

Wisdom Ind., Ltd.

Wise
Go
"Go Gator"
Kiddie

OPERATOR'S MANUAL

for

GO GATOR

Serial No. 83955

ARMYTOWN.COM



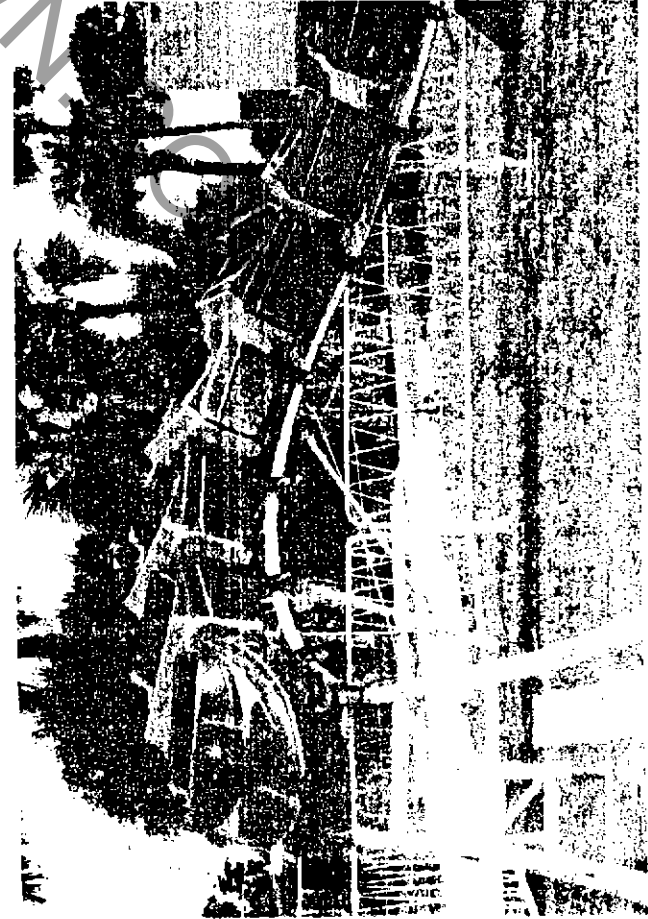
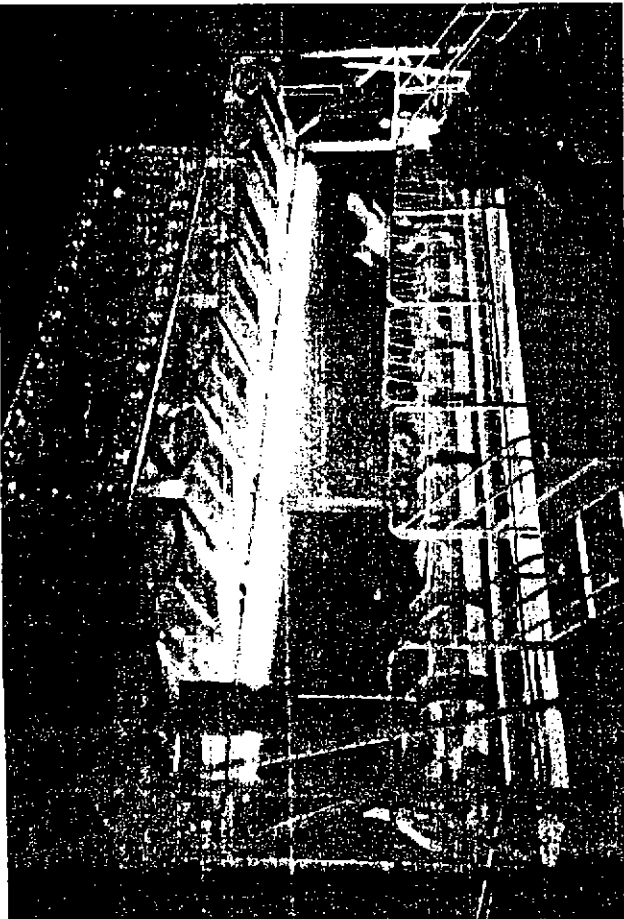
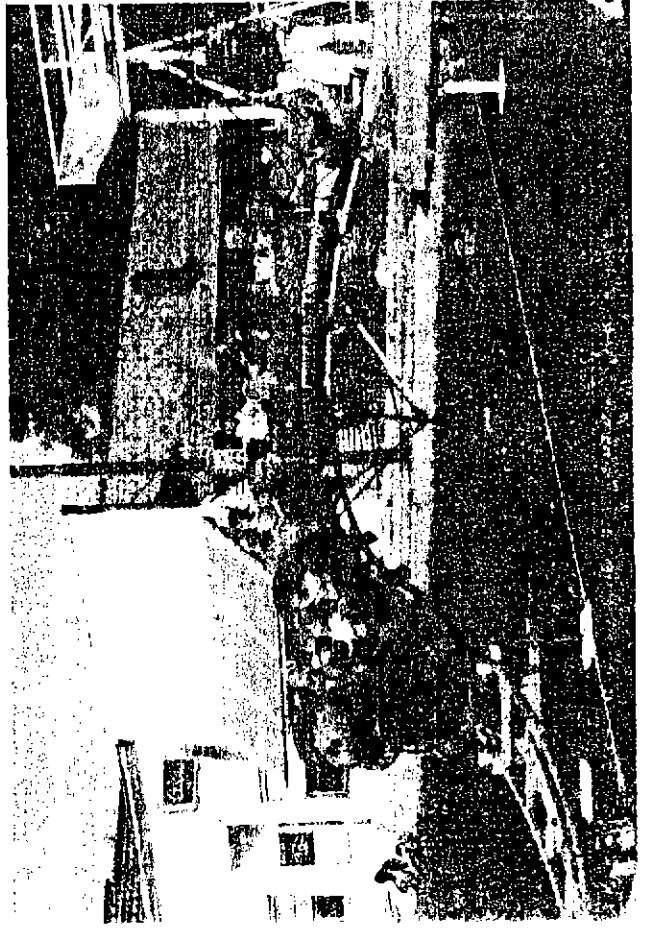
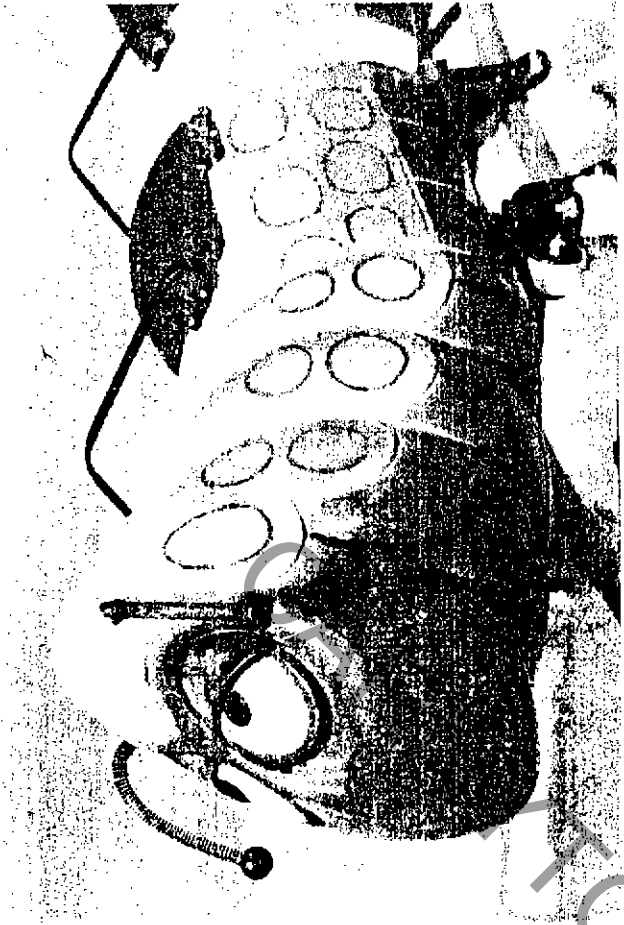
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WISDOM ROLLER COASTERS

DRAGON WAGON
GO GATOR
SOOPER JET
CLATTERPILLER
MINER MIKE

WMI INDUSTRIES
P.O. BOX 5000
STERLING, CO 80751
970-522-7515
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DRAGON WAGON

This season you can add extra flash and lighting to your kiddie land with the **DRAGON WAGON**. Unlike most kid's rides, the **DRAGON WAGON** adds scenery to the kiddie portion of the midway, giving a touch of flair usually found only on major rides.

DRAGON WAGON is decked out with a durable plastic castle front which compliments the main feature – the friendliest looking little dragon you've ever seen. Youngsters race to take their turns on this flashy piece.

The entire ride is driven by one 5 HP three phase motor. For added thrills, the **DRAGON WAGON** runs both forward and backward. The operator runs the ride from a convenient vantage point on the trailer. When it's time to set up or tear down, no problem! The **DRAGON WAGON** is easily set up by two men in only an hour! A three-quarter ton pickup is all you need for transport.

The front scenery is made of durable plastic, which can keep its original beauty for years to come. European lighting tops off the **DRAGON WAGON's** good looks.

The **DRAGON WAGON** is a spectacular kiddie ride that you and the kids will love for many years to come.

SPECIFICATIONS:

Trailer:

28' Long X 8'6" Wide X 13'5" Tall
12,000 pounds gross weight.
Tandem axle or Single 10k axle

Electric:

8 KW total
5 HP 3 phase drive motor
3 KW lighting

Setup:

28' deep - 45' wide
24' tall
1 hour with 2 men

Capacity:

8 seats; 2 people per seat
4.5 RPM
480 per hour

For more information on the **DRAGON WAGON** and what it can do for you, Contact Jerry or Vic Wisdom today.

FREE WHEELING MINER MIKE

This "Operation Manual" has been written for the benefit of the ride operator and owner. **WISDOM INDUSTRIES LTD. advise all ride operators and owner to read this manual before operation.**

INTENDED USE

The equipment herein described is intended to be used by a commercial operator to provide a service to the buyer's customers. As a commercial operator, the buyer agrees to operate and maintain the equipment for its intended use in a professional and competent manner as per Wisdom Industries, Ltd. recommendations and instructions, industry and government standards, and good commercial practices, using professional and competent mechanics and operators. If at any time, and for any reason the equipment cannot be adequately and safely operated for its intended use, the buyer agrees not to operate the equipment until proper repairs or corrections are made.

SPECIFICATIONS

CAPACITY.14 children
LOADING.2 children per car
MAX WEIGHT PER CAR.	180 LBS.
ROTATION.	4 RPM
SET UP AREA.	Varies according to track layout
MOTOR POWER.	2-5HP 3 PHASE . DRIVE MOTORS
BRAKE.12 V DC WHEEL BRAKE
ELECTRICAL.	18 KW 50 AMP/220VOLT 3 PHASE

SETTING UP THE SOOPER JET GO-GATOR & CLATTERPILLAR

- STEP 1 When you place the trailer on location, place the 4 jacks at each corner of the trailer to stabilize the Roller Coaster Trailer.
- STEP 2 Remove the Center Pole and spread out the three legs and pin the braces to form the base for the center commutator ring.
- STEP 3 Place the commutator ring assembly on top of the Center Pole, remove the Center Pole to approximate center of the ride when set up.
- STEP 4 Put out the front steps, placing them on the back side of the ride to make it easier for unloading each track section.
- STEP 5 Spread out all the jack stands around the ride in their approximate location. Each is numbered, starting with number 1, at the front of the ride going counter clockwise to the rear of the ride.
- STEP 6 Remove the first track section (number 1-2) and pin in to the front of the ride and support with that jackstand. At this time install 2 diagonal braces from the jack stand to the track section.
- STEP 7 Install second track section, (numbered 2-3) and install the medium high jack stand to stabilize that end. Drive in the track pins and wedges, install 2 braces.
- STEP 8 Then roll the coaster car up on the curve so they are out of your way for removing the rest of the track sections.
- STEP 9 Starting at the back of the ride, install each track section in order with the jack stand and braces as you proceed around from the back of the ride, clockwise to the front. The last piece of track should be section 4-5.
- STEP 10 As you assemble the track, the track can be adjusted so that the joints are smooth all with way around the ride.

- STEP 11 After all sections are together, use 2 cables from each short stand. These are connected to the center pole, this will center the pole in the middle of the ride. Use the third cable to hold it in position for moving during operation. This cable goes from the center pole to the trailer in the front:
- STEP 12 Connect the electrical cord from the commutator ring assembly to the main power box using the twist lock plugs.
- STEP 13 Set out the fence and fence feet around the ride.
- STEP 14 Move the steps from the back side of the trailer to the front where they pin in for an entrance and install the handrails.
- STEP 15 Place the fiberglass center pole cover on the center pole.
- STEP 16 Connect the electrical power cord to 110-220 3 phase power and test the ride. This should operate according to the control switch lettering.
- STEP 17 Stand up Sign and Pin.

During the operation of the ride, each passenger must wear the seat belt and it should be pulled up snug around them.

After the first half hour of operation check to see that all jack stands and pin wedges are tight and on stable ground. Thereafter the wedges should be checked every two to three hours to make sure that they are locked into the pins securely. Also the jack stands should be checked, at least daily, to make sure they are firmly on the ground.

Car wheels should be check daily for excessive wear or looseness.

Check gear box grease monthly.

Grease wheels weekly.

Check hitches daily.

SETTING UP THE MINER MIKE

- Step 1 - Place the trailer on location, lower the 4 jacks at each corner of the trailer to stabilize the trailer.
- Step 2 - Level the trailer.
- Step 3 - Remove the center pole from the trailer and place in the approximate center of the ride.
- Step 4 - Pin the short Brace to the center pole from the commutator to the pipe on the side of the trailer.
- Step 5 - Spread out all the track jack stands around the ride in their approximate location. Each is numbered, starting with number 1; at the front of the ride going counter clockwise to the rear of the ride.
- Step 6 - Remove the first track section (number 1-2) and pin in to the front of the ride and support with that jackstand. At this time install 2 diagonal braces from the jack stand to the track section. Pin 1 track & stand together using 2 pins & wedges.
- Step 7 - Install second track section,(numbered 2-3)& install the jack stand to stabilize that end. Drive in the track pins & wedges, install 2 braces.
- Step 8 - Continue with pinning the track sections and stands until all the track is assembled.
- Step 9 - Block the loading area of the track so that all the feet are evenly supported.
- Step 10 - Install all diagonal braces from the track to the jack stands.
- Step 11 - As you assemble the track, the track stands can be adjusted up and down so that the joints are even all the way around the joint.
- Step 12 - Pin the two scenery panels to the commutator pole.
- Step 13 - Install the scenery diagonal brace between the two scenery panels and pin to the brace going from the commutator pole to the trailer.
- Step 14 - Place the control stand at the front of the ride.
- Step 15 - Set out the fence and fence feet around the ride.
- Step 16 - Set up the 2 quartz light stands to light the ride.
- Step 17 - Remove all racks from the trailer.
- Step 18 - Connect the electrical power cord to 110-220 3 phase power.
- Step 19 - Unpin the car travel retainers.
- Step 20 - Run cars to the front of the ride.
- Step 21 - Stand up Sign and Pin and Wedge.
- Step 22 - Recheck that all pins & wedges are tight.
- Step 21 - Test run the ride.
- Step 22 - Check all car couplers and wheels for adjustment and wear before operating the ride.

The Miner Mike should operate according to the control switch lettering.
To tear down the ride reverse the above procedure.

SAFETY REQUIREMENTS

The key to safety is well trained and supervised employees. Make certain that all employees know how the ride operates. The employees should have a good attitude towards safety and common sense.

REMEMBER, SAFETY MUST ALWAYS COME BEFORE REVENUE.

Do not neglect the employees' safety. Before starting the ride, be certain there are no personnel inside the fences or on the ride structure. Be certain all electricity is turned off whenever an employee might come into contact with electrical connections or components.

GENERAL SAFETY GUIDELINES

The following is a list of a few general rules which should be adhered to by everyone. Remember that in the long run, the key to a safe and successful operation is to have well-trained and well-supervised employees.

1. All work must be done by competent, qualified mechanics capable of understanding the function of the parts and their proper installation.
2. Inspect the ride each day of operation to determine that no portion of the ride is damaged, omitted, or worn in such a manner that it is unsafe, or that unsafe conditions may develop.
3. Perform manufacturer's recommended maintenance procedures at intervals and in the manner specified by the Operation and Maintenance Manual, in the following general areas:
 - (a) Lubrication
 - (b) Electrical Systems
 - (c) Torquing of bolts
 - (d) Wear of bolted or pinned joints
 - (e) Adjustment and care of mechanical components
 - (f) Passenger securing devices
 - (g) All parts are present and installed
 - (h) Operating and emergency controls
 - (i) Factory installed safety devices

4. Study each job carefully to determine all hazards so that necessary safeguards can be taken.
5. Examine safety devices, tools, ladders, etc. before they are used to make sure they are in good condition.
6. Use the proper tool or equipment for each job. Ground all hand electric power tools before use unless the manufacturer advises otherwise.
7. Wear close fitting comfortable clothing when working on or close to mechanical apparatus or live electrical circuits. Avoid finger rings, jewelry, or other articles which may be caught in moving parts or come in contact with electrical circuits.
8. Protect your eyes by wearing approved safety glasses or goggles.
9. Where work is to be performed is hazardous, such as live electrical circuits, at least two men should work together.
10. If guards must be removed from equipment, make sure they are replaced before leaving the job.
11. Clean up each job and dispose of surplus materials.
12. Keep a record of parts replaced and date of replacement. Inform the manufacturer of any replacement requirements that are frequent or cause unsafe conditions.
13. Make modifications and additions as outlined in the manufacturer's Service and Safety Bulletins.

OPERATOR RESPONSIBILITIES

1. **HANDICAPPED PERSONS** - Persons who are physically handicapped must not be allowed to ride violent or fast moving rides. If the management of the amusement area allow handicapped to ride certain slow rides, the operator must ensure that the handicapped person is under the full control of an adult person who will ride with them and provide supervision during the ride or will not be injured while riding the ride.
2. **PROHIBITED PASSENGERS** - Operators shall not allow a passenger on the ride who cannot be properly secured due to his size or if there is a malfunction to the securing device. Similarly, they must refuse service to a pregnant woman, or a passenger who is visibly ill, or under the influence of alcohol or drugs.
3. **CLEARANCE PRECAUTION** - Before operating the ride, it is important to ensure that there are no personnel around the ride structure or any exposed electrical components or other areas where there could be a risk of injury.
4. **ON-DUTY ATTENTION** - Insist that each operator remain in full control of the operating controls during operation of the ride with complete attention to the ride and passengers. Under no circumstances should the operator leave his or her position while the ride is in operation.

If it does become necessary for the operator to leave his post at the controls, he must turn the ride off completely to ensure it does not accidentally start and injure passengers or staff.
5. **INSPECTION/CHECK LIST** - Operators must inspect the ride and complete a General Check List before each day's operation.
6. **DAILY WARM-UP** - The operator must always run the ride through several cycles before the first passengers are loaded. This warm-up without passengers is necessary to make sure the ride is safe and there are no problems mechanically not detected previously.

7. **PRECAUTIONS BEFORE AND DURING THE RIDE** - Never start the ride unless the operator or assistant is facing the ride and is in a position to observe the whole are because:
 - Patrons have been known to jump fences.
 - Patrons have been known to try to change positions while the ride is running.
 - Patrons have been known to "skylark" causing their own safety and that of others to be put in jeopardy.
 - The operator's assistant may wish to make a last minute adjustment and be put in a dangerous position when the operator puts the ride in motion.
8. **SMOKING** - Smoking is not allowed on the ride. This includes the operator as well as the passengers.
9. **LOOSE ITEMS** - The area inside the ride must be clear of any items that can fly out to the edge of the ride when it gets up to speed.
10. **FOOD AND DRINK** - It is recommended that no food or drink be allowed onto the ride.

OPERATOR SELECTION AND INSTRUCTION

1. Select competent, mature operators, capable of understanding the function and use of amusement rides and their control.
2. Instruct each operator fully in the proper use and function of the ride he is to supervise, including:
 - (a) Controls and procedures for normal and emergency operation.
 - (b) Manufacturer's recommended maximum speed and load.
 - (c) Manufacturer's recommended length of ride time and frequency of repeat rides.
 - (d) Any foreseeable misuse of the ride as determined by the manufacturer or owner, or by special conditions such as weather, location, or crowds.
 - (e) Each operator must have immediate availability of a manufacturer's Operator Manual for the ride he supervises.
3. Require each operator to inspect the ride he supervises, each day of the operation.
 - (a) Determine that no portion of the ride is damaged, omitted or worn in such a manner that it is unsafe or that it may develop into an unsafe condition.
 - (b) Report any irregularities to the superintendent or owner.
 - (c) Do not operate the ride if any irregularities are found until such condition has been corrected.
4. Instruct the operator to allow no passengers to ride who are visibly ill, or under the influence of drugs or alcohol.
5. Instruct operators and attendants on the proper methods of securing passengers in the ride. Do not allow a passenger to board a ride if he cannot be properly secured because of his size or because there is a malfunction of the securing device.

STOP the ride immediately if any passenger is observed moving from their seat, turning upside down, or behaving dangerously, such as standing up.

6. Advise the operator against starting or operating the ride while any person (passenger, spectator, or employee) is in an endangered or unsafe position on the ride, or within the ride area.
7. Insist that each operator remain in full control of the operating controls during operation of the ride, and gives his full attention to the ride and its passengers.
8. Instruct the operator to let no other person, other than another trained operator, operate the controls of the ride, except those portions of the ride that are specifically designed to be controlled by the passenger.
9. Advise the operator that factory-installed safety devices are not to be tampered with or removed.
10. Advise the operator of owner/supervisor procedures for assisting ill or injured passengers.
11. Instruct operators and attendants that patrons are required to secure all articles, such as keys, change, eye glasses, etc., which may become loose while riding.

OPERATING AMUSEMENT DEVICES - OPERATOR INSTRUCTIONS

The following are the correct loading (balance) procedure for amusement devices:

1. Every amusement ride must always be operated with a balanced load of passengers at all times.
2. The balancing rule is to ensure an even load on the ride's structure and mechanical drive, which in turn will cause less wear and tear and ensure a safer, longer life of the structure with less down time for adjustments and repairs.
3. In practical terms, consider the difference in driving a motor vehicle with balanced wheels as against unbalanced wheels, which causes vibrations and eventually wear and tear. The majority of operators have experienced driving a car with unbalanced wheels and the consequent results. Amusement devices are mostly large wheels and react the same as an automotive wheel when out of balance.
4. Although the out of balance load on some devices cannot be felt by the passengers or operator, it is still essential for the ride to be balanced.
5. On an extremely fast moving ride, it is essential that the ride be accurately balanced at all time.
6. Although it may not be strictly essential to balance slower revolving rides, it is still most desirable to achieve a balance load, in the interests of the passengers and the owner of the ride, for increased safety and less "wear and tear".

REPLACEMENT OF BOLTS

During normal maintenance practices, it is necessary to replace some bolts. They work loose because they have not been checked periodically, or they become lost when they are removed to repair some component. The points we wish to stress are the following:

Wisdom Industries uses only grade 5 bolts or better.

Bolts are identified by markings on the bolt head. Bolts without markings are generally grade 2 or 3 (common hardware store variety) and are not strong enough to be used on amusement rides in high stress areas.

When replacing any bolt, always use an equivalent or stronger bolt. Higher numbers mean stronger bolts.

NOTE: There are some bolts available above grade 8; however, these bolts are not to be used for general purposes. They are extremely brittle and are designed for special applications.

If trouble is encountered with bolts working loose, check the tightness according to the torque chart.

If certain bolts continue to work loose, remove the bolts and inspect the threaded holes. If threads are in good condition, clean the hole out with a non-oil base solvent and blow dry and apply "loctite" to the threads. After doing this, install new washer and bolt and torque as per the chart.

BOLT TENSIONING TORQUE

1. All tensioning pressures are for grade 5 bolts which have a tensile strength of 50 tons per square inch.
2. Bolts that are used continuously for portable ride erection should not be tensioned to maximum torque unless instructed to do so or they are in a high stress area.

3. Bolts tensioned to maximum torque should not be continuously reused and should be replaced with new bolts of equivalent strength.
4. Caution should be exercised in applying torque because in some cases, it may not be possible to utilize all the torque a bolt will stand because of distorting surrounding parts.
5. Lubricate bolts when using with SAE 30 oil or an approved anti-sieze compound.

CAUTION: Torque values are given for steel bolts and steel nuts screwed into threaded holes in steel. Be certain threaded parts are not aluminum, brass, or other soft alloys.

BOLT TORQUE CHART

Bolt Size Grade 5	Max Torque	Recommended Torque Reusable Bolt	Recommended Torque Permanent Bolt
U.N.C.	ft. lbs.	ft. lbs.	ft. lbs.
3/8	27	24	26-28
1/2	66	55	60-66
5/8	130	95	125-130
3/4	230	180	220-230
7/8	370	290	360-370
1	560	480	540-560

Maximum torque listed is 65% proof load of bolt

NOTE: It is important to note the necessity of lightly oiling bolt before use as outlined above.

PNEUMATIC TIRES ON AMUSEMENT DEVICES AND SUPPORT VEHICLES

- * It is strongly recommended to carry a quality spare tire and wheel for every type you have in operation, and inflated to pressure.
- * Check pressures regularly on all tires in operation and maintain to manufacturer's recommendations.
- * Unless unavoidable, it is strongly recommended that repairs or the fitting of new tires to rims be carried out by experts at recognized tire dealers using correct equipment.

******CAUTION**

Respect the potential power and explosive force of air under pressure. Serious accidents have resulted from lack of awareness of the explosive potential of compressed air. Respect it as you would DYNAMITE.

The following pages of guidelines, safety precautions and procedures of tire changing are included to make all operators aware of the dangers that can be encountered by neglecting care and safety in handling tires and compressed air.

TIRE SAFETY - MOUNTING/DEMOUNTING

The following guidelines and safety procedures are intended to be used for reference only. Procedures will vary for different tire mount equipment and different types of rims. If at any time an uncertainty exists about the method of assembly or component parts or use of equipment, consult specific equipment manuals.

The following precautions apply generally for all types of tires. In addition, each section emphasizes specific precautions for each particular type of tire.

WARNING

FAILURE TO OBSERVE THE PRECAUTIONS OUTLINED IN THIS SECTION MAY RESULT IN FAULTY POSITIONING OF THE TIRE AND/OR RIM PARTS, CAUSING THE ASSEMBLY TO BURST WITH EXPLOSIVE FORCE SUFFICIENT TO CAUSE SERIOUS PHYSICAL INJURY OR DEATH.

CORRECT PROCEDURES - DO it this way.

1. Make sure that all rims are in good condition for use - not damaged, dented, or deformed.
2. Remove valve core and exhaust all air from the tire (or tires in the case of a dual assembly) before demounting. Probe the valve stem with a wire as a final check to make sure the valve is not plugged. Do not stand in front of a valve opening as dirt particles may be blown into your eyes.
3. Block vehicle in a positive manner so it cannot roll forward or backward after it is jacked up.
4. Place large hardwood blocks under the jack, regardless of how hard or firm the ground appears.
5. Place safety jacks, or crib up with blocks at an appropriate place under the vehicle, in case the jack slips.

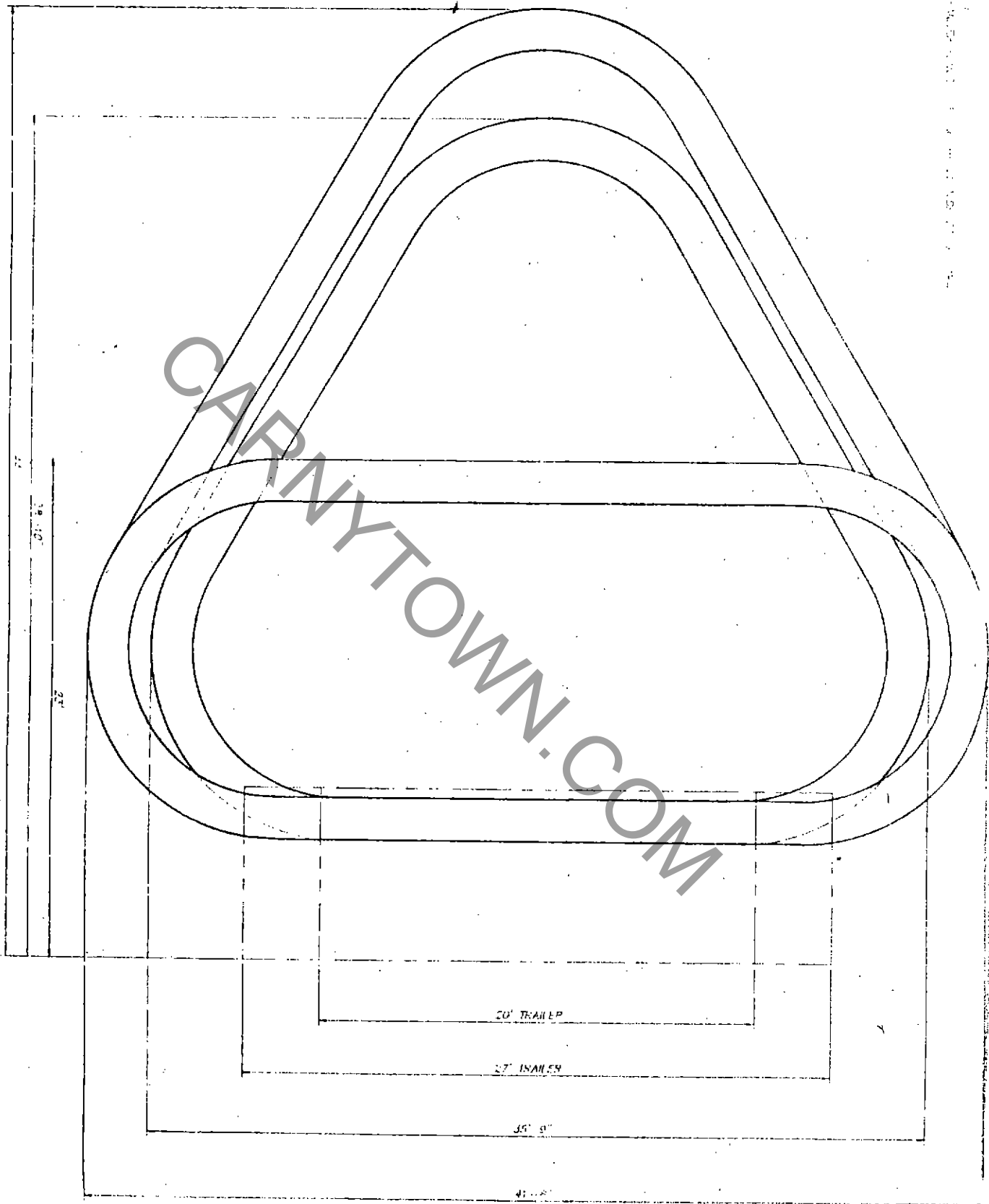
6. Check rim diameter to be sure it exactly matches the rim diameter molding on the tire. If rim is multiple piece, check component parts to see if they are made by the same manufacturer.
7. Clean and inspect used rim parts thoroughly.
8. Use new tubes and new flaps in new tires.
9. Inspect inside of tire for loose cords, cuts, penetrating objects, or other carcass damage. Scrap tires that are beyond simple repair. Remove dirt, debris, and liquids from the inside of tire before tube is installed.
10. Lubricate with approved rubber lubricant, such as thin vegetable oil soap solution.
11. Use a clip on chuck and extension hose with remote control valve and pressure gauge, long enough to allow you to stand to one side, not in front of the assembly, during inflation.
12. Center tire properly on rim before inflating.
13. Secure lock wheel down, or place assembly in safety cage or portable safety device before attempting to inflate tire to seat beads.
14. Check for proper flange and lock ring seating.
15. Adjust air pressure to manufacturer's recommended cold operating pressure, after beads have been seated.
16. Inspect valve cores or proper air retention. Replace damaged or leaky cores.

FAULTY PROCEDURES - Do NOT do it this way

1. Don't work on tire and rim assemblies until you have reviewed safety practices and procedures.

2. Don't loosen lug nuts on duals until all air is exhausted from both tires. A broken or cracked rim part under pressure could blow apart and seriously injure or kill if lugs are removed before air is exhausted.
3. Don't ever apply heat or do repair work on an inflated tire, rim, and wheel assembly. Heat can increase air pressure to a level sufficient to burst the tire or rim.
4. Don't reinflate a tire that has been run flat or seriously under-inflated without demounting the tire and checking the tire and tube for damage.
5. Don't mix rim parts of different manufacturers unless such use is approved by those manufacturers.
6. Don't attempt, under any circumstances, to rework, weld, heat, or braze rim parts. Replace damaged parts with the same size, type, and make.
7. Don't reuse tubes or flaps that have buckled or creased.
8. Don't use a tube in a tire larger or smaller than that for which the tube was designed.
9. Don't inflate beyond recommended bead seating pressure. Don't stand over tire when inflating.
10. Don't transport fully inflated tires mounted on multi-piece rims. Inflate only enough (12-15 PSI) to keep rim parts in place. Inflate tires to correct operating pressure only after tire and rim assembly have been fastened in place, all lug nuts properly torqued, and rim parts rechecked for proper fit.
11. Do not substitute petroleum based lubricants, silicon or anti-freeze for approved rubber lubricants.

TRACK / TRAILER OPTIONS



Parts Replacement Manual
For
DODGE® TORQUE-ARM™
Speed Reducers
Straight Bore & Taper Bushed

SIZES: TXT 109 — TXT115 — TXT125
TXT 209 — TXT215 — TXT225

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Reliance Electric Industrial Company nor are the responsibility of Reliance Electric Industrial Company. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

DODGE / P.O. Box 499 / 6040 Ponders Ct. / Greenville, South Carolina 29602-0499 / 803-297-4800

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**RELIANCE
ELECTRIC** 

INSTALLATION

1. Use eyebolts to lift reducer.

2. Determine the running positions of the reducer. (See Fig. 1) Note that the reducer is supplied with either 4 or 7 plugs; 4 around the sides for horizontal installations and 1 on each face for vertical installations. These plugs must be arranged relative to the running positions as follows:

Horizontal Installations — Install the magnetic drain plug in the hole closest to the bottom of the reducer. Throw away the tape that covers the filler/ventilation plug in shipment and install plug in topmost hole. Of the 3 remaining plugs on the sides of the reducer, the lowest one is the minimum oil level plug.

Vertical Installations — Install the filler/ventilation plug in the hole provided in the top face of the reducer housing. Use the hole in the bottom face for the magnetic drain plug. Of the 5 remaining holes on the sides of the reducer, use a plug in the upper housing half for the minimum oil level plug.

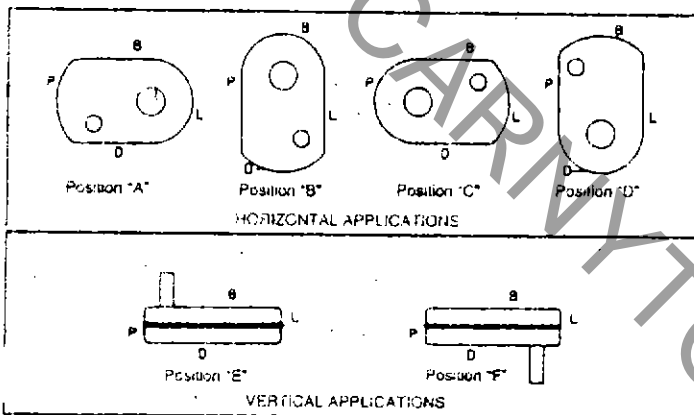


Fig. 1 — Mounting Positions

The running position of the reducer in a horizontal application is not limited to the four positions shown in Figure 1. However, if running position is over 20° either way from sketches, the oil level plug cannot be safely used to check the oil level, unless during the checking the torque arm is disconnected and the reducer is swung to within 20° in position "B" and "D" or 5° in position "A" and "C" of the positions shown in Figure 1. Because of the many possible positions of the reducer, it may be necessary or desirable to make special adaptations using the lubrication fitting holes furnished along with other standard pipe fittings, stand pipes and oil level gages as required.

3. Mount reducer on driven shaft as follows:

Important: Because reducer is shipped without oil, it is necessary to add the proper amount of oil before running. Use a high-grade petroleum-base, rust and oxidation inhibited (R&O) gear oil — see tables. Follow instructions on reducer nameplate, warning tags, and in the installation manual.

Under average industrial operating conditions, the lubricant should be changed every 2500 hours of operation or every 6 months, whichever occurs first. Drain reducer and flush with kerosene, clean magnetic drain plug and refill to proper level with lubricant.

CAUTION: Extreme pressure (EP) lubricants are not recommended for average operating conditions. Failure to observe these precautions could result in bodily injury.

WARNING

To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

For Straight Bore: Mount reducer on driven shaft as close to bearing as practical. If bushings are used, assemble bushings in reducer first. A set of bushings for one reducer consists of one keyseated bushing and one plain bushing. Extra length setscrews are furnished with the reducer. Driven shaft should extend through full length of speed reducer. Tighten both set-screws in each collar.

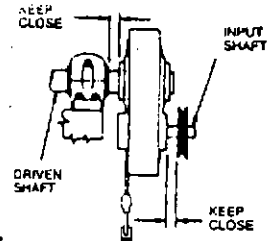


Fig. 2

For Taper Bushed: Mount reducer on driven shaft per instruction sheet No. 499629 packed with tapered bushings.

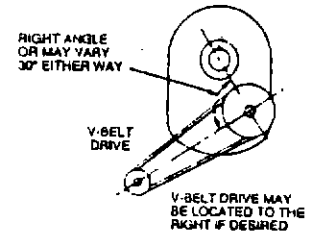


Fig. 3

4. Install sheave on input shaft as close to reducer as practical. (See Fig. 2).

5. Install motor and V-belt drive so belt will approximately be at right angles to the center line between driven and input shaft. (See Fig. 3) This will permit tightening the V-belt with the torque arm.

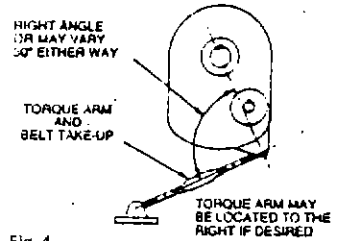


Fig. 4

6. Install torque arm and adaptor plates using the long reducer bolts. The bolts may be shifted to any of the holes on the input end of the reducer.

7. Install torque arm fulcrum on a rigid support so that the torque arm will be approximately at right angles to the center line through the driven shaft and the torque arm anchor screw. (See Fig. 4) Make sure that there is sufficient take-up in the turnbuckle for belt tension adjustment when using V-belt drive.

CAUTION: Unit is shipped without oil. Add proper amount of recommended lubricant before operating. Failure to observe this precaution could result in damage to, or destruction of the equipment.

8. Fill gear reducer with recommended lubricant.

LUBRICATION

CAUTION: Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly. Failure to observe this precaution could result in bodily injury.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200°F., the oil should be changed every 1 to 3 months depending on severity of conditions.

CAUTION: Do not use EP oils or oils containing slippery additives such as graphite or molybdenum disulphide in the reducer when backstop is used. These additives will destroy sprag action.

Table 1 — Oil Volumes

Reducer Size	Volume of Oil Required to Fill Reducer to Oil Level Plug																	
	† Position A			† Position B			† Position C			† Position D			† Position E			† Position F		
	Fluid Ounces (Approx)	Quarts* (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts* (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts* (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts* (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts* (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts* (Approx)	Liters (Approx)
TX1109																		
TX1115	16	½	.47	16	½	.47	20	¾	.59	24	¾	.71	32	1	.95	40	1¼	1.19
TST209																		
TX1215	28	¾	.83	32	1	.95	20	¾	.59	32	1	.95	52	1¼	1.54	56	1¼	1.66
TX1225																		

† Refer to Fig. 1 on page 2 for mounting positions.
 * U.S. Measure: 1 quart = 32 fluid ounces = .94646 liters.

Note: If reducer position is to vary from those shown in Figure 1 either more or less oil may be required. Consult factory.

Table 2—Minimum Oil Recommendations for Average Operating Conditions

Lubrication Recommendations—
 ISO Grades for Ambient Temperatures of 15° to 60°

Output RPM	Reducer Size														
	1	2	3	4	5	6	7	8	9	10	12	13	14	15	
301-400	220	220	150	150	150	150	150	150	150	150	150	150	150	150	
201-300	220	220	150	150	150	150	150	150	150	150	150	150	150	150	
151-200	220	220	150	150	150	150	150	150	150	150	150	150	150	150	
126-150	220	220	220	150	150	150	150	150	150	150	150	150	150	150	
101-125	220	220	220	220	150	150	150	150	150	150	150	150	150	150	
81-100	220	220	220	220	220	150	150	150	150	150	150	150	150	150	
41-60	220	220	220	220	220	220	150	150	150	150	150	150	150	150	
11-40	220	220	220	220	220	220	220	220	220	220	150	150	150	150	
1-10	220	220	220	220	220	220	220	220	220	220	220	220	220	220	

Lubrication Recommendations—
 ISO Grades for Ambient Temperatures of 50° to 125°

Output RPM	Reducer Size														
	1	2	3	4	5	6	7	8	9	10	12	13	14	15	
301-400	320	320	220	220	220	220	220	220	220	220	220	220	220	220	
201-300	320	320	220	220	220	220	220	220	220	220	220	220	220	220	
151-200	320	320	220	220	220	220	220	220	220	220	220	220	220	220	
126-150	320	320	320	220	220	220	220	220	220	220	220	220	220	220	
101-125	320	320	320	320	220	220	220	220	220	220	220	220	220	220	
81-100	320	320	320	320	320	220	220	220	220	220	220	220	220	220	
41-60	320	320	320	320	320	320	220	220	220	220	220	220	220	220	
11-40	320	320	320	320	320	320	320	320	320	320	320	320	320	320	
1-10	320	320	320	320	320	320	320	320	320	320	320	320	320	320	

Below -23°F call application engineering.
 20°F to -22°F use Mobil SHC67
 Above 125°F use Mobil SHC63

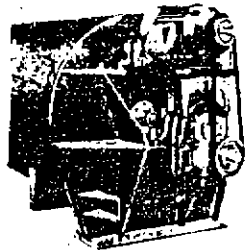


Fig. 5 NOTE: Belt guard removed for photographic purposes.
 Warning: Do not operate if belt guard is not in place.

MOTOR MOUNTS

The motor mount must be installed on output end of reducer as shown in Figure 5. Note: the T-A M motor mount is not recommended for applications requiring the use of TRI-MATIC® overload release.

Remove two or three (as required) housing bolts on output end of reducer. Place the motor mount in position and install the longer housing bolts supplied with the motor mount. Tighten bolts to torque specified in Table 3.

Install motor, drive sheave and driven sheave so that driven sheave is as close to the reducer housing as practical. Install V-belt and tension with the four adjusting screws provided on T-A M motor mount.

Check all bolts to see that they are securely tightened.

GUIDELINES FOR TORQUE-ARM REDUCER LONG-TERM STORAGE

During periods of long storage, or when waiting for delivery or installation of other equipment, special care should be taken to protect a gear reducer to have it ready to be in the best condition when placed into service.

By taking special precautions, problems such as seal leakage and reducer failure due to the lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage:

Preparation

1. Drain the oil from the unit. Add a vapor phase corrosion inhibiting oil (VCI-105 oil by Daubert Chemical Co.) in accordance with Table 3.
2. Seal the unit air tight. Replace the vent plug with a standard pipe plug and wire the vent to the unit.
3. Cover the shaft extension with a waxy rust preventative compound that will keep oxygen away from the bare metal. (Non-Rust X-110 by Daubert Chemical Co.)
4. The instruction manuals and lubrication tags are paper and must be kept dry. Either remove these documents and store them inside or cover the unit with a durable waterproof cover which can keep moisture away.

5. Protect the reducer from dust, moisture, and other contaminants by storing the unit in a dry area.

6. In damp environments, the reducer should be packed inside a moisture-proof container or an envelope of polyethylene containing a desiccant material. If the reducer is to be stored outdoors, cover the entire exterior with a rust preventative.

When placing the reducer into service

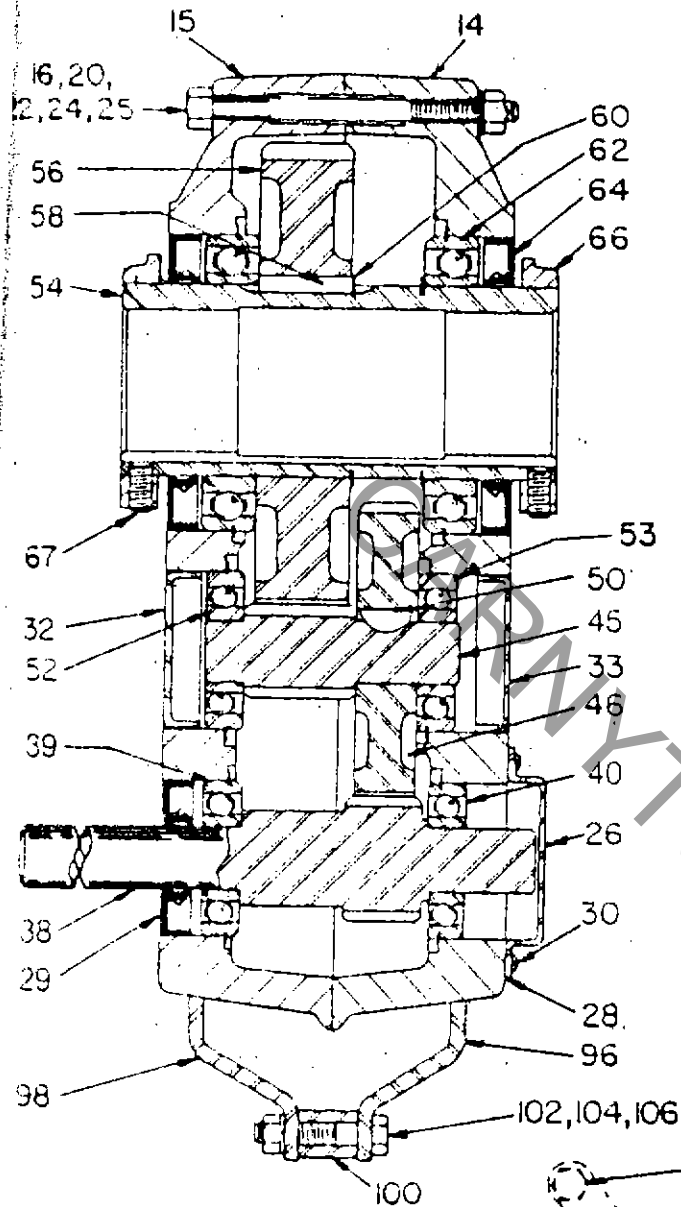
1. Assemble the vent plug into the proper hole.
2. Clean the shaft extensions with petroleum solvents.
3. Fill the unit to the proper oil level using a recommended lubricant. The VCI oil will not affect the new lubricant.
4. Follow the installation instructions provided in this manual.

**Table 3 — Quantities of VCI #105 Oil
 DODGE part number 415112-80-DB**

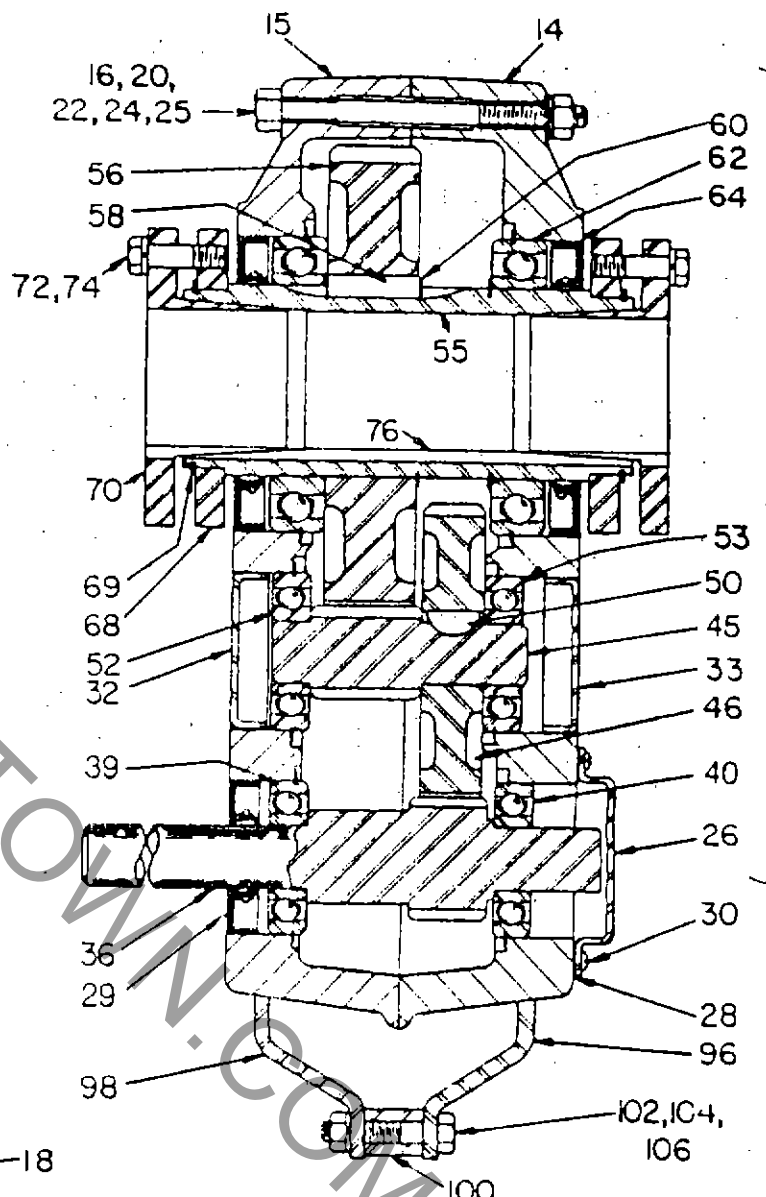
Case Size	Quarts or Liters
TX11 & TX12	1

VCI #105 & #10 are interchangeable.
 VCI #105 is more readily available.

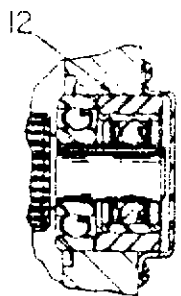
PARTS FOR TXT1 thru TXT2 STRAIGHT BORE & TAPER BUSHED SPEED REDUCERS



Straight Bore

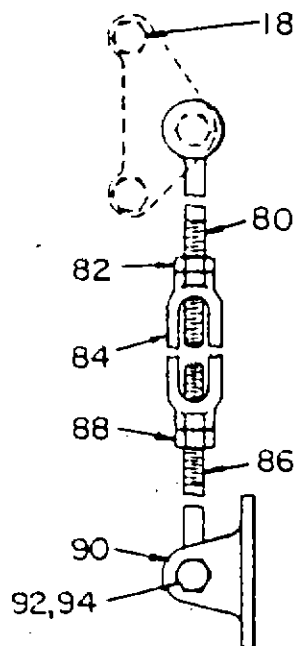


Taper-Bushed



Backstop Assembly

Note: The two-digit numbers are for reference only. Order parts by the six-digit numbers in the Parts List. Each six-digit number is a complete identification of the part or assembly.



Torque-Arm Assembly

Reference	Name of Part	No. Req'd	TXT1	TXT2
			Part No.	Part No.
12	Backstop Assembly	1	242101	252101
14	Housing	1	241190	242190
15	Air Vent	1	241237	241237
16	Housing Bolt	1	411418	411418
18	Adapter — Housing Bolt	2	411420	411420
20	Lockwasher	1	419011	419011
22	Hex Nut	1	407087	407087
24	Dowel Pin	2	420091	420091
25	Pipe Plug	2	430031	430031
26	Magnetic Plug	1	430060	430060
25	Washer	4	419092	419204
28	Backstop Cover	1	242221	243221
30	Backstop Cover Screw	4	415022	415022
31	Lockwasher	4		
32	C Shaft Brg. Cover (Input)	1	242224	242212
33	C Shaft Brg. Cover (Backstop)	1	242224	243224
34	Input Shaft with Pinion	9:1 Ratio 15:1 Ratio 25:1 Ratio	241481 241302 241200	242481 242186 242187
35	Input Shaft Key	1	443008	443014
45	COUNTER-SHAFT ASSEMBLY	9:1 Ratio 15:1 Ratio 25:1 Ratio	392100 392090 392091	392101 392092 392093
46	Δ Countershaft With Pinion	1	241216	242185
46	Δ First Reduction Gear	9:1 Ratio 15:1 Ratio 25:1 Ratio	241482 241170 241171	242482 242008 242005
50	Δ Gear Key	1	241309	242218
54	OUTPUT HUB ASSEMBLY*			
	Straight Bore	1	390151	392110
	Taper Bushed Δ Output Hub (Str. Bore)	1	390878	392111
55	Δ Output Hub (Taper Bush)	1	241208	242208
56	Δ Output Gear	1	241265	242134
58	Δ Output Gear Key	1	241007	242181
60	Δ Output Hub Snap Ring	1	241217	443399
61	Output Hub Key □ (Max. Bore)	2	421013	421017
66	Output Hub Collar □	2	241209	242209
67	Collar Screw □	4	400062	400094
68	Bushing Back-up Plate ●	2	241268	242137
69	Retaining Ring ●	2	421111	421112
28	SEAL KIT*	1	392119	392120
29	Δ Backstop Cover Gasket	1	242220	243220
29	Δ Input Shaft Seal	1	241457	242211
54	Gasket Eliminator Tube	1	465044	465044
31	Δ Output Hub Seal	2	241210	242210
39	BEARING KIT*	1	389905	389906
39	Δ Input Shaft Brg (Input)	1	424112	424019
40	Δ Input Shaft Brg (Backstop)	1	424111	424090
52 & 53	Δ Countershaft Brg	2	424006	424000
62	Δ Output Brg	2	424020	424022

Reference	Name of Part	No. Req'd	TXT1	TXT2	
			Part No.	Part No.	
70	BUSHING ASSEMBLY* (Taper Bushed Only)	1" Bore	1	241278	—
		1 1/4" Bore	1	241280	—
		1 1/2" Bore	1	241282	242146
		1 3/4" Bore	1	241286	242148
		1 7/8" Bore	1	241288	242150
		2" Bore	1	241290	242152
		2 1/8" Bore	1	241294	242154
		2 1/4" Bore	1	241292	242156
		2 1/2" Bore	1	—	242158
		2 3/4" Bore	1	—	242162
		3" Bore	1	—	242164
72	Δ Bushing Screw	6	411405	411390	
74	Δ Lockwasher	6	419010	419010	
76	Δ Key, Bushing to Shaft	1" Bore	1	443274	—
		1 1/4" Bore	1	443274	—
		1 1/2" Bore	1	443271	443281
		1 3/4" Bore	1	241308	443281
		1 7/8" Bore	1	241307	443281
		2" Bore	1	241306	443264
		2 1/8" Bore	1	241310	443280
		2 1/4" Bore	1	241305	443282
		2 1/2" Bore	1	—	443282
		2 3/4" Bore	1	—	242172
		3" Bore	1	—	242171
8	Δ Key, Bushing to Output Hub	1	—	443284	
5	Δ Key, Bushing to Output Hub	1" thru 1 1/4" Bore	1	443272	—
5	Δ Key, Bushing to Output Hub	1 1/2" Bore	1	443273	—
80	TORQUE ARM ASSEMBLY*	1	241097	243097	
82	Δ Rod End	1	241245	243245	
84	Δ Hex Nut	1	407093	407095	
84	Δ Turnbuckle	1	241246	243246	
86	Δ Extension	1	241247	243247	
88	Δ L.H. Hex Nut	1	407242	407244	
90	Δ Fulcrum	1	241249	243249	
92	Δ Fulcrum Screw	1	411456	411484	
94	Δ Hex Nut	1	407091	407093	
96	ADAPTER ASSEMBLY*	1	259151	259152	
96	Δ R.H. Adapter Plate	1	241242	242136	
98	Δ L.H. Adapter Plate	1	241241	242135	
100	Δ Adapter Bushing	1	242243	243243	
102	Δ Adapter Bolt	1	411412	411437	
104	Δ Lockwasher	1	419011	419012	
106	Δ Hex Nut	1	407087	407089	

* Includes parts listed immediately below marked "Δ". Bushing assembly includes 2 bushings.

Δ The parts marked "Δ" make up the assemblies under which they are listed.

δ Not shown on drawing.

† 4 req'd. on TXT1; 5 req'd. on TXT2.

‡ 6 req'd. on TXT1; 7 req'd. on TXT2.

□ Straight Bore only.

■ Taper Bushed only.

On Size TXT2 for 1 1/4" thru 1 3/4" bores.

REPLACEMENT OF PARTS

IMPORTANT:

Using tools normally found in a maintenance department, a TORQUE-ARM speed reducer can be disassembled and reassembled by careful attention to the instructions following.

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press, and equipment for heating bearings and gears, should be available for shrinking these parts on shafts.

Our factory is prepared to repair reducers for customers who do not have proper facilities or who for any reason desire factory service.

The oil seals are of the rubbing type and considerable care should be used during disassembly and reassembly to avoid damage to the surface which the seals rub on.

The keyseat in the input shaft as well as any sharp edges on the output hub should be covered with tape or paper before disassembly or reassembly. Also be careful to remove any burrs or nicks on surfaces of the input shaft or output hub before disassembly or reassembly.

ORDERING PARTS:

When ordering parts for reducer specify reducer size number, reducer serial number, part name, part number and quantity.

It is strongly recommended that when a pinion or gear is replaced, the mating gear or pinion be replaced also.

If the large gear on the output hub must be replaced, it is recommended that an output hub assembly of a gear assembled on a shaft be ordered to secure undamaged surfaces on the output hub where the oil seals rub. However, if it is desired to use the old output hub, press the gear and bearing off and examine the rubbing surface under the oil seal carefully for possible scratching or other damage resulting from the pressing operation. To prevent oil leakage at the shaft oil seals the smooth surface of the output hub must not be damaged.

If any parts must be pressed from a shaft or from the output hub this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against outer race of any bearing.

Because old shaft oil seals may be damaged in disassembly it is advisable to order replacements for these parts.

REMOVING REDUCER FROM SHAFT:

CAUTION: Remove all external loads from drive before removing or servicing drive or accessories.

WARNING

To ensure that drive is not unexpectedly started, turn off and kick out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

STRAIGHT BORE —

Loosen screws in both output hub collars. Remove the collar next to end of shaft. This exposes three pulley holes in output hub and use of wheel pulley. In removing reducer from shaft be careful not to damage ends of hub.

TAPER BUSHED —

1. Remove bushing screws.
2. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws make sure screw threads and threaded holes in bushing flanges are clean.
3. Remove the outside bushing, the reducer and then the inboard bushing.

DISASSEMBLY:

1. Position reducer on its side and remove all bolts. Gently tap the output hub and input shaft with a soft hammer (rawhide not a lead hammer) to separate the housing halves. Open housing evenly to prevent damage to the parts inside.
2. Lift shaft, gear, and bearing assemblies from housing.
3. Remove seals from housing.

REASSEMBLY:

1. **Output Hub Assembly:** Heat gear to 325°F to 350°F to shrink onto hub. Heat bearings to 270°F to 290°F, to shrink onto hub. Any injury to the hub surfaces where the oil seals rub will cause leakage making it necessary to use a new hub.
2. **Countershaft Assembly:** Shaft and pinion are integral. Press gear and bearings on shaft. Press against inner (not outer) race of bearings.
3. **Input Shaft Assembly:** Shaft and pinion are integral. Press bearings on shaft. Press against inner (not outer) race of bearings.
4. Drive the two dowel pins into place in the right-hand housing half. Position right half of housing (as shown in drawing) on blocks to allow clearance for protruding end of output hub.
5. Apply a few drops of oil to all bearings. Mesh output hub assembly, countershaft assembly and input shaft assembly together and place in the housing half. Tap lightly with a soft hammer (nylon or rawhide, not a lead hammer) until bearings are properly seated. Gearing should spin freely if bearings are properly seated.
6. Place input housing half into position and tap with a soft hammer until seated and housing flanges are together. Insert and torque down housing bolts. Spin input shaft to check for any drag or binding, assemblies will turn freely if housing is properly seated. Torque housing bolts per torque values listed below.

Table 3 — Housing Bolt Torque Values

Reducer Size	Recommended Torque
TXT1 & TXT2	360 lbs.-ins.

7. Extreme care should be used in installing seals on input shaft and output hub to avoid damage to seals due to contact with sharp edges of the keyseat in the input shaft or the retaining ring groove in the output hub. This danger of damage and consequent oil leakage can be decreased by covering the keyseat and groove with tape or paper which can be removed subsequently. Chamfer or burr housing bore if end of bore is sharp or rough. Fill cavity between lips of seal with grease. Seals should be pressed or tapped with a soft hammer evenly into place in the housing, applying force only on outer corner of seals. A slight oil leakage at the seals may be evident during initial running in, but will disappear unless the seals have been damaged.

Table 4 — Manufacturers' Part Numbers for Replacement Output Hub Bearings

TORQUE-ARM Reducer Drive Size	Output Bearing	
	DODGE Part Number	SKF Part Number
TXT109 TXT115 TXT125	424020	6011NR
TXT209 TXT215 TXT225	424022	6013NR

Table 5 — Manufacturers' Part Numbers for Replacement Countershaft Bearings

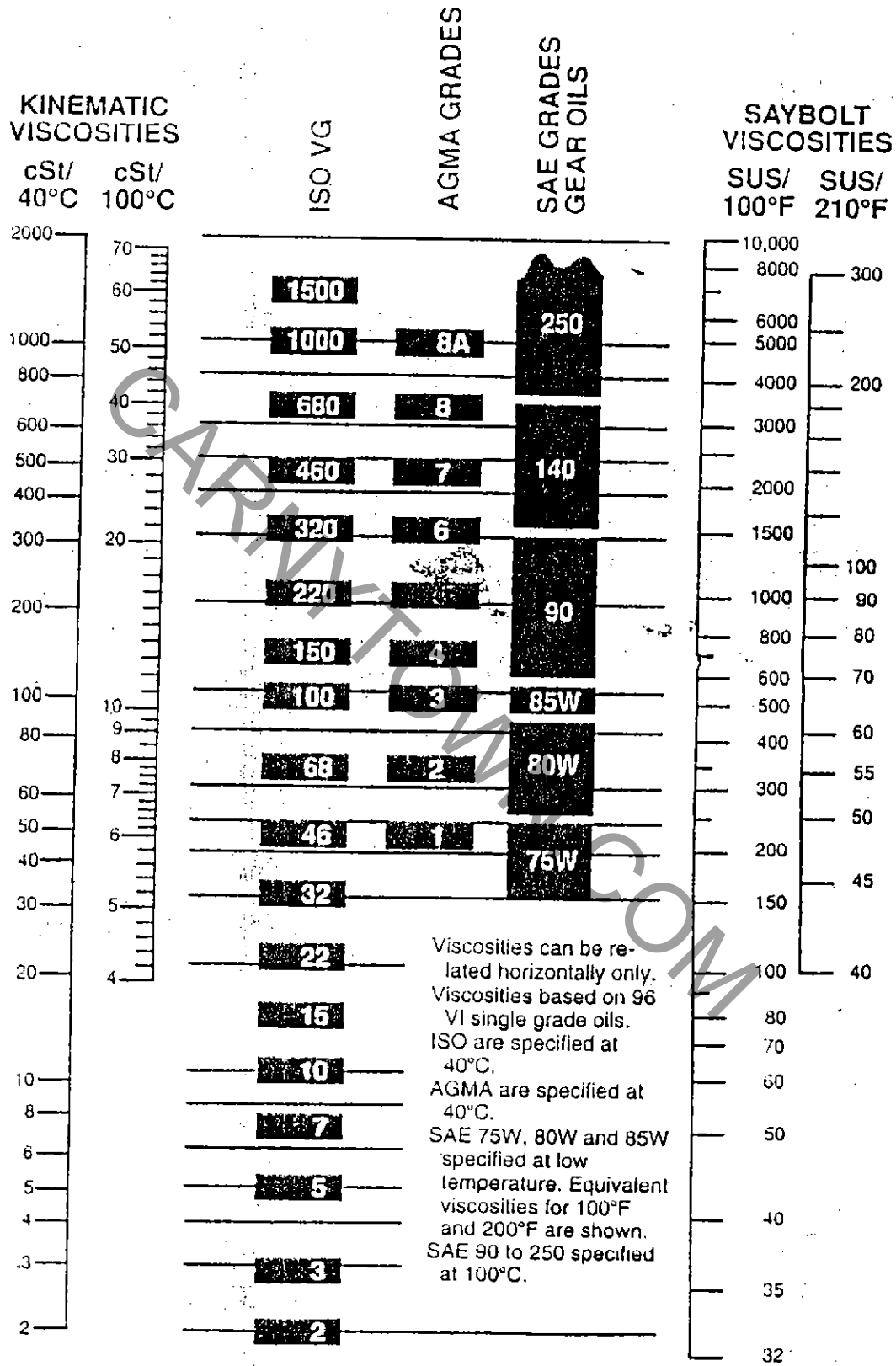
TORQUE-ARM Reducer Drive Size	Counter Bearing Input Side		Countershaft Bearing Adapter Side	
	DODGE Part Number	SKF Part Number	DODGE Part Number	SKF Part Number
TXT109 TXT115 TXT125	424006	304SG	424006	304SG
TXT209 TXT215 TXT225	424000	305MG*	424000	305MG*

Table 6 — Manufacturers' Part Numbers for Replacement Input Shaft Bearings

TORQUE-ARM Reducer Drive Size	Input Bearing Input Side		Input Bearing Adapter Side	
	DODGE Part Number	SKF Part Number	DODGE Part Number	SKF Part Number
TXT109 TXT115 TXT125	424112	205SG*	424011	204MG*
TXT209 TXT215 TXT225	424019	206MG*	424090	305SG*

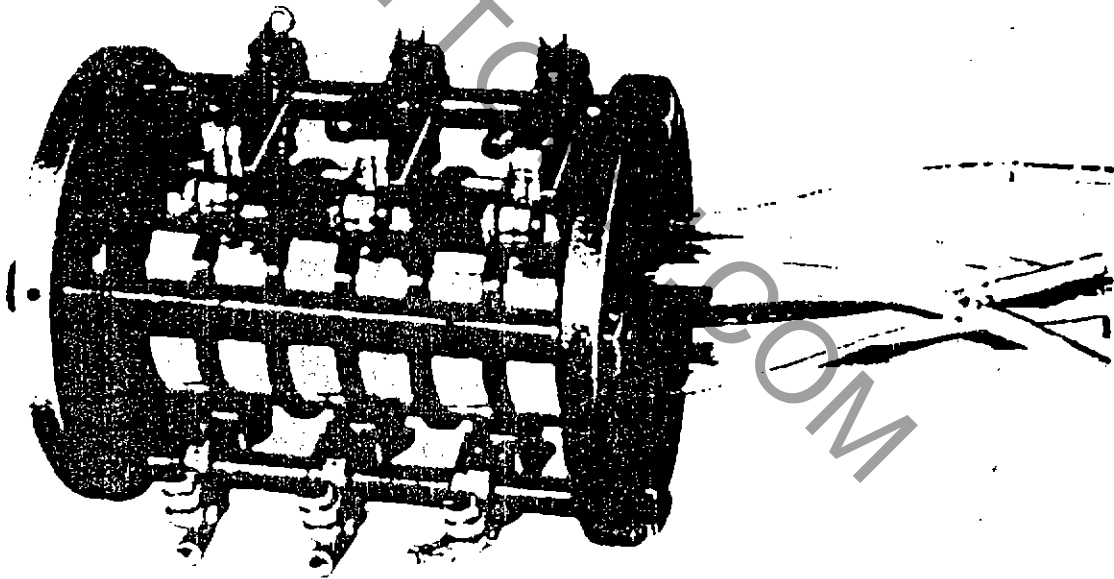
*MRC BRG

VISCOSITY CLASSIFICATION EQUIVALENTS



INSTALLATION-OPERATING-MAINTENANCE INSTRUCTIONS

ALL PURPOSE COLLECTOR RINGS



INSUL 8

CONDUCTIC DIVISION



© DELACHAUX GROUP

BASIC SAFETY

1. ELECTRICAL WARNINGS

- (a) The Collector Ring should be interfaced with the unit on which it is installed and the entire unit grounded in accordance with the National Electric Code and local codes and ordinances.
- (b) **DANGER:** Hazard of electrical shock or burn. Always disconnect or remove the power from the Collector Ring before attempting to perform any service function.
- (c) Do not use this Collector Ring with electrical loads greater than the rated current and voltage of the Collector Ring.

2. OPERATIONAL AND MAINTENANCE WARNINGS

- (a) Collector Rings must be enclosed or otherwise protected from contact by any personnel. Means for the provision of this protection is the responsibility of the user.
- (b) All fasteners or hardware should be checked periodically to assure tightness. Care should be exercised when handling the collector ring while servicing, adjusting or during operation.
- (c) **WARNING:** Modification of this equipment may cause excessive wear and void warranty. Modification may cause safety and fire hazards. Contact manufacturer regarding change or modifications of equipment which could affect reliability or safety.

A. OPERATION

1. Collector Rings may be installed with either the Brush Stud Assembly or the Slip Ring Core rotating. One of these two units should be stationary.

B. INSTALLATION

1. **Install** the Slip Ring Assembly on a shaft and lock it in place with set screws in the drive collar.
2. **On a Standard Collector Ring Installation**, screw Brush Stud in place (at proper center distance), place Brush Assembly in place and secure clamp bolt. Be sure Brush Box is located so that the top of the brush is parallel with the top of the brush box. Brush sides should not be in contact with the walls of the insulator ring.
3. **Make connections** at lugs on Brush Holders and ends of lead wires or busbar. Be sure connections on brush assemblies do not interfere or exert tension on the brush holders. It is recommended that flexible wire be used for brush and core terminations.

C. MAINTENANCE

1. GENERAL

(a) Periodic inspection and adjustment are essential to the maintenance of a collector ring assembly. Proper care of brushes, brush rigging, rings and current collection parts is a fundamental necessity for satisfactory performance of a collector ring assembly.

(b) Environmental conditions affect the performance of the collector ring and these conditions should be considered in the enclosure design. Periodic inspection of the enclosure is essential maintenance of the collector ring assembly.

2. COLLECTOR RING INSPECTION AND ADJUSTMENT

(a) Brush Rigging

(1) Brush studs are supported between (2) outboard bearings. The brush studs extend through the outboard bearings and they are secured by a setscrew in the outboard bearing. The setscrews prevent rotation of the brush stud. The setscrews should be checked for tightness. Some collector ring assemblies are furnished with additional brush stud anti-rotation devices. These devices are located on the outboard side of the outboard bearings. They incorporate an additional setscrew to prevent brush stud rotation. The additional setscrew must also be checked for tightness.

(2) The spacing between the outboard bearings is critical to assure the free rotation of the brush rigging. The brush stud insulator sleeves are cut to length in order to provide the proper spacing. The outboard bearings should be located snugly against the insulator sleeve without any deformation of the materials. Hand tighten the outboard jam nuts and then secure the brush stud with the setscrews referred to in 2.(a)(1). Caution: Do not over-tighten the outboard jam nuts. Over-tightening can preload the bearings and cause excessive rotation friction. Final check should be made to assure no binding of outboard brush rigging or binding of brushes with insulator barriers.

(b) Brush Holders

(1) Inspect brush holders for proper alignment. Brush holders should be located so that the entire brush contact surface rides squarely on the ring with the brush moving freely in the brush box. The top of the brush should be parallel with the top of the brush box.

(2) Brush holder clamps should be checked for tightness. Clamp bolts should be set at 40-45 lbs. in (75 lbs. in maximum). Loose clamps will allow the brush holder to rotate, causing the brush to lift from the surface of the ring. Brush lift will cause arcing and excessive heat concentration.

(3) Brush terminations at the holder should be inspected to assure that no external force is imposed on the holder that would cause rotation of the holder on the stud. Flexible or soft wire leads are recommended for these terminations. External clamps should be used to support the entire weight of the leads.

(4) A final check should be made to assure that the brush studs can not rotate. See 2(a).

(c) **Brushes**

- (1) Inspect for wear. If the distance from the top of the brush to the top of the brush box is over half the depth of the brush box, the brush should be replaced.
- (2) Inspect brush contact surface by removing the brush and checking the brush surface for dirt, oxidation, pitting or other contaminants. Remove any large particles and follow seating instructions in paragraph 2.1(c)(3).
- (3) Check brush contact surface for proper seating. If the seating is not proper, the contact surface will be tracked differently in different areas. To reseat the brushes, lay a piece of sandpaper between the ring and the brush. Install the brush in the brush holder in proper alignment and rotate the core while applying pressure on the brush. If the core cannot be rotated, the sandpaper must be pulled across the brush surface. Wrap sandpaper at least 180° around the ring to prevent rounding of the brush edges. Recheck the brush contact surface and repeat the sanding process, if necessary until the entire contact surface appears uniform and without pits. Caution: Do not use emery paper or cloth to seat brushes since the emery will become embedded in the brush and continue the abrasive action against the ring and brush. Emery and many other abrasives are conductive and must not be used.

(d) **Brush Springs**

- (1) Inspect and test springs for proper tension. The brush tension springs should be set at 1.5-3.0 lbs. per spring and as uniform as possible. Uniform settings for each brush prevent selective action by which certain brushes carry more or less than their share of the load. Insufficient brush pressure can cause loss of contact and overtension can cause excessive brush and ring wear.
- (2) The spring tension should be periodically tested on all brushes to assure uniform brush tension. Test for tension as shown in Figure 1. See paragraph 5(b) for spring tension adjustment.

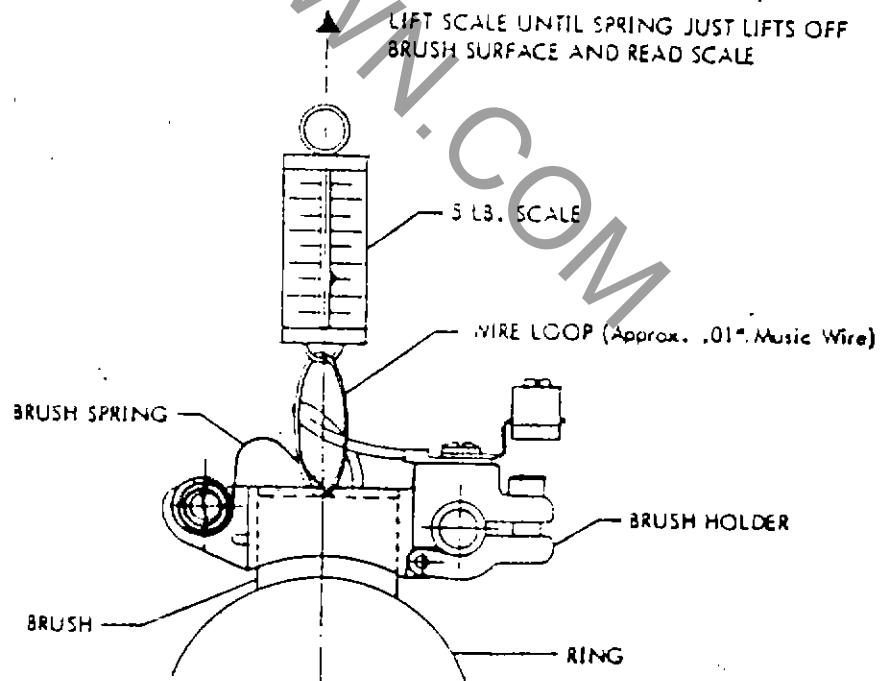


FIGURE 1

(e) **Rings**

- (1) Inspect the ring surface for dirt, oxidation or other contaminants. A properly operating ring will have a film that appears burnished in color where the brushes track with a darker surrounding color. If this condition does not exist, cleaning will be necessary.
- (2) The ring should be cleaned with a non-conductive abrasive such as Ideal Industries' Flexible Abrasive for collector rings. Hold the abrasive against the ring with a medium amount of pressure while turning the core. If the core cannot be turned, the abrasive must be rubbed over the ring. Continue this process until the ring surface is polished without any dirt or contaminants left on the surface. To prevent abrasive from being lodged in the brushes, they should be lifted off the ring.
- (3) Inspect rings for pitting. Pitting of the ring must be corrected since pits will produce arcing, leading to the development of larger and more pits. Small pits can be removed by hand stoning of the area. If large pits and/or a considerable amount of pits are present on the surface, the surface must be machined. Machining is also necessary if concentricity of the surface is questionable. When stoning or machining rings, remove only enough material to eradicate the pits. Again, the brushes should be lifted from the surface when stoning or machining. Finish the ring surface to a 16-32 microfinish as described in 2(e)(2).

(f) **Electrical Connections**

- (1) Inspect all electrical connections for corrosion and tightness. Clean corroded parts with a wire brush and/or muriatic acid. Loose and/or corroded terminations will cause a concentration of excessive heat.

3. ENCLOSURE INSPECTION

- (a) Moisture is a major cause of collector ring deterioration. Corrosion of parts and insulation breakdown can be attributed to the presence of water. Dust and dirt present within the enclosure will affect the proper operation of the assembly. Most dusts cause excessive brush and collector ring wear and conductive dusts, if allowed to accumulate, will form a path for short circuiting.
- (b) A properly designed enclosure will be dust tight and watertight; however, condensation may still form on the walls of the enclosure. In some environments, condensation can be eliminated with the addition of a breather and drain. Other environments, particularly dusty ones, require a thermostatically controlled heater to eliminate condensation.
- (c) An inspection should be periodically performed by removing the enclosure and checking for condensation, water and dust collection. If contaminants are found, the enclosure and the assembly should be wiped down with a lint free cloth. If the problem appears persistent, steps should be taken to remedy the leakage or condensation problem.

4. FREQUENCY OF INSPECTIONS

- (a) The first inspection should be made shortly after installation and before operation. Continuing inspections should be made on a regular basis after every 200-400 hours of operation under normal conditions.

5. REMOVING AND REPLACING BRUSHES AND SPRING TENSION SCREWS

- (a) **Brush Holders with non-adjustable spring tension (Figure 2)**
- (1) Pull spring free end (B) out of brush holder recess and slide spring off of fixed hub (A).
 - (2) Unscrew binder screw (C) and take off brush shunt connector (D) and remove brush (E).
 - (3) Install new brush, reversing above procedure.

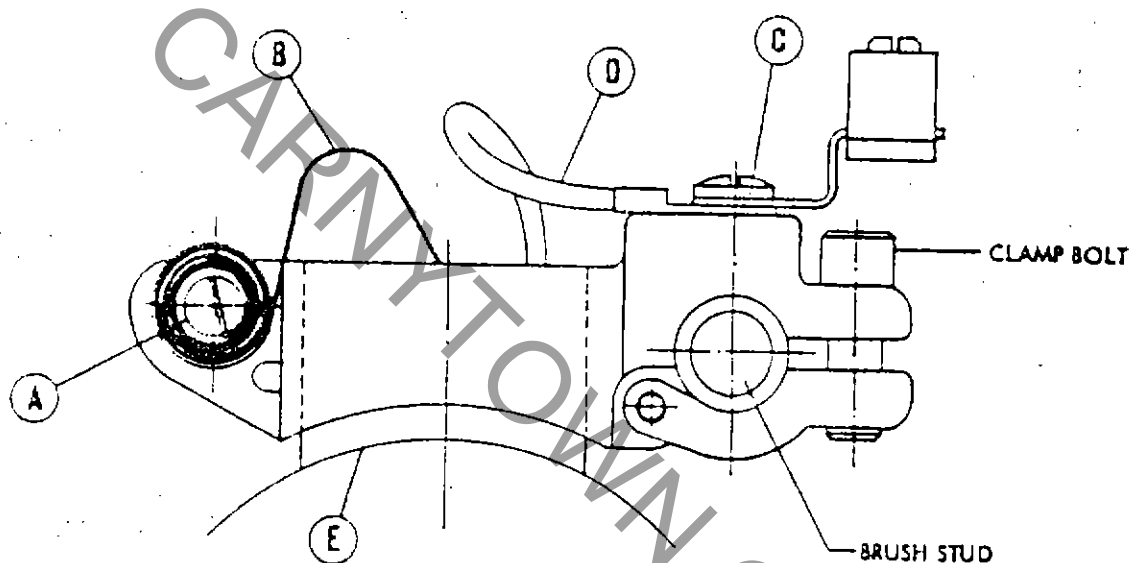
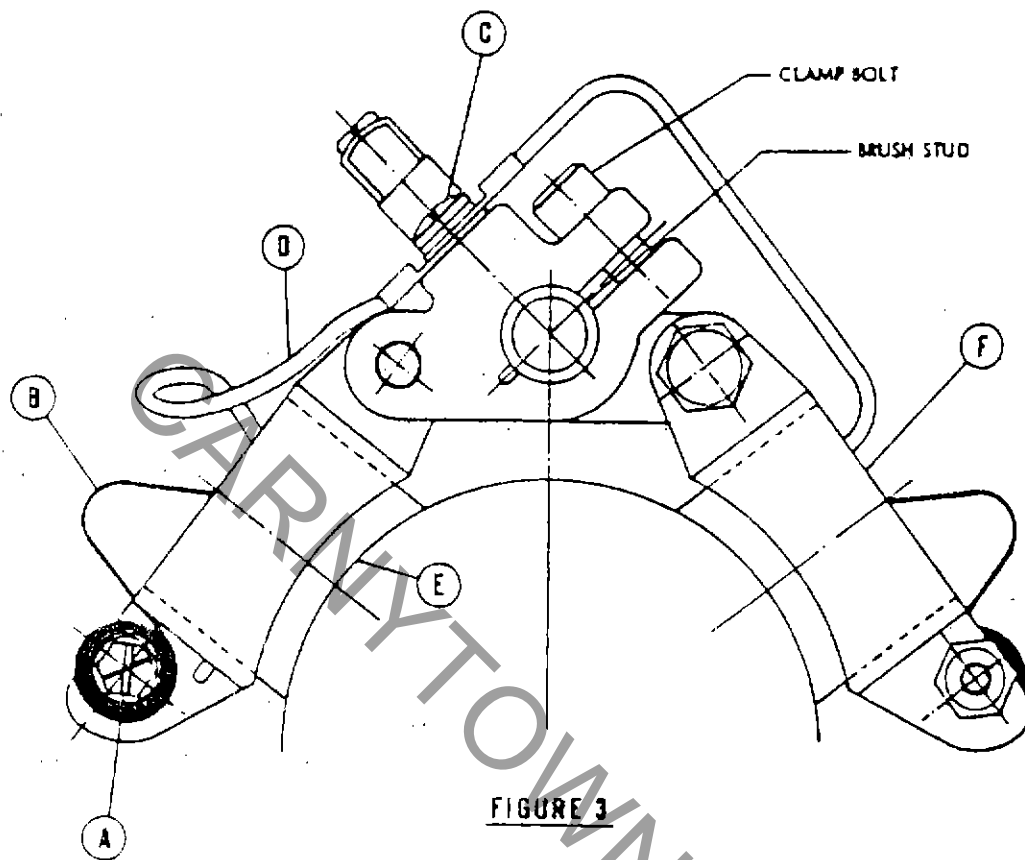


FIGURE 2

- (b) **Brush Holders with adjustable spring tension (Figure 3)**
- (1) Release spring tension on the brush spring by holding the spring tension screw with a screw driver at slot (A) and loosening spring tension nut on opposite side. Do not completely remove the nut, just loosen. Screws can be adjusted with 9/32 wrench without removing from stud.
 - (2) Pull spring (B) up and out of the way and unscrew binder screw (C). Take off brush shunt connector (D) and remove brush (E).
 - (3) Install new brush, reversing above procedure.
 - (4) Tension is applied on brush spring by holding nut with wrench and turning screw with screw driver clockwise until inner coils are tight. Back off ¼ turn, then tighten the nut. Spring should have a minimum of 1 pound pull at the brush. See paragraph 2.(d)(1).

- (5) To replace brush spring tension screw (A), simply take spring tension screw nut off and pull the screw and spring out of the holes in brush holder (F). Use above steps in reverse order to replace spring tension screw.



D. STORAGE

When not in use, the collector ring should be kept in a clean, dry place, protected and preferably at room temperature. Collector Ring Enclosures should be opened periodically to check for condensation. It is recommended that a self-contained or bagged absorbent material be placed in the Collector Ring Enclosure during extended periods of storage. Remove absorbent material before putting the collector ring into operation.

E. RECORD

It is imperative that the following information is available when ordering replacement parts or discussing the collector ring with the factory. Please record the information now in the spaces provided below.

CATALOG NO. OF COLLECTOR RING _____

SERIAL NUMBER M- _____