

MFG.: MANBELS
RIDE : PONY CARTS

PONY CART

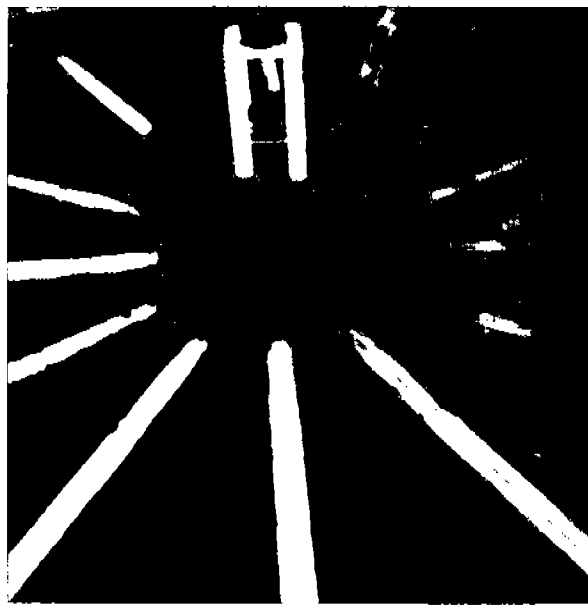
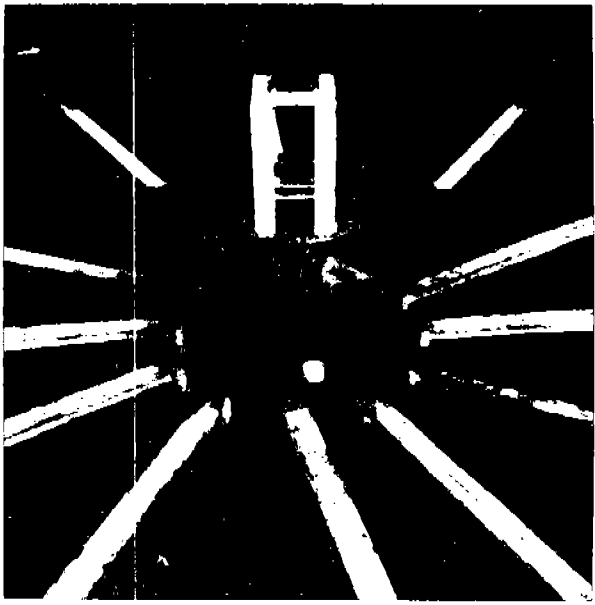
1. THE SET UP DIMENSIONS ARE:
HEIGHT: 21'
DIA: 30'
2. MAXIMUM SPEED OF 10 REVOLUTIONS PER MINUTE.
3. THE RIDE OPERATES IN A FORWARD CIRCULAR DIRECTION ONLY.
4. ELECTRICAL: THE RIDE REQUIRES 220 VOLT, SINGLE PHASE, 30 AMPS. 5 H.P. MOTOR
5. PASSENGER CAPACITY:
1500 LBS TOTAL WEIGHT OR MAXIMUM OF 200 LBS PER SEAT.
16 PASSENGERS, 2 PER SEAT.
6. RIDE DURATION: RECOMMENDED TIME IS TWO MINUTES NEVER MORE THAN FOUR MINUTES.
7. BALANCE DOES NOT AFFECT OPERATION OF RIDE.
8. PASSENGER RESTRICTIONS: NO ONE UNDER ONE YEAR OF AGE MAY RIDE ALONE. MAXIMUM SIZE IS LIMITED BY PHYSICAL SIZE OF SEAT COMPARTMENT.
9. PASSENGER RESTRAINT: ALL PASSENGERS MUST BE RESTRAINED BY THE SEAT BELT. NEVER OPERATE A SEAT WITH A BROKEN SEAT BELT.

SET UP PROCEDURE-PONY CART

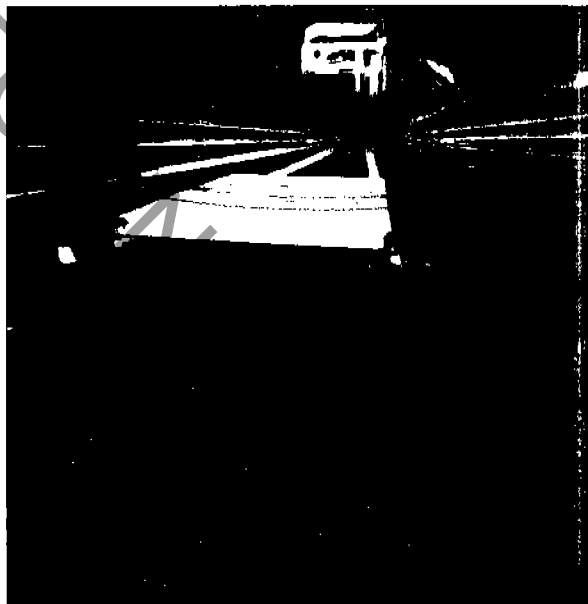
SPACE REQUIREMENT-35 FOOT CIRCLE

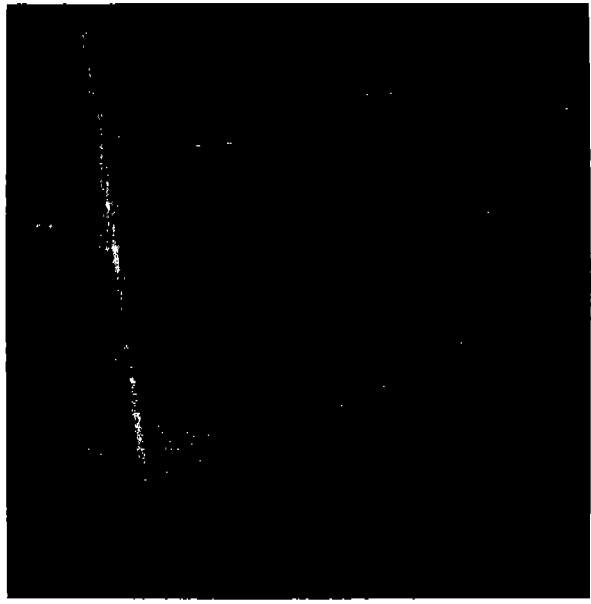
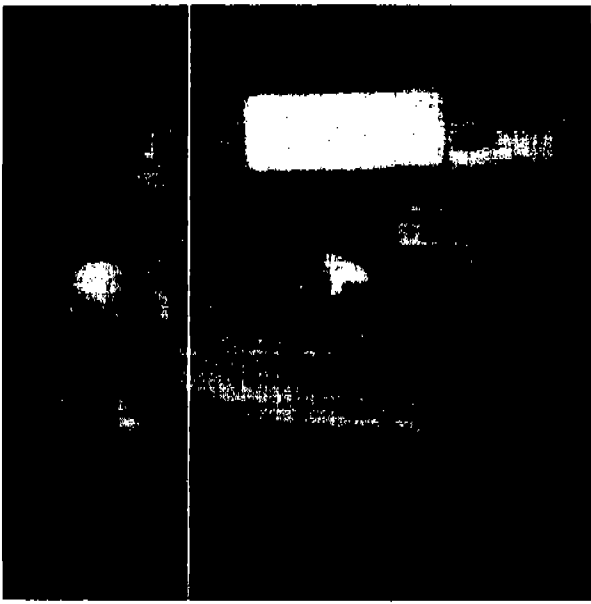
ELECTRIC REQUIREMENT-30 AMP 220 VOLT SINGLE PHASE

- (1) UNLOAD CENTER ON LOCATION AND LEVEL IT UP
- (2) ATTACH UNDERPENDING TO THE CENTER BY PLACING PIPE END ON THE PEG
- (3) NEXT, LEVEL THE UNDERPENDING
- (4) PLACE THE PLATFORMS DOWN IN THE ORDER THEY GO
- (5) PUT TOP SUPPORT POLES IN THE ENDS OF THE UNDERPENDING
- (6) CONNECT POLES TOGETHER BY ATTACHING THE LIGHT PANELS WITH PINS AT THE TOP
- (7) PLACE CENTER POLE IN THE PIPE AT THE CENTER
- (8) SNAP CANVAS TOP TO EYEBOLTS ON LIGHT PANELS
- (9) PULL TOP UP BY BLOCK AND TACKLE ON CENTER POLE
- (10) PLACE PONY CARTS ON PLATFORMS AROUND THE RIDE
- (11) SLIDE SWEEPS INTO BOTTOMS OF CARTS AND PUT TWO PINS IN THEM
- (12) CONNECT SWEEPS TO THE CENTER WITH PINS
- (13) PUT BOW LIGHTS ON CENTER POLE AND KEY THEM
- (14) PLACE SPREADERS AND BOLTS IN BETWEEN SWEEPS
- (15) SPREAD CANVAS COVER OVER CENTER AND HOOK THE SNAPS TO SPREADERS
- (16) HOOK UP LEAD CORD TO CONTROL BOX
- (17) PLUG IN CENTER AND PANEL LIGHTS
- (18) TEST RUN RIDE AND THEN OPERATE

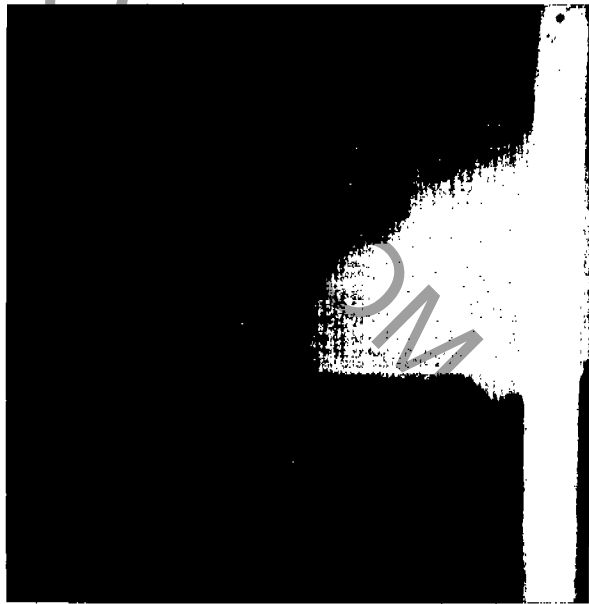
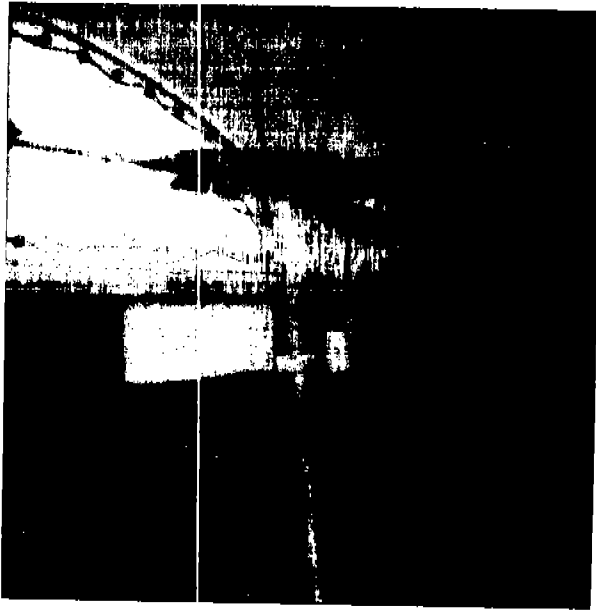


CARNY/T





CARNYTO



OPERATION OF RIDE

1. OPEN ENTRANCE GATE AND ALLOW PROPER NUMBER OF RIDERS IN.
2. HELP SMALLER CHILDREN IN SEATS.
3. SECURE ALL SEAT BELTS.
4. CLOSE ENTRANCE GATE.
5. CHECK AND DOUBLE CHECK TO SURE THAT NO ONE IS INSIDE THE FENCE BEFORE STARTING RIDE.
6. BE SURE EVERYONE ON RIDE IS SEATED BEFORE TURNING RIDE ON.
7. OPERATE RIDE FOR A MINIMUM OF 2 MINUTES. MAXIMUM OF 4 MINUTES.
8. STOP THE RIDE AND OPEN THE GATE.
9. RELEASE ALL SEAT BELTS AND ASSIST SMALL CHILDREN IN GETTING OFF RIDE.

NOTE: DO NOT LET ANYONE SIT ON OR LEAN OVER THE FENCE WHILE THE RIDE IS IN MOTION.

OWNER/OPERATOR'S RESPONSIBILITY - OPERATION PROCEDURES

- 4.1 Each owner/operator of an amusement ride or device shall read and become familiar with the contents of the manufacturer's recommended operating instructions and specifications, when received as provided in 3.1. Each owner/operator shall prepare an operating fact sheet. This fact sheet shall be made available to each ride or device operator and attendant of the amusement ride or device. The owner's/operator's fact sheet (on a ride-to-ride basis) shall include but not be limited to:
 - 4.1.1 Specific ride or device operation policies and procedures with pertinent information from the manufacturer's instructions.
 - 4.1.1.1 Description of the ride or device operation.
 - 4.1.1.2 Duties of the specific assigned position of the ride or device operator or attendant.
 - 4.1.1.3 General safety procedures.
 - 4.1.1.4 Additional recommendations of the owner/operator.
 - 4.1.2 Specific emergency procedures in the event of an abnormal condition or an interruption of service.
 - 4.1.3 The owner/operator shall provide training for each ride or device operator and attendant of an amusement ride or device. This training shall include but not be limited to the following, where applicable:
 - 4.1.3.1 Instructions on ride or device operating procedures.
 - 4.1.3.2 Instructions on specific duties of the assigned position.
 - 4.1.3.3 Instructions on general safety procedures.
 - 4.1.3.4 Instructions on emergency procedures.
 - 4.1.3.5 Demonstration of the physical ride or device operation.
 - 4.1.3.6 Supervised observations of the ride or device operator's physical operation of the ride or device.

- 4.1.3.7 Additional instructions deemed necessary by the owner/operator.
- 4.1.4 The ride or device operator of each amusement ride or device shall conduct a daily pre-opening inspection of each ride or device prior to carrying passengers. This inspection shall include but not be limited to the following:
- 4.1.4.1 Visual check of all passenger-carrying devices, including restraint devices and latches.
 - 4.1.4.2 Visual inspection of entrances, exits, stairways, and ramps.
 - 4.1.4.3 Test of all communications equipment necessary for the operation of the ride or device.
 - 4.1.4.4 Prior to carrying passengers, the ride or device shall be operated for a minimum of one complete operating cycle.

SPECIAL CAUTION

The most important safety requirement on this ride is a well trained, alert operator. You must always remember this ride is not a product designed for use by an untrained person. Failure to do so could result in a severe personal accident. Many hours of direct training on the operation of this ride are mandatory before any individual can be allowed to take full responsibility. It is mandatory for the operator to be intimately familiar with this manual.

It is our philosophy that accidents are not acceptable as they represent human suffering and property damage which are preventable through proper management.

CAUTIONS

1. Be intimately familiar with this manual and properly trained before attempting to operate this ride. Do not lose this manual. Its 1987 replacement cost is \$25.00.
2. This ride is electrically grounded. This helps prevent a person from being shocked should a short develop in the ride. This also produces a very dangerous condition. Should you touch a live wire and grounded ride, you may be killed even though it is only 110v and you are young and healthy. Therefore, ALWAYS, ALWAYS DISCONNECT the main power source before doing anything which might bring you in contact with anything electrical.
3. This ride is heavy moving machinery. Should you or anyone else be hit or become tangled in its machinery, the results will be worse than you expect.
4. Anything happening on or near this ride is your responsibility. Your not seeing anything is no excuse. Be extra alert at all times.
5. Always listen for any unusual noise from your ride. Should you hear or notice anything unusual, stop the ride and immediately contact your supervisor before attempting further operation.
6. Be polite and cautious even when customers are not. Your attitude has a major effect on safety on this ride.
7. Always allow plenty of time to complete all pre-opening and closing procedures. Keep your ride area clean and orderly.
8. In case of an accident, even a very small one:

- a. stop the ride
 - b. get help (office or supervisor)
 - c. aid the injured as best you can
 - d. stay calm
 - e. control crowds
 - f. when help arrives, assist them
 - g. remember the facts---don't gossip---you will have plenty of time to tell the real story at a later time
9. Always make absolutely certain everyone is properly seated and strapped in before starting the ride.
 10. Check carefully that everyone is clear of the ride and outside the fence before starting the ride.
 11. Do not let anyone climb on, play on, or lean over the fence.
 12. Keep the fence a safe distance from the ride.
 13. Use common sense.
 14. Understand that everything inside the fence is your personal responsibility.
 15. Should there be an accident and you even had beer on your breath, had been drinking, or were taking any type of illicit drugs, you could be charged with a felony and sentenced to prison.
 16. When erecting or dismantling a ride, most injuries occur because:
 - a. something falls on someone
 - b. someone slips and falls
 - c. something touches a high voltage line

Remember, the wires on the regular wooden poles often carry 7200 volts.

17. Preventing a child from being injured is by far your most important job.
18. Periodic factory safety bulletins---put these into effect immediately and add them to this book.
19. When you leave the ride turn power off.
20. Be cautious and ready for the unexpected when dealing with children.

NEVER ALLOW A CHILD TO GET IN FRONT OF A MOVING AMUSEMENT RIDE VEHICLE. IT COULD RESULT IN A SERIOUS INJURY OR DEATH.

- CAUTION: Never ride anyone without the proper seat restraint.
- CAUTION: Never let anyone lean over or sit on the fence while the ride is in motion.
- CAUTION: Never operate the ride without watching the ride while in motion.
- CAUTION: Never operate the ride while anyone not on the ride is inside the fence.

PERSONAL CONDUCT

The following should not be permitted while operating a ride:

1. Any use of alcohol or illicit drugs.
2. Eating, smoking, or drinking beverages at the ride.
3. Failure to follow the instructions of your supervisor.
4. Failure to follow standard operating procedures and safety rules.
5. Arguing or using profanity in front of customers.
6. Leaving the ride unattended.
7. Listening to radios or tape players.
8. Visiting or having long conversations with others.

AVOIDING LAW SUITS

In addition to providing a safe operation, a little PR can go a long way in preventing a minor injury from becoming a major law suit. We recommend you train your employees in the art of being courteous, helpful and considerate to anyone with even the slightest injury. Employees should immediately notify their supervisors so that they may show additional extraordinary consideration to make absolutely certain that the injured party and friends know that you are concerned and have done everything possible to keep the injury from spoiling a day of fun.

OWNER/OPERATOR'S RESPONSIBILITY - MAINTENANCE

- 4.1 Each owner/operator of an amusement ride or device shall read and become familiar with the contents of the manufacturer's maintenance instructions and specifications when received, as provided in 3.1. Based on the manufacturer's recommendations, each owner/operator shall implement a program of maintenance, testing, and inspections providing for the duties and responsibilities necessary in the care of each amusement ride or device. This program of maintenance shall include a checklist to be made available to each person performing the regularly scheduled maintenance on each ride or device. The owner/operator's checklist (on a ride-to-ride basis) shall include but not be limited to:
 - 4.1.1 Description of preventive maintenance assignments to be performed.
 - 4.1.2 Description of inspections to be performed.
 - 4.1.3 Special safety instructions, where applicable.
 - 4.1.4 Any additional recommendations of the owner/operator.
- 4.2 The owner/operator of the amusement ride or device shall provide training for each person performing the regularly scheduled maintenance on the ride or device, pertaining to their duties. This training shall include, but not be limited to the following:
 - 4.2.1 Instruction on inspection and preventive maintenance procedures.
 - 4.2.2 Instruction on the specific duties of the assigned position.
 - 4.2.3 Instruction on general safety procedures.
 - 4.2.4 Demonstration of the physical performance of the assigned regularly scheduled duties and inspections.
 - 4.2.5 Supervised observation of the maintenance person's physical performance of their assigned regularly scheduled duties and inspections.
 - 4.2.6 Additional instructions deemed necessary by the owner/operator.
- 4.3 Prior to carrying passengers, the owner/operator shall conduct or cause to be conducted a daily documented and signed pre-opening inspection, based on provided instructions, to insure the proper operation of the ride or device. The inspection program shall include, but not be limited to the following:

- 4.3.1 Inspection of all passenger-carrying devices, including restraint devices and latches.
 - 4.3.2 Visual inspection of entrances, exits, stairways, and ramps.
 - 4.3.3 Functional test of all communication equipment necessary for the operation of the ride.
 - 4.3.4 Inspection or test of all automatic and manual safety devices.
 - 4.3.5 Inspection or test of all brakes, including service brakes, emergency brakes, parking brakes, and back stops.
 - 4.3.6 Visual inspection of all fencing, guarding, and barricades.
 - 4.3.7 Visual inspection of the ride structure.
 - 4.3.8 The ride or device shall be operated for a minimum of one complete operating cycle.
- 4.4 Following an unscheduled cessation of operation, and the unloading of an amusement ride or device, necessitated by malfunction, adjustment, environmental conditions, mechanical, electrical, or operational modification, that affected the operation, the ride or device, or the specifically affected element, shall be appropriately inspected, and operated, without passengers, to determine that the cause for cessation of operation has been corrected and does not create an operational problem.

OWNER/OPERATOR'S RESPONSIBILITIES - INSPECTION

- 4.2.1 Owner/operators of amusement rides or devices shall have an inspection program consistent with the inspections outlined in Practices F770 and F853.
- 4.2.2 Inspection documents deemed appropriate by the owner/operator to be maintained in the ride file shall be filed according to the procedures outlined in Practices F770 and F853.
- 4.2.3 The owner/operator of an amusement ride or device shall promptly notify the manufacturer of an incident, failure or malfunction which, in his judgment, seriously affects the continued proper operation of the ride or device and is information of which the manufacturer should be aware.

SAMPLE GUIDE FOR OUTSIDE AMUSEMENT RIDE SAFETY OFFICERS
(INSPECTORS)

A. INVOLVE MANAGEMENT

1. Require the owner, manager or whoever is in the real position to control safety to accompany the inspector during the complete inspection at least once per season.
2. Require the ride foreman to be there during the inspection.
3. Make certain the ride foreman has access to the ride manual and understands everything in the manual.

B. THE INSPECTION

1. Check all passenger restraints for operation and mechanical condition.
2. Make certain the seat will stay on the ride. Check:
 - a. pins and safety pins
 - b. bolts and nuts
 - c. bearings and shafts
 - d. wheels
 - e. cracks in sweeps
 - f. anything repaired or homemade
3. Check guards, fence and other devices to protect the public and the operator from the machinery.
4. Go over your prepared list to see if there is anything that this particular ride needs checked.
5. Interview the foreman with three goals in mind:
 - a. to teach safety to the foreman
 - b. to learn more yourself
 - c. to improve safety attitude and knowledge in the management.

NOTE: The interview should be friendly, cooperative and informal. The following items should be covered

1. What could be done to make this ride safer mechanically?
2. Does he understand that all safety inside the fence is his personal responsibility?
3. What could be done to make this ride safer from an operational point of view?

4. Ask him how he knows if the ride has problems ... does he listen for sounds? What if it jerks or jumps? To whom would he report anything unusual?
5. What would he do if someone got hurt on his ride? What if he got a drunk customer? What if he had some customers get in a fight?
6. Is he aware that his ride is electrically grounded? This makes the ride less likely to shock him or his customers. Warn him that a grounded ride is much more dangerous if anyone touches a live wire and the ride at the same time. It is just like holding a bathroom faucet and touching a live wire. It really can kill you... Because the ride is grounded so well, 110 volts can be much more dangerous than much higher voltage under different circumstances.
7. Explain that should there be an accident and even if he had beer on his breath or taken any illicit (non-prescription) drugs, he could be charged with a felony. That is very serious.
8. Ask how often he inspects the ride. Suggest a couple of times a day. Teach him the first four points of your inspection.
9. For carnivals:
 - a. new DOT laws
 - b. sleeping under trucks
 - c. cranes and high voltage
 - d. falling while erecting or fixing rides

C. OWNER/MANAGER MEETING AFTER INSPECTIONS

Try to encourage them to become a couch-counselor, emphasizing the following:

1. Give your workers a chance to do their job with pride.
2. Make certain they know their job.
3. Make your workers feel important and contributing.
4. Take steps to reduce employee turnover.
5. Listen and learn from your workers.
6. Most accidents are the result of a chain of relatively unimportant situations.

D. As a safety inspector, your job is accident prevention in its broadest concept.

1. Apply your efforts to those areas most likely to prevent accidents.
2. Help, don't hinder, the profitability of the ride operation. A profitable ride operation is invariably a safer operation.

GENERAL GUIDELINES

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 load.
 - C. Manufacturer's recommended length of ride time.
 - 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 and a complete working knowledge of the manufacturer's operator's manual for the ride he supervises.
3. Require each operator to inspect the ride he supervises on each day of operation.
 - A. Determine that no portion of the ride is damaged, omitted or worn in such a manner that it is unsafe or that may develop into an unsafe condition.
 - B. Report any irregularities to superintendent or owner.
 - C. Do not operate the ride if any irregularities are found until such condition is corrected.
4. Instruct the operator to allow no passenger to ride who is 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 in the ride who cannot be properly secured due to passenger size or because of malfunction of the securing device.
 - A. Stop the ride immediately if any passenger is observed tampering with any restraining device 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 give his full attention to the ride and its passengers.
8. Instruct operator to allow no other person, other than another trained operator, to operate the controls of the ride.
9. Instruct operator and attendants fully as to the proper method of assembly and disassembly of portable rides. Supply adequate personnel and equipment to do this safely.
10. Instruct operator to inspect and correct or replace damaged, lost or worn parts that are unsafe or that may develop into unsafe parts simultaneously with assembly or disassembly.
11. Advise operator of owner/supervisor procedure for assisting ill or injury passengers.
12. Advise operator that factory-installed safety devices are not to be tampered with or removed.
13. Instruct operators and attendants that patrons are required to secure all loose articles such as keys, change, eye glasses, etc.
14. We recommend that every operator take a first aid course after their first season.

OPERATIONAL LOAD TESTING

Any operational test including load testing performed on a ride shall be completely nondestructive in nature. Overload testing exceeding the rated limits listed on the information plate, operation manual, field inspection guide or specifications sheet shall be deemed inappropriate. Where maximum total passenger weight is not readily available passenger capacity multiplied by 170 pounds per adult and/or 90 pounds per child may be used.

Nondestructive testing with inert loads can be accomplished only with special care as to placement of the load so that it is centered both vertically and horizontally as would be the load of the passenger it replaces. Extra seat reinforcement must be used to offset any load concentration created. Such tests shall be documented and certified as nondestructive by the person making the test and the agency requiring it. Results of all load tests shall be communicated to the factory upon completion by the Certifying Agency.

Conducting a nondestructive operational load test assures the testing agency only that it will carry a given load in a given way at a given moment and in no way assures future safety of the ride.

Conducting a destructive load or overload test also assures the testing agency that it will carry a given load in a given way at a given moment and in no way assures future safety of the ride. However, it also introduces the probability of inflicting serious irreparable damage to the ride that may or may not be apparent at the time of the test.

We consider inert load testing of any nature appropriate only for situations requiring experimental development of stress-strain testing during prototype development. A certificate of load test on the prototype and certification that each production ride met the design criteria when it was manufactured is available from the factory upon request.



MOTOR INSTALLATION and MAINTENANCE INFORMATION

Integral HP Motors

MOTOR MODEL NO. _____
INSTALLED BY _____
DATE _____

INITIAL INSPECTION and HANDLING

Upon receipt of the motor, check for carton damage. Note any signs of damage on appropriate shipper forms. After opening carton, look for concealed damage such as damaged conduit box, bent base or cracked castings. If concealed damage is found, immediately file claim with carrier. Verify that shaft turns by hand. While turning shaft check for unusual noises, scraping sounds, binding or tight spots. Single phase motors normally have a slight rubbing sound from the centrifugal switch mechanism.

Check the nameplate to verify that data conforms to specifications of motor ordered, and connection diagram agrees with lead labeling.

On large motors, an eyebolt is provided for lifting motor. The eyebolt is intended for lifting the motor *only* and must not be used to lift any other weight or attached equipment such as a pump or gearbox. Be sure eyebolt is tightened before lifting begins. Never exceed 15° angle with shank of eyebolt. Refer to NEMA Standard MG2-1977 (Safety Standard for Construction and Guide for Selection, Installation and use of Electric Motors and Generators) for additional information. If lifting equipment is used, do not touch overhead power lines. Stand clear to avoid injury if load drops.

SAFETY

High voltages and moving parts around motors and motor-driven equipment can cause serious or fatal injuries, so be careful when installing, operating and maintaining electrical equipment. Be familiar with and follow all local electrical and safety codes, as well as NEMA MG2-1977 (Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators), the National Electrical Code (NEC), and the Occupational Safety and Health Act (OSHA).

Copies of the National Electric Code may be ordered from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210, or contact your local government inspection agency. NEMA Standards (including MG2-1977) may be ordered from the National Electrical Manufacturers Association, 2101 L Street NW, Washington, DC 20037. Contact the U.S. Government Department of Labor for availability of OSHA requirements. Dayton publications may be requested from Dayton Electric Mfg. Co., 5959 W. Howard Street, Chicago, IL 60648.

(Continued)

SAFETY, Continued

Electrical — Motor must be securely and adequately grounded by wiring with a grounded, metal-clad raceway system, by using a separate ground bonding wire connected to bare metal on the motor frame, or other suitable means. Refer to NEC Article 250 (Grounding) for additional information. All wiring should be done by a qualified electrician.

Do not depend on a motor control device (motor starter, tripped manual protector, etc.) to ensure against unexpected motor start up. Always disconnect the power source before working on a motor or its connected load. If the power disconnect point is out of sight, lock it in the open position and tag to prevent unexpected application of power. Discharge all capacitors (power factor correction, motor start and motor run) by shunting across the terminals with a ten ohm insulated resistor.

Insulate all connections carefully to prevent grounding or short-circuits. Sharp edges on terminals require extra protection. For safety and to prevent entry of contaminants, re-install all conduit and terminal box covers. Do not force connections into the conduit box.

Thermal Protection — Use thermally protected motors or a motor starter incorporating thermal overload protection wherever required by safety regulations (including NEC) or Underwriters Laboratories Standards; or where overloading, jamming or other abnormal operating conditions may occur. Motors with automatic reset protectors (or motor starter thermal overload relays set for automatic reset) MUST NOT be used where automatic restarting of the motor could be hazardous. Where such a hazard exists, always use a MANUAL-RESET protector or motor starter overload relays set for manual reset. Applications where automatic restarting could be hazardous include compressors, conveyors, power tools, farm equipment and some fans and blowers. Under low temperature conditions, manual reset protectors may reset automatically, causing the motor to start unexpectedly. Always disconnect power before working on equipment where motor's protector (auto or manual) has tripped.

Mechanical — All moving and electrical parts must be guarded to prevent personal injury. Guard all propeller fans, exposed blowers, couplings, belts and sheaves, flywheels, etc. Keep fingers and foreign objects away from ventilation and other openings. Do not insert any object into the motor. Remove the shaft key before running the motor without a connected load. (Caution: Shaft keyway edges are sharp.) Be careful when touching the exterior of an operating motor — it may be hot enough to be painful or cause injury. This condition is normal for most motors when operated at rated load and voltage.

A brake must be used on overhauling loads. A motor on a gear reducer (including worm gears) used on a holding or overhauling application (such as a hoist or conveyor) should have a brake or other holding device. Do not depend on gear friction to hold the load; it may move unexpectedly, causing injury or damage. Overhauling or high inertia loads can result in motor overspeed. Means such as a clutch or brake must be provided to limit such overspeeding to brief periods and 4500 RPM maximum for 2 pole (3600 RPM) motors, 2250 RPM maximum for 4 pole (1800 RPM) motors, and 1800 RPM maximum for 6 pole (1200 RPM) motors.

For hazardous locations (explosive atmospheres), as defined by Article 500 of the NEC and local codes, an explosion-proof motor may be required. The nameplate on an explosion-proof motor will show a number (or code letters and number called a "T number") indicating the maximum surface temperature, under abnormal conditions, of a properly installed and connected motor. This number should be less than the ignition temperature of the hazardous material involved. Refer to both Article 500 of the NEC and your local governmental inspection agency or insurance company inspector for an explanation of "T numbers", and for guidance and detailed information on proper motor selection and protection.

LOCATION

Open dripproof motors are designed for use in dry, clean locations with access to an adequate supply of cooling air. Totally enclosed motors are intended for dirty, damp or oily locations. In hazardous locations, explosion-proof motors must be used. To prevent accidents, locate motor in a suitable (ventilated) enclosure, or guard all moving parts and ventilation openings. For outdoor installations, protect motor with a cover that does not block air flow to the motor.

Ambient temperature around the motor should not exceed 104° F (40° C). Minimum ambient temperature is -20° F (-29° C). If the words AIR-OVER are shown on nameplate, motor is designed for direct-drive fan and blower applications, mounted in air stream to receive proper cooling. Failure to locate an air-over motor in this manner will cause motor overheating and premature failure.

If the motor has been stored in a damp location for any length of time, dry it out before placing it in service. If an oven is used, temperature should not exceed 185° F (85° C).

POWER

Voltage, frequency and phase of the power supply must correspond to that shown on the motor nameplate. Low voltage can reduce performance and cause overheating, while high voltage will increase motor temperature and noise. Motor current may exceed nameplate value because of overloading or high voltage. Voltage 5% or more above rated nameplate value will cause motor current to increase, frequently above nameplate value.

Normally, Dayton motors can be operated at rated load with voltage variations as much as $\pm 10\%$ of rated. However, with low voltage, under conditions of inadequate wiring, heavy starting loads or low temperature the motor may not be able to start and accelerate load to full speed. 120/208 volt Y power systems may have operating voltages as low as 190 volts. For such systems, use a motor rated 200 or 208 volts, not motors rated 208-220/440 or 230/460 volts. Good installation practice requires adequate wiring and full rated voltage under all operating conditions.

On three phase systems, voltages on all three lines must be balanced as closely as possible. Line-to-line voltage unbalance greater than one percent will result in reduced starting and breakdown torque and motor speed, grossly increased heating and noise, and premature motor failure. Unbalanced transformer connections such as open delta will cause unbalanced voltages and motor problems. Single to three phase converters, unless carefully designed, often deliver unbalanced voltages. A poor connection anywhere in the system can cause voltage unbalance.

MOTOR CONTROL

Use of a motor starter, either manual or magnetic, incorporating thermal overload protection is advisable and usually required by electrical codes. Supply lines must have fuses to provide short circuit protection for the motor and controller. Time delay type fuses, with current rating selected to correspond to motor current, are preferred. An explosion-proof motor which includes overtemperature thermostats should be controlled by a magnetic starter to which the thermostats have been properly connected.

Carefully follow the control manufacturer's recommendations on heater selection or setting. If an existing controller is to be used with a replacement motor, new heaters may be required. Use the automatic reset provision of the overload relay only when unexpected restarting of the motor will not be hazardous (see SAFETY-Electrical). For three phase motors, always use a three-heater type control. Do not oversize heater elements to prevent nuisance tripping; instead, correct the cause of the tripping. Refer to NEC Article 430 (Motor Circuits and Controllers) and local electrical code requirements for motor control circuits and wiring.

MOUNTING

Motor must be securely fastened to a rigid, flat surface to prevent vibration and minimize noise. Adjustable motor bases and rails are often used for easy, accurate belt adjustment. For secure mounting, use high-quality bolts of the largest possible diameter. Before tightening bolts, make sure all four mounting pads of the base are in contact with mounting surface. Add shims as required to prevent possible bending or cracking of the motor base. When installing NEMA C-face or D-flange mounted motors, mounting surfaces must be clean and free from burrs. Disconnect power and check for proper seating and alignment by turning shaft manually.

WIRING

To connect motor for proper voltage and rotation, refer to connection diagram on nameplate or inside terminal/conduit box. If power factor correction capacitors are used for individual motor power factor correction, do not exceed maximum recommended value.

All aspects of the installation must conform to the requirements of the NEC, including Article 430 (Motor Circuits and Controllers), and all local codes. Wherever possible, each motor should be powered from a separate circuit of adequate capacity to keep voltage drop to a minimum during starting and running. Increase wire size where motor is located a distance from the power source. Wire size must be adequate to minimize voltage drop during starting and running. Refer to Tables A and B for suggested wire sizes. Portable cords, if used, should be as short as possible to

TABLE A — Minimum Wire Sizes for Three-Phase Motors

Motor HP	25 to 50 Feet			100 Feet			150 to 200 Feet		
	200V	230V	460V	200V	230V	460V	200V	230V	460V
1	14	14(16)*	14(18)*	10	12	14(18)*	8	10	14
1.5	12	14	14(18)*	10	10	14(16)*	6	8	14
2	12	12	14(18)*	8	10	14(16)*	6	6	12
3	10	12	14(18)*	8	8	14	4	6	12
5	8	10	14(16)*	6	8	14	2	4	10
7.5	8	8	14	4	6	12	2	2	8
10	6	8	12	4	4	10	1	2	8
15	4	6(4)*	10(8)*	2	4	10	2/0	1	6
20	2	4(2)*	8(6)*	1	2	8	2/0	1/0	6
25	1	4	8(6)*	1/0	2	8	4/0	2/0	4
30	2	3	6(4)*	1/0	1	6	4/0	3/0	4
40	1/0	1	6(2)*	2/0	1/0	6	300MCM	4/0	2
50	3/0	2/0	4	3/0	2/0	4	350MCM	250MCM	2
60	4/0	3/0	3	4/0	3/0	3	500MCM	350MCM	1
75	300MCM	250MCM	1	300MCM	250MCM	1	600MCM	400MCM	1/0
100	500MCM	350MCM	2/0	500MCM	350MCM	2/0	700MCM	600MCM	2/0

TABLE B — Minimum Wire Sizes for Single-Phase Motors

Motor HP	25 Feet		50 Feet		100 Feet		150 Feet		200 Feet	
	115V	230V	115V	230V	115V	230V	115V	230V	115V	230V
1	10	14(16)*	8	14	4	10	4	8	2	8
1.5	10	14(16)*	8	12	4	10	3	8	1	6
2	8	14	6	12	3	8	2	6	1/0	6
3	8	10	4	10	2	8	1/0	6	2/0	4
5	—	8	—	8	—	6	—	4	—	3
7.5	—	6	—	6	—	4	—	3	—	1
10	—	6(4)*	—	6(4)*	—	3	—	1	—	1/0

(-) Type S, SO, SJ, SJJ, etc. flexible cable wire sizes. See NEC Article 400 for ampacity. Note: Above wire sizes based on approximate 5% voltage drop during starting; copper conductors; and 75°C type TH, THW, RH, RHW, etc. insulation. For aluminum wire, increase two wire size steps minimum. See NEC Article 310 for ampacities of aluminum conductors and 60°C type RUW, T, etc. insulation.

START-UP

Before running a motor no-load, remove the shaft key. After connections are made, if possible run motor no-load to verify rotation and to check for unusual noises, etc. Check no-load current; it should be at or below nameplate, unless high or unbalanced voltage conditions exist.

Connect motor to load and run briefly. Again check for unusual noises and vibration and again check motor current. It should be close to nameplate, unless voltages are high or unbalanced, and should be balanced (three phase) within approximately 5%. If significantly unbalanced, check for unbalanced line voltages; small amounts of voltage unbalance can produce significant current unbalance.

Visually re-inspect the installation. Make sure that guards and other protective devices are securely in place. All covers and gaskets must be re-installed to minimize the entry of dirt and moisture.

MAINTENANCE

Before performing any maintenance, disconnect power and allow motor to come to a complete stop. Discharge capacitors for safety. Dirt accumulations can cause motor overheating and a fire hazard. Remove dirt accumulations from open-type motors, especially in and around vent openings, by vacuuming. Enclosed motors can be cleaned with an air jet; use eye protection. Exercise caution with solvents; some solvents may attack motor insulation, finish or bearing lubricants; some are highly flammable. If solvents are used, make sure area is well ventilated.

Periodically inspect the installation. Check for dirt accumulations; unusual noises or vibration; overheating; worn or loose couplings, sheaves and belts; high motor current; poor wiring or overheating connections; loose mounting bolts or guards; and worn motor starter contacts.

Dayton ball-bearing motors without lubrication provision do not require periodic relubrication. Where motor has provision for bearing lubrication, lubricate as follows:

1. After stopping motor and disconnecting power, remove fan cover (TEFC only) and lower drain or vent plug.
2. Clean area around upper fill hole and remove plug. Install a 1/8" pipe thread lube fitting.
3. Using a low pressure grease gun, pump new grease into motor until it appears at the lower drain hole.
4. Run motor for several minutes to discharge excess grease. Shut motor off, replace upper and lower plugs, and fan cover.

TABLE D — Suggested Regreasing Intervals

Type of Service	Motor HP at 1800 RPM Max.		
	Under 50	50 to 100	Over 100
Infrequent operation or light duty in clean atmosphere	1-2 Yrs.	1-2 Yrs.	1 Yr.
8 to 16 hours per day in clean, relatively dry atmosphere	1 Yr.	1 Yr.	6 Mos.
12 to 24 hours per day heavy duty use, or if moisture is present	1 Yr.	6 Mos.	3 Mos.
Heavy duty use in dirty, dusty locations; high ambients; moisture-laden atmosphere; constant vibration	4 Mos.	3 Mos.	3 Mos.

Note 1: Motors operating faster than 1800 RPM should be relubricated on a more frequent maintenance schedule. Use a reputable brand lithium or synthetic-base grease intended for electric motor ball bearings. Keep grease container covered.

Note 2: For motors used on food or drug handling applications, select a grease acceptable to the Food and Drug Administration, and similar governing bodies.

TABLE C — Minimum Sheave Diameters (NEMA MG1-14.42)

Motor HP	Conventional A, B, C, D, E Min. Pitch Dia. Sheave width less than $(2(N-W)-0.25)$ inches				Narrow 3V, 5V, 8V Min. Outside Dia. Sheave width less than $(N-W)$ inches			
	Motor Synchronous Speed-RPM				Motor Synchronous Speed-RPM			
	3600	1800	1200	900	3600	1800	1200	900
1	2.2	2.2	2.4	2.4	2.2	2.2	2.4	2.4
1.5	2.2	2.4	2.4	2.4	2.2	2.4	2.4	2.4
2	2.4	2.4	2.4	3.0	2.4	2.4	2.4	3.0
3	2.4	2.4	3.0	3.0	2.4	2.4	3.0	3.0
5	2.6	3.0	3.0	3.8	2.4	3.0	3.0	3.8
7.5	3.0	3.0	3.8	4.4	3.0	3.0	3.8	4.4
10	3.0	3.8	4.4	4.6	3.0	3.8	4.4	4.4
15	3.8	4.4	4.6	5.4	3.8	4.4	4.4	5.2
20	4.4	4.6	5.4	6.0	4.4	4.4	5.2	6.0
25	4.4	5.0	6.0	6.8	4.4	4.4	6.0	6.8
30	·	5.4	6.8	6.8	·	5.2	6.8	6.8
40	·	6.0	6.8	8.2	·	6.0	6.8	8.2
50	·	6.8	8.2	9.0	·	6.8	8.2	8.4
60	·	7.4	9.0	10.0	·	7.4	8.0	10.0
75	·	9.0	10.0	10.5	·	8.6	10.0	9.5
100	·	10.0	11.0	12.5	·	8.6	10.0	12.0

[·] Speed excessive for required sheave dia. Note: $(N-W)$ is approx. usable shaft length.

minimize voltage drop. Long or inadequately sized cords, especially on hard starting loads, can cause motor failure. Insulate and protect motor lead connections to prevent cut-through from sharp edges and vibration. Tape wire nuts to prevent loosening. All electrical connections in system must be secure to prevent voltage drop and localized heating.

Determine direction of rotation before connecting driven equipment to prevent damage. Remove shaft key if motor is to be operated at no-load. On three phase motors, interchange any two line leads (not motor leads) to reverse rotation. On air compressors, rotation of flywheel should direct air towards the cylinders. Look for rotational arrow on flywheel.

All motors must be securely and adequately grounded by wiring with a grounded, metal-clad raceway system, using a separate ground bond wire connected to bare metal on the motor frame, or other suitable means. Refer to NEC Article 250 (Grounding) for additional information.

Explosion-proof motors incorporating overtemperature thermostats should be controlled with a magnetic starter. The thermostat circuit must be wired in series with the holding coil circuit, as shown on tag or nameplate on motor, to remove power from the starter coil if motor overheats.

COUPLING

Belt drive sheaves must be in line. Use a straight-edge to check. In general, the closer sheaves are mounted to motor bearing, the less the bearing load. The inner edge of sheave rim should be as close to endshield as possible, but not closer than shoulder on shaft. The center point of belt or system of V-belts must not be beyond end of motor shaft. See Table C for minimum sheave diameters. For devices other than sheaves, refer to NEMA MG1-14.07B (Motor and Generator Standard) for multipliers.

Do not strike shaft with hammer or other tool. Do not force sheave or coupling on shaft; forcing can cause bearing damage. Belt tension should be sufficient to prevent slippage; approximately 0.5 inch deflection at mid-span with normal thumb pressure usually is sufficient. Avoid excessive belt tension; overtightening will shorten belt life and damage bearings. Refer to Dayton Publication 5S1244 (V-Belt Drive Systems) for more information.

On direct-drive installation, carefully check shaft and coupling alignment. Shim as required. Do not depend on a flexible coupling to compensate for misalignment.

MOTOR TROUBLE GUIDE, Continued

TROUBLE	CAUSE	WHAT TO DO
MOTOR OVERHEATS WHILE RUNNING UNDER LOAD	Overload	Reduce load; increase motor size; belts may be too tight
	Dirt preventing ventilation	Clean motor
	Motor may have one phase open (3-phase motors)	Check to make sure that all leads are well connected and a fuse is not blown
	Unbalanced terminal voltage (3-phase motors)	Check for faulty connections and transformers. Excessive single phase loads
	Faulty connection	Clean, tighten or replace
	High or low voltage	Check voltage at motor, should not be more than 10% above or below rated
	Defective motor	Repair or replace

DAYTON LIMITED WARRANTY

LIMITED WARRANTY. Dayton electric motors are warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use (rental use excluded), for one year after date of purchase. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be repaired or replaced at Dayton's option. For warranty claim procedures, see "Prompt Disposition" below. This warranty gives purchasers specific legal rights, and purchasers may also have other rights which vary from state to state.

DISCLAIMER. Dayton has made a diligent effort to describe the motors herein accurately; however, such descriptions are for the sole purpose of identification, and do not express or imply a warranty that the motors are merchantable, or fit for a particular purpose, or that the motors will necessarily conform to the descriptions. Except as provided below, no warranty or affirmation of fact, express or implied, other than as stated in "LIMITED WARRANTY" above is made or authorized by Dayton, and Dayton's liability in all events is limited to the purchase price paid.

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PROMPT DISPOSITION. Dayton will make a good faith effort for prompt correction or other adjustment with respect to any motor which proves to be defective within warranty. For any motor believed to be defective within warranty, first write or call dealer from whom motor was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date and number of dealer's invoice, and describing the nature of the defect. If product was damaged in transit to you, file claim with carrier.

DAYTON ELECTRIC MFG. CO.

GENERAL OFFICE: 5959 HOWARD ST., CHICAGO 60648

MOTOR TROUBLE GUIDE

The purpose of this guide is to suggest common answers to electric motor problems. The information is not all-inclusive and does not necessarily apply in all cases. When unusual operating conditions, repetitive failures, or other problems occur, consult an electric motor service firm for assistance.

TROUBLE	CAUSE	WHAT TO DO
MOTOR FAILS TO START	Blown fuses	Replace with time-delay fuses. Check for grounded winding
	Low voltage	Inadequate wiring or extension cords. Low system voltage
	Improper line connections	Check connections against diagram supplied with motor
	Overload (thermal protector) tripped	Check and reset overload relay in starter. Check heater rating against motor nameplate current rating. Check motor load. If motor has manual reset thermal protector, check if tripped
	Motor may be overloaded	Reduce load; increase motor size
	If three-phase, one phase may be open	Indicated by humming sound. Check lines for open phase. Check voltage with motor disconnected, one fuse blown
	Defective motor or starter	Repair or replace
MOTOR STALLS	Overloaded motor	Reduce load or increase motor size
	Low motor voltage	See that nameplate voltage is maintained
MOTOR DOES NOT COME UP TO SPEED	Not applied properly	Consult motor service firm for proper type. Use larger motor
	Voltage too low at motor terminals due to line drop	Use higher voltage tap on transformer terminals, increase wire size. Check for poor connections
	Starting load too high	Check load motor is carrying at start
MOTOR TAKES TOO LONG TO ACCELERATE	Excess loading; tight belts. High inertia load	Reduce load; increase motor size. Adjust belts
	Inadequate wiring	Increase wire size. Check for poor connections
	Applied voltage too low	Reconnect to a higher tap. Increase wire size. Check for poor connections
	Defective motor	Repair or replace
	Inadequate starting torque	Replace with larger motor
MOTOR VIBRATES OR IS EXCESSIVELY NOISY	Motor misaligned	Realign
	Three-phase motor running single phase	Check for open circuit, blown fuses or unbalanced voltages
	High or unbalanced voltages	Check wiring connections, transformer
	Worn, damaged, dirty or overloaded bearings	Replace; check loading and alignment
	Loose sheave or coupling	Tighten set screw(s); replace