2	P2	L 4	sheet 1	R81	G 6	sheet 2			
C87	C 1	sheet 2	P620	C 5	sheet 2	R82	J 6	sheet 2			
C88	H 6	sheet 1	P621	C 5	sheet 2	R83	H 4	sheet 2			
C89	H 6	sheet 1	P626	E 5	sheet 2	R84	H 4	sheet 2			
C90	G 5	sheet 1	P627	E 3	sheet 2	R85	H 2	sheet 2			
C91	K 4	sheet 2				R86	H 2	sheet 2			
C92	H 2	sheet 2	Q1	F 2	sheet 1	R87	H 6	sheet 2			
C93	H 4	sheet 2	Q2	A 3	sheet 1	R88	H 6	sheet 2			
C94	H 6	sheet 2	Q3	L 2	sheet 1	R89	G 1	sheet 1			
C95	A 6	sheet 1	Q4	G 5	sheet 1	R90	G 2	sheet 1			
C96	D 2	sheet 1	Q5	I 2	sheet 1	R91	G 1	sheet 1			
C97	K 6	sheet 1	Q6	G 4	sheet 1	R92	G 1	sheet 1			
C100	C 6	sheet 2	Q7	K 2	sheet 1	R93	H 1	sheet 1			
C101	D 6	sheet 2	Q8	K 2	sheet 1	R94	G 2	sheet 1			
C109	B 3	sheet 1	Q9	I 2	sheet 1	R95	F 3	sheet 1			
C201	E 6	sheet 2	Q10	L 1	sheet 1	R96	F 3	sheet 1			
C202	E 4	sheet 2	Q11	K 4	sheet 1	R97	G 4	sheet 2			
C203	E 2	sheet 2	Q12	L 4	sheet 1	R98	F 4	sheet 2			
C204	C 6	sheet 1	Q14	K 6	sheet 2	R99	J 4	sheet 1			
C205	D 6	sheet 1	Q15	J 2	sheet 2	R100	J 4	sheet 1			
C206	C 2	sheet 1	Q16	J 5	sheet 2	R101	I 4	sheet 1			
C207	D 5	sheet 1	Q17	H 3	sheet 1	R102	J 4	sheet 1			
C208	J 3	sheet 2	Q18	G 3	sheet 1	R103	H 5	sheet 1			
C210	H 2	sheet 1	Q19	I 4	sheet 1	R104	H 4	sheet 1			
C604	A 6	sheet 1	Q20	J 3	sheet 2	R105	I 3	sheet 2			
C624	D 5	sheet 2	Q21	B 4	sheet 1	R106	J 3	sheet 2			
C625	D 5	sheet 2	Q22	H 2	sheet 2	R107	J 3	sheet 2			
C634	E 4	sheet 1	Q23	H 4	sheet 2	R108	I 4	sheet 1			
			Q24	H 6	sheet 2	R109	C 4	sheet 1			
			Q25	I 1	sheet 2	R110	C 4	sheet 1			
			Q26	I 1	sheet 2	R111	B 4	sheet 1			
D1	K 5	sheet 1									
D2	D 4	sheet 1									
D3	D 3	sheet 1									
D5	I 2	sheet 1									







FRAME

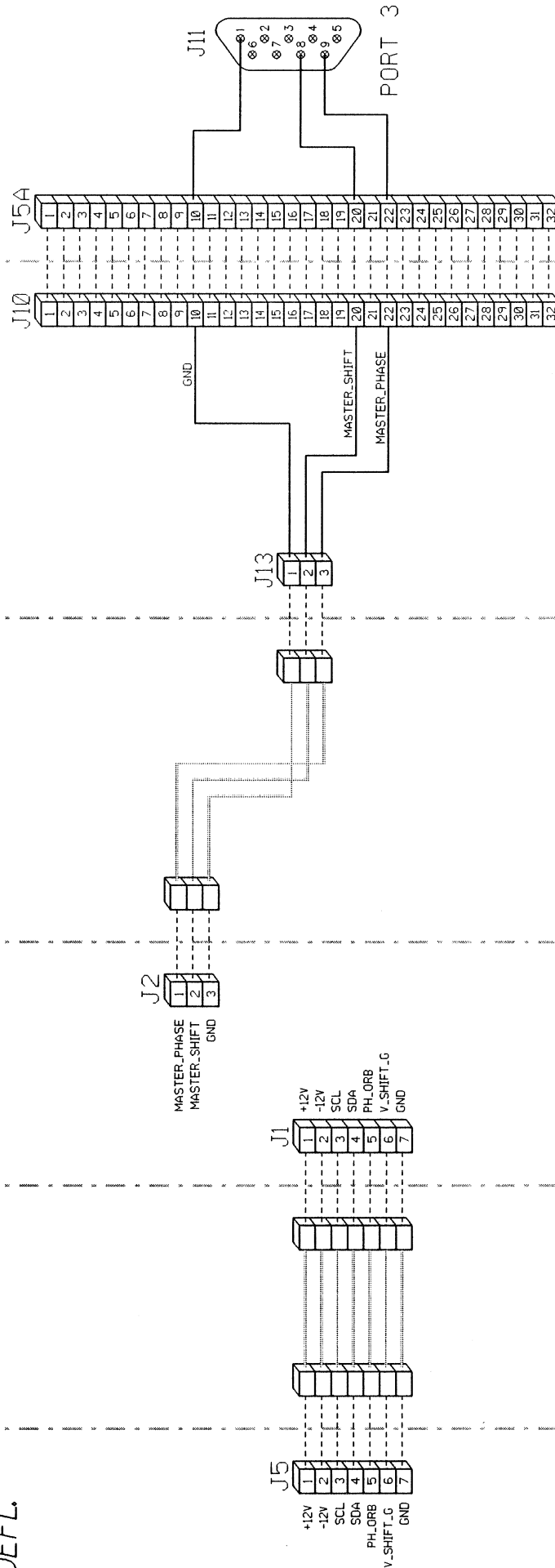
IBCL-LINK UNIT  
OR CONTRAST  
MODULATION

WIRE-UNIT

ORBITING  
MODULE

WIRE-UNIT

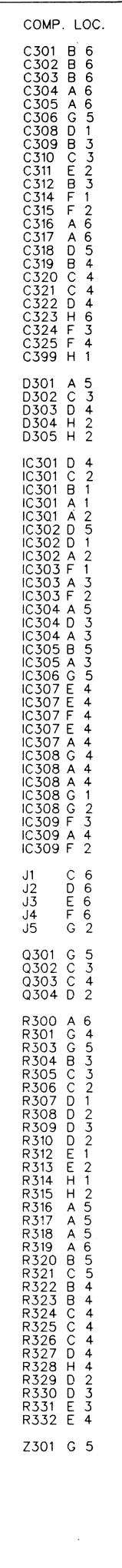
SUB-  
UNIT  
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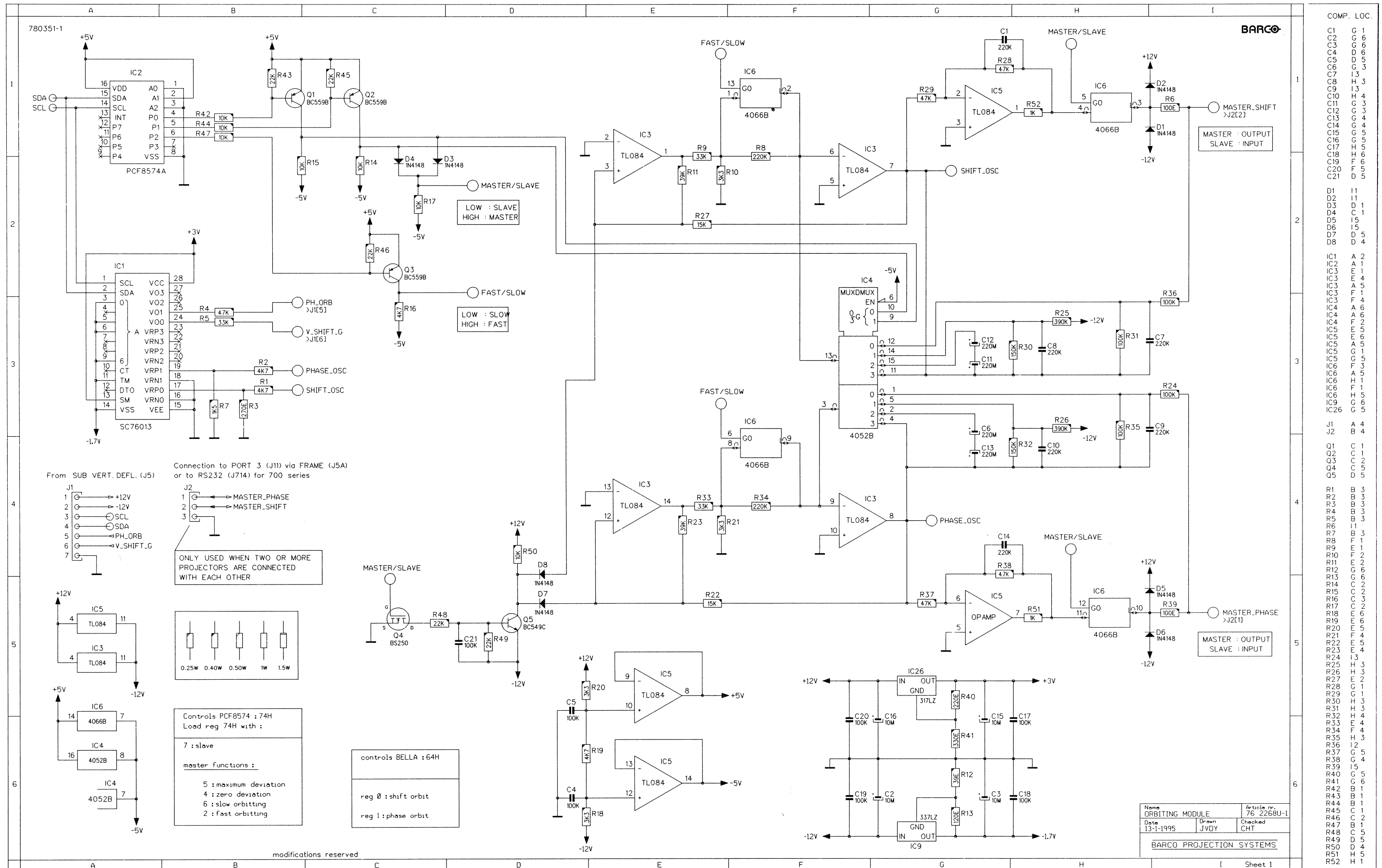
# ORBITING LINK

BARCO

Name ORBITING LINK		Article nr. 800 series
Date 13-01-1995	Drawn JVDY	Checked CHT
BARCO PROJECTION SYSTEMS		







## Adjustment procedure 'VERTICAL DEFLECTION+SYNC MODULE'

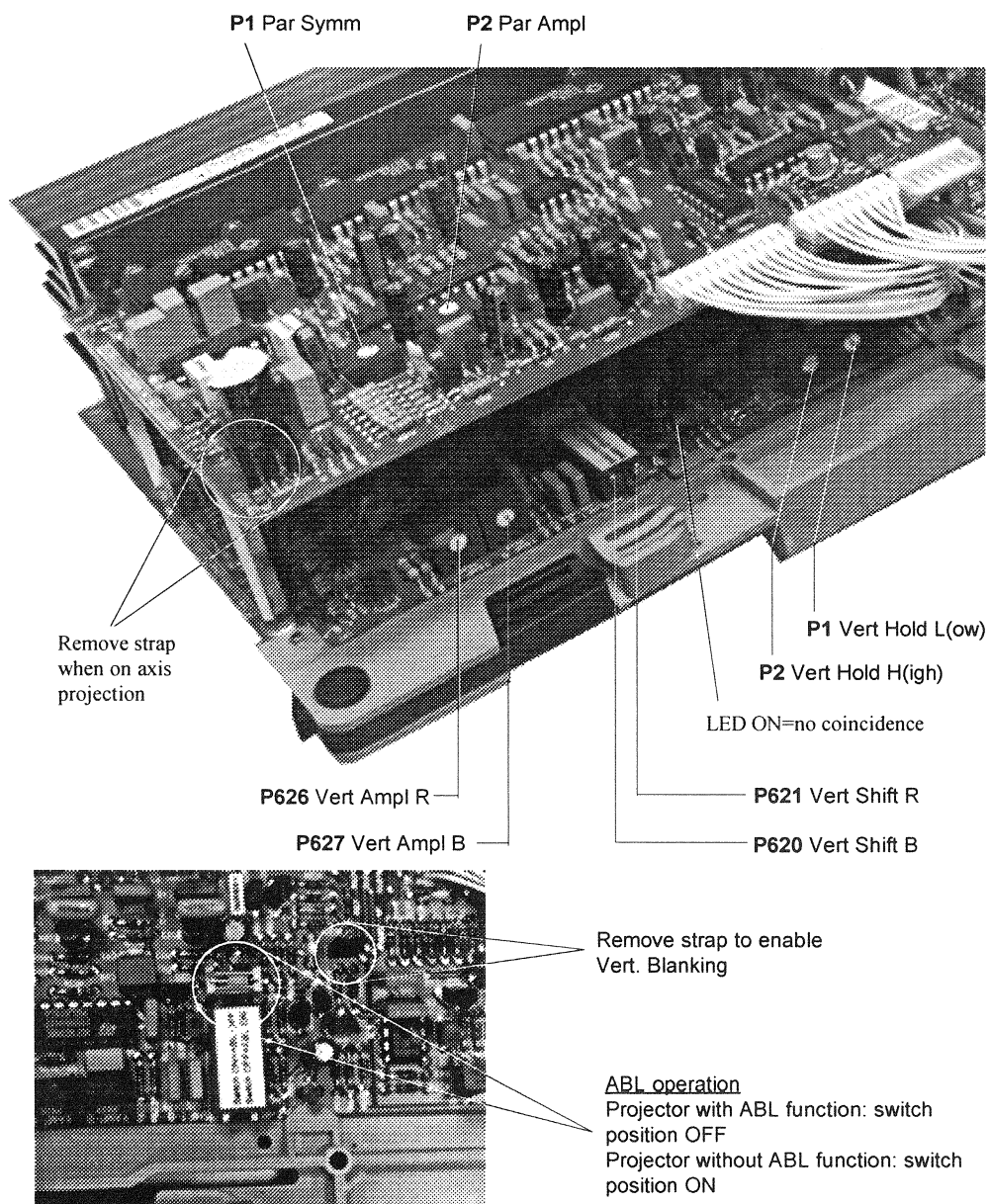
### Introduction

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

- a. Vertical HOLD L P1 and Vertical HOLD H P2
- b. Vertical SHIFT adjustment for RED - P621 and BLUE - P620 image
- C. Vertical amplitude correction for RED - P626 and BLUE - P627 image

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

- a. Vertical parabola symmetry P1
- b. Vertical parabola amplitude P2



## Adjustments on the main module

### a. Main Vertical SHIFT adjustment for RED and BLUE image

**Note:** These are factory set coarse alignments of vertical shift, to compensate for the shift caused by the stigmators on the CRT necks. These potentiometers also are used to minimize the range of the BELLA potentiometers for the vertical shift, allowing for a more accurate center convergence.

#### Preparation

Adjust the vertical raster centering controls for Red and Blue in their mid position. 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 vertical shift controls P621 for RED and P620 for BLUE to shift vertically the Red and Blue image until the horizontal center line coincides with this of the Green image.

### b. Vertical amplitude correction for RED and BLUE image

Adjust potentiometer P626 for the Red image and P627 for the Blue image to obtain the same vertical amplitude as the Green image.

### c. Vertical Hold I P1 - Hold II P2

#### Adjustment on the **lowest Vert. Frequency 37 Hz - P1**

- Projector has to operate on a signal with 37 Hz frame frequency
- Turn the potentiometer P2 in its mid-position
- Adjust P1 for synchronisation of the picture

#### Adjustment on the **highest Vert. Frequency 120 Hz - P402**

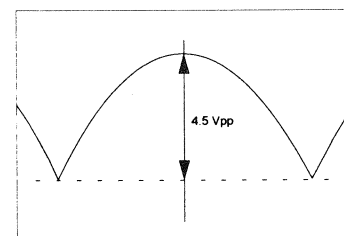
- Projector has to operate on a signal with 120 Hz frame frequency
- Adjust P2 for synchronisation of the picture

## Adjustments on the sub module

### Vertical parabola symmetry P1 and amplitude P2

#### Adjustment **Symmetry** of the vertical parabola P1

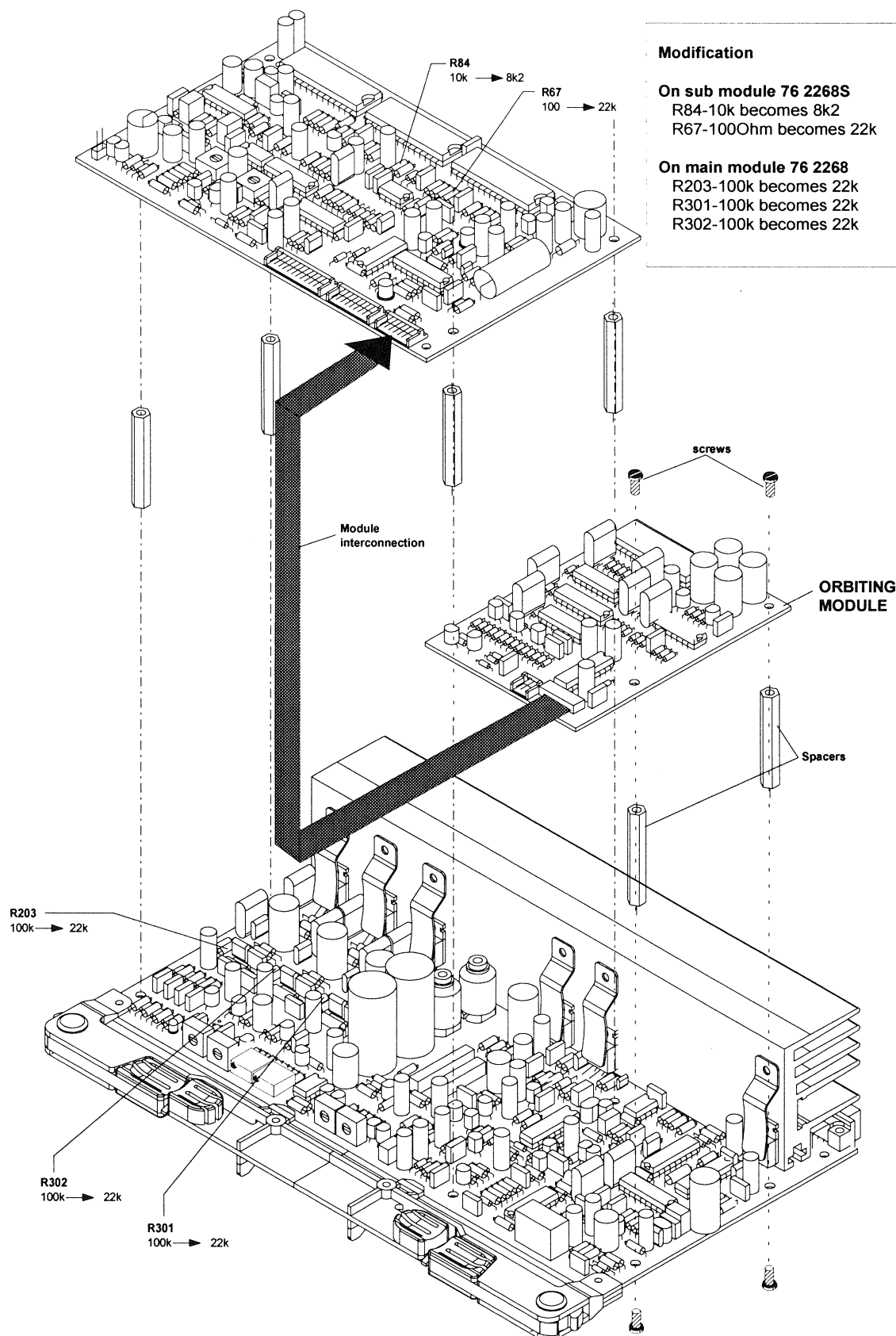
- Projector has to operate on a signal with standard frequency.
- Connect the oscilloscope to the resistor R29.
- Adjust P1 for a symmetrical curve of the parabola signal.



#### Adjustment **Amplitude** of the vertical parabola P2

- Projector has to operate on a signal with standard frequency.
- Connect the oscilloscope to the resistor R29.
- Adjust P2 for an amplitude of the parabola signal of 4.5 Vpp

## Mounting the ORBITING module 76 2268u





## TECHNICAL DESCRIPTION "UN SYNC + VERT DEFL" 7622685.

### Introduction.

On this board and its subunit we find :

- the sync separators
- the autolock circuits for driving the line and vertical oscillators
- the vertical power output stages
- the top / bottom blanking
- the preparation of the waveforms for the east-west correction.
- preparation of the horizontal drive pulses, including the phase and skew / bow.
- generation of the pulses for the ABL (Automatic Black Level).

A (Barco) customer-made IC, comprising four (4) digital potentiometers, and driven by an I<sup>2</sup>C bus is used to adjust waveforms and DC voltages.

### I. The vertical Oscillator.

#### a) Sawtooth oscillator ( free running ) :

The vertical sawtooth relaxation oscillator is built up around Q3 and Q8.

The +30 volts from the Switched Mode Power Supply board is stabilized at 24 volts by IC8 and charges up the capacitors C13 and C14 through P1 (Vert Hold for the lowest frequency) through R23 and R26.

As soon the emitter of Q3 reaches the voltage set by R38 / R39 the transistor Q3 starts conducting. As its collector current flows into the base of Q8, the latter saturates very qu

#### 1) By means of the composite sync :

The composite video (**VID**), composite sync (**CS**) or Hor Sync (**HS**) is, at any time, applied to pin 2 of IC14, a typical sync separator. The output pin 1 serves the digital PLL IC6 for all modes.

If D606 is in conduction (depends on the DC level of the input signal) the video composite also passes on to Q2, for serving the TDA2595. In this case D601 is blocked and the output pin 1 of the LM1881 is not used.

The TDA2595 is used as sync separator for video composite since its input is noise - integrating. In that case the transistor Q596 is saturated and D601 is blocked.

If the sync input is HS or CS, then, the LM1881 is used as sync separator since it has no integrator at the input.

The composite sync output HS / CS, pin 1, is proceeding to IC1 via a buffer Q2 (Q596 is not saturated then).

The output pin 9 of IC1 is providing vertical pulses which are now sent to the base of Q7. If we assume that the switcher Q6 is conducting (see later), the negative pulses on the collector of Q7 can trigger the vertical oscillator.

The oscillator can also be triggered by means of the vertical pulses **VS**ync, which come straight from an BNC input (via the differential input, at the base of Q4.

Note that an optional HDTV interface with tri-level sync may be connected to the J7 connector.

## 2 ) By means of the vertical pulses VSync, if applied separately.

These vertical pulses enter the board at contact 13 of the J4A connector and are capacitively coupled to the base of Q4.

The amplified negative pulses on the collector trigger the oscillator now via D10 / D7.

To prevent triggering via Q7, the fet Q6 is now blocked as follows:

Each time a VS pulse arrives on the base of Q4, capacitor C23 is charged via D9 / Q4. Consequently, the gate of Q6 is low and Q6 is blocked, to disconnect the emitter of Q7.

## c) Barco made IC : 4 x digital controlled potentiometer.

The voltage or waveform, applied between **VRPx** and **VRNx**, the two extremities of a potentiometer, is adjustable in 128 steps through the remote control (I2C bus). The output, or, the 'slider' voltage is available at **VOx**. The corresponding pins are eg. VRP1, VRN1 and VO1.

We find **4** of such potentiometers **in one chip**, and there are three of these chips on the subunit: IC1, IC2 and IC3, which we will meet in the explanations hereafter.

The output waveform or voltage is controlled by the **SCL** (Serial Clock) and **SDA** (Serial Data) lines which are connected to the microprocessor of the controller board.

The address info, arriving via the data SDA line, is identified by a hardware connection of the address pins of the chip (the address pins are differently connected for each chip).

Obviously, as there are 4 potentiometers, the address of the chip is followed by a 'slave- address' to drive the requested potentiometer in the chip itself.

## d) Vertical Linearity control.

The V PAR (Vertical Parabola) signal at the emitter of Q2 is divided by R23 / R100 and applied to the potentiometer "1" of IC2 (pin 19). The adjusted parabola at output VO1, pin 25, is now sent to the non-inverting input of IC8 whereas the full amplitude of the parabola is applied to the inverting input of the OPAMP (voltage difference amplifier). The output is then added to the V ST (Vertical Sawtooth) at pin 17 of the same IC2.

## e) The vertical autolock circuit - Generation of ABL pulses.

This circuit is built up around Q19 / OP AMP in TL084 (IC7) / 353 (IC9), Q11 and Q12.

The vertical sync pulses are taken at the collector of Q7 and differentiated by C9 / R16.

This differentiation produces a negative, followed by a positive pulse and it is this positive pulse that triggers the transistor Q19.

The output of the OP AMP, behaving as a voltage comparator, is fed back to the base of the transistor in order to prevent it from retriggering as long this output is low .

However, the negative transition of this output voltage is slightly delayed by C30 not to disturb the trigger pulse.

The non-inverting input is pulled up to the +12 Volts line by R108 and a capacitor C31 is connected to ground.

When no trigger pulses are applied to the base of Q19, pin 12 is at +12 volts and obviously the output is equally at 12 volts.

Whenever a trigger pulse (vertical pulse) is applied on the base, the capacitor C31 is discharged via Q19, and the output pin 14 switches to the -12 volts.

As pin 12 is pulled up to the +12 volts, the capacitor C31 charges up again to the +12 volts and from the moment the voltage equals the voltage of the inverting input, the output switches high again.

D38 gets blocked and the base of Q19 is free for a next trigger pulse.

When the next trigger occurs ( next vertical pulse), the cycle starts all over again.

The time between two consecutive pulses, being the vertical period, determines the time the output is high as the time the output is low is invariable and determined by the time constant C31/R108 and the voltage set at pin 13.

The duty cycle of this squared waveform is thus proportional with the vertical period.

This squared waveform is now clamped at ground by D35 as only to allow the positive part to charge the capacitors C62/ C61(= integration).

D34 and D36 provide a rapid change in ' both directions' of the voltage across these capacitors.

The resulting voltage at the input of the buffer IC9 (353) is proportional with the vertical period, and consequently a measure of the vertical frequency ( = \_\_\_\_\_ frequency to voltage conversion).

When the vertical frequency increases, the voltage on C61 decreases, which results in a less conducting Q11 and obviously a decrease of the **charging current** of Q12 (voltage to current conversion).

The **Vert HOLD- H** (P2) allows an adjustment of the gain and thus of the highest frequency that can be locked by this system .

## Generation of ABL pulses :

Two pulses are generated with the two monoflops in IC15. The first monoflop is triggered with V\_ST and the second one with the inverted output pulse of the first one.

\*ABL DEFL PULSE : this pulse causes an overshoot in the vertical deflection at the end of the vertical retrace time in order to make invisible the spot, as, during this time the blanking is disabled.

\*ABL PULSE : this pulse determines the exact time of implementation of the black current and the measurement of this implemented current.

## **f) Vertical output stages - Vertical shift - Vertical amplitude.**

### **Vertical amplitude - ABL Deflection Overshoot:**

The vertical sawtooth at the emitter of Q10 is leaving the main board and reaches the subunit to be applied to IC2 (VRN0 and VRP0). The output is VO0 (pin 24) and is coming back to the board at J4 (4) of the edge connector.

It is now buffered twice with Q27 and Q28.

The switcher Q29 at the base of Q28 is driven with the ABL DEFL PULSE in order to cause an overshoot in the vertical deflection during the time the ABL circuit is active.

It is now capacitively coupled to the inverting inputs of the power amplifiers IC11 / IC12 / IC13 together with a DC-voltage (Vertical Shift voltage).

The amplitudes for the red and blue can be adjusted by P3 and P4 to allow a matching with the green and to minimize the convergence corrections.

### **Vertical shifts :**

These DC voltages are adjusted in IC3 of the subunit (outputs 25, 26, 27).

The big tolerances on the deflection units and the stigmators require a coarse alignment of the shift for red and blue in order to improve the resolution of the digital potentiometers.

This pre-alignment or coarse alignment is done by the multiturn potentiometers P620 and P621. The voltages applied to the extremities of these potentiometers are inversed when moving the vertical scan inversion switch (switching from ceiling to table or vice versa).

An " VS I " info is therefore sent to the switching transistors Q611 / Q612.

This "VS I " is at ground level or not at ground (= 'open'). It is a info coming from the contact of the vertical scan inversion switch on the frame.

One of the two transistors is in conduction, depending on the voltage at Q611's base.

When the green raster is moving on the screen, the red and blue rasters move also allowing a quick adjustment of the three colours.

### **Vertical output stages :**

The amplified sawtooth output currents flow in the respective scan coils and find their way back to ground through the feedback resistors R44 / R97 / R79.



The amplitude of the waveforms across these resistors is proportional with the vertical amplitude and can obviously be utilized as feedback to stabilize the vertical amplitude.

The TDA8172 has an internal boost up circuit which allows a short vertical retrace time by boosting the supply voltage during the retrace time.

At the end of the scan time, the voltage across the capacitors C35, C55 and C52 is switched in series with the supply voltage of +8 volts by means of a transistor in the chip.

As a result, the voltage during flyback is approximately  
 $8 + (8 \times 17) = 33 \text{ volts}$ .

This boosting up means a possible **rapid change** of the current in the coils in order to realize a short flyback time.

## g) Vertical scan fail detection.

The sawtooth waveforms across the feedback resistors of 2E2 are capacitively coupled to the base of a transistor. The conduction time of these transistors is proportional with the amplitude of the sawtooth. In normal scanning conditions, the average DC voltages on the three collectors is too low to forward bias Q14. As soon one amplitude is too low or absent, Q14 is saturated and the SF line is dropped to ground level.

On the other hand, the diode D16 and the saturated Q14 **cause a permanent conduction of the Q15** transistor (via D16).

The **VBL** (Vertical Blanking) output is obviously permanently high and this means also a total blanking or **cut-off of the three crt's**.

## h) Vertical blanking during retrace :

Vertical blanking pulses are picked up at pin 6 of the blue output stage and are applied through C63, D41 and R306 at the base of Q20. D41 prevents the BL pulses to penetrate into the vertical output stages.

On the same base arrive the pulses **BL** for the top and bottom blanking. These pulses are adjusted on the subunit (see further top / bottom blanking).

Tr Q20 drives Q15 and the **VBL** pulses leave at A,C(26) of the J4B edge connector to the decoder, where they are mixed up with the horizontal blanking pulses.

A differentiated vertical sawtooth is added to the base of Q15 in order to blank from the start of the flyback. Indeed, the flyback pulse from the output stage is slightly delayed.

## II. EAST - WEST Correction a) Generation of a frequency independent vertical sawtooth :

This generator is built up around Q4 / Q11 / Q10 / IC7. The vertical sawtooth "VST" is buffered and then differentiated to get pulses driving on and off the switching Fet Q10.

When this Fet is on, the output is shorted to the input. This input is approximately ground level since the other input of the OPAMP, pin 10, is connected to ground. The time that Q10 is not in conduction, C18 is charged up from the output voltage at pin 8 via D6 / R46 towards the negative voltage at pin 14 of IC7. The charging current depends obviously upon this negative voltage and the latter is the averaged sawtooth obtained by integration.

By doing this, a constant sawtooth amplitude of 1.9Vpp is got at pin 8. The sawtooth starts from 0 volts due to the clamping transistor Q10.

### b) Trapezoidal distortion correction (on the subunit) :

The sawtoothed waveform at pin 8 of IC7, is applied to the inverting pin 2 of IC7 in order to obtain two opposite phase sawtoothed waveforms.

These two signals are now entered into a digital potentiometer in IC1 (pins 16 / 17 or VRN0 and VRP0). The corresponding output is VO0 and via R45 the adjusted sawtooth (in amplitude and phase) reaches the adder- amplifier TL084, pin 5.

### c) Parabolic or pincushion distortion correction :

To generate the parabolic waveform, a multiplier is used.

The MC1495 is a wideband monolithic four-quadrant multiplier. The output is a linear product of the two input voltages.

In this case the two input signals are the same ( a sawtooth voltage).

One of the sawtooths is applied between pins 4 and 8, whereas the second (and same sawtooth) one is applied between pins 9 and 12.

But, since the pins 4 - 12 and 9 - 8 are connected together, the output is a nice parabolic shaped waveform ( = product of two linear ramps).

The open collector outputs are pulled up to the + supply line and sent to an OPAMP in IC8

The parabolic signal is then capacitively coupled to an inverter - OPAMP. The two opposite phased signals are then sent to a digital potentiometer in IC1 for the pincushion correction.

The output VO2 is now mixed up with the previously discussed sawtooth output and passing the line frequency depending amplifier described hereafter.

The parabolic waveform is also amplified by Q3 and led out by the buffer Q2 to the focus board.

### c) Frequency depending correction :

The gain of the OP AMP in IC7 is variable and depends on the divider R31 / Q1.

The Fet Q1 is biased by the output of another OP AMP (integrator-comparator) in IC7 (pin 1).

The DC level of the non-inverting input, pin 3, is set by R30 / R24. This DC voltage now is amplified by a factor determined by the ratio R31 / Q1. The east - west waveform obviously 'undergoes' the same gain.

The output now ( sum of DC and east-west waveforms) is sent to a 'comparator' in IC7. But the east - west waveform is filtered out by the R55 / C28 network. This resulting amplified dc voltage is compared to a portion (R28 / R22) of the HTHD' voltage which is applied to the non-inverting input. The output of the comparator is sent now to the gate of Q1 via a filter network.

This filter network also depends on the state of Q306. The VSI line can switch on and off Q306 in order to add or disconnect R309 / C304. There is thus a correction depending upon the ceiling table position.

NOTE : The J6 contacts must be shorted for an off-axis projection.

**For IN - AXIS projection it is recommended to remove the strap to guarantee an optimum geometry.**

This gate voltage changes or adapts the gain of the named amplifier as long as the voltages at the comparator inputs are not the same.

An increase of the line frequency means also an increase of the +HTHD' voltage, thus an increase of pin 5 voltage, so, a change of the Q1 / R31 ratio or of the gain.

By this looped circuit we obtain an automatic tracking of the east-west correction with the line frequency without any alignment.

### d) Power amplifier :

The sum of the corrections is now sent back to the motherboard to be amplified by IC10 ( TDA2030) before reaching the 'hor. defl.' board to modulate the scan voltage HTHD for the horizontal deflection circuits.

### III. Phase control - Skew and Bow

#### Introduction

The midline bow and skew dynamic corrections are added to the DC phase control of the picture. These corrections change in a dynamic manner the horizontal phase of the picture during the vertical scan.

The position of the HS pulse at pin 4 of the TDA2595 is determined by the position of the pulse sent to pin 2 (Flyback Pulse Simulation). The second PLL of the TDA2595 adjusts then the Hor drive output pin 4 " back in the time" in accordance with the position of the simulated pulse.

The original pulse may now be delayed in the time to determine the start of the scanning with respect to the reference video (= phase control).

This delay happens in two steps by means of two monoflops. The first one realizes the phase control itself. The second one the skew and bow corrections. The width of the final pulse "H PULS" is significant for the total delay and the falling edge of this pulse triggers a third monoflop IC5 on the main board which also sets the width of the real horizontal drive pulse.

The same pulse H PULS' is also sent to the microprocessor board to lock the text and generate the pixelclock.,

## a) Phase control (IC12)

The HS pulse at pin 4 triggers the monoflop IC12 on the positive going edge. The absolute value of the phase control may be lower for the high scanning line frequencies than for the low scanning frequencies. This is automatically realized by a loop system :

The pulse train at pin 5 's output is integrated with R78 / C43. The obtained DC voltage across C43 is proportional with the width of the pulses (= adjusted phase) and the line frequency. The required phase shift is applied to the base of Q7 via R84 coming from IC2.

The voltage difference between the two collectors of Q7 is now the base-emitter voltage of Q6.

This transistor is the current source for pin 7 (Rx / Cx) and automatically adapts the length of the output pulse to the line frequency.

The width of the output pulse is regulated by the current generator as long as the voltages at the bases of Q7 are not the same (balanced).

## b) Skew and Bow Corrections

The adjusted sawtooth (skew) and parabolic (bow) waveforms are added with R44 and R42, and sent to an inverting OP AMP in IC8.

The monoflop in IC12 is triggered on the positive going edge of the pulse of pin 12. The width of the output pulse is modulated by the waveform applied via D16. Here again, the range is tracked with the line frequency by applying the HTHD' voltage through R77 / R75.

The output pulse of pin 4 is now inverted with Q8 and the "H PULS" is sent to the last monoflop (IC5) in the row located on the main board.

## V. Horizontal oscillator - Horizontal autolock.

### a) Horizontal autolock :

The sync separator IC14 serves Q1 with composite sync.

The amplified sync is then split to the PLL (IC6) and transistor Q17 of the coincidence detector.

The line oscillator in the TDA2595 is locked to its exact frequency by a PLL in the chip. Unfortunately, the latter has a very limited lock range of approx. 1.2 khz only and cannot lock the range from 15 to 92 khz.

An extra PLL is utilized, the **4046** (IC6), for the **coarse alignment**. The fine tuning is performed by the PLL in the TDA2595 itself.

This PLL - IC consists of two phase comparators, and a VCO.

For this application the second phase comparator only is used, the VCO is not used either.

The 'signal input' (pin 14) is the line oscillator of the TDA2595 (squared hor. drive output of the TDA2595) and the 'comparator input' (pin 3) is the composite sync having been inverted by Q1.

The corresponding output is pin 13, a three-state output, and, initially biased at 6 volts with R89 / R92.

If the output is 'high impedant or open' (in the locked state) the voltage is **set at 6 volts** with R92/89.

This voltage is buffered by a voltage follower in IC7 and then reaching pin 5 of another OPAMP, acting as a voltage comparator, in IC7.

The other input, pin 6 of IC7 is set at approximately 7.7 volts with R94 / R90.

Consequently, the **COIN NEG (pin 7) is low in the locked position.**

### b) Line oscillator lower than the horizontal sync :

If we assume that the local oscillator frequency is lower than the hor. sync pulses, then, the voltage on C8 decreases (pull down state). This voltage is now buffered and sent to pin 5 of IC7. But, because of the zener Z3, this voltage cannot decrease and stays at approximately 6 volts.

The other pin 6 is initially at 7.7 volts (divider R90/R94). This voltage now decreases because the transistor Q17 discharges the capacitor C97 as follows:

The squared hor. drive of pin 4 switches on and off Q18.

When the frequency of the local line oscillator is different from the hor sync (as we assumed), some pulses arrive on the base of Q17 at the moment Q18 is not saturated.

These hor sync pulses turn on Q17 and C97 is discharged. The voltage at pin 6 drops and becomes lower than the other input, pin 5.

The output **COIN NEG (pin 7) switches 'high' in the unlocked state.**

The gate of the mosfet Q9 is now positive and Q9 conducts to connect the output pin 8 of the PLL (IC7) to the inverting input pin 2 of the next 'proportional - integrating' OP AMP.

The decreasing voltage output of the PLL is inverted by IC7 and transistor Q21 draws more current out of pin 14 of the TDA2595 in order to increase the frequency of the line oscillator.

As the line oscillator frequency is increasing, the PLL output increases also.

This continues up to the moment there is coincidence between the hor. drive and the hor. sync at the base of Q17.

Once coincidence is reached, the voltage at pin 6 is again 7.7 volts and the state of the Mosfet Q9 changes again to a stable and blocked position.

All this means, we have reached now the capture range of the PLL in the TDA2595. From now onwards the PLL in the TDA2595 takes over as follows :

As long there is no coincidence, Q33 is blocked and the PLL output pin 17 is disconnected from the VCO input pin 14. Q33 is closed the moment there is coincidence.

The line frequency is fine tuned by the PLL output pin 17 of the TDA2595, as long this PLL output has not reached the 6 volts installed at pin 3 of IC7.

Therefore, the pin 17 output is sent to the same pin 2 of the integrating OP AMP.

In the locked state of the PLL of the TDA2595 this output is indeed 6 volts.

Any change in frequency is now compensated or corrected by the PLL of the TDA2595, and the 4046 is switched off.

Above circuit does not require any alignment as it is completely self-aligning, and guarantees a correct locking to the center of the lock range of the PLL system in the TDA2595.

## c) Line oscillator higher than the hor sync :

A similar explanation is valuable here, although, in this case the PLL's output is increasing now. The zener diode Z3 does not limit the voltage because the voltage across it is not 6 volts. Pin 5 'follows' the PLL output.

As there is no coincidence as well, the other input of the comparator goes down resulting in a 'high' output for pin 7.

Q9 is turned on and the PLL output can correct the line oscillator frequency.

## VI. Adjustable TOP/BOTTOM BLANKING.

On the subunit, blanking pulses are generated for an adjustable blanking of the top and the bottom of the picture by the user.

To achieve a high accuracy, the sawtooth is passed into a so-called '**dead band response amplifier**' built up around an OP AMP in IC8.

The sawtooth is entered at pin 9 of IC8. The output is inverted and the ramp is steepened at the start and the end.

Two clipping levels are installed by clamping circuits in order to obtain a complete feedback between these levels (= center of the screen).

As soon the first clipping level is reached, the output is invariable. and obviously no change any more in the output is noticed.

The transformed waveform is now sent to two level detectors in IC9.

The voltage clipping levels of the other inputs of the comparators are regulated by the potentiometers in IC2 and IC3.

## VII. Simulation of the Fly-back pulse for the PLL of the TDA2595.

By means of the monoflops in IC4 a 'simulated' line (flyback) pulse is generated. The first monoflop introduces a small delay for the pulse and the second one determines the width.

The introduced delay is used to 'mislead' the PLL and consequently to allow a 'negative' phase alignment. Indeed, this phase comparator (PLL) determines the phase of the squared output at pin 4.

It normally has to compensate for the delays in the power switching of the deflection circuits. If we can mislead this PLL by giving a 'wrong' info, the hor. output at pin 4 is anticipating the reference (video).

This allows now a range for the phase going from a 'negative' phase shift to a positive one.

## VIII. BLANKING - COINCIDENCE.

In the event of a non - coincidence, the transistor Q16 gets in complete saturation since the **COIN NEG** signal is at a high level.

This results in :

- Led D20 comes on to show the non - coincidence situation.
- if the strap J5 is in position, the transistor Q15 is also in saturation and causes a total blanking of the three crt's.



# Sync+Vertical Deflection module

R7622695

## Parts listing Sync+Vertical Deflection module R7622695

SIT.	ITEM NO.	DESCRIPTION	QUANTITY	SIT.	ITEM NO.	DESCRIPTION	QUANTITY
110	R133039	SPR L 8 D 4 D 1.2 C	5	C 43	R113724	C POMERA 100N K 63E2	
90	R133074	Q ACC ISO SIL600 W 30	0,15	C 44	R113729	C POMERA 270N K 63E2	
				C 45	R113729	C POMERA 270N K 63E2	
80	R3133921	J MD JMP P 1 E1SN	1	C 46	R113729	C POMERA 270N K 63E2	
	R34217004	WU UL1007 AWG24 ST BK 40	1	C 47	R1137171	C POMERA 27N K100E2	
	R34217005	WU UL1007 AWG24 ST BK 50	1	C 48	R1137171	C POMERA 27N K100E2	
	R3484096	CD CT FTMT P 9 140	1	C 49	R1137171	C POMERA 27N K100E2	
	R3484124	CD CT FTMT P12 140	1	C 50	R113724	C POMERA 100N K 63E2	
				C 51	R112362	C N750MI 100P G100E2	1
50	R3631049	SCR D933 M 3 X 6 XIC	14	C 52	R111488	C EL RA 220M Z 40E2 85	1
40	R3631059	SCR D933 M 3 X 8 XIC	3	C 53	R113724	C POMERA 100N K 63E2	
150	R367699	RVT CHB D2.38L6.35 P A	6	C 54	R113728	C POMERA 220N K 63E2	
				C 55	R111488	C EL RA 220M Z 40E2 85	1
				C 56	R113728	C POMERA 220N K 63E2	
100	R722276	LOCK PJ49 PCB UN CPL	1	C 57	R112737	C CE MI 680P K100E2	1
	R762268S	UN VER+S PJ49 G801 V_HOLD	1	C 58	R113728	C POMERA 220N K 63E2	
				C 59	R112737	C CE MI 680P K100E2	1
				C 60	R1137161	C POMERA 22N K100E2	
70	R802628	Q ACC SPG 1X 3.1	6	C 61	R111550	C EL RA 4M7M 50E2 85	
10	R802644	HTSNK PJ49 VER	1	C 62	R111550	C EL RA 4M7M 50E2 85	
20	R802645	HTSNK PJ49 VER FIX LATH	1	C 63	R111550	C EL RA 4M7M 50E2 85	
30	R805147	FRM PJ49 VER SCR N FIX	1	C 64	R114068	C POMERA 10N M 63E2	1
				C 65	R111531	C EL RA 10M M 35E2 85	1
60	Z3676041	SPR L37 H 5,5 M3 BIN	4	C 66	R113724	C POMERA 100N K 63E2	
C 1	R111487	C EL RA 100M Z 40E2 85	1	C 67	R111531	C EL RA 10M M 35E2 85	
C 2	R113730	C POMERA 330N K 63E2		C 68	R111477	C EL RA 100M Z 25E2 85	
C 3	R112743	C CE MI 2N2K100E2		C 69	R115928	C PP RA 3N3J 63E2 85	1
C 4	R111531	C EL RA 10M M 35E2 85		C 70	R114068	C POMERA 10N M 63E2	1
C 5	R111678	C EL BRA 10M M 25E2 85		C 71	R113724	C POMERA 100N K 63E2	
C 6	R111550	C EL RA 4M7M 50E2 85		C 72	R111469	C EL RA1000M M 16E2 85	1
C 7	R112763	C CE MI 10N U 63E2	1	C 73	R114087	C POMERA 470N M 63E2	
C 8	R113724	C POMERA 100N K 63E2		C 74	R112363	C N750MI 120P G100E2	1
C 9	R112762	C CE MI 4N7U100E2		C 75	R113724	C POMERA 100N K 63E2	
C 10	V114098	C POMERA 2M2M 50E2 100	1	C 78	R113724	C POMERA 100N K 63E2	
C 11	R113728	C POMERA 220N K 63E2		C 79	R111531	C EL RA 10M M 35E2 85	
C 12	R113728	C POMERA 220N K 63E2		C 80	R1114909	C EL RA1000M M 50E3 105	1
C 13	R114085	C POMERA 330N K 63E2	1	C 81	R1114909	C EL RA1000M M 50E3 105	1
C 14	R114085	C POMERA 330N K 63E2	1	C 82	R111531	C EL RA 10M M 35E2 85	
C 15	R111531	C EL RA 10M M 35E2 85		C 83	R112743	C CE MI 2N2K100E2	
C 16	R111546	C EL RA 1M M 50E2 85		C 84	R112763	C CE MI 10N U 63E2	
C 18	R111531	C EL RA 10M M 35E2 85		C 85	R112763	C CE MI 10N U 63E2	
C 19	R113724	C POMERA 100N K 63E2		C 86	R112763	C CE MI 10N U 63E2	
C 20	R111531	C EL RA 10M M 35E2 85		C 87	R111476	C EL RA 47M M 25E2 85	1
C 21	R115936	C PP RA 6N8J 63E2 85	1	C 88	R115940	C PP RA 10N J 63E2	1
C 22	R111550	C EL RA 4M7M 50E2 85		C 89	R1159161	C PP RA 1N J100E2 85	
C 23	R111550	C EL RA 4M7M 50E2 85		C 90	R112739	C CE MI 1N K100E2	1
C 24	R112737	C CE MI 680P K100E2	1	C 91	R113724	C POMERA 100N K 63E2	
C 25	R113728	C POMERA 220N K 63E2		C 92	R112739	C CE MI 1N K100E2	
C 26	R113728	C POMERA 220N K 63E2		C 93	R112739	C CE MI 1N K100E2	
C 27	R112737	C CE MI 680P K100E2	1	C 94	R112739	C CE MI 1N K100E2	
C 28	R112737	C CE MI 680P K100E2	1	C 95	R113724	C POMERA 100N K 63E2	1
C 29	R113724	C POMERA 100N K 63E2		C 96	R113724	C POMERA 100N K 63E2	
C 30	R113720	C POMERA 47N K 63E2		C 97	R111466	C EL RA 100M Z 16E2 85	1
C 31	R114079	C POMERA 100N M 63E2		C100	R111531	C EL RA 10M M 35E2 85	1
C 32	R113724	C POMERA 100N K 63E2		C101	R111531	C EL RA 10M M 35E2 85	
C 33	R112364	C N750MI 150P G100E2		C109	R113724	C POMERA 100N K 63E2	1
C 34	R111476	C EL RA 47M M 25E2 85	1	C201	R113724	C POMERA 100N K 63E2	
C 35	R111488	C EL RA 220M Z 40E2 85	1	C202	R113724	C POMERA 100N K 63E2	
C 36	R112366	C N750MI 220P G100E2	1	C203	R113724	C POMERA 100N K 63E2	
C 37	R111678	C EL BRA 10M M 25E2 85	1	C204	R113724	C POMERA 100N K 63E2	
C 38	R112363	C N750MI 120P G100E2	1	C205	R113724	C POMERA 100N K 63E2	
C 39	R112365	C N750MI 180P G100E2	1	C206	R1115695	C EL RA 10M M250E2 85	1
C 41	R113728	C POMERA 220N K 63E2		C207	R113730	C POMERA 330N K 63E2	
C 42	R112737	C CE MI 680P K100E2	1	C208	R114068	C POMERA 10N M 63E2	1
				C210	R114068	C POMERA 10N M 63E2	1

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C604	R113724	C POMERA 100N K 63E2	1	J 2	R313525	J EUR2C MBS P64 E1C2S 1,6	1
C624	R113724	C POMERA 100N K 63E2		J 5	R3132862	J MD1 MBT P 2 E1SN	1
C625	R113724	C POMERA 100N K 63E2		J 7	R313926	J CT H MBT P 6 M2SN	1
C634	R112763	C CE MI 10N U 63E2		J 8	R313922	J CT H MBT P 2 M2SN	1
				J 9	R313930	J CT H MBT P10 M2SN	1
D 1	R131637	D R BA158 600400 DO7		J100	R3132845	J CIS MBS P 5 R1SN LONG	1
D 2	R131621	D S 1N4148 075150 DO35		J102	R3132845	J CIS MBS P 5 R1SN LONG	1
D 3	R131621	D S 1N4148 075150 DO35					
D 5	R131621	D S 1N4148 075150 DO35		L 1	R305913	CH MNS AX 12 UH 3A	1
D 6	R131621	D S 1N4148 075150 DO35		L 2	R305913	CH MNS AX 12 UH 3A	1
D 7	R131621	D S 1N4148 075150 DO35		L 3	R3061222	CH AX NS 1.5 UH	1
D 8	R131621	D S 1N4148 075150 DO35		L 4	R3061222	CH AX NS 1.5 UH	1
D 9	R1316361	D Y BAT85 030200 DO34		L 5	R3061222	CH AX NS 1.5 UH	1
D 10	R1316361	D Y BAT85 030200 DO34					
D 11	R131637	D R BA158 600400 DO7		P 1	R106836	R TCE V500K K 0W5 S10SS	1
D 12	R131637	D R BA158 600400 DO7		P 2	R106833	R TCE V100K K 0W5 S10SS	1
D 13	R131637	D R BA158 600400 DO7		P620	R107534	R MCE H100K K 0W75 M20SS	1
D 14	R131621	D S 1N4148 075150 DO35		P621	R107534	R MCE H100K K 0W75 M20SS	1
D 15	R131646	D R 1N4007 10201A DO41		P626	R106827	R TCE V 2K K 0W5 S10SS	1
D 16	R131621	D S 1N4148 075150 DO35		P627	R106827	R TCE V 2K K 0W5 S10SS	1
D 18	R131621	D S 1N4148 075150 DO35					
D 19	R131621	D S 1N4148 075150 DO35		PC	R780443	PCS PJ53 V700 SYN PHDETSW	1
D 20	R131662	D LED D3 T RD	1	PC	R780017	PCD PJ49 801 VER	1
D 21	R131637	D R BA158 600400 DO7					
D 22	R131621	D S 1N4148 075150 DO35		Q 1	R1314182	Q BC559C P SS TO92	
D 23	R131646	D R 1N4007 10201A DO41		Q 2	R1314295	Q BC549B N SS TO92	
D 24	R131621	D S 1N4148 075150 DO35		Q 3	R1314181	Q BC559B P SS TO92	1
D 25	R131637	D R BA158 600400 DO7		Q 4	R131411	Q BC549C N SS TO92	
D 28	R131621	D S 1N4148 075150 DO35		Q 5	R131411	Q BC549C N SS TO92	1
D 30	R131621	D S 1N4148 075150 DO35		Q 6	R132910	Q BS170 FN SS TO92	1
D 31	R131637	D R BA158 600400 DO7		Q 7	R131411	Q BC549C N SS TO92	
D 32	R131637	D R BA158 600400 DO7		Q 8	R1314072	Q BC547A N SS TO92	1
D 33	R131646	D R 1N4007 10201A DO41		Q 9	R1314651	Q BF245B FN SS TO92	1
D 34	R131621	D S 1N4148 075150 DO35		Q 10	R131411	Q BC549C N SS TO92	
D 35	R1316361	D Y BAT85 030200 DO34		Q 11	R1314295	Q BC549B N SS TO92	
D 36	R131621	D S 1N4148 075150 DO35		Q 12	R1314181	Q BC559B P SS TO92	1
D 37	R131621	D S 1N4148 075150 DO35		Q 14	R131411	Q BC549C N SS TO92	
D 38	R131621	D S 1N4148 075150 DO35		Q 15	R1314131	Q BC557B P SS TO92	
D 39	R131621	D S 1N4148 075150 DO35		Q 16	R131411	Q BC549C N SS TO92	
D 40	R131621	D S 1N4148 075150 DO35		Q 17	R131411	Q BC549C N SS TO92	
D 41	R131621	D S 1N4148 075150 DO35		Q 18	R1314295	Q BC549B N SS TO92	1
D 42	R1316361	D Y BAT85 030200 DO34		Q 19	R131411	Q BC549C N SS TO92	
D 43	R1316361	D Y BAT85 030200 DO34		Q 20	R131411	Q BC549C N SS TO92	
D 44	R1316361	D Y BAT85 030200 DO34		Q 21	R1314295	Q BC549B N SS TO92	
D 45	R131621	D S 1N4148 075150 DO35		Q 22	R131411	Q BC549C N SS TO92	
D 46	R131621	D S 1N4148 075150 DO35		Q 23	R131411	Q BC549C N SS TO92	
D 51	R131621	D S 1N4148 075150 DO35	1	Q 24	R131411	Q BC549C N SS TO92	
D601	R131621	D S 1N4148 075150 DO35		Q 25	R132910	Q BS170 FN SS TO92	1
D606	R131621	D S 1N4148 075150 DO35		Q 26	R132916	Q BS250 FN SS TO92	1
D633	R131637	D R BA158 600400 DO7	1	Q 27	R131411	Q BC549C N SS TO92	
				Q 28	R131411	Q BC549C N SS TO92	
I 1	R132762	U 2595 TDA DIP18 P	1	Q 29	R132910	Q BS170 FN SS TO92	1
I 2	R134002	U 7812 TO220 P	1	Q 30	R1314182	Q BC559C P SS TO92	1
I 3	R134016	U 7912 TO220 P	1	Q 33	R132916	Q BS250 FN SS TO92	1
I 4	R1373325	U 4098B DIP16 P	1	Q596	R132910	Q BS170 FN SS TO92	1
I 5	R1373325	U 4098B DIP16 P	1	Q611	R1314181	Q BC559B P SS TO92	1
I 6	R137602	U 4046B DIP16 P	1	Q612	R1314181	Q BC559B P SS TO92	
I 7	R134113	U 084 TL DIP14 P	1				
I 8	R134025	U 78L24 TO92 P	1	R 1	R101544	R MF H 4K7 F 0W4 E3	
I 9	R134116	U 353 LF DIP8 P	1	R 3	R101557	R MF H 56K F 0W4 E3	
I10	R132751	U 2030V TDA TO220T P	1	R 4	R101152	R MF H 22K1 F 0W6 E4	
I11	R132827	U 8172 TDA H_W P	1	R 5	R101152	R MF H 22K1 F 0W6 E4	
I12	R132827	U 8172 TDA H_W P	1	R 6	R101565	R MF H270K F 0W4 E3	
I13	R132827	U 8172 TDA H_W P	1	R 8	R101536	R MF H 1K F 0W4 E3	
I14	R132817	U 1881 LM DIP8 P	1	R 9	R101134	R CF H680E J 0W25	
I15	R1373325	U 4098B DIP16 P	1	R 10	R101140	R MF H 2K21F 0W6 E4	
				R 11	R101165	R CF H270K J 0W25	
J 1	R313525	J EUR2C MBS P64 E1C2S 1,6	1	R 12	R101166	R CF H330K J 0W25	

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R 13	R101150	R MF H 15K F 0W6 E4		R 85	R101561	R MF H120K F 0W4 E3	
R 14	R101555	R MF H 39K F 0W4 E3		R 86	R101555	R MF H 39K F 0W4 E3	
R 15	R101284	R MF H 10M F 0W6 E4		R 87	R101555	R MF H 39K F 0W4 E3	
R 16	R101148	R CF H 10K J 0W25		R 88	R101561	R MF H120K F 0W4 E3	
R 17	R101166	R CF H330K J 0W25		R 89	R101143	R CF H 3K9 J 0W25	
R 18	R101164	R CF H220K J 0W25		R 90	R101160	R CF H100K J 0W25	
R 19	R101536	R MF H 1K F 0W4 E3	1	R 91	R101158	R CF H 68K J 0W25	
R 20	R101124	R CF H100E J 0W25	1	R 92	R101146	R MF H 6K81F 0W6 E4	
R 21	R101560	R MF H100K F 0W4 E3	1	R 93	R101134	R CF H680E J 0W25	
R 23	R101568	R MF H470K F 0W4 E3		R 94	R101158	R CF H 68K J 0W25	
R 24	R101168	R CF H470K J 0W25		R 95	R101148	R CF H 10K J 0W25	
R 25	R101541	R MF H 2K7 F 0W4 E3		R 96	R101148	R CF H 10K J 0W25	
R 26	R101550	R MF H 15K F 0W4 E3		R 97	R102604	R MF H 2E2 F 0W4	1
R 27	R101515	R MF H 18E F 0W4 E3		R 98	R101550	R MF H 15K F 0W4 E3	
R 28	R101148	R CF H 10K J 0W25		R 99	R101148	R CF H 10K J 0W25	
R 29	R101548	R MF H 10K F 0W4 E3		R100	R101148	R CF H 10K J 0W25	
R 30	R101530	R MF H330E F 0W4 E3		R101	R1011644	R MF H220K J 0W25	1
R 31	R101168	R CF H470K J 0W25		R102	R101556	R MF H 47K F 0W4 E3	
R 32	R101533	R MF H560E F 0W4 E3		R103	R101148	R CF H 10K J 0W25	
R 34	R101148	R CF H 10K J 0W25		R104	R101148	R CF H 10K J 0W25	
R 35	R101154	R CF H 33K J 0W25		R105	R101549	R MF H 12K F 0W4 E3	
R 36	R101138	R CF H 1K5 J 0W25		R106	R101548	R MF H 10K F 0W4 E3	
R 37	R101544	R MF H 4K7 F 0W4 E3		R107	R101548	R MF H 10K F 0W4 E3	
R 38	R101529	R MF H270E F 0W4 E3		R108	R1011544	R MF H 33K J 0W25	1
R 39	R101536	R MF H 1K F 0W4 E3		R109	R101143	R CF H 3K9 J 0W25	
R 41	R101548	R MF H 10K F 0W4 E3		R110	R101139	R CF H 1K8 J 0W25	
R 42	R101546	R MF H 6K8 F 0W4 E3		R111	R101142	R MF H 3K32F 0W6 E4	1
R 43	R101558	R MF H 68K F 0W4 E3		R112	R101112	R MF H 10E F 0W6 E4	
R 44	R102604	R MF H 2E2 F 0W4	1	R113	R101149	R MF H 12K1 F 0W6 E4	
R 45	R101524	R MF H100E F 0W4 E3		R114	R101139	R CF H 1K8 J 0W25	1
R 47	R101550	R MF H 15K F 0W4 E3		R115	R101148	R CF H 10K J 0W25	
R 48	R101500	R MF H 1E F 0W4 E3		R116	R101551	R MF H 18K F 0W4 E3	1
R 49	R101548	R MF H 10K F 0W4 E3		R117	R101135	R CF H820E J 0W25	
R 50	R101548	R MF H 10K F 0W4 E3		R119	R101144	R CF H 4K7 J 0W25	
R 51	R101508	R MF H 4E7 F 0W4 E3		R120	R101556	R MF H 47K F 0W4 E3	1
R 52	R101136	R CF H 1K J 0W25		R121	R101228	R CF H220E J 0W5	
R 53	R101160	R CF H100K J 0W25		R122	R101146	R MF H 6K81F 0W6 E4	
R 54	R101561	R MF H120K F 0W4 E3		R123	R101547	R MF H 8K2 F 0W4 E3	
R 55	R101500	R MF H 1E F 0W4 E3		R124	R101562	R MF H150K F 0W4 E3	
R 56	R101548	R MF H 10K F 0W4 E3		R125	R101562	R MF H150K F 0W4 E3	
R 57	R101560	R MF H100K F 0W4 E3		R126	R101562	R MF H150K F 0W4 E3	
R 58	R101548	R MF H 10K F 0W4 E3		R127	R101156	R MF H 47K5 F 0W6 E4	
R 59	R101546	R MF H 6K8 F 0W4 E3		R128	R101549	R MF H 12K F 0W4 E3	
R 60	R101546	R MF H 6K8 F 0W4 E3		R129	R101538	R MF H 1K5 F 0W4 E3	
R 61	R101524	R MF H100E F 0W4 E3	1	R130	R101550	R MF H 15K F 0W4 E3	
R 62	R101536	R MF H 1K F 0W4 E3		R131	R101542	R MF H 3K3 F 0W4 E3	
R 63	R101524	R MF H100E F 0W4 E3	1	R132	R101536	R MF H 1K F 0W4 E3	
R 64	R101556	R MF H 47K F 0W4 E3		R133	R101538	R MF H 1K5 F 0W4 E3	
R 65	R101547	R MF H 8K2 F 0W4 E3		R134	R101555	R MF H 39K F 0W4 E3	
R 66	R101548	R MF H 10K F 0W4 E3		R135	R101553	R MF H 27K F 0W4 E3	
R 67	R101552	R MF H 22K F 0W4 E3		R136	R101552	R MF H 22K F 0W4 E3	
R 68	R101540	R MF H 2K2 F 0W4 E3		R137	R101548	R MF H 10K F 0W4 E3	1
R 69	R101124	R CF H100E J 0W25		R138	R101544	R MF H 4K7 F 0W4 E3	
R 70	R101124	R CF H100E J 0W25		R139	R101558	R MF H 68K F 0W4 E3	
R 71	R101124	R CF H100E J 0W25		R140	R101551	R MF H 18K F 0W4 E3	
R 72	R101158	R CF H 68K J 0W25		R186	R101572	R MF H 1M F 0W4 E3	1
R 73	R101550	R MF H 15K F 0W4 E3		R201	R101566	R MF H330K F 0W4 E3	
R 74	R101155	R MF H 39K2 F 0W6 E4		R202	R101566	R MF H330K F 0W4 E3	
R 75	R101155	R MF H 39K2 F 0W6 E4		R203	R101552	R MF H 22K F 0W4 E3	
R 76	R101524	R MF H100E F 0W4 E3		R301	R101552	R MF H 22K F 0W4 E3	
R 77	R101500	R MF H 1E F 0W4 E3		R302	R101552	R MF H 22K F 0W4 E3	
R 78	R101550	R MF H 15K F 0W4 E3		R303	R101125	R CF H120E J 0W25	
R 79	R102604	R MF H 2E2 F 0W4	1	R304	R101167	R CF H390K J 0W25	
R 80	R101500	R MF H 1E F 0W4 E3		R305	R101146	R MF H 6K81F 0W6 E4	
R 81	R101524	R MF H100E F 0W4 E3		R306	R101540	R MF H 2K2 F 0W4 E3	
R 82	R101558	R MF H 68K F 0W4 E3		R307	R101545	R MF H 5K6 F 0W4 E3	
R 83	R101561	R MF H120K F 0W4 E3		R308	R101546	R MF H 6K8 F 0W4 E3	
R 84	R101555	R MF H 39K F 0W4 E3		R599	R101536	R MF H 1K F 0W4 E3	

# Sync+Vertical Deflection module

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R600	R101527	R MF H180E F 0W4 E3		S 1	R324182	SW DIP 1M P 1 BT SN	1
R605	R101555	R MF H 39K F 0W4 E3		SR 1	R1011917	R CFFH E22K 0W4	1
R607	R101548	R MF H 10K F 0W4 E3		SR 2	R1001909	R CFFV E1 K 0W4 E2	1
R608	R101527	R MF H180E F 0W4 E3		SR 3	R1003009	R CFFV 1E J 0W25 E1	1
R609	R101552	R MF H 22K F 0W4 E3		SR 4	R1003009	R CFFV 1E J 0W25 E1	1
R610	R101548	R MF H 10K F 0W4 E3		SR 5	R1001129	R CFFV 10E J 0W25 E2	1
R613	R101560	R MF H100K F 0W4 E3		SR 6	R1011046	R CFFH 2E2 J 0W25	1
R614	R101558	R MF H 68K F 0W4 E3		SR 7	R1003009	R CFFV 1E J 0W25 E1	1
R615	R101560	R MF H100K F 0W4 E3					
R616	R101526	R MF H150E F 0W4 E3		Z 1	R131768	D ZEN 7V5 0W5 B DO35	1
R617	R101540	R MF H 2K2 F 0W4 E3		Z 2	R131716	D ZEN 5V1 0W5 C DO35	1
R618	R101526	R MF H150E F 0W4 E3		Z 3	R131734	D ZEN 5V6 0W5 B DO35	1
R619	R101540	R MF H 2K2 F 0W4 E3		Z 4	R131740	D ZEN 12V 0W5 C DO34	
R622	R101571	R MF H820K F 0W4 E3					
R623	R101571	R MF H820K F 0W4 E3					
R628	R1011481	R CF H 9K1 J 0W25	1				
R629	R1011481	R CF H 9K1 J 0W25	1				

## Parts listing Sub module R762268S

SIT.	ITEM NO.	DESCRIPTION	QUANTITY	SIT.	ITEM NO.	DESCRIPTION	QUANTITY
10	R3133921	J MD JMP P 1 E1SN	1	C 39	R111531	C EL RA 10M M 35E2 85	
	R34225405	WU UL1061 AWG26 ST YE 50	2	C 40	R112242	C NP0 MI 100P G100E2	
	R34225407	WU UL1061 AWG26 ST YE 70	1	C 41	R111230	C EL AX 22M T160E12 85	1
	R34809002	SLVU SHR D2.4/2 020 BLK	1	C 42	R113724	C POMERA 100N K 63E2	
C 1	R111678	C EL BRA 10M M 25E2 85		C 43	R113724	C POMERA 100N K 63E2	1
C 2	R113724	C POMERA 100N K 63E2		C 44	R112242	C NP0 MI 100P G100E2	
C 3	R111531	C EL RA 10M M 35E2 85		C 45	R111531	C EL RA 10M M 35E2 85	
C 4	R111468	C EL RA 470M Z 16E2 85	1	C 46	R111531	C EL RA 10M M 35E2 85	
C 5	R113724	C POMERA 100N K 63E2		C 47	R111531	C EL RA 10M M 35E2 85	1
C 6	R1137121	C POMERA 10N K250E2 85		C 48	R111531	C EL RA 10M M 35E2 85	
C 7	R1137121	C POMERA 10N K250E2 85		C 49	R111500	C EL RA 47M M 10E2 85	
C 8	R111531	C EL RA 10M M 35E2 85		C 50	R1127475	C CE MI 4N7K100E2	1
C 9	R113724	C POMERA 100N K 63E2	1	C 51	R112739	C CE MI 1N K100E2	
C 10	R113724	C POMERA 100N K 63E2		C 52	R112741	C CE MI 1N5K100E2	
C 11	R113732	C POMERA 470N K 63E2 85		C 53	R111500	C EL RA 47M M 10E2 85	
C 12	R113819	C POMERA 3N3J250E2	1	C 54	R1115935	C EL5 RA 10M M 35E2 85	1
C 13	R1114885	C EL RA 220M Z 40E2 85	1	C214	R112743	C CE MI 2N2K100E2	1
C 14	R111550	C EL RA 4M7M 50E2 85		C219	R111461	C EL RA 10M Z 16E2 85	
C 15	R113724	C POMERA 100N K 63E2		C300	R1137121	C POMERA 10N K250E2 85	1
C 16	R111550	C EL RA 4M7M 50E2 85	1	C302	R113724	C POMERA 100N K 63E2	
C 17	R113724	C POMERA 100N K 63E2		C304	R114090	C POMERA 1M M 63E2	1
C 18	R114090	C POMERA 1M M 63E2	1	C368	R111500	C EL RA 47M M 10E2 85	
C 19	R111550	C EL RA 4M7M 50E2 85		D 1	R131621	D S 1N4148 075150 DO35	
C 20	R113724	C POMERA 100N K 63E2		D 2	R131621	D S 1N4148 075150 DO35	
C 21	R114090	C POMERA 1M M 63E2	1	D 3	R1316361	D Y BAT85 030200 DO34	
C 22	R114090	C POMERA 1M M 63E2	1	D 4	R1316361	D Y BAT85 030200 DO34	
C 23	R111500	C EL RA 47M M 10E2 85		D 5	R1316361	D Y BAT85 030200 DO34	
C 24	R111531	C EL RA 10M M 35E2 85		D 6	R131621	D S 1N4148 075150 DO35	
C 25	R111461	C EL RA 10M Z 16E2 85		D 7	R1316361	D Y BAT85 030200 DO34	
C 26	R111531	C EL RA 10M M 35E2 85		D 8	R131621	D S 1N4148 075150 DO35	
C 27	R113724	C POMERA 100N K 63E2		D 9	R131621	D S 1N4148 075150 DO35	
C 28	R113732	C POMERA 470N K 63E2 85		D 10	R131621	D S 1N4148 075150 DO35	1
C 29	R113724	C POMERA 100N K 63E2		D 11	R131621	D S 1N4148 075150 DO35	
C 30	R1127475	C CE MI 4N7K100E2	1	D 12	R131621	D S 1N4148 075150 DO35	
C 31	R1127475	C CE MI 4N7K100E2	1	D 13	R131621	D S 1N4148 075150 DO35	
C 32	R111531	C EL RA 10M M 35E2 85		D 14	R131621	D S 1N4148 075150 DO35	
C 33	R111531	C EL RA 10M M 35E2 85		D 16	R1316361	D Y BAT85 030200 DO34	
C 35	R1137181	C POMERA 33N K100E2	1	D 17	R131639	D S BAX12 090400 DO35	1
C 36	R113730	C POMERA 330N K 63E2		D 18	R131621	D S 1N4148 075150 DO35	
C 37	R1137151	C POMERA 18N K100E2		D377	R131637	D R BA158 600400 DO7	
C 38	R1137121	C POMERA 10N K250E2 85		I 1	R132833	U 76013 SC DIP28 P	1

# Sync+Vertical Deflection module

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I 2	R132833	U 76013	SC	DIP28	P	1	R 46	R101150	R MF H 15K F 0W6	E4	
I 3	R132833	U 76013	SC	DIP28	P	1	R 47	R101154	R CF H 33K J 0W25		
I 4	R134028	U 317LZ	LM	TO92	P	1	R 48	R101154	R CF H 33K J 0W25		
I 5	R134029	U 337LZ		TO92	P	1	R 49	R101167	R CF H390K J 0W25		
I 6	R134032	U 78L05		TO92	P	1	R 50	R101154	R CF H 33K J 0W25		
I 7	R134113	U 084	TL	DIP14	P	1	R 51	R101154	R CF H 33K J 0W25		
I 8	R134113	U 084	TL	DIP14	P	1	R 52	R101547	R MF H 8K2 F 0W4	E3	
I 9	R134114	U 393	LM	DIP8	P	1	R 53	R101124	R CF H100E J 0W25		
I 10	R137397	U 4013B		DIP14	P	1	R 54	R101124	R CF H100E J 0W25		
I 11	R134124	U 082	TL	DIP8	P	1	R 55	R101168	R CF H470K J 0W25		
I 12	R137552	U 74HCT123		DIP16	P	1	R 57	R101148	R CF H 10K J 0W25		
I336	R134222	U 1595	MC	DIP14	P	1	R 58	R1015401	R MF H 2K F 0W4	E3	
							R 59	R101158	R CF H 68K J 0W25		
J 3	R313949	J CT H	MBS P 9	M2SN		1	R 60	R101128	R MF H221E F 0W6	E4	
J 4	R313952	J CT H	MBS P12	M2SN		1	R 61	R101148	R CF H 10K J 0W25		
J 5	R313947	J CT H	MBS P 7	M2SN		1	R 62	R101149	R MF H 12K1 F 0W6	E4	
J 6	R3132862	J MD1	MBT P 2	E1SN		1	R 63	R101130	R CF H330E J 0W25		
							R 64	R101119	R MF H 39E2 F 0W6	E4	
P 1	R106727	R TCE H	2K K 0W5	S10TS		1	R 65	R101125	R CF H120E J 0W25		
P 2	R106729	R TCE H	10K K 0W5	S10TS		1	R 67	R101152	R MF H 22K1 F 0W6	E4	
PC	R780018	PCD PJ49	800	VER SUB 76		1	R 68	R101124	R CF H100E J 0W25		
							R 69	R101152	R MF H 22K1 F 0W6	E4	
Q 1	R1314651	Q BF245B	FN SS	TO92		1	R 70	R101152	R MF H 22K1 F 0W6	E4	
Q 2	R1314295	Q BC549B	N SS	TO92		1	R 71	R101160	R CF H100K J 0W25		
Q 3	R1314295	Q BC549B	N SS	TO92			R 72	R101537	R MF H 1K2 F 0W4	E3	
Q 4	R131411	Q BC549C	N SS	TO92			R 73	R101152	R MF H 22K1 F 0W6	E4	
Q 6	R1314181	Q BC559B	P SS	TO92			R 74	R101116	R MF H 22E1 F 0W6	E4	
Q 7	R132944	Q BCY87	2N SS	TO71		1	R 75	R101159	R MF H 82K5 F 0W6	E4	
Q 8	R131491	Q BSX20	.2369	N SS TO18		1	R 76	R101142	R MF H 3K32F 0W6	E4	
Q 10	R1329105	Q BS170	FN SS	TO92		1	R 77	R101146	R MF H 6K81F 0W6	E4	
Q 11	R131411	Q BC549C	N SS	TO92			R 78	R101149	R MF H 12K1 F 0W6	E4	
Q306	R1314181	Q BC559B	P SS	TO92			R 79	R101148	R CF H 10K J 0W25		1
Q312	R1314181	Q BC559B	P SS	TO92		1	R 80	R101124	R CF H100E J 0W25		
R 1	R101154	R CF H 33K	J 0W25				R 81	R101136	R CF H 1K J 0W25		
R 2	R101140	R MF H 2K21F	0W3	E4			R 82	R101137	R MF H 1K21F 0W6	E4	
R 9	R101147	R MF H 8K25F	0W6	E4			R 83	R101148	R CF H 10K J 0W25		
R 10	R101144	R CF H 4K7	J 0W25				R 84	R101147	R MF H 8K25F 0W6	E4	
R 11	R101126	R MF H150E	F 0W6	E4			R 85	R101104	R CF H 2E2 J 0W50		
R 12	R101524	R MF H100E	F 0W4	E3			R 86	R101229	R MF H274E F 0W6	E4	
R 13	R101533	R MF H560E	F 0W4	E3			R 87	R101144	R CF H 4K7 J 0W25		
R 14	R101136	R CF H 1K	J 0W25				R 88	R101148	R CF H 10K J 0W25		
R 16	R101141	R CF H 2K7	J 0W25				R 89	R101172	R CF H 1M J 0W25		
R 17	R101136	R CF H 1K	J 0W25				R 90	R101148	R CF H 10K J 0W25		
R 18	R101143	R CF H 3K9	J 0W25				R 91	R101147	R MF H 8K25F 0W6	E4	
R 19	R101124	R CF H100E	J 0W25				R 92	R101148	R CF H 10K J 0W25		
R 20	R101148	R CF H 10K	J 0W25				R 93	R101148	R CF H 10K J 0W25		
R 21	R101141	R CF H 2K7	J 0W25				R 94	R101140	R MF H 2K21F 0W6	E4	
R 22	R101136	R CF H 1K	J 0W25				R 95	R101138	R CF H 1K5 J 0W25		
R 23	R101141	R CF H 2K7	J 0W25			1	R 96	R101142	R MF H 3K32F 0W6	E4	
R 24	R101148	R CF H 10K	J 0W25				R 97	R101146	R MF H 6K81F 0W6	E4	
R 26	R101140	R MF H 2K21F	0W6	E4			R 98	R101154	R CF H 33K J 0W25		
R 27	R101160	R CF H100K	J 0W25				R 99	R101154	R CF H 33K J 0W25		
R 28	R101153	R MF H 27K4	F 0W6	E4			R100	R101137	R MF H 1K21F 0W6	E4	1
R 29	R101116	R MF H 22E1	F 0W6	E4			R101	R101541	R MF H 2K7 F 0W4	E3	1
R 30	R101168	R CF H470K	J 0W25				R102	R101144	R CF H 4K7 J 0W25		
R 31	R101141	R CF H 2K7	J 0W25				R212	R101148	R CF H 10K J 0W25		
R 32	R101134	R CF H680E	J 0W25				R213	R101148	R CF H 10K J 0W25		
R 35	R101141	R CF H 2K7	J 0W25				R217	R101136	R CF H 1K J 0W25		
R 37	R101148	R CF H 10K	J 0W25				R218	R101160	R CF H100K J 0W25		
R 38	R101156	R MF H 47K5	F 0W6	E4			R222	R101148	R CF H 10K J 0W25		1
R 39	R101144	R CF H 4K7	J 0W25				R301	R101124	R CF H100E J 0W25		
R 40	R101147	R MF H 8K25F	0W6	E4			R307	R101148	R CF H 10K J 0W25		
R 41	R101156	R MF H 47K5	F 0W6	E4			R308	R101148	R CF H 10K J 0W25		
R 42	R101148	R CF H 10K	J 0W25				R309	R101149	R MF H 12K1 F 0W6	E4	
R 43	R101136	R CF H 1K	J 0W25				R311	R101152	R MF H 22K1 F 0W6	E4	
R 44	R101148	R CF H 10K	J 0W25				R363	R101132	R CF H470E J 0W25		
R 45	R101136	R CF H 1K	J 0W25				R364	R101136	R CF H 1K J 0W25		
							R365	R101139	R CF H 1K8 J 0W25		

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R366 R101136 R CF H 1K J 0W25  
R367 R101126 R MF H150E F 0W6 E4

R368 R101536 R MF H 1K F 0W4 E3 1  
Z 1 R131704 D STB 2V6 0W33 DO35 1

## Parts listing Orbiting module 76 2268U (Option)

ITEM NO.	SIT.	DESCRIPTION	ITEM NO.	SIT.	DESCRIPTION
34 84071		CD CT FWT MBS P 7 L 110	13 1621	D..7	D S 1N4148 075150 DO35
11 3728	C..1	C POMERA 220N K 63E2	13 1621	D..8	D S 1N4148 075150 DO35
11 1531	C..2	C EL RA 10M M 35E2 85	13 2833	I..1	U 76013 SC DIP28 PD_POT
11 1531	C..3	C EL RA 10M M 35E2 85	13 2832	I..2	U 8574A PCF DIP16 PEXP
11 3724	C..4	C POMERA 100N K 63E2	13 4113	I..3	U 084 TL DIP14 POPAMP
11 3724	C..5	C POMERA 100N K 63E2	13 7600	I..4	U 4052B DIP16 PM/DEM
11 1478	C..6	C EL RA 220M Z 25E2 85	13 4113	I..5	U 084 TL DIP14 POPAMP
11 3728	C..7	C POMERA 220N K 63E2	13 7303	I..6	U 4066B DIP14 PSWTCH
11 3728	C..8	C POMERA 220N K 63E2	13 4029	I..9	U 337LZ TO92 PSTAB
11 3728	C..9	C POMERA 220N K 63E2	13 4028	I.26	U 317LZ TO92 PSTAB
11 3728	C.10	C POMERA 220N K 63E2	31 3943	J..2	J CT MBS P 3 M2SN
11 1478	C.11	C EL RA 220M Z 25E2 85	78 0224	PC..	PCD PJ49 800 ORBIT 2
11 1478	C.12	C EL RA 220M Z 25E2 85	13 14181	Q..1	Q BC559B P SS TO92 030A1
11 1478	C.13	C EL RA 220M Z 25E2 85	13 14181	Q..2	Q BC559B P SS TO92 030A1
11 3728	C.14	C POMERA 220N K 63E2	13 14181	Q..3	Q BC559B P SS TO92 030A1
11 1531	C.15	C EL RA 10M M 35E2 85	13 2916	Q..4	Q BS250 FN SS TO92 045A2
11 1531	C.16	C EL RA 10M M 35E2 85	13 1411	Q..5	Q BC549C N SS TO92 030A1
11 3724	C.17	C POMERA 100N K 63E2	10 1544	R..1	R MF H 4K7 F 0W4 E2
11 3724	C.18	C POMERA 100N K 63E2	10 1544	R..2	R MF H 4K7 F 0W4 E2
11 3724	C.19	C POMERA 100N K 63E2	10 1529	R..3	R MF H270E F 0W4 E2
11 3724	C.20	C POMERA 100N K 63E2	10 1548	R..4	R MF H 10K F 0W4 E2
11 3724	C.21	C POMERA 100N K 63E2	10 1554	R..5	R MF H 33K F 0W4 E2
13 1621	D..1	D S 1N4148 075150 DO35	10 1524	R..6	R MF H100E F 0W4 E2
13 1621	D..2	D S 1N4148 075150 DO35	10 1529	R..7	R MF H270E F 0W4 E2
13 1621	D..3	D S 1N4148 075150 DO35	10 1564	R..8	R MF H220K F 0W4 E2
13 1621	D..4	D S 1N4148 075150 DO35			
13 1621	D..5	D S 1N4148 075150 DO35			
13 1621	D..6	D S 1N4148 075150 DO35			

