

**TECHNICAL DETAILS OF CNC H. BORING MACHINE, SPINDLE DIA-130 MM, MAKE-SACEM, PLAN NO. 11/1-017**

**A. Technical Details of the Machine:**

1. Make : SACEM, SPAIN, Model: RACEM – 601
2. Existing CNC System : Sinumerik 840C
3. Spindle Dia : 130mm, Spindle inside taper: BT 50 – MAS 403
4. Ram dimensions : 350X400 mm
5. Column travel (**X-Axis**) : 4000mm,
6. Head stock vertical travel (**Y-Axis**) : 2500mm, Ball Lead Screw Dia 80x15 mm pitch
7. Spindle Horizontal travel (**Z-Axis**) : 1000mm, Ball Lead Screw Dia 63x10 mm pitch
8. Ram Horizontal travel (**W-Axis**) : 1000mm, Ball Lead Screw Dia 63x10 mm pitch
9. Infinitely variable feeds for all axes : 3-10000mm/min.
10. Infinitely variable speeds of the spindle : 4-2500 rpm
11. AC motor for spindle speeds : 1PH6 206-4NE46-Z=G97, 122 A, 63KW, 1250/5000 RPM
12. Rated/Stall(60K) torque & speed of X axis feed motor : 45/60 Nm, 2000rpm, Motor 1FT5 132-0AC71-1(without brake)
13. Rated/Stall(60K) torque & speed of X axis feed motor : 45/60 Nm, 2000rpm, Motor 1FT5 132-0AC71-1-Z=G45 (with brake)
14. Rated/Stall(60K) torque & speed of Z & W axes feed motors: 39/45 Nm, 2000rpm, Motors 1FT5 106-0AC71-1-Z=G45+G51(with brake)
15. Hydraulic group motor for clamping, tool clamping and counterbalance : 22 KW, 380 VAC
16. Hydraulic group motor for speed range change and tool changer : 4.0 KW, 380 VAC
17. Aerostatic group Motor : 5.5 KW, 380VAC
18. Headstock Inside Lubrication Motor : 2.2 KW, 380VAC
19. Coolant Pump Motor : 3.0 KW, 380VAC
20. Hydraulic Motor for Ram Compensation : 0.75 KW, 380VAC
21. Chip Conveyor Motor : 0.75 KW, 380VAC
22. Main Motor Fan Motor : 0.25 KW, 380VAC
23. Gross Weight of the Machine : 26,000 Kg

## **B. Technical Details of the Rotary Table:**

1. Dimension of table : 1800X2200 mm
2. Table longitudinal travel (V Axis) : 2000mm, Ball Lead Screw Dia 80x10 mm pitch
3. Rapid motion (B-Axis) : 1.8 rpm
4. Rotation feeds infinitely variable : 0.002-1.8 rpm
5. Feeds infinitely variable for longitudinal travel (V - Axis) : 3-2500mm/min.
6. Rated/Stall(60K) torque & speed of E/V axis feed motor : 28/45 Nm, 3000 rpm, 1FT5 106-0AF71-1 (without brake)
7. Rated/Stall(60K) torque & speed of B axis feed motor : 47/45Nm, 1200 rpm, 1FT5 106-0AA71-1 (without brake)
8. Hydraulic Motor for Table Clamping : 0.55 KW, 220VAC
9. Maximum load capacity of Rotary Table : 15,000 Kg
10. Gross Weight of the Rotary Table : 10,500 Kg

## **C. Technical Details of the Existing Hydraulic, Aerostatic, Lubrication and other systems.**

1. **Aerostatic system** of X-axis consists of rotary screw air compressor (SULLAIR- make Model –**ES 6**), Air drier (HANKISON- make and Model –**HD-55-E**), Air-filter (JOUCOMATIC make), lubricator (JOUCOMATIC make), electro-magnetic valves (JOUCOMATIC make), flow and pressure switches (SUCO make), pipes and air nozzles etc. The compressor system consists of:
  - a. Fluid management system – Fluid is injected into the compressor unit and mixes directly with the air, as internal rotor turn compressing the air. This fluid acts as coolant, Sealant and Lubricant. This fluid is later separated from the air in the sump.
  - b. Motor /Drive Section – It consist of squirrel cage induction motor 5.5 KW and integrated drive gearing.
  - c. Compressor cooling system – It consist of fluid cooler, fan and cooler shroud.The minimum sump pressure is 60 PSI (415 kPa) under full load condition and capacity is 4.35 liters. Air flow rate is 0.85m<sup>3</sup>/min (CFM). Maximum pressure is 7.5 bar. Existing Drier Flow capacity at 30°C inlet air temperature and at 7 bar inlet air pressure is **69 m<sup>3</sup>/h**. **Dew point** is between 3°C to 10°C. The compressed air from compressor goes to drier and then this dry air pass through FRL unit (Filter + Pressure regulator + Lubricator) of JOUCOMATIC make.
2. **Hydraulic Group:** Hydraulic group operates the following systems:

Hydraulic counterbalance of Y-axis; Speed gearbox- for gear shifting through hydraulic cylinders; Ram compensation; Clamping of X- and Y-axes; Clamping of Tools in spindle & Clamping mechanism of Attachment Heads onto Ram.

At present, the Hydraulic group consists of a sump of 300 liters capacity with three pumps positioned on top of the tank.

These pumps provide pressurized hydraulic oil to aforesaid systems.

- A. PUMP 1 - **Vickers** make, Variable Flow, axial piston pump, Model- **PVH-57-QIC-RF-1S-CV25V21**, rated pressure 250 bar and discharge at rated pressure is 83 LPM at 1500 rpm, supplies pressurized oil for X- & Y-axes clamping, Tool Clamping and Headstock Counterbalance systems.
  - B. PUMP 2 – **Vickers** make axial piston pump, Model – **PVB-10-RSY-CMC-11** supplies oil for, Spindle Speed Range Change and Tool Changer.
  - C. PUMP 3 – **Hawe** make Radial Piston pump, Model – **R-2, 5** provides oil supply for Ram compensation.
3. **Hydraulic counterbalance** – Machine has a hydraulic counterbalance system of the headstock that guarantees a constant equilibration of the same in any point of its vertical travel. The hydraulic system for the headstock counterbalance has safety elements to guarantee the instantaneous blocking of headstock if the chain of the counterbalance is exceptionally broken, also in case of huge leaks or unexpected breaks on the pressure hose of the cylinder. Hydraulic counterbalance pressure is **150 bars**.
  4. **Hydraulic coupling system of the Head attachments:** There are two nos. head attachments (**two axes indexing milling head and Universal head**). The coupling/clamping of heads onto the Ram is made by means of mechanical hydraulic system comprising of **04 nos.** cylinders. The gripping force on each cylinder with the accessory mounted is approximately 4600 kg.
  5. **Oil-Air mist system of INTZA make**, to moisten the air with minute oil droplets and provides lubrication to spindle bearings and Ball nuts of Z- and W- axes.
  6. **Lubrication System of RAM Roller Bearings.**
  7. **Double pinion Gear box** Lubrication System of X-Axis.
  8. **Headstock inside / Spindle speed gearbox** lubrication system.
  9. **Two nos. oil Chiller units** one each for **main hydraulic system** and **speed gear box lubrication system.**
  10. **Clamping of V and B- axes of Rotary Table:**

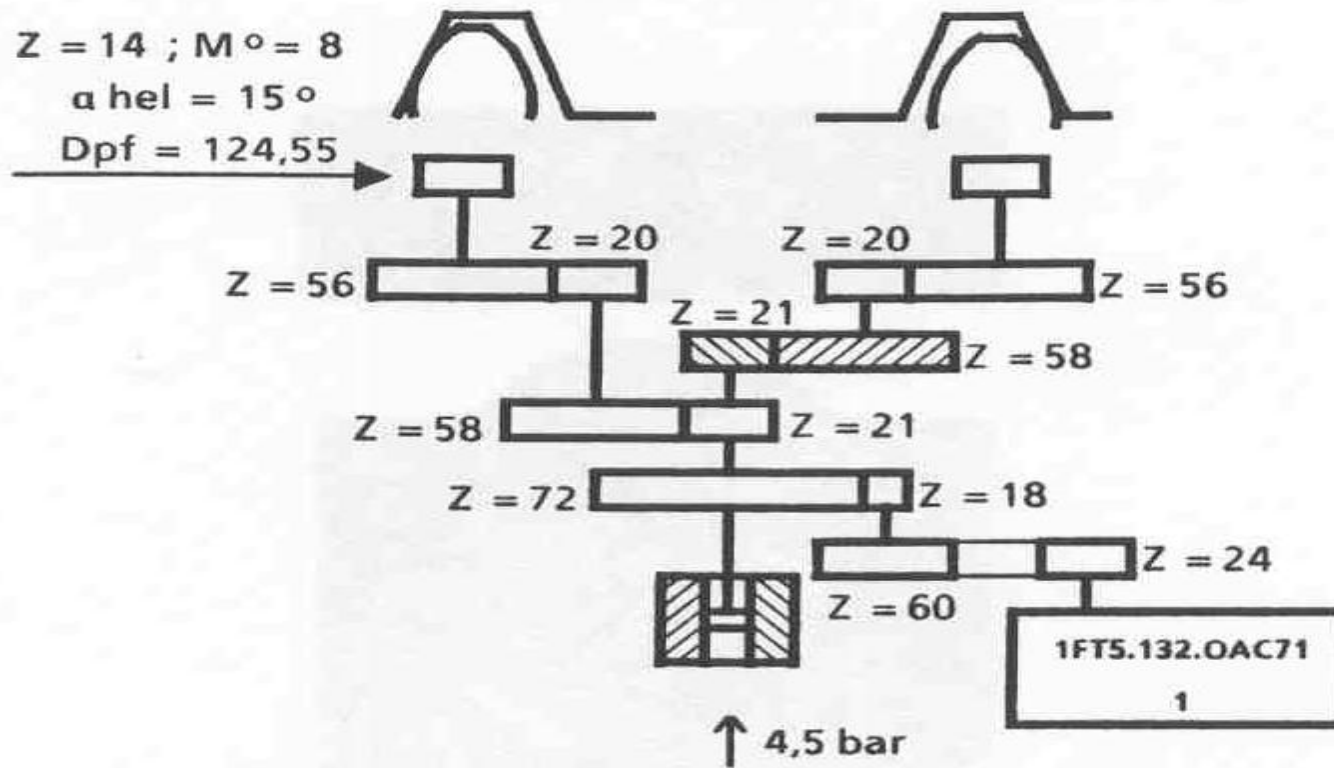
At present, a hydraulic group of **Hawe** make with Model **HC 2/2, 06-B2/250-0-31X**. The motor is 0.55 KW and the pump is Radial piston pump having rated pressure of 250 bars and discharge of 2.06 LPM.
  11. **Lubrication System of Table Ball Screw & Bearings.**
  12. **Double pinion Gear box Lubrication & Back-lash Compensation System** of Rotary Table.

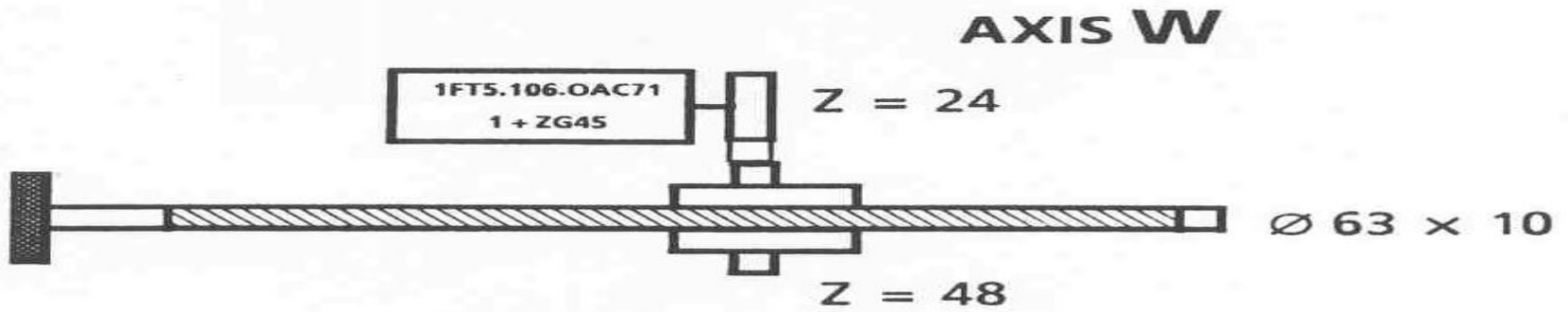
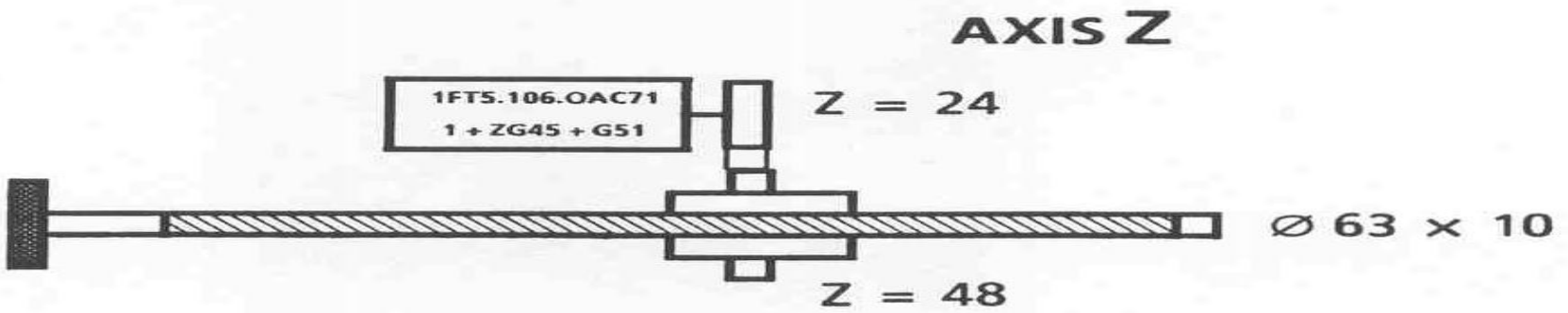
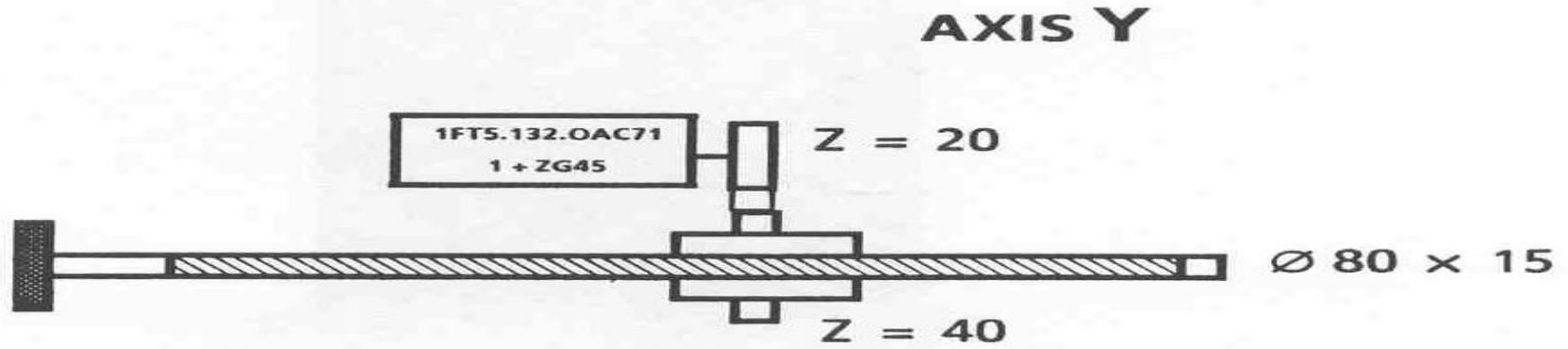
**D. List of Bearings**

<b>Sl. No.</b>		<b>Quantity</b>
	<b>SPINDLE BEARINGS</b>	
1.	MATCHED PAIR SET OF TWO ANGULAR CONTACT BALL BEARING SKF 7018 AS/P4A-TBT-A OR EQUIVALENT SIZE: 90X140X24	01 Set
2.	S/R ANGULAR CONTACT BALL BEARING SKF:7018 AC SIZE 90 X 140 X 24 MM OR EQUIVALENT	1
3.	SINGLE ROW TAPER ROLLER BEARING SKF: 33210 (50X90X35) OR EQUIVALENT.	1
4.	SINGLE ROW RIGID RADIAL (DEEP GROOVE) BALL BEARINGS 25X47X12 SKF:6005-2RS	1
5.	SINGLE ROW RIGID RADIAL (DEEP GROOVE) BALL BEARINGS 35X62X14 SKF:6007-2RS	1
6.	B71938C TPA P4	2
7.	n° 71940 HQ 16 J84	3
8.	n° 71938 HDB J74	2
	<b>RAM GUIDE</b>	
9.	LINEAR ROLLER BEARING INA: RUS 26102 SIZE:26X102X40 OR EQUIVALENT	8
10.	ADJUSTING JIB FOR LINEAR ROLLER BEARING, INA:VUS 26102,SIZE:25X113X39.50 OR EQUIVALENT	8
	<b>Y- AXIS</b>	
11.	WS- 81120 NS- 19039	2
12.	WS- 81120 NS- 19041	2
13.	WS- 81120 NS- 19038	2
14.	WS- 81120 NS- 19051	2

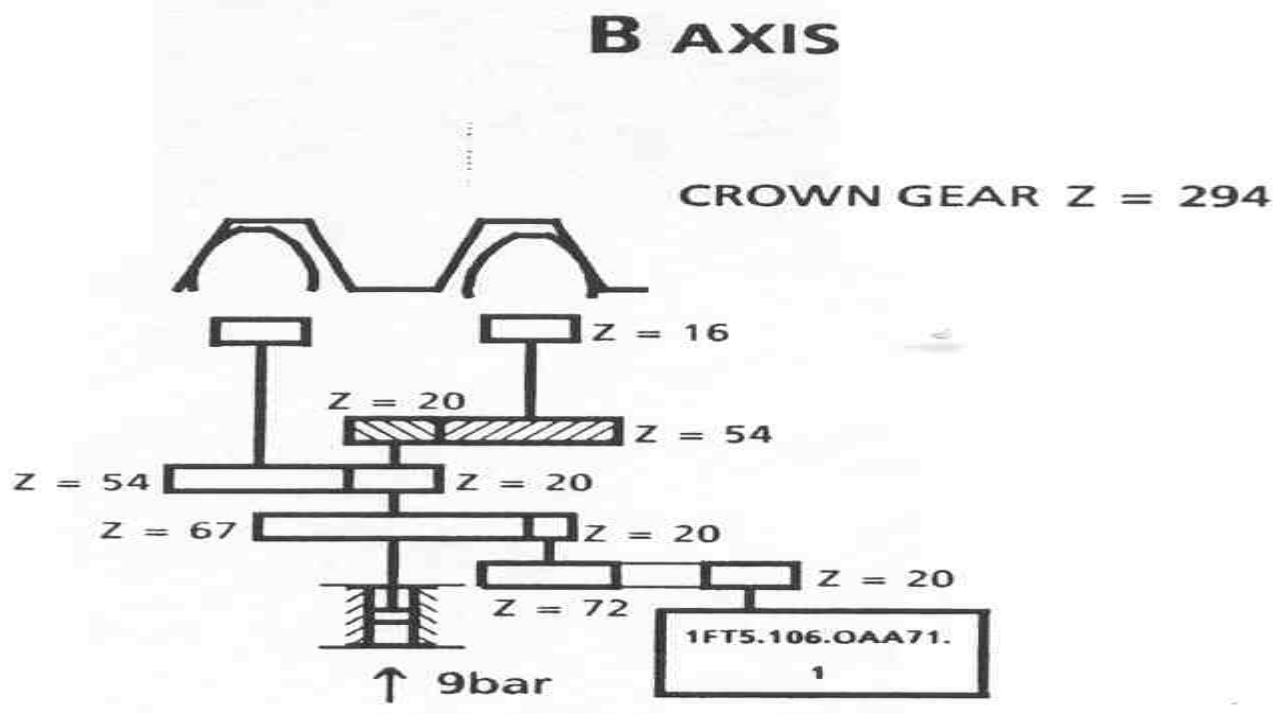
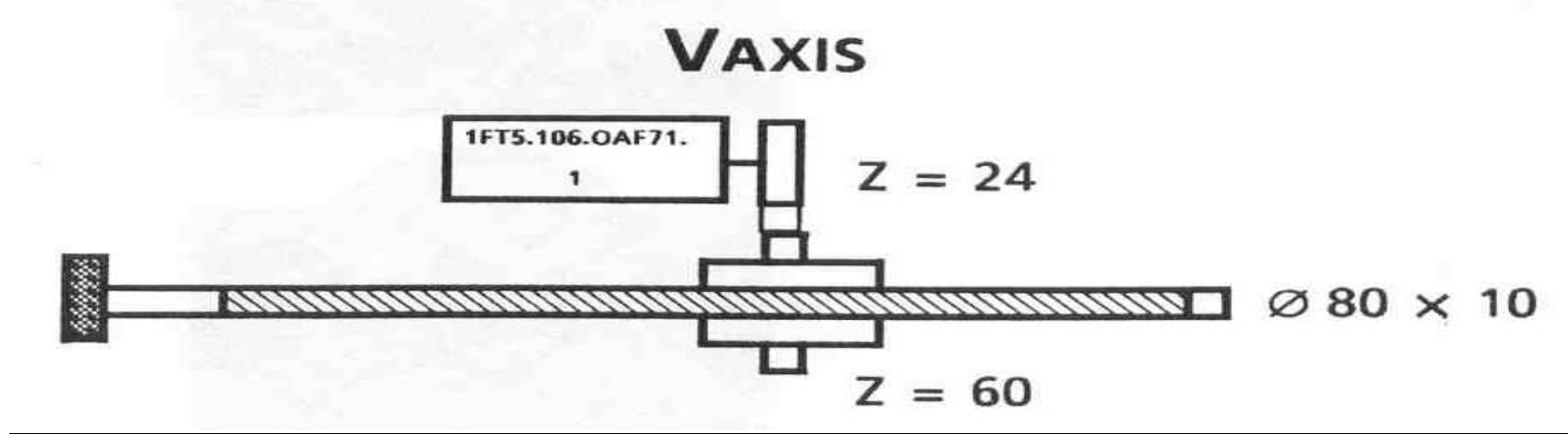
E. Kinematic Chain of X, Y, Z & W Axes

# AXIS X



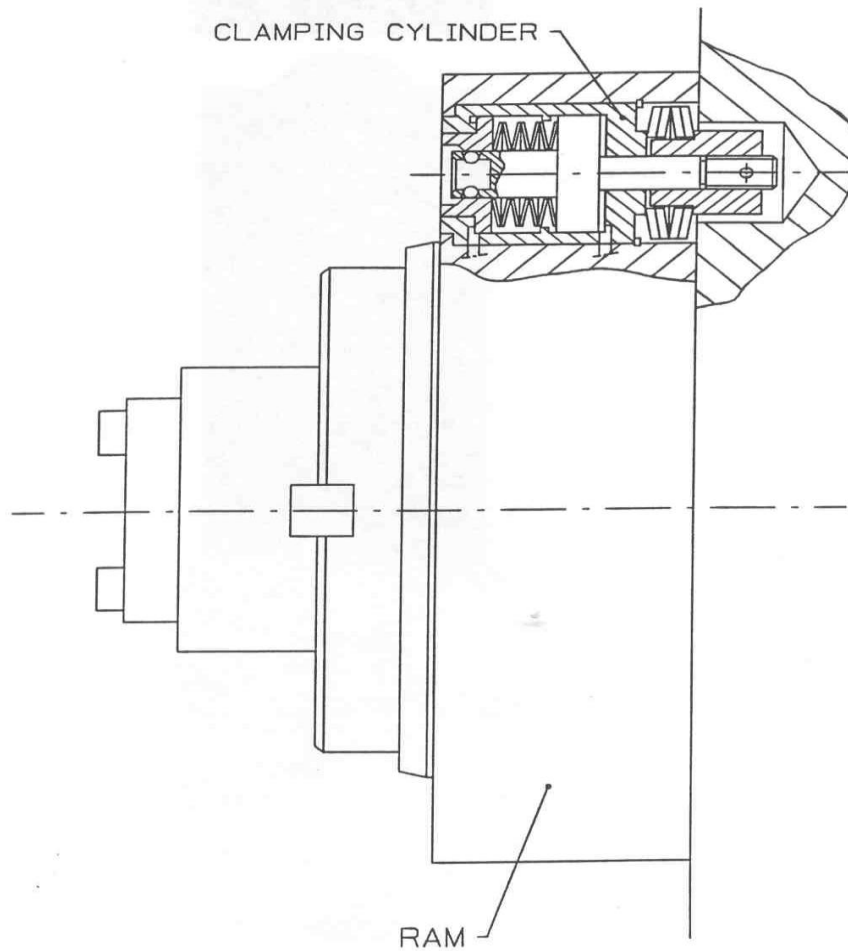


F. Kinematic Chain of E/V & B Axes of Table

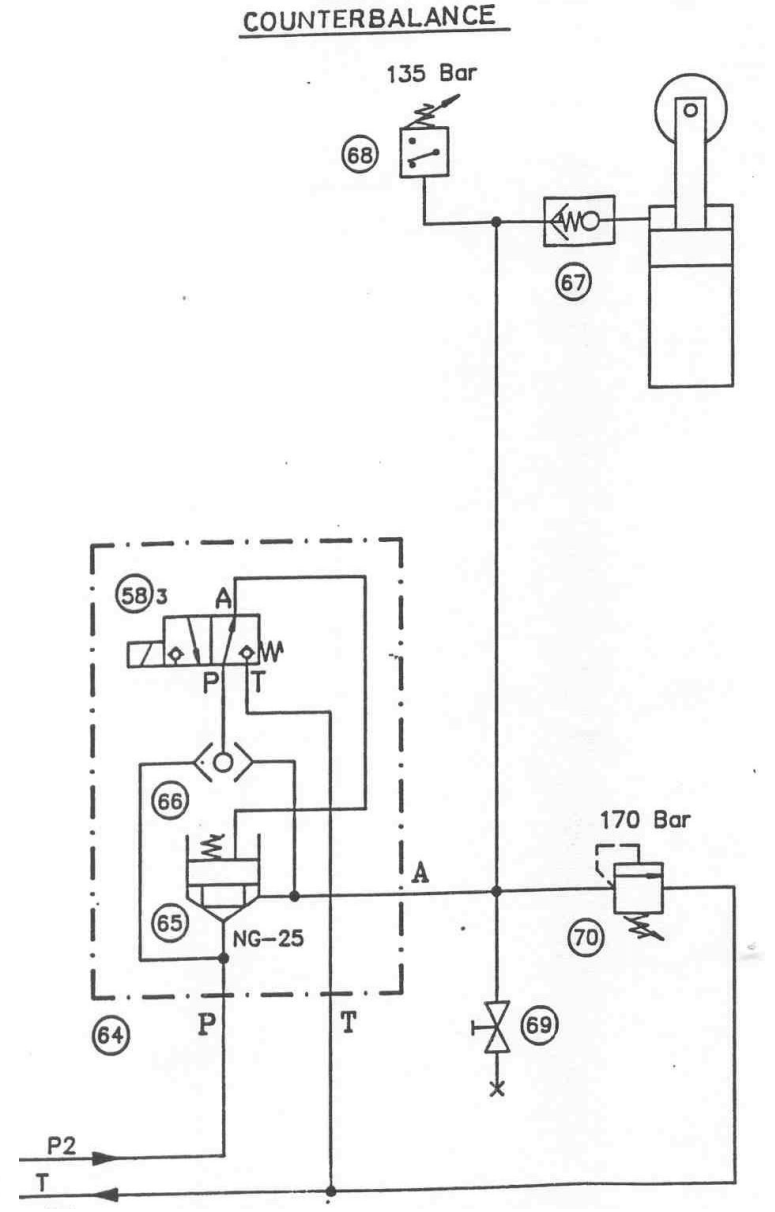
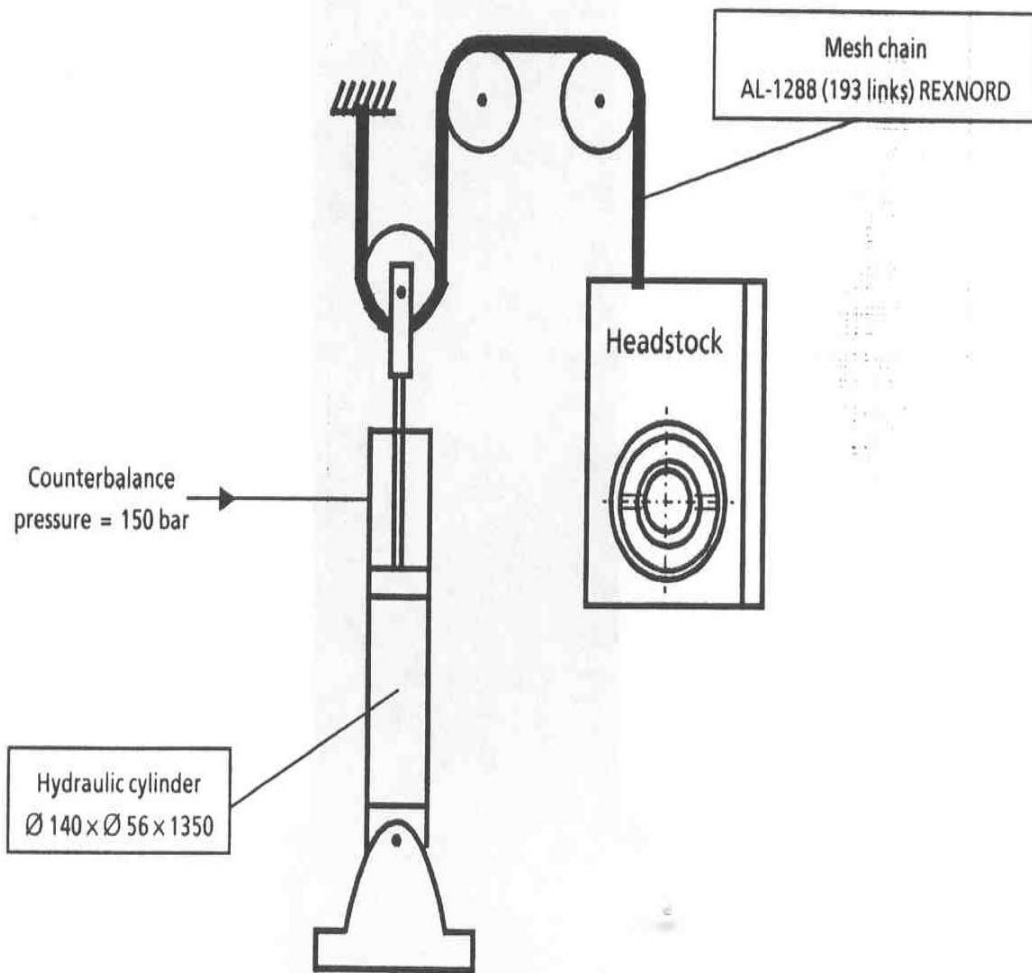


G. Hydraulic Coupling System of the Attachments

HYDRAULIC COUPLING SYSTEM  
OF THE ATTACHMENTS



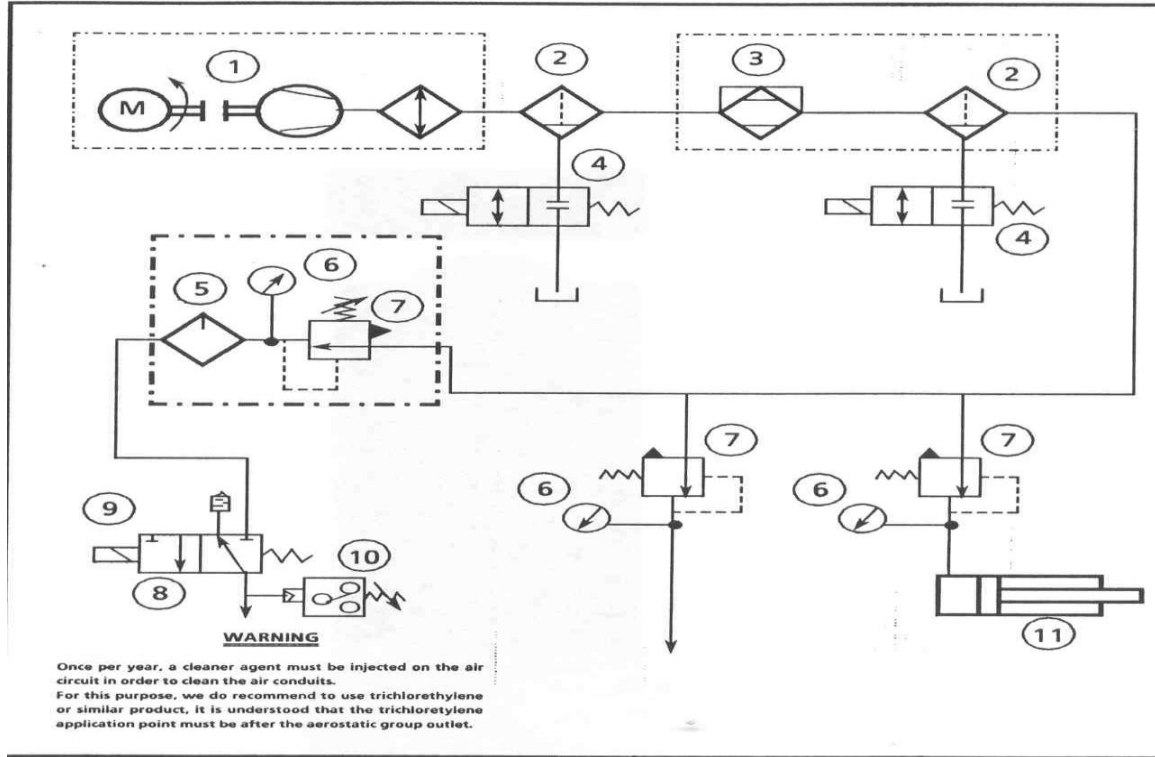
## H. Hydraulic Counter Balance System



# I. Aerostatic Scheme

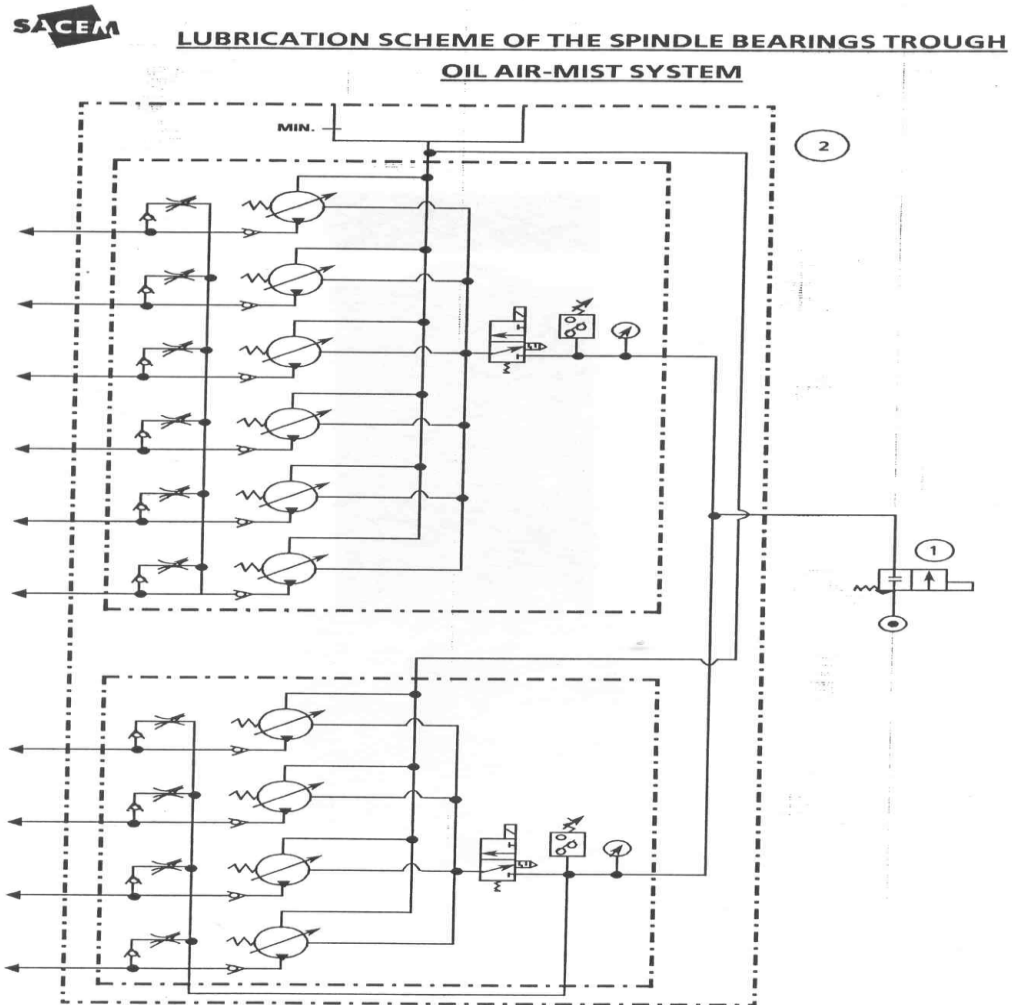


## AEROSTATIC SCHEME

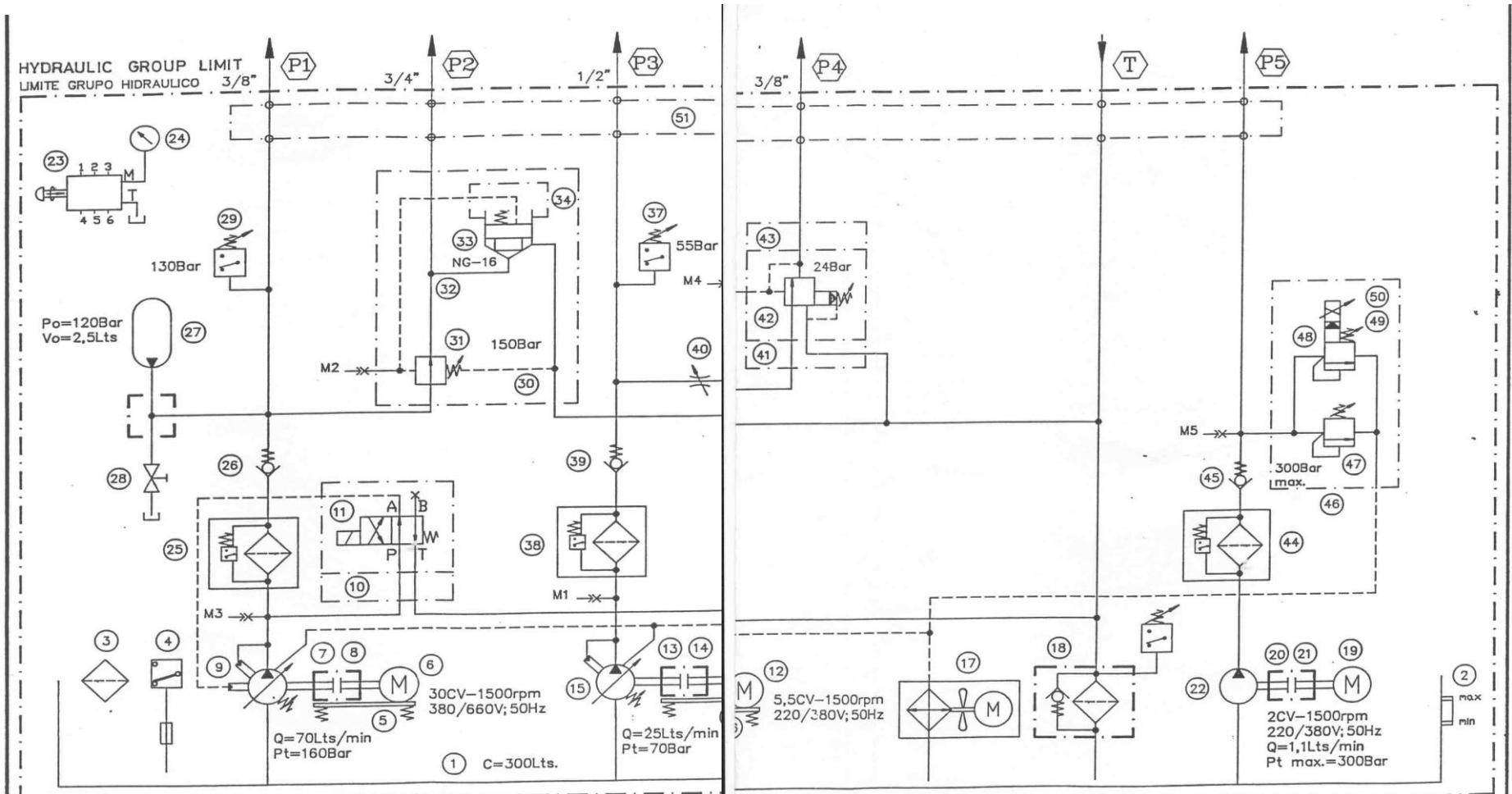


POS.	DENOMINATION	QTY.	REFERENCE	MANUFACTURER
1	Compressor 7,5 CV n° E8-9500148	1	Integral-5	MACO SULLAIR
2	Filter	2	34200006	JOUCOMATIC
3	Dryer n° 0353-8T-503-087	1	40-55-E	HANKISON
4	Electrovalve 24V CC T-40	2	11500003	JOUCOMATIC
5	Lubricator G 1/2" M-20	1	34200030	JOUCOMATIC
6	Manometer 0-12 bar	3	D-M52-10T	DIPRAX
7	Regulator G 1/2" M-20	3	34200019	JOUCOMATIC
8	Distributor 3/2 NC + Base G 3/8"	1	36290352 + 35700002	JOUCOMATIC
9	Electric pilot 24V CC	1	19000014	JOUCOMATIC
10	Pressure switch	1	D-7032-3	SUCO
11	Cylinder	1		SACEM

## J. Lubrication Scheme of Spindle Bearings



# K. Hydraulic Scheme



MARCA	CANT.	DENOMINACION	REFERENCIA	FECHA	NOMBRE	DENOMINACION	SUSTITUYE A	SUSTITUIDO POR
<b>HINE S.A.</b>			d	9.10.95	IMI	HYDRAULIC SCHEME		
OLEOHIDRAULICA			c	COMPR.		ACCIONAMIENTO OLEHIDRAULICO		
<b>VICKERS</b>			b			" MAQUINA EH-016047 "	Nº PLANO	3-11.234/1
		TRATAMIENTO	a	ESCALA	PEDIDO Nº	COMPLEMENTA A LOS PLANOS Nº	Nº ARCHIVO CAD	
		PESO Kg.			446195			TOTAL HOJAS 4
		MODIFICACIONES		FECHA				HOJA Nº 1
						3-112341		

**L. Material List - Machine Hydraulic System**



**MATERIAL LIST**

POS.	DENOMINATION	QTY.	REFERENCE	MANUFACTURER
1	Oil tank C = 300 l.	1	Drawing 1769	HINE
2	Oil level	1	LM-127T	MODINA
3	Filling cap	1	TM-78-G100	SOFIMA
4	Electric level	1	LM2-BF-200	ELECTROTE
5	Support	1	Drawing 3725 A	HINE
6	Electric motor B3/B5	1	30 CV., 1500 R.P.M., 380/660 V., 50 Hz.	
7	Coupling	1	HE-236	SALAMI
8	Support	1	HLC-10	SALAMI
9	Pump	1	PVH-57-QIC-RF-1S-CV25V21	VICKERS
10	Base plate	1	DGMS-3-1E-10R	VICKERS
11	Electrovalve	1	DG4V3-2A-24Dc	VICKERS
12	Electric motor B3/B5	1	5,5 CV., 1500 R.P.M., 220/380 V., 50 Hz.	
13	Coupling	1	HE-229	SALAMI
14	Support	1	HLC-4	SALAMI
15	Pump	1	PVB-10-RSY-CMC-11	VICKERS
16	Support	1	Drawing 3762 A	HINE
17	Air cooler	1	TP-20	PILAN
18	Microfilter	1	RFM-50-FD-1B-610/R20	SOFIMA
19	Electric motor V1	1	2 CV., 1500 R.P.M., 220/380 V., 50 Hz.	
20	Coupling	1	Drawing 4408	HINE
21	Support	1	Drawing 4408	HINE
22	Pump	1	R-2,5	HAWE
23	Manometer selector	1	SPM-606A	MP
24	Manometer	1	W250-D63-GP-02	WIKA
25	Microfilter	1	MHT-302-FD1-01-HB5	SOFIMA
HYDRAULIC SCHEMA:			EH 016.047	HOJA 1 DE, 3



## MATERIAL LIST

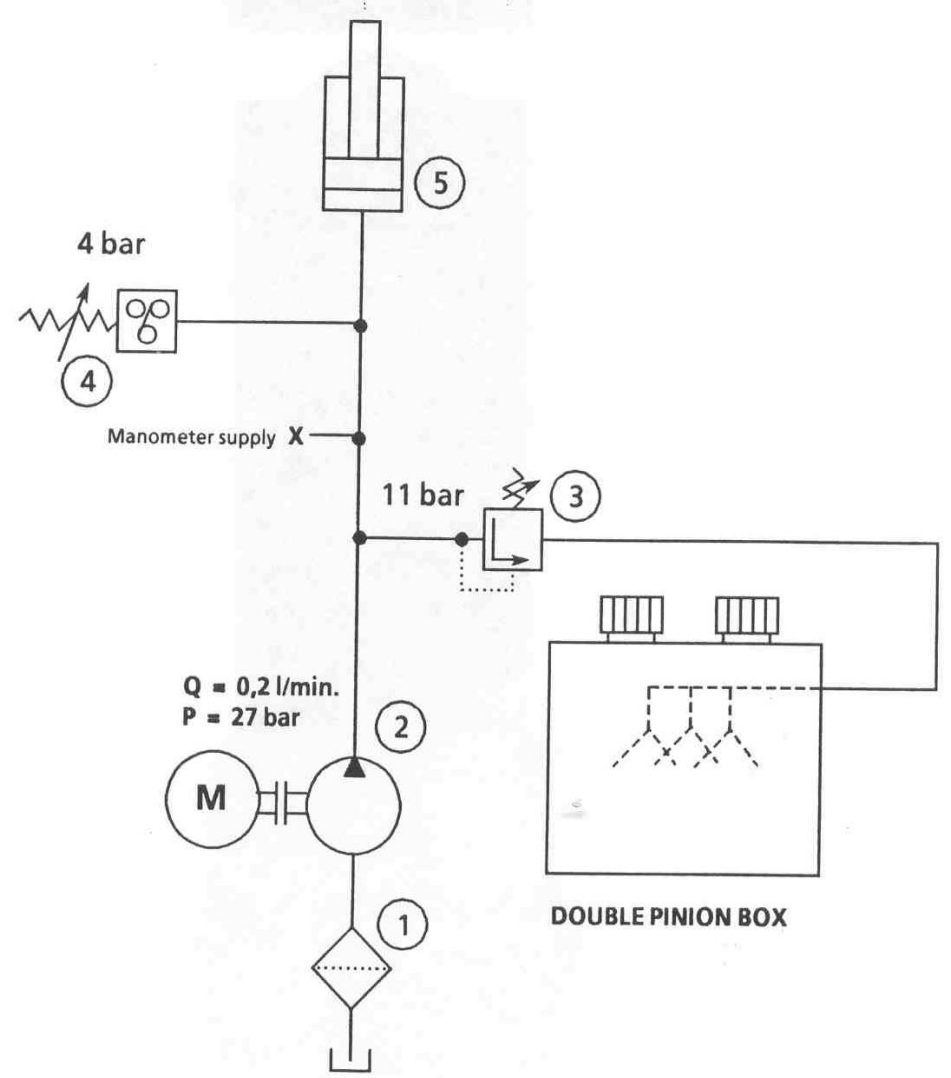
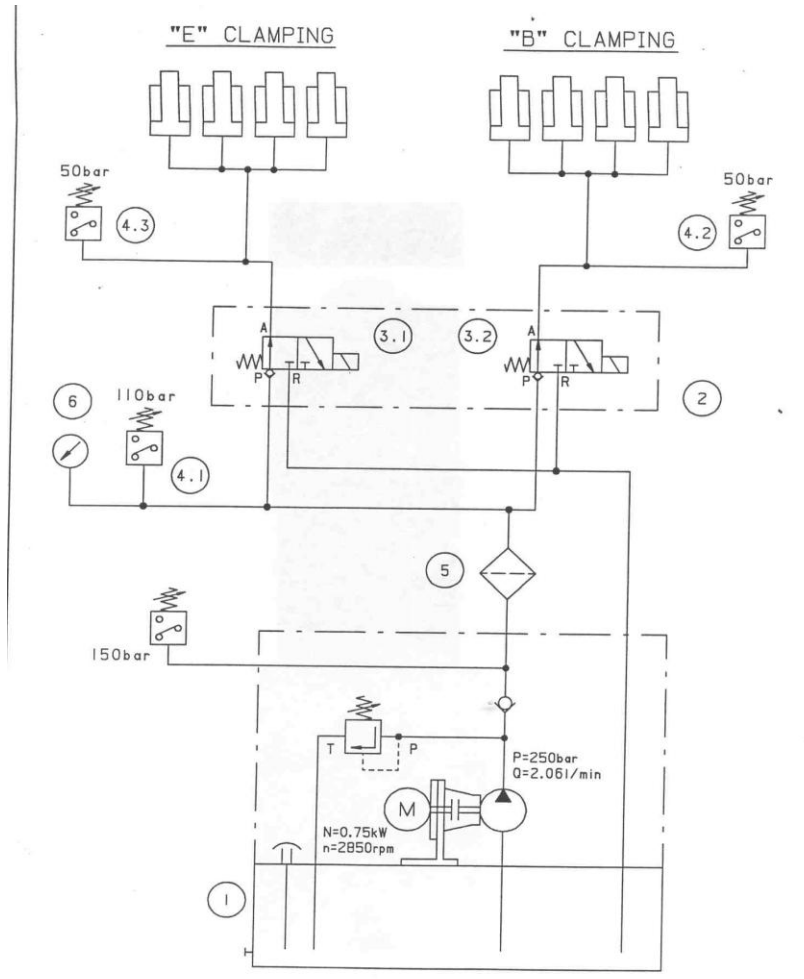
POS.	DENOMINATION	QTY.	REFERENCE	MANUFACTURER
26	Retention valve	1	RHD-25S	EO
27	Accumulator	1	IHV-2,5-330	OLAER
	Support	1	Drawing 10045	HINE
28	Ball valve	1	CH-500 706 1/4" G	LECUONA
29	Pressure switch	1	XMJ-A-1607	TEE
30	Base plate	1	Drawing 2-5550	HINE
31	Reducer valve	1	XG2V6-FW	VICKERS
32	Plate	1	Drawing 5975	HINE
33	Logical valve	1	CVI-16-D10	VICKERS
34	Cover	1	CVC-16-N-B29	VICKERS
35				
36				
37	Pressure switch	1	XMJ-A-1607	TEE
38	Microfilter	1	MHT-302-FD1-01-HB5	SOFIMA
39	Retention valve	1	RHD-16S	EO
40	Shut-off valve	1	9N-400S	PARKER
41	Base plate	1	DGMS-3-1E-10R	VICKERS
42	Reducer valve	1	DGMX2-3-PP-AW-B40	VICKERS
43	Cover	1	DGMA-3-C1-10	VICKERS
44	Microfilter	1	MHT-302-FD1-01-HB5	SOFIMA
45	Retention valve	1	RHD-8S	EO
46	Base plate	1	Drawing 10054 V2	HINE
47	Safety valve	1	DGMC-3-PT-CW	VICKERS
48	Proportional pressure relief valve	1	KCG-3-350-DZ-MUH-110	VICKERS
49	Electronic card	1	615 237	VICKERS
50	Card-holder	1	EEA-PAM-513-A10	VICKERS
HYDRAULIC SCHEMA:			EH 016.047	HOJA 2 DE, 3



## MATERIAL LIST

POS.	DENOMINATION	QTY.	REFERENCE	MANUFACTURER
51	Plate	1	Drawing 1-8240	HINE
	Base plate	1	Drawing 1-3448	HINE
	Cover	1	Drawing 2109	HINE
52	Base plate C3 × 5E	1	DGMS-3-5E-10R	VICKERS
53	Base plate C3 × 1E	2	Drawing 2-5230B	HINE
54	Base plate C3 × 2E	2	Drawing 2-5230-V2	HINE
55	Retention valve	11	DGMDC-3-YPK-40	VICKERS
56	Electrovalve	5	DG4V3-2A-24Dc	VICKERS
57	Electrovalve	4	DG4V3-2AL-24Dc	VICKERS
58	Electrovalve	3	DG3VP3-102A-24Dc	VICKERS
59	Plate C3 × 1E	2	DGMS-3-1E-10R	VICKERS
60	Reducer valve	2	DGMX2-3-PP-CW-B40	VICKERS
61	Cover	2	DGMA-3-C1-10	VICKERS
62	Ball valve	1	CH-500 706 1/4" G	LECUONA
63	Pressure switch	1	XMJA-1607	TEE
64	Base plate	1	Drawing 2-5532	HINE
65	Logical valve	1	CVI-25-D20	VICKERS
66	Cover	1	CVC-25-W13	VICKERS
67	Safety valve	1	LB-4-G80 80 l/min.	HAWE
68	Pressure switch	1	XMJ-A-1607	TEE
69	Ball valve	1	CH-500 706 1/4" G	LECUONA
70	Safety valve	1	DBDS-20-G10/315	REXROTH
71	Base plate	1	HPB G-2394/2-5 VALV.	SACEM
72	Electrovalve	5	WHIR-G24	SACEM

# M. Clamping of Table axes & Double Pinion Compensation



Denominación: HYDRAULIC SCHEME MACHINE Nr.14206			Fecha	Nombre
Tipo de máquina: MGL-1600			Dibujado	23-1-96
Nº plano: EHO.14206		Verificado		
Vº de hojas:   Hoja nº:		Sustituye a:		
		Sustituido por:		