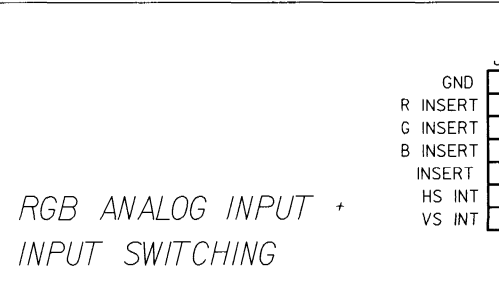
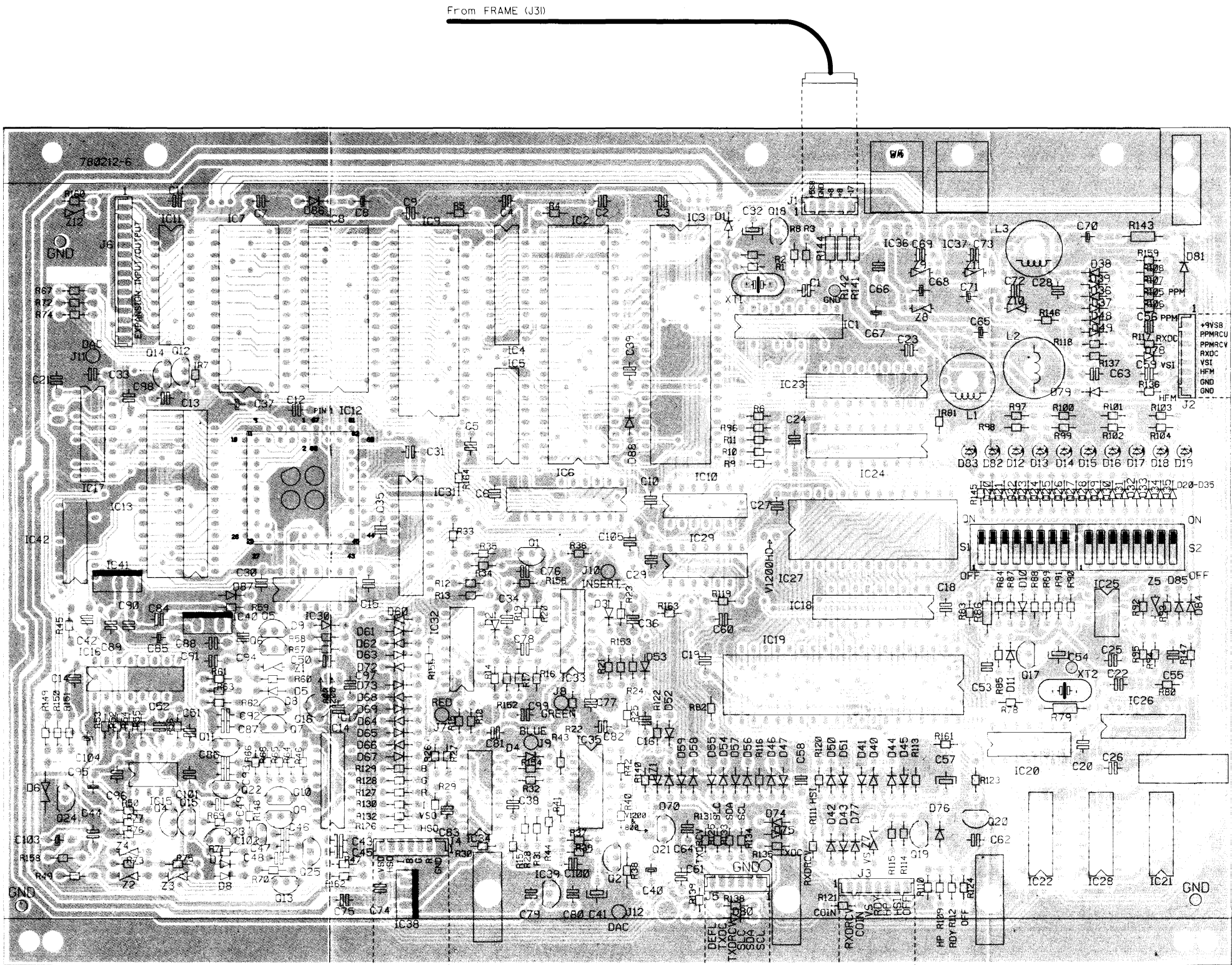


FUTURE EXPANSION I/O

CONTROLLER



*		Article nr.
Controller	G800	76 17735
Controller	D800	76 17555
Controller	G500	76 18755
Controller	D500	76 18745
Controller	VI600	76 21235
Controller	DI100	76 21505
Controller	G80I	76 228I
Controller	D80I	76 2249
Name CONTROLLER		Article nr. (See *)
Date 03-09-1993	Drawn JV DY	Checked GT
BARCO PROJECTION SYSTEMS		



*		Article nr.
CONTROLLER (ASIC) G800	76 17735	
CONTROLLER (ASIC) D800	76 17555	
CONTROLLER (ASIC) G500	76 18755	
CONTROLLER (ASIC) D500	76 18745	
CONTROLLER (ASIC) V1600	76 21235	
CONTROLLER (ASIC) D1100	76 21505	
CONTROLLER (ASIC) G801	76 2281	
CONTROLLER (ASIC) D801	76 2249	
CONTROLLER (ASIC) V1200	76 2167	
CONTROLLER (ASIC) G1200	*76 21095	
CONTROLLER (ASIC) G1208	76 2166	
Name CONTROLLER (ASIC)	Article nr. (See *)	
Date 14-09-1993	Drawn JVDY	Checked GT

BARCO PROJECTION SYSTEMS

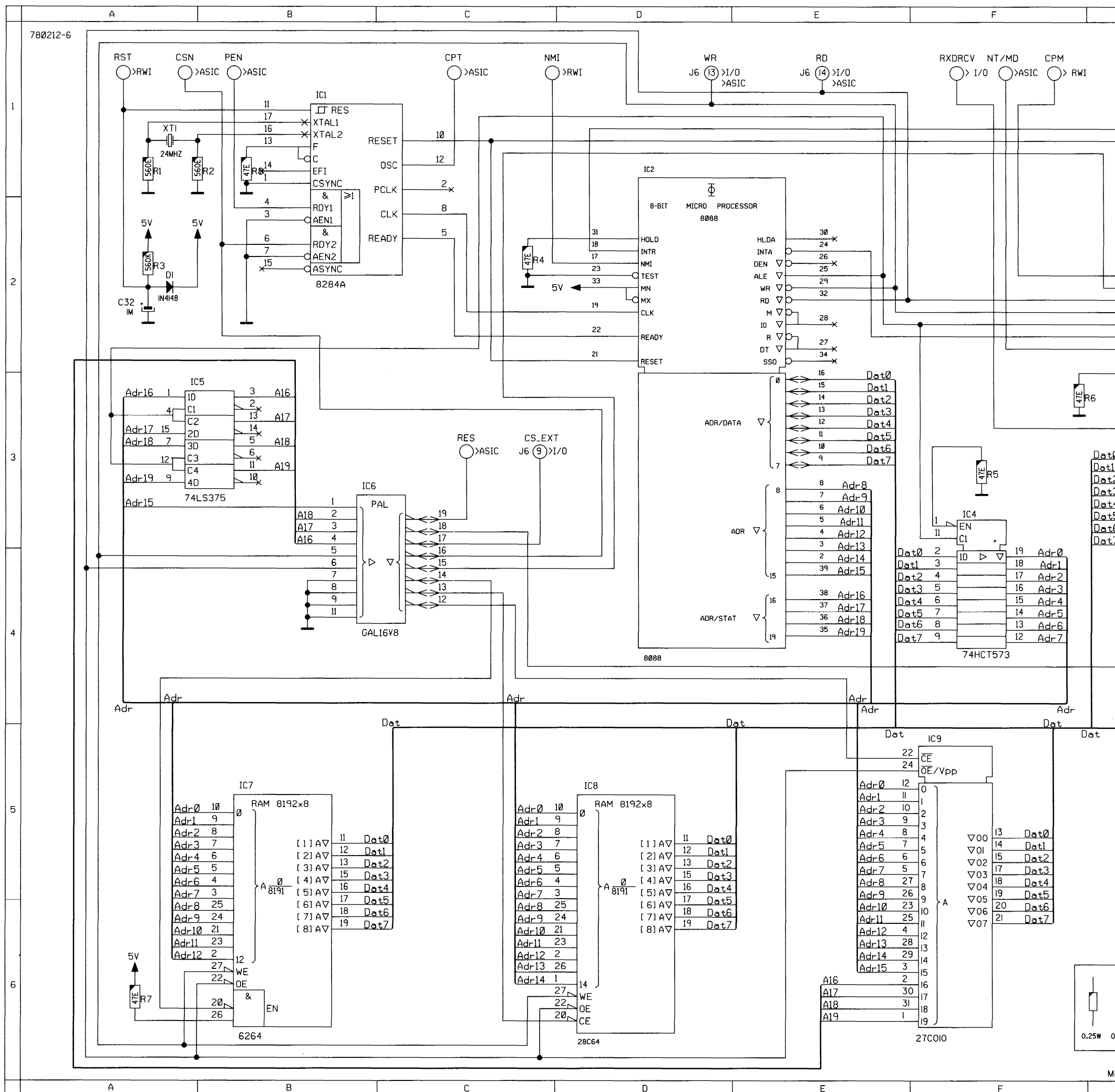
Modifications reserved

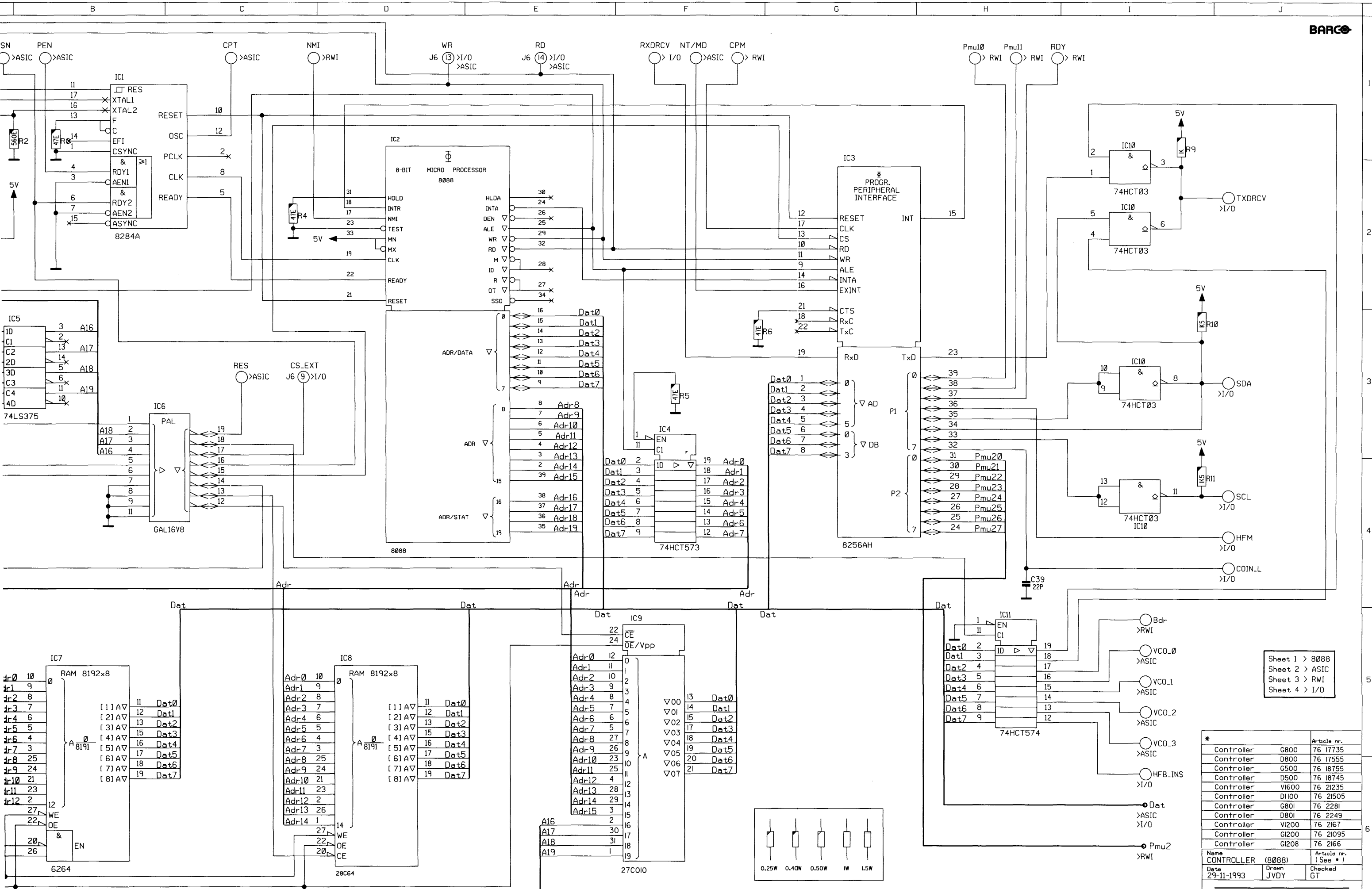
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C7	C 2	D33
C8	C 2	D34
C9	D 2	D35
C10	E 3	D36
C11	B 2	D37
C12	C 3	D38
C13	C 3	D39
C14	D 4	D40
C15	C 4	D41
C16	E 4	D42
C17	C 4	D43
C18	F 4	D44
C19	E 4	D45
C20	G 4	D46
C21	B 3	D47
C22	G 4	D48
C23	F 2	D49
C24	E 3	D50
C25	G 4	D51
C26	G 4	D52
C27	E 3	D53
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C30	C 3	D56
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C32	E 2	D58
C33	B 3	D59
C34	D 4	D60
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C36	E 4	D62
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C40	E 3	D66
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C48	C 5	D74
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D26	G 3	J26

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C20	G 4	D46	E 4	R5	D 2	R140	E 4
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C23	F 2	D49	G 2	R8	E 2	R143	G 2
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C26	G 4	D52	E 4	R11	E 3	R146	F 2
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To FRAME (J30)





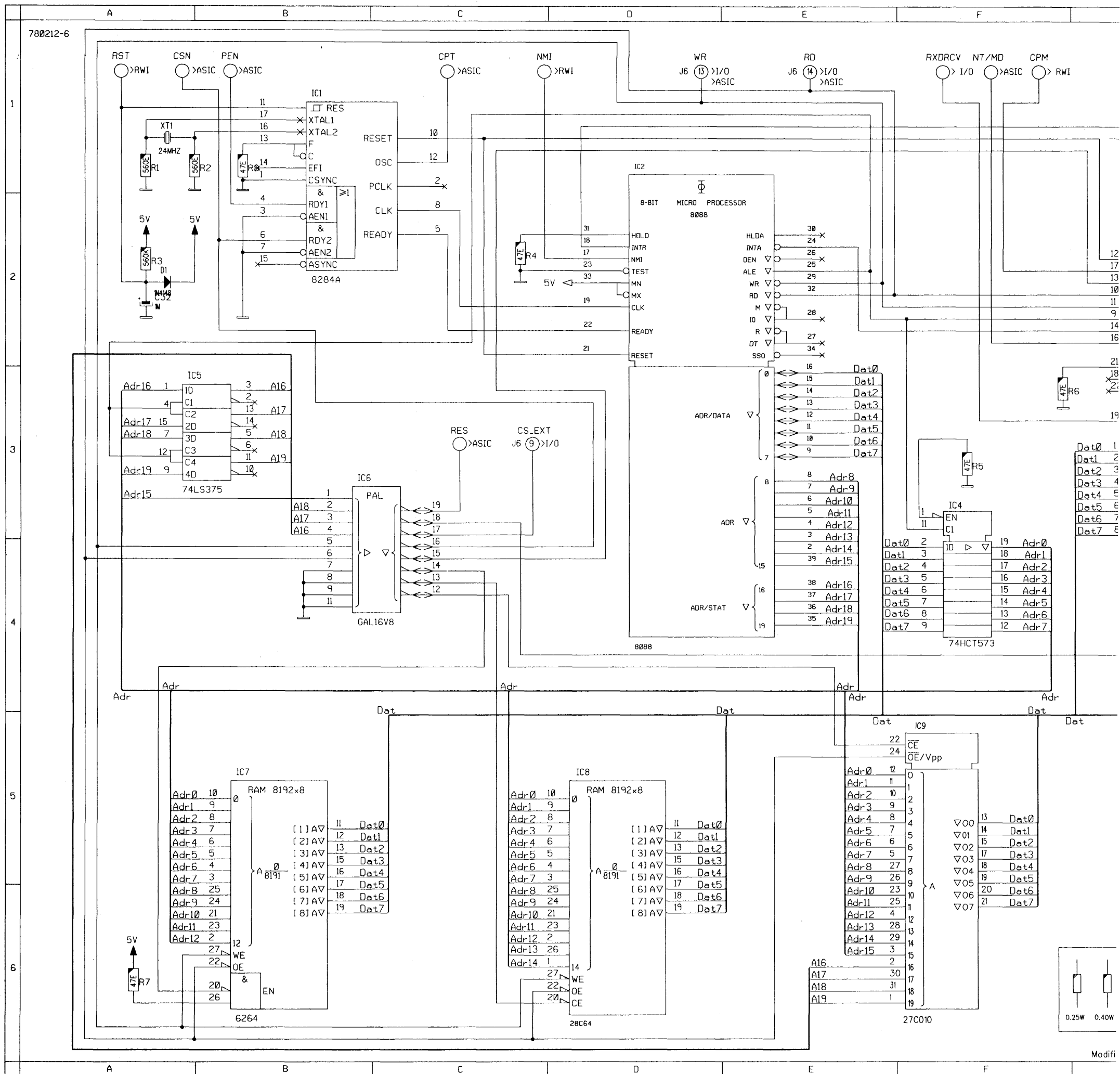
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*	Controller	Article nr.
	Controller G800	76 17735
	Controller D800	76 17555
	Controller G500	76 18755
	Controller D500	76 18745
	Controller VI600	76 21235
	Controller DI100	76 21505
	Controller G801	76 2281
	Controller D801	76 2249
	Controller VI200	76 2167
	Controller GI200	76 21095
	Controller GI208	76 2166

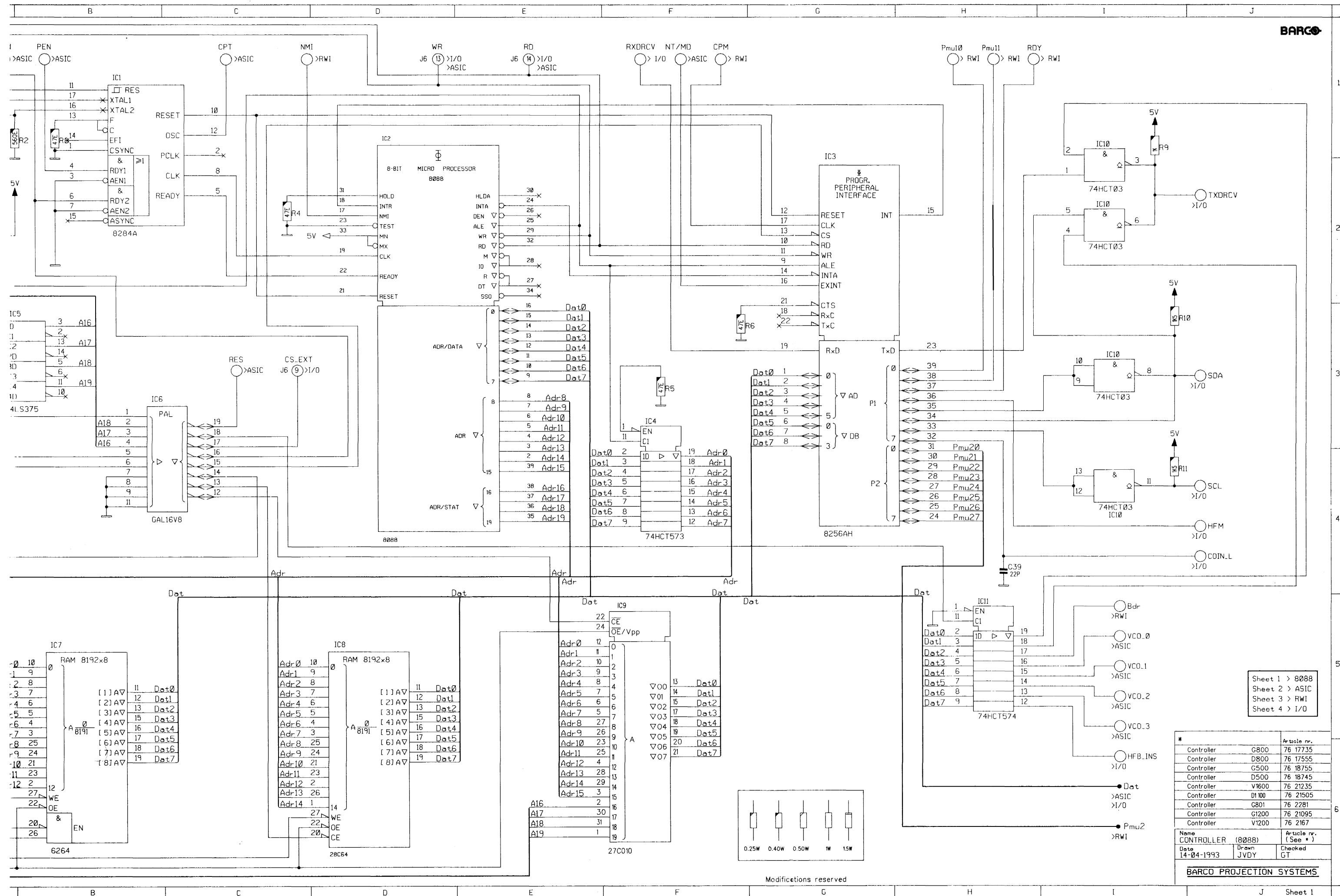
Name	CONTROLLER (8088)	Article nr.
Date	29-11-1993	Drawn
	JVDY	Checked
	GT	

BARCO PROJECTION SYSTEMS

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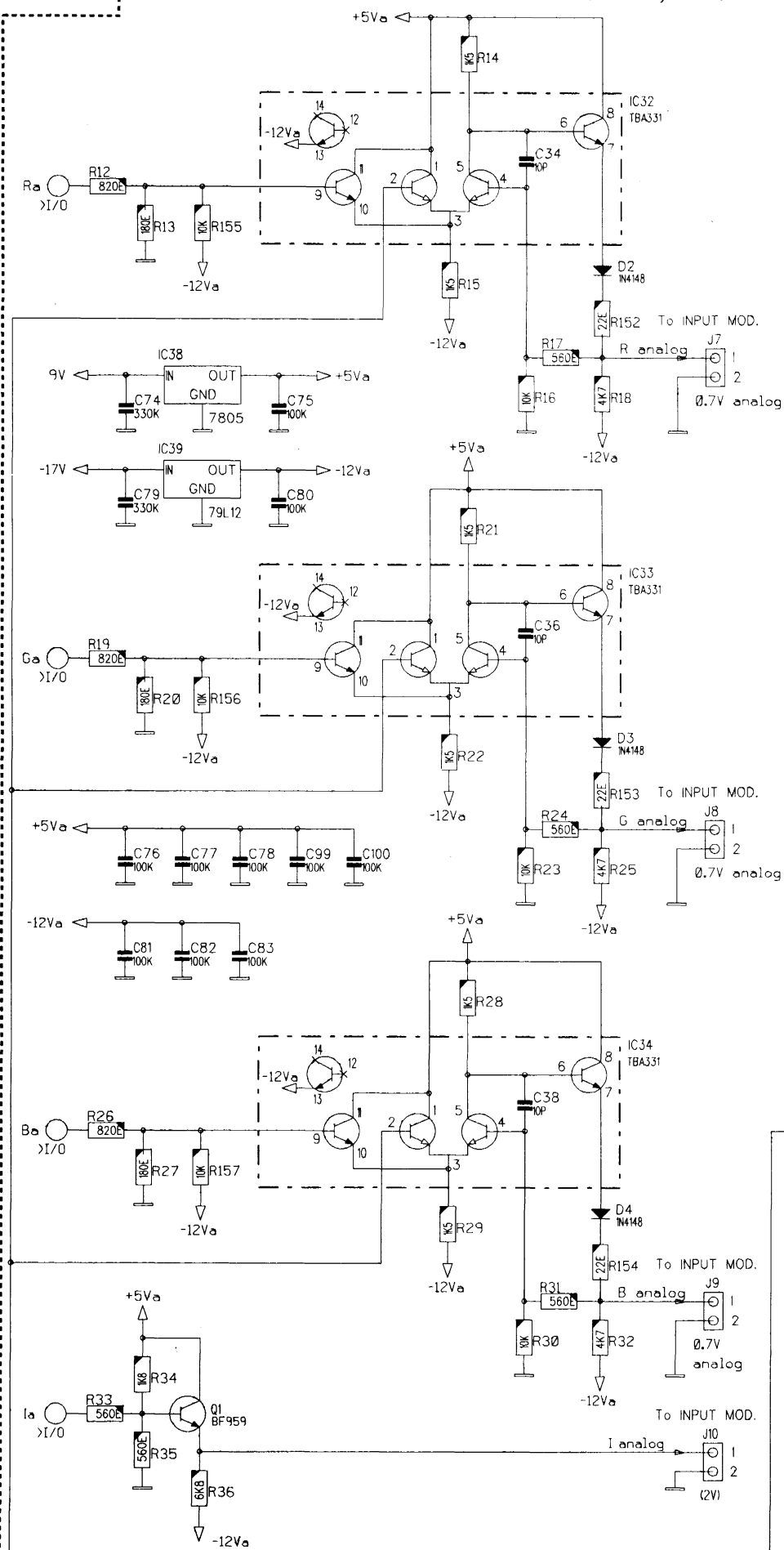




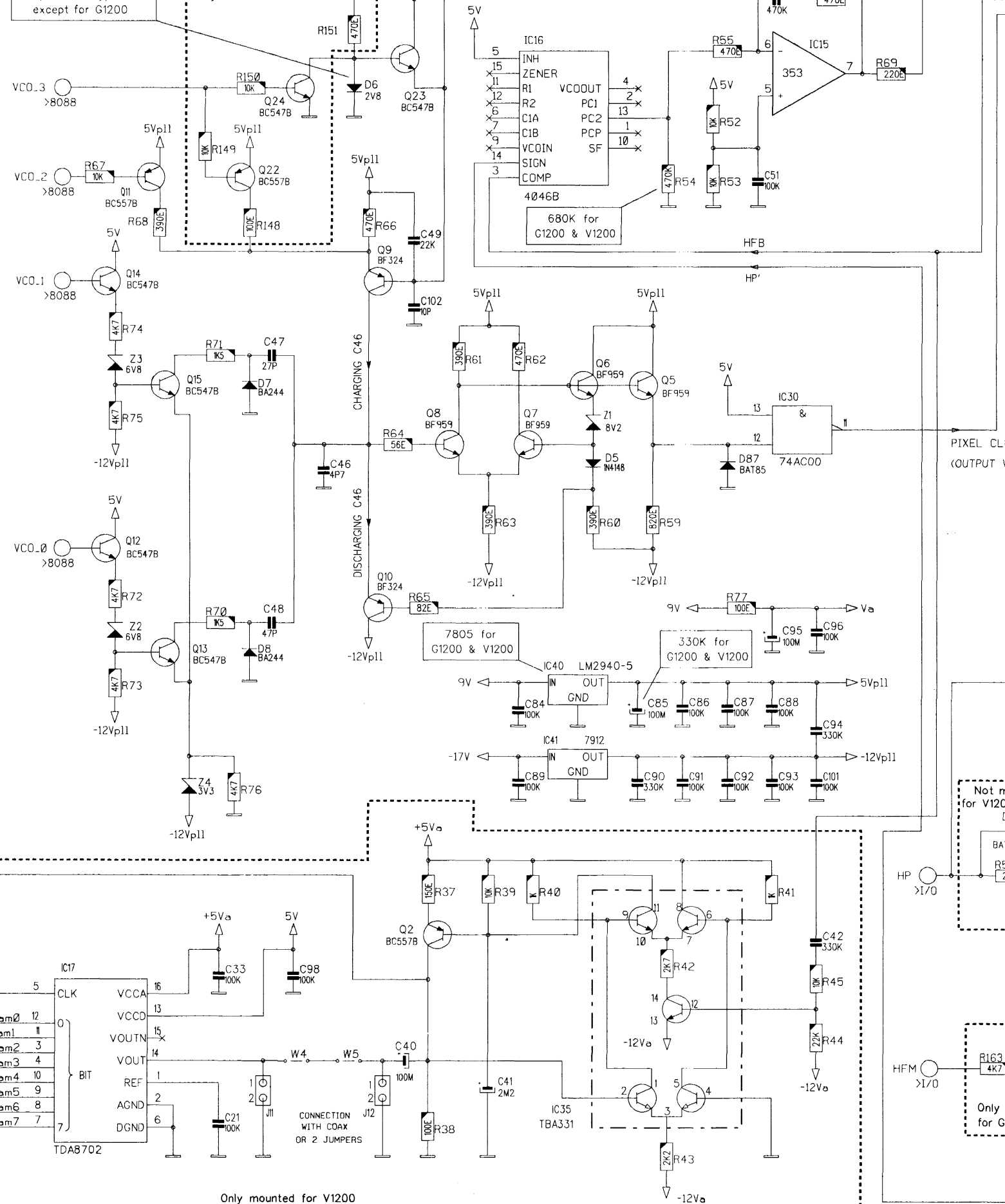


780212-6

Only mounted for V1200

Jumper for all types  
except for G1200

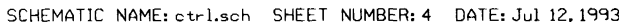
Only mounted for G1200











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C4	H 3	sheet 4	D24	G 2	sheet 3	K20	C 1	sheet 3	Q23	F 1	sheet 2
C5	H 3	sheet 4	D25	G 2	sheet 3	K20	A 3	sheet 3	Q24	E 1	sheet 2
C6	H 3	sheet 4	D26	G 2	sheet 3	K20	C 4	sheet 3	Q25	I 6	sheet 2
C7	H 4	sheet 4	D27	G 2	sheet 3	K20	A 3	sheet 3	R1	A 1	sheet 1
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C100	B 4	sheet 2	K10	G 5	sheet 4	J12	E 6	sheet 2	R96	F 6	sheet 3
C101	G 4	sheet 2	K11	H 5	sheet 1	L1	F 6	sheet 4	R97	H 1	sheet 3
C102	F 2	sheet 2	K11	H 1	sheet 4	L2	G 5	sheet 4	R98	H 1	sheet 3
C103	K 5	sheet 2	K11	H 1	sheet 4	L3	G 6	sheet 4	R99	H 1	sheet 3
C104	K 5	sheet 2	K12	J 1	sheet 2	O1	A 6	sheet 2	R100	H 1	sheet 3
C105	C 2	sheet 4	K13	K 4	sheet 2	O2	E 5	sheet 2	R101	H 1	sheet 3
D1	A 2	sheet 1	K13	H 1	sheet 4	O4	K 5	sheet 2	R102	H 1	sheet 3
D2	C 2	sheet 2	K13	H 1	sheet 4	O5	G 2	sheet 2	R103	H 1	sheet 3
D3	C 3	sheet 2	K14	H 2	sheet 2	O6	F 2	sheet 2	R104	H 1	sheet 3
D4	F 3	sheet 2	K14	H 2	sheet 2	O7	F 3	sheet 2	R105	A 2	sheet 4
D5	E 1	sheet 2	K15	J 5	sheet 2	O8	F 3	sheet 2	R106	A 3	sheet 4
D6	E 1	sheet 2	K15	H 1	sheet 2	O9	E 2	sheet 2	R107	A 3	sheet 4
D7	E 3	sheet 2	K15	H 4	sheet 4	O10	E 3	sheet 2	R108	A 4	sheet 4
D8	E 4	sheet 2	K16	F 1	sheet 2	O11	D 2	sheet 2	R109	A 4	sheet 4
D9	H 5	sheet 2	K16	H 2	sheet 4	O12	D 3	sheet 2	R110	A 4	sheet 4
D10	A 5	sheet 3	K16	H 2	sheet 4	O13	E 4	sheet 2	R111	A 5	sheet 4
D11	B 4	sheet 3	K17	D 5	sheet 2	O14	D 2	sheet 2	R112	A 1	sheet 4
D12	H 1	sheet 3	K18	E 3	sheet 3	O15	E 2	sheet 2	R113	B 1	sheet 4
D13	H 1	sheet 3	K18	I 1	sheet 4	O16	I 5	sheet 2	R114	B 1	sheet 4
D14	H 1	sheet 3	K19	D 4	sheet 3	O17	A 4	sheet 3	R115	A 2	sheet 4
D15	H 1	sheet 3	K19	I 1	sheet 4	O18	G 6	sheet 3	R116	B 2	sheet 4
D16	H 1	sheet 3	K19	I 1	sheet 4	O19	A 1	sheet 4	R117	A 3	sheet 4
D17	H 1	sheet 3	K19	I 1	sheet 4				R118	B 5	sheet 4
D18	H 1	sheet 3							R119	B 6	sheet 4
D19	H 1	sheet 3							R120	A 6	sheet 4
D20	F 2	sheet 3							R121	C 6	sheet 4



№		Article nr.
Controller	G800	76 17735
Controller	D800	76 17555
Controller	G500	76 18755
Controller	D500	76 18745
Controller	V1600	76 21325
Controller	D1100	76 21505
Controller	D111	76 2456
Controller	G801	76 2281
Controller	D801	76 2249
Controller	V1200	76 2167
Controller	G1200	76 21095
Controller	G1208	76 2166
Name CONTROLLER (XY LOC.)		Article nr. (See *)
Date 12-07-1993	Drawn JVDY	Checked GT
BARCO PROJECTION SYSTEMS		

## TECHNICAL DESCRIPTION CONTROLLER MODULE EQUIPPED WITH THE ASIC .

### Introduction.

This board is equipped with a customer - made IC (ASIC) comprising the counters and sync generation circuits, the text generation and works closely together with the PLL to generate the pixelclock.

The controller board can be functionally divided into four blocks (two blocks are in the ASIC) :

- a) The **Interface or Real World Interface (RWI)** which realizes the contact with the rest of the projector and communicates with the user via the remote controls or the PC communication.
- b) The **CTRL** section comprising the microprocessor itself, the MUART IC3 , and the associated memories (EPROM , E<sup>2</sup>PROM etc..).
- c) The **Timing and text generation** both integrated in the **ASIC** . Attached to the text generator is the PLL which generates a Pixelclock, locked to the horizontal flyback pulses in phase and frequency.

In the adjust mode the board generates a crosshatch pattern at the requested frequencies , gen- locked with the incoming signals or generated by the timers in the ASIC.

The text ( programmed in the E<sup>2</sup>PROM) related to the menu in the adjustment mode or informations on the selected source is generated and displayed on the screen.

The ASIC measures at any time the line and vertical frequencies. These informations are a must in order to let the processor run. When the sync information is not available the processor automatically sets brightness and contrast to a minimum and waits for a coincidence to start working.

The linear controls are displayed on a barscale.

The controller is supplied with a 9 volts standby voltage (9VSB) for the circuits that must be ready to receive an ON command (RWI).

The other circuits are supplied with a stabilized +5V (derived from the +9V) and a negative -12V.

The text generator can run in two modes :

- \* a **32** characters or **256** pixels mode
- \* a **64** characters or **512** pixels mode in the convergence mode to obtain small vertical lines.



## Overview of the Input / output signals on the different connectors :

### J1 connector :

- (1) : **+5VSB OUT** : not used
- (2) : ground
- (3) and (4) : **+ 9 V**
- (5) : **-17V** , negative supply for the PLL

### J2 connector :

- (1) : **+9VSB IN** : standby power supply
- (2) : **PPM RCU** : PPM signal from the Remote Control Unit, 5 V active low
- (3) : **PPMRCV** : PPM signal from the RCVDS or an optional IR Remote Display
- (4) : **RXDC IN** : receive line from for the RS232 communication, 5 V active low.
- (5) : **VSI IN** : Vertical Scan Info : tells the microprocessor whether the projector is in table or ceiling position in order to adapt the text mode (write the characters from right to left or left to right).
- (6) : **HFM** : Not used in the 800 series  
Info on the flyback time of the BG1200, 1.25 or 2.5  $\mu$ S required by the microprocessor to write the text with the correct width.
  - \* + 12V -----> Tf = 2.5  $\mu$ S
  - \* - 12V -----> Tf = 1.25  $\mu$ S
- (7) and (8) : ground

### J3 connector :

- (1) : **RXDRCV** : Receive line for the RCVDS communication, 5 Volts active high.
- (2) : **COIN** : Coincidence info on the status of the horizontal and vertical oscillators.  
5V, Active high.
- (3) : **VS** : Vertical pulse , positive pulse of approx. 33 volts.
- (4) : **RDY** : Ready signal from the RCVDS switcher  
+5 volts : RCVDS connected and powered up.
- (5) : **HP** : Horizontal pulse, positive  
10V, active High
- (6) : **HSI** : Horizontal Scan Identification.  
Information on the position of the horizontal scan switches.
- (7) : **OFF** : open collector output connected to the SMPS and controlled by the RWI  
when low level the SMPS is operational.

### J4 connector :

- (1) : ground
- (2) : **Ro** : Red output from the textgenerator.
- (3) : **Go** : Green output from the textgenerator
- (4) : **Bo** : Blue output from the textgenerator
- (5) : **Insert** : 5 volts active high  
When this signal is high, the video is blanked and replaced by the text .

- (6) : **HSO** : Output horizontal sync from the text generator , 5 volts pulses  
(7) : **VSO** : Output vertical sync, 5 V active high pulses.  
When an external source is selected, then  
- VSO is at 0 volts  
- HSO is at 5 volts.

## J5 connector :

- (1) : **SCL** : I<sup>2</sup>C clock signal, 5 volts active low  
(2) : **SDA** : I<sup>2</sup>C data line, 5 volts active low.  
(3) : **SLC** : I<sup>2</sup>C clock for the optional external IR remote with seven segment display  
- 5 volts active high  
- this clock comes active only when no RCVDS is connected

**Note:** when an RCVDS is connected and the IR remote display is connected to the RCVDS, then, the RCVDS generates the SLC clock for the display.

- (4) : **TXDRCV** : transmit line for the RCVDS communication, 5 volts active high  
(5) : **TXDC** : transmit line for the RS232 PC communication.  
(6) : **DEFL** : not used in the 800 series, only for the 1200 series.

## **Real world interface RWI**

This is the only part of the controller that is powered up in stand-by. The Real world interface circuit is responsible for following :

- a) Identification and decoding of the PPM coded signal emitted by the IR transmitter or coming in via the wired remote control. The identification consists of the address check  
On the other hand, the RS232 codes from a PC com. port are decoded and an ON- command may be switching on the projector if in stand-by.
- b) Communication with the main processor via the Pmp2 bus (ports) and the P2 of the MUART IC3.
- c) Scanning of the DIP switches and drive of the red LEDs.

## These DIP switches allow following default settings :

- \* **Projector address** : The address of the projector must be the same of the address of the PPM code. The 8 switches make 256 different addresses possible. The hand held remote control is however limited to 9 addresses.
- \* **Power up mode** : At pushing the mains switch, the projector can start up in the stand-by mode or fully power up.
- \* **Password enable** : when in the ON position, the user must enter a password prior to enter the service and adjustment modes.
- \* **Baud rate** : determines the speed of communication with the PC com-port (RS232).

The red LEDs have following meaning :

- \* **Standby Power** : this LED is connected straight to the +9 V of the standby power supply.
- \* **Main power** : this LED is connected straight to the +8 volts, comes on as soon the projector is fully operational.
- \* **Processor cycles** : this LED is flickering all the time when the processor of the RWI communicates with the main processor of the controller board. It means that everything on the RWI works fine. If this LED is not flickering in stand-by the projector never starts up.
- \* **I<sup>2</sup>C shorted** : comes on when there is a very heavy load on the I<sup>2</sup>C bus. The communication via the bus is impossible.
- \* **Block match** : comes on when the connected source can use a memory block of the E<sup>2</sup>PROM .
- \* **Error** : this LED comes on together with another one of the next three when there is a problem in the communication.
  - RCVDS
  - RCU
  - PC
- \* **Pause** : is ON when the Pause button has been pushed to dim the light from the CRTs.

The program of the RWI microcontroller IC19 is programmed in the 8k x 8 EPROM (IC27).

The lower addresses are coming from the P0 ports via the latch IC18 and the higher addresses from P2.

IC23 is the buffer - latch for the communication with the main processor 8088.

## **Watch dog :**

At switching on the projector, a positive pulse is applied to the RST input in order to reset the micro-controller 80C32.

As long the processor is working fine, a pulse is sent to the base of Q17 via C53. These pulses cause a charging current through Q17 and keep C54 at a level higher than the voltage set by the divider R88 / R89. The output pin 1 is low. If the micro-controller is in trouble and its program is stopped for any reason, a reset pulse is applied to the RST input pin 9 of the micro-controller IC19.

## **9 Volts Watch :**

The 9V Standby supply , dropped and stabilized at 5V6 biases pin 6 of IC25. The 9 V Watch is the +9 V available as soon the projector is fully powered up.

If either one of these voltages is missing or dropped (even temporarily by an arcing e.g.) the INT0 of the processor receives a warning and tries to restart the SMPS. This is obviously only needed when the projector is in stand-by.

The purpose of this "9 V Watch" circuit is :

- a) Restart the SMPS at switching on when the first attempt has failed.
- b) Restart of the controller when, due to an arcing the +5V or the +9V standby disappears for a while.

## Controller (CTRL)

The heart of the controller board is without any doubt the microprocessor 8088. The program of the processor is loaded in the EPROM (IC9).

The 8088 receives all its commands from the RWI through the latch IC18 (see schematic of RWI).

The 8088 loads all the digital potentiometers or send information to the I / O peripheral interfaces for the source selection and other functions.

The text is loaded into the ASIC RAM (IC13) through the ASIC. The timing informations on the selected source are sent to the 8088. The main processor can now search in its memory (E<sup>2</sup>PROM) to find a corresponding block if available, or, to create a new block.

The MUART 8256 is responsible for :

- the I / O communication
- I<sup>2</sup>C communication
- the serial communication with the RCVDS800 switcher
- some "handshake" signals for the RWI and the ASIC.

The clock with its special duty cycle is generated by the 8284. The latter also generates Ready and Reset pulses if needed (e.g. at starting up).

The highest address bits are decoded in the **Gal-ADEC (Address DECoder)** to provide on its turn the needed " clock - in" signals for the data.

## ASIC - PLL

### A. ASIC.

The ASIC (= customer made for Barco) generates the text if needed and measures permanently the line and vertical frequencies of the input source. In the internal crosshatch mode it generates the R, G and B signals with the associated HSO and VSO sync pulses for the crosshatch pattern.

The ASIC automatically generates standard sync to allow the display of the start up screen or to display a warning or other info on the screen to inform the user.

The ASIC RAM (IC13) is loaded through the ASIC with the text information. A maximum of 8 bytes per line are written to the RAM during the HFB (see later) time.

This HFB pulse is derived from the pixelclock, via a divider by 256 (32 character mode) or 512 (64 character mode) in the ASIC.

When the PLL is out of order, the controller cannot start up since the HFB pulses are absent .

The horizontal sync pulse for the phase comparator determines the position of the text on the screen. To position the text always in the middle of the scan, we

need to take into account the delay caused by the opto-couplers, and other switching circuitry on the horizontal deflection board. This delay is adjusted with IC14 and automatically tracked with the line frequency via a integrating - feedback system.

## **B. PLL**

The PLL consists of the VCO (Q5 - Q13) , the phase comparator (IC16) with filter (IC15) and the divider in the ASIC.

The capacitor C46 is charged through Q9 and discharged through Q10. The input of the VCO is the base of Q9. The range of the VCO or pixelclock is quite extensive (from 5 Mhz to 85 Mhz). To cover this big range, we divide the range in so-called frequency banks.

As the frequencies of the active selected signal are known by the 8088, the latter can switch the right frequency bank with the VCO\_0, VCO\_1, VCO\_2 or VCO\_3 signals.

A capacitor is added in parallel or a current is added to the main charging current source :

C47 and / or C48 may be added in parallel to C46 with VCO\_0 and VCO\_1. Current may be added via VCO\_2 and VCO\_3.

The lower the voltage at the base of Q9, the higher the pixelclock. A short of the base to ground means a maximum pixelclock frequency.

The clock is passed into IC10 (very fast switching) and applied to the ASIC. to be divided by 256 or 512. The output of this divider is the HFB pulse sent to the phase comparator IC16.

The output of the comparator is then integrated or filtered with IC15 and applied to the base of Q9 (the input of the VCO).

In the 800 series, the text output is at a TTL level. The components in the dashed areas are not needed then.

In the BV1200 greyscales can be generated. This requires the DAC( IC17) and the components shown on the schematics in the dashed areas. The text output is at an analog level.

## Parts listing Controller module 76 2249

ITEM NO.	SIT.	DESCRIPTION	ITEM NO.	SIT.	DESCRIPTION
34 225405	W_U	7X0.16 UL1061 050 YEL	11 1477	C.85C	EL RA 100M Z 25E2 85
11 2774	C..1C	CE MI 100N S 63E2	11 2774	C.86C	CE MI 100N S 63E2
11 2774	C..2C	CE MI 100N S 63E2	11 2774	C.87C	CE MI 100N S 63E2
11 2774	C..3C	CE MI 100N S 63E2	11 2774	C.88C	CE MI 100N S 63E2
11 2774	C..4C	CE MI 100N S 63E2	11 2774	C.89C	CE MI 100N S 63E2
11 2774	C..5C	CE MI 100N S 63E2	11 3730	C.90C	POMERA 330N K 63E2
11 2774	C..6C	CE MI 100N S 63E2	11 2774	C.91C	CE MI 100N S 63E2
11 2774	C..7C	CE MI 100N S 63E2	11 2774	C.92C	CE MI 100N S 63E2
11 1500	C..8C	EL RA 47M M 10E2 85	11 2774	C.93C	CE MI 100N S 63E2
11 2774	C..9C	CE MI 100N S 63E2	11 3730	C.94C	POMERA 330N K 63E2
11 2774	C.10C	CE MI 100N S 63E2	11 1477	C.95C	EL RA 100M Z 25E2 85
11 2774	C.11C	CE MI 100N S 63E2	11 2774	C.96C	CE MI 100N S 63E2
11 2774	C.12C	CE MI 100N S 63E2	11 2737	C.97C	CE MI 680P K100E2
11 2774	C.13C	CE MI 100N S 63E2	11 2774	C101C	CE MI 100N S 63E2
11 2774	C.14C	CE MI 100N S 63E2	11 2430	C102C	NPO MI 10P G 63E1
11 2774	C.15C	CE MI 100N S 63E2	11 2230	C102C	NPO MI 10P G 63E2
11 2774	C.16C	CE MI 100N S 63E2	11 1477	C103C	EL RA 100M Z 25E2 85
11 2774	C.17C	CE MI 100N S 63E2	11 1477	C104C	EL RA 100M Z 25E2 85
11 2774	C.18C	CE MI 100N S 63E2	13 1621	D..1D	S 1N4148 075150 DO35
11 2774	C.19C	CE MI 100N S 63E2	13 1621	D..5D	S 1N4148 075150 DO35
11 2774	C.20C	CE MI 100N S 63E2	34 8100	D..6W_U	JUMP 0.6 AUT
11 2774	C.22C	CE MI 100N S 63E2	13 1629	D..7D	S BA244 020100 DO35
11 2774	C.23C	CE MI 100N S 63E2	13 1629	D..8D	S BA244 020100 DO35
11 2774	C.24C	CE MI 100N S 63E2	13 16361	D..9D	Y BAT85 030200 DO35
11 2774	C.25C	CE MI 100N S 63E2	13 1621	D.10D	S 1N4148 075150 DO35
11 2774	C.26C	CE MI 100N S 63E2	13 1621	D.11D	S 1N4148 075150 DO35
11 2774	C.27C	CE MI 100N S 63E2	13 1662	D.12D	LED D3 T RED
11 2774	C.28C	CE MI 100N S 63E2	13 1662	D.13D	LED D3 T RED
11 2774	C.29C	CE MI 100N S 63E2	13 1662	D.14D	LED D3 T RED
11 2774	C.30C	CE MI 100N S 63E2	13 1662	D.15D	LED D3 T RED
11 2774	C.31C	CE MI 100N S 63E2	13 1662	D.16D	LED D3 T RED
11 1546	C.32C	EL RA 1M M 50E2 85	13 1662	D.17D	LED D3 T RED
11 2774	C.35C	CE MI 100N S 63E2	13 1662	D.18D	LED D3 T RED
11 3730	C.37C	POMERA 330N K 63E2	13 1662	D.19D	LED D3 T RED
11 2234	C.39C	NPO MI 22P G 63E2	13 1621	D.20D	S 1N4148 075150 DO35
11 2386	C.43C	N152MI 390P J 63E2	13 1621	D.21D	S 1N4148 075150 DO35
11 3724	C.44C	POMERA 100N K 63E2	13 1621	D.22D	S 1N4148 075150 DO35
11 2386	C.45C	N152MI 390P J 63E2	13 1621	D.23D	S 1N4148 075150 DO35
11 2226	C.46C	NPO MI 4P7C 63E2	13 1621	D.24D	S 1N4148 075150 DO35
11 2235	C.47C	NPO MI 27P G 63E2	13 1621	D.25D	S 1N4148 075150 DO35
11 2238	C.48C	NPO MI 47P G 63E2	13 1621	D.26D	S 1N4148 075150 DO35
11 37161	C.49C	POMERA 22N K100E2	13 1621	D.27D	S 1N4148 075150 DO35
11 2735	C.50C	CE MI 470P K100E2	13 1621	D.28D	S 1N4148 075150 DO35
11 2774	C.51C	CE MI 100N S 63E2	13 1621	D.29D	S 1N4148 075150 DO35
11 4087	C.52C	POMERA 470N M 63E2	13 1621	D.30D	S 1N4148 075150 DO35
11 1546	C.54C	EL RA 1M M 50E2 85	13 1621	D.31D	S 1N4148 075150 DO35
11 37121	C.55C	POMERA 10N K100E2	13 1621	D.32D	S 1N4148 075150 DO35
11 3730	C.56C	POMERA 330N K 63E2	13 1621	D.33D	S 1N4148 075150 DO35
11 1550	C.57C	EL RA 4M7M 50E2 85	13 1621	D.34D	S 1N4148 075150 DO35
11 3726	C.58C	POMERA 150N K 63E2	13 1621	D.35D	S 1N4148 075150 DO35
11 3724	C.59C	POMERA 100N K 63E2	13 1621	D.36D	S 1N4148 075150 DO35
11 3724	C.60C	POMERA 100N K 63E2	13 1621	D.37D	S 1N4148 075150 DO35
11 3724	C.61C	POMERA 100N K 63E2	13 1621	D.38D	S 1N4148 075150 DO35
11 3724	C.62C	POMERA 100N K 63E2	13 1621	D.39D	S 1N4148 075150 DO35
11 1477	C.65C	EL RA 100M Z 25E2 85	13 1621	D.40D	S 1N4148 075150 DO35
11 3730	C.66C	POMERA 330N K 63E2	13 1621	D.41D	S 1N4148 075150 DO35
11 1477	C.67C	EL RA 100M Z 25E2 85	13 1621	D.42D	S 1N4148 075150 DO35
11 1476	C.68C	EL RA 47M M 25E2 85	13 1621	D.43D	S 1N4148 075150 DO35
11 3730	C.69C	POMERA 330N K 63E2	13 1621	D.44D	S 1N4148 075150 DO35
11 1477	C.70C	EL RA 100M Z 25E2 85	13 1621	D.45D	S 1N4148 075150 DO35
11 1476	C.71C	EL RA 47M M 25E2 85	13 1621	D.46D	S 1N4148 075150 DO35
11 3730	C.72C	POMERA 330N K 63E2	13 1621	D.47D	S 1N4148 075150 DO35
11 3730	C.73C	POMERA 330N K 63E2	13 1621	D.48D	S 1N4148 075150 DO35
11 2774	C.84C	CE MI 100N S 63E2	13 1621	D.49D	S 1N4148 075150 DO35

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13 1621	D.50D S 1N4148 075150 DO35	13 4001	I.37U 7805 TO220 PSTAB
13 1621	D.51D S 1N4148 075150 DO35	13 4030	I.40U 2940-5 LM TO220 PSTAB
13 1621	D.52D S 1N4148 075150 DO35	13 4016	I.41U 7912 TO220 PSTAB
13 1621	D.53D S 1N4148 075150 DO35	13 6701	I.42U 74AC32
13 1621	D.54D S 1N4148 075150 DO35		
13 1621	D.55D S 1N4148 075150 DO35	31 3925	J..1J CT MBT P 5 M2SN
13 1621	D.56D S 1N4148 075150 DO35	31 3928	J..2J CT MBT P 8 M2SN
13 1621	D.57D S 1N4148 075150 DO35	31 3927	J..3J CT MBT P 7 M2SN
13 1621	D.58D S 1N4148 075150 DO35	31 3926	J..5J CT MBT P 6 M2SN
13 1621	D.59D S 1N4148 075150 DO35		
13 1621	D.60D S 1N4148 075150 DO35	77 3215	L..1CH SMP PJ49
13 1621	D.61D S 1N4148 075150 DO35	77 3028	L..2CH SMP TV31
13 1621	D.62D S 1N4148 075150 DO35	77 3215	L..3CH SMP PJ49
13 1621	D.63D S 1N4148 075150 DO35		
13 1621	D.64D S 1N4148 075150 DO35	36 20216	O..1SCR D84 M 3 X 6 SI
13 1621	D.65D S 1N4148 075150 DO35		
13 1621	D.66D S 1N4148 075150 DO35	78 0212	PC..PCD PJ49 800 CTRL ASIC 07
13 1621	D.67D S 1N4148 075150 DO35		
13 1621	D.68D S 1N4148 075150 DO35	13 14182	Q..4Q BC559C P SS TO92 030A1
13 1621	D.69D S 1N4148 075150 DO35	13 2568	Q..5Q BF959 N SS TO92 02030
13 1621	D.70D S 1N4148 075150 DO35	13 2568	Q..6Q BF959 N SS TO92 02030
13 1621	D.71D S 1N4148 075150 DO35	13 2568	Q..7Q BF959 N SS TO92 02030
13 1621	D.72D S 1N4148 075150 DO35	13 2568	Q..8Q BF959 N SS TO92 02030
13 1621	D.73D S 1N4148 075150 DO35	13 2507	Q..9Q BF324 P SS TO92 03025
13 1621	D.74D S 1N4148 075150 DO35	13 2507	Q..10Q BF324 P SS TO92 03025
13 1621	D.75D S 1N4148 075150 DO35	13 14131	Q..11Q BC557B P SS TO92 045A1
13 1621	D.76D S 1N4148 075150 DO35	13 14071	Q..12Q BC547B N SS TO92 045A1
13 1621	D.77D S 1N4148 075150 DO35	13 14071	Q..13Q BC547B N SS TO92 045A1
10 1524	D.78R MF H100E F 0W4 E2	13 14071	Q..14Q BC547B N SS TO92 045A1
13 1644	D.81D R 1N4001 05001A DO41	13 14071	Q..15Q BC547B N SS TO92 045A1
13 1662	D.82D LED D3 T RED	13 1491	Q..16Q BSX20 2369 N SS TO18 015A2
13 1662	D.83D LED D3 T RED	13 14182	Q..17Q BC559C P SS TO92 030A1
13 1621	D.84D S 1N4148 075150 DO35	13 14071	Q..18Q BC547B N SS TO92 045A1
13 1621	D.85D S 1N4148 075150 DO35	13 14071	Q..19Q BC547B N SS TO92 045A1
13 1621	D.86D S 1N4148 075150 DO35	13 1411	Q..20Q BC549C N SS TO92 030A1
13 16361	D.87D Y BAT85 030200 DO35	13 14071	Q..23Q BC547B N SS TO92 045A1
13 7192	I..1U 8284A DIP18 PCPU	10 1533	R..1R MF H560E F 0W4 E2
13 7191	I..2U 8088 DIP40 PCPU	10 1533	R..2R MF H560E F 0W4 E2
13 7274	I..3U 8256AH DIP40 PMUART	10 1569	R..3R MF H560K F 0W4 E2
13 7002	I..4U 74HCT573 DIP20 PLATCH	10 1520	R..4R MF H 47E F 0W4 E2
13 7518	I..5U 74LS375 DIP16 PLATCH	10 1520	R..5R MF H 47E F 0W4 E2
32 8193	I..6U_S D 800 ADEC V200	10 1520	R..6R MF H 47E F 0W4 E2
13 7271	I..7U SRAM 8KX8-12DIP28 P 6264	10 1520	R..7R MF H 47E F 0W4 E2
13 7184	I..8U 28C64 DIP28 CEPROM	10 1520	R..8R MF H 47E F 0W4 E2
32 8296	I..9U_S D 801 CTRL V510	10 1536	R..9R MF H 1K F 0W4 E2
13 7005	I..10U 74HCT03 DIP14 PNANDG	10 1538	R..10R MF H 1K5 F 0W4 E2
13 7567	I..11U 74HCT574 DIP20 PFL_FL	10 1538	R..11R MF H 1K5 F 0W4 E2
13 2882	I..12U#1 TG PLCC68 P CTRL	10 1550	R..46R MF H 15K F 0W4 E2
13 7174	I..13U SRAM 32KX8 70DIL28	10 1550	R..49R MF H 15K F 0W4 E2
13 7552	I..14U 74HCT123 DIP16 PMULTV	10 1533	R..50R MF H560E F 0W4 E2
13 4116	I..15U 353 LF DIP8 POPAMP	10 1548	R..52R MF H 10K F 0W4 E2
13 76025	I..16U 4046B DIP16 PPLL	10 1548	R..53R MF H 10K F 0W4 E2
13 7002	I..18U 74HCT573 DIP20 PLATCH	10 1568	R..54R MF H470K F 0W4 E2
13 7193	I..19U 80C31 DIP40 PCPU	10 1532	R..55R MF H470E F 0W4 E2
13 7536	I..20U 74HCT04 DIP14 PINV	10 1532	R..56R MF H470E F 0W4 E2
13 7534	I..21U 74HCT00 DIP14 PNANDG	10 1537	R..57R MF H 1K2 F 0W4 E2
13 7537	I..22U 74HCT08 DIP14 PNANDG	10 1552	R..58R MF H 22K F 0W4 E2
13 7544	I..23U 74HCT245 DIP20 PTR	10 1535	R..59R MF H820E F 0W4 E2
13 7002	I..24U 74HCT573 DIP20 PLATCH	10 1531	R..60R MF H390E F 0W4 E2
13 4114	I..25U 393 LM DIP8 PV_COM	10 1531	R..61R MF H390E F 0W4 E2
13 7495	I..26U 74LS92 DIP14 PCOUNT	10 1532	R..62R MF H470E F 0W4 E2
32 8221	I..27U_S **MK1 RWI V403	10 1531	R..63R MF H390E F 0W4 E2
13 7551	I..28U 74HCT14 DIP14 PSTRIG	10 1521	R..64R MF H 56E F 0W4 E2
13 7551	I..29U 74HCT14 DIP14 PSTRIG	10 1523	R..65R MF H 82E F 0W4 E2
13 6702	I..30U 74AC00	10 1532	R..66R MF H470E F 0W4 E2
13 6700	I..31U 74AC541	10 1548	R..67R MF H 10K F 0W4 E2
13 4030	I..36U 2940-5 LM TO220 PSTAB	10 1531	R..68R MF H390E F 0W4 E2



10 1528	R.69R MF H220E F 0W4 E2	10 11907	R141R CFFH E1 J 0W4
10 1538	R.70R MF H 1K5 F 0W4 E2	10 11907	R142R CFFH E1 J 0W4
10 1538	R.71R MF H 1K5 F 0W4 E2	10 11008	R143R CFFH 1E J 0W25 0207
10 1544	R.72R MF H 4K7 F 0W4 E2	10 1536	R145R MF H 1K F 0W4 E2
10 1544	R.73R MF H 4K7 F 0W4 E2	10 1536	R146R MF H 1K F 0W4 E2
10 1544	R.74R MF H 4K7 F 0W4 E2	10 1562	R147R MF H150K F 0W4 E2
10 1544	R.75R MF H 4K7 F 0W4 E2	10 1524	R158R MF H100E F 0W4 E2
10 1544	R.76R MF H 4K7 F 0W4 E2	10 1554	R159R MF H 33K F 0W4 E2
10 1524	R.77R MF H100E F 0W4 E2	10 1525	R160R MF H120E F 0W4 E2
10 1548	R.78R MF H 10K F 0W4 E2	10 1544	R161R MF H 4K7 F 0W4 E2
10 1180	R.79R CF H 4M7 J 0W25		
10 1520	R.80R MF H 47E F 0W4 E2	32 4184	S..1SW DIP 1M P 8 BT SN
10 1520	R.81R MF H 47E F 0W4 E2	32 4184	S..2SW DIP 1M P 8 BT SN
10 1520	R.82R MF H 47E F 0W4 E2		
10 1520	R.83R MF H 47E F 0W4 E2	30 6858	XT.1X 24.000000 MHZ HC49
10 1560	R.84R MF H100K F 0W4 E2	30 6857	XT.2X 18.432000 MHZ HC49
10 1544	R.85R MF H 4K7 F 0W4 E2		
10 1183	R.86R CF H 8M2 J 0W25	13 1743	Z..1D ZEN 8V2 0W5 C DO35
10 1567	R.87R MF H390K F 0W4 E2	13 1742	Z..2D ZEN 6V8 0W5 C DO35
10 1554	R.88R MF H 33K F 0W4 E2	13 1742	Z..3D ZEN 6V8 0W5 C DO35
10 1555	R.89R MF H 39K F 0W4 E2	13 1754	Z..4D ZEN 3V3 0W5 C DO35
10 1559	R.90R MF H 82K F 0W4 E2	13 1744	Z..5D ZEN 5V6 0W5 C DO35
10 1548	R.91R MF H 10K F 0W4 E2	13 1730	Z..7D ZEN 20V 0W5 C DO35
10 1548	R.92R MF H 10K F 0W4 E2	13 1744	Z..9D ZEN 5V6 0W5 C DO35
10 1552	R.93R MF H 22K F 0W4 E2	13 1744	Z.11D ZEN 5V6 0W5 C DO35
10 1563	R.94R MF H180K F 0W4 E2	13 1734	Z.12D ZEN 5V6 0W5 B DO35
10 1544	R.95R MF H 4K7 F 0W4 E2		
10 1555	R.96R MF H 39K F 0W4 E2		
10 1535	R.97R MF H820E F 0W4 E2		
10 1535	R.98R MF H820E F 0W4 E2		
10 1535	R.99R MF H820E F 0W4 E2		
10 1535	R100R MF H820E F 0W4 E2		
10 1535	R101R MF H820E F 0W4 E2		
10 1535	R102R MF H820E F 0W4 E2		
10 1535	R103R MF H820E F 0W4 E2		
10 1535	R104R MF H820E F 0W4 E2		
10 1536	R105R MF H 1K F 0W4 E2		
10 1524	R106R MF H100E F 0W4 E2		
10 1550	R107R MF H 15K F 0W4 E2		
10 1524	R108R MF H100E F 0W4 E2		
10 1536	R109R MF H 1K F 0W4 E2		
10 1532	R110R MF H470E F 0W4 E2		
10 1524	R111R MF H100E F 0W4 E2		
10 1524	R112R MF H100E F 0W4 E2		
10 1536	R113R MF H 1K F 0W4 E2		
10 1548	R114R MF H 10K F 0W4 E2		
10 1535	R115R MF H820E F 0W4 E2		
10 1534	R116R MF H680E F 0W4 E2		
10 1524	R117R MF H100E F 0W4 E2		
10 1544	R118R MF H 4K7 F 0W4 E2		
10 1544	R119R MF H 4K7 F 0W4 E2		
10 1524	R120R MF H100E F 0W4 E2		
10 1524	R121R MF H100E F 0W4 E2		
10 1548	R122R MF H 10K F 0W4 E2		
10 1555	R123R MF H 39K F 0W4 E2		
10 1528	R124R MF H220E F 0W4 E2		
10 1524	R125R MF H100E F 0W4 E2		
10 1524	R126R MF H100E F 0W4 E2		
10 1524	R127R MF H100E F 0W4 E2		
10 1524	R128R MF H100E F 0W4 E2		
10 1524	R129R MF H100E F 0W4 E2		
10 1524	R130R MF H100E F 0W4 E2		
10 1524	R131R MF H100E F 0W4 E2		
10 1524	R132R MF H100E F 0W4 E2		
10 1524	R133R MF H100E F 0W4 E2		
10 1524	R134R MF H100E F 0W4 E2		
10 1524	R135R MF H100E F 0W4 E2		
10 1536	R137R MF H 1K F 0W4 E2		

## Spare parts Controller module 76 2249

ART NO.	DESCRIPTION	QUANTITY	ART NO.	DESCRIPTION	QUANTITY
1011008	R CFFH 1E J 0W25 0207	1	328221	U_S **MK1 RWI V403	1
1011907	R CFFH E1 J 0W4	2	328296	U_S D 801 CTRL V510	1
1314071	Q BC547B N SS TO92 045A1	7	34225405	W_U 7X0.16 UL1061 050 YEL	1
131411	Q BC549C N SS TO92 030A1	1	348019	CBL ACC TIE B L100 W2.5	7
1314131	Q BC557B P SS TO92 045A1	1	348071	CBL ACC TIE FIX TM1S6	1
1314182	Q BC559C P SS TO92 030A1	2	348089	CBL ACC SLCSE D 5.6	5
131491	Q BSX20.2369 N SS TO18 015A2	1			
131621	D S 1N4148 075150 DO35	65	361913	SCR D965 M 3 X 8 PS Z	2
131629	D S BA244 020100 DO35	2	3620216	SCR D84 M 3 X 6 SI	2
1316361	D Y BAT85 030200 DO35	2	3620226	SCR D84 M 3 X 8 SI	2
131644	D R 1N4001 05001A DO41	1	3626696	SCR D921 M 3 X 8 SI	12
131662	D LED D3 T RED	10	366102	NUT D934 M 3 S Z	2
131730	D ZEN 20V 0W5 C DO35	1	3661026	NUT D934 M 3 I	4
131734	D ZEN 5V6 0W5 B DO35	1	3674391	RVT POP D3.2 L 7.4 P ASW	4
131742	D ZEN 6V8 0W5 C DO35	2	367502	WSHR D6798 A 3.2 S Z	4
131743	D ZEN 8V2 0W5 C DO35	1			
131744	D ZEN 5V6 0W5 C DO35	3	722209	FRM PJ49 CTRL LED FIX	1
131754	D ZEN 3V3 0W5 C DO35	1	722226	FRM PJ49 CTRL CBL FIX	2
132507	Q BF324 P SS TO92 03025	2			
132568	Q BF959 N SS TO92 02030	4	773028	CH SMP TV31	1
132882	U#1 TG PLCC68 P CTRL	1	773215	CH SMP PJ49	2
134001	U 7805 TO220 PSTAB	1			
134016	U 7912 TO220 PSTAB	1	780212	PCD PJ49 800 CTRL ASIC 07	1
134030	U 2940-5 LM TO220 PSTAB	2			
134114	U 393 LM DIP8 PV_COM	1	801602	X ACC INSUL STRIP PCM5	2
134116	U 353 LF DIP8 POPAMP	1	802613	FRM PJ49 CTRL DN 09	1
136700	U 74AC541	1	804530	FRM PJ51 CTRL FIX FR	1
136701	U 74AC32	1	804531	FRM PJ51 CTRL FIX RR	1
136702	U 74AC00	1	805319	HTSNK PJ49 *801 CTRL MK2 01	2
137002	U 74HCT573 DIP20 PLATCH	3			
137005	U 74HCT03 DIP14 PNANDG	1			
137174	U SRAM 32KX8 70DIL28	1			
137184	U 28C64 DIP28 CEPROM	1			
137191	U 8088 DIP40 PCPU	1			
137192	U 8284A DIP18 PCPU	1			
137193	U 80C31 DIP40 PCPU	1			
137271	U SRAM 8KX8-12DIP28 P 6264	1			
137274	U 8256AH DIP40 PMUART	1			
137495	U 74LS92 DIP14 PCOUNT	1			
137518	U 74LS375 DIP16 PLATCH	1			
137534	U 74HCT00 DIP14 PNANDG	1			
137536	U 74HCT04 DIP14 PINV	1			
137537	U 74HCT08 DIP14 PNANDG	1			
137544	U 74HCT245 DIP20 PTR	1			
137551	U 74HCT14 DIP14 PSTRIG	2			
137552	U 74HCT123 DIP16 PMULTV	1			
137567	U 74HCT574 DIP20 PFL_FL	1			
1376025	U 4046B DIP16 PPLL	1			
306857	X 18.432000 MHZ HC49	1			
306858	X 24.000000 MHZ HC49	1			
312830	J UPLCC FBT P68 E1SN SPG	1			
313248	J U0.3 FBT P14 E1SN SPG	1			
3132539	J U0.6 FBT P28 E1AU TLP	1			
313487	J U0.6 FBT P32 E1SN SPG	1			
313925	J CT MBT P 5 M2SN	1			
313926	J CT MBT P 6 M2SN	1			
313927	J CT MBT P 7 M2SN	1			
313928	J CT MBT P 8 M2SN	1			
315302	J PIN MBT D 1.3L 5.5+3	2			
324184	SW DIP 1M P 8 BT SN	2			
328193	U_S D 800 ADEC V200	1			

