

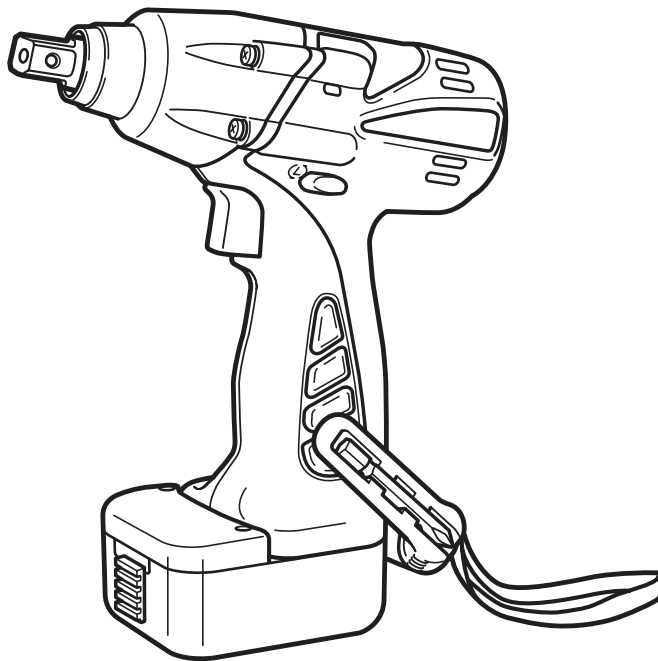
MODEL

WR 12DAF

Hitachi Power Tools

CORDLESS IMPACT WRENCH WR 12DAF

**TECHNICAL DATA
AND
SERVICE MANUAL**



LIST No. G812

Jun. 2004

REMARK:

Throughout this TECHNICAL DATA AND SERVICE MANUAL, a symbol(s) is(are) used in the place of company name(s) and model name(s) of our competitor(s). The symbol(s) utilized here is(are) as follows:

Symbol Utilized	Competitor	
	Company Name	Model Name
C	MAKITA	6918DW
P	DeWALT	DW053K



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1. PRODUCT NAME

Hitachi Cordless Impact Wrench, Model WR 12DAF

2. MARKETING OBJECTIVE

The current high-grade Model WR 12DM2 is obtaining high evaluation in the cordless impact wrench market. The new Model WR 12DAF is a popular version that provides an excellent cost/performance ratio, inheriting the well-reputed features of the Model WR 12DM2 such as soft grip and belt hook. Vigorous sales promotion is anticipated with the introduction of the new Model WR 12DAF ahead of the competitors.

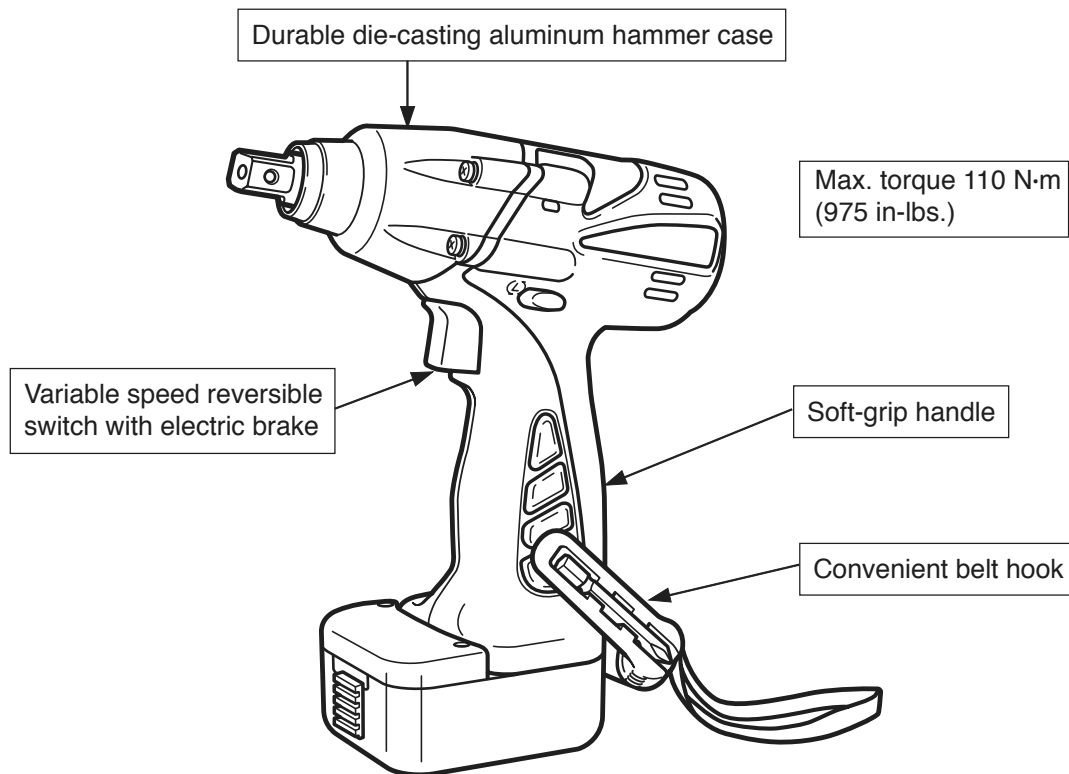
3. APPLICATIONS

- Tightening/loosening of bolts, nuts, etc.

[Applicable Markets]

- Construction industry: Assembly of scaffolding, roofing, aluminum sashes, fencing, etc.; removal of plastic cones from concrete forms, mounting/removal of form ties; drilling into the wood frames of concrete forms, etc.
- Manufacturing industry: Assembly work for automobiles, rolling stock, shipbuilding, agricultural machinery and tools, industrial machines, steel furniture, etc.
- Service industry: General repair work; installation of advertising aids, automobile repair, assembly of garages and carports storage sheds, etc.
- Various other assembly, construction or repair facilities

4. SELLING POINTS



4-1. Selling Point Descriptions

(1) Max. torque 110 N·m (975 in-lbs.)

The maximum torque of the Model WR 12DAF is 110 N·m (975 in-lbs.) thanks to the optimum striking design while maintaining high mechanical strength with the durable die-casting aluminum hammer case, etc.

(2) Soft-grip handle

The grip of the Model WR 12DAF is soft, slip-resistant and comfortable thanks to the soft resin (elastomer) covered on the handle.

(3) Convenient belt hook

A hook is very convenient if there is no place to put the impact wrench temporarily. Although various kinds of hooks are on the market, there is a user demand for a standard accessory hook. To cope with this demand, the Model WR 12DAF is equipped with the hook having the following features as a standard accessory.

- ① The hook can be quickly slid out and can be slid in when not needed.
- ② The hook is mountable on either side to cope with the use by either right-handed persons and left-handed persons. The mounting position can be changed by using a flat-blade screwdriver or a coin.
- ③ The angle of the hook is adjustable in five steps (0, 20, 40, 60 and 80°). The hook can be adjusted to the optimum position according to the weight of the socket in use.

5-1. Specifications

- 3 -

Charger (Model UC 14YFA)		<ul style="list-style-type: none">• Overcharge protection system: (1) Battery voltage detection (Δ^2V system) (2) Battery surface temperature detection (thermostat or thermistor) (3) 120-minute timer• Input capacity: 90 W• Charging time: Approx. 40 minutes [for type EB 1212S/EB 1214L battery at 20°C (68°F)] Approx. 50 minutes [for type EB 1220BL battery at 20°C (68°F)] Approx. 60 minutes [for type EB 1226HL battery at 20°C (68°F)]• Operable ambient temperature range: 0°C – 40°C (32°F – 104°F) The maximum allowable temperature of the type EB 1212S, EB 1214L and EB 1220BL battery is 60°C (140°F) and the type EB 1226HL battery is 45°C (113°F).		
Weight	Net	Main body (with battery EB 1214L/EB 1220BL/EB 1226HL) 1.6 kg (3.5 lbs.) (with battery EB 1212S) 1.5 kg (3.3 lbs.) Charger unit (UC 12SD) (including cord) 1.4 kg (3.1 lbs.) Charger unit (UC 14YFA) (including cord) 0.6 kg (1.3 lbs.)		
	Gross	WR 12DAF (SSK) (with extra battery) 5.1 kg (11.3 lbs.) WR 12DAF (SLSK) (with extra battery) 5.3 kg (11.7 lbs.) WR 12DAF (BLFK) (with extra battery) 4.5 kg (9.9 lbs.) WH 12DAF (HLFK) (with extra battery) 4.5 kg (9.9 lbs.)		
Standard accessories		Charger	Battery	Case
SSK (with extra battery)		○ UC 12SD x 1	○ EB 1212S x 2	○ x 1
SLSK (with extra battery)		○ UC 12SD x 1	○ EB 1214L x 2	○ x 1
BLFK (with extra battery)		○ UC 14YFA x 1	○ EB 1220BL x 2	○ x 1
HLFK (with extra battery)		○ UC 14YFA x 1	○ EB 1226HL x 2	○ x 1

*1: This torque is based on tightening an M12 (15/32") bolt (strength grade: 12.9) for 3 sec. with a hexagon socket.

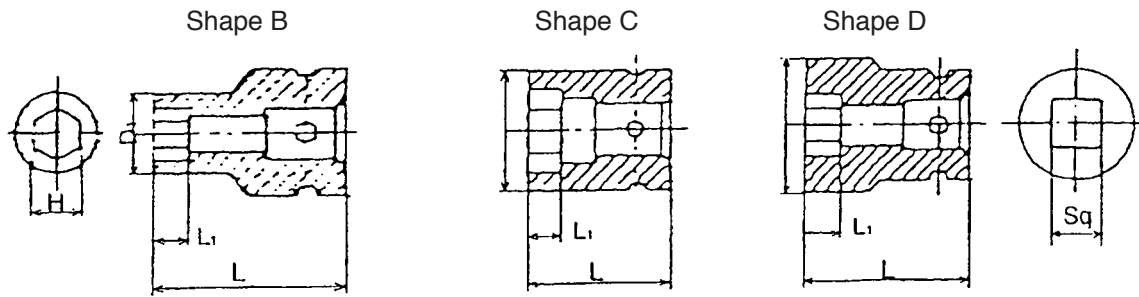
Pilot lamp indications (Model UC 14YFA)

Red pilot lamp remains lit or flashes	Prior to charging	Blinks	0.5 sec ON, 0.5 sec OFF ■ ■ ■ ■ ■	
	During charging	Lit	Stays ON constantly ■■■■■■■■■■	
	Charging completed	Blinks	0.5 sec ON, 0.5 sec OFF ■ ■ ■ ■ ■	
	Charging not possible	Flickers	0.1 sec ON, 0.1 sec OFF ■ ■ ■ ■ ■ ■ ■ ■	Storage battery or charger is faulty.
Green pilot lamp is lit	High battery temperature	Lit	Stays ON constantly ■■■■■■■■■■	Charging not possible because storage battery temperature is too high.

5-2. Optional Accessories

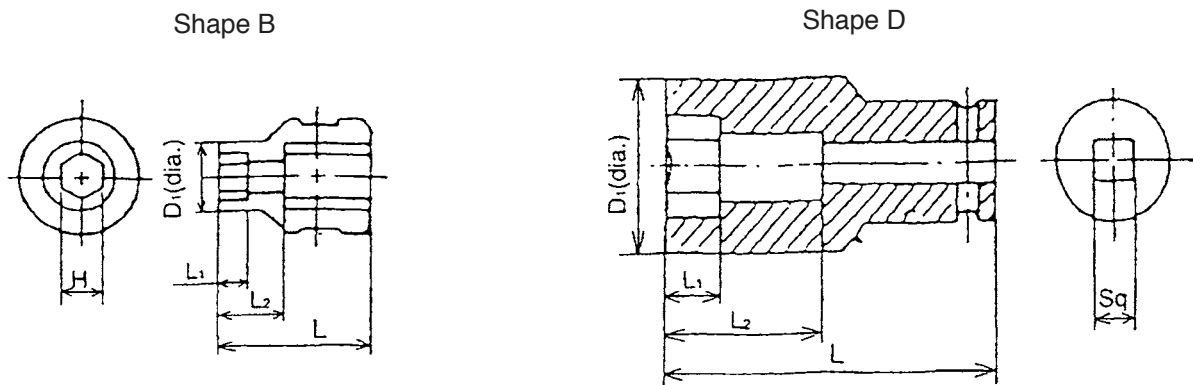
(1) Optional accessories

- Each dimension and applicable bolt for each hexagon socket



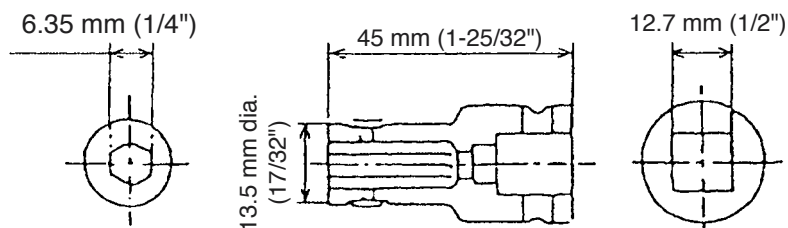
Square drive dimension Sq	Part name	Code No.	Nominal diameter of applicable bolts				Dihedral width H (mm)	Shape	Socket primary dimensions (mm)		
			ISO (High-strength)	ISO (Ordinary)	ISO (Small type)	Inch screw			L	L ₁	D ₁
12.7 mm (1/2")	Hexagon socket	10 mm 944291	—	M 6 (1/4")	—	—	10 (3/8")	B	40 (1-9/16")	8 (5/16")	18 (23/32")
		12 mm 873632	—	—	M 8 (5/16")	W 5/16"	12 (15/32")	B	40 (1-9/16")	8 (5/16")	20 (25/32")
		13 mm 873539	—	M 8 (5/16")	—	—	13 (1/2")	B	40 (1-9/16")	9 (11/32")	25 (1")
		14 mm 873540	—	—	M 10 (3/8")	—	14 (9/16")	B	40 (1-9/16")	9 (11/32")	25 (1")
		17 mm 873536	—	M 10 (3/8")	M 12 (15/32")	W 3/8"	17 (21/32")	C	32 (1-1/4")	8 (5/16")	28 (1-3/32")
		19 mm 873624	—	M 12 (15/32")	M 14 (9/16")	W 7/16"	19 (23/32")	C	34 (1-11/32")	9 (11/32")	28 (1-3/32")
		21 mm 873626	—	—	—	W 1/2"	21 (53/64")	D	36 (1-13/32")	10 (3/8")	32 (1-1/4")
		22 mm 873627	M 12 (15/32")	M 14 (9/16")	M 16 (5/8")	—	22 (7/8")	D	40 (1-9/16")	14 (9/16")	35 (1-3/8")

- Each dimension and applicable bolt for each long socket



Square drive dimension Sq	Part name	Code No.	Nominal diameter of applicable bolts				Dihedral width H (mm)	Shape	Socket primary dimensions (mm)			
			ISO (High-strength)	ISO (Ordinary)	ISO (Small type)	Inch screw			L	L ₁	L ₂	D ₁
12.7 mm (1/2")	Long socket	12 mm 955138	—	—	M 8 (5/16")	W 5/16"	12 (15/32")	B	52 (2-3/64")	20 (25/32")	34(1-11/32")	20 (25/32")
		13 mm 955139	—	M 8 (5/16")	—	—	13 (1/2")	B	52 (2-3/64")	20 (25/32")	34(1-11/32")	21.5 (53/64")
		14 mm 955140	—	—	M 10 (3/8")	—	14 (9/16")	B	52 (2-3/64")	20 (25/32")	34(1-11/32")	22 (7/8")
		17 mm 955141	—	M 10 (3/8")	M 12 (15/32")	W 3/8"	17 (21/32")	B	52 (2-3/64")	24 (15/16")	34(1-11/32")	25 (1")
		17 mm 955149	—	M 10 (3/8")	M 12 (15/32")	W 3/8"	17 (21/32")	B	75 (2-15/16")	24 (15/16")	57(2-1/4")	25 (1")
		19 mm 955142	—	M 12 (15/32")	M 14 (9/6")	W 7/16"	19 (23/32")	B	52 (2-3/64")	24 (15/16")	34(1-11/32")	28 (1-3/32")
		19 mm 955150	—	M 12 (15/32")	M 14 (9/6")	W 7/16"	19 (23/32")	B	75 (2-15/16")	24 (15/16")	57(2-1/4")	28 (1-3/32")
		21 mm 955143	—	—	—	W 1/2"	21 (53/64")	D	52 (2-3/64")	24 (15/16")	34(1-11/32")	31 (1-7/32")
		21 mm 955151	—	—	—	W 1/2"	21 (53/64")	D	75 (2-15/16")	24 (15/16")	57(2-1/4")	31 (1-7/32")
		21 mm 991480	—	—	—	W 1/2"	21 (53/64")	D	125 (4-47/51")	24 (15/16")	107 (4-7/32")	31 (1-7/32")
		22 mm 955144	M 12 (15/32")	M 14 (9/16")	M 16 (5/8")	—	22 (7/8")	D	52 (2-3/64")	24 (15/16")	34(1-11/32")	32.5 (1-9/32")

• Bit adaptor (Code No. 991476)



Part name	Overall length (mm)	Code No.
Plus hd. driver bit No.2	45 (1-25/32")	955229
	70 (2-3/4")	955654
Plus hd. driver bit No.3	45 (1-25/32")	955230
	70 (2-3/4")	955655

- Extension bar [Overall length 100 mm (3-15/16")] (Code No. 873633)
- Universal joint (Code No. 992610)
- Socket ass'y for duct

Dihedral width of applicable bolts	Code No.
12 (15/32")	993658
13 (1/2")	992613
14 (9/16")	992615

- EW-14R corner attachment (Code No. 9329-9001)

6. COMPARISONS WITH SIMILAR PRODUCTS

6-1. Specification Comparisons

Item \ Maker \ Model			HITACHI		C	P
			WR 12DAF	WR 12DM2		
Capacity	Ordinary bolt		M6 – M14 (1/4" – 9/16")	M6 – M16 (1/4" – 5/8")	M8 – M14 (5/16" – 9/16")	M6 – M16 (1/4" – 5/8")
	High-strength bolt		M6 – M10 (1/4" – 3/8")	M6 – M12 (1/4" – 15/32")	M6 – M12 (1/4" – 15/32")	—
Max. tightening torque ^{*1}		N·m	110 (975 in-lbs., 1020 kgf·cm)	165 (1460 in-lbs., 1683 kgf·cm)	120 (1063 in-lbs., 1220 kgf·cm)	160 (1400 in-lbs., 1632 kgf·cm)
No-load rotation speed		/min	0 – 2,200	0 – 2,600	0 – 2,300	0 – 2,400
Impact rate		/min	0 – 2,900	0 – 3,200	0 – 3,000	0 – 3,000
Main body weight ^{*2}		kg	1.6 (3.5 lbs.) : With EB 1214L/ EB 1220BL/ EB 1226HL	1.6 (3.5 lbs.)	1.6 (3.5 lbs.)	1.75 (3.9 lbs.)
			1.5 (3.3 lbs.) : With EB 1212S			
Overall length		mm	181 (7-1/8")	162 (6-3/8")	176 (6-15/16")	168 (6-39/64")
Overall height		mm	226 (8-7/8") : With EB 1214L/ EB 1220BL/ EB 1226HL	226 (8-7/8")	231 (9-3/32")	233 (9-11/64")
			217 (8-1/2") : With EB 1212S			
Center height		mm	26 (1-1/64")	26.5 (1-1/64")	26 (1-1/64")	29 (1-9/64")
Tip condition			12.7 mm (1/2") square drive	12.7 mm (1/2") square drive	12.7 mm (1/2") square drive	12.7 mm (1/2") square drive
Tool tip mounting system			Plunger	Plunger	—	Plunger
Switch	Variable speed		Equipped	Equipped	Equipped	Equipped
	Electric brake		Equipped	Equipped	Equipped	Equipped
Type of motor			DC magnet	DC magnet	DC magnet	DC magnet
Voltage		V	12	12	12	12
Battery	Type		EB 1212S/EB 1214L/ EB 1220BL/EB 1226HL	EB 1220BL/EB 1230HL	1234	DE9071
	Nominal capacity	Ah	1.2/1.4/2.0/2.6	2.0/3.0	2.6	2.0
	Nominal voltage	V	12	12	12	12
Charger	Model		UC 12SD/UC 14YFA	UC 14YFA	DC 1411	DW9107
	Recharging voltage	V	12/7.2 – 14.4	7.2 – 14.4	7.2 – 14.4	8.0 – 20
	Charging time	min.	EB 1212S, EB 1214L Approx. 60/40 min.	EB 1220BL Approx. 50 min.	60 min.	60 min.
			EB 1220BL ^{*3} Approx. – /50 min.	EB 1230HL Approx. 70 min.		
			EB 1226HL ^{*3} Approx. – /60 min.			
Standard accessories			• Plastic case • Charger (UC 12SD/UC 14YFA)	• Plastic case • Charger (UC 14YFA)	• Plastic case • Charger	• Plastic case • Charger

*1: Max. tightening torque is based on tightening an M12 (15/32") bolt (strength grade: 12.9) for 3 sec. with a hexagon socket.

*2: Main body weight does not include accessory tools (hexagon socket etc.).

*3: This type of battery could not be charged by the Model UC 12SD.

6-2. Tightening Torque

6-2-1. Screw Diameter and Appropriate Tightening Torque

Generally speaking, the appropriate tightening torque for a screw can be determined by the strength grade of the screw and the material tightened. Tables 1 and 2, and Fig. 1 below list data relative to the strength grade of various screws and the appropriate tightening torque. For further reference, appropriate tightening torque is calculated with the following formula. Study and use this formula for accurate selection of tightening torque.

$$T = k \cdot d \cdot p$$

T: Appropriate tightening torque (kgf·cm)

d: Nominal diameter for the screw (mm)

p: Recommended axial tightening force to be applied to the screw (kgf)

$p = \text{rated axial stress (kgf/cm}^2\text{)} \times 0.8 \times \text{effective sectional area of the thread (mm}^2\text{)}$

K: Torque coefficient (0.17)

- Strength grade and rated axial stress of threads

Table 1

Strength grade	4.8	6.8	8.8	12.9
Rated axial stress (kgf/mm ²)	29.1	43.7	58.2	95
Material	Mild steel		Alloy steel including Ni, Mn, Cr, etc.	
Heat treatment	None		Processed-hard material	

- Diameter and effective sectional areas of threads

Table 2

Kind of thread (x pitch)	M5 x 0.8 mm (3/16")	M6 x 1 mm (1/4")	M8 x 1.25 mm (5/16")	M10 x 1.5 mm (3/8")	M12 x 1.75 mm (15/32")	M14 x 2 mm (9/16")
Effective sectional area of thread (mm ²)	14.2	20.1	36.6	58.0	84.3	115

- Thread diameter and appropriate tightening torque

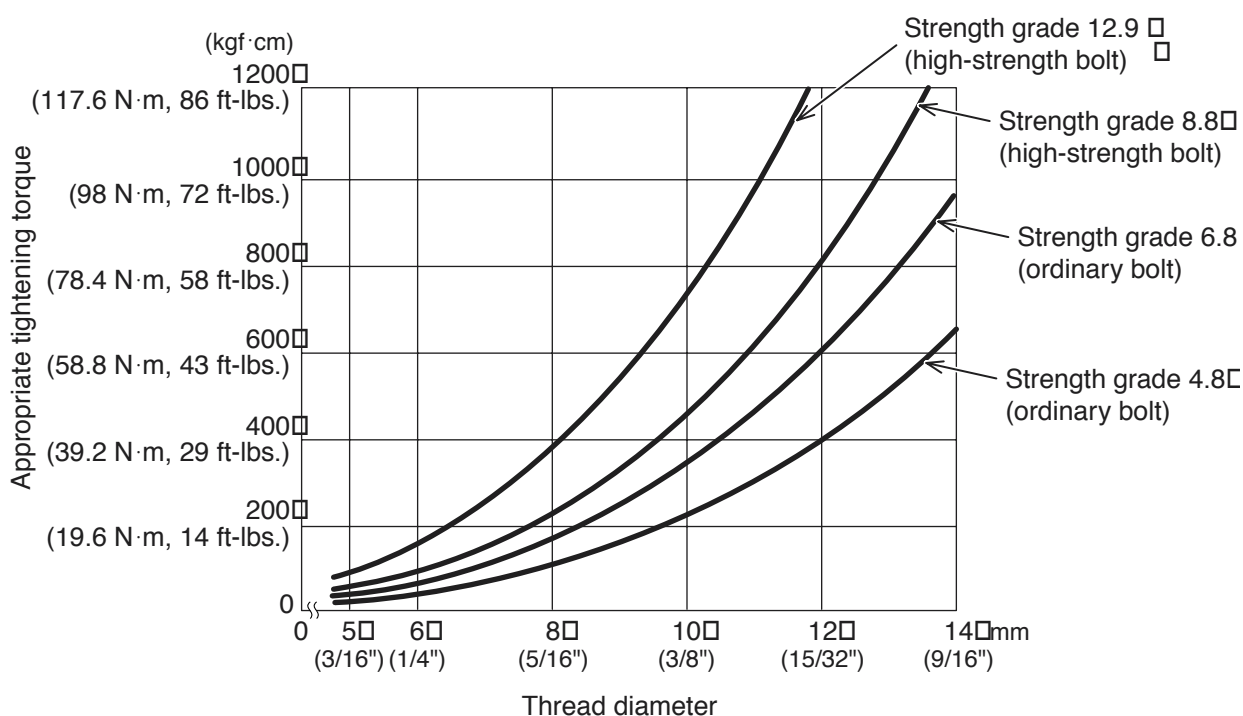


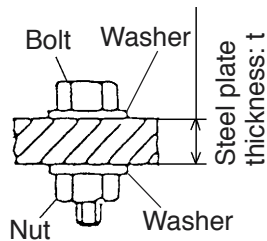
Fig. 1

6-2-2. Bolt Tightening Torque Characteristics

Figure 2 shows relationships between time and tightening torque for individual bolt types and sizes. While the data are useful for handy reference, actual tightening torque will vary depending on tightening conditions and other variables. For details, please refer to Para. 7-3, Tightening Torque Variation.

(Note)

- The term "tightening time" indicates the impact time after the lower surface of the bolt has come in contact with the material into which it is being tightened.
- In the tightening conditions shown in Fig. 2, the screws are being tightened directly into a steel plate; accordingly, the torque goes up very abruptly in comparison with ordinary bolt tightening conditions.



* The following bolts were utilized:
Ordinary bolt; strength grade 4.8
High-strength bolt; strength grade 12.9

Strength grade is read as follows:
4.8
Yield point or durable force: (45,500 psi)
Tensile strength of the bolt: (56,900 psi)

• Model WR 12DAF

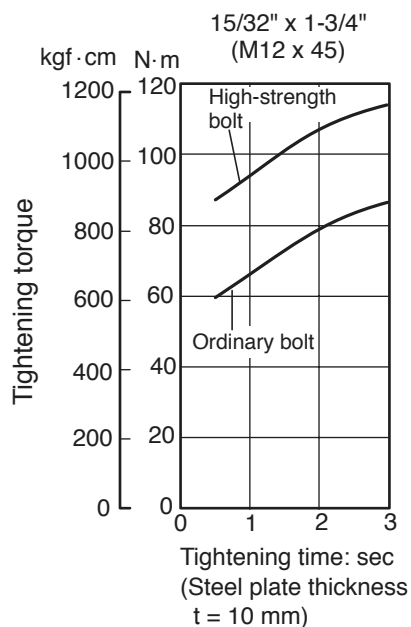
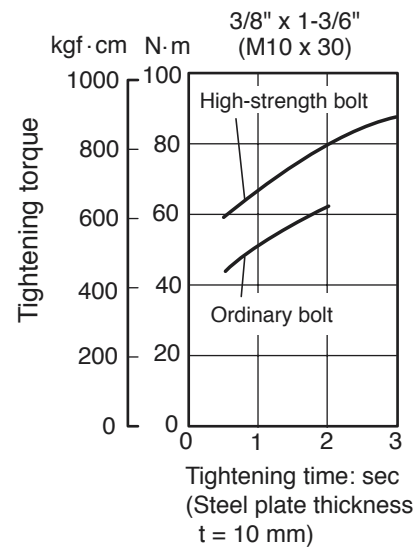
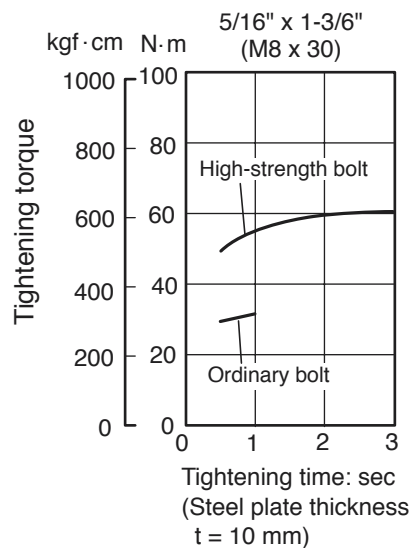


Fig. 2

7. PRECAUTIONS IN SALES PROMOTION

7-1. Safety Instructions

In the interest of promoting the safest and most efficient use of these tools by all our customers, it is very important that at the time of sale the salesperson carefully ensures that the buyer seriously recognizes the importance of the contents of the Handling Instructions, and fully understands the meaning of the precautions listed on the Caution Plate and Name Plate attached to each tool.

A. Handling Instructions

Salespersons must be thoroughly familiar with the contents of the Handling Instructions in order to give pertinent advice to the customer. In particular, they must have a thorough understanding of the precautions in the use of the cordless (battery charger type) electric power tools which are different from those of ordinary electric power tools.

- (1) Before use, ensure that the unit is fully charged.

New units are not fully charged. Even if the units were fully charged at the factory, long periods without use, such as during shipping, cause the storage battery to lose its charge. Customers must be instructed to fully charge the unit prior to use.

- (2) When charging storage batteries, use only the exclusive Model UC 12SD or UC 14YFA charger provided with the tool. Because of the designed rapid-charging feature (about one hour), use of other battery chargers is hazardous.

- (3) Follow prescribed steps in using the charger.

First connect the EB 12 storage battery to the Model UC 14YFA charger, then plug the charger into an AC outlet (ensuring that the voltage matches that indicated on the unit). If this order is reversed, the charger may not function properly.

- (4) Ensure the power source voltage is the same as that indicated on the Name Plate of the charger. Use of any other power source (DC outlet, fuel powered generator, etc.) will cause the charger to overheat and burn out.

- (5) Do not use any voltage increasing equipment (transformer etc.) between the power source and the charger.

If the charger is used with voltage over and above that indicated on the unit, it will not function properly.

- (6) Conduct battery charging at an ambient temperature range of 0 °C — 40° C (32 °F — 104 °F).

Special temperature sensitive devices are employed in the charger to permit rapid charging. Ensure that customers are instructed to use the charger at the indicated ambient temperature range. At temperatures under 0 °C (32 °F), the thermostat will not function properly, and the storage battery may be over-charged. At temperatures over 40 °C (104 °F), the storage battery cannot be sufficiently charged. The optimum temperature range is 20 °C — 25 °C (68 °F — 77 °F).

- (7) The battery charger should not be used continuously.

At high ambient temperatures, if over three storage batteries are charged in succession, the temperature of the coils on the transformer will rise and there is a chance that the temperature fuse inserted in the interior of the transformer will inadvertently melt. After charging one battery, please charge the next battery after about a fifteen-minute interval.

- (8) The charger case is equipped with air vents to protect the internal electronic components from overheating.

Caution the customer not to allow foreign materials, such as metallic or flammable objects, to be dropped or inserted into the air vents. This could cause electrical shock, fire or other serious hazards.

(9) Do not attempt to disassemble the storage battery or the charger.

Special devices, such as a thermostat, are built into the storage battery and charger to permit rapid charging. Incorrect parts replacement and/or wiring will cause malfunctions which could result in fire or other hazards. Instruct the customer to bring these units to an authorized service center in the event repair or replacement is necessary.

(10) Disposal of the Type EB 1212S, EB 1214L, EB 1220BL or EB 1226HL storage battery

Ensure that all customers understand that Type EB 1212S, EB 1214L, EB 1220BL or EB 1226HL storage batteries should be turned in to any Hitachi power tool sales outlet or authorized service center when they are no longer capable of being recharged or repaired. If thrown into a fire, the batteries may explode, or if discarded indiscriminately, leakage of the cadmium compound contained in the battery may cause environmental pollution.

B. Caution Plates

(1) The following precautions are listed on the Name Plate or Caution Plate attached to the main body of each tool.

For Asia and Oceania

CAUTION

- Read thoroughly **HANDLING INSTRUCTIONS** before use.

For the U.S.A. and Canada

Warning

- To reduce the risk of injury, user must read and understand Instruction Manual.

AVERTISSEMENT

- Afin de réduire le risque de blessures, l'utilisateur doit lire et bien comprendre le mode d'emploi.

(2) The following cautions are listed on the Name Plate attached to each Type EB 1212S, EB 1214L, EB 1220BL or EB 1226HL storage battery:

For Europe

- CAUTION**
- Read thoroughly **HANDLING INSTRUCTIONS** before use.
 - Do not disassemble nor throw into fire.

For the U.S.A. and Canada

- CAUTION**
- For safe operation, see Instruction Manual.
 - Use **HITACHI** charger recommended in instruction manual for recharging.

(3) The following caution is listed on the Name Plate attached to the Model UC 12SD or UC 14YFA charger.

< UC 12SD >

For the U.S.A. and Canada

- CAUTION** • For safe operation, see instruction manual.
- Charger HITACHI rechargeable battery types EB 1212S, FEB 12S and EB 1214L. Other types of batteries may burst causing personal injury and damage.
 - Charge between 50°F and 104°F. Rest 15 minutes between the charging of batteries.
 - Indoor use only. • Replace defective cord immediately.

< UC 14 YFA >

For the U.S.A. and Canada

- CAUTION**
- For safe operation, see Instruction Manual.
 - Charge HITACHI rechargeable batteries Type EB 7, EB 9, EB 12 and EB 14 series. Other types of batteries may burst causing personal injury and damage.
 - Charge between 32 and 104°F. Rest 15 minutes between the charging of batteries.
 - Indoor use only.
 - Replace defective cord immediately.

7-2. Tightening Torque Inspection Prior to Operation

As described and shown in Para. 6-2-2, the output tightening torque of which the Model WR 12DAF is capable in excess of the rated tightening torque of certain bolts and screws. Accordingly, if the tightening time is prolonged for such bolts and screws, it could cause damage to their threads or, in the worst case, cause them to be sheared off. (This phenomenon is common to all existing impact wrenches.) Particularly when tightening M6 (1/4") or smaller screws, tightening time must be kept extremely short: 0.5 seconds or less. The customer should be advised to carry out several bolt tightening operations and adjust the tightening time as necessary by measuring the tightening torque with an appropriate torque wrench before commencing continuous operation.

7-3. Tightening Torque Variation

The tightening torque of the cordless impact wrench may vary slightly in accordance with the factors described below. Salespersons are requested to advise the customer to confirm that appropriate tightening torque is obtained by measuring the torque with an appropriate torque wrench at the beginning of the tightening operations, and as necessary during the tightening operations. In addition, the torque values shown in Para. 6-2-1 above are useful as a handy reference, and may be utilized as tentative standards.

(1) Voltage of battery

Tightening torque is affected by the voltage output of the battery. Tightening torque decreases as the number of bolts tightened increases. This phenomenon is caused by the decline in voltage output of the battery due to the increasing number of bolts tightened. In particular, the tightening torque decreases rapidly just before the battery is fully discharged. As this phenomenon is an inherent drawback in any cordless impact wrench, salespersons are requested to ensure that the customer is fully aware of and understands this characteristic.

(2) Effects of low ambient temperatures

The tightening torque required may be reduced at low ambient temperatures or under the influence of grease and different torque coefficients (dependent on manufacturing and finishing processes, and specified by bolt manufacturers).

(3) Different bolt diameter

Differences in bolt diameter will cause variation of the required levels of tightening torque. Generally speaking, tightening torque is higher for large bolts.

(4) Different materials being tightened

When a bolt is tightened into a soft material such as aluminum, plastic, wood, etc., the tightening torque is considerably less than when the bolt is tightened into a hard material such as steel.

(5) Different tightening conditions

The tightening torque may vary in accordance with bolt torque coefficient (dependent on manufacturing process, and specified by bolt manufactures), bolt grade and bolt length, even though the dimensions of the bolts are the same. Tightening torque may also vary depending on the surface finishing state of tightening materials (steel, aluminum, etc.), and materials to be tightened. In addition, if there is seal packing, clearance, etc., between tightening materials, the tightening torque is decreased.

(6) Wear and looseness of the socket

With extended use, the hexagonal portion of the socket which is fitted to the head of the bolt and/or hexagonal portion of the socket which is fitted onto the anvil in the main body will become worn and loose. Wear and looseness will cause a proportionate loss of tightening torque.

In addition, use of an incorrect size socket (slightly larger than the bolt being tightened) will also result in decreased torque.

(7) Bolt and nut rotate together

Tightening torque that can be achieved will be considerably decreased if the bolt and nut rotate together during the tightening operation. The customer should be advised to carefully observe the operation and ensure this does not occur.

7-4. Suggestions and Precautions for the Efficient Use of the Charger and Storage Batteries

(1) Batteries may not be rechargeable immediately after use

If any of the storage batteries Types EB 1212S, EB 1214L, EB 1220BL and EB 1226HL is exposed to direct sunlight for an extended period or if the temperature of the battery is high immediately after it has been used in the tool, the battery may not be chargeable when the battery is connected to the charger. Chargeable temperature ranges of each type of battery are specified as follows.

Types EB 1212S, EB 1214L and EB 1220BL: from -5°C to 60°C (from 23°F to 140°F)

Type EB 1226HL: from 0°C to 45°C (from 32°F to 113°F)

In such a case, the customer should be advised to place the battery in a shaded area with a good airflow, and allow sufficient cooling before recharging. This phenomenon is common to all existing batteries that employ a thermostat. The cooling time required before charging varies from a few minutes to about 30 minutes, depending on the load, duration of use, and ambient temperature.

8. OTHER PRECAUTIONS

(1) Check for cracks or other damage on the socket

Cracks or any other faults on the socket are very hazardous. In addition, cracks or other damage to accessories will cause loss of tightening torque efficiency. Advise the customer to inspect accessories often, and ensure there are no abnormalities.

(2) Socket dimensions

Without fail, utilize an appropriate socket which matches the bolt and/or nut dimensions. If the socket dimensions are larger than the bolts or nuts, it will not only cause insufficient tightening torque, but could also easily cause damage to the socket. Please refer to the tables in Para. 5-2 for appropriate socket dimensions.

(3) Hammering section lubrication

Frequent or continuous use of the tool will cause excessive temperature rise of the hammering section, resulting in depletion of the grease and subsequent increased wear of components which will, in turn, cause loss of tightening efficiency. Accordingly, it is necessary to periodically replenish the grease in the hammering section to ensure proper lubrication of moving and sliding components.

9. REPAIR GUIDE

WARNING: Without fail, remove the Types EB 1212S, EB 1214L, EB 1220BL or EB 1226HL battery from the main body before starting repair or maintenance work. Because the tool is cordless, if the battery is left in and the switch is activated inadvertently, the motor will start rotating unexpectedly, which could cause serious injury.

9-1. Precautions in Disassembly and Reassembly

The **[Bold]** numbers correspond to the item numbers in the Parts List and the exploded assembly diagram for the Model WR 12DAF.

9-1-1. Disassembly

(1) Removal of the Gear Box Ass'y [1]

Remove the four Tapping Screws (W/Sp. Washer) D4 x 35 (Black) [2] that connect the Hammer Case [3] with Housing (A).(B) Set [29]. Remove the Hammer Case [3], the Inner Cover [21] and the Damper [22] together from Housing (A).(B) Set [29]. Remove the Retaining Ring [23]. Then the Gear Box Ass'y [1] can be removed.

(2) Removal of the Hook Ass'y [34] [36]

Remove the Special Screw M5 [42] with a flatblade screwdriver or a coin then remove the Hook Ass'y [34] [36] and the Hook Spring [41].

(3) Removal of housing (B)

Remove the seven Tapping Screws (W/Flange) D4 x 20 (Black) [27] from the main body to remove housing (B).

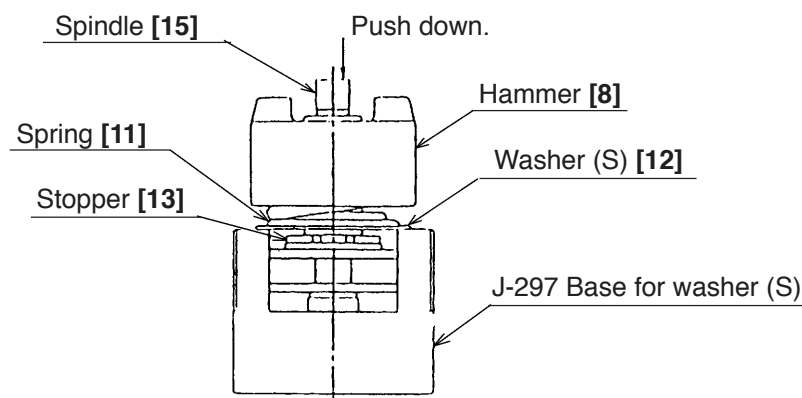
(4) Remove the DC-Speed Control Switch [31], the Fin [40] and the Motor [24] together. Remove the Pushing Button [32] and the Strap (Yellow) [38].

(5) Disassembly of the switch ass'y

Disconnect the Internal Wire (Red) 115L [25] and the Internal Wire (Black) 60L [26] from the DC-Speed Control Switch [31] with a soldering iron. Remove the Machine Screw (W/Sp. Washer) M3 x 4 [39] to remove the Fin [40] from the FET of the DC-Speed Control Switch [31].

(Note) Do not disconnect the three FET internal wires soldered to the DC-Speed Control Switch [31].

(6)



Mount the hammer assembly onto the J-297 base for washer (S). With a hand press, push down the top of the Spindle [15] to compress the Spring [11]. In this position, remove the Stopper [13] with a flat-blade screwdriver, then release the hand press. (See Fig. 3.)

Fig. 3

Remove the hammer assembly from the J-297 base for washer (S) and support the end surface of the Spindle [15]. With a hand press, push down either of the raised faces of the Hammer [8] to compress the Spring [11]. In this position, extract the two Steel Balls D5.556 [7] from the cam grooves of the Spindle [15] and the Hammer [8] with a small flat-blade screwdriver or a similar tool. Then, slowly release the hand press and lift the Hammer [8] and Washer (S) [12] together to extract them from the Spindle [15]. The Spring [11] can then be removed.

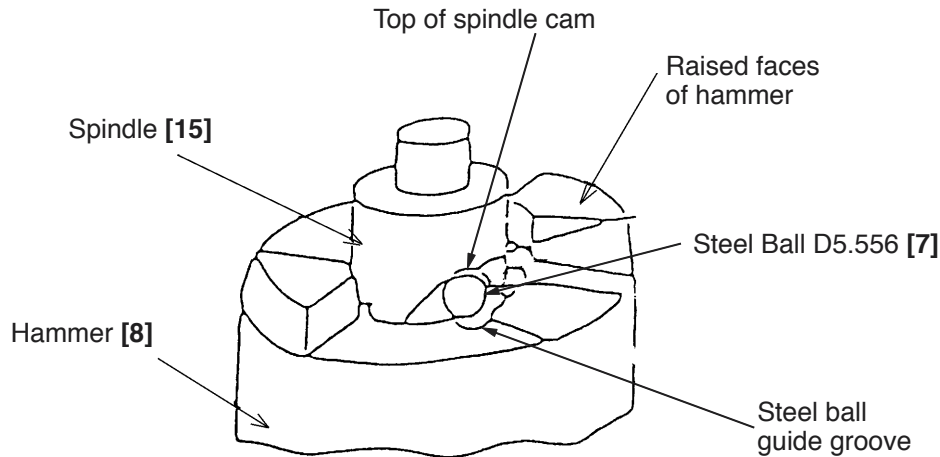


Fig. 4

9-1-2. Reassembly

Reassembly can be accomplished by following the disassembly procedures in reverse. However, special attention should be given to the following items.

(1) Reassembly of Housing (A) assembly

- (a) Be sure to follow the wiring diagram (Fig. 5) for proper wiring.
- (b) Pay attention to the polarity of the Motor [24] when soldering the Internal Wire (Red) 115L [25] and Internal Wire (Black) 60L [26] to the Motor [24]. The red-marked side of the Motor [24] is positive.
- (c) Mount the Motor [24] into housing (A) so as to pay attention to the position of the Internal Wire (Red) 115L [25] and the depression for preventing motor body from rotating fit in housing (A).

(Note) Make sure that the Internal Wire (Red) 115L [25] is passed under the motor so that it is not caught between the motor and housing (A).

- (d) Mount the DC-Speed Control Switch [31] to housing (A) so that the projection of the forwarding/reversing lever at the top of the switch is inserted into the U-shaped groove of the Pushing Button [32]. Secure the Fin [40] to the FET of the DC-Speed Control Switch [31] with the Machine Screw (W/Sp. Washer) D3 x 4 [39].

(Note) Make sure that the three internal wires from the FET are passed above the DC-Speed Control Switch [31]. To avoid pinching, be careful not to place the internal wire of the battery terminal on the terminal plate of the DC-Speed Control Switch [31].

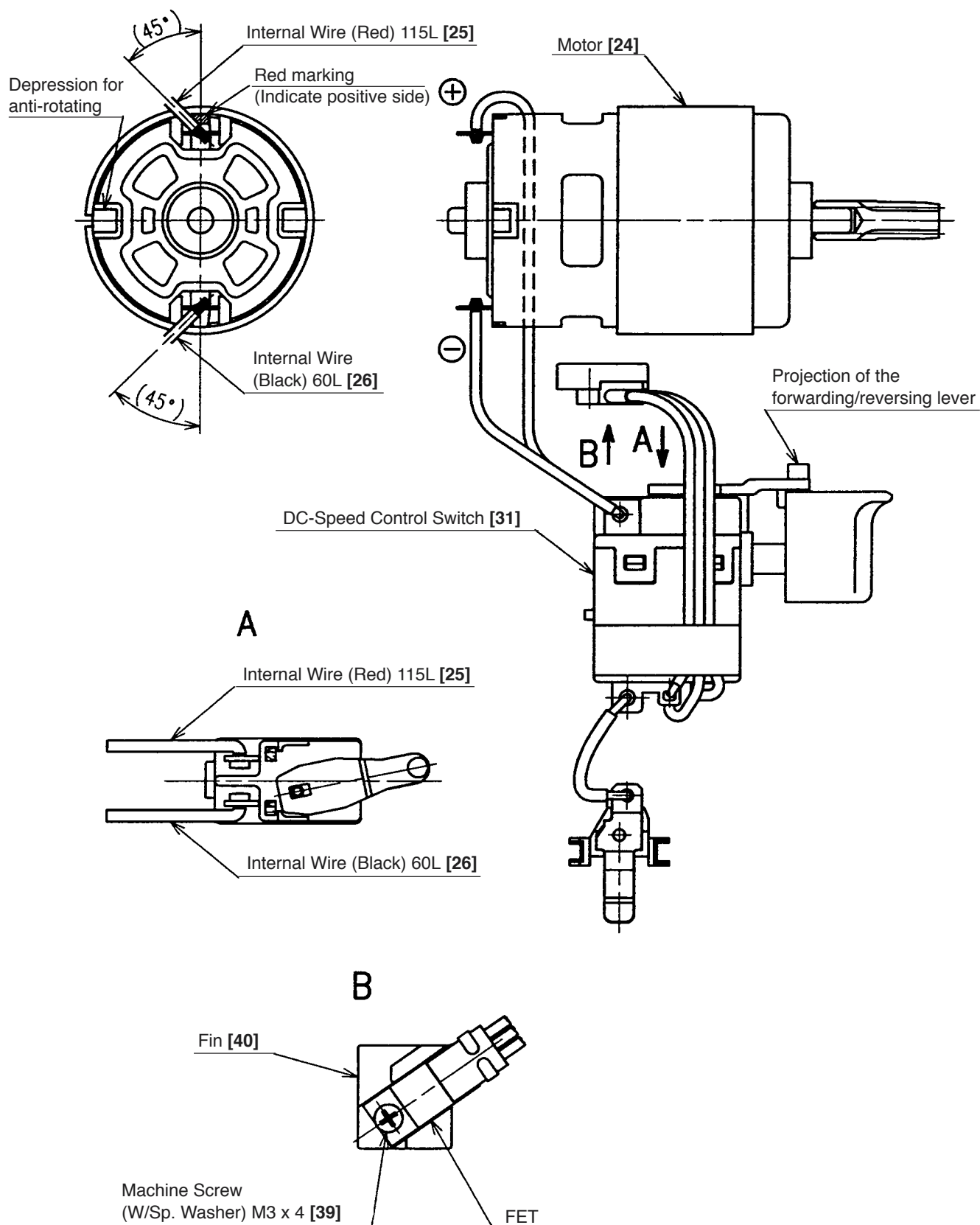


Fig. 5

(2) Reassembly of Housing (A).(B) Set [29]

Mount the Strap (Yellow) [38] and housing (B) to housing (A), and secure them with the seven Tapping Screws (W/Flange) D4 x 20 (Black) [27].

(3) Reassembly of the mechanical parts

- (a) Put Washer (S) [12] onto the shaft of the Spindle [15] and mount the Hammer [8] containing the twenty-eight Steel Balls D3 [9], Washer (J) [10] and the Spring [11] to the Spindle [15].
- (b) Align the top of the cam groove on the Spindle [15] with the steel ball guide groove on the Hammer [8] as illustrated in Fig. 4. Press down either of the raised faces of the Hammer [8] with a hand press to compress the Spring [11] until the end surface of the Hammer contacts the flange of the Spindle [15].
- (c) Insert the two Steel Balls D5.556 [7] into the steel ball guide groove. Check that the steel balls are properly inserted in the cam groove. Then release the hand press.
- (d) Mount the hammer assembly onto the J-297 base for washer (S). With a hand press, push down the top of the Spindle [15] to compress the Spring [11]. On this condition, mount the Stopper [13] onto the spindle shaft and then release the hand press.
- (e) Mount the Ring Gear [18], Washer (C) [19], Ball Bearing [20], Inner Cover [21], Damper [22] and the Retaining Ring [23] to the above reassembly. Furthermore, mount the other mechanical parts and Anvil (C) [6], then the Hammer Case [3].

(4) Mounting the Gear Box Ass'y [1] to the housing

Coat Housing (A).(B) Set [29] with Silicon Rubber (THREEBOND 1211) as shown in Fig. 6. Mount the Gear Box Ass'y [1] so that the pinion press-fitted in the Motor [24] properly meshes with the Idle Gear Set [16]. Check that Anvil (C) [6] turns smoothly. If not, the gear meshes improperly. Check the meshing condition. Tighten the four Tapping Screws (W/Sp. Washer) D4 x 35 (Black) [2]. Wipe the Silicon Rubber protruded from the housing with a cloth.

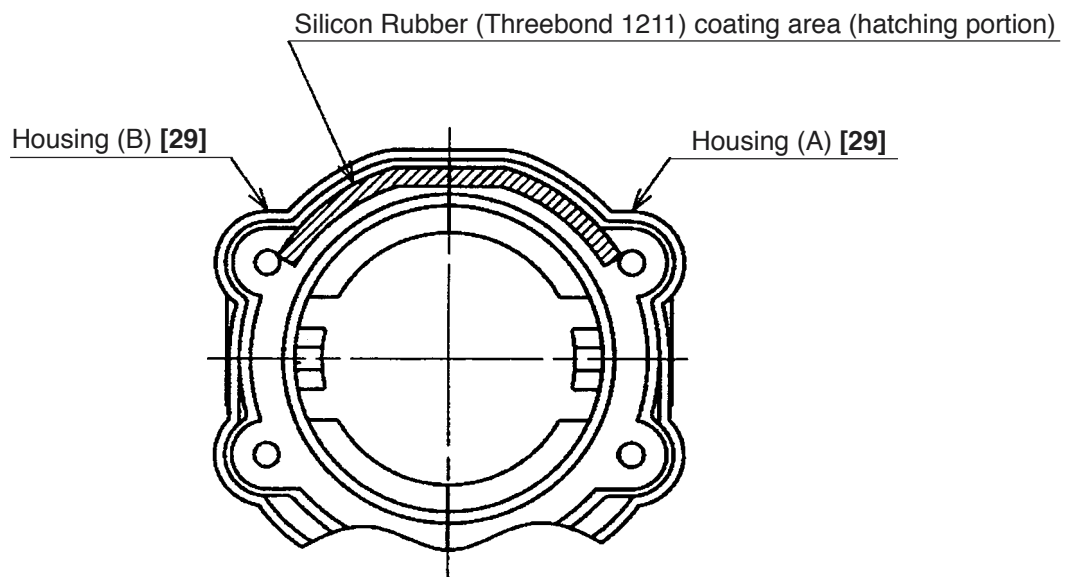


Fig. 6

(5) Reassembly of the Hook Ass'y [34] [36]

Check that the V-Lock Nut M5 [35] is mounted to the Hook Ass'y [34] [36]. Then mount the Hook Spring [41] and secure it with the Special Screw M5 [42]. (Mount the Hook Spring [41] with its larger-diameter side pointing toward the inside of the housing.)

(6) Check whether the direction of rotation of Anvil (C) [6] coincides with the directional markings on the push-on side of the Pushing Button [32]. When the Pushing Button [32] is turned to the (R) side, the direction of rotation of Anvil (C) [6] should be clockwise, as viewed from behind.

(7) Lubrication

(a) ATTOLUB MS No. 2

- Cam groove and sliding section of the Spindle [15]
- Cam groove and projection of the Hammer [8]
- 8 mm diameter hole and oil groove and upper surface of the claw of Anvil (C) [6]
- Sliding section between Anvil (C) [6] and the metal
- Two Steel Balls D5.556 [7]
- Pinion tooth flanks and front metal of the Motor [24]
- Tooth flanks of the Ring Gear [18]
- Twenty-eight Steel Balls D3 [9]
- Needle Roller [17]
- Tooth flanks and 5 mm diameter hole of the Idle Gear Set [16]

(8) Screw tightening torque

- Tapping Screw (W/Sp. Washer) D4 x 35 (Black) [2] $1.96 \pm 0.49 \text{ N}\cdot\text{m}$ ($20 \pm 5 \text{ kgf}\cdot\text{cm}$, $17.4 \pm 4.3 \text{ in}\cdot\text{lbs.}$)
- Tapping Screw (W/Flange) D4 x 20 (Black) [27] $1.96 \pm 0.49 \text{ N}\cdot\text{m}$ ($20 \pm 5 \text{ kgf}\cdot\text{cm}$, $17.4 \pm 4.3 \text{ in}\cdot\text{lbs.}$)
- Machine Screw (W/Sp. Washer) M3 x 4 [39] $0.29 - 0.39 \text{ N}\cdot\text{m}$ ($3 - 4 \text{ kgf}\cdot\text{cm}$, $2.6 - 3.5 \text{ in}\cdot\text{lbs.}$)
- Special Screw M5 [42] $1.96 - 0.49 \text{ N}\cdot\text{m}$ ($20 \pm 5 \text{ kgf}\cdot\text{cm}$, $17.4 \pm 4.3 \text{ in}\cdot\text{lbs.}$)

9-2. Precautions in Disassembly and Reassembly of Battery Charger

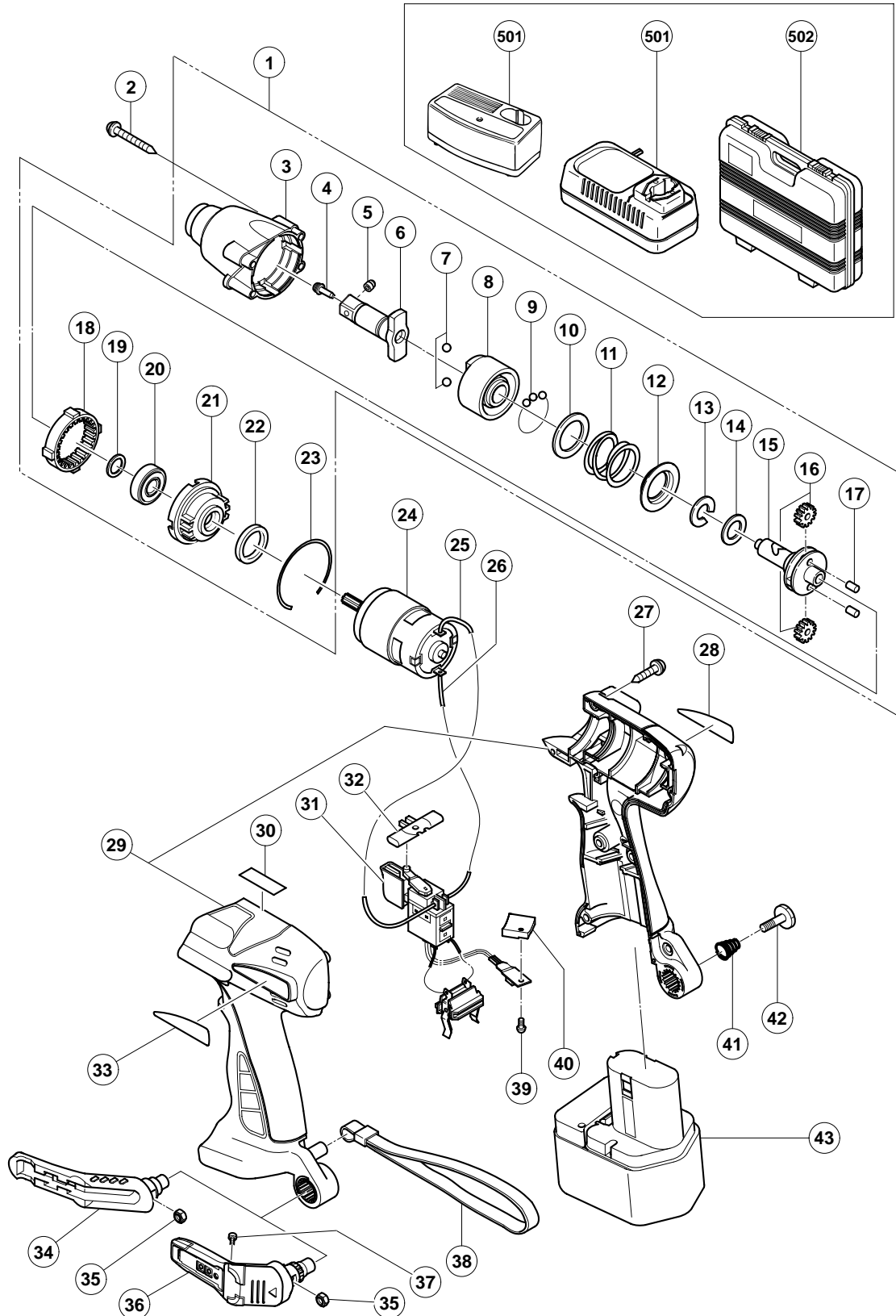
Refer to the Technical Data and Service Manual for precautions in disassembly and reassembly of the Model UC 12SD or UC 14YFA Battery Charger.

10. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
WR 12DAF	General Assembly	Work Flow						
		Hook Ass'y		DC-Speed Control Switch				
					Housing (A).(B) Set			
				Inner Cover Motor Damper				
				Hammer Case Pin Retainer Plunger Anvil (C) Ring Gear	Hammer Steel Ball Spring Spindle Idle Gear Set Needle Roller Ball Bearing (6001VV)			
		Gear Box Ass'y						

ELECTRIC TOOL PARTS LIST

■ **CORDLESS IMPACT WRENCH** 2004 • 6 • 10
Model WR 12DAF (E1)



PARTS

WR 12DAF

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS	
1	323-188	GEAR BOX ASS'Y	1	INCLUD. 3-23	
2	306-305	TAPPING SCREW (W/SP. WASHER) D4X35 (BLACK)	4		
3	323-189	HAMMER CASE	1		
4	323-194	PIN RETAINER	1		
5	323-193	PLUNGER	1		
6	323-192	ANVIL (C)	1	INCLUD. 4, 5	
7	959-154	STEEL BALL D5.556 (10 PCS.)	2		
8	321-886	HAMMER	1		
9	321-934	STEEL BALL D3 (10 PCS.)	28		
10	315-978	WASHER (J)	1		
11	316-170	SPRING	1		
12	316-172	WASHER (S)	1		
13	316-171	STOPPER	1		
14	321-888	WASHER	1		
15	321-889	SPINDLE	1		
16	321-882	IDLE GEAR SET (2 PCS.)	2		
17	321-883	NEEDLE ROLLER	2		
18	321-891	RING GEAR	1		
19	321-890	WASHER (C)	1		
20	600-1VV	BALL BEARING 6001VVCMP2L	1		
21	321-892	INNER COVER	1		
22	321-894	DAMPER	1		
23	321-893	RETAINING RING	1		
24	321-874	MOTOR	1		
25	321-876	INTERNAL WIRE (RED) 115L	1		
26	321-877	INTERNAL WIRE (BLACK) 60L	1		
27	302-086	TAPPING SCREW (W/FLANGE) D4X20 (BLACK)	7		
28		NAME PLATE	1		
29	321-913	HOUSING (A).(B) SET	1		
* 30		CAUTION PLATE	1	FOR USA, CAN	
31	321-917	DC-SPEED CONTROL SWITCH	1		
32	321-871	PUSHING BUTTON	1		
33		HITACHI LABEL	1		
* 34	320-287	HOOK ASS'Y	1	INCLUD. 35	
* 35	320-288	V-LOCK NUT M5	1	FOR USA, CAN	
* 36	321-918	HOOK ASS'Y (W/LIGHT)	1	INCLUD. 35, 37 FOR USA, CAN	
* 37	321-672	TAPPING SCREW D2X6	2	FOR USA, CAN	
38	318-349	STRAP (YELLOW)	1		
39	320-777	MACHINE SCREW (W/SP. WASHER) M3X4	1		
40	320-776	FIN	1		
41	319-926	HOOK SPRING	1		
42	319-927	SPECIAL SCREW M5	1		
* 43	320-608	BATTERY EB 1214L (W/ENGLISH N.P.)	2		
* 43	320-387	BATTERY EB 1220BL (W/ENGLISH N.P.)	2		
* 43	320-386	BATTERY EB 1220BL (W/ENGLISH N.P.)	2	FOR USA, CAN	

WR 12DAF

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ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS	
601		CORNER ATTACHMENT ASS'Y	1	INCLUD. 602-618	
602	955-300	HOUSING	1		
603	955-301	METAL	3		
604	955-302	SPINDLE	1		
605		HITACHI LABEL	1		
606	955-303	BEARING RACE	2		
607	955-304	NEEDLE THRUST BEARING (NTA-1413)	2		
608	955-305	COVER	1		
609	955-306	NEEDLE BEARING (NTN BK1012)	1		
610	948-227	RETAINING RING FOR D47 HOLE	1		
611	955-307	PINION	1		
612	955-308	SLEEVE	1		
613	955-309	WASHER	1		
614	955-310	SOCKET COVER	1		
615	955-311	SOCKET	1		
616	303-247	SEAL LOCK HEX. SOCKET HD. BOLT M5X25	6		
617	873-537	SOCKET PIN	1		
618	873-187	O-RING (J1SW1516)	1		
619	991-481	FORM TIE SOCKET ASS'Y 11.3MMX95L	1	INCLUD. 617, 618	
620	992-610	UNIVERSAL JOINT ASS'Y	1	INCLUD. 617, 618	
621	955-153	UNIVERSAL JOINT PIN	1		
622	991-476	BIT ADAPTER ASS'Y	1	INCLUD. 617, 618	
623	944-291	HEX. SOCKET ASS'Y 10MMX40L	1	INCLUD. 617, 618	
624	873-632	HEX. SOCKET ASS'Y 12MMX40L	1	INCLUD. 617, 618	
625	873-539	HEX. SOCKET ASS'Y 13MMX40L	1	INCLUD. 617, 618	
626	873-540	HEX. SOCKET ASS'Y 14MMX40L	1	INCLUD. 617, 618	
627	873-536	HEX. SOCKET ASS'Y 17MMX32L	1	INCLUD. 617, 618	
628	873-624	HEX. SOCKET ASS'Y 19MMX34L	1	INCLUD. 617, 618	
629	873-626	HEX. SOCKET ASS'Y 21MMX36L	1	INCLUD. 617, 618	
630	873-627	HEX. SOCKET ASS'Y 22MMX40L	1	INCLUD. 617, 618	
631	955-138	HEX. SOCKET ASS'Y (LONG) 12MMX52L	1	INCLUD. 617, 618	

OPTIONAL ACCESSORIES

WR 12DAF

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