

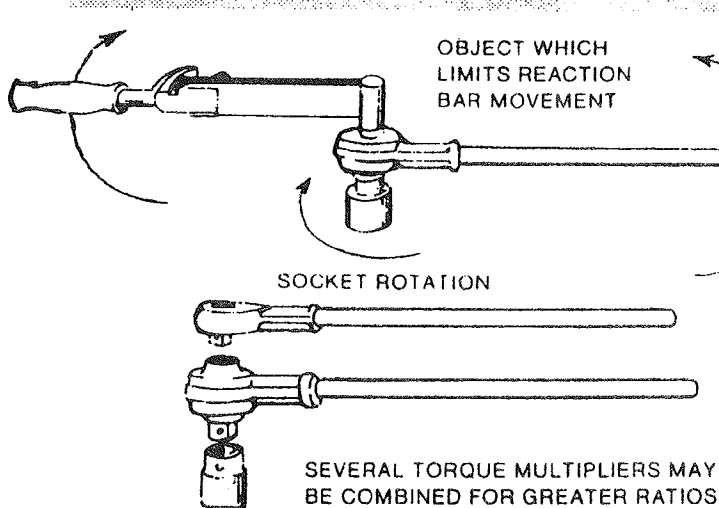
## USE OF THE TORQUE MULTIPLIER

The mechanical advantage in the use of your torque multiplier is derived from the planetary transmission within the gear head of the tool. With the torque multiplier reaction bar in a fixed position against a stationary object, and the input tool driving, the socket and fastener sees forces equalling the ratio of the torque multiplier or combination of multipliers being used times the input force. Due to frictional losses in the gear train, a torque loss factor of about 10% to 20% should be anticipated.

In breaking a difficult or frozen fastener, the driving force is simple reversed, it is important to set the reaction bar against a strong stationary object. The reaction bar rotation is **opposite** the output force rotation. See sketch.

**CAUTION:** DO NOT EXCEED THE RATED CAPACITY OF THE MODEL TORQUE MULTIPLIER BEING USED. EXCESSIVE INPUT FORCE MAY RESULT IN TOOL FAILURE AND SUDDEN RELEASE OF INPUT DRIVE.

**NOTE:** TORQUE MULTIPLIERS ARE **NOT** INTENDED FOR USE WITH INPUT FORCES FROM IMPACT TOOLS. HIGH SHOCK LOADS MAY CAUSE DAMAGE TO TOOL.



### Mathematics of the X-4 Torque Multiplier

When the torque multiplier is used, its mechanical advantage applies a factor to the above equation as follows:

$$F \times D \times \text{Multiplier Factor} = T \times \text{Multiplier Factor}^*$$

It can thus be seen that the same applied force  $F$  results in several times the total turning force when the X-4 tool is used. \*In actual operation this factor is reduced by about 10% to 20% due to normal losses in the tool head.

In most wrench applications the force relationship may be expressed by the following formula:

$$F \times D = T$$

FORCE DISTANCE TORQUE

where:  $F$  equals turning force in pounds applied by the operator.  
 $D$  equals lever arm of wrench handle in inches or feet.  
 $T$  equals total force applied to wrench head in inch-pounds or foot-pounds

## SERVICE INSTRUCTIONS — MODELS TM750LW, TM1000, TM1000R, TM1500, TM2000 and TM2500

When and if it becomes necessary to dismantle your X-4 Torque Multiplier, follow these instructions carefully:

1. On Model TM1000R only, remove the ratchet assembly by backing off the set screw.
2. Remove the four socket head cap screws Item 12.
3. With any soft material as a punch, drive the input pinion, Item 1, in the direction indicated in the sketch, noting the position of Item 11. When Item 11 is completely clear of Item 10 all further disassembly can be accomplished without the use of tools.
4. Note the location of Item 7 in some models during disassembly. These washers are retainers for the input pinion, Item 1, and must be replaced in exactly the same position.
5. After disassembly, carefully wash and inspect each part for excessive wear or other damage. Replace worn or damaged parts as necessary.
6. In reassembling the X-4 it is very important that all bearing surfaces be completely coated with special X-4 lubricant and an additional liberal amount packed in all the gear teeth.
7. Reassembly starts with Item 1 and progresses in order as indicated in the sketch, ending with Item 12, the latter being socket head cap screws which should be very tight.
8. Inspect by turning the input pinion, Item 1. If the wrench cannot be turned, the retainer washers, Item 7, are improperly installed. The washer must be directly opposite from each other, and in the recessed counter bores of Item 3. (Some models only)

## SERVICE INSTRUCTION — MODEL TM1200

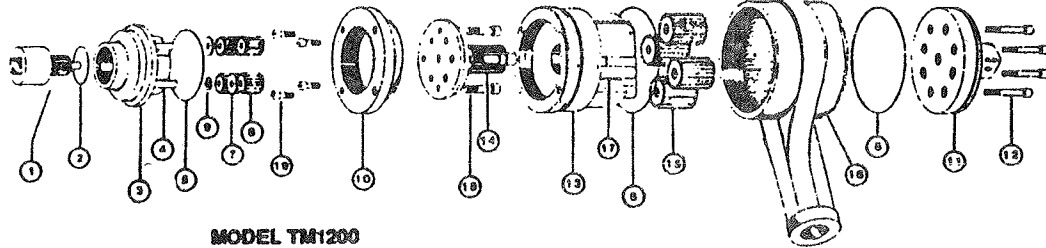
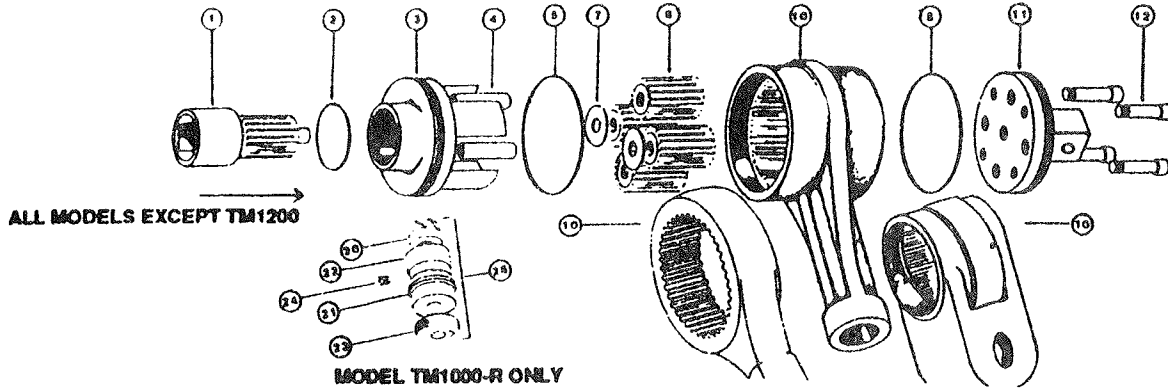
1. Loosen cap screws at output stub approximately 1/2 inch. Place head of loosened screws down on two support rails and force down the outer housing to release internal components.
2. Remove screws from the first stage carrier ring (input side).
3. Remove first stage input assembly. This assembly removal may require light hammering (use soft face mallet).
4. To disassemble the first stage input assembly, remove the screws on the output side, and then, using a soft metal bar, strike the female socket firmly. This will cause the entire first stage assembly to come apart.
5. After disassembly, carefully wash and inspect each part for excessive wear or other damage. Replace worn or damaged parts as necessary. In reassembling the X-4 it is very important that all bearing surfaces be completely coated with special X-4 lubricant and an additional liberal amount packed in all the gear teeth. There are two retainers (larger diameter) and two spacers in the first stage assembly. Be certain to position the retainers opposite each other when reassembling.



(See opposite side)

COLUMBUS, GA 31908

## USE AND SERVICE INSTRUCTIONS—PARTS LISTS



Model	Output Capacity	Input Drive	Output Drive	Ratio	Approx. Wgt.
TM-750LW	1000 FT. LBS. (140 KPM)	1/2"	1/2"	4 to 1	7 LBS. (3.2 KG)
TM-1000	2000 FT. LBS. (260 KPM)	3/4"	1"	4 to 1	14 LBS. (6.4 KG)
TM-1000R	2000 FT. LBS. (260 KPM)	3/4"	1"	4 to 1	15 LBS. (6.9 KG)
TM-1200	3000 FT. LBS. (420 KPM)	3/4"	1 1/2"	14.3 to 1	30 LBS. (14 KG)

Model	Output Capacity	Input Drive	Output Drive	Ratio	Approx. Wgt.
TM-1500	4000 FT. LBS. (560 KPM)	1"	1 1/2"	4.33 to 1	30 LBS. (14 KG)
TM-2000	6000 FT. LBS. (840 KPM)	1"	1 1/2"	4.6 to 1	47 LBS. (21 KG)
TM-2500	12000 FT. LBS. (1680 KPM)	1"	2 1/2"	6 to 1	73 LBS. (33 KG)

Part Item	Part Description	Part No. TM750LW	Part No. TM1000	Part No. TM1000R	Part No. TM1200	Part No. TM1500	Part No. TM2000	Part No. TM2500
1.	Input Pinion	-02	-02	02	-02	-02	-02	-02
2.	Input "O" Ring		-10	-10	-10	-10	-10	-10
3.	Input Carrier	-04	-04	-04	-04	-04	-04	-04
4.	Dowel Pins	(4)-08	(4)-08	(4)-08	(4)-08	(4)-08	(4)-08	(4)-08
5.	Housing "O" Ring		(2)-09	(2)-09	(2)-09	(2)-09	(2)-09	(2)-09
6.	Carrier "O" Ring				-27			
7.	Input Retainer	(1)-07	(2)-07	(2)-07	(2)-07	(2)-07	(4)-07	(2)-07
8.	Planet Pinion	(4)-03	(4)-03	(4)-03	(4)-03	(4)-03	(4)-03	(4)-03
9.	Spacer		(2)-26	(2)-26	(2)-26			
10.	Housing	-01	-01	-01	-01	-01	-01	-01
11.	Output Stub	-05	-05	-05	-05	-05	-05	-05
12.	Special Screw	(4)-06	(4)-06	(4)-06	(4)-06	(4)-06	(4)-06	(4)-06
13.	Carrier, 2nd				-28			
14.	Sun Pinion, 2nd				-29			
15.	Planet Pinion, 2nd				(4)-30			
16.	Housing, 2nd				-31			
17.	Dowel, 2nd				(4)-32			
18.	Screw, Coupling				(4)-33			
19.	Screw				(4)-34			
20.	Pawl			-20				
21.	*Spring, Pawl			-21				
22.	Sleeve, Pawl			-22				
23.	Knob, Ratchet			-23				
24.	Screw, Retainer			-24				
25.	Assy, Ratchet			-25				
26.	*Reaction Bar	-16	-16	-16	-16	-16	-16	-16
27.	*Lube Pack	-17	-17	-17	-17	-17	-17	-17

\* Not Shown

Be sure to mention Model and Serial No. when ordering parts.



(See opposite side)

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