

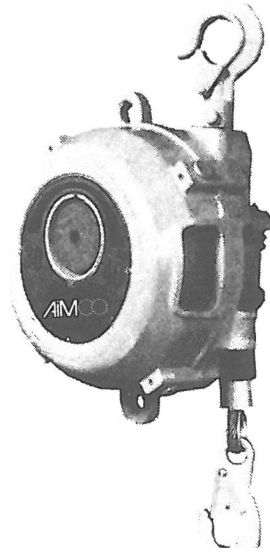
TW-Series
Spring Balancer
Operations Manual

MODELS TW-9 - TW-70



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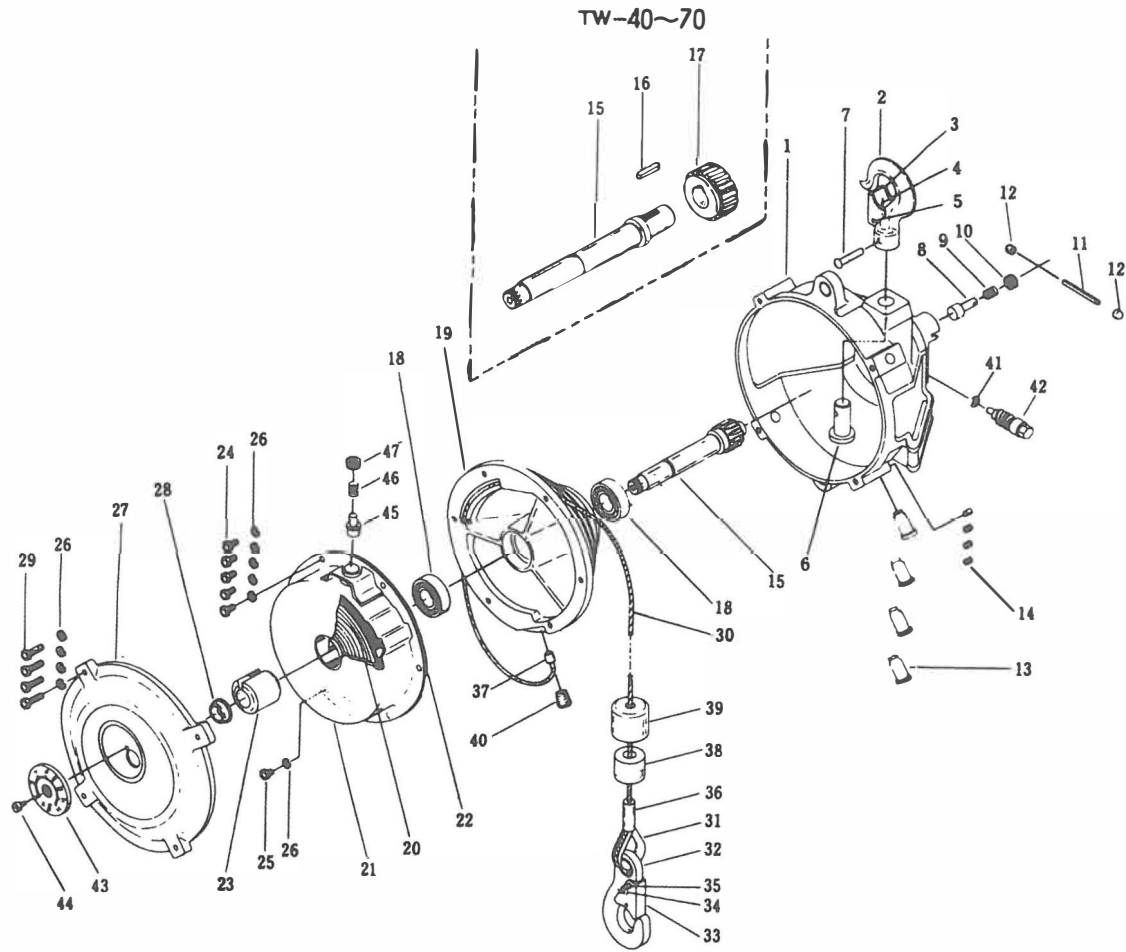


SPECIFICATIONS

MODEL	Capacity				Cable Travel		Net Weight	
	Minimum		Maximum		meter	feet	kg	lb
	kg	lb	kg	lb				
TW- 9	4.5	9.9	9.0	19.8	1.3	4.3	3.4	7.48
TW-15	9.0	19.8	15.0	33.0	1.3	4.3	3.8	8.36
TW-22	15.0	33.0	22.0	48.0	1.5	5.0	7.2	7.48
TW-30	22.0	48.0	30.0	66.0	1.5	5.0	8.5	15.84
TW-40	30.0	66.0	40.0	88.0	1.5	5.0	9.8	21.56
TW-50	40.0	88.0	50.0	110.0	1.5	5.0	10.4	22.88
TW-60	50.0	110.0	60.0	132.0	1.5	5.0	11.6	25.52
TW-70	60.0	132.0	70.0	154.0	1.5	5.0	11.8	25.96

IMPORTANT NOTE : All balancers listed above are designed to deliver true balance the within the ranges listed

I. SKETCH DRAWING



II. PARTS LIST

Index NO.	PART NAME	Parts No.							
		TW-9	TW-15	TW-22	TW-30	TW-40	TW-50	TW-60	TW-70
1	Case	9001	9001	22001	22001	40001	40001	40001	40001
	Main Hanger Set	9021	9021	22025	22025	22025	22025	22025	22025
2	Main Hanger	—	—	—	—	—	—	—	—
3	Latch	—	—	—	—	—	—	—	—
4	Latch Spring	—	—	—	—	—	—	—	—
5	Round Rivet	—	—	—	—	—	—	—	—
6	Main Hanger Shaft	9019	9019	22023	22023	22023	22023	22023	22023
7	Main Hanger Rivet	RR525	RR525	RR732	RR732	RR732	RR732	RR732	RR732
8	Stopper Pin	9018	9018	22055	22055	40055	40055	40055	40055
9	Stopper Spring	9016	9016	22019	22019	22019	22019	22019	22019
10	Stopper Pin Holder	9015	9015	22017	22017	22017	22017	22017	22017
11	Stop Ring Pin	PS2.535	PS2.535	PS340	PS340	PS340	PS340	PS340	PS340

Index No.	Parts Name	Parts No.							
		TW-9	TW-15	TW-22	TW-30	TW-40	TW-50	TW-60	TW-70
12	Cap	9049	9049	22056	22056	22056	22056	22056	22056
13	Safety Arm	9014	9014	22016	22016	22016	22016	22016	22016
14	Hex Cap Screw	SH512	SH512	SH612	SH612	SH612	SH612	SH612	SH612
15	Spindle	9009	9009	22010	22010	40010	40010	60010	60010
16	Key	Unnecessary				40012	40012	40012	40012
17	Worm Wheel	Unnecessary				40011	40011	40011	40011
18	Ball Bearing	Unnecessary		BB6004	BB6004	BB6004	BB6004	BB6004	BB6004
19	Drum	9003	9003	22003	22003	22003	22003	22003	22003
	Spiral Spring Set	9008	15008	22008	30008	40008	50008	60008	70008
20	Spiral Spring	—	—	—	—	—	—	—	—
21	Spring Case	—	—	—	—	—	—	—	—
22	Spring Case Cover	—	—	—	—	—	—	—	—
23	Bushing	9011	9011	22009	22009	40009	40009	60009	60009
24	Hex, Bolt	SH510	SH510	SH610	SH610	SH610	SH610	SH610	SH610
25	Hex, Bolt	Unnecessary		SH68	SH68	SH68	SH68	SH68	SH68
26	Spring Washer	WS52	WS52	WS62	WS62	WS62	WS62	WS62	WS62
27	Casing Cover	9002	9002	22002	22002	40002	40002	60002	60002
28	Casing Cover Bushing	9013	9013	22015	22015	22015	22015	22015	22015
29	Hex Bolt	SH520	SH520	SH620	SH620	SH620	SH620	SH620	SH620
	Cable Set	9040	9040	22044	22044	22044	22044	22044	22044
30	Cable	—	—	—	—	—	—	—	—
31	Thimble	—	—	—	—	—	—	—	—
32	Load Hook	—	—	—	—	—	—	—	—
33	Load Hook Latch	—	—	—	—	—	—	—	—
34	Load Hook Latch Spring	—	—	—	—	—	—	—	—
35	Round Rivet	—	—	—	—	—	—	—	—
36	Lock (A)	—	—	—	—	—	—	—	—
37	Lock (B)	—	—	—	—	—	—	—	—
38	Collar	9045	9045	22049	22049	22049	22049	22049	22049
39	Shock Absorber	9046	9046	22050	22050	22050	22050	22050	22050
40	Cable Set-Bolt	PH1/8	PH1/8	PH1/4	PH1/4	PH1/4	PH1/4	PH1/4	PH1/4
41	Thrust Washer	9012	9012	9012	9012	40014	40014	40014	40014
42	Worm	9010	9010	9010	9010	40013	40013	40013	40013
43	Gage	9039	15039	22043	30043	40043	50043	60043	70043
44	Gage Screw	9038	9038	9038	9038	9038	9038	9038	9038
45	Safety Device Pin	9017	9017	22021	22021	40021	40021	40021	40021
46	Safety Device Spring	9016	9016	22019	22019	40020	40020	40020	40020
47	Safety Device Spring Screw	9015	9015	22017	22017	40018	40018	40018	40018

Remarks : When ordering spare parts, please specify Index No. Part Name and Applicable Model.

Fig. 1

III. OPERATING PROCEDURE

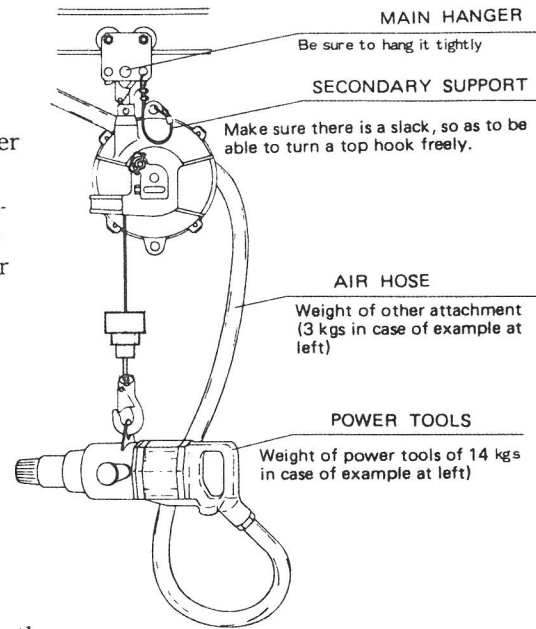
1. Selection of Correct Model (Refer to Fig.1)

- 1). Select the proper model of spring balancer for the loading weight of suspension.
When selecting a balancer, first consideration should be given to the weight of the total load to be balanced (tool plus cable or hose plus other attachments).

Example :

$$\begin{array}{rcl} \text{Weight of} & + & \text{Weight of} & = & \text{Weight of} \\ \text{Power Tool} & & \text{Attachment} & & \text{Total Load} \\ (14 \text{ kgs}) & & + (3 \text{ kgs}) & & = (17 \text{ kgs}) \end{array}$$

Select the Spring Balancer Model TW-22 in the above case.



- 2). In the case that the weight of total load is between maximum capacity of one spring balancer and minimum capacity of another spring balancer, for instance, where a total weight is 22 kgs, it is better to select a bigger capacity spring balancer, Model TW-30 (22 - 30 kgs in balance range) than TW-22 (15 - 22 kgs in balance range), otherwise it may shorten the life of the spiral spring if the smaller model, TW-22 in this case, is selected.

2. Manner of Suspension

Make sure of the following points, and suspend at a proper place.

- Ensure that the balancer is securely fastened.
- It must be in a position to operate smoothly, even if, the spring balancer is used in slanting position.
- Be sure to fit a secondary support chain.
(Make sure there is enough slack in secondary support chain, so as to be able to turn a top hook freely).
- Avoid possibility of colliding with another spring balancer, when installing two or more balancers on a trolley.

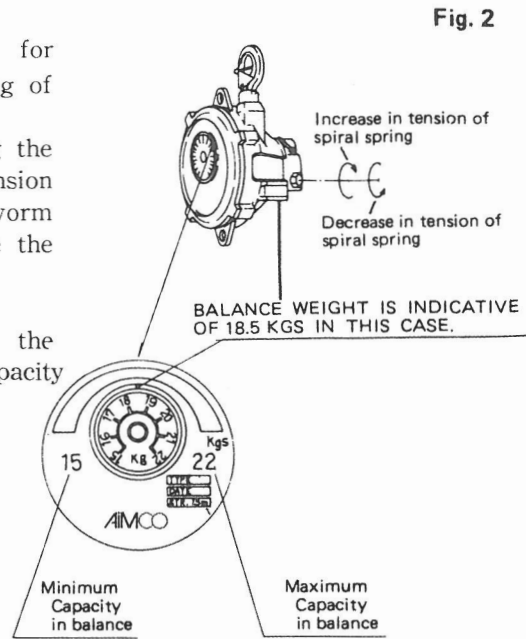
Note : -Always ensure that the top hook (main hanger), holding the balancer, is free to rotate.

3. Adjustment of Spiral Spring (Refer to Fig.2).

Adjust the tension of spiral spring to suit for loading weight and working condition by turning of worm.

Tension of spiral spring increases when turning the worm clockwise direction. To decrease the tension of spiral spring for load in light weight, turn worm counterclockwise direction. You can judge the approximate loading weight through gauge.

When supplying the products from factory, the tension of spiral spring is set in the middle of capacity



Note : -Avoid adjusting the spiral spring over or below the rated capacity of the balancer. Use balancer always within the balance range. If the spring is wound over its maximum capacity, it will shorten the stroke of the cable and decrease the life of spiral spring. And, if the spring is loosened to lower to tension than minimum capacity, safety device will act and stop operation prematurely.

4. Replacement of attached equipment (Refer to Fig. 3)

The following procedure should be adopted, in the following order if it is necessary to replace any parts during operation of spring balancers.

- 1). Pull all length of cable (wire rope) out of drum, and set stopper pin (8) at a groove as illustrated on Fig-3 and lock drum (19).
- 2). After making sure of locking the drum, change attached parts.

Note : It is very dangerous to attempt to replace any parts before making sure that the drum is locked by the stopper pin to prevent the spring snatching back. Therefore, DO NOT RELEASE MANUAL DRUM LOCK WITHOUT ATTACHING FULL LOAD.

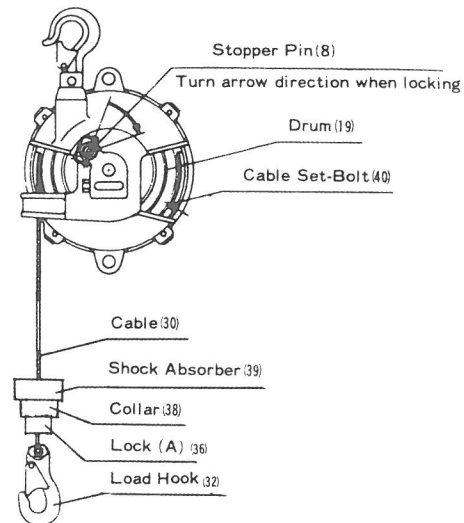
- 3). If weight of total load to be attached is different from previous equipment, readjust the tension of spiral spring anew.

Fig. 3

IV. DISASSEMBLING AND ASSEMBLING

1. Replacement of Cable (Refer to Fig. 3)

- 1). Pull all length of cable (30) out of drum and set stopper pin (8) at a groove (move to position of arrow on Fig. 3), and lock drum (19). In this condition, cable set-bolt (40) must be a position of Fig. 3.
- 2). Take attached equipment off load hook (32). (Detach attached equipment from load hook after making sure of that the drum is locked. Otherwise there is a danger of the cable being pulled suddenly if condition of lock is insufficient).
- 3). Remove cable set-bolt and take out cable set from drum.
- 4). Remove load hook (32), shock absorber (39), from cable. And, exchange damaged or worn-out cable for new one.
- 5). Fix cable set on drum. The manner of re-assembling of cable set in reversed order of disassembly.
- 6). Fix cable set bolt. Mount equipment to be attached on load hook and release stopper pin. **DO NOT RELEASE STOPPER PIN PRIOR TO ATTACHMENT EQUIPMENT.**



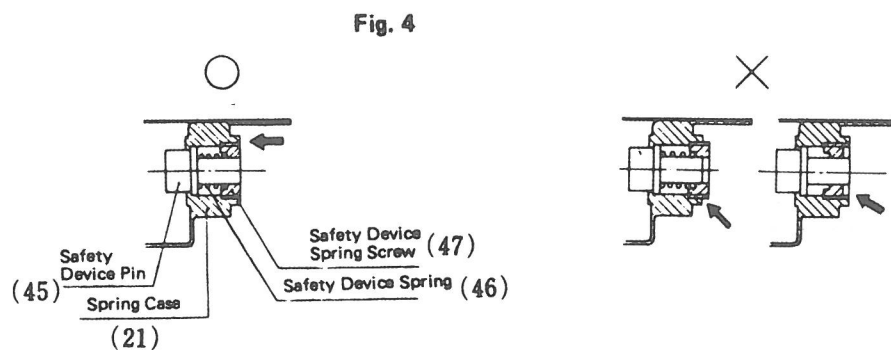
2. Procedure of Disassembly (disassemble in order of description)

When the spring balancer is to be disassembled, the procedure indicated below is recommended (refer to sketch drawing).

- 1). Take attached equipment off load hook (32). And detach spring balancer from trolley or beam.
- 2). Remove gauge (43).
- 3). Turn worm (42) counter-clockwise direction and loosen spiral spring (20) and remove worm. (worm come off case (1) when loosened spiral spring completely).
- 4). Remove hex cap screw (14) and take out safety arm (13).
- 5). Remove cable set bolt (40), and take out cable (30) from drum (19).
- 6). Remove casing cover (27).
- 7). Take spring case (21), drum (19) and spindle (15) simultaneously off case.
- 8). Pull out spindle (15), take spring case off drum.
- 9). Take bushing (23) and safety device pin off spring case.

3. Procedure of Assembly (Refer to Fig.4).

- 1). Install bushing (23) into spring case (21).
- 2). Install spindle (15) and spring case (21) on drum (19).
- 3). After making sure that stopper pin (8) is not at a position of drum lock, assemble drum, spindle and spring case and set casing cover (27).
- 4). Install safety arm (13). Fasten hex cap screw (14) correctly.
- 5). After installation thrust washer (41) onto the end of worm (42), assemble worm with turning clockwise direction.
- 6). Install cable (30). Fix cable set-bolt (40).



4. Load and Inspection of Operation

- 1). Turn worm clockwise direction and wind spiral spring.
- 2). Suspend spring balancer in position and adjust the balancer (adjust the tension of spiral spring).
 - 2-1). Attach an equipment on the load hook (32) and adjust the tension of the spiral spring by turning the worm to take up the length of stroke of cable. (It is recommended to set the balancer at a medium position of tension of spiral spring)
 - 2-2). Install safety device pin (45), safety device spring (46) and safety device spring screw (47).

The upper surface of the safety device spring screw should be adjusted to same level of surface of spring case.
 - 2-3). Attach gauge (43), Adjust the indication of gauge with loading weight.

V. MAINTENANCE AND INSPECTION

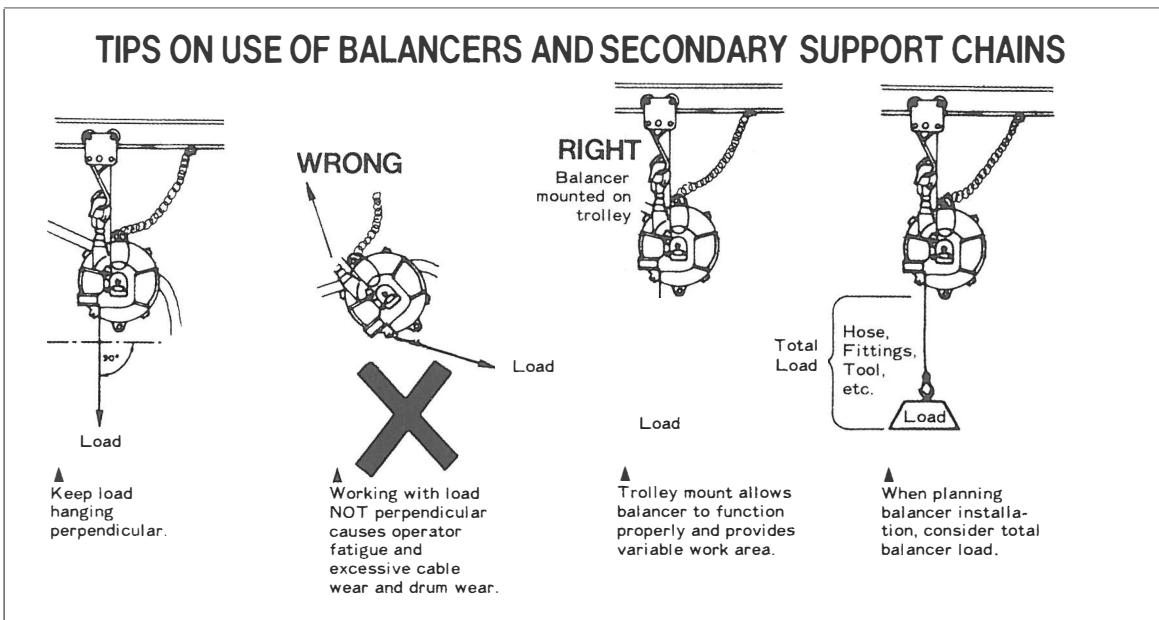
For the purpose of preventing of accidental falling, inspection should be carried out at least one time monthly.

- Make sure whether the bolts of the respective parts are not loosened.
- Make sure whether top hook and load are not worn-out or damaged.
- Make sure whether cable is not torn or worn-out
(Take care to check a condition of tear, kink of wire rope and damage of locking part of end on cable).

VI. AFTER SERVICE

- Make sure whether safety device operated correctly.

In the event that any part of the spring balancer has broken or damaged, repair immediately through the agent.





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