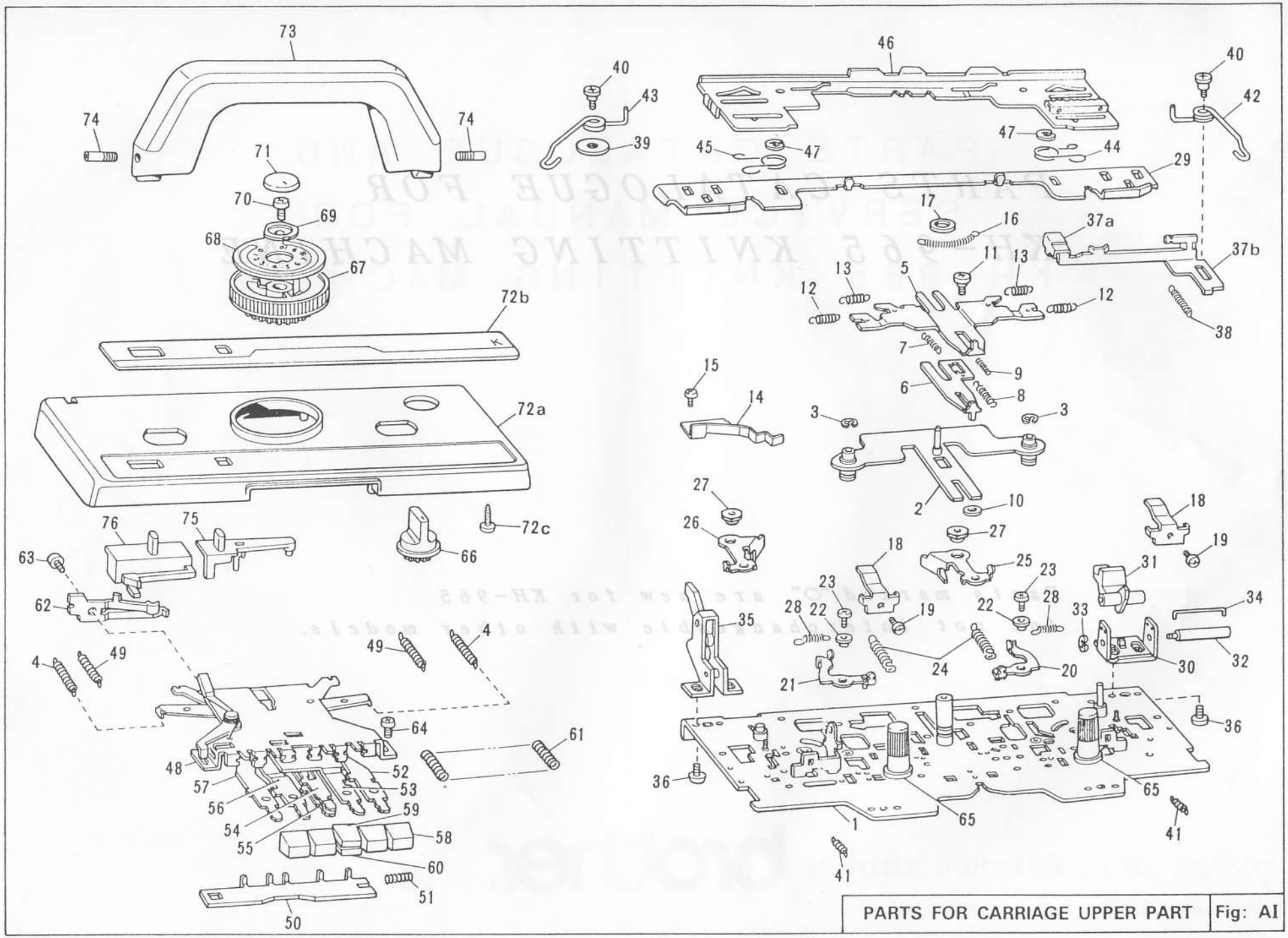
PARTS CATALOGUE AND SERVICE MANUAL FOR KH-965 KNITTING MACHINE

brother®

PARTS CATALOGUE FOR KH-965 KNITTING MACHINE

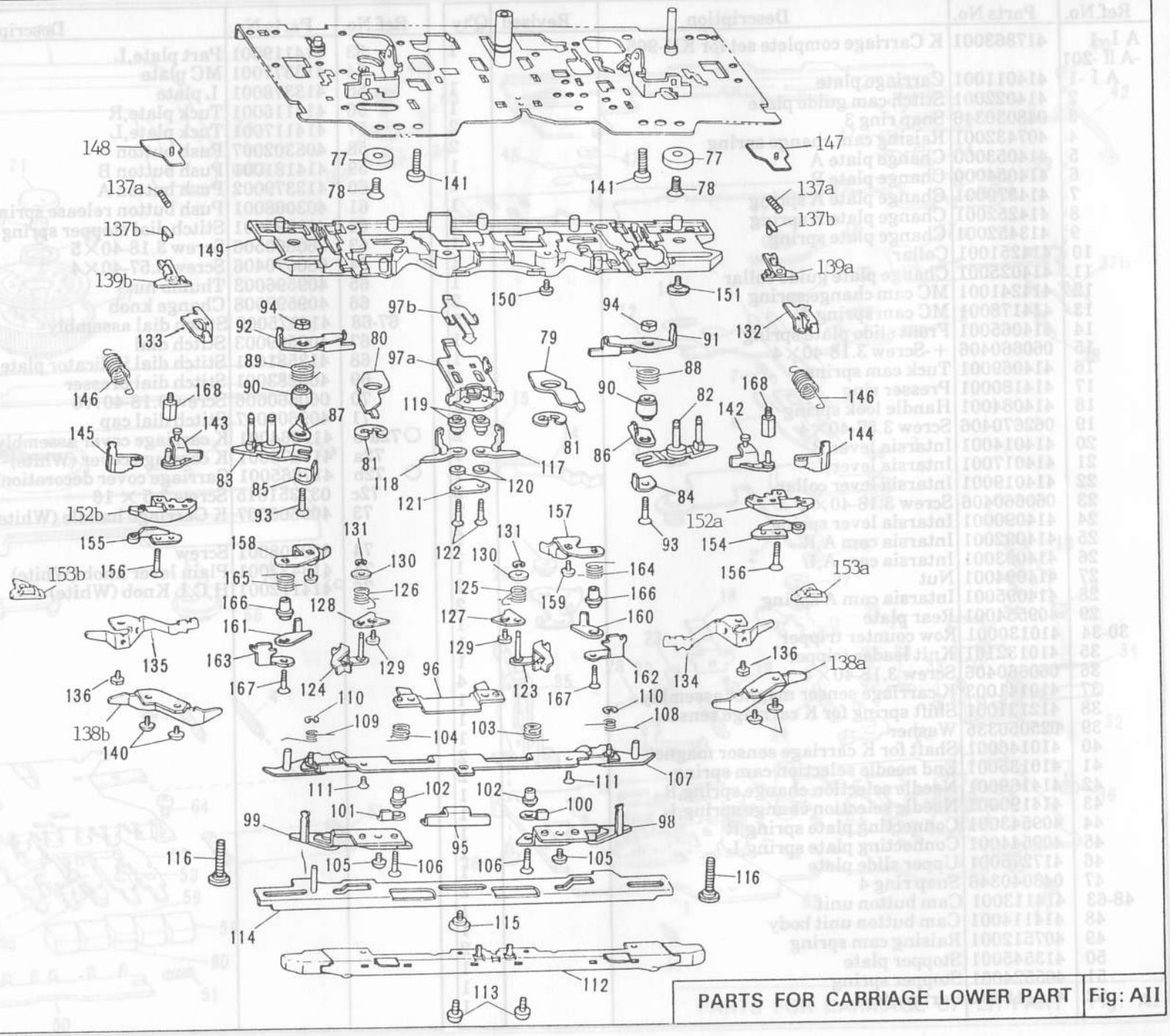
Parts marked "O" are new for KH-965
And not interchangeable with other models.



PARTS FOR CARRIAGE UPPER PART | Fig: AI

PARTS FOR CARRIAGE UPPER PART

Ref.No.	Parts No.	Description	Revised	Q'ty
A I -1 -A II -201	417863001	K Carriage complete set for KH-965		1
A I -1	414011001	Carriage plate		1
2	414022001	Stitch cam guide plate		1
3	048030346	Snap ring 3		2
4	407432001	Raising cam change spring		2
5	414053000	Change plate A		1
6	414054000	Change plate B		1
7	414370001	Change plate A spring		1
8	414252001	Change plate B spring		1
9	413452001	Change plate spring		1
10	414251001	Collar		1
11	414025001	Change plate guide collar		1
12	414241001	MC cam change spring		2
13	414178001	MC cam spring A		2
14	414065001	Front slide plate spring		1
15	060660406	+-Screw 3.18-40×4		1
16	414069001	Tuck cam spring		1
17	414180001	Presser ring		1
18	414084001	Handle look spring		2
19	062670406	Screw 3.57-40×4		2
20	414014001	Intarsia lever,R		1
21	414017001	Intarsia lever,L		1
22	414019001	Intarsia lever collar		2
23	060660406	Screw 3.18-40×4		2
24	414090001	Intarsia lever spring		2
25	414092001	Intarsia cam A,R		1
26	414093001	Intarsia cam A,L		1
27	414094001	Nut		2
28	414095001	Intarsia cam A spring		2
29	409554001	Rear plate		1
30-34	410130001	Row counter tripper		1
35	410132101	Knit leader tripper		1
36	060660406	Screw 3.18-40×4		4
37	410141003	K carriage sensor magnet assembly		1
38	412131001	Shift spring for K carriage sensor		1
39	025050335	Washer		1
40	410146001	Shaft for K carriage sensor magnet		2
41	410135001	End needle selection cam spring		2
42	414189001	Needle selection change spring,R		1
43	414190001	Needle selection change spring,L		1
44	409543001	Connecting plate spring,R		1
45	409544001	Connecting plate spring,L		1
46	417275001	Upper slide plate		1
47	048040346	Snap ring 4		2
48-63	414113001	Cam button unit		1
48	414114001	Cam button unit body		1
49	407512001	Raising cam spring		2
50	413545001	Stopper plate		1
51	405524001	Stopper spring		1
52	414118001	Part plate,R		1
53	414119001	Part plate,L		1
54	413377001	MC plate		1
55	413378001	L plate		1
56	414116001	Tuck plate,R		1
57	414117001	Tuck plate,L		1
58	405302007	Push button		4
59	414181001	Push button B		1
60	413379002	Push button A		1
61	403008001	Push button release spring		4
62	409595001	Stitch dial stopper spring		1
63	060660506	Screw 3.18-40×5		1
64	060670406	Screw 3.57-40×4		2
65	409596003	Thumb nut		2
66	409597008	Change knob		1
67-68	414175009	Stitch dial assembly		1
67	409599003	Stitch dial		1
68	413581011	Stitch dial indicator plate		1
69	406283001	Stitch dial presser		1
70	060660606	Screw 3.18-40×6		1
71	409601007	Stitch dial cap		1
○72a-b	417864001	K carriage cover assembly KH965		1
72a	417278001	K carriage cover (White)		1
○ 72b	417865001	Carriage cover decoration plate KH965		1
72c	037351615	Screw 3.5 × 16		2
73	409605007	K Carriage handle (White)		1
				2
74	409608001	Screw		1
75	413437001	Plain lever knob (White)		1
76	414112001	H.C.L Knob (White)		

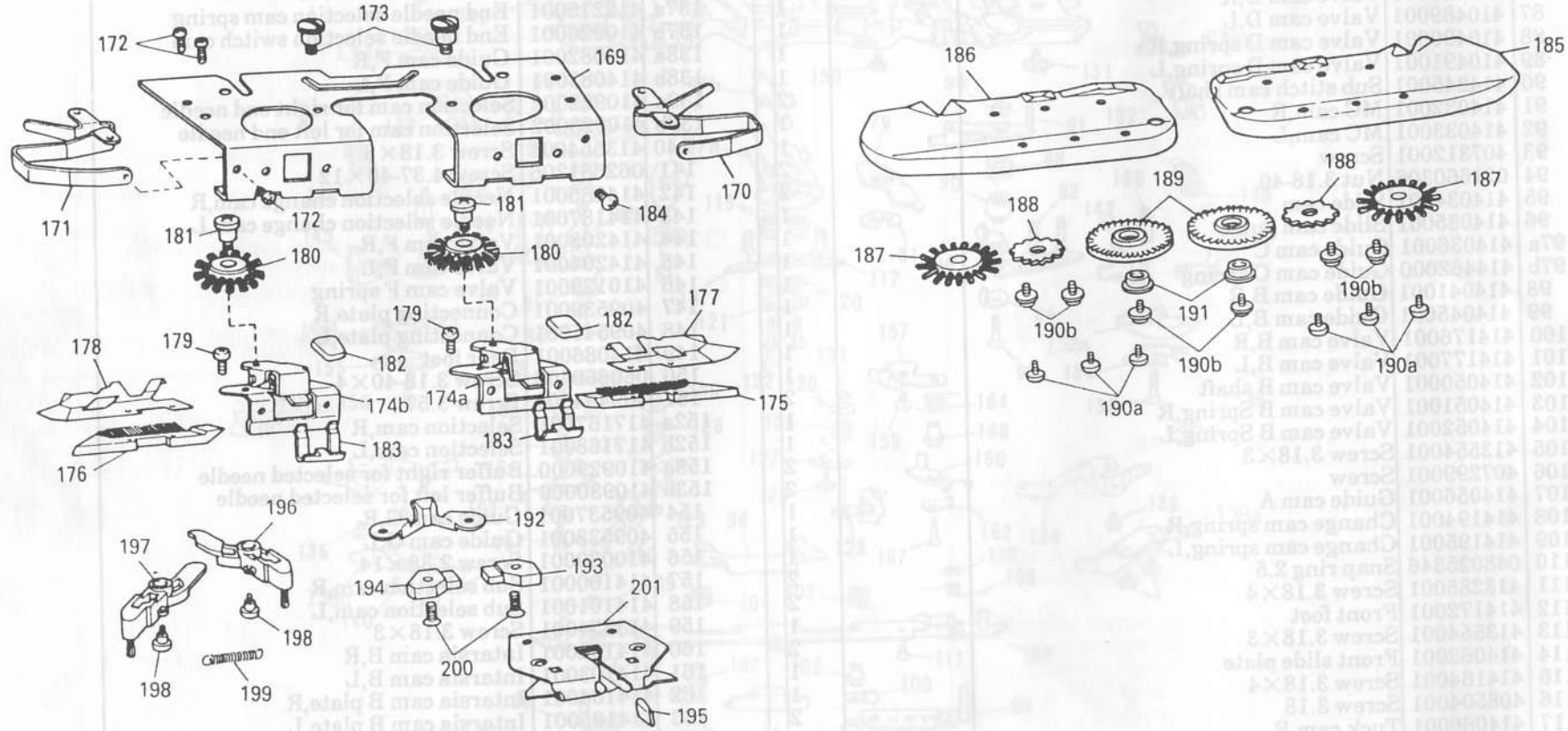


PARTS FOR CARRIAGE LOWER PART | Fig: AII

PARTS FOR CARRIAGE LOWER PART

Ref.No.	Parts No.	Description	Revised	Q'ty
AⅡ-77	407285000	Carriage magnet 16 × 18		2
78	408773006	Flat head screw 3.18-40×9		2
79	414242001	Raising cam guide,R		1
80	414243001	Raising cam guide,L		1
81	048070346	Snap ring 7		2
82	414026001	Stitch cam assembly,R		1
83	414030001	Stitch cam assembly,L		1
84	407296001	Sub stitch cam,R		1
85	407297001	Sub stitch cam,L		1
86	410488001	Valve cam D,R		1
87	410489001	Valve cam D,L		1
88	410490001	Valve cam D spring,R		1
89	410491001	Valve cam D spring,L		1
90	414245001	Sub stitch cam shaft		2
91	414032001	MC cam,R		1
92	414033001	MC cam,L		1
93	407312001	Screw		2
94	021660306	Nut 3.18-40		2
95	414034001	Slide cam		1
96	414035001	Slide cam guide		1
97a	414036001	Guide cam C		1
97b	414462000	Guide cam C spring		1
98	414041001	Guide cam B,R		1
99	414045001	Guide cam B,L		1
100	414176001	Valve cam B,R		1
101	414177001	Valve cam B,L		1
102	414050001	Valve cam B shaft		2
103	414051001	Valve cam B Spring,R		1
104	414052001	Valve cam B Spring,L		1
105	413554001	Screw 3.18×3		2
106	407299001	Screw		2
107	414056001	Guide cam A		1
108	414194001	Change cam spring,R		1
109	414195001	Change cam spring,L		1
110	048025346	Snap ring 2.5		2
111	413285001	Screw 3.18×4		2
112	414172001	Front foot		1
113	413554001	Screw 3.18×3		2
114	414062001	Front slide plate		1
115	414184001	Screw 3.18×4		1
116	408504001	Screw 3.18		2
117	414066001	Tuck cam,R		1
118	414067001	Tuck cam,L		1
119	414068001	Tuck cam shaft		2
120	414179001	Washer		2
121	407340001	Tuck cam plate		1
122	407299001	Screw		2
123	414070001	Valve cam G,R		1
124	414073001	Valve cam G,L		1
125	414075001	Valve cam G spring,R		1
126	414076001	Valve cam G spring,L		1

Ref.No.	Parts No.	Description	Revised	Q'ty
127,128	414077001	Cam plate		1
129	414049001	Screw		2
130	025350233	Washer		2
131	048020346	Snap ring 2		2
132	410924101	Selection cam for right end needle		1
133	410925101	Selection cam for left end needle		1
134	414487001	Separation cam,R		1
135	414488001	Separation cam,L		1
136	060660406	+-Screw 3.18-40×4		2
137a	412215001	End needle selection cam spring		2
137b	410926001	End needle selection switch cam		2
138a	414082001	Guide cam F,R		1
138b	414083001	Guide cam F,L		1
139a	410922002	Selection cam for right end needle		1
139b	410923002	Selection cam for left end needle		1
140	413554001	Screw 3.18×3		4
141	062681206	Screw 4.37-40×12		2
142	414185001	Needle selection change cam,R		1
143	414187001	Needle selection change cam,L		1
144	414203001	Valve cam F,R		1
145	414204001	Valve cam F,L		1
146	410129001	Valve cam F spring		2
147	409539001	Connecting plate,R		1
148	409541001	Connecting plate,L		1
149	414086001	Rear foot		1
150	060660406	Screw 3.18-40×4		4
151	409494001	Screw 3.57		2
152a	417167001	Selection cam,R		1
152b	417168001	Selection cam,L		1
153a	410929000	Buffer right for selected needle		1
153b	410930000	Buffer left for selected needle		1
154	409537001	Guide cam G,R		1
155	409538001	Guide cam G,L		1
156	410030001	Screw 2.38×14		2
157	414100001	Sub selection cam,R		1
158	414101001	Sub selection cam,L		1
159	413554001	Screw 3.18×3		2
160	414102001	Intarsia cam B,R		1
161	414103001	Intarsia cam B,L		1
162	414104001	Intarsia cam B plate,R		1
163	414105001	Intarsia cam B plate,L		1
164	414106001	Intarsia cam B spring,R		1
165	414107001	Intarsia cam B spring,L		1
166	414108001	Intarsia cam B shaft		2
167	407299001	Screw		2
168	414091001	Selection change cam shaft		2

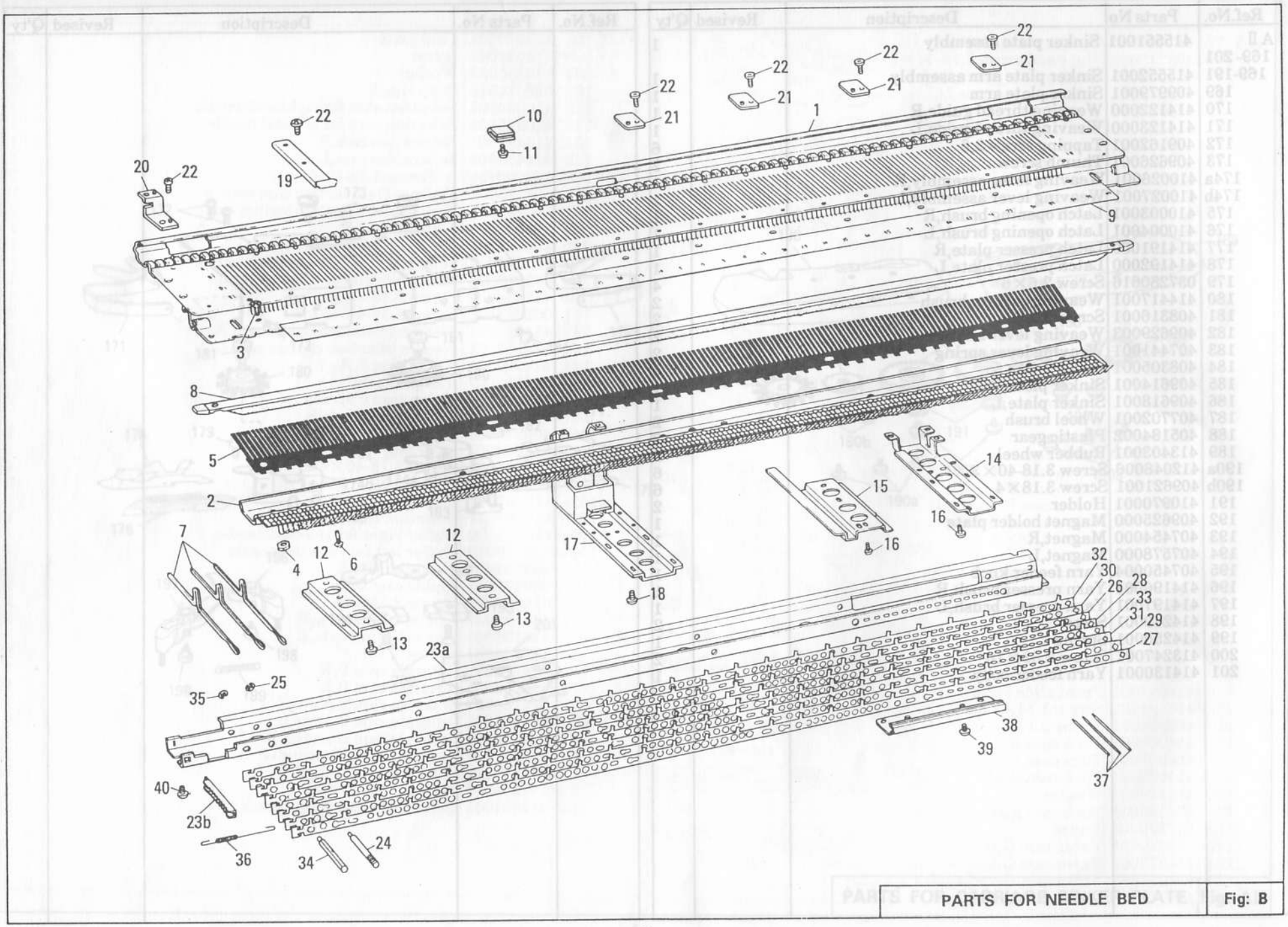


PARTS FOR CARRIAGE SINKER PLATE | Fig: AII

PARTS FOR CARRIAGE SINKER PLATE

Ref.No.	Parts No	Description	Revised	Q'ty
A Ⅱ	415551001	Sinker plate assembly		1
169-201				
169-191	415552001	Sinker plate arm assembly		1
169	409979001	Sinker plate arm		1
170	414122000	Weaving thread guide,R		1
171	414123000	Weaving thread guide,L		1
172	409162001	Tapping screw 2.6		6
173	409626001	Thumb screw		2
174a	410026001	Weaving lever assembly,R		1
174b	410027001	Weaving lever assembly,L		1
175	410003001	Latch opening brush,R		1
176	410004001	Latch opening brush,L		1
177	414191000	Latch presser plate,R		1
178	414192000	Latch presser plate,L		1
179	037280616	Screw 2.6×6		4
180	414417001	Weaving pattern brush		2
181	408316001	Screw 3.18		2
182	409629003	Weaving lever knob		2
183	407441001	Weaving lever spring		2
184	408305001	Screw 3.18×5		4
185	409614001	Sinker plate,R		1
186	409618001	Sinker plate,L		1
187	407702001	Wheel brush		2
188	405184002	Plastic gear		2
189	413403001	Rubber wheel		2
190a	412048006	Screw 3.18-40×3		6
190b	409621001	Screw 3.18×4		6
191	410970001	Holder		2
192	409625000	Magnet holder plate		1
193	407454000	Magnet,R		1
194	407578000	Magnet,L		1
195	407450004	Yarn feeder knob		1
196	414196001	Yarn presser brush,R		1
197	414197001	Yarn presser brush,L		1
198	414249001	Screw		2
199	414250001	Spring		1
200	413247001	Screw 2.38×10		2
201	414130001	Yarn feeder body		1

Ref.No.	Parts No.	Description	Revised	Q'ty

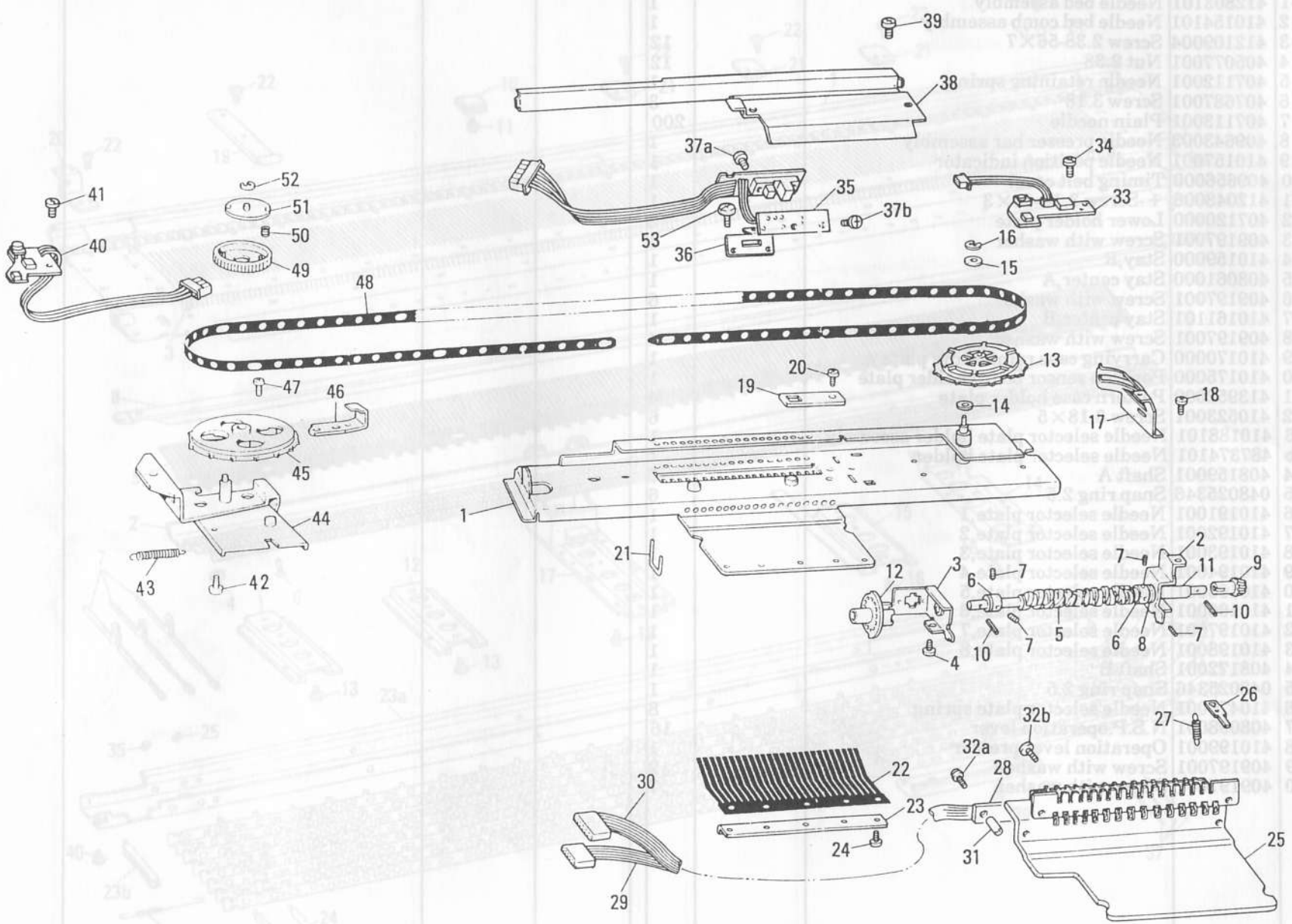


PARTS FOR NEEDLE BED | Fig: B

PARTS FOR NEEDLE BED

Ref.No.	Parts No	Description	Revised	Q'ty
B-1	412803101	Needle bed assembly		1
2	410154101	Needle bed comb assembly		1
3	412109004	Screw 2.38-56×7		12
4	405077001	Nut 2.38		12
5	407112001	Needle retaining spring		1
6	407687001	Screw 3.18		3
7	407113001	Plain needle		200
8	409643003	Needle presser bar assembly		1
9	410157001	Needle position indicator		1
10	409656000	Timing belt cover		1
11	412048006	+-Screw 3.18-40×3		1
12	407120000	Lower holder plate		2
13	409197001	Screw with washer		4
14	410159000	Stay,R		1
15	408061000	Stay center,A		1
16	409197001	Screw with washer		6
17	410161101	Stay center,B		1
18	409197001	Screw with washer		4
19	410170000	Carrying case reinforcing plate		1
20	410175000	Position sensor board holder plate		1
21	413952000	Pattern case holder plate		4
22	410523001	Screw 3.18×5		6
23-36	410188101	Needle selector plate holder assembly		1
23a-b	487374101	Needle selector plate holder		1
24	408159001	Shaft A		6
25	048025346	Snap ring 2.5		6
26	410191001	Needle selector plate,1		1
27	410192001	Needle selector plate,2		1
28	410193001	Needle selector plate,3		1
29	410194001	Needle selector plate,4		1
30	410195001	Needle selector plate,5		1
31	410196001	Needle selector plate,6		1
32	410197001	Needle selector plate,7		1
33	410198001	Needle selector plate,8		1
34	408172001	Shaft B		1
35	048025346	Snap ring 2.5		1
36	410476001	Needle selector plate spring		8
37	408098001	N.S.P.operation lever		16
38	410199001	Operation lever presser		1
39	409197001	Screw with washer		2
40	409197001	Screw with washer		7

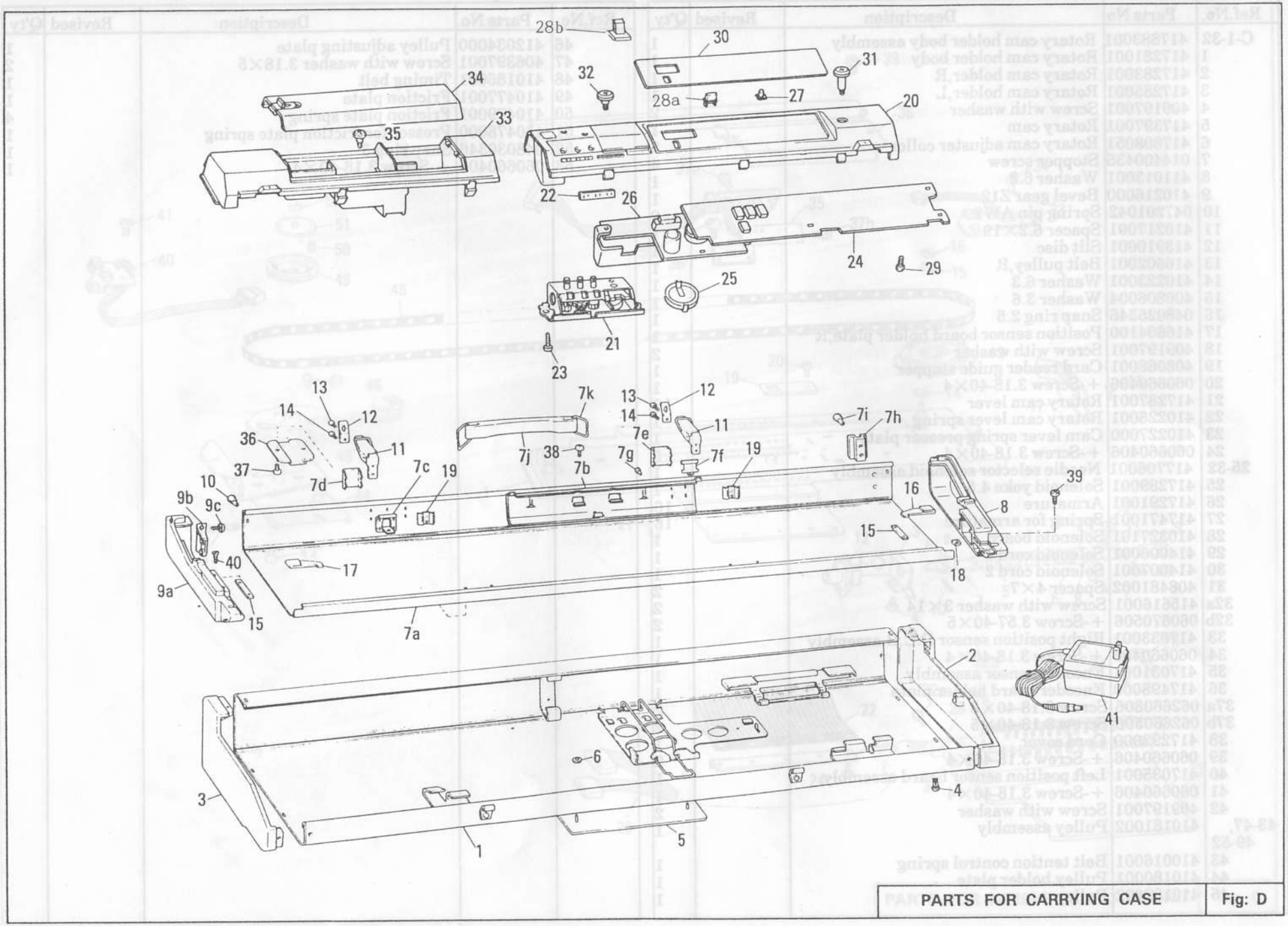
Ref.No.	Parts No.	Description	Revised	Q'ty



PARTS FOR NEEDLE SELECTOR UNIT | Fig: C

PARTS FOR NEEDLE SELECTOR UNIT

Ref.No.	Parts No	Description	Revised	Q'ty
C-1-32	417883001	Rotary cam holder body assembly		1
1	417281001	Rotary cam holder body		1
2	417283001	Rotary cam holder,R		1
3	417285001	Rotary cam holder,L		1
4	409197001	Screw with washer		2
5	417397001	Rotary cam		1
6	417808051	Rotary cam adjuster collor		2
7	014400435	Stopper screw		4
8	411013001	Washer 6.3		1
9	410216000	Bevel gear Z12		1
10	047201042	Spring pin AW2		2
11	410217001	Spacer 6.2×19		1
12	413910001	Slit disc		1
13	416602001	Belt pulley,R		1
14	410223001	Washer 6.3		1
15	400806004	Washer 3.6		1
16	048025346	Snap ring 2.5		1
17	416604100	Position sensor board holder plate,R		1
18	409197001	Screw with washer		2
19	408068001	Card reader guide stopper		1
20	060660406	+-Screw 3.18-40×4		1
21	417287001	Rotary cam lever		16
22	410226001	Rotary cam lever spring		1
23	410227000	Cam lever spring presser plate		1
24	060660406	+-Screw 3.18-40×4		5
25-32	417706001	Needle selector solenoid assembly		1
25	417289001	Solenoid yoke 4.5		1
26	417291001	Armature		16
27	417471001	Spring for armature		16
28	410327101	Solenoid board		1
29	414006001	Solenoid cord 1		1
30	414007001	Solenoid cord 2		1
31	408481002	Spacer 4×7		2
32a	415616001	Screw with washer 3×14		2
32b	060670506	+-Screw 3.57-40×5		2
33	417033001	Right position sensor P.C.B.assembly		1
34	060660406	+-Screw 3.18-40×4		1
35	417031001	Encoder sensor assembly		1
36	417498000	Encoder board holder plate		1
37a	062660806	Screw 3.18-40×8		2
37b	062660506	Screw 3.18-40×5		2
38	417292000	Cord cover		1
39	060660406	+-Screw 3.18-40×4		2
40	417035001	Left position sensor board assembly		1
41	060660406	+-Screw 3.18-40×4		1
42	409197001	Screw with washer		2
43-47, 49-52	410181002	Pulley assembly		1
43	410016001	Belt tention control spring		1
44	410180001	Pulley holder plate		1
45	410182002	Pulley		1
46	412034000	Pulley adjusting plate		1
47	406397001	Screw with washer 3.18×5		2
48	410186001	Timing belt		1
49	410477001	Friction plate		1
50	410479001	Friction plate spring		4
51	410478000	Presser for friction plate spring		1
52	048030346	Snap ring 3		1
53	060660406	+-Screw 3.18-40×4		1

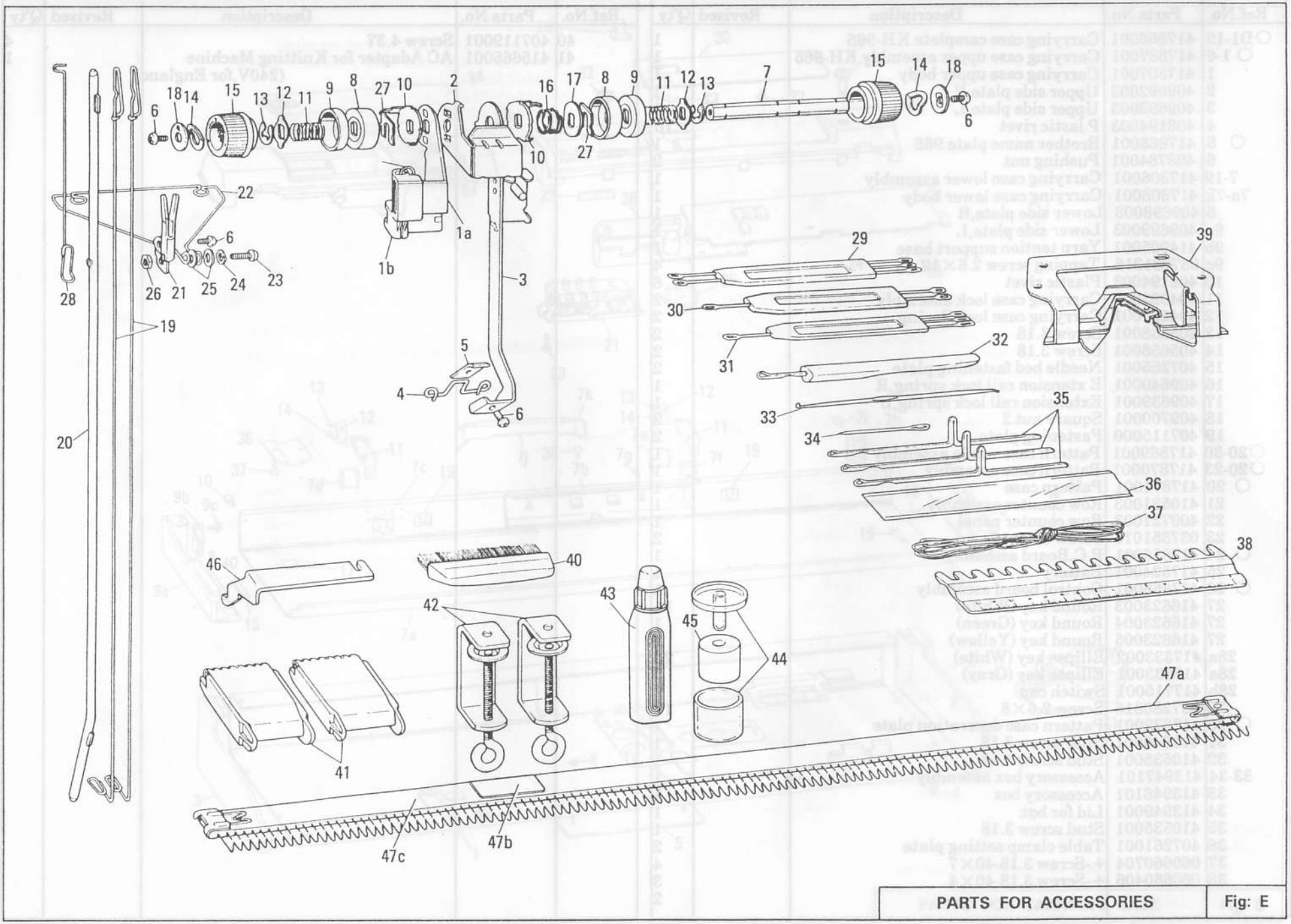


PARTS FOR CARRYING CASE | Fig: D

PARTS FOR CARRYING CASE

Ref.No.	Parts No.	Description	Revised	Q'ty
○D1-19	417866001	Carrying case complete KH-965		1
○ 1-6	417867001	Carrying case upper assembly KH-965		1
1	417307001	Carrying case upper body		1
2	409692003	Upper side plate,R		1
3	409693003	Upper side plate,L		1
4	408194003	P lastic rivet		10
○ 5	417868001	Brother name plate 965		1
6	408784001	Pushing nut		2
7-19	417306001	Carrying case lower assembly		1
7a-7k	417308001	Carrying case lower body		1
8	409698003	Lower side plate,R		1
9a	409699003	Lower side plate,L		1
9b	414005001	Yarn tention support base		1
9c	037281216	Tapping screw 2.6×12		4
10	408194003	Plastic rivet		6
11	404022002	Carrying case lock assembly		2
12	404027001	Carrying case lock Spring		2
13	405658001	Screw 3.18		2
14	405658001	Screw 3.18		2
15	407265001	Needle bed fastening plate		2
16	409640001	E xtension rail lock spring,R		1
17	409639001	Extension rail lock spring,L		1
18	409700001	Square nut 2		2
19	407115000	Fastening plate		2
○20-30	417869001	Pattern case whole assembly		1
○20-23	417870001	Pattern case assembly		1
○ 20	417871001	Pattern case		1
21	410531003	Row counter assembly		1
22	409721003	Row counter panel		1
23	037351016	Screw 3.5×10		2
○ 24	417856001	P.C.Board assembly		1
25	417524001	Battery		1
○ 26	417858001	Control board assembly		1
27	416623003	Round key (White)		14
27	416623004	Round key (Green)		1
27	416623005	Round key (Yellow)		1
28a	417333002	Ellipse key (White)		25
28a	417333001	Ellipse key (Gray)		2
28b	417715001	Switch cap		1
29	037280816	Screw 2.6×8		11
○ 30	417872001	Pattern case decoration plate		1
31	413946001	Stud screw 3.18		1
32	410535001	Stud screw 3.18		1
33-34	413947101	Accessory box assembly		1
33	413948101	Accessory box		1
34	413949001	Lid for box		1
35	410535001	Stud screw 3.18		1
36	407261001	Table clamp setting plate		2
37	060660704	+-Screw 3.18-40×7		4
38	060660406	+-Screw 3.18-40×4		3
				2

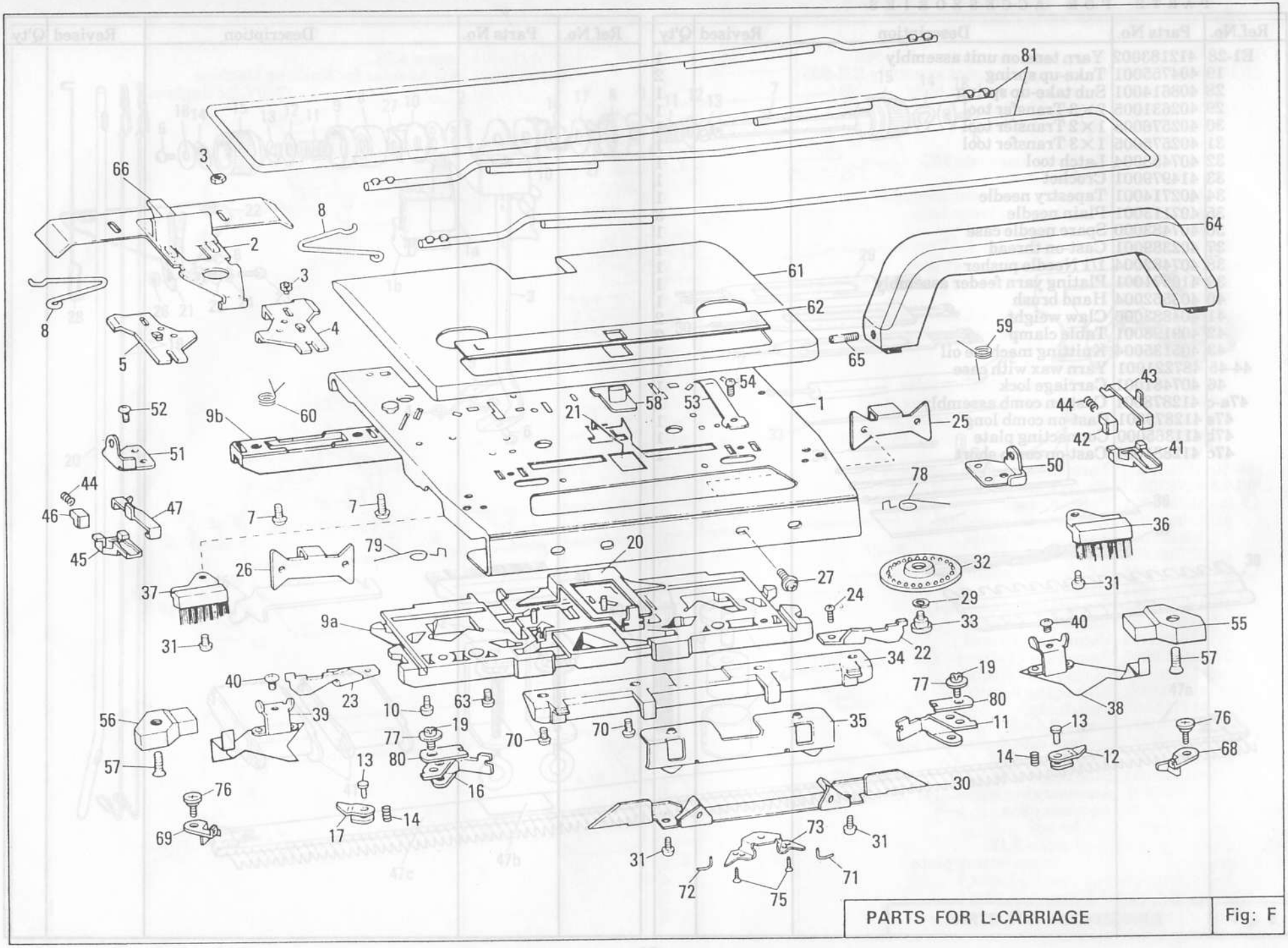
Ref.No.	Parts No.	Description	Revised	Q'ty
40	407119001	Screw 4.37		4
41	415665001	AC Adapter for Knitting Machine (240V,for England)		1



PARTS FOR ACCESSORIES | Fig: E

Ref.No.	Parts No.	Description	Revised	Q'ty
E1-28	412183002	Yarn tension unit assembly		1
19	404755001	Take-up spring		2
28	408614001	Sub take-up spring		1
29	402631005	2×3 Transfer tool		1
30	402576005	1×2 Transfer tool		1
31	402575005	1×3 Transfer tool		1
32	407458004	Latch tool		1
33	414979001	Crochet		1
34	402714001	Tapestry needle		1
35	407113001	Plain needle		3
36	407483000	Spare needle case		1
37	402389001	Cast-on thread		1
38	407482004	1/1 Needle pusher		1
39	410971001	Plating yarn feeder assembly		1
40	403552004	Hand brush		1
41	404883006	Claw weight		2
42	409198001	Table clamp		2
43	405135004	Knitting machine oil		1
44-45	487221001	Yarn wax with case		1
46	407481001	Carriage lock		1
47a-c	412878001	Cast-on comb assembly		1
47a	412879001	Cast-on comb long		1
47b	411365000	Connecting plate		1
47c	412881001	Cast-on comb short		1

Ref.No.	Parts No.	Description	Revised	Q'ty



PARTS FOR L-CARRIAGE | Fig: F

PARTS FOR L-CARRIAGE

Ref.No.	Parts No.	Description	Revised	Q'ty
○ F 1-80	417876001	L carriage assembly KH965		1
1	410481001	L carriage plate		1
2	410483001	Release button plate		1
3	408166001	Stud for release button plate		4
4	410484001	Connecting plate R for L carriage		1
5	410485001	Connecting plate L for L carriage		1
7	060660706	Screw 3.18-40×7		4
8	410486001	Connecting plate spring		2
9a	415702001	Main cam		1
9b	415704000	Rear foot		1
10	060660806	Screw 3.18-40×8		2
11	410578001	Separation cam R for L carriage		1
12	408132001	Raising cam right for L carriage		1
13	410579001	Shaft for separation cam		2
14	408134001	Raising cam spring		2
16	410581001	Separation cam L for L carriage		1
17	408137001	Raising cam left for L carriage		1
19	060660706	Screw 3.18-40×7		2
20	408582001	Lace selecting cam		1
21	408583001	Change lever spring		1
22	410583001	Right end needle separation cam for L		1
23	410584001	Left end needle separation cam for L		1
24	410592001	+-Screw 3.18×11.6		2
25	410494001	Needle transfer plate R		1
26	410495001	Needle transfer plate L		1
27	413734001	Screw 3.18-40×4		4
29	028030243	Spring washer		2
30	408573001	Cam plate		1
31	060660406	Screw 3.18-40×4		4
32	411003001	Rubber wheel		2
33	405029001	Stud screw		2
34	407490000	Front foot		1
35	408579000	Front foot holder		1
36	408580004	Small brush,R		1
37	408581004	Small brush,L		1
38	408561001	Spring plate,R		1
39	408562001	Spring plate,L		1
40	060660406	Screw 3.18-40×4		2
41	410957002	R end needle selection cam for L		1
42	410959001	R end needle selection change cam for L		1
43	410958001	R end needle selection plate for L		1
44	410963001	End needle selection cam spring for L		2
45	410960002	L end needle selection cam for L		1
46	410962001	L end needle selection change cam for L		1
47	410961001	L end needle selection plate for L		1
50	409740001	Handle setting base,R		1
51	409739001	Handle setting base,L		1
52	060670506	Screw 3.57-40×5		2
53	407522001	Handle lock spring		2
54	060660406	Screw 3.18-40×4		2
55	407454000	Magnet,R		1
56	407578000	Magnet,L		1
57	417596001	Screw 3.18-40×10		2
58	409744005	Lace selecting knob		1
59	412148001	L valve cam C spring,R		1
60	412147001	L valve cam C spring,L		1
○ 61-62	417877001	L carriage cover for KH965		1
○ 62	417878001	L carriage cover decoration plate KH965		1
63	060660406	Screw 3.18-40×4		2
64	409748007	L carriage handle		1
65	409751001	Screw		2
66	410585005	Release button		1
68	412145001	L valve cam C,R		1
69	412146001	L valve cam C,L		1
70	060660806	Screw 3.18-40×8		4
71	412141001	L valve cam B,R		1
72	412142001	L valve cam B,L		1
73	412143001	Reinforcing plate B		1
75	040210812	Screw 2×8		2
76	409528001	Lever shaft		2
77	403069001	Washer 3.3		2
78	410966001	R end needle selection change spring		1
79	410967001	L end needle selection change spring		1
80	412898000	Separation cam plate		2
81	412205002	Extension rail		2

* When exchange the Main cam (Ref.No.F-9a) into new one, please refer to how to adjust the Mounting dimension of the Main cam on P.35.

*** Mounting dimension of the Main cam**

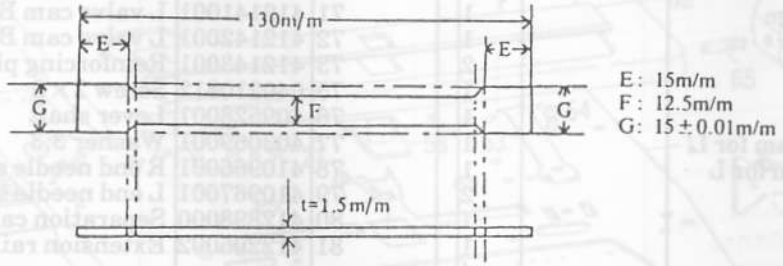
Mount the Main cam (Ref. No. F-9a) or Main cam and the Rear foot (Ref. No. F-9b) on the L carriage plate so that the dimension Ⓐ (between both inner faces of cam) are within range of 45.2m/m ± 0.1m/m, according to the following steps. (refer to Fig. 1)

(1) Tighten the Rear foot with 4 screws, while pushing it toward the "arrow" direction. (Also in case of replacing Rear foot.)

(2) If you made the adjustment tool as shown in Fig. 1, you can adjust the dimension Ⓐ easily.
And place the adjustment tool between the rear foot and the Main cam, then tighten the Main cam with two screws, while pushing it toward the "arrow" direction.

* Although you will not use the adjustment tool, you can adjust the dimension Ⓐ with a calipers, the way of adjustment is that put the calipers on the place of dimension Ⓐ then tighten the main cam with two screws, while pushing it toward the "arrow" direction.

(3) Attach the end needle separation cams Ⓓ while pushing them toward the "arrow" direction.



E: 15m/m
F: 12.5m/m
G: 15±0.01m/m

(Adjustment tool)

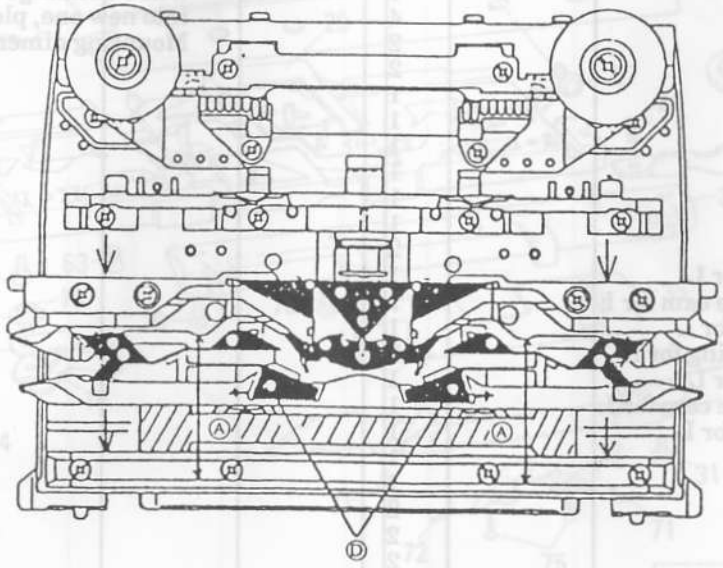


Fig. 1

SERVICE MANUAL FOR KH-965
ELECTRONIT.
(ELECTRONIC PART ONLY)

Please refer to the Service Manual below,
for the following part ;

K-Carriage & L-Carriage	.... KH-940 Service Manual
Mechanical part of the machine body	.... KH-900 Service Manual

brother®

5. CIRCUITRY CONFIGURATION

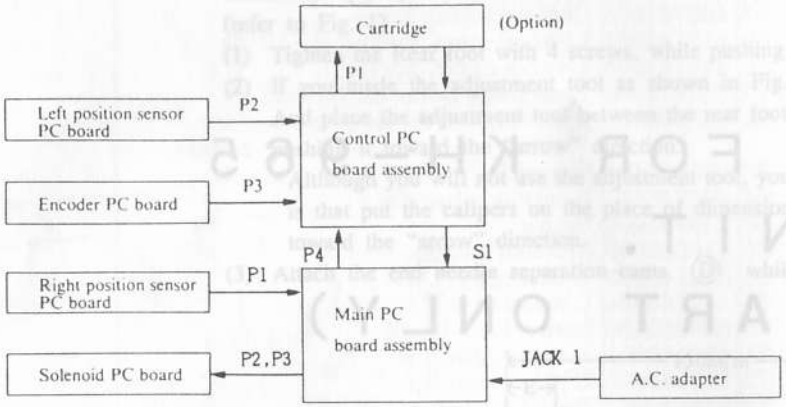


Fig. 5-1 shows the circuitry configuration of the KH-965

5.1 Control PC Board

The control PC board is the main control portion of the equipment. It is comprised of the microcomputer, memory, and voltage regulator, etc.

5.2 Main PC Board

The main PC board is the keyboard portion. It is comprised the lamp (LED and 7 segment LED), switch, and solenoid driver, etc.

5.3 Left Position Sensor PC Board and Right Position Sensor PC Board

The left and right position sensor PC board are what send out the carriage position signal. It is connected to the control PC board by a connector (P2, P6).

The position sensor signal (pin 3 of P2, P1) is normally DC 1.8V, but when the K carriage sensor magnet approaches the position sensor, it becomes DC3.4V or more.

5.4 Encoder PC Board

The encoder PC board emits signals required in the detection of the direction and amount of carriage movement and in solenoid selection. It is connected to the main PC board by a connector (P3).

The V1 (Pin 4 of P3), V2 (Pin 3 of P3), and BP (Pin 5 of P3) signals are configured as shown in figure5-2 below:

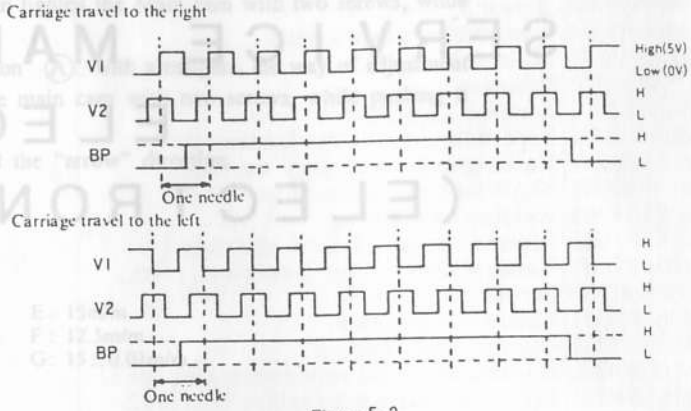


Figure 5-2

The amount and direction of movement of the carriage are detected via the V1 and V2 signals, and the type of engagement between the belt and the carriage is detected via the BP signal (Belt phase signal). There are two types of engagement, discriminated between by sensing whether the BP signal is high or low when the carriage passes the position sensor.

5.5 Power

The power uses exclusive adapter.
The generating power of the adapter is DC 7.5V and 1A ~ 1.2A.
The generating power of the adapter, which is changed into 5V by voltage regulator in the main PC board of the knitting machine, is supplied to computer and memory etc.
Polarity of the DC plug; outside ..... (+)
inside ..... (–) (see Fig.5-3)

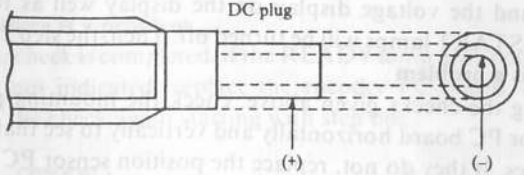


Figure 5-3

5.6 Solenoid PC Board

The solenoid PC board is a PC board which is acted upon by the needle selector device. It is connected to the main PC board assembly by a connector (P3, P2). There are 16 needle selector solenoids, with numbers on them, counted sequentially from left to right. There are 8 needle selector plates, the relationship to the rotary cam of which is given in figure 5-4 below.

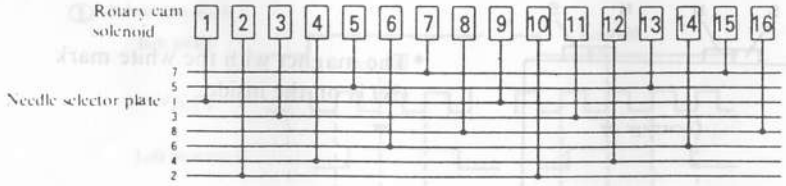


Figure 5-4

5.7 Relationship between Needle Selector Plate, Solenoid, Needle Number, and Belt Phase Signals

Needle selector plate	Solenoid		Yellow needle numbers (left)							Green needle numbers (right)						
1	1	9	100	84	68	52	36	20	4		13	29	45	61	77	93
2	2	10	99	83	67	51	35	19	3		14	30	46	62	78	94
3	3	11	98	82	66	50	34	18	2		15	31	47	63	79	95
4	4	12	97	81	65	49	33	17	1		16	32	48	64	80	96
5	5	13	96	80	64	48	32	16		1	17	33	49	65	81	97
6	6	14	95	79	63	47	31	15		2	18	34	50	66	82	98
7	7	15	94	78	62	46	30	14		3	19	35	51	67	83	99
8	8	16	93	77	61	45	29	13		4	20	36	52	68	84	100
1	9	1	92	76	60	44	28	12		5	21	37	53	69	85	
2	10	2	91	75	59	43	27	11		6	22	38	54	70	86	
3	11	3	90	74	58	42	26	10		7	23	39	55	71	87	
4	12	4	89	73	57	41	25	9		8	24	40	56	72	88	
5	13	5	88	72	56	40	24	8		9	25	41	57	73	89	
6	14	6	87	71	55	39	23	7		10	26	42	58	74	90	
7	15	7	86	70	54	38	22	6		11	27	43	59	75	91	
8	16	8	85	69	53	37	21	5		12	28	44	60	76	92	
BP signal	L	H	K carriage left turn mark													
	H	L	K carriage right turn mark													
	H	L	L carriage left turn mark													
	H	L	L carriage right turn mark													

5.8 Cartridge (option)

The cartridge is used to load the optional pattern and to save the patterns made by the PPD120 or KH965. It is connected to the Main PC board connector (P1).

6. TEST PROGRAMS

6.1 Test 885 ..... Needle Position Detect Circuit Test

• **Step 1** —Display right or left position signal voltage. The computer will report that it has detected either the K, L, or G sensor magnet.

■ **Test procedure**

(1) Turn the power switch on.

(2) Input the digits [8][8][5] and push the [STEP] key.
The voltage of the left position signal will be indicated in the display (for example, [184] indicates 1.84V). A yellow lamp will light, indicating that the left side is being checked. When there is no carriage sensor magnet in front of the sensor, a voltage of 1.76V or 1.92V will be indicated. At this point, if the VR on the left position sensor PC board is turned, the voltage displayed in the display will also change.
***Note:**
In the event that the voltage displayed in the display does not fall between 1.76V and 1.92V, adjust via the VR on the left position sensor PC board. This adjustment should be done as follows: first, turn the VR slowly until 1.92V is displayed, then turn it slowly to the left until 1.76V is displayed and stop.
***When there is a problem**
When adjustment cannot be effected, replace the position sensor PC board and attempt the above adjustment again.

(3) Place the K carriage sensor magnet in front of the sensor (with the change knob on <KC >). At this time, the voltage indicated in the display should be 3.52V or over. When voltage is 3.04V or over and the computer detects the K carriage (N), a "1" will be displayed in the memo display.

(4) With the K carriage sensor magnet in front of the sensor, turn the change knob to <N.L> (plain stitch). Ensure that the voltage is below 2.84V. The memo display will not turn off even if the indicated voltage drops below 3.04V. If the direction of carriage movement changes from right to left (when the yellow lamp is on), it will turn off.

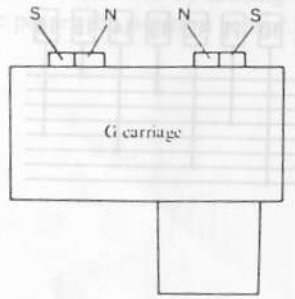
(5) Place the L carriage sensor magnet in front of the sensor. 0V should be indicated. When voltage drops over 0.76V or lower and the computer detects the L carriage (S), the memo display will indicate a "2."

(6) Pass the G carriage sensor magnet across the outside of the sensor.
When detecting the N pole magnet within 3 needles after detecting the S pole magnet, a 3 is displayed, indicating detection of the G carriage.

(7) Push the [GREEN] key.
The voltage of the right position sensor signal will be displayed. The green lamp will light indicating that the right side is being checked.

(8) Using the sequence given in (3)-(6) above, check the conditions of the K carriage, the L carriage, and the G carriage on the left.
***Note:**
To recheck the left side, pushing the [YELLOW] key will put the equipment in the condition given in (2) above.
When there is no problem by performing the checks given above. Push the [STEP] key, and the voltage display on the display well as the YELLOW, GREEN, and START lamps will be turned off. Then, the step 2 test will begin.
***When there is a problem**
By performing the checks given above, check the mounting position of the position sensor PC board horizontally and vertically to see that each have the proper voltages. If they do not, replace the position sensor PC board.

If voltage goes down during the K carriage check or up during the L carriage check, replace the carriage sensor magnet. If there is some abnormality during the G carriage check, check the G carriage sensor magnet. In the event that the magnet is properly mounted, replace the G magnet holder. If there is no problem with the indicated voltage, but nothing is displayed in the memo display, perform the step 2 check (refer to figure 6-1).



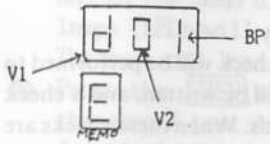
* The magnet with the white mark (N) is on the inside.

Figure 6-1

• **Step 2** —This is to check to see whether, of the needle position detect circuit signals, the V_1, V_2, BP, and iRQ (count edge) signals have been properly sent to the computer.

(9) Move the carriage forward and backward one time (20 needles or more). If a problem is noted during step 2, an "E" will be displayed in the memo display, and an error digit in the display. When there is an error digit in the display, the step will proceed no further.

If the CE key then the STEP key is pressed, the step 2 test will be repeated.



d: proper condition.
1: The signal remains High
0: The signal remains Low

***When there is a problem**

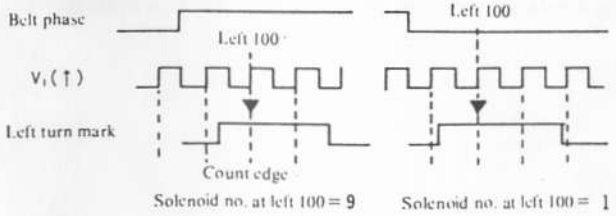
(10) After the check is completed, if the READY lamp does not light, or if an error digits is not indicated, replace the encoder PC board. After replacement perform the check again starting with step one.

(11) Press the [STEP] key.
Move the carriage from the outside of the left turn mark toward the center. The step 3 test will begin.

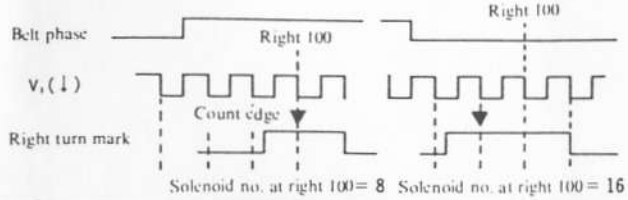
• **Step 3** —Mounting position tests for the left and right position sensor PC boards

When the K carriage passes the left turn mark, and when the L carriage passes the right turn mark, during the time from the belt phase signal reversing to the first V_1 count edge in the right or left position signal, the V_1 count edge should be one or more.

① K left turn mark

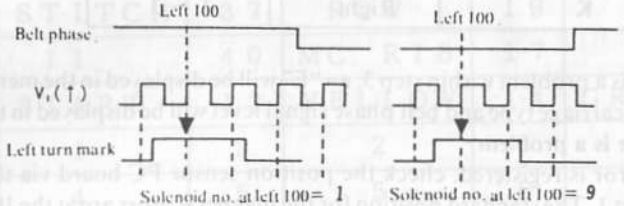


② L right turn mark

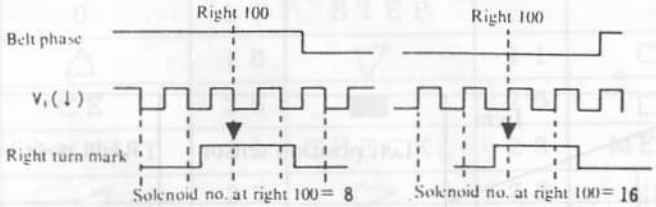


When the L carriage passes the left turn mark, and when the K carriage passes the right turn mark V_1 count edge should be one or more during the time from the first V_1 count edge in the right or left position signal to the belt phase signal reversing.

③ L left turn mark

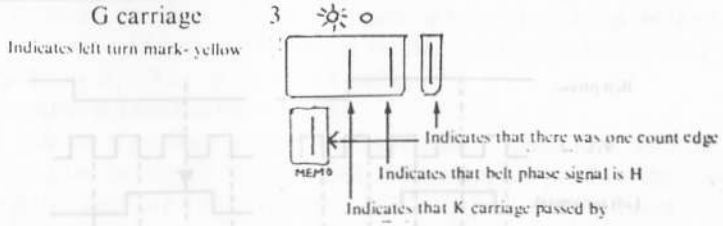


④ K right turn mark



If there is no problem, the READY lamp will go on, and the carriage type and belt phase signal level will be displayed in two digits. In the memo display, the digit for the count edge will be indicated.

First digit: Belt phase signal	Display
When H	1
When L	0
Second digit: Carriage type	**Display**
K carriage	1
L carriage	2
G carriage	3



	Memo display carriage	Turn mark	Count edge
①	K	Left	0 ~ 2
②	L	Right	0 ~ 2
③	L	Left	1 ~ 3
④	K	Right	1 ~ 3

When there is a problem within step 3, an "E" will be displayed in the memo display, and also the carriage type and belt phase signal level will be displayed in the display.

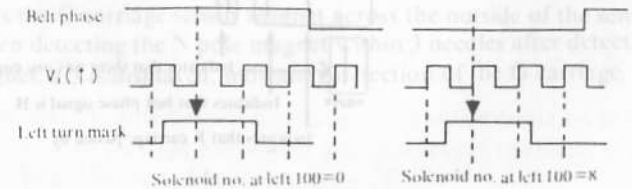
***When there is a problem**

When an error is registered, check the position sensor PC board via the items as given in chart 1. The standard position for the magnet sensors are at the 100th needle to the left and to the right. After checking these items, repeat the checks from step 1.

Chart 1

Item / Error	Left position sensor	Right position sensor
When there is an error with the K carriage	Leans toward the inside	Leans toward the outside
When there is an error with the L carriage	Leans toward the outside	Leans toward the inside

When the READY lamp lights, or when an "E" is displayed, press the step key so that you can repeat the step 3 test. The 885 test is finished by turning the power switch off. With the STEP key, when the belt phase signals ①, ②, ③, and ④ of step 3 are H or L, altogether, a total of 8 checks are performed.



6.2 Test 888 ..... Memory Test

The computer will test the memory. The execution of this test will clear the memory of the entirety of its contents.

■ Test procedure

① Turn the power switch on.

② Input the digits [8][8][8] and push the [STEP] key.
55 (HEX) will be written into all memory fields and a check will be performed to ensure that 55 has been written. Then, AA (HEX) will be written, and a check performed to see that AA has been written into all fields. When these checks are passed, a 0 is written into all fields of the memory and the READY lamp lights. If the checks are not passed, an "E" will indicate in the memo display. Pushing the [CE] button then pushing the [STEP] button repeats this test.

***Note**

The check requires abuot 20 seconds for completion

Be sure not to turn the power switch off before it is completed.

***If there is a problem**

If an error is registered on the display, replace the control PC board.

6.3 Test 889 ..... Display Key Test

• **Step 1** —Indicator lamps all blink.

① Turn the power switch on.

② Input the digits 8 8 9 , and push the STEP key. In the display and in the memo display window 8 8 8 and 8 , and the remaining lamps (LEDs)will all light on except the save and the load lamps. The save and load lamps will be brinking.

③ Press the STEP key. The display and lamps will all go off,and the step 2 test is ready. Check to ensure that the keys are functioning properly.

④ If a key is pushed, the number for that key should be displayed in the display. The numbers for each of the keys is given in chart 2.

***If there is a problem**

in the event that there is a problem, in either the main PC board or in the control PC board. Replace the main PC board and repeat the "889" test program . If the same problem reoccurs, that will indicate that there is a problem in the control PC board, so replace it. In this event, the former main PC board should be normal.

Chart 2

INDICATION	KEY	INDICATION	KEY	INDICATION	KEY
41	LOAD	42	SAVE	43	EXEC
38	STITCH	37	ROW	19	1
29	11	40	MC RIB	17	M
39	START	13	YELLOW	14	GREEN
1	1	2	2	3	3
4	4	5	5	6	6
7	7	8	8	9	9
0	0	10	STEP		
15	△	16	▽	11	CR
12	CE	26	■	25	▭
20	INPUT	21	CHECK	23	MEMO
28	◁	27	▷	22	
18	C	30		31	
33		34		32	REF
35		36			

7. CHECKING THE A.C. ADAPTER

KH-965 uses exclusive A.C. adapter.
As the D.C. output of the exclusive A.C. adapter is 9.5V ~ 14V in no resistance, follow the test procedure below:

•Test Procedure

(1) Turn off the power switch of the knitting machine. Pull out the A.C. adapter from the knitting machine and the outlet.
(2) Check that the voltage of the outlet is within ±10% of the rated input voltage. (If it is less than -10% of the rated input voltage, the knitting machine cannot work. If it is more than +10% of the rated input voltage, the knitting machine and the A.C. adapter may run hot and this is dangerous.)
(3) If the voltage of the outlet is appropriate, plug the A.C. adapter into the outlet and check that the D.C. output is 9.5V ~ 14V.
Take care not to mishandle the plus and minus terminals of the tester. (And not to shortcircuit them.)
* If the D.C. output is not 9.5 ~ 14V ..... Replace the A.C. adapter with the new one.

8. CHECKING THE NEEDLE SELECTOR

8.1 Checking with the Power Switch Turned Off

① Set the K carriage change knob to <KC>, and put all of the needles in position B.

② Turn the power switch off, and move the K carriage to check all the needles should be selected to position D.

***Note:**

The above check should be performed with the carriage traveling right, left, and at high speed and at low speed.

***If there is a problem**

Then it will be in the needle selector mechanism of the main body or in the carriage needle selector mechanism.

8.2 Checking with the Power Switch Turned On

① Set the K carriage change knob to <KC>, and put all of the needles in position B.

② Turn the power switch on, and push the [INPUT] key. The [INPUT] key lamp should light.

③ Select needles after the K carriage has passed the turn mark from the outside. At this point, the needles should all be selected to position B.

***Note:**

The above check should be performed with the carriage traveling right, left, and at high speed and at low speed.

***If there is a problem**

If there are needles selected to position D, perform the check given 8.3.

8.3 Checking with the Solenoid On

① Remove the two operation panel screws. While holding up the left side of the panel and sliding the panel toward the left, remove it from the main body with connectors on.
(*Place the removed panel on the rear of the main body case.)

② Remove the two cord cover screws and the cord cover.

③ Set the K carriage needle change knob to <KC>, and put all the needles in position A.

④ Turn the power switch on, and push the [INPUT] key (as in 8.2②).

⑤ Move the K carriage past the turn mark from the outside, and then move it from right to left. The armatures should all remain in the down position.

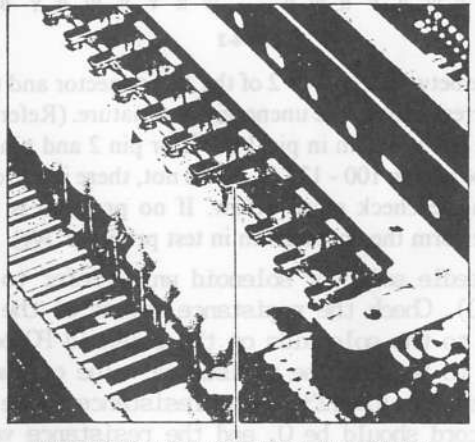


Figure 8-1

The fourth armature from the right is out of position.

***If a problem is found in the 8.2 check**

If a problem is found during the 8.2 check but the 8.3 check produced none, it will indicate a problem in either the needle selector mechanism of the main body or in the carriage needle selector mechanism (refer to 12 on P 43 of KH-900 and 9.3 on p 26 of KH-940).

***If a problem is found in the 8.3 check**

It will indicate a problem in the electrical circuitry. Check this with the test program given in chapter 6(885, 888). If this does not produce the answer, perform the check in 8.4 (the example shown in the picture is a solenoid no. "13" problem).

8.4 Checking the Solenoid

① Turn the power switch off, and disconnect connector S3 and S2 (P3 and P2 on the main PC board).

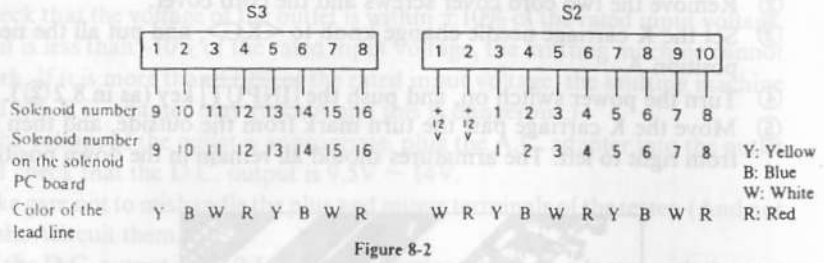


Figure 8-2

② Check the resistance between pin 1 or 2 of the S2 connector and the pin of the connector which corresponds to the unenergised armature. (Refer to figure 8-2. In picture 8-1, there is a problem in pin 1 of S2 or pin 2 and pin 5 of S3). Resistance should be within 100 - 123 Ω. If it is not, there is a problem, which may be found with the check given below. If no problem is found in the resistance values, perform the check given in test program 885

③ Disconnect the needle selector solenoid unit (refer to on P.37 item 10 of KH-900). Check the resistance values of the places which correspond to the solenoids on the solenoid PC board which were found to be bad. The resistance value of the solenoid coil should be between 100-123Ω, the resistance value of the solenoid signal cord should be 0, and the resistance value of the metal portion of the main body and the solenoid should be ∞Ω(refer to figure 8-3).

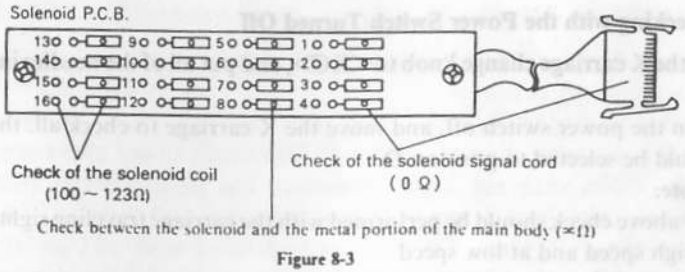


Figure 8-3

***If there is a problem**

If a problem is found in a check between the solenoid coil and the solenoid chassis, replace the needle selector solenoid assembly. If a problem is found when checking the solenoid signal cord, replace the solenoid signal cord.

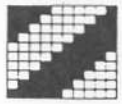
7.5 Checking Needle Selection by Test Pattern

Pattern numbers 1 through 555 and 801 through 860 are internalized, but other than that, there are also 881 through 884 which are test patterns. The pattern for each of these is given in figure 8-4.
The test is performed according to the following procedure.

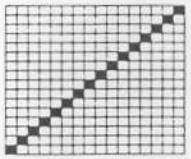
① Put a sufficient number of needles in position B.
② Turn the power switch on and push the selector (1) key.
③ Push the STEP key. Then, enter the digits 881-884, and push the STEP key seventh. The READY lamp should light.
④ Turn the variation (4) (double length) switch on, and set the K carriage change knob on <KC>.
⑤ Select needles after passing the K carriage from the outside of the turn mark. The needle selection should change after every other pass.

○ Test patterns

881: 1x1 alternative needle selection



882: 5x5 alternative needle selection



883: 1-16 needle selection

884: 1-5-5-5 needle selection

Figure 8-4

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The part No. is subject to change without notice.