

ITE 15HK 500  
OPERATING MECHANISM  
BASIC TEARDOWN PROCEDURE

- 1) Make sure the breaker is open and springs are discharged.
- 2) Remove the front plate, front barrier, phase barriers and ARC chutes.
- 3) Manually charge and block the close springs (Note: The breaker must be in the disconnect or test position) then, slow close the breaker slightly so that the springs no longer touch the stops.
- 4) Tip the breaker on it's side and remove the springs.

Note: When marking parts of the mechanism, always mark the parts consistently on the front and left side. (i.e.: do not mark some on the LH and some on the RH some on the front and some toward the rear).

- 5) Remove the wires from the top of the motor disconnect switch.
- 6) Remove the motor disconnect switch and the spring charge motor.
- 7) Remove the (6) allenhead bolts holding the mechanism to the truck.

Note: There could be tension on the mechanism from the opening springs).

- 8) Remove the link pin between the mechanism and the jack shafts.
- 9) Remove the mechanism (tuck link into mechanism and lower then turn 90 degrees). Remove both the trip and close coils.
- 10) Put the mechanism on a bench.
- 11) From the front, remove the "trip" button and linkage. Remove the manual close lever and the pin in the lower front.

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- 12) Starting in the back of the mechanism, mark and remove the components of the Hex shaft, noting where the cam and ratchet gear are in relation to the hex shaft. Clean and lubricate components as you disassemble them.

The roller on the cam and the flat spot on the racking gear line up on the hex shaft with the holes when the spring cam is facing rearward. The motor charge rod is in board of the manual charge rod.

- 13) Remove the (2) smallest diameter shafts noting that the upper shaft is behind the close link.
- 14) Remove the shaft with the manual charge lever.
- 15) Remove the last (2) shafts. As the link assembly is removed mark it for reassembly. (Note: the close prop is in the center and under the smaller shaft).
- 16) For reassembly, reverse the above steps with the following special precautions:

When at step 9, the cam should just start to push the link upward. At step 7, after the link pin is installed, rotate the hex shaft approximately 270 degrees, so the link assembly collapses. At step 6, return the hex shaft to its original position. (Note: the close prop needs to be moved in order to rotate the hex shaft).

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## 5 & 15HK OPERATING MECHANISM ASSEMBLY

### I. INTRODUCTION

- A. The 5 & 15HK operating mechanism is broken down into various levels. The first level is the basic operating mechanism which contains six sub-assemblies. The sub-assemblies are:

163700-T1	Primary & Secondary Closing Latch
163700-T2	Charge Pawl Carrier
163700-T3	Holding Pawl Carrier
163700-T4	Closing and Timing Cam
163700-T5	Trip Latch Assembly
163700-T6	Third Toggle Assembly

These sub-assemblies along with the mech housing and other miscellaneous parts make up what we refer to as the basic operating mechanism. These parts again are the primary and secondary close latch, charging pawl carrier, holding pawl carrier, closing and timing cam, trip latch assembly and third toggle assembly. To the basic mech we then add closing springs, trip and close latch and motor assembly.

- B. The closing spring assemblies can be one of five following different assemblies:

The first is the 194111-T3 assembly for the 5HK 75/150/250 with a 1200 or 2000 amp.

The T4 assembly for the 5HK 350 1200/2000 amp.

The T5 assembly is a 5HK 350/3000 amp.

The T6 assembly for 7.5HK 250 15HK 150/250/500 1200/2000 amp.

The T7 assembly for 7.5HK 500 15HK 750 1200/2000 amp.

- C. The trip and close coil assembly can be one of eight combinations varying primarily in voltage rating. The difference being in the coil being used in the assembly. The possible voltage ratings are as follows:

191920-T3 assembly rated for 250V D.C.

191920-T4 assembly rated at 48V D.C.

191920-T5 assembly rated at 110/120V A.C.

191920-T6 assembly rated at 208/240V A.C.

191920-T11 assembly rated at 24V D.C.

191920-T13 assembly rated at 32V D.C.

191920-T14 assembly rated at 125V D.C.

191920-T15 assembly rated at 125V D.C. - this is used on the special fast action assembly.

- D. The motor assemblies come in three voltage capacities: the 709799-T11-115V A.C. 125V D.C.; T12 is 220V A.C. 250V D.C.; T13 is for 48V D.C.

## II. BASIC OPERATING MECHANISM ASSEMBLY

Now lets take a closer look at the six sub-assemblies:

First is a primary and secondary close latch and charge pawl carrier, holding pawl carrier, closing and timing cam, trip latch assembly and the third toggle assembly.

Now we will see the actual assembly of the operating mechanism. First we attach the retaining link onto the stud inside the operating mech housing. The link is then secured with a horseshoe retainer.

### A. Holding and Charging Pawl Carrier

Then we take the holding pawl carrier, place the ratchet plate inside the holding pawl carrier. The charging pawl carrier is positioned holding the holding pawl carrier. Take the hex shaft and place it through these three parts. Then we take two pawl carrier bearings position one in each side of the shaft.

After proper adjustments are made this assembly is ready to be placed in the housing.

After is assembly is positioned into the housing, three flatwashers are placed to the inside of the holding and charging pawl carriers.

### B. Closing and Timing Cam

The closing and timing cam sub-assembly is then positioned in the housing on the hex shaft.

The hex shaft is pushed through the opposite side of the housing.

Then for the proper position of these parts we place a flatwasher next to the holding pawl carrier followed by a shoulder bushing with a pressed in needle bearing and a crank shaft inner race bearing, two flatwashers, a bushing and the crank arm assembly. The crank arm is then secured by placing a cotter pin through the crank arm assembly and the hex shaft.

Then to the opposite side of the housing on the hex shaft you place a bushing, flatwasher, a shoulder bushing with a pressed in bearing and a crank arm inner race bearing, a flatwasher, bushing and the crank arm assembly which again is secured by placing a cotter pin through the crank arm and the hex shaft.

Next these two cotter pins will be secured to the two crank arm assemblies.

The torsion spring is then attached to the holding pawl carrier and the weld stud in the mech housing.

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The operating mechanism is then turned over to allow better access for the following operations.

The motor connecting rod is attached to the charge pawl carrier with a pin and two truarc retainers. One retainer is put on the pin prior to inserting it through the charge pawl carrier and the connecting rod.

C. Third Toggle Assembly

Next is the installation of the third toggle assembly. First two pins are placed into the side of the housing and a bushing is placed on the larger pin. The third toggle assembly is then positioned in the housing and the tension spring is connected to the weld stud in the housing. Then the large pin is placed through the housing and through the first toggle. The other pin is placed through the trip roller carrier and then to the opposite side of the housing.

D. Primary and Secondary

The primary and secondary close latch is then installed. The torsion spring is placed on the primary close latch and is lined up to the retainer pin which is then placed through the latch.

Then a bushing is added between the close latch and the housing and the pin is placed through the housing.

Three stop pins are then placed through the housing.

The three stop pins are secured the truarc retainers.

The other pins which hold the third toggle and primary and secondary close latch are secured with cotter pins.

E. Trip Latch Assembly

The mechanism is then turned over which will enable us to complete the assembly operation.

Next is the installation of the trip latch assembly. First we place a pin into the housing on the right side and position the trip latch assembly to the pin in the housing.

A torsion spring is placed on the secondary close latch which is then aligned to the trip latch and the pin is then slid through the secondary close latch.

The retaining link is then lined up to the secondary close latch and pin is slid through the retaining link.

Manual charge lever is then aligned to the same pin. Pin is pushed through the charge lever and out the opposite side of the housing. This pin is then secured with a retainer and a hex head screw and lockwasher.



Then position the manual firing lever and spring into the mech housing. A large firing lever pin is then placed through the housing and the lever.

Two bushings are then placed on each side of the pin and secured with truarc retainer.

The bell crank is then placed into the housing and secured to the housing with a horseshoe retainer.

The manual trip is then placed to the outside of the housing and the stud being placed through the housing and secured with a horseshoe retainer. Spring is then attached to the manual trip button.

When the spring is positioned to the manual close lever and attached to the manual firing lever and secured with the horseshoe retainer.

The end of the torsion spring shown here needs to be aligned to the trip latch assembly.

### III. FINAL ASSEMBLY OF OPERATING MECHANISM

Now the close and trip coil assemblies will be installed.

#### A. Close & Trip

First the close coil assembly is placed in the housing and secure in place with two hex head screws. The trip coil assembly is then placed in the housing and secured with one hex head screw and one round head screw. The round head screw is used on the 15HK mechanism to provide for additional clearance when the operating mechanism is assembled into the truck.

#### B. Motor Assembly

Now we have the installation of the motor assembly into the operating mechanism. The motor is first positioned into the side of the housing where it is placed through the motor link and the motor is fastened to the housing using three allen head screws.

#### C. Charging Spring Assembly

Next the charging spring assemblies are installed onto the operating mechanism. First two flatwashers are placed on crank arm assembly stud. The spring is then slid over the firing latch pin. Then attached to the crank arm assembly stud. Two more flatwashers are placed on the stud and then are secured with a cotter.

This sequence is then repeated for the opposite side of the operating mech housing.

This completes the assembly of the 5 & 15HK operating mechanism.

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#### IV. TOOLS

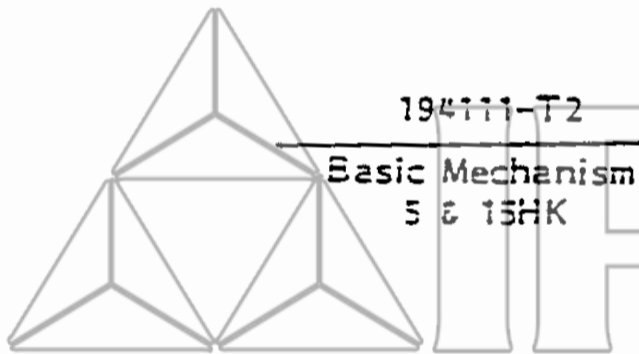
We will now take a look at some of the tools used in the assembly of the operating mechanism.

Screwdriver, side cutters, battery terminal pliers, truarc retainer pliers, needlenose pliers, small truarc retainer pliers, 7/16" socket, 1/4" allen socket, 1/2" socket, side cutters, screwdriver and hammer used for miscellaneous assembly operations.



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BASIC OPERATING MECHANISM

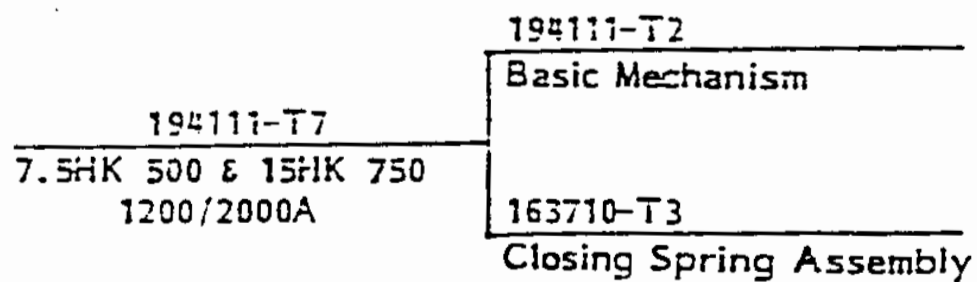
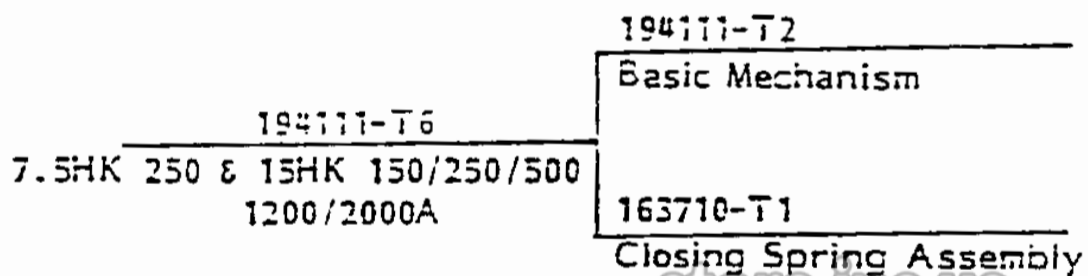
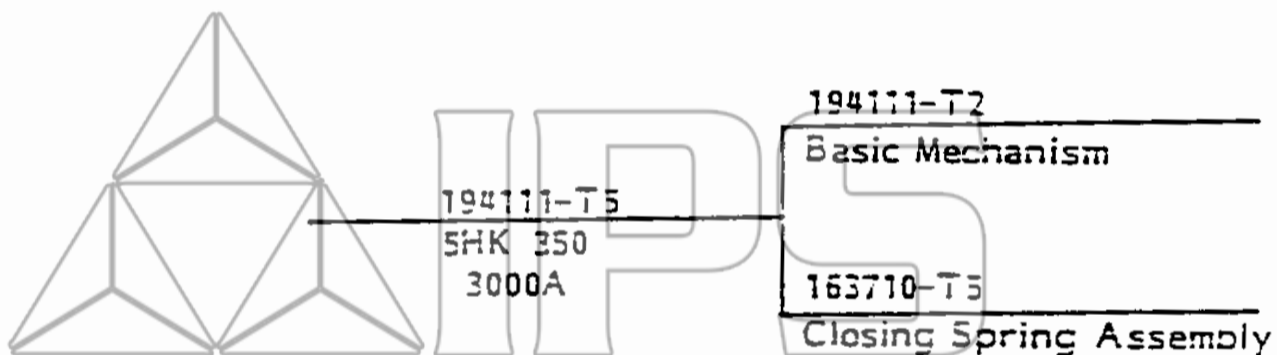
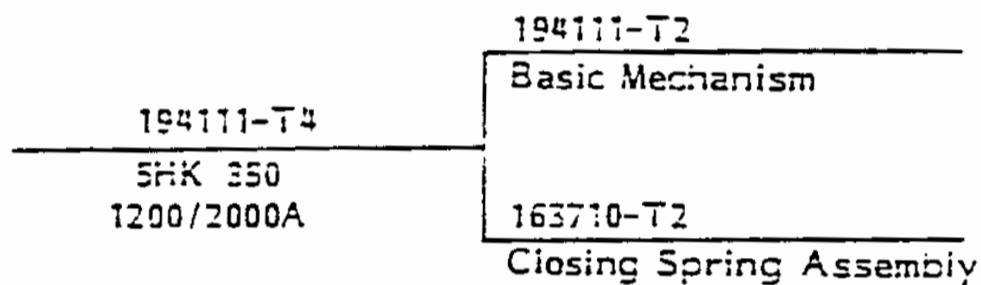
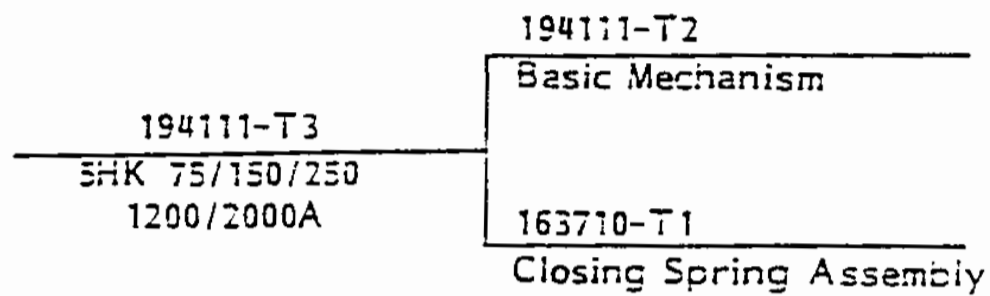


- 163700-T1  
Primary & Secondary Close Latch
- 163700-T2  
Charge Pawl Carrier
- 163700-T3  
Holding Pawl Carrier
- 163700-T4  
Closing and Timing Cam
- 163700-T5  
Trip Latch Assembly
- 163700-T6  
Third Toggle Assembly

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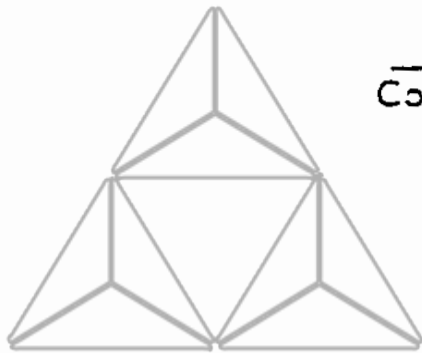


OPERATING MECHANISM



TRIP AND CLOSE COIL ASSEMBLY

<p>191920-T3 Complete Assembly for 250V D.C.</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K2 Coil 250V D.C.</p>
<p>191920-T4 Complete Assembly for 48V D.C.</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K3 Coil 48V D.C.</p>
<p>191920-T5 Complete Assembly for 110-120V</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K4 Coil 110-120V</p>
<p>191920-T6 Complete Assembly for 208-240V</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K5 Coil 208-240V</p>
<p>191920-T11 Complete Assembly for 24V D.C.</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K10 Coil 24V D.C.</p>
<p>191920-T13 Complete Assembly for 32V D.C.</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K12 Coil 32V D.C.</p>
<p>191920-T14 Complete Assembly for 125 V D.C.</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K13 Coil 125V D.C.</p>
<p>191920-T15 Complete Assembly for 125V D.C.</p>	<p>191920-T1 Basic Trip &amp; Close Coil Assembly</p> <hr/> <p>192386-K13 Coil 125V D.C.</p>

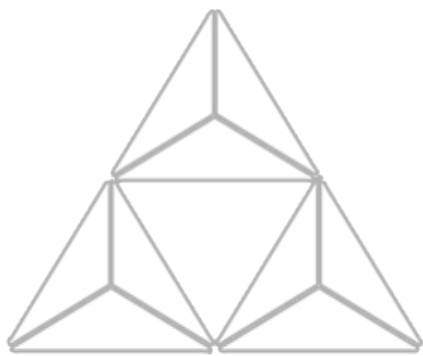


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MOTOR ASSEMBLIES

709799-T11  
115V AC / 125V DC



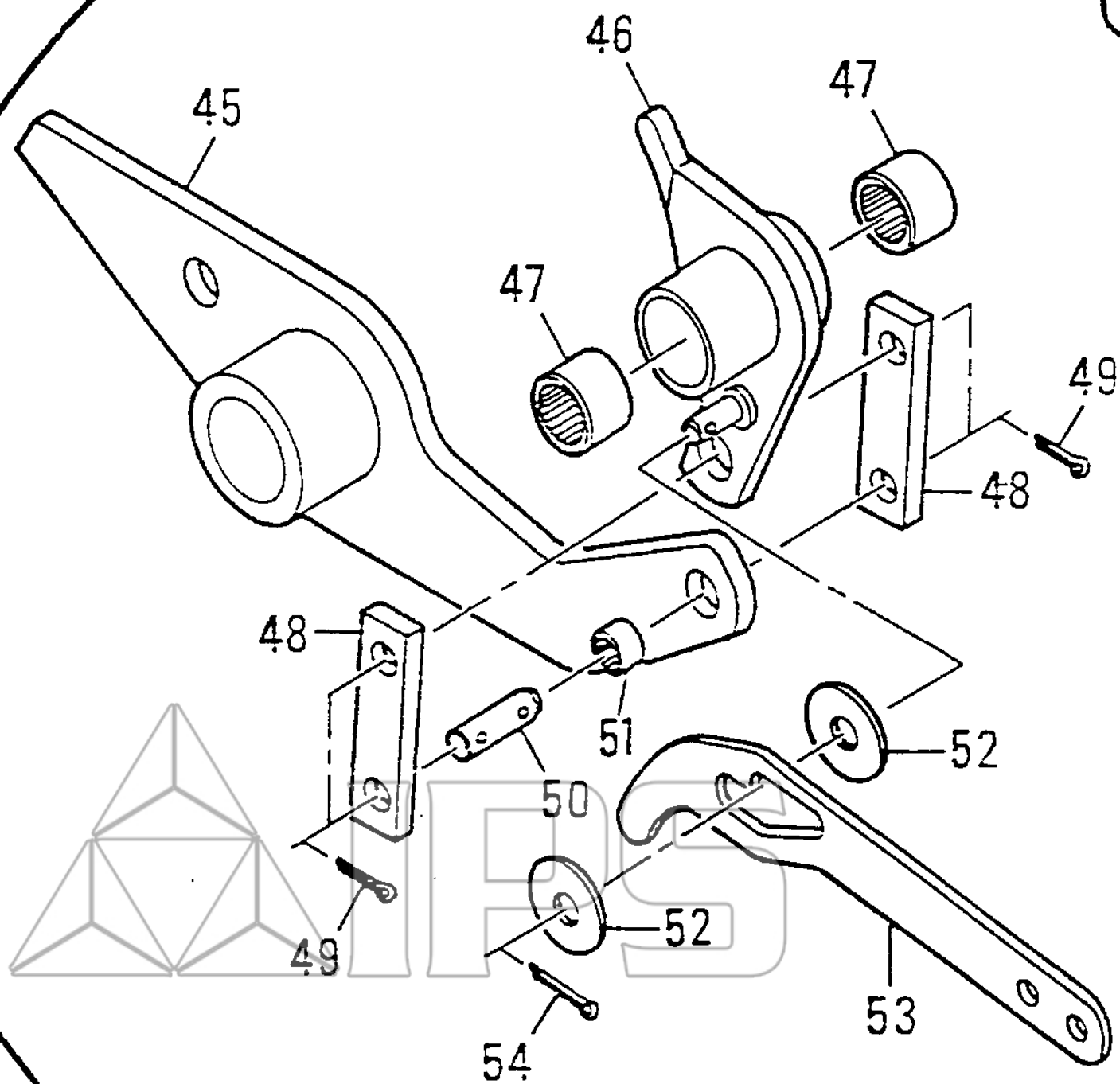
709799-T12  
220V AC / 250V DC

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709799-T13  
48V D.C.

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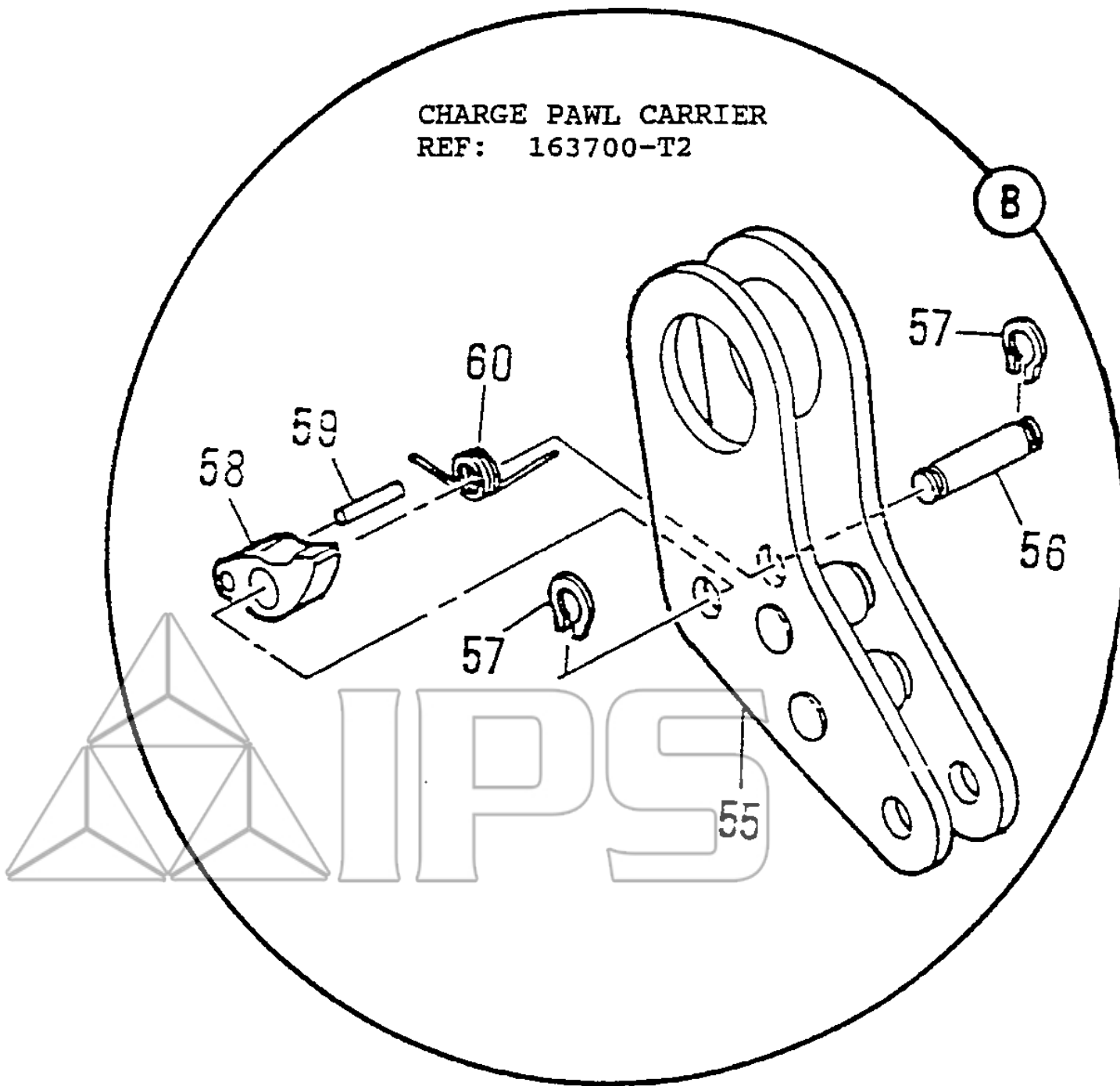
PRIMARY and SECONDARY CLOSE LATCH  
REF: 163700-T1



45	194906-K1	1	PRIMARY CLOSE LATCH
46	194909-K2	1	SECONDARY CLOSE LATCH ASSY.
47	75547-D	2	NEEDLE BEARING
48	196457-A	2	FLAT LINK
49	53117-B	4	COTTER PIN
50	650040-A24	2	PIN
51	75547-A10	2	NEEDLE BEARING
52	650351-A41	2	WASHER
53	193191-A	1	MANUAL CLOSE
54	53113-B2	1	COTTER PIN DISCONNECTOR

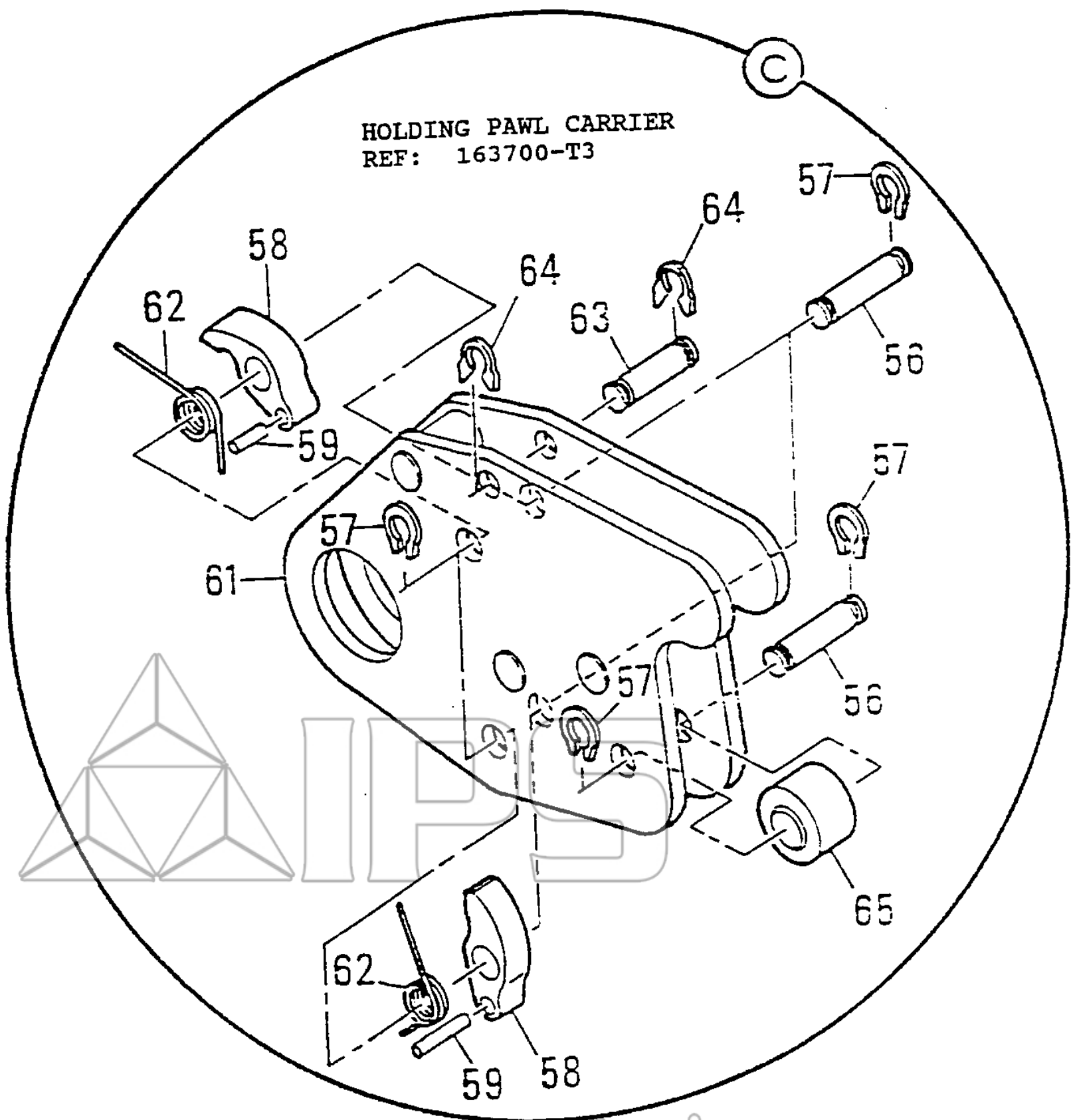
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CHARGE PAWL CARRIER  
REF: 163700-T2



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55	191647-K2	1	CHARGE PAWL CARRIER
56	650050-B32	4	PIN
57	650440-G	8	RETAINER (TRUARC)
58	192307-A	3	PAWL
59	650044-C	3	SPIRAL PIN
60	650213-F	1	SPRING

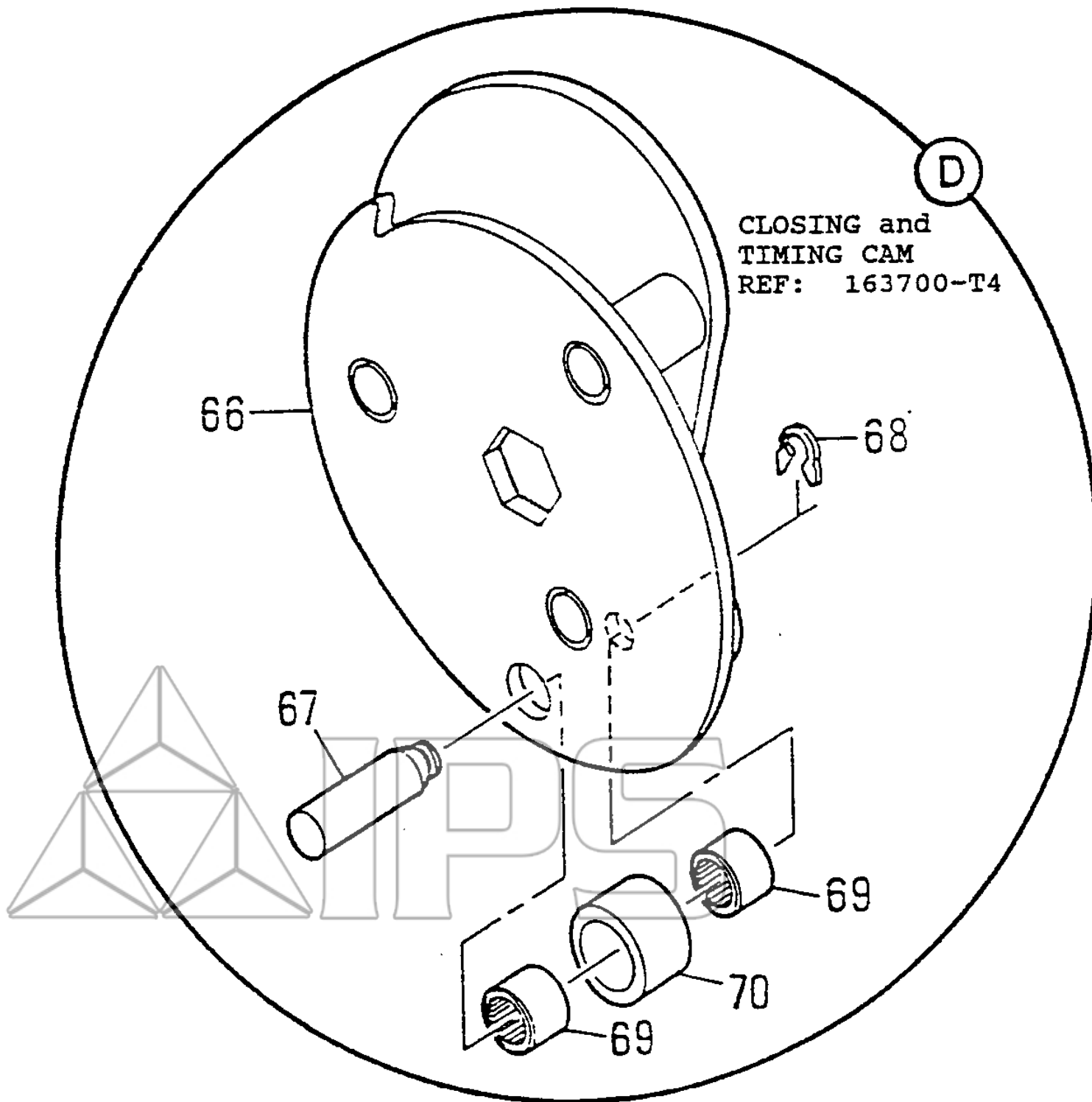


HOLDING PAWL CARRIER  
REF: 163700-T3

56	650050-B32	4	PIN
57	650440-G	8	RETAINER (TRUARC)
58	192307-A	3	PAWL
59	650044-C	3	SPIRAL PIN
61	191649-K2	1	HOLDING PAWL CARRIER
62	650213-E	2	SPRING
63	650050-B33	1	PIN
64	703250-A	2	RETAINER
65	191343-A	1	ROLLER

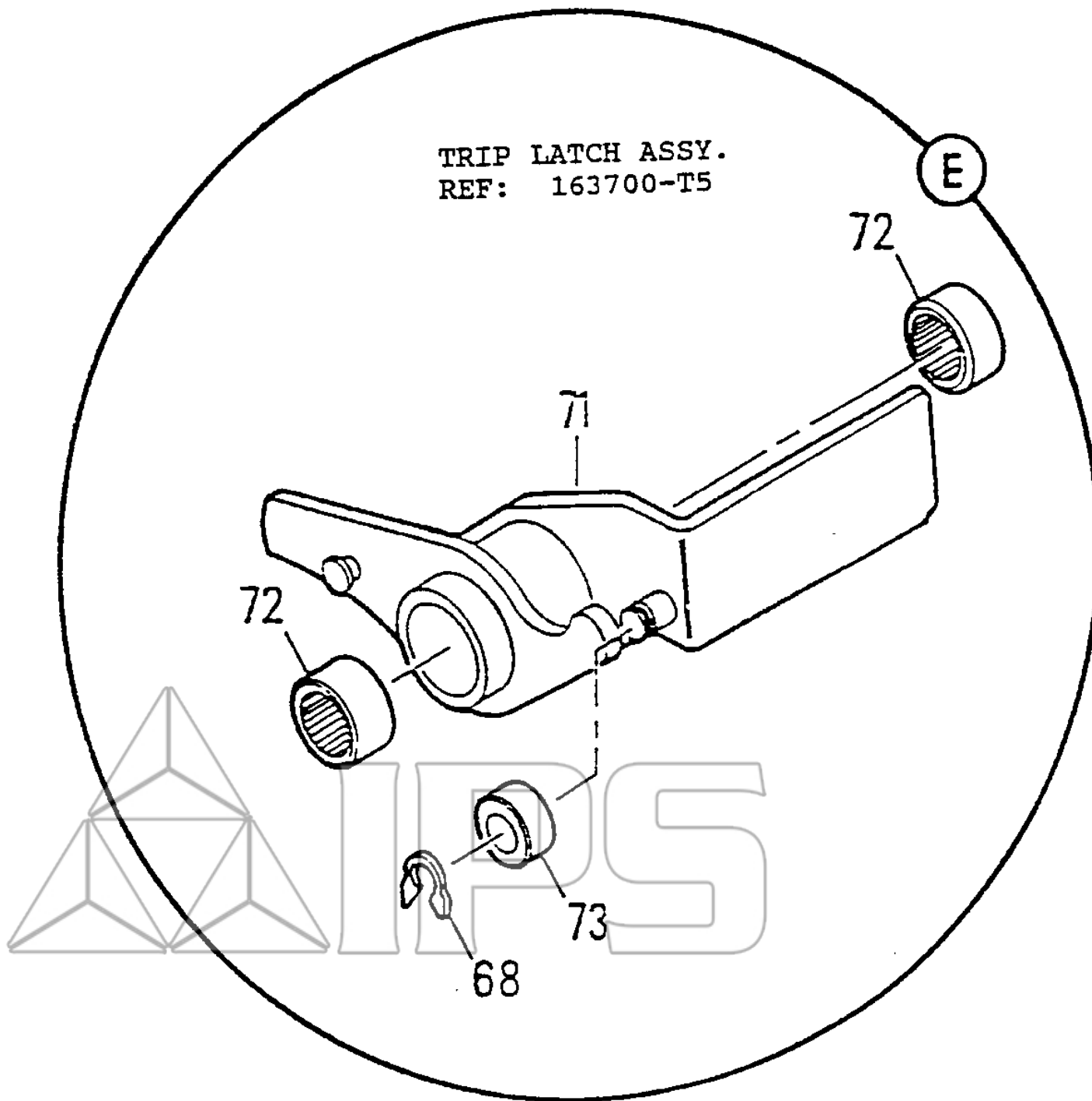
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66	194642-K1	1	CLOSING & TIMING CAM
67	192298-B	1	PIVOT PIN
68	702312-A	2	RETAINER
69	191566-C	2	NEEDLE BEARING
70	195206-A	1	PROP ROLLER

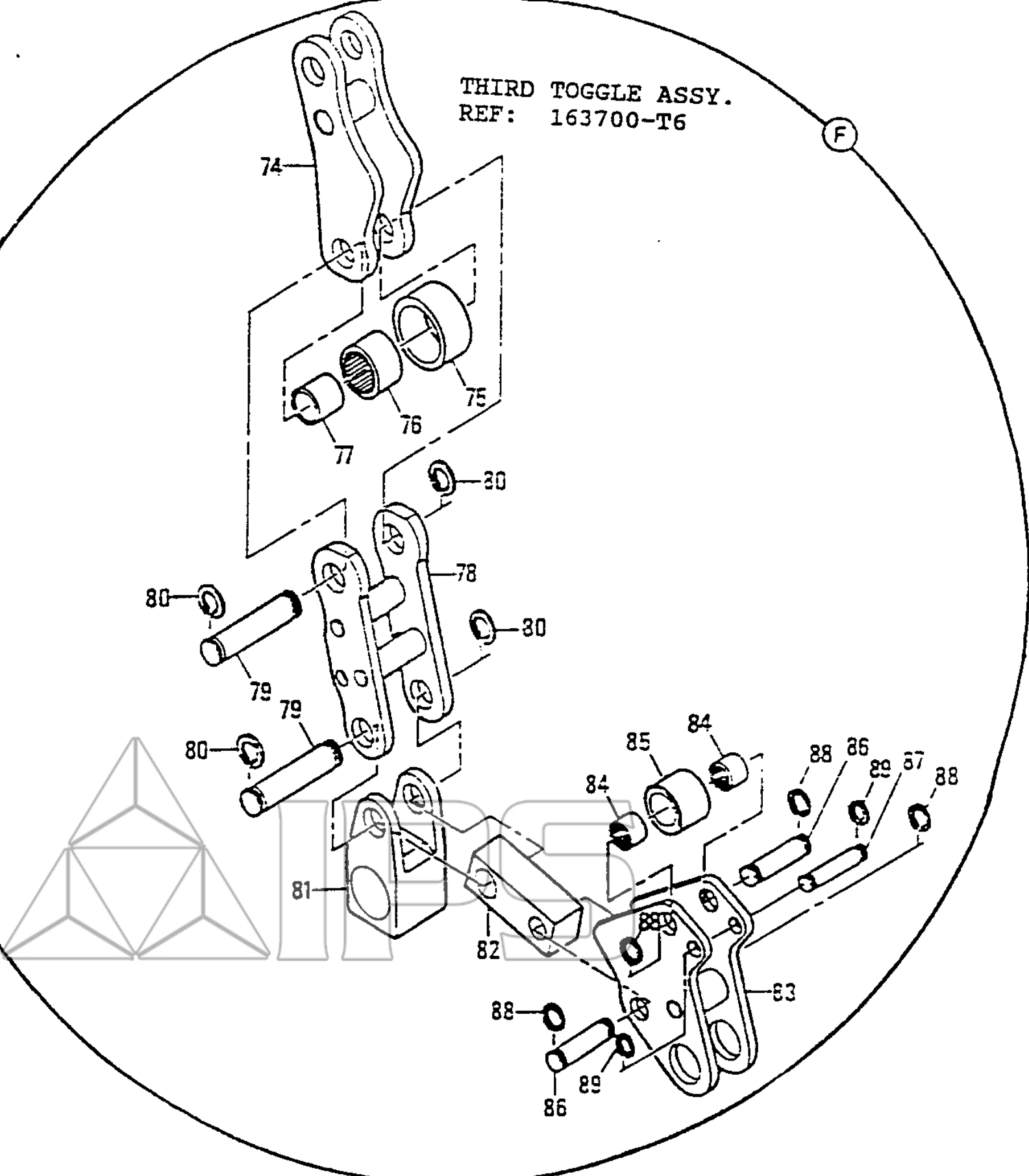


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68	702312-A	2	RETAINER
71	195089-K2	1	TRIP LATCH ASSY.
72	75547-D	2	NEEDLE BEARING
73	704131-A	1	ROLLER

THIRD TOGGLE ASSY.  
REF: 163700-T6

F



74	190770-K2	1	THIRD TOGGLE ASSY.
75	650301-C71	1	OUTER RACE
76	75547-A11	1	NEEDLE BEARING
77	650301-C70	1	INNER RACE
78	180089-K3	1	SECOND TOGGLE ASSY.
79	50131-B93	2	PIN
80	650433-A	4	RING, RETAINING
81	161786-B	1	FIRST TOGGLE
82	180092-A	1	LINK
83	180096-K2	1	TRIP ROLLER CARRIER
84	191566-B	2	BEARING
85	180097-A	1	TRIP ROLLER
86	50131-B92	2	PIN
87	650050-B19	1	PIN
88	53100-D	4	RING, RETAINING
89	53100-B	2	RING, RETAINING