

- **#50X30T CHAIN TYPE TOOL CHANGER
SYSTEM MAINTENANCE MANUAL (DETA)**
- **AUTOMATIC TOOL CHANGER (DEX-2)
SERVICE MANUAL**

(BT50/CAT50/DIN50)



#50 CHAIN TYPE TOOL CHANGER SYSTEM
MAINTENANCE MANUAL

This manual is applicable to model:

MC5CQ
(QA)
BT50/CAT50/DIN50

Contents

Page

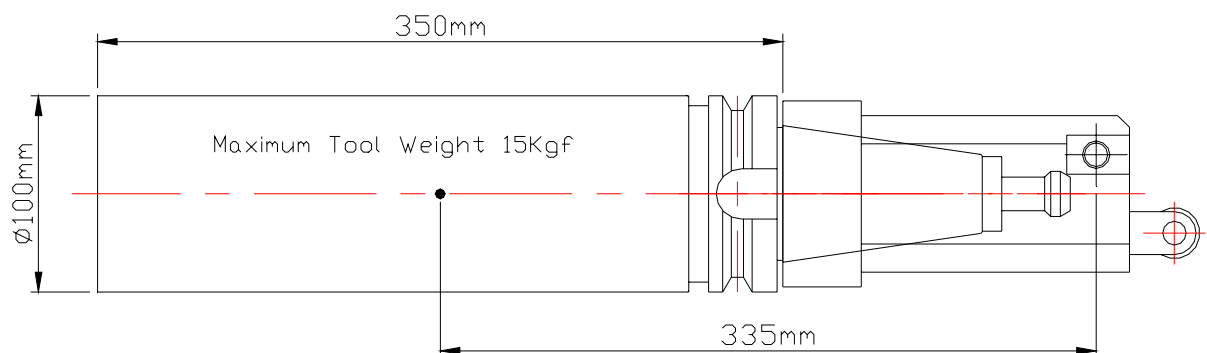
1、 Tool Changer System Mechanical Specification & Drawings.....	02
2、 Tool Changing Motion Flowchart.....	04
3、 Power Supply Specification for Electronic Control.....	05
4、 Electrical Control.....	06
5、 Electrical Control Protection Programming.....	08
6、 Installation Procedure.....	09
7、 Original Setting.....	11
8、 Trouble Shooting.....	12
9、 Maintenance.....	18

1、 Tool Change System Specification :

1-1. Specification:

Item	MC5CQ
Tool Capacity of Magazine	30 Tools
Maximum Tool Diameter	127 mm/229 mm
Maximum Tool Weight	15 Kgf
Average Tool Weight	10 Kgf
Total Tool Weight	300 Kgf
Maximum Tool Length	350mm
Tool to Tool Time (Cambox only)	2.5 sec
Indexing Time	0.5 sec/pot
Method of Tool Selection	Two way Random
Nett. Weight of Magazine	850 Kgf

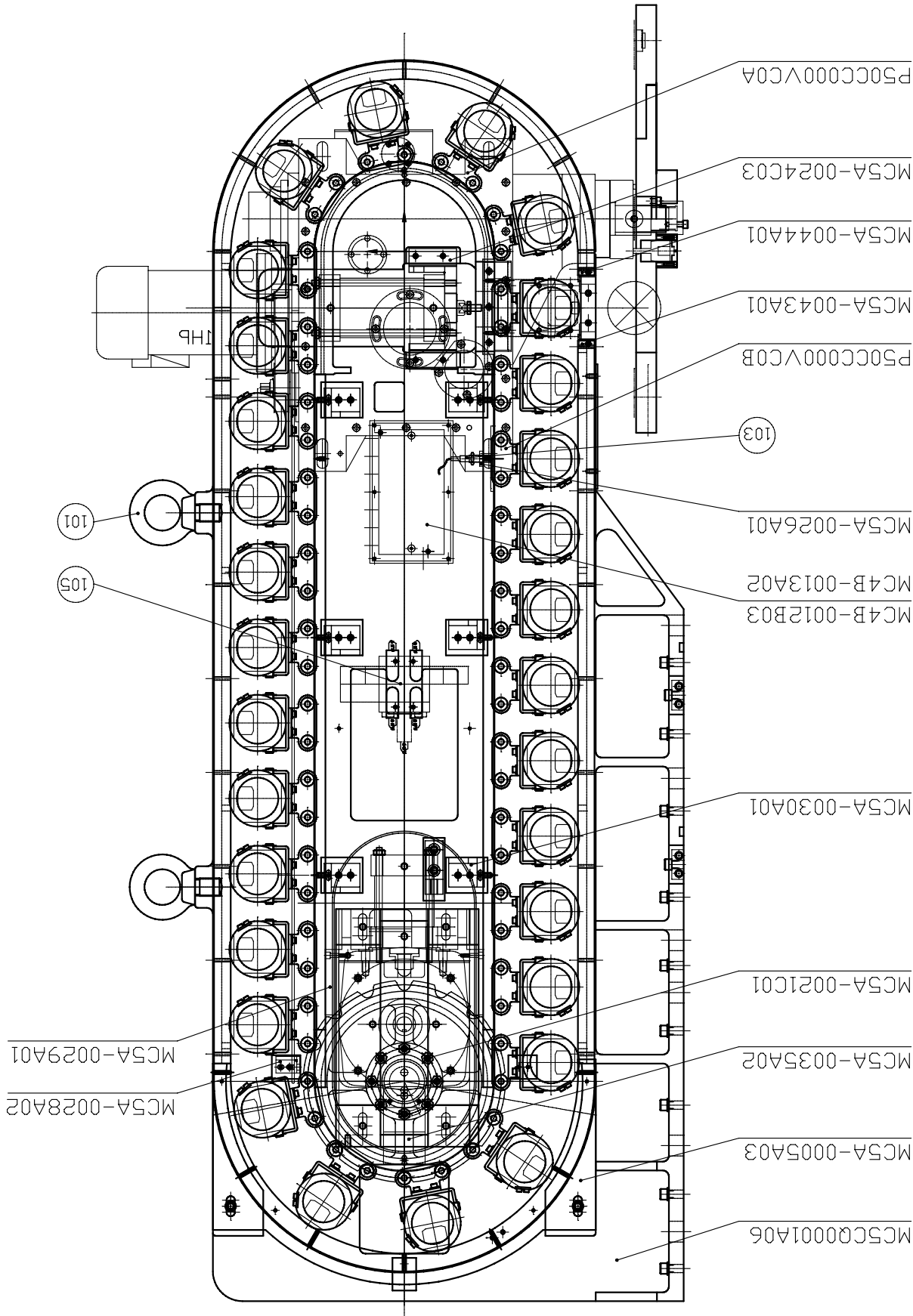
1-2. Maximum “Tool Rotational” Inertia:



1-3. Drawings:

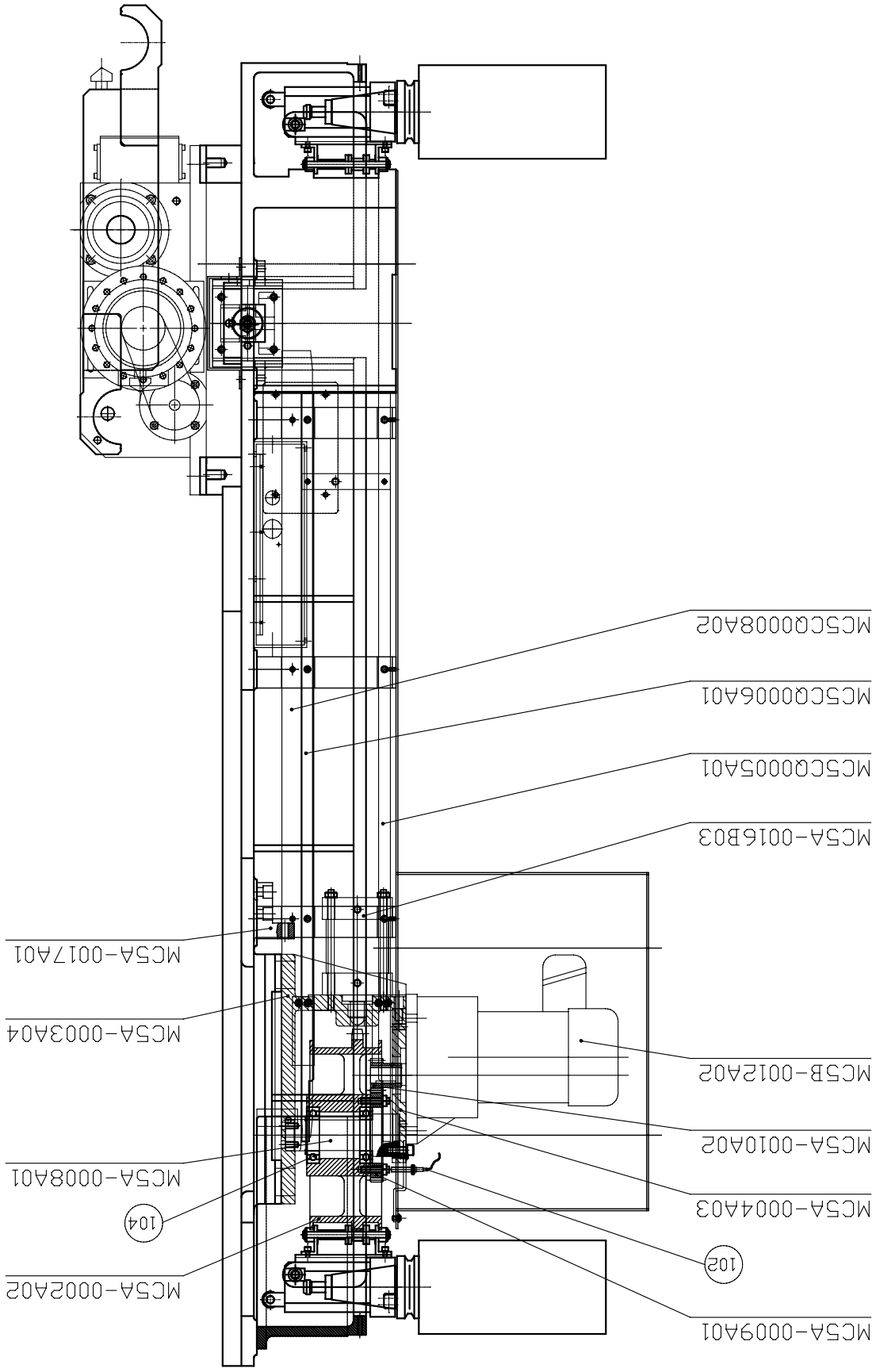
Assembly drawing and part list for chain type tool magazine, Tool changing mechanism and tool changing arm as per attached drawings and list.

#50X30T CHAIN TYPE TOOL MAGAZINE ASSEMBLY DRAWING - 1



--

#50X30T CHAIN TYPE TOOL MAGAZINE ASSEMBLY DRAWING - 2

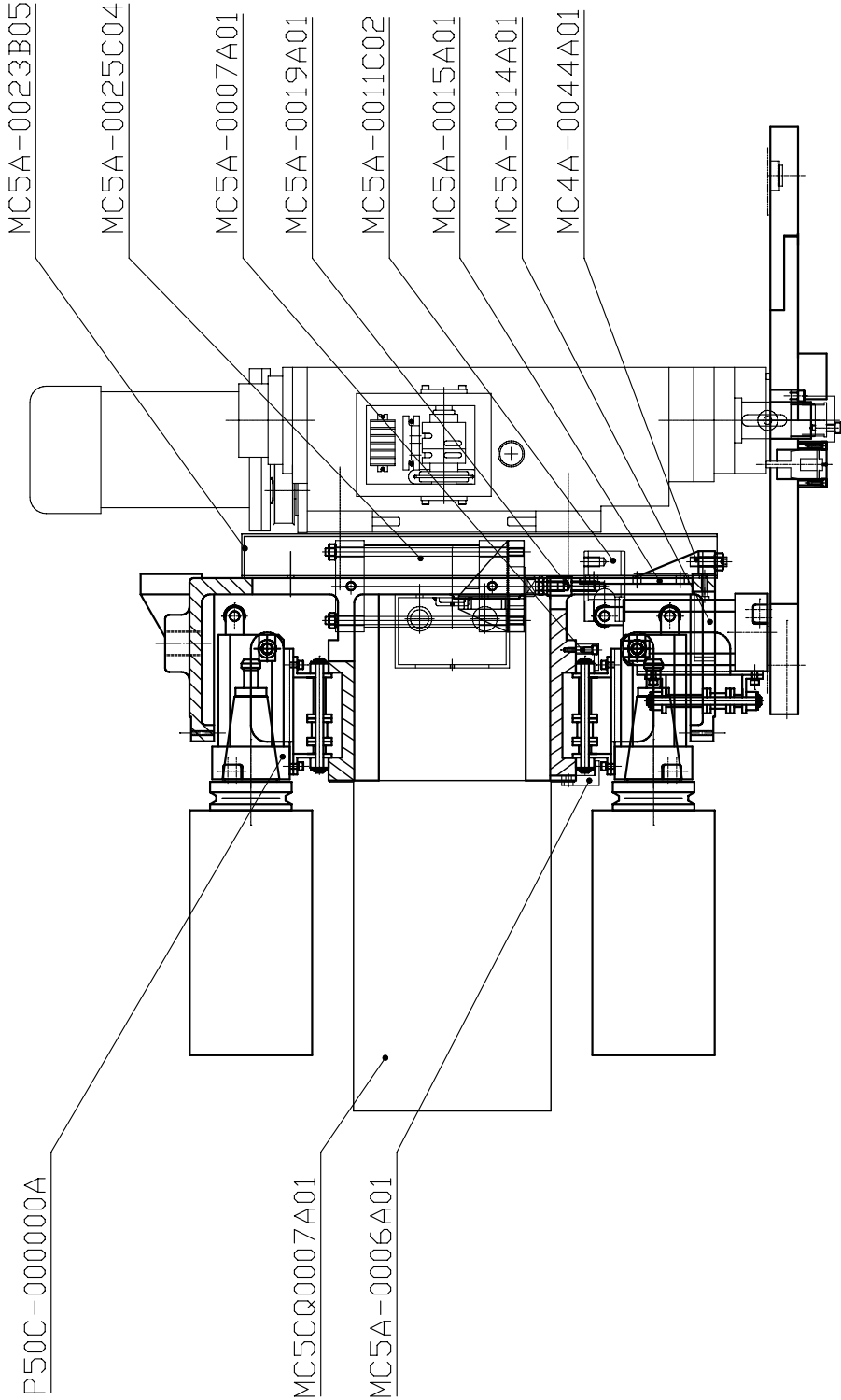


UNIT NO.		QUANTITY	MATERIAL	ND:	TOLERANCE
MC5CQQA00A01				D4-02-03 2001/12	>0 ±0.1 >6 ±0.2 >30 ±0.3 >120 ±0.5 >315 ±0.8 >1000 ±1.2
PART NO.		SCALE	TITLE		
MC5CQQA00A01-02			#50X30T		

DRAWING DESIGN		CHECK	APPROVE
Maggie2005/10/24			

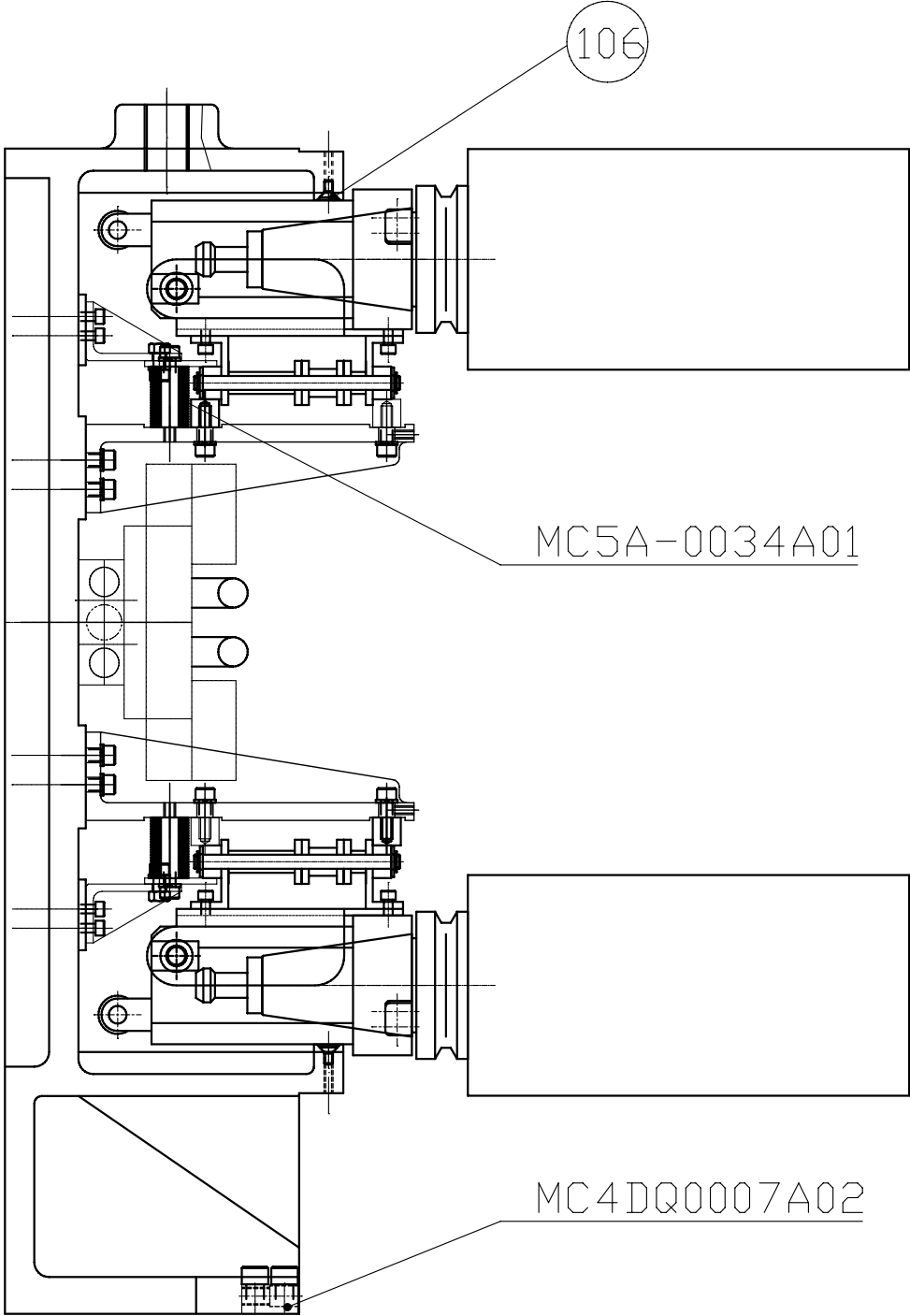
NAME	TEL:886-4-25617722 FAX:886-4-25617177
deta International	

#50X30TCHAIN TYPE TOOL MAGAZINE ASSEMBLY DRAWING - 3



deta <i>International</i> TEL:886-4-25617722 FAX:886-4-25617177	NAME Maggie2005/10/24	DRAWING DESIGN Maggie2005/10/24	CHECK APPROVE	UNIT NO.	QUANTITY	MATERIAL	NO:	TOLERANCE
				MC5CQQA00A01			D4-02-03 2001/12	>0 ±0.1 >6 ±0.2 >30 ±0.3 >120 ±0.5 >315 ±0.8 >1000 ±1.2
				PART NO.	SCALE	TITLE		
				MC5CQQA00A01-03		#50X30T		

#50X30TCHAIN TYPE TOOL MAGAZINE ASSEMBLY DRAWING - 4



deta *International*

TEL:886-4-25617722 FAX:886-4-25617177

NAME

DRAWING DESIGN
Maggie2005/10/24

CHECK APPROVE

UNIT NO.

MC5CQQA00A01

QUANTITY

MATERIAL

TITLE

#50X30T

NO:

D4-02-03

2001/12

TOLERANCE

>0 ±0.1
>6 ±0.2
>30 ±0.3
>120 ±0.5
>315 ±0.8
>1000 ±1.2

deta *International* PROCESS PART LIST

D4-02-07
2001/12

Page	Model	Unit No.		Design	Check	Approve
1/2	#50X30T Chain Type	MC5CQQA00A01		Candy 2006/01/20		
No.	Part Name	Part No.	Q'TY	Specification	Note	
1	Pot Assembly	P50C-0600112-01	30	BT50(60度)		
		P50C-0600212-01	30	CAT50(60度)		
		P50C-0600312-01	30	DIN50(60度)		
2	Main Body	MC5CQ0001A06	1	FC30		
3	Rail (A)	MC5CQ0005A01	2	SS41		
4	Rail (B)	MC5CQ0006A01	2	SS41		
5	Front Cover	MC5CQ0007A01	1	SS41		
6	Plate	MC5CQ0008A02	2	SPCC		
7	SKT. HD. CAP. SCR.	MC4A-0044A01	1	M12xP1.75		
8	Electric Box	MC4B-0012B03	1	SS41		
9	Electric Box Cover	MC4B-0013A02	1	SS41		
10	Sprocket	MC5A-0002A02	1	FC30		
11	Housing	MC5A-0003A03	1	FC30		
12	Motor Seat	MC5A-0004A03	1	FC30		
13	Adjustable Rail (Outer)	MC5A-0005A03	1	FC30		
14	Chain Rail(Front)	MC5A-0006A01	1	S45C		
15	Chain Rail(Behind)	MC5A-0007A01	1	S45C		
16	Shaft	MC5A-0008A01	1	S45C		
17	Gear	MC5A-0009A01	1	SCM4		
18	Gear	MC5A-0010A02	1	SCM4		
19	Tool Tilt Block	MC5A-0011C02	1	S45C		
20	Tool Position Bracket	MC5A-0014A01	1	UP		
21	Tool Tilt Block Rail	MC5A-0015A01	2	S45C		
22	Sprocket Lock Cylinder	MC5A-0016B03	1	φ 100*25L		
23	Adjusting Block	MC5A-0017A01	1	SS41		
24	Connect Shaft	MC5A-0019A01	1	23*23Hexagon stick		
25	Dog	MC5A-0021C01	8	17*17Hexagon stick		
26	Cover Seat	MC5A-0023B05	1	SS41		
27	Cylinder Seat	MC5A-0024C03	1	SS41		
28	Hydraulic Cylinder	MC5A-0025C04	1	φ 100*85L		
29	Compute Tool Seat	MC5A-0026A01	1	SS41		
30	Pot Plate Seat	MC5A-0028A02	2	SS41		

deta *International* PROCESS PART LIST

D4-02-07
2001/12

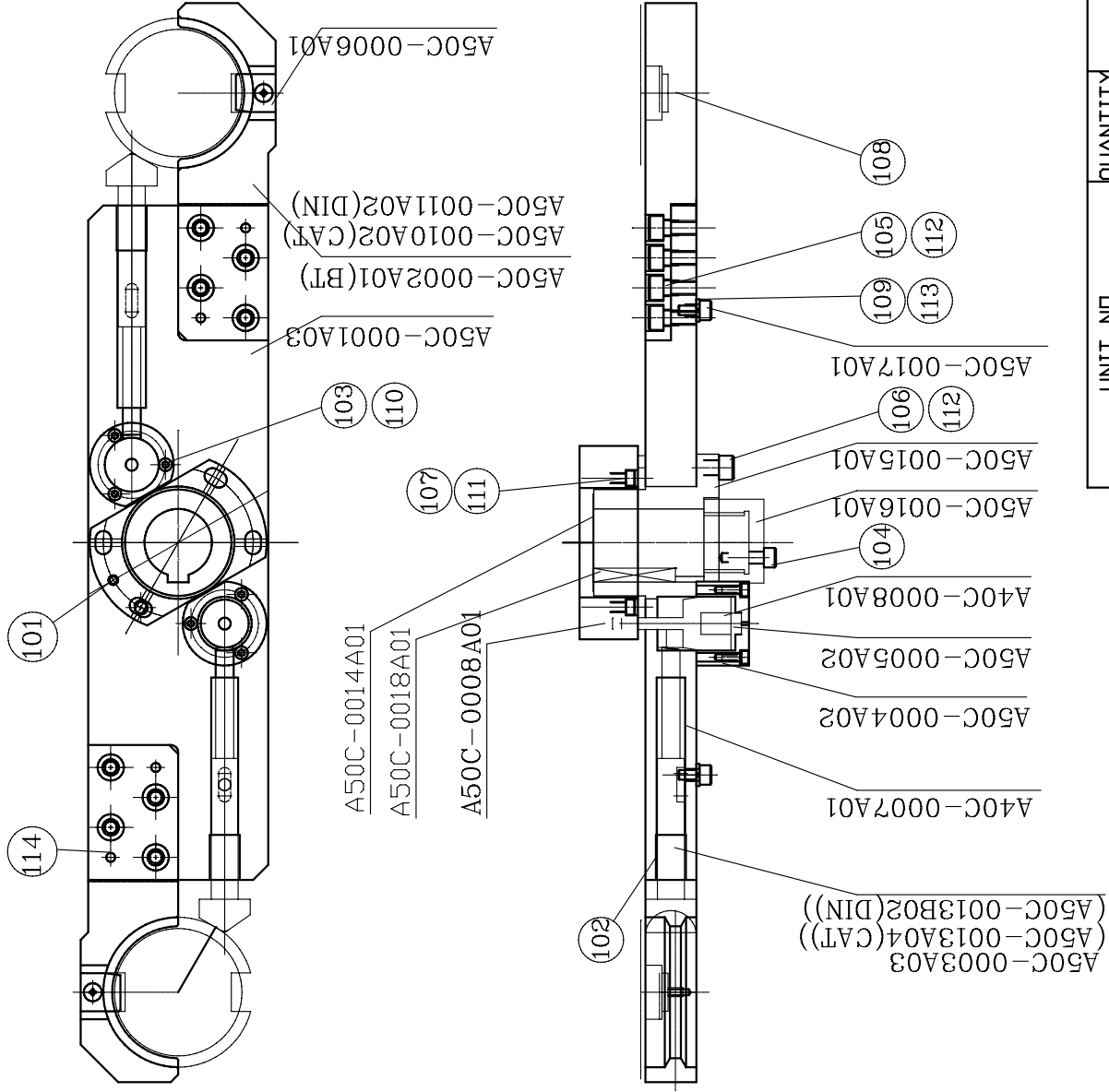
Page	Model	Unit No.		Design	Check	Approve
2/2	#50X30T Chain Type	MC5CQA00A01		Maggie 2005/10/24		
No.	Part Name	Part No.	Q'TY	Specification		Note
31	Rail Support Block	MC5A-0029A01	4	UP		
32	Rail	MC5A-0030A01	6	FC30		
33	Spacer	MC5A-0034A01	6	SS41		
34	Cover Seat	MC5A-0035A02	1	SS41		
35	Pot Bracket (Left)	MC5A-0043A01	1	SS41		
36	Pot Bracket (Right)	MC5A-0044A01	1	SS41		
37	Motor	MC5B-0012A02	1	1.5HP-1:60-220V-60Hz		
38	Pot Chain Assembly	P50CC000VC0A	7	SS41		
39	Pot Chain Assembly(Home)	P50CC000VC0B	1	SS41		
40	ABOVE					
41						
42						
43						
44						
45						
46						
47						
48						
49						
50						
51						
52						
53						
54						
55						
56						
57						
58						
59						
60						

deta *International* STANDARD PART LIST

D4-02-08
2001/12

Page	Model	Unit No.	Design	Check	Approve
1/1	#50X30T Chain Type	MC5CQQA00A01	Maggie 2005/10/24		
No.	Part Name	Part No.	Q'TY	Specification	Note
101	Bolt	BT00000000030	2	M30	
102	Sensor	SR00000000008	2	9981-2000	
103	Sensor	SR00000000012	1	3RG4012-0AB00	
104	Bearing	BE00006210ZZ	2	6210ZZ	
105	Solenoid Valve	EVA5C1252024	1	DC24V	
106	Pot Rail	MC0022053540	3	MC UP 5T*22*2000	
107	ABOVE				
108					
109					
110					
111					
112					
113					
114					
115					
116					
117					
118					
119					
120					
121					
122					
123					
124					
125					
126					
127					
128					
129					
130					

#50 Taper Arm Assembly Drawing(R=300mm)



deta International TEL:886-4-25617722 FAX:886-4-25617177	DRAWING DESIGN		CHECK APPROVE		NAME		May Junay,27,2001					
	UNIT NO.		QUANTITY		MATERIAL		ND:		TOLERANCE			
	A50C-0000A01						04-02-03 2001/12		>0 ±0.1 >6 ±0.2 >30 ±0.3 >120 ±0.5 >315 ±0.8 >1000 ±1.2			
	PART NO.		SCALE		TITLE							
					#50 ARM(R=300)							

deta *INTERNATIONAL* PROCESS PART LIST

EDITION:01

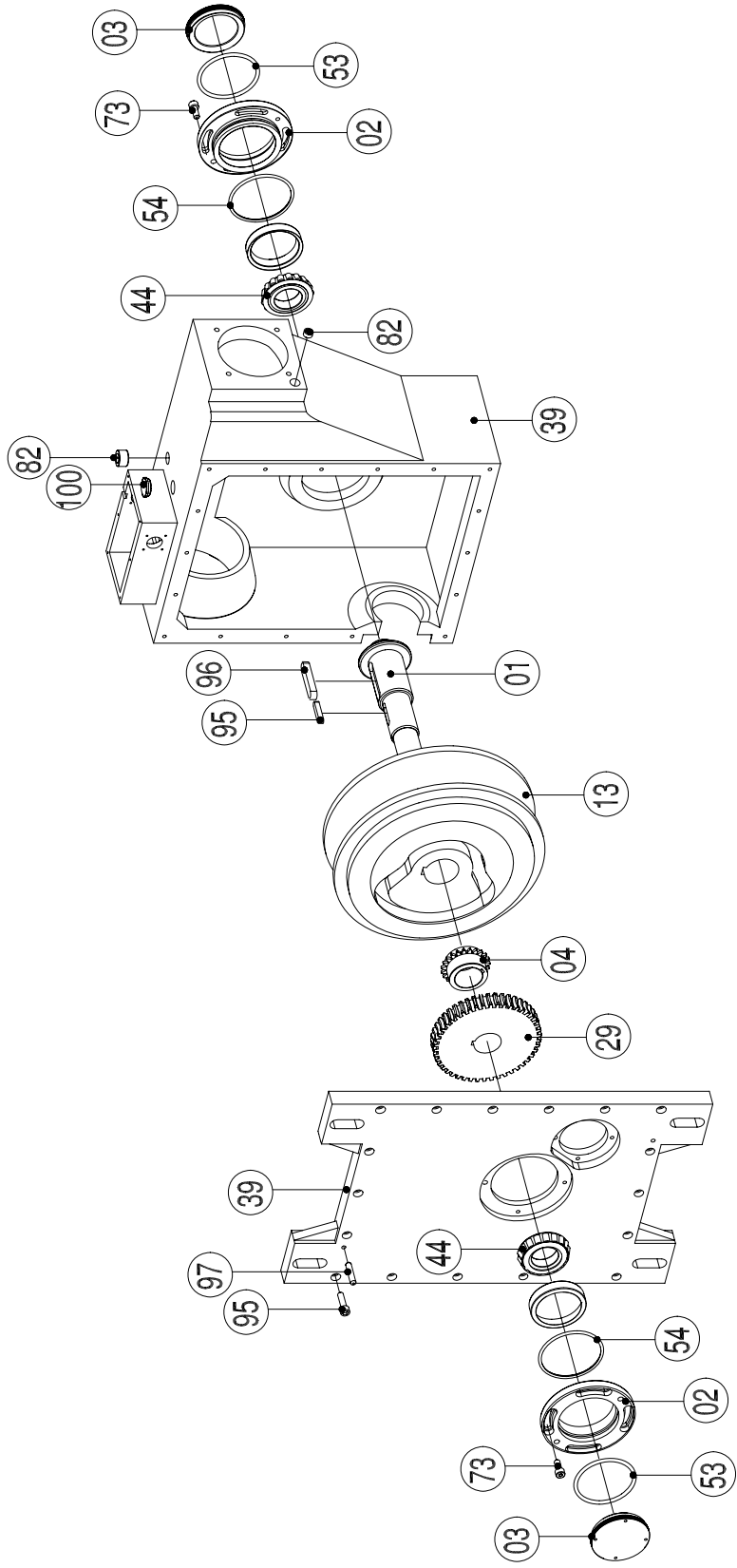
PAGE	MODEL	UNIT NO.		DESIGN	CHECK	APPROVE
1/1	#50 ARM(R=300)	A50C-0000A02		Betty MAY, 28, 2002		
NO.	PARTS NAME	PART NO.	Q' TY	MATERIAL		NOTE
1	MAIN BODY	A50C-0001A02	1	S50C		
2	CLIP(BT)	A50C-0002A01	2	S50C		OPTIONAL
3	CLIP(CAT)	A50C-0010A02	2	S50C		OPTIONAL
4	CLIP(DIN)	A50C-0011A01	2	S50C		OPTIONAL
5	FINGER(BT)	A50C-0003A02	2	S50C		OPTIONAL
6	FINGER(CAT)	A50C-0013A03	2	S50C		OPTIONAL
7	FINGER(DIN)	A50C-0013B01	2	S50C		OPTIONAL
8	SPRING COVER	A50C-0004A01	2	S45C		
9	SAFETY PIN	A50C-0005A01	2	S45C		
10	KEY	A50C-0006A01	2	S45C		
11	PIN PLATE	A50C-0008A01	1	S45C		
12	ARM WASER	A50C-0014A01		SS41		
13	ARM FIXED	A50C-0015A01	1	S45C		
14	SKT. HD. CAP. SCR	A50C-0017A01	2	M8XP1. 25X14L		
15	KEY	A40C-0007A01	2	S45C		
16	FINGER SPRING	A40C-0007A01	2	SWC		
17	PIN SPRING	A40C-0008A01	2	SWC		
18	COPPER	A40C-0020A01	2	BRASS		
19	ABOVE					
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

deta *INTERNATIONAL* PROCESS PART LIST

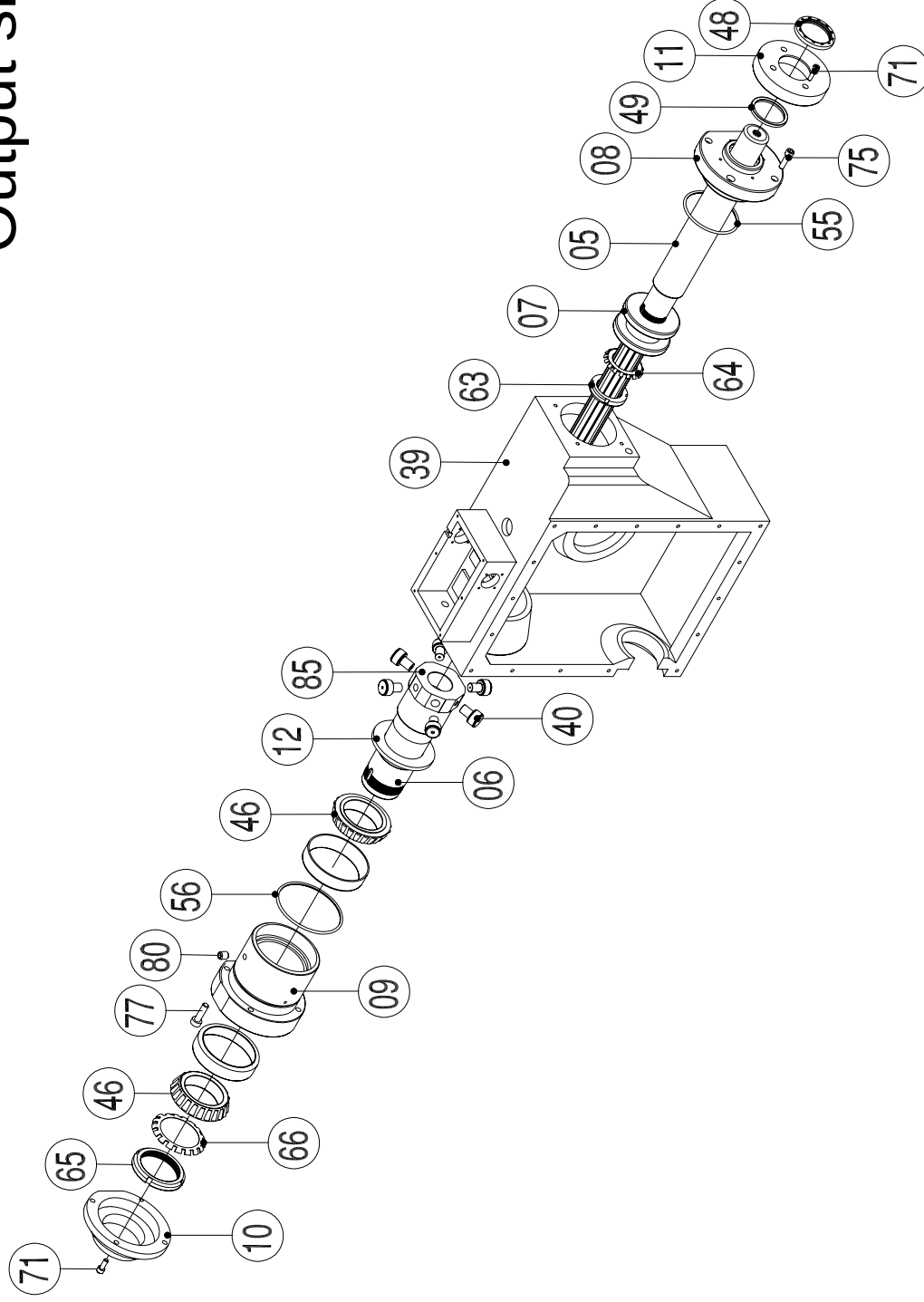
EDITION:01

PAGE	MODEL	UNIT NO.		DESIGN	CHECK	APPROVE
1/1	#50 ARM(R=300)	A50C-0000A02		Betty MAY, 28, 2002		
NO.	PARTS NAME	PART NO.	Q' TY	MATERIAL		NOTE
101	TAPER PIN	PN0000208040	1	§ 8X40L		
102	SKT. HD. CAP SCR.	CP0000005040	6	M5XP0.8X40L		
103	SKT. HD. CAP SCR.	CP0000008030	1	M8XP1.25X30L		
104	SKT. HD. CAP SCR.	CP0000010020	8	M10XP1.5X20L		
105	SKT. HD. CAP SCR.	CP0000010035	4	M10XP1.5X35L		
106	SKT. HD. CAP SCR.	CP0000006055	4	M6XP1X55L		
107	FALT HD. SCR	FM0000005010	2	M5XP0.8X10L		
108	SPRING WASHER	SW0000000008	2	§ 8		
109	SPRING WASHER	SW0000000005	6	§ 5		
110	SPRING WASHER	SW0000000006	4	§ 6		
111	SPRING WASHER	SW0000000010	12	§ 10		
112	WASHER	WA0000000008	2	§ 8		
113	SPING PIN	PN0000108025	2	§ 8X25L		
114	RING	OT00000SER18	2	SER-18(φ 22X φ 18X3.9H)		
115	O-RING	OR0000000P18	2	P18		
116	ABOVE					
117						
118						
119						
120						
121						
122						
123						
124						
125						
126						
127						
128						
129						
130						

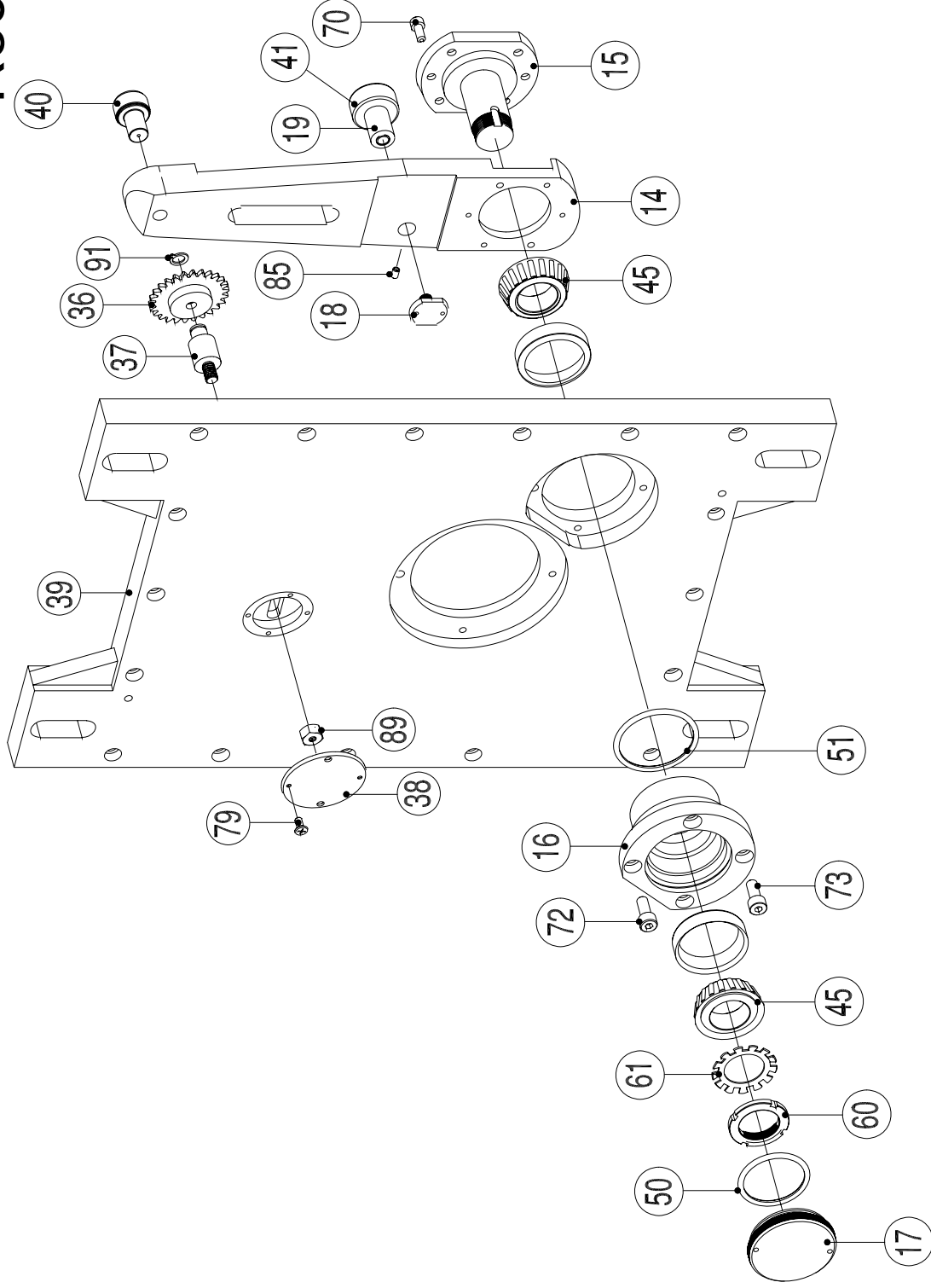
Input shaft



Output shaft



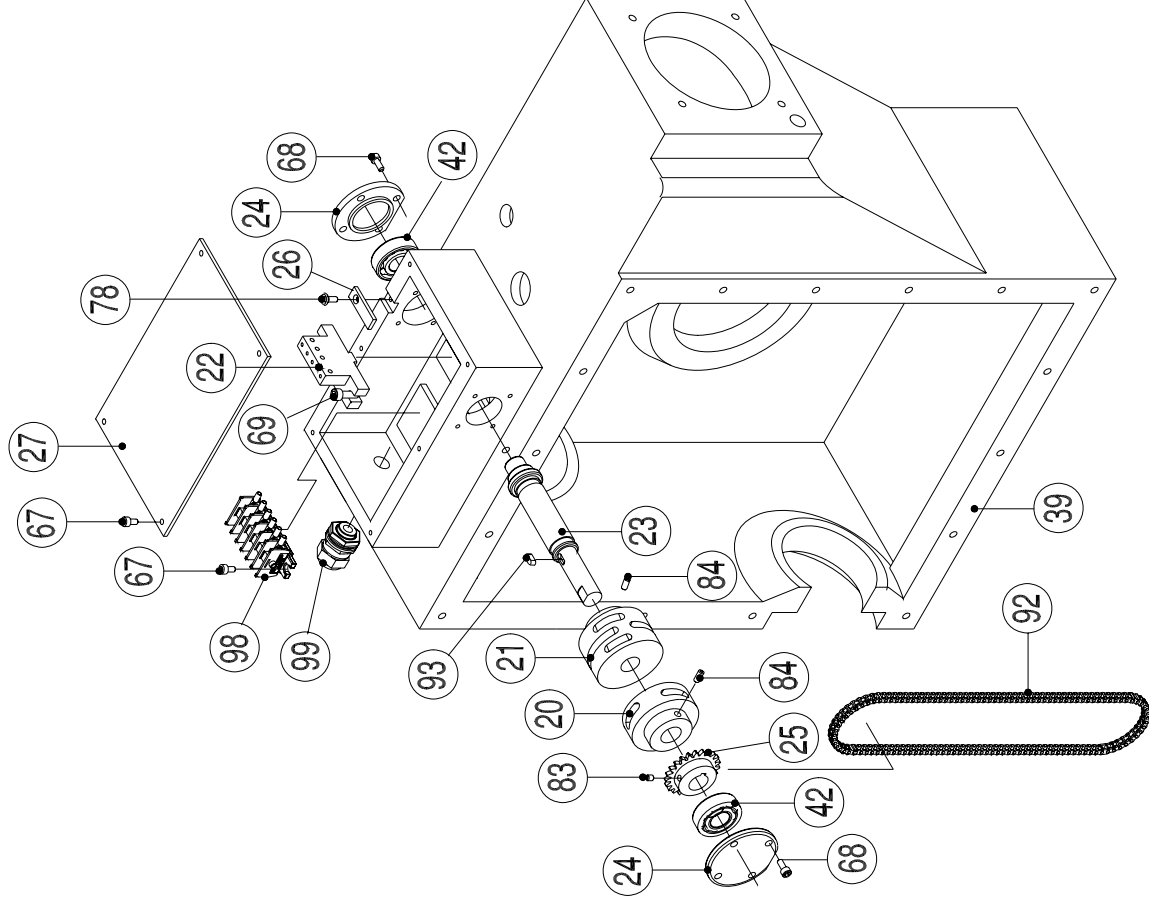
Rocker



This technical drawing is an exploded view of a mechanical assembly, likely a pump or a similar fluid-handling device. The components are numbered as follows:

- 30**: A vertical shaft or rod passing through the top of the main housing.
- 34**: A nut or lock nut on the shaft.
- 43**: A series of washers or spacers on the shaft.
- 52**: A circular plate or gasket.
- 33**: A large cylindrical component, possibly a pump body or a large bearing housing.
- 74**: A small pin or screw.
- 43**: Another set of washers or spacers.
- 59**: A small circular component, possibly a seal or a small bearing.
- 60**: A small circular component, possibly a seal or a small bearing.
- 35**: A small circular component, possibly a seal or a small bearing.
- 90**: A small circular component, possibly a seal or a small bearing.
- 47**: A small circular component, possibly a seal or a small bearing.
- 58**: A small circular component, possibly a seal or a small bearing.
- 32**: A small circular component, possibly a seal or a small bearing.
- 57**: A small circular component, possibly a seal or a small bearing.
- 28**: A flange or mounting plate.
- 86**: A small pin or screw.
- 88**: A small pin or screw.
- 85**: A small pin or screw.
- 31**: A small circular component, possibly a seal or a small bearing.
- 87**: A small pin or screw.
- 101**: A large circular component, possibly a pump head or a large bearing housing.
- 76**: A small pin or screw.
- 102**: A large cylindrical component, possibly a motor or a large bearing housing.
- 39**: A large circular component, possibly a pump head or a large bearing housing.

Signal



DEX52 Part list

NO.	Parts No.	Specification	Q'TY	NO.	Parts No.	Specification	Q'TY	NO.	Parts No.	Specification	Q'TY
01	A501A101DEX002	Cam shaft	1	19	A501D603DEX001	Cam followers shaft	1	39	A501Z00CDEX001	Cam box	1
02	A501A209DEX001	Tune-up cap	2	20	A502E11CDEX001	Brake signal wheel	1	40	Y0A260X369X145	φ 26 Cam followers	7
03	A501A309DEX001	Tune-up screw	2	21	A502E12CDEX001	Cam signal wheel	1	41	Y2A350X160X191	φ 35 Cam followers	1
04	A502A409YJ1001	Chain wheel	1	22	A502E200DEX001	Signal fixture	1	42	71100130	6202zz/Ball bearings	2
05	A502B101DEX001	Spline shaft	1	23	A502E309DEX001	Signal wheel shaft	1	43	71101060	HR30205/Tapered roller bearings	2
06	A501B203DEX001	Bearings tube	1	24	A402E409DEX002	Signal cap	2	44	71101090	HR30208/Tapered roller bearings	2
07	A501B303DEX001	Transmit wheel	1	25	A502E509DEX001	Signal chain wheel	1	45	71101270	HR32006/Tapered roller bearings	2
08	A501B409DEX001	Front fix cap	1	26	A402E60YDEX001	Signal adjust slice	1	46	71101350	HR32014/Tapered roller bearings	2
09	A501B50CDEX001	Bearings tube fixture	1	27	A502E70ZDEX001	Dustproof cap	1	47	71200200	20*52*8/TC type oil seals	1
10	A501B609DEX001	Back fix cap	1	28	A501F10CDEX001	Motor fixture	1	48	71200690	55*70*9/TC type oil seals	1
11	A501B701DEX001	Oil seals cap	1	29	A502F209YJ1002	Worm wheel	1	49	71201390	UHS55/UHS packings	1
12	A501B809DEX001	Bearings tube gasket	1	30	A501F301DEX001	Worm	1	50	71204070	G50/O ring	1
13	A501C102-60L3-A165	60° Cam	1	31	A501F409A5M035	Motor pulley-38T	1	51	71204110	G60/O ring	1
	A501C102-65L3-A165	65° Cam			A501F409A5M038	Motor pulley-42T		52	71204140	G70/O ring	1
	A501C102-70L3-A165	70° Cam			A501F409A5M041	Motor pulley-46T		53	71204160	G80/O ring	2
	A501C102-75L3-A165	75° Cam		32	A401F409B5M053	Worm pulley-46T	1	54	71204180	G90/O ring	2
	A501C102-80L3-A165	80° Cam			A401F409B5M050	Worm pulley-42T		55	71204190	G95/O ring	1
	A501C102-85L3-A165	85° Cam			A401F409B5M048	Worm pulley-39T		56	71204210	G105/O ring	1
	A501C102-90L3-A165	90° Cam		33	A401F509DEX001	Worm fixture	1	57	71300040	AN03/Locknut	1
14	A501D109DEX001	Rocker	1	34	A401F709DEX001	Worm fixture gasket	1	58	71300041	AW03/Lock washer	1
15	A401D209DEX001	Rocker shaft	1	35	A401F709DEX002	Worm fixture gasket	1	59	71300060	AN05/Locknut	1
16	A401D309DEX001	Rocker fixture	1	36	A502J109DEX001	Idler pulley	1	60	71300061	AW05/Lock washer	1
17	A401D409DEX001	Rocker fixture cap	1	37	A502J201DEX002	Idler pulley shaft	1	61	71300070	AN06/Locknut	1
18	A501D501DEX001	Cam followers screw	1	38	A402J109DEX001	Idler pulley cap	1	62	71300071	AW06/Lock washer	1

DEX52 Part list

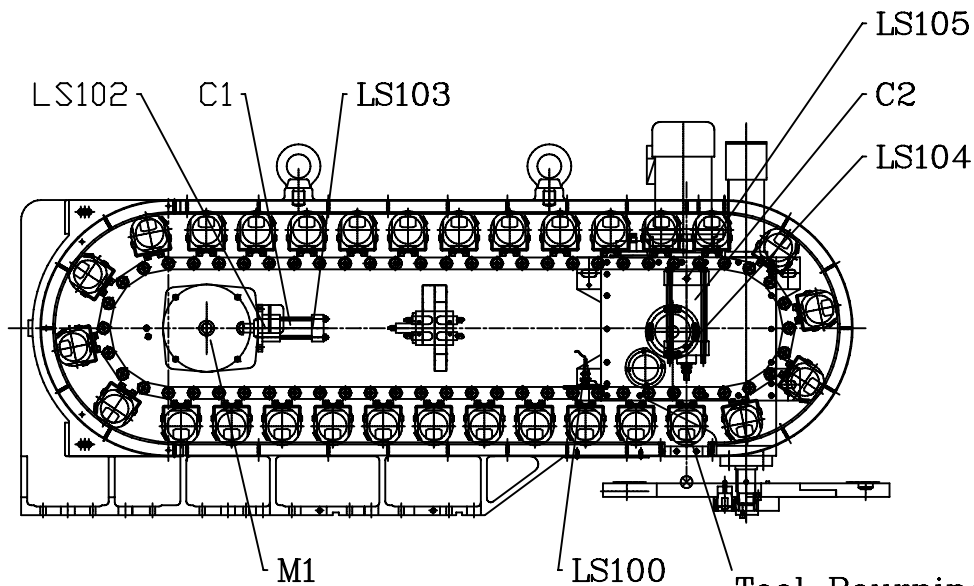
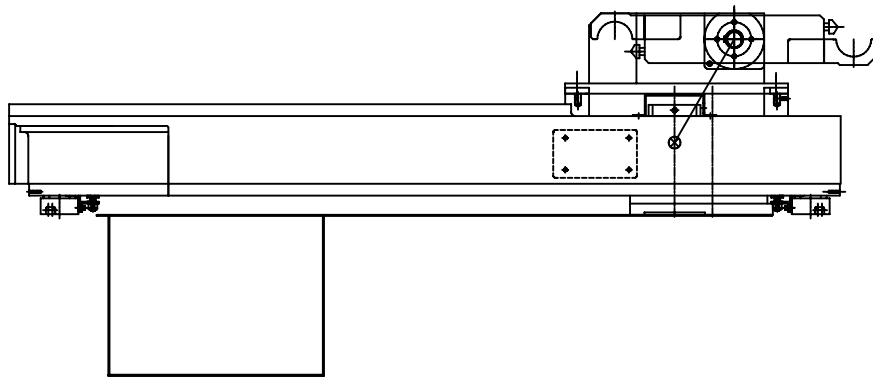
NO.	Parts No.	Specification	Q'TY	NO.	Parts No.	Specification	Q'TY	NO.	Parts No.	Specification	Q'TY
63	71300100	AN09/Locknut	1	87	71303525	φ 10/Spring washer	4	110			
64	71300101	AW09/Lock washer	1	88	71304130	M8*25/ Hex screw	4				
65	71300150	AN14/Locknut	1	89	71305052	M10*P1.25/Locknut	1				
66	71300151	AW14/Lock washer	1	90	71305590	RTW52/Basic external RTW	1				
67	71301050	M4*8L/Hex socket cap screw	6	91	71305805	STW12/Basic external STW	1				
68	71301060	M4*10L/Hex socket cap screw	8	92	71308060	25*128L Chain	1				
69	71301160	M5*16L/Hex socket cap screw	2	93	71401060	4*4*10/Double round key	1				
70	71301290	M6*14L/Hex socket cap screw	6	94	71401120	5*5*20/Double round key	1				
71	71301320	M6*25L/Hex socket cap screw	8	95	71401521	10*8*45/Double round key	2				
72	71301450	M8*16L/Hex socket cap screw	2	96	71401781	14*9*70/Double round key	1				
73	71301460	M8*20L/Hex socket cap screw	10	97	71403210	8*40L(1/50)/Taper pin	2				
74	71301470	M8*25L/Hex socket cap screw	4	98	71700030	Signal-PNP-3/E2E-CR8B1	1				
75	71301480	M8*30L/Hex socket cap screw	21	99	71704050	MG16A-10B/Wire studs	1				
76	71301630	M10*25L/Hex socket cap screw	4	100	71405070	28mm Oil eyeglass	1				
77	71304650	M10*35L/Hex socket cap screw	4	101	74600200	HTD500-5M-20mm/Belt	1				
78	71302800	M4*8L/Countersink screw	1	102	FF00600AA1A	Motor _1.5HP_AC220V	1				
79	71302820	M5*8L/Countersink screw	4		FF00600DA1A	Motor _1.5HP_DC90/220V					
80	71303010	PT1/8**8/Oil plug	1	103							
81	71303030	PT1/4**9/Oil plug	1	104							
82	71303050	PT1/2**12/Oil plug	2	105							
83	71303140	M5*5L/Socket set screw	2	106							
84	71303150	M5*10L/Socket set screw	4	107							
85	71303170	M6*8L/Socket set screw	10	108							
86	71303516	φ 8/Spring washer	4	109							

2、 Tool Changing Motion Flowchart:

#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 1	DMC5CQ001A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 2	DMC5CQ002A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 3	DMC5CQ003A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 4	DMC5CQ004A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 5	DMC5CQ005A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 6	DMC5CQ006A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 7	DMC5CQ007A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 8	DMC5CQ008A01
#50 Chain Type Tool Magazine Tool Changing Motion Flowchart – 9	DMC5CQ009A01

Deta International #50 Chain Type Tool Magazine

Tool Changing Motion Flowchart-1



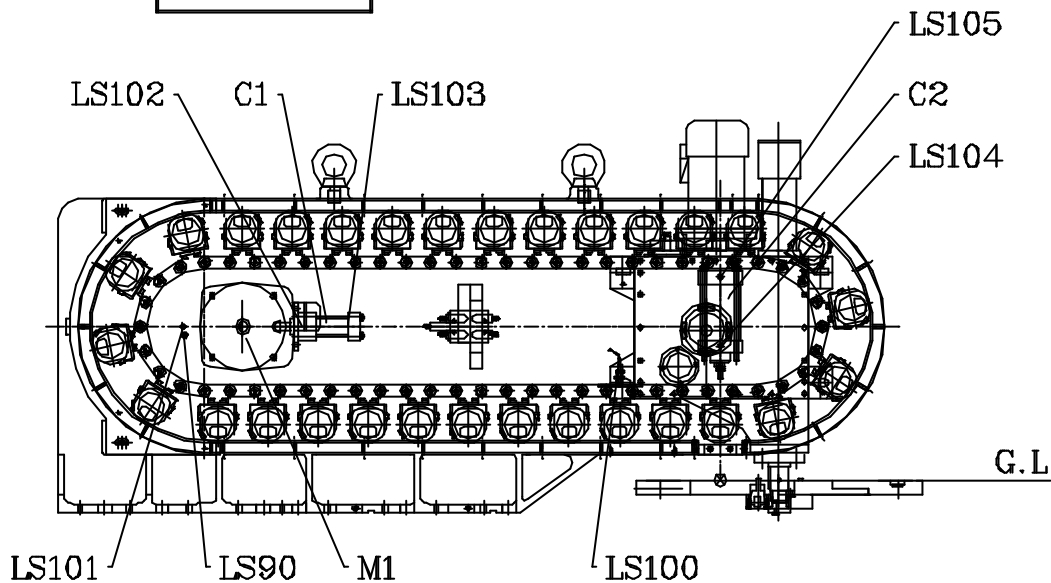
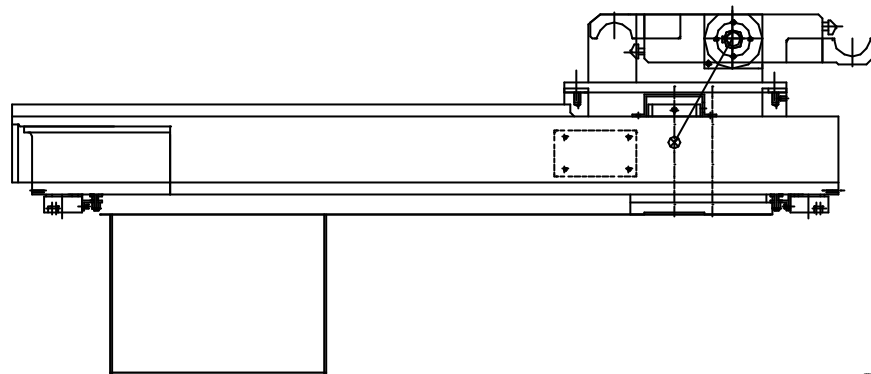
Tool Reurning Horizontal
Positon for Tool Pot

1. When the tool pot returns the tool, the reed switch R.S104 Should be ON. This confirms that the tool pot is at the horizontal position. At the same time, the positioning cylinder retracts to confirm that the switch R.S103 is ON, and the tool toppling cylinder hold at tool returning status. Start the tool magazine motor M1 to bring the tool chain into motion.

UNIT NO.	QUANTITY	MATERIAL	NID:	D4-02-03 2001/12	TOLERANCE
PART NO.	SCALE	TITLE	D4-02-03 2001/12	TOLERANCE	± 0.1 ± 0.2 ± 0.3 ± 0.5 ± 0.8 ± 1.2
DMC5CQ001A01					
DRAWING DESIGN	CHECK APPROVE				
Maggie2006/01/24					
NAME					
TEL:886-4-25617722 FAX:886-4-25617177					

Deta International #50 Chain Type Tool Magazine

Tool Changing Motion Flowchart-2



1. When the tool magazine motor is started, it is operating at low speed to the next tool position (Counter Positioning Sensor P.S101 is ON) and then the tool magazine motor changes to high-speed operation.
2. When tool magazine motor is operating to one tool position ahead of the target tool position, the motor is running at low speed operation until it reach the pre-selected changes to high-speed operation tool position (Counter Positioning Sensor P.S101 is ON) with tool magazine motor M1 cutting off the power and stop operation. At the same time cuts off the power supply to the solenoid valve (R.S103) of the positioning cylinder, the positioning cylinder extended, and then confirming that the switch R.S102 is ON in order to complete tool selection motion.
3. If the tool chain only needs to operate one or two tool position before reaching pre-selected tool position, it can operate at low speed through out the whole course.
4. When writing program, one should use the nearest tool selection to decide on the direction of rotation for the motor.

UNIT NO.		QUANTITY	MATERIAL	NO.	TOLERANCE
PART NO.		SCALE	TITLE	D4-02-03 2001/12	≥ 0 ± 0.1 > 6 ± 0.2 > 30 ± 0.3 > 120 ± 0.5 > 315 ± 0.8 > 1000 ± 1.2
CHECK APPROVE					
DRAWING DESIGN					
NAME					
Deta International					
TEL: 886-4-25617722 FAX: 886-4-25617177					

deta *International*

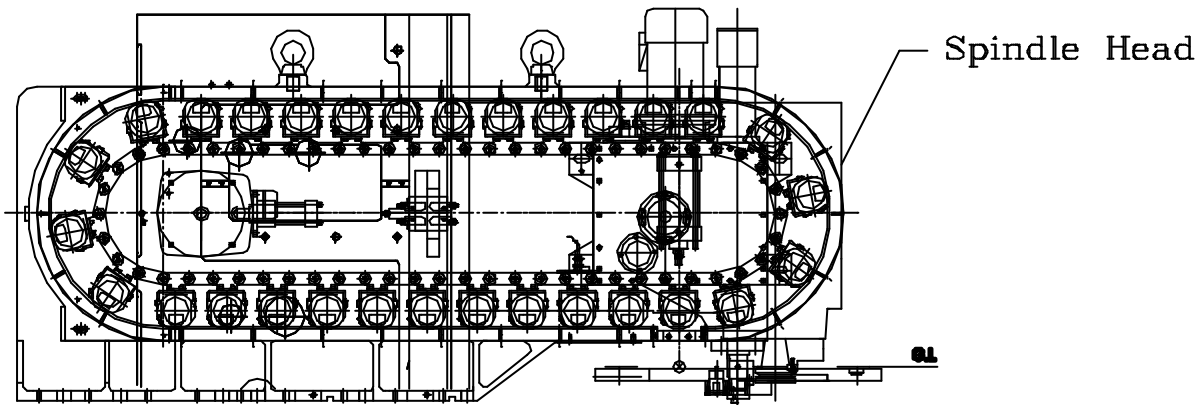
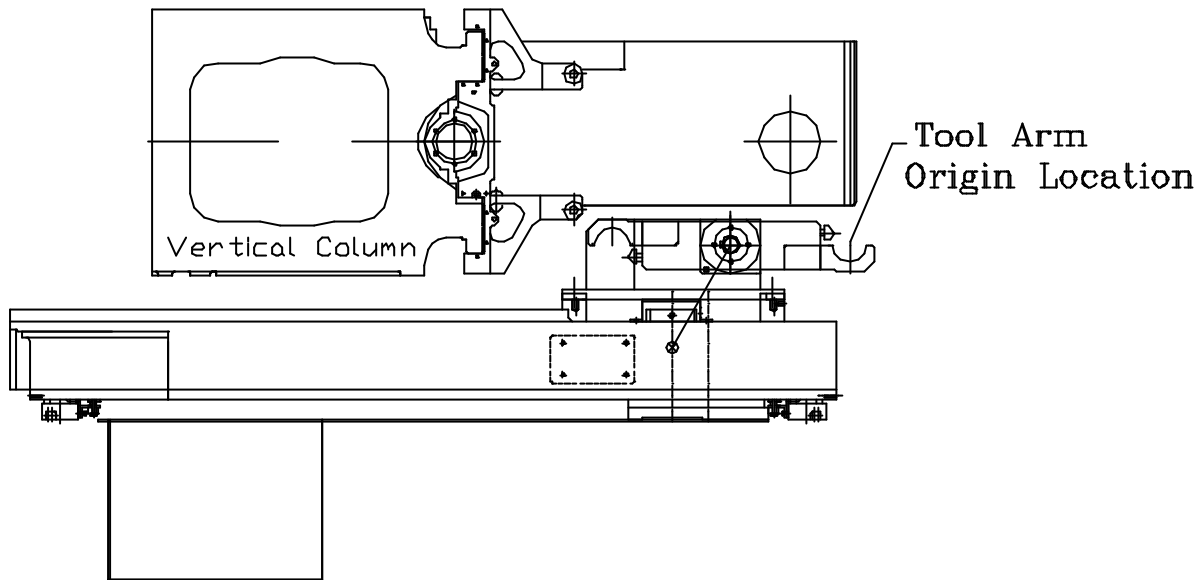
TEL:886-4-25617722 FAX:886-4-25617177

UNIT NO.	QUANTITY	MATERIAL	NO:	TOLERANCE
			D4-02-03	>0 ±0.1
			2001/12	>6 ±0.2
				>30 ±0.3
				>120 ±0.5
				>315 ±0.8
				>1000 ±1.2
DMC5CQ0003A01				

	DRAWING DESIGN	CHECK APPROVE
NAME	Maggie2006/01/24	

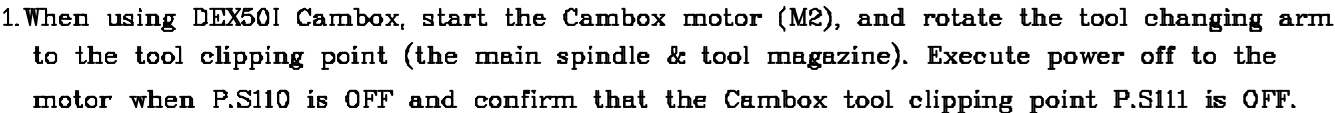
Deta International #50 Chain Type Tool Magazine

Tool Changing Motion Flowchart-4

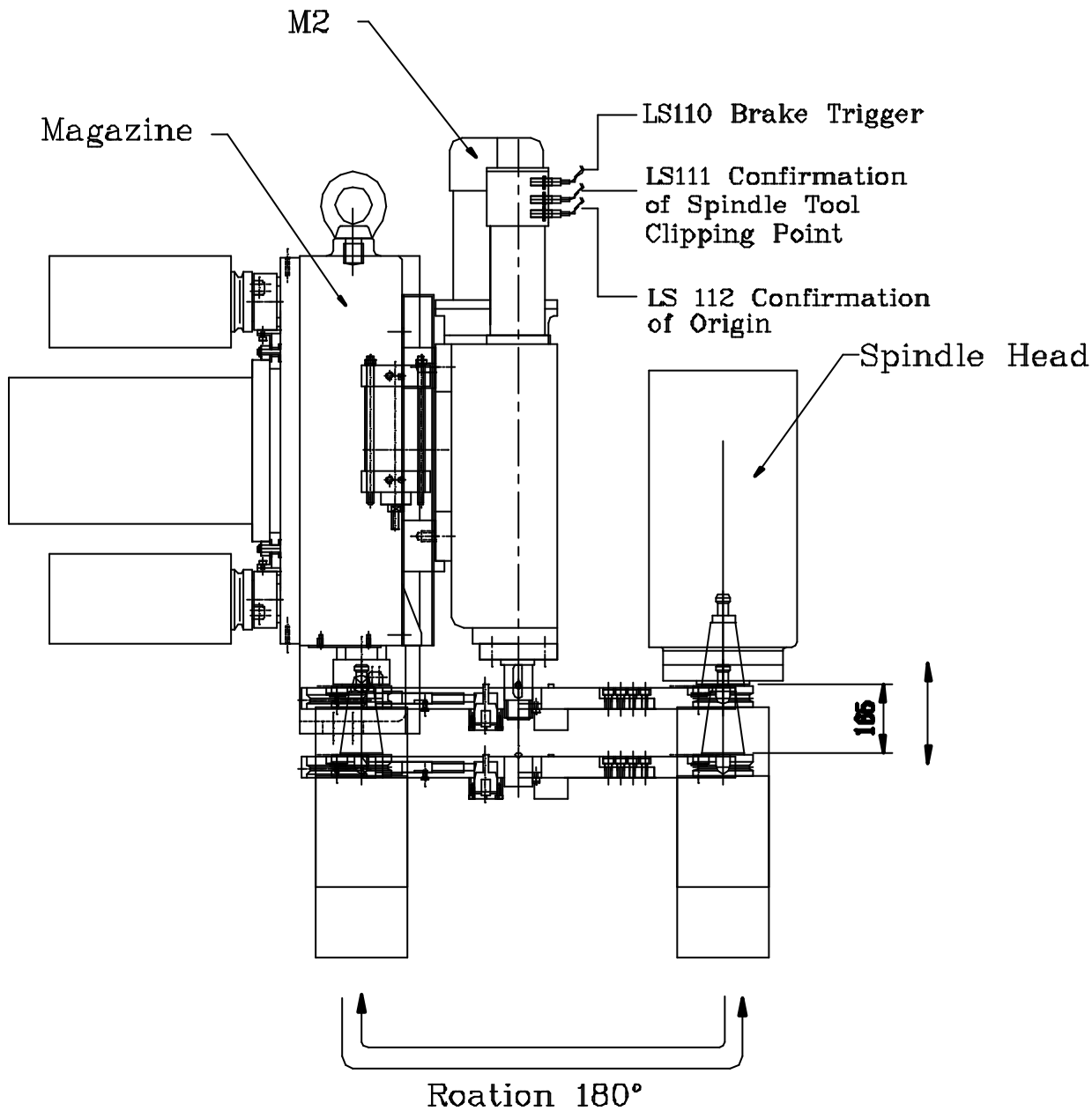


1. After completed the machining, the spindle head rise to the tool changing point and completes the directional orientation of spindle.

UNIT NO.		QUANTITY	MATERIAL	NO.	TOLERANCE
PART NO.		SCALE	TITLE	D4-02-03 2001/12	≥ 0 ± 0.1 > 30 ± 0.2 > 120 ± 0.3 > 315 ± 0.5 > 1000 ± 0.8 ± 1.2
DMC5CQ004A01					
NAME		DRAWING DESIGN	CHECK APPROVE		
Maggie		2006/01/24			

**deta** *International*

Deta International #50 Chain Type Tool Magazine Tool Changing Motion Flowchart-7



1.After main spindle executed the tool releasing motion and confirmation, start the Cambox motor (M2).The Cambox power output spindle pulls down the tool changing arm by 165mm, rotate by 180° andrise by 165mm.

2.When the Cambox brake sensor P.S110 is OFF again, execute the motor power off braking, at this time should confirm Cambox tool clipping point P.S111 is OFF and confirm position of tool arm to tool clipping.

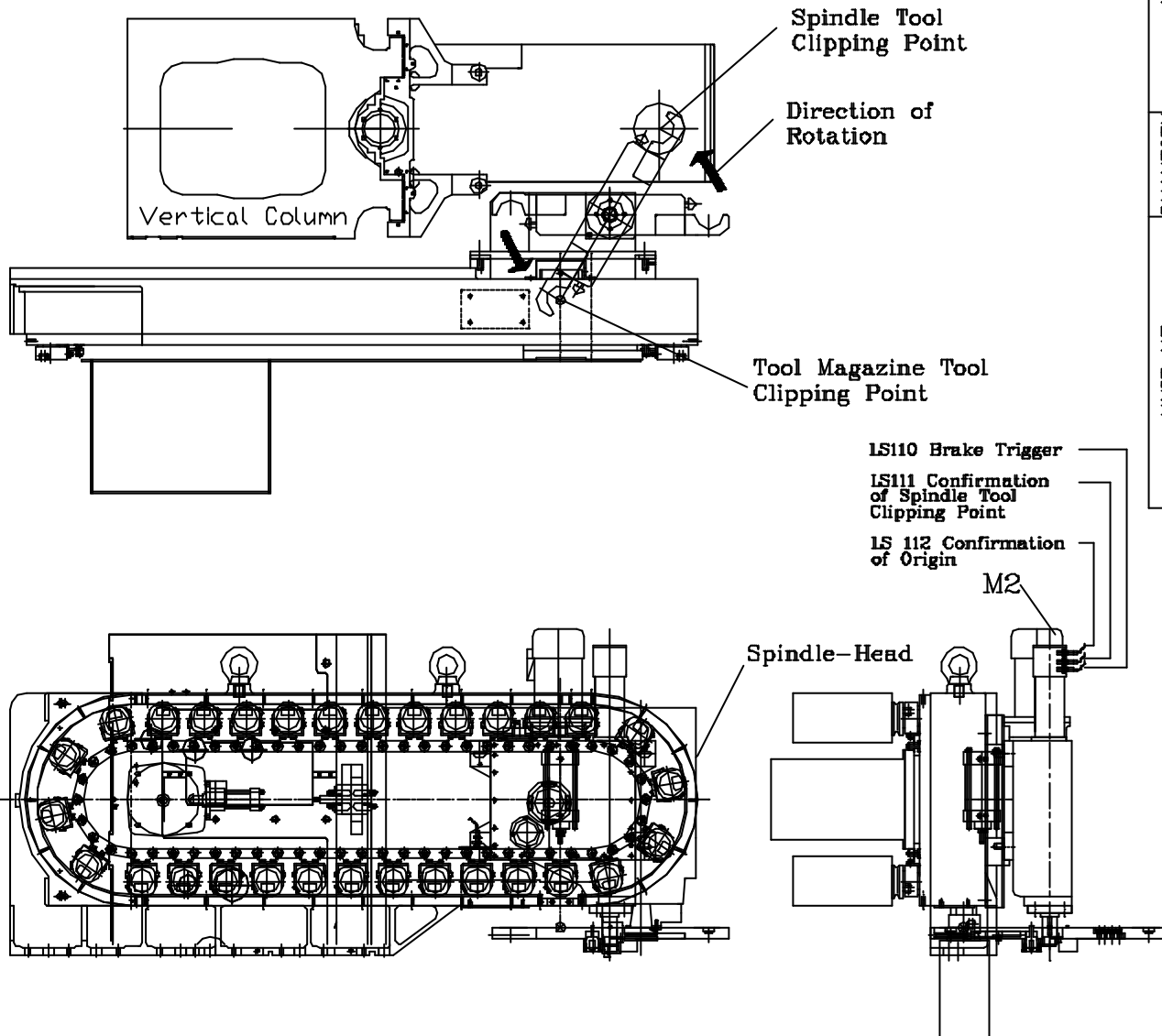
Part the

er

s OFF

			ad					
UNIT NO.		QUANTITY	MATERIAL	NO:	D4-02-03			TOLERANCE
					2001/12			
PART NO.		SCALE	TITLE					
DMC5CQ007A01								
		CHECK APPROVE	DRAWING DESIGN	NAME	Maggie2006/01/24			
deta International		TEL:886-4-25617722 FAX:886-4-25617177						

Deta International #50 Chain Type Tool Magazine Tool Changing Motion Flowchart-8

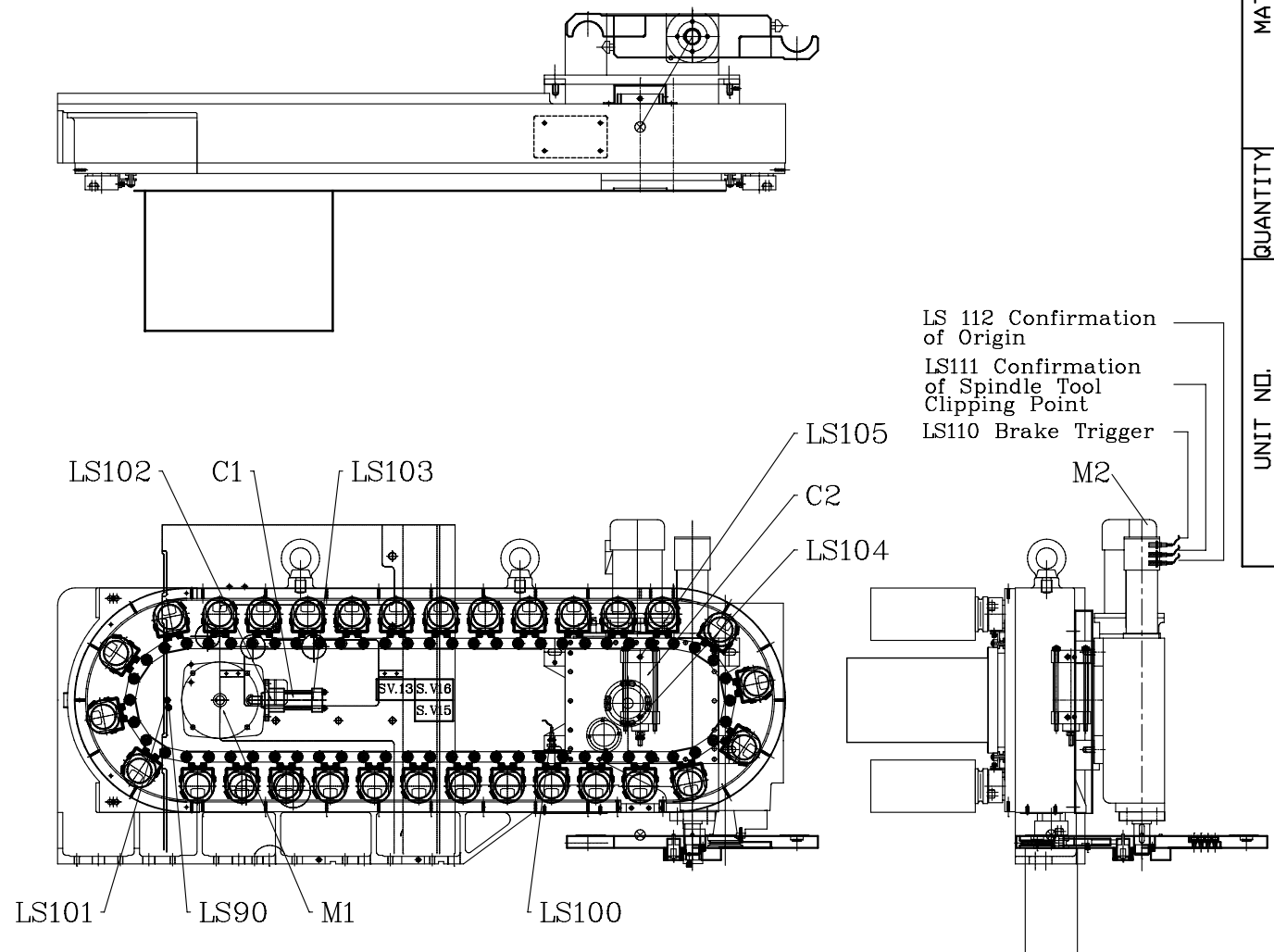


1.After the spindle execute unclamp motion and confirm that the unclamping motion has completed, it start the Cambox (M2) to enable the tool changing arm to return to location of motor origin.

2.When the Cambox brake sensor P.S110 is OFF again, execute the Cambox motor's power disconnection braking, and must confirm that the Cambox origin sensor P.S112 is OFF, OFF also confirm that the tool arm is positioned at the origin location.

UNIT NO.	PART NO.	CHECK APPROVE	DRAWING DESIGN	NAME	TOLERANCE	NO.
DMC5CQ008A01	SCALE		Maggie2006/01/24			
QUANTITY	MATERIAL					
TITLE						
DMC5CQ008A01	SCALE		Maggie2006/01/24			
DMC5CQ008A01	SCALE		Maggie2006/01/24			

Deta International #50 Chain Type Tool Magazine
Tool Changing Motion Flowchart-9



- 1.Excitation pneumatic directional valve (R.S105) activate the tool toppling cylinder and execute the tool returning motion.
- 2.After the tool returning confirmation switch (R.S104) indicates ON,the tool changing and returning mot ion is completed.
- 3.Completed the tool changing motion.

TEL:886-4-25617722 FAX:886-4-25617177 deta <i>International</i>						DRAWING DESIGN		CHECK APPROVE		UNIT NO.		QUANTITY		MATERIAL		NO:		TOLERANCE			
				NAME		Maggie2006/01/24												D4-02-03 2001/12		>0 ±0.1 >6 ±0.2 >30 ±0.3 >120 ±0.5 >315 ±0.8 >1000 ±1.2	

3、 Power Supply Specification for Electrical Controls:

3-1. Tool Change System's power supply specifications:

Power Supply Category	Electrical	Pneumatic
Specification	Electrical Power Supply: 3 Phase 220V (50/60Hz) Signal Power Supply: DC 24V	5 BAR (Filtered through three- points assembly)

3-2. Specification of Sensors in the Magazine:

Sensor	Tool Magazine Positioning and Counting	Tool-Changing Mechanism
Specification	M12 PNP 24Vx1 M8 PNP 24Vx2 Normally Open Shielded M12 Distance = 2mm M8 Distance = 1.5mm	M12 PNP DC24V(DEX50) ψ4 PNP DC24V(DEX52) Normally Open Shielded M12 Distance = 2mm ψ4 Distance = 0.8mm

4 、 Electrical Control:

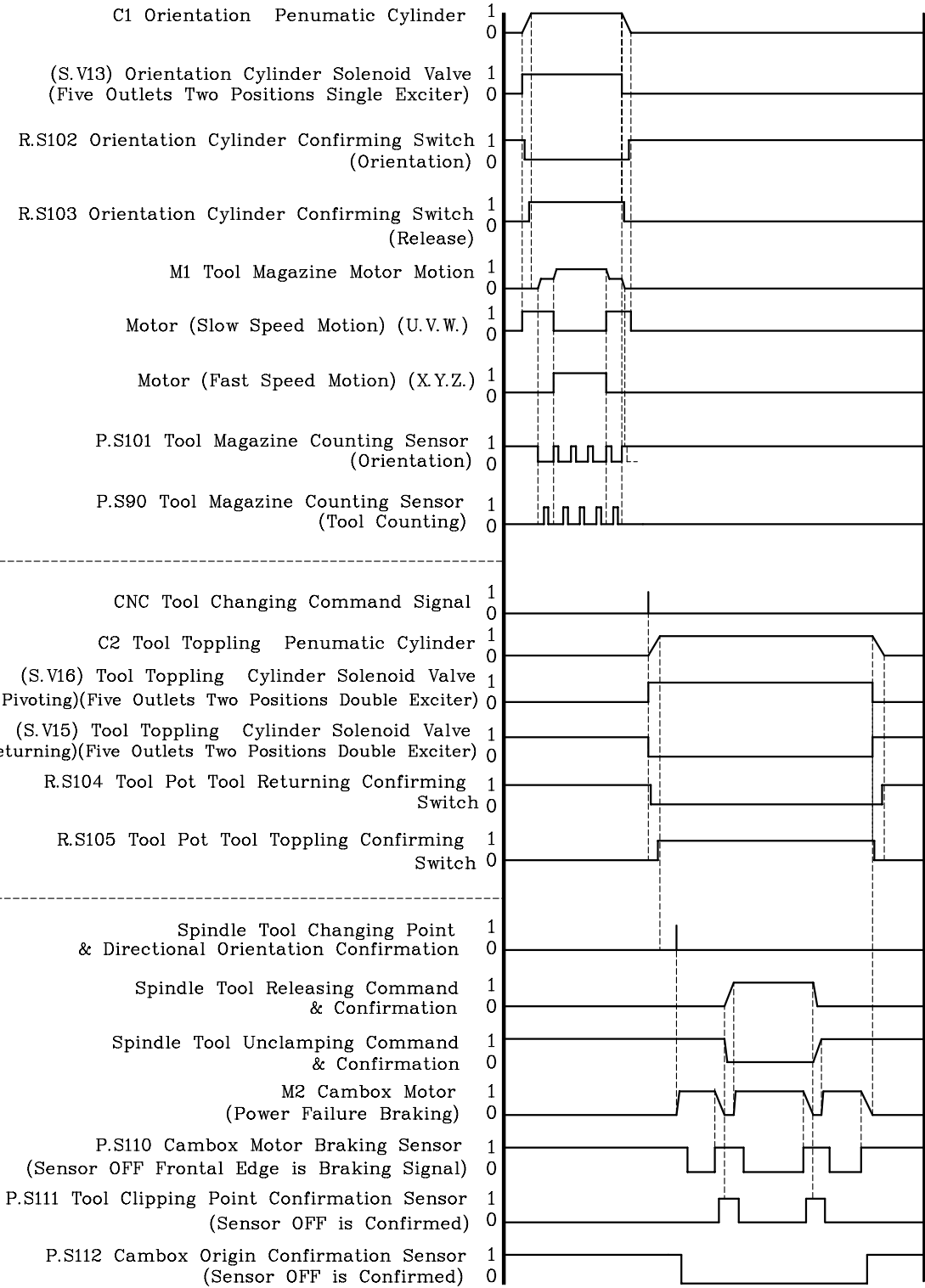
Configuration Drawing for Electrical Control Elements (DEX50 II)	DMC5CQQA1A01
Sequence Diagram of Tool-Changing System (DEX50 II)	DMC5CQQA3A01
Standard Wiring Diagram.....	DMC5CQQA4A01
Wiring Diagram for Magazine Motor.....	DMC5CQQA5A01
Wiring Diagram for CamBox Motor.....	DMC5CQQA6A01
Configuration Drawing for Pneumatic Control Elements.....	DMC5CQQA7A01
Wiring Diagram for Sensors.....	DMC5CQQA8A01
Pneumatic Circuit Diagram.....	DMC5CQQA9A01

#50 Pneumatic Chain Type Timing Sequence Drawing
for Tool Changing System

Tool Magazine Tool
Waiting Motion

Tool Magazine Tool
Toppling Motion

Cambox Tool Changing Motion



- Note:
1. P.S90, P.S100, P.S101 are M8 PNP NO Proximity Switches for Counting on the Tool Magazine.
 2. R.S102, R.S103, R.S104, R.S105 are Confirming Switches on the Hydraulic Cylinder.
 3. P.S100 are M12 PNP NO Proximity Switches for Counting on the Tool Magazine.
 4. P.S110, P.S111, P.S112 are 4 PNP NO Type Proximity Switches (Cambox DEX50-II)
 5. Magazine Motor is Pole Change Motor(4/8 POLES).
 6. Cambox Motor Spec is (3Pole,220V,1.5HP).

Magazine.

 TEL:886-4-25617722 FAX:886-4-25617177																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

#50 Pneumatic Chain Type Tool Magazine Wiring Diagram

Wiring Diagram as follow:

Deta Standard	24V	24V	24V	0V	0V	90	100	101	102	103	104	105	110	111	112	13	15	16	L01	L01	L01	PE	PE	PE	U2	V2	W2	PE	PE	U1	V1	W1	X	Y	Z
Client Specification																																			

- (1)L01 : Solenoid valve common point (13, 15, 16)

(2)S.V10 : Magazine Slow Valve.

(3)S.V11 : Tool Magazine CW Valve.

(4)S.V12 : Tool Magazine CCW Valve.

(5)S.V13 : Orientation solenoid valve for orientation cylinder

(6)S.V15 : Tool returning solenoid valve for tool toppling cylinder

(7)S.V16 : Tool toppling solenoid valve for tool toppling cylinder

(8) 24V: Power supply common connection point for
tool toppling orientation confirmation switch

(9)R.S102 : Orientation cylinder confirmation switch (orientation)

(10)R.S103 : Orientation cylinder confirmation switch (release)

(11)R.S104 : Tool pot tool returning confirmation switch

(12)R.S105 : Tool pot tool toppling confirmation switch
- (13) 24V: Tool magazine Cambox sensor power supply
positive charge

(14) 0V: Tool magazine Cambox sensor power supply
negative charge

(15)P.S90: Tool magazine counting sensor

(16)P.S100: Tool magazine origin sensor

(17)P.S101: Tool magazine orientation sensor

(18)P.S110: Cambox motor braking sensor

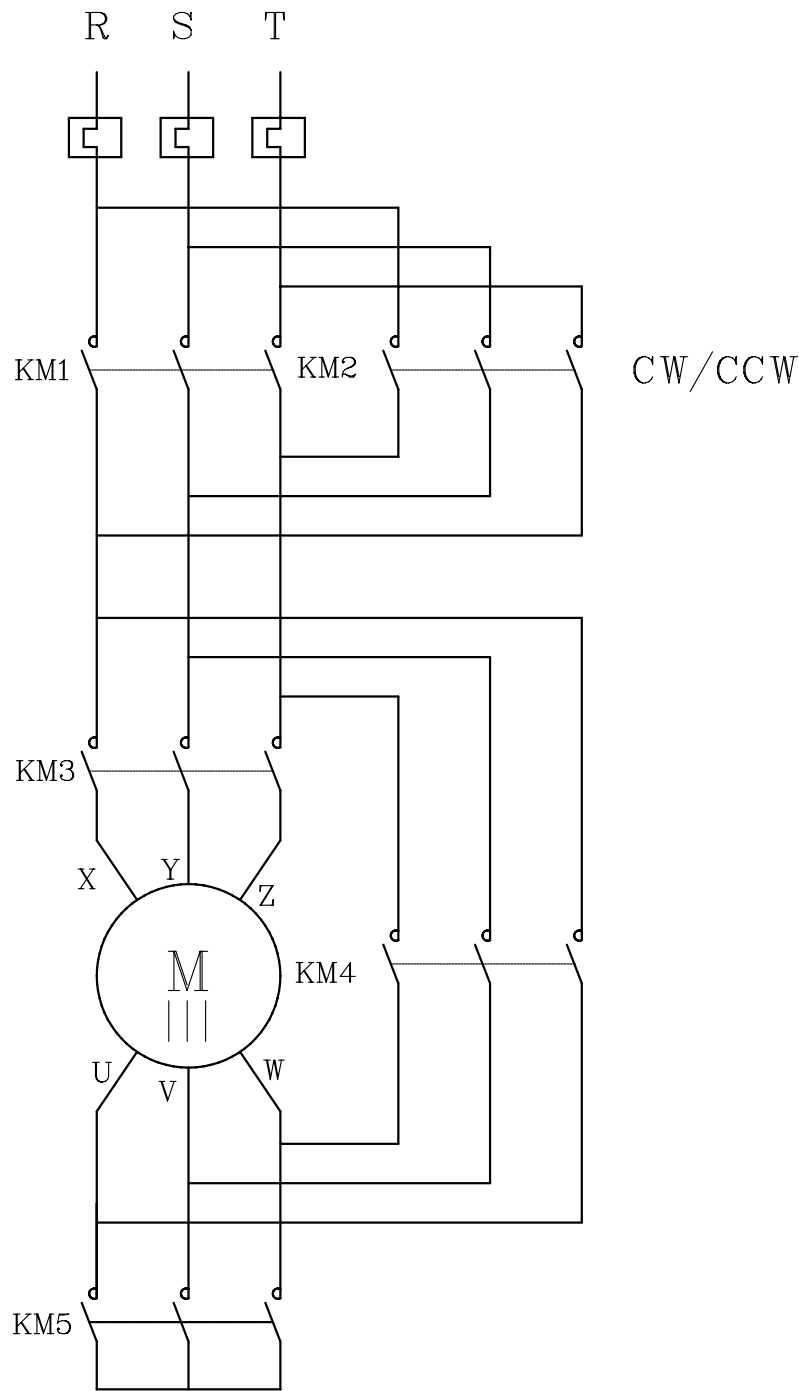
(19)P.S111: Cambox tool clipping sensor

(20)P.S112: Cambox origin sensor

(21) U2, V2, W2: Cambox motor connection point

(22)PE: Earth lead

#50 Magazine Motor CircuitT Diagram



Hight-Speed 4P 2Y

The diagram illustrates a mapping from a set of variables X, Y, Z, U, V, W to a set of variables R, S, T . The variables X, Y, Z are connected to R, S, T respectively by vertical lines. The variables U, V, W are connected to a common horizontal line, which then connects to R, S, T respectively.

Slow-Speed 8P $\triangle$

U V W X Y Z

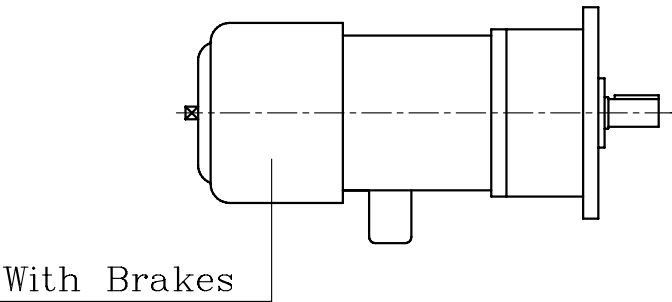
R S T

Open

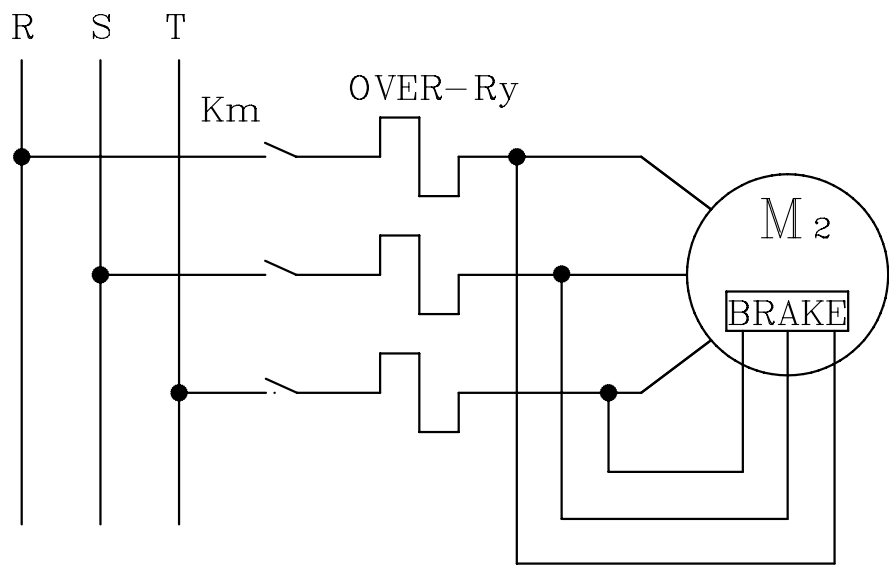
[illegible]

#50 ATC Motor Circuit Diagram

Motor:



AC 220V 3PHASE

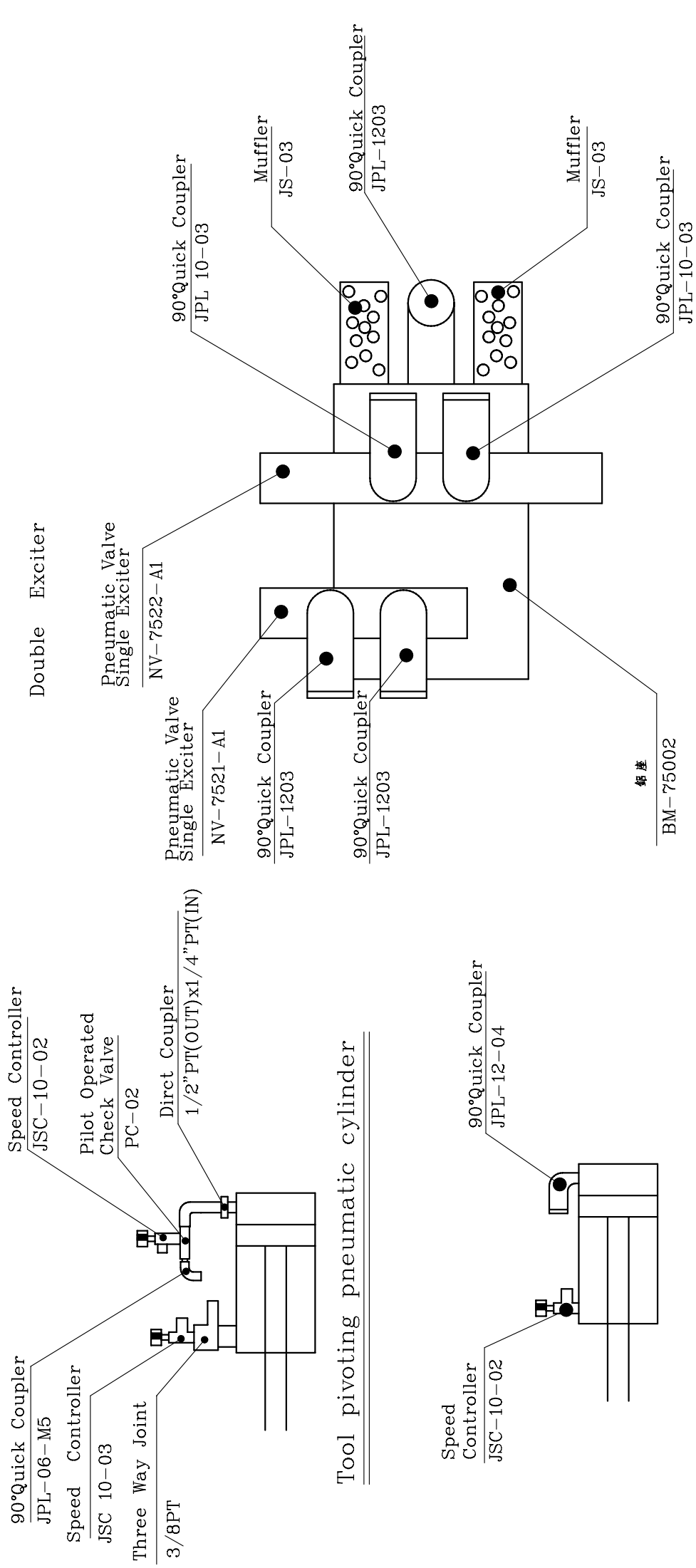


ATC Motor Standard:

- 1.Horsepower
- 2.Pole
- 3.Voltage
- 4: rpm
- 5.Voltage max
- 6.Insulation Resistanc
- 7.No Electric Current
- 8.Full Electric Current
- 9.Brake Space
- : 1.5HP
- : 4P
- : 60HZ,220V
- : 1720R. P. M.
- : 1800VA.C
- : 100MΩ
- : 2.5A
- : 4.4A
- : 0.3~0.4mm

Deta International TEL:886-4-25617722 FAX:886-4-25617177	DRAWING DESIGN		CHECK APPROVE	UNIT NO.	QUANTITY	MATERIAL	NO:	TOLERANCE
	Maggie2006/01/24						D4-02-03 2001/12	>0 ±0.1 >6 ±0.2 >30 ±0.3 >120 ±0.5 >315 ±0.8 >1000 ±1.2
				PART NO.	SCALE	TITLE		
				DMC5CQQA6A01				

Configuration Drawing for # 50 Pneumatic Chain Type Magazine Control Components



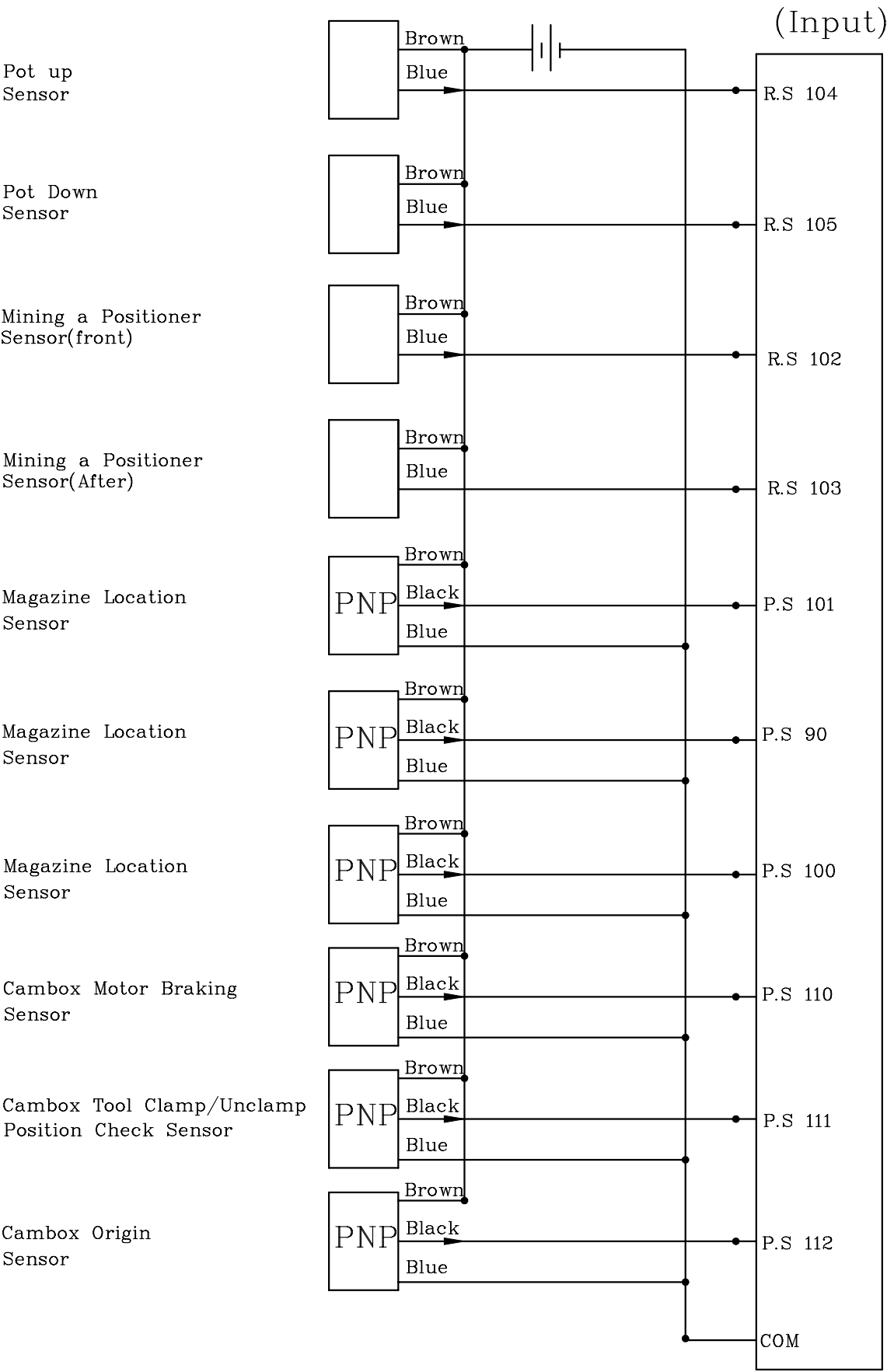
Orientation pneumatic cylinder

Valve

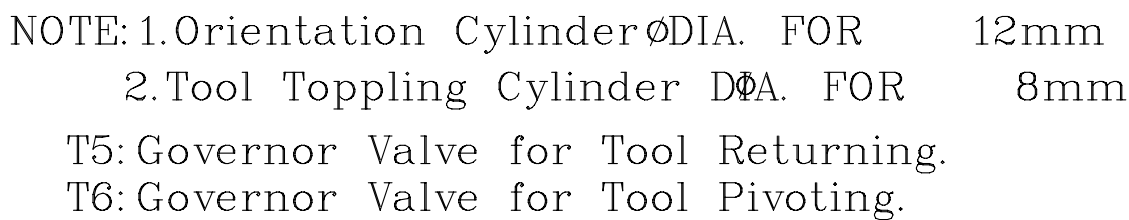
UNIT NO.	QUANTITY	MATERIAL
PART NO.	SCALE	TITLE

ND:	TOLERANCE
D4-02-03 2001/12	>0 ±0.1 >6 ±0.2 >30 ±0.3 >120 ±0.5 >315 ±0.8 >1000 ±1.2

Deta International #50 Pneumatic Chain Type
Sensor Circuit Diagram



NO:		TOLERANCE	
D4-02-03		>0 ±0.1	
2001/12		>6 ±0.2	
		>30 ±0.3	
		>120 ±0.5	
		>315 ±0.8	
		>1000 ±1.2	
MATERIAL		TITLE	
QUANTITY		SCALE	
UNIT NO.		PART NO.	
		DMC5CQQ48A01	
CHECK		APPROVE	
DRAWING		DESIGN	
		Maggie2006/01/24	
		NAME	
		TEL:886-4-25617722 FAX:886-4-25617177	



deta International TEL:886-4-25617722 FAX:886-4-25617177		DRAWING DESIGN	CHECK APPROVE	UNIT NO.	QUANTITY	MATERIAL	NO:	TOLERANCE
	NAME	Maggie2006/01/24		PART NO.	SCALE	TITLE		±0.1 ±0.2 ±0.3 ±0.5 ±0.8 ±1.2
								>0 >6 >30 >120 >315 >1000

5、 Electrical Control Protection Programming

- (1) As Cambox and the tool magazine move extremely fast, the control program for all motor relays, sensors, and the I/O port of electromagnetic valves should be written on PLC Level 1 of the controller (where scan time reacts faster). This is to prevent the electrical control from having slow reactions and causing mechanical wrong movements.
- (2) In the proceeding of tool changing, each movement has to be confirmed for its completion signal before continuing with the next movement. (Refer to the tool-changing flowchart diagram)
- (3) Do not start the motor of the tool magazine or rotate the tool chain prior to confirmation by tool magazine tool returning sensor (LS104 is ON) and orientation pneumatic cylinder sensor (LS103 is ON).
- (4) Do not tilt the tool prior to confirmation by the tool magazine orientation sensor (LS101 is ON), orientation cylinder sensor (LS102 is ON) and Cambox origin sensor (LS112 is ON).
- (5) Do not start the Cambox motor or rotate the tool chain prior to confirmation by tool tilt pneumatic cylinder (LS104 is ON) (LS105 is ON) during the course of tool tilt.
- (6) Do not change the tool if the spindle of the machine has not returned to the tool changing position.
- (7) Do not change the tool if the spindle orientation has not been completed.
- (8) Do not move the spindle head if the tool arm has not return to its home position (LS112 is OFF).
- (9) Overload protection relay should be activated when overloading occur, so that the motor will not be burn off.
- (10) The amperage of the motor's current has to be below the motor's full load current.
1/4 Hp: 1.2 A; 1/2 Hp: 2 A; 1 Hp: 3A; 1.5Hp: 3.5A (at 60Hz)

6、 Installation Procedure

Before installing our chain type tool-changing system, one should read this section carefully and understand this manual completely before proceeding with the installation procedure.

The adjustment of the alignment between arm and the pot within magazine has been done before the product left our factory, users do not have to spend time working on it. Hence, users could treat the tool magazine, the tool-changing mechanism and the tool arm as a complete unit without having to do any adjustment when installing our Chain Type Tool Changing System. But the tool-changing point of the spindle and the tool-changing point of the arm have to be accurately adjusted.

The tool-changing point of the spindle and the tool-changing point of the arm have to be accurately overlapped, so that tool-changing movements will be smoothly carried out under normal usage without any collision noise. If the adjustment is inaccurate, not only tool-changing movements will not be smooth but it will also produce collision noises, which will have harmful effect on the life span of the tool. Hence, the only important point for installing our Chain Type Tool Changing System is “to overlap the tool-changing point of the spindle and the tool-changing point of the arm accurately”. We recommend users to follow the installation procedures below:

- (1) Make a bracket as we have suggested, and tight it onto the vertical column after confirming the bilateral perpendicularity geometrical tolerance between the vertical column interface and the tool magazine interface.
- (2) Make a three-stages tool-calibration fixture as we have suggested.
(As per attached drawing)
- (3) Lock the chain type tool-changing system onto the interfacing bracket. Put the two rest blocks closely on the top of the interfacing bracket and ensure the horizontal accuracy is kept.
- (4) Move the Z-direction of the spindle to the highest point.
- (5) Put adjustment fixture A into the spindle for the spindle to grip and let the tool-changing arm grip adjustment fixture B. Press and release the brake, which is on top of the tool-changing mechanism motor. Then

use a hexagonal spanner to turn the screw, which is located at the top center of the motor, until the tool-changing mechanism reaches the tool-clipping position. (Keep turning the screw on top of the tool-changing mechanism motor, and the tool-changing arm will remain fixed for a period of time. This will ensure that the tool-clipping position has been reached.)

- (6) Use a level to adjust the interfacing bracket so that the tool-changing arm is perpendicular to the spindle.
- (7) Move the Z-direction of the spindle to about 2mm from the top of the predicted tool-changing point.
- (8) Adjust the X- and Y-direction of the tool-changing system so that the X- and Y-coordinate of the tool changing points for the tool-changing arm and the spindle overlap. If adjusting the Fixture C allow it to pass through the Fixture B and entering the internal hole of the Fixture A that means the X and Y direction adjustment is completed.
- (9) Measure the Z-direction coordinate for the tool-changing point of the tool-changing arm. Use the electronic control system to move the spindle down to approximately 0.3~0.5mm above the Z-direction coordinate of the tool-changing point for the tool-changing arm (the ideal distance would be 1/2 of the spindle clamp distance). And set this point as the coordinate for the tool-changing point. Again, use the hexagonal spanner to turn the screw on the top center of the motor in the opposite direction, until the tool-changing mechanism returns to its home position.
- (10) Change the tool manually first, to check that the movements of tool pot toppling, the tool-changing mechanism performing the tool-change, the spindle catching and releasing tools, ... etc coordinate well together without any error, then proceed with CNC automatic sequence program control. After trial tool-changing several times and making sure that no bad phenomena appear, the positioning pins can be fix into positions between the tool-changing system and the interfacing bracket, and between the interfacing bracket and the vertical column, respectively.
- (11) Connect the circuit for electronic control, pneumatic valves, and pneumatic source according to the wiring diagram.
- (12) Pour the hi-grade of circulation oil into the tool-changing mechanism until the surface of the oil can be seen from the oil-viewing window.

7、 Original Setting

- (1) The gap between the tool magazine orientation and the counter sensor (M8) and the sensor block should be adjusted to between 0.8~1.0 mm.
- (2) The gap of tool magazine motor's brake pad should be adjusted to between 0.3~0.35 mm.
- (3) The gap between the sensor ($\phi 4$) on Cambox tool-changing mechanism and the sensing block should be adjusted to between 0.4~0.5 mm.
- (4) The gap of Cambox motor's brake pad should be adjusted to between 0.3~0.35 mm.
- (5) Setting for Tool Magazine Motor's speed and Tool Pivoting/Tool Returning Time:

5.1 Setting for Pneumatic Electric Motor Drive Speed and Tool Pivoting /Tool Returning Time:

- A. Because the tool magazine uses variable pole motor, therefore tool magazine operation high speed time setting is 0.5sec/tool, and slow speed time setting is 1sec/tool.
- B. Time setting for tool Pivoting/tool returning:
The tool Pivoting time is set at 1sec, and the tool returning time is set at 1.3 sec.
- C. Ways of adjustment for tool Pivoting/tool returning time:
 - (a) Adjustment method for setting the tool Pivoting:
(as per picture DMC5A0025A01)
When the electromagnetic valve (S. V16) is magnet-induced, the tool Pivoting pneumatic cylinder retracts, the tool pot produce tool Pivoting, and the way of adjusting the tool Pivoting time is by using the governor valve (T4) on the cylinder. Make tool Pivoting time to 1sec.
 - (b) Adjustment method for setting the tool returning:
(as per picture DMC5A0025A01)
When the electromagnetic valve (S. V15) is magnet-induced, the tool Pivoting pneumatic cylinder extended, the tool pot produce tool returning, and the way of adjusting the tool returning time is by using the governor valve (T5) on the cylinder. Make tool returning time to 1.3sec.

5.2 Setting for Hydraulic Motor Drive Speed and Tool Pivoting/Tool Returning Time:

A. Tool magazine hydraulic motor under normal operation is slow speed operation (slow speed time setting is 1sec/tool). When the electromagnetic valve (S. V10) is magnet-induced, the hydraulic motor operation changes to high speed (high speed time setting is 0.5sec/tool). (As per picture DMC5A0010A01)

B. Setting for tool Pivoting/tool returning:

Tool Pivoting time setting is 1sec, and time setting for tool returning is 1.3sec.

(a) Adjustment method for tool Pivoting time:

(as per picture DMC5A0014A01)

When the electromagnetic valve (S. V16) is magnet-induced, the tool Pivoting hydraulic cylinder retracts, the tool pot produce tool Pivoting, and the way of adjusting the tool pot tool Pivoting time is by using the governor valve (T2). Make tool Pivoting time to 1sec.

(b) Adjustment method for setting the tool returning:

(as per picture DMC5A0014A01)

When the electromagnetic valve (S. V15) is magnet-induced, the tool Pivoting hydraulic cylinder extended, the tool pot produce tool returning, and the way of adjusting the tool pot tool returning time is by using the throttle valve (T1). Make tool returning time to 1.3sec.

8、 Trouble Shooting:

8-1.Unstable tool-toppling:

We have made the best adjustment to the chain type tool-changing system before our product left our factory, and we would suggest users not to do any random adjustment. If tool toppling is unstable due to the transportation or human error, please follow the procedures below to check and make adjustment:

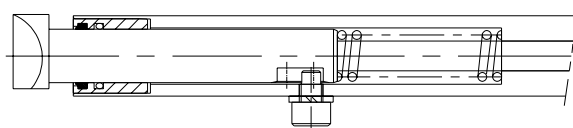
- (1) Check whether the pneumatic source conform to the power supplying specification (refer to the section on the electronic control's power supply specification). Re-check the pneumatic piping to see whether there is any clogging or bending.
- (2) Check whether the tool-toppling mechanism has any damage to it. If so, please contact us and we will send someone over to repair it.
- (3) If there is no error from the above two points mentioned, then the tool toppling pneumatic cylinder should be adjusted (it is situated below the back side of the tool magazine main structure, please refer to the attached drawing). Please use the heaviest 20 kef tool to test the tool toppling speed, adjust the speed adjustment valve on the pneumatic cylinder, so the tool toppling stroke and tool returning stroke takes approximately 1 second each to complete.
※Note: Be sure not to set the speed too fast, otherwise there is a possible danger of dropping the tool.

8-2.Tool Calibration Procedure:

Please adjust the arm as following procedure when need:

- a. Uplift the Cambox:
 - (1) Use an overhead crane to lift the Cambox and inspect it externally for any flaw.
 - (2) Use M16×55Lmm+spring washer+flat washer to fasten the Cambox onto the datum surface of the tool magazine's main structure, and pull the Cambox to the elongated holes on the outside.
 - (3) Open the power distribution box of the Cambox and connect it to the power supply of the electronic control box. Check to see if there is any abnormal phenomenon in the operation of the Cambox.
- b. Tool-Changing Arm Calibration:
 - (1) Press the double circular key 14×9×55Lmm into the key groove on the spindle of the Cambox.
 - (2) Put the fixture cap of the tool-changing arm on the tool-changing arm, and fix it with M10×40Lmm+spring washer+flat washer, do not tighten it.
 - (3) Utilize the threaded M12 hole on the end of Cambox spindle with the calibration tools. Press the fixture cap of the tool-changing arm with the tool-changing arm into the spindle of the Cambox until the threads on the spindle is exposed certain distance, and then withdraws the calibration tools. Fastening the tool-changing arm and nuts until the fixture cap of the tool-changing arm is closely fitted to the end surface of Cambox spindle with O.D. of 55mm.
 - (4) Rotate the Cambox spindle to the tool clipping point location, and remove the M10×40Lmm to check the height of tool-changing arm.
 - (5) Topple the tool pot to 90 degree and install the cutting tool.
 - (6) Adjust the position of the Cambox, so the protuberance of the tool clipper and the groove on the cutting tool are closely fitted (the center of tool changing arm and the center of cutting tool are coincide with each other.).

- (7) Three-point tool calibration fixtures can be use for the adjustment. The adjustment method is to insert Fixture A into the tool pot, and Fixture B is placed at the tool clipper and coupled with the protuberance, but the tool pusher clip has to be placed into the arm first. Then, re-adjust the Cambox position, so that Fixture C can go through Fixture A and Fixture B and reach the arm at the position of the tool-clipping point, and line up with the center of the tool pot.
- (8) After the position of Cambox is located, fix the Cambox by fastening four M16×55L bolts.
- (9) Check whether the protuberance of the tool clipper and the gap of the groove on the tool are consistent. The tool clipper's clamping gap should be 0.8mm (BT shank, CAT & DIN is 0.2mm); the best position for the tool clipper protuberance is slightly above the middle, but leave some gaps above it and below it. If the height of the tool-changing arm is not in this position, then add on a tool-changing arm separation ring washer, or grind the separation ring of the tool-changing arm, so that the height of the arm is as described above.
- (10) After adjusting the position of the tool-changing arm and centering the tool to make them concentric, fasten four M10×40Lmm bolts.
- (11) Make sure the locking nuts for the tool-changing arm has been tighten, and insert one M8 bolt + nut to fix the tool changing arm and prevent loosen by tightening it.
- (12) During the process of tightening, use magnetic holder to hold the leveler on the Cambox. The pointer of the leveler should touch the tool clipper near the outer rim. Repeat the height measurement for both ends of the tool clipper, where the height at both ends should be within 0.1mm of difference.
- (13) Place the tool pusher clip spring onto the end of the tool pusher clip, and after smearing some lubricating oil, fit it into the tool-changing arm. Fix M8 anti-revolving bolt + spring washer to the arm



(as illustrated).

- (14) Turn the position of tool changing arm to the descending position, apply lubricant on the safety pusher pin of the tool-changing arm and then insert it into the lubricated spring of safety pusher pin. Then,

insert the safety pusher pin into the tool-changing arm and fasten it with M5×40L bolt + spring washer.

- (15) After fastening the parts for the tool-changing arm, try several times to make sure that the safety pusher pin can spring upwards freely, and test to see if tool-changing movement is working properly by putting a tool into the tool pot.
- (16) After checking without any error, use an electrical drill hole reamer to insert the 8mm conical pin into the fixture cap.

8-3. When the tool chain does not run smoothly:

- (1) Please check to see if there is any foreign object got stuck to the chain wheel or rotating axis (refer to the assembly drawing and part list). Please eliminate it.
- (2) Check whether there is any foreign objects got stuck to the tool pot track (refer to the assembly drawing and part list). Please eliminate it.
- (3) Please dismantle the motor and then electrify the motor, so it operates independently. Check to see if it rotates smoothly without any noise.
- (4) If after going through above inspections without eliminating the breakdown, please contact our company.

8-4. When the tool arm does not run smoothly:

- (1) Please check to see if there is any damage to the tool-changing arm. If there is, please contact our company to have the parts replaced.
- (2) Please check the tool-changing mechanism and main structure of the tool magazine to see if there is any change to the locking position (Check to see whether there is any damage to the positioning pin or it has already been shear off. If there is, please contact our company to have the parts replaced.
- (3) Please check whether there is any loose movement between the

tool-changing arm and axis of the tool-changing mechanism. If there is, please stop the machine and cut off the power supply and loosen the screw on top center of the motor with a hexagonal spanner until the tool-changing mechanism reach the tool clipping position. Push the tool-changing arm upward to the end and clip on the tool that has toppled down, then calibrate both end of the tool-changing arm so they are within (0.1mm) in height, fastening the tool-changing arm packing ring cover in between the tool-changing arm and axis of the tool-changing mechanism. (Refer to tool calibration procedure)

- (4) Be sure not to self dismantle the tool-changing mechanism, if there is any breakdown, please contact our company.

8-5.When the tool-changing speed is too slow:

- (1) Please check whether the motor produces any strange noise
- (2) Please check whether the power supply conform to the specification.
- (3) Please check whether the speed of spindle clamping and unclamping complies with the requirement.
- (4) If there is any other breakdown, please contact us.

9、Maintenance

- (1) The circulation oil inside the tool-changing mechanism should be changed after 2400 hours of continuous usage. And the oil level has to be checked non-periodically. A refill is in order if the oil falls below the required level.
- (2) The cylindrical cam and the tool-toppling cam rotate inside the tool palette should be checked approximately once a month to ensure that there is still some lubricating oil.
- (3) Check and see if there is still some lubricating oil in the bearing every three-month.
- (4) If the brake for the tool-changing mechanism's motor and the tool magazine's motor reached the end of their useful life, please contact our company for adjustment or replacement.

Thank you for using our products. Please inform us if there is any defect so that we can make improvements and offer you more stable and better quality products.

deta*INTERNATIONAL*

No. 47-5, Zungian Rd., Shengang Shiang, Taichung County
42952, Taiwan(R.O.C).

Tel: (886-4) 2561-7722

Fax: (886-4) 2561-7177

Sales department e-mail sales@deta.com.tw

Design department e-mail design@deta.com.tw

AUTOMATIC TOOL CHANGER
DEX-2

SERVICE MANUAL

2002-06-04

INDEX :

1. Outside dimension
2. Parts list
3. Dismantled drawing
 - A. Input shaft :
 - B. Output shaft & motor :
 - C. Rocker part :
 - D. Signal sensor :
 - E. Dismantled step :
4. ATC illustration
5. DEX-2 stroke angle corresponding drawing
6. DEX-2 time chart
7. Deviation cover mounting direction
8. Cam adjustment method
9. Tool arm adjustment method
10. Lubrication

Dismantled procedure :

How to take the spline(output) shaft :

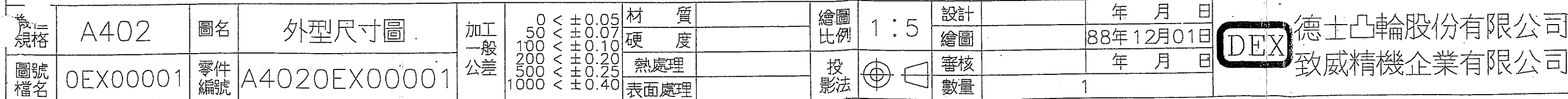
1. Turn to start position, remove the case cap of screw (227) and pin (246)
2. Remove the case cap (101B)
3. Loose hexagonal screw (225) ,remove the front fix cap (111) .
4. Remove the spline(output) shaft (106) ,and transmitt wheel (107) , sun's nut (208) , sun's gasket (210) ,and take the new shaft.
5. Assrmbly it, you can reverse in connection.

Change the bearings on bearings tube :

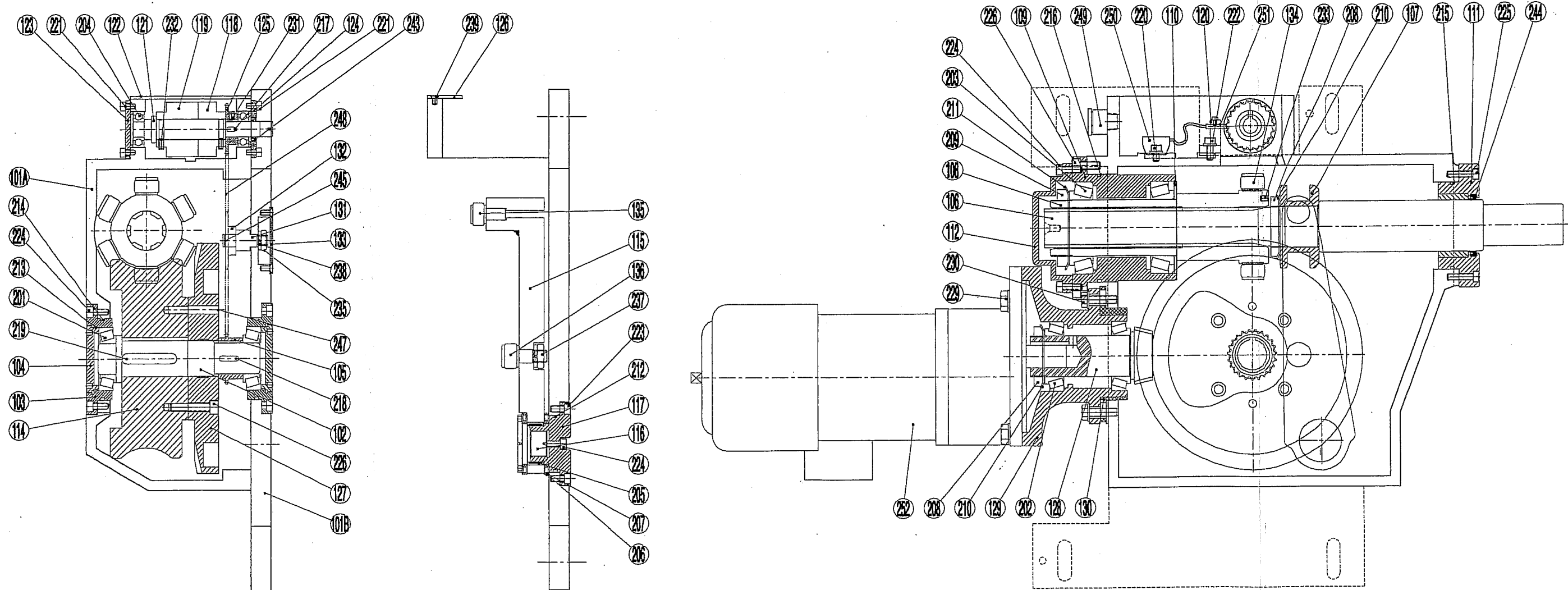
1. Turn to start position, remove the case cap of screw (227) and pin (246) .
2. Remove the case cap (101B) .
3. Rotate the bearings tube (108) .
4. Remove the side settled screw (233) .
5. Use special tool to remove the bearings, take the new bearings, use the no air rubber to fastener the settled screw (233) .
6. Assrmbly it, you can reverse in connection.

Take rocker apart in many steps :

1. Turn to start position, remove the case cap of screw (227) and pin (246) .
2. Remove the case cap (101B) .
3. Then remove the rocker of settled screw down (224) .
4. Use the teardown tool, removed the rocker shaft (116) .
5. Remove the thrust bearings AXK1108 (206) (207) , and needle bearings HK3516 (205) .
6. Bearings number: $\varnothing 22$ (135) · $\varnothing 24$ (136) taken apart the rocker is now replaced new product.
7. Assrmbly it, you can reverse in connection.



記號	更改說明	改變者



種類 規格	A402	圖名	組合圖	加工 一般 公差	50以下 ±0.05 50-100 ±0.07 100-200 ±0.10 200-500 ±0.20 500-1000 ±0.25 1000以上 ±0.40	材 質 硬 度 熱處理 表面處理	繪圖 比例	1:6	設計 繪圖 審核 數量	年 月 日 年 月 日 年 月 日 1 件/組	DEX 德士凸輪股份有限公司 致威精機企業有限公司
圖號 檔名		零件 編號					投 影 法				

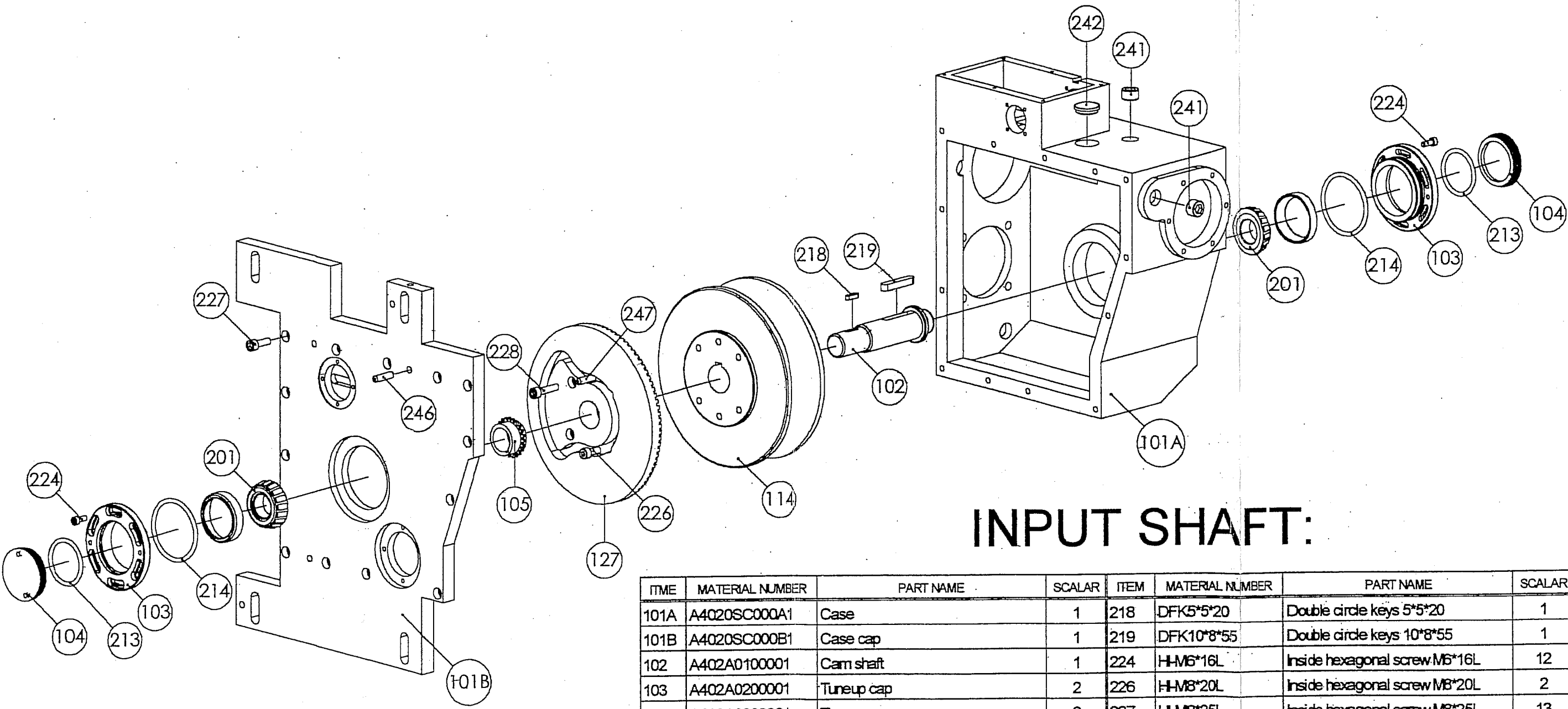
A402 ELEMENT CHECKLIST

ITEM	MATERIAL NUMBER	PART NAME	SCALAR	ITEM	MATERIAL NUMBER	PART NAME	SCALAR	ITEM	MATERIAL NUMBER	PART NAME	SCALAR
101	A4020SC00001	Case	1	134	RB00020000A1	Bearings ϕ 20	6	234	CO-M4*8L	Bury screw M4*8L	1
102	A402A0100001	Cam shaft	1	135	RB00022000A1	Bearings ϕ 22	1	235	CO-M5*8L	Bury screw M5*8L	4
103	A402A0200001	Tuneup cap	2	136	RB00024000A2	Bearings ϕ 24	1	236	SC-M10	Hexagonal screw capM10	1
104	A402A0300001	Tuneup screw cap	2	137				237	SC-M12	Hexagonal screw capM12	1
105	A402A0400001	Cam shaft sprocket	1	138				238	WS-M10	Gasket M10	1
106	A402B0100001	Spline(output) shaft	1	139				239	PF-308	Plastics screw M3*6L	4
107	A402B0200001	Transmitt wheel	1	140				240	PT1/8"	Oil plugger PT 1/8"	1
108	A402B0300001	Bearings tube	1	201	HR30206	Tapered roller bearings 30206	2	241	PT1/2"	Oil plugger PT 1/2"	4
109	A402B0400001	Bearings tube fixture	1	202	HR32008	Tapered roller bearings 32008	2	242	OI-28	Oil eyeglass ϕ 28	1
110	A402B0500001	Bearings tube gasket	1	203	HR32011	Tapered roller bearings 32011	2	243	TC15*24*5	TC type oil seals 15*24*2	1
111	A402B0600001	Front fix cap(20mm)	1	204	BR6202	Deep groove ball bearings 6202	2	244	USH50*60*6	USH type oil seals 50*60*6	1
	A402B0800002	Front fix cap(10mm)		205	HK3516	Needle bearings HK3516	1	245	C12S	Shaft ouch C12	1
112	A402B0900001	Back fix cap	1	206	AXK1108	Thrust bearings AXK1108	2	246	PIN-T-8*32L	Taper pin ϕ 8*32L(1:50)	3
113	A402B1000001	Front fix gasket(10mm)	1	207	AS1108	Thrust bearings parcel AS1108	4	247	PIN-P-8*30L	Parallelism pin ϕ 8*30L	2
114	A402C0100060	Cam(60°)	1	208	AN08	Sun's unt AN08	2	248	CH-95	Chain	1
	A402C0100065	Cam(65°)		209	AN11	Sun's unt AN11	1	249	AG-16	Wire studs(KSS)	1
	A402C0100070	Cam(70°)		210	AW08	Sun's gasket AW08	2	250	TM-10A600V	Terminal frisket	1
	A402C0100075	Cam(75°)		211	AW11	Sun's gasket AW11	1	251	PNP-3	Signal PNP-3 rungs	1
	A402C0100080	Cam(80°)		212	G50	O ring G50	1		PNP-3-M8*P1	Signal PNP-3 rungs(M8*P1)	
	A402C0100085	Cam(85°)		213	O-55*2	O ring ϕ 55*2	2		PNP-4	Signal PNP-4 rungs	
	A402C0100090	Cam(90°)		214	G75	O ring G75	2		NPN-4	Signal NPN-4 rungs	
115	A402D0100001	Rocker	1	215	G80	O ring G80	1	252	MR1/2HP-DC90V-9		
116	A402D0200001	Rocker shaft	1	216	G100	O ring G100	1			Motor 1/2HP-DC90V (1:9)	1
117	A402D0300001	Rocker stand packing cap	1	217	DFK4*4*10	Double circle keys 4*4*10	1		MR1/2HP-DC90V-12		
118	A402E01000A1	Brake signal wheel	1	218	DFK5*5*20	Double circle keys 5*5*20	1			Motor 1/2HP-DC90V (1:12)	
119	A402E01000B1	Cam signal wheel	1	219	DFK10*8*55	Double circle keys 10*8*55	1		MR1/2HP-AC220V-12		
120	A402E0200001	Signal fixture	1	220	HI-M4*8L	Inside hexagonal screw M4*8L	8			Motor 1/2HP-AC220V (1:12)	
121	A402E0300001	Signal shaft	1	221	HI-M4*10L	Inside hexagonal screw M4*10L	8	253			
122	A402E0400001	Dustproof cap	1	222	HI-M5*16L	Inside hexagonal screw M5*16L	2	254			
123	A402E0500001	Signal cap	1	223	HI-M6*14L	Inside hexagonal screw M6*14L	4	255			
124	A402E0600001	Signal cap(have hole)	1	224	HI-M6*16L	Inside hexagonal screw M6*16L	17	256			
125	A402E0700001	Signal sprocket	1	225	HI-M6*25L	Inside hexagonal screw M6*25L	6	257			
126	A402E0800001	Signal try up parcel	1	226	HI-M8*20L	Inside hexagonal screw M8*20L	7	258			
127	A402F0100001	Big umbrella gear	1	227	HI-M8*25L	Inside hexagonal screw M8*25L	13	259			
128	A402F0200001	Small umbrella gear	1	228	HI-M8*35L	Inside hexagonal screw M8*35L	2	260			
129	A402F0300001	Motor fixture	1	229	HI-M10*20L	Inside hexagonal screw M10*20L	4	P.S. (113)A402B1000001and (111)A420B0600002 Front fix gasket match up front fix cap mounting.			
130	A402F0900001	Adjustment sheet	1	230	HI-M10*30L	Inside hexagonal screw M10*30L	4				
131	A402J0100001	Idler shaft	1	231	HS-M5*5L	settled screw M5*5L	1				
132	A402J0200001	Idler sprocket	1	232	HS-M5*10L	settled screw M5*10L	2				
133	A402J0300001	Idler outside cap	1	233	HS-M6*8L	settled screw M6*8L	8				



TE-SHIN CAM CO., LTD.

TYPE	DEX-2	DATE	01/12/99
DRAWER		DWG NO.	A402-01



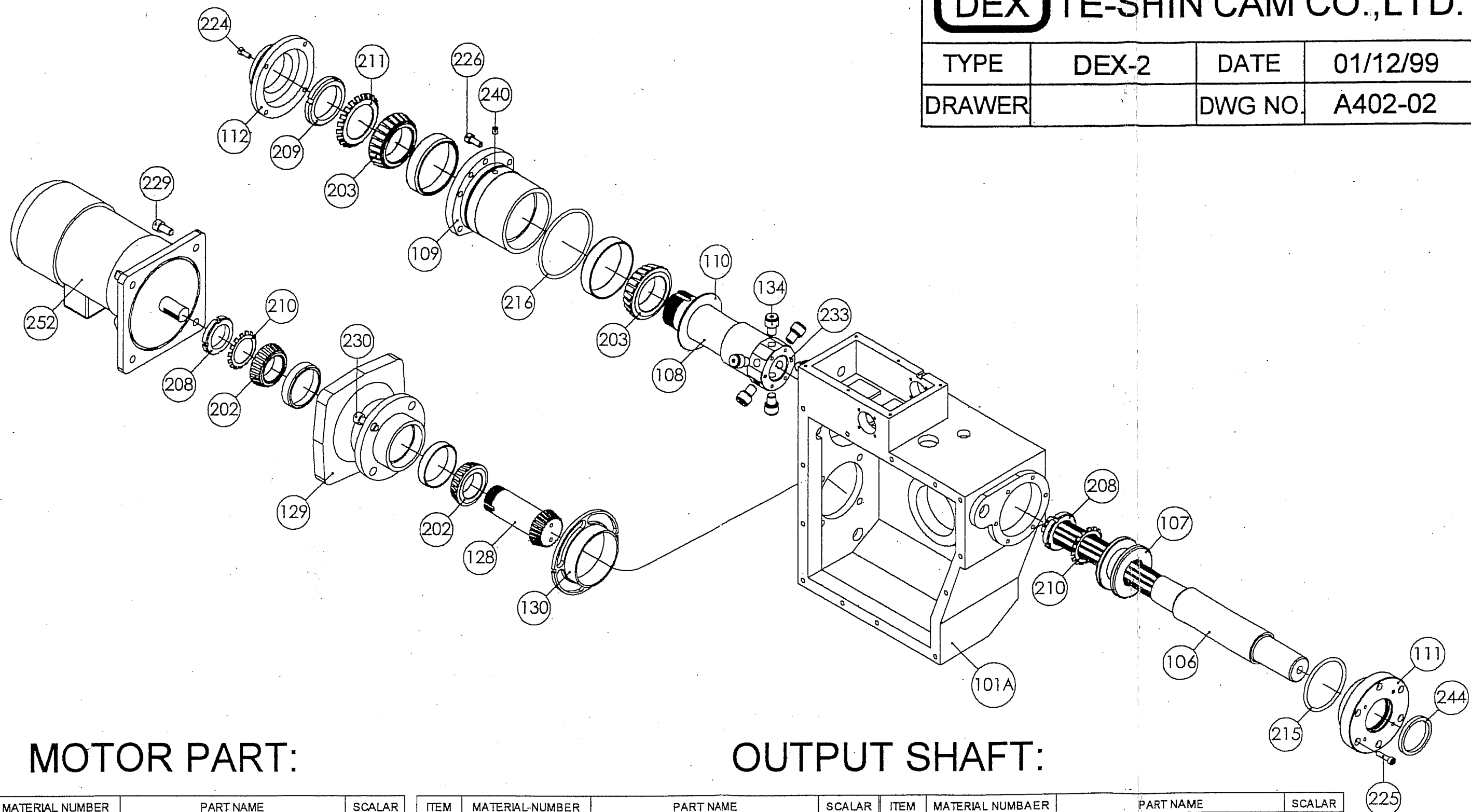
INPUT SHAFT:

ITEM	MATERIAL NUMBER	PART NAME	SCALAR	ITEM	MATERIAL NUMBER	PART NAME	SCALAR
101A	A4020SC000A1	Case	1	218	DFK5*5*20	Double circle keys 5*5*20	1
101B	A4020SC000B1	Case cap	1	219	DFK10*8*55	Double circle keys 10*8*55	1
102	A402A0100001	Cam shaft	1	224	H-M6*16L	Inside hexagonal screw M6*16L	12
103	A402A0200001	Tuneup cap	2	226	H-M8*20L	Inside hexagonal screw M8*20L	2
104	A402A0300001	Tuneup screw cap	2	227	H-M8*25L	Inside hexagonal screw M8*25L	13
105	A402A0400001	Cam shaft sprocket	1	228	H-M8*35L	Inside hexagonal screw M8*35L	2
114	A402C0100001	Cam	1	241	PT1/2"	Oil plugger PT1/2"	4
127	A402F0100001	Big umbrella gear	1	242	O-28	Oil plugger (φ28mm)	1
201	HR30206	Tapered roller bearings 30206	2	246	PIN-T-8*32L	Taper pin φ8*32L(1:50)	3
213	O-55*2	O ring φ55*2	2	247	PIN-P-8*30L	Parallelism pin φ8*30L	2
214	G75	O ring G75	2				

DEX

TE-SHIN CAM CO.,LTD.

TYPE	DEX-2	DATE	01/12/99
DRAWER		DWG NO.	A402-02



MOTOR PART:

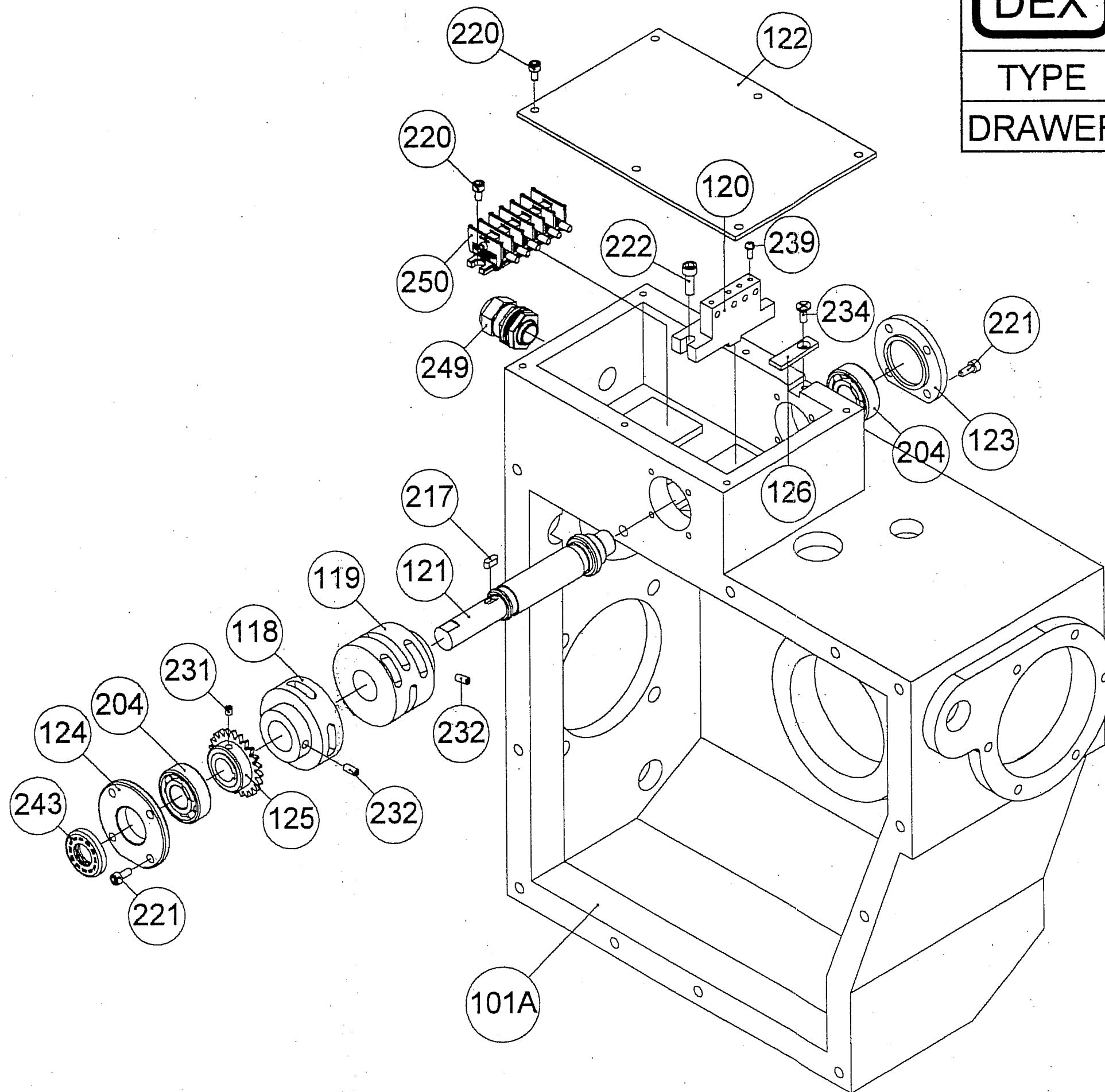
OUTPUT SHAFT:

ITEM	MATERIAL NUMBER	PART NAME	SCALAR
128	A402F0200001	Small umbrella gear	1
129	A402F0300001	Motor fixture	2
130	A402F0900001	Adjustment sheet	1
202	HR32008	Tapered roller bearings 32008	2
208	AN08	Sun's unt AN08	1
210	AW08	Sun's gasket AW08	1
229	HI-M10*20L	Inside hexagonal screw M10*20L	4
230	HI-M10*30L	Inside hexagonal screw M10*30L	4
252	MR1/2HP	Motor 1/2HP	1

ITEM	MATERIAL-NUMBER	PART NAME	SCALAR	ITEM	MATERIAL NUMBAER	PART NAME	SCALAR
101A	A4020SC000A1	Case	1	209	AN11	Sun's unt AN11	1
106	A402B0100001	Spline(output) shaft	1	210	AW08	Sun's gasket AW08	1
107	A402B0200001	Transmitt wheel	1	211	AW11	Sun's gasket AW11	1
108	A402B0300001	Bearings tube	1	215	G80	O ring G80	1
109	A402B0400001	Bearings tube fixture	1	216	G100	O ring G100	1
110	A402B0500001	Bearings tube gasket	1	224	HI-M6*16L	Inside hexagonal screw M6*16L	4
111	A402B0600001	Front fix cap	1	225	HI-M6*25L	Inside hexagonal screw M6*25L	6
112	A402B0900001	Back fix cap	1	226	HI-M8*20L	Inside hexagonal screw M8*20L	5
134	RB00020000A1	Bearings ϕ 20	6	233	HS-M6*8L	settled screw M6*8L	6
203	HR32011	Tapered roller bearings 32011	2	240	PT1/8"	Oil plugger PT1/8"	1
208	AN08	Sun's unt AN08	1	244	USH50*60*6	USH type oil seals50*60*6	1

DEX TE-SHIN CAM CO.,LTD.

TYPE	DEX-2	DATE	01/12/99
DRAWER		DWG NO.	A402-04

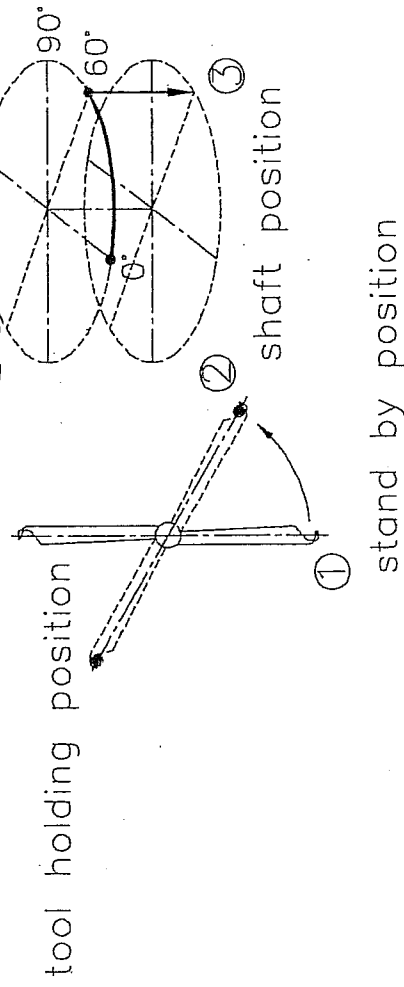


SIGNAL PART:

ITEM	MATERIAL NUMBER	PART NAME	SCALAR
101A	A4020SC000A1	Case	1
118	A402E01000A1	Brake signal wheel	1
119	A402E01000B1	Cam signal wheel	1
120	A402E0200001	Signal fixture	1
121	A402E0300001	Signal shaft	1
122	A402E0400001	Dustproof cap	1
123	A402E0500001	Signal cap	1
124	A402E0500001	Signal cap(have hole)	1
125	A402E0700001	Signal sprocket	1
126	A402E0300001	Signal try up parcel	1
204	BR6202	Deep groove ball bearings 6202	4
217	DFK4*4*10	Double circle keys 4*4*10	4
220	H-M4*8L	Inside hexagonal screw M4*8L	8
221	H-M4*10L	Inside hexagonal screw M4*10L	8
222	H-M5*16L	Inside hexagonal screw M5*16L	2
231	HS-M5*5L	Settled screw M5*5L	1
232	HS-M5*10L	Settled screw M5*10L	2
239	PF-308	Plastics screw M3*8L(KSS)	4
243	TC15*24*5	TC type oil seals 15*24*5	1
249	AG-16	Wire studs (KSS)	1
250	TM-10A600V	Terminal frisket	1

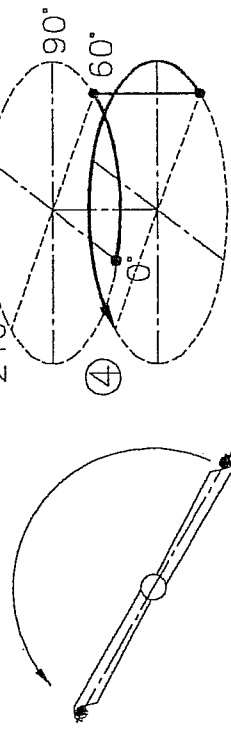
— ATC Drawing of edged tool change —

(1)



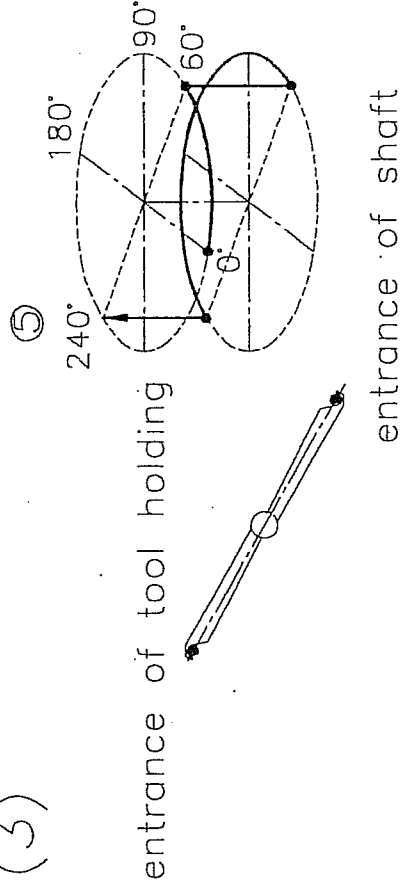
1. Turning 60° after shaft in position
2. Pull edged tool downwards.

(2)



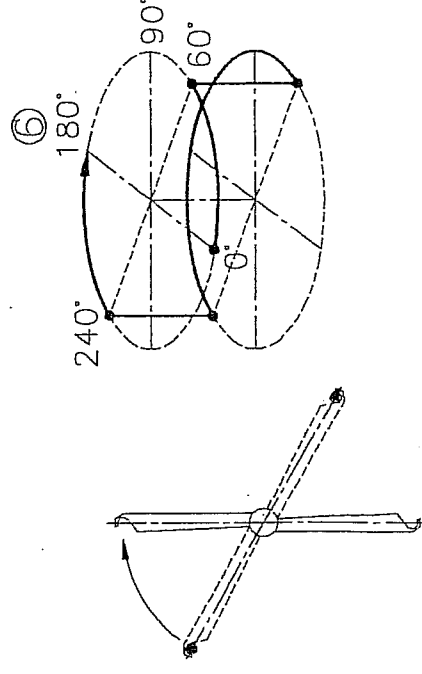
3. Change edged tool by turning 180°

(3)



4. Pull edged tool upwards.

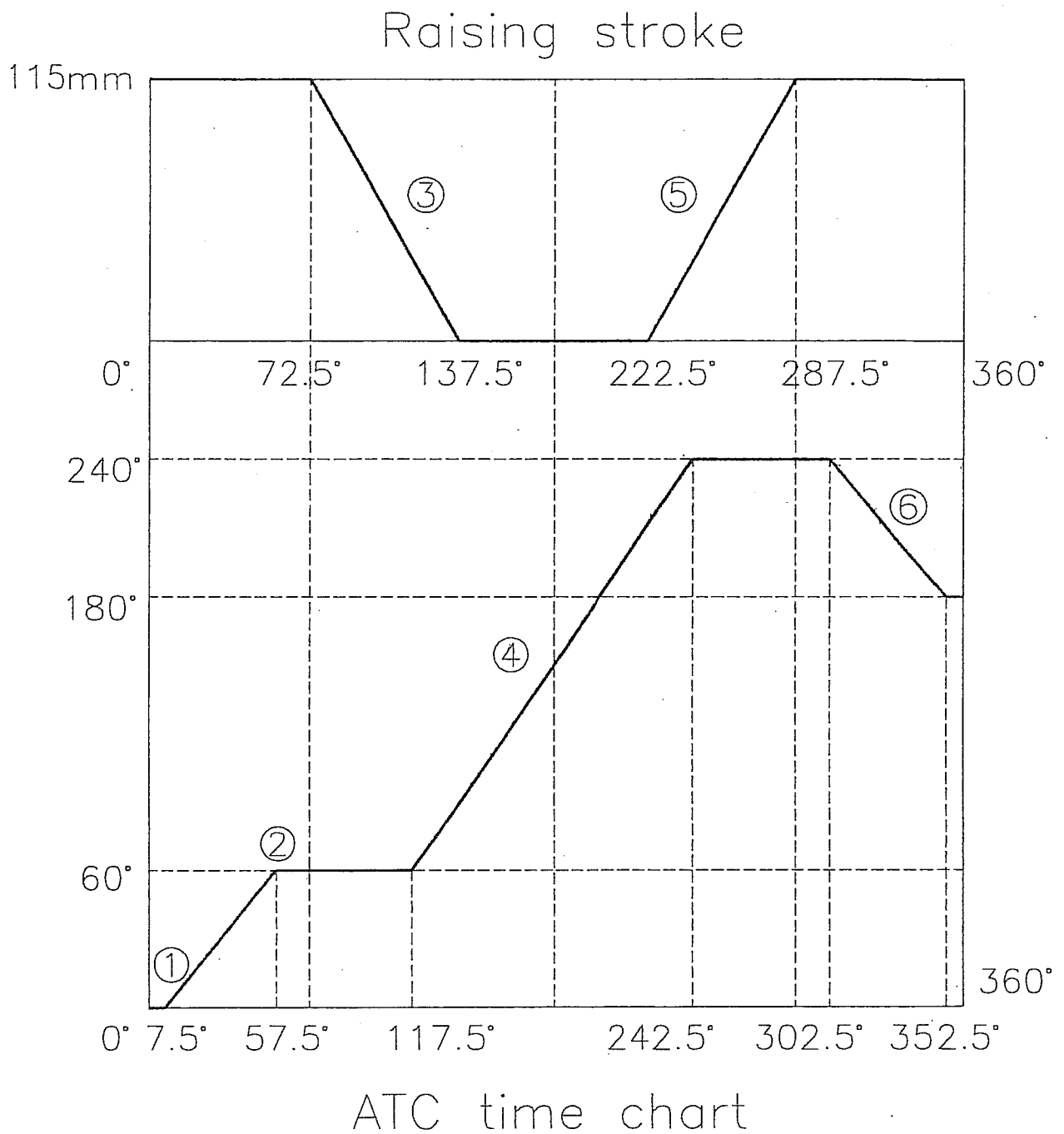
(4)



5. Finishing tool change by turning 60° inversely.

DEX-2

Stroke angle corresponding drawing



*raising stroke

*original position
confirmation

*holding knife angle
knife angle confirmation

```
*for brake
```

Power output direction

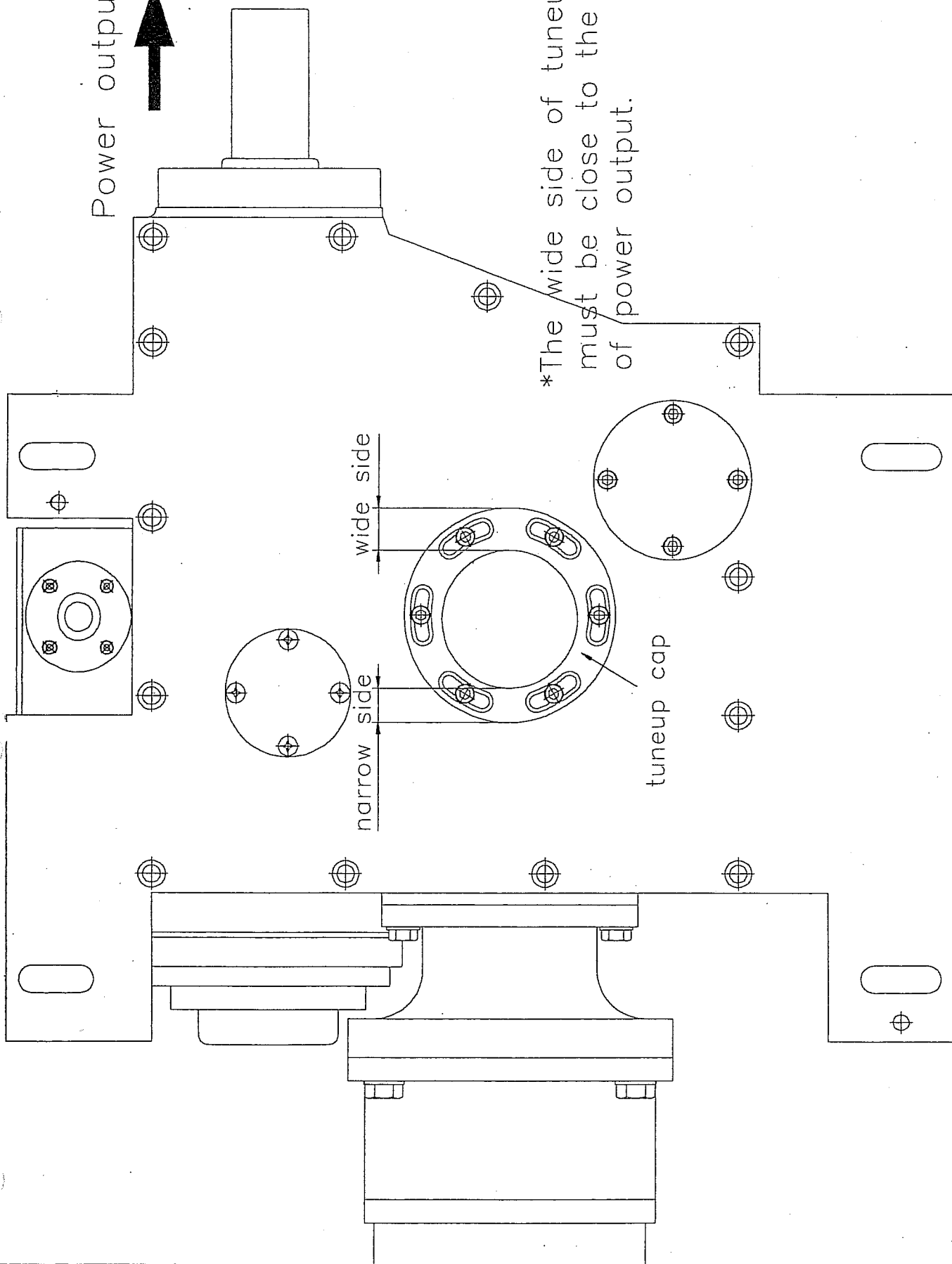


wide side

narrow side

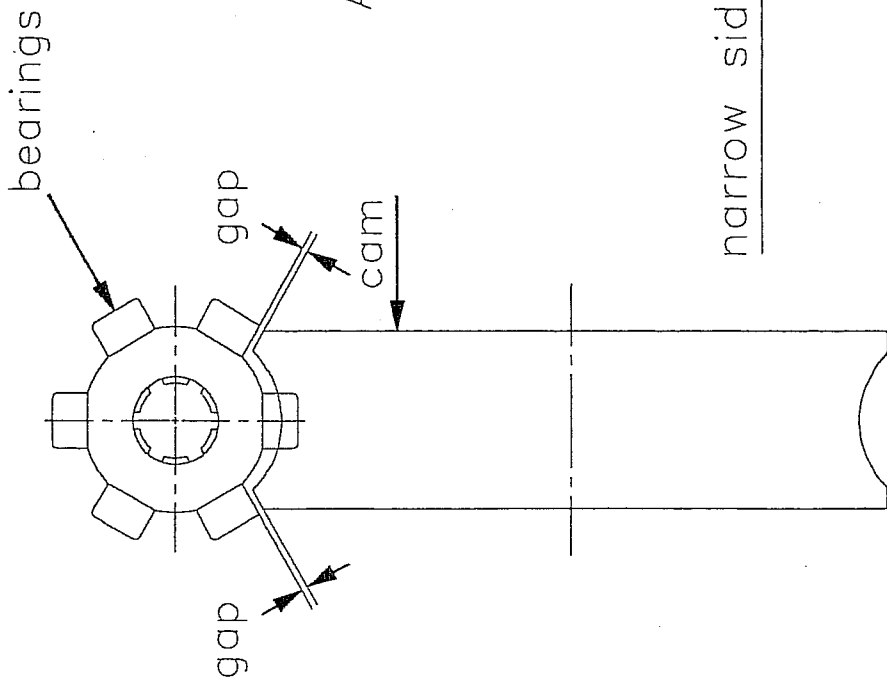
*The wide side of tuneup cap must be close to the direction of power output.

tuneup cap

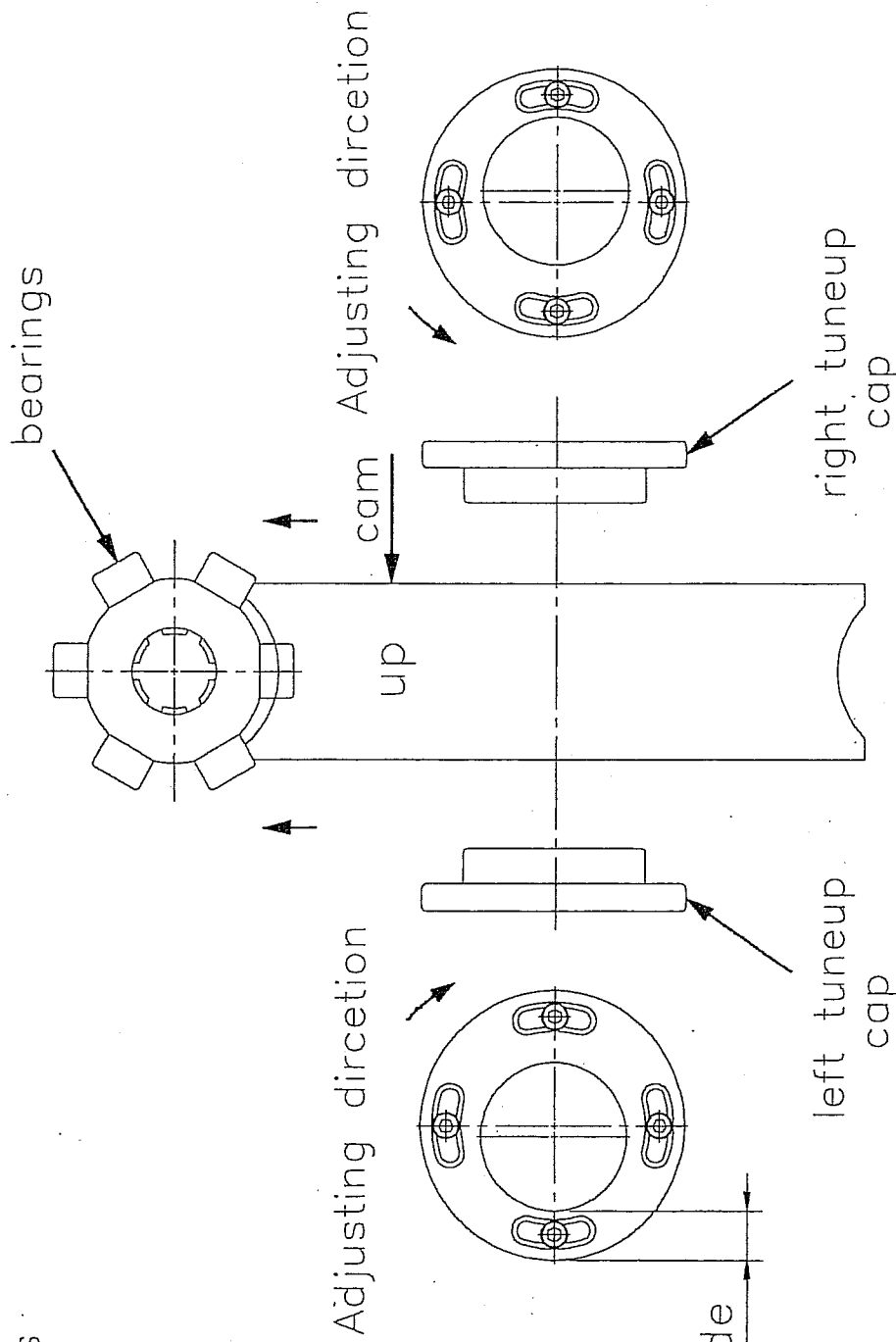


Adjustment of cam and bearings

&Before adjustment



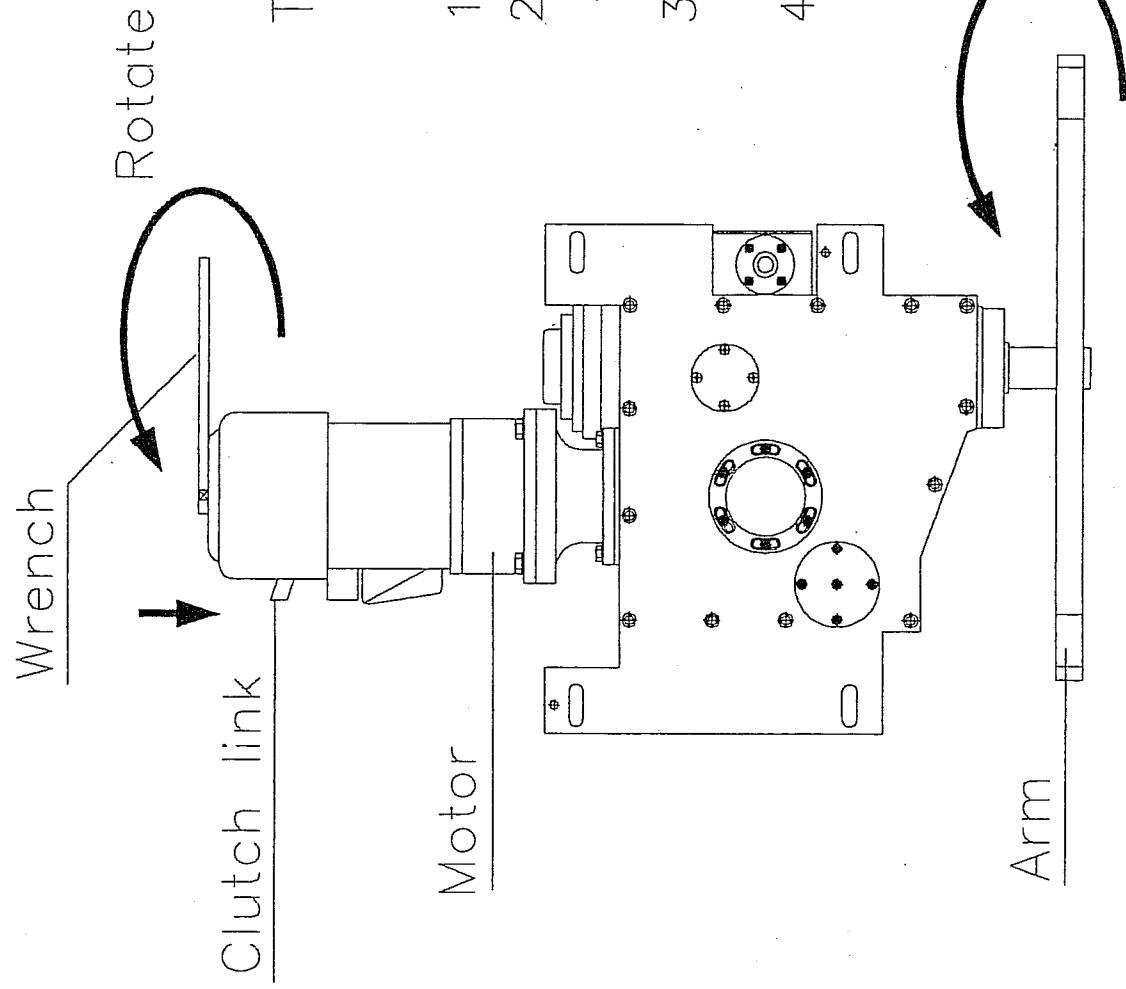
&After adjustment



Adjustment steps:

- 1.Loosen the screws of cap.
- 2.Adjusting cap to make cam contact with bearings normally.
(According to the figure above, the cam will move upwards)
- 3.Adjusting nut to make cam move left or right.

Adjustment of Arm



The steps of arm adjustment

1. Push down clutch link.
2. Rotate motor by using the wrench and turn the arm to the angle of setting up edged tool.
3. Adjusting the arm to hold the edged tool.
4. Tighten up the setup screws.

ATC Gear oil specification

NAME	SPECIFICATION (ISO VG)
SHEEL	Omala EP 150~220
TOTAL	Garter EP 150~220
MOBIL	Mobilgear 150~220
ESSO	Spartan EP 150~220
CASTROL	ALPHA SP(EP) 150~220

1. Supplying oil:

In this machine element inside, supplying clean lubricating oil is necessary. don't use recycle oil please.

2. Running intervals:

The guideline of oil intervals is 2400 hours, of operation. replacement nrul oil please.

3. Maintenance and inspection:

A. The daily inspction before rumming. oil amonnt check is necessary. directly apply oil if capacity is proot.

B. The viscosity of lubricating oil should be suitable.

C. It must be correct for motor wiring.